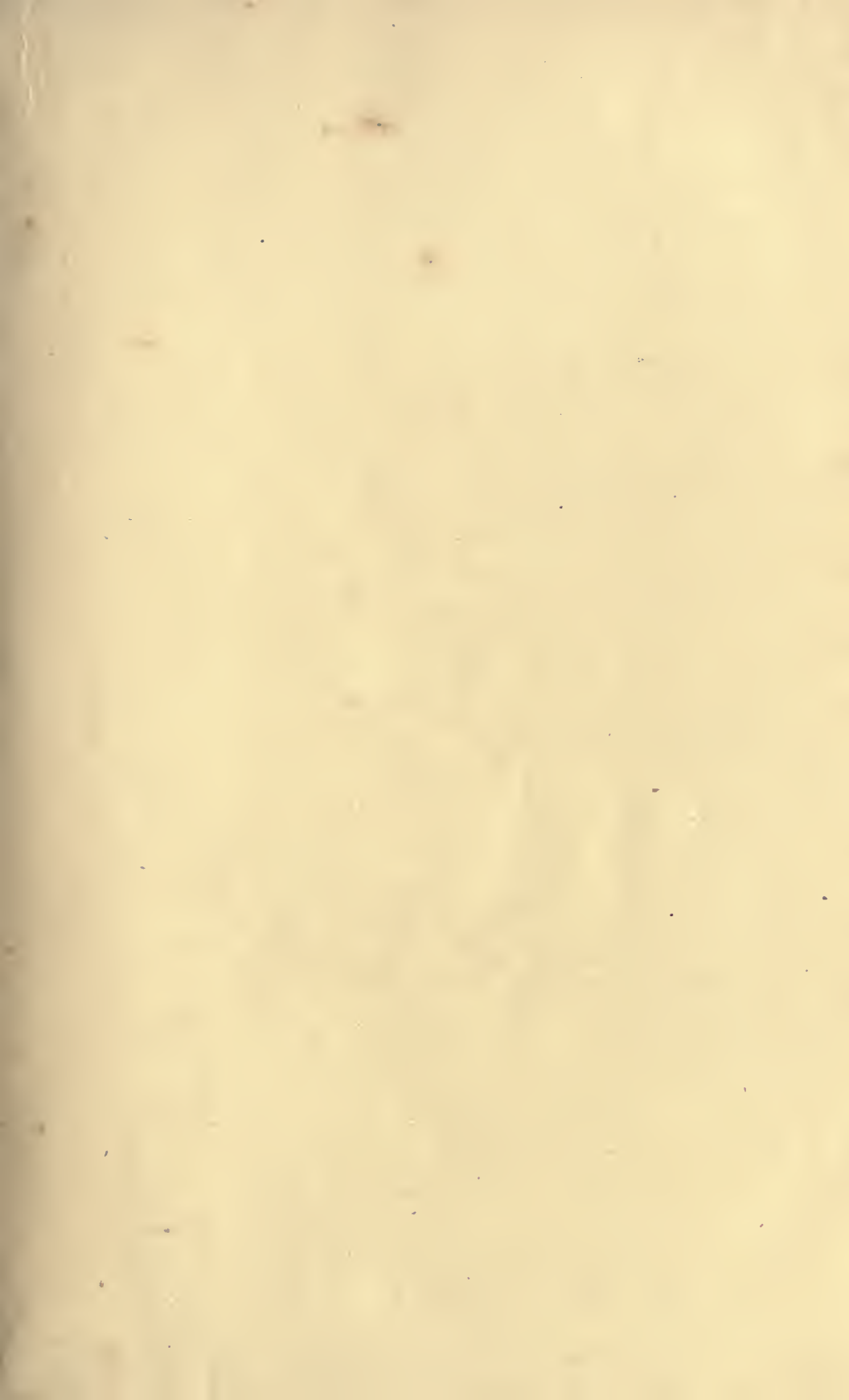




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A Book for the Farmer, Mechanic, and Working Men of all Trades and Occupations; the Stock Raiser, the Household, and every Family who wants to Save Money; a Book of Solid Worth and Practical Utility, containing a Remedy for every Ill, a Solution for every Difficulty, and a Method for every Emergency.

BY DANIEL R. SHAFER, A.M.

Author of "Foundations of Success and Laws of Trade," "Sexual Philosophy," Etc.

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PREFACE.

For years such a book as the 'HOUSEHOLD AND FARMERS CYCLOPÆDIA' has been needed by the public, and especially by the AMERICAN FARMER, but up to this time nothing has appeared to supply the want. A glance at the within pages will satisfy any one of the great importance of such a demand, and the only wonder is, that such a book as the "CYCLOPÆDIA" has never before been published, for its value cannot be estimated by dollars and cents.

The design was, and is, to produce a work of substantial and enduring value, and of universal application and use. To sum up, then, this book is offered as one containing more that has been proven by long use to be of value, more that is necessary for every FARMER and MECHANIC to know, and more of promising novelty, than any other that has ever been presented to the Farmers and Mechanics of America. It is complete in every particular in which it is possible for such a book to be complete; and, in addition to this, it is sufficiently suggestive in many other respects to induce its readers to read more, to think more, to experiment more, and to become more intelligent and more successful in the management of their business, as well as really happier and wiser men and women.

In its editing and compiling great care has been taken to avoid all difficult, technical and scientific terms, and to make the language so simple, as to insure its value as a useful and reliable work for every day reference.

To compile such a work as this, is an amount of labor that one not familiar with such work would hardly believe, or even imagine. Thousands of works have been examined, public libraries and private book-cases overhauled, and the writings of noted writers, both in this country and Europe, have been carefully compared, and selections made from the best. Where selections of a reliable nature could not be found, original articles by the most scientific men in the country were obtained, thus

giving "FACTS FOR THE PEOPLE" such character, prominence and reliability, as sure to be all that is claimed for it.

This work is intended especially for the use of those practical working men and women—the FARMER, MECHANIC, HOUSEWIFE, the rich and the poor—who are willing to believe that, while they have learned much from experience, it is not impossible that others may have learned something, too—something that it may benefit them to learn also, and who are liberal enough to see that all the truth and value of a fact is not destroyed by its being printed.

The editor is under great obligations to PROF. C. V. RILEY, State Entomologist of Missouri, for permission to cull information on injurious Insects, from his valuable reports; to PROF. TOWNSEND GLOVER, Entomologist, and HON. FRED. WATTS, Commissioner of the Agricultural Department, Washington, D. C.; HON. HORACE CAPRON, Ex-Commissioner of Agriculture; SETH GREEN, the noted Fish Breeder; HON. GEO. HUSSMAN, the well-known Grape Grower; PROF. JOHN H. TICE, known throughout the world as "Old Almanac," and hundreds of others, whose names will be found on the pages of the book.

We leave the work to the judgment of a generous public, believing, if there is merit in its pages, that the same will be appreciated.

D. R. S.

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HOUSEHOLD AND FARMERS' CYCLOPEDIA.

THE HORSE-KEEPERS' GUIDE.

HORSE, External Form, as Indicated by Points.—By horsemen in general this is considered under certain subdivisions, which are called "points," and which are severally represented by figures in the following outline :

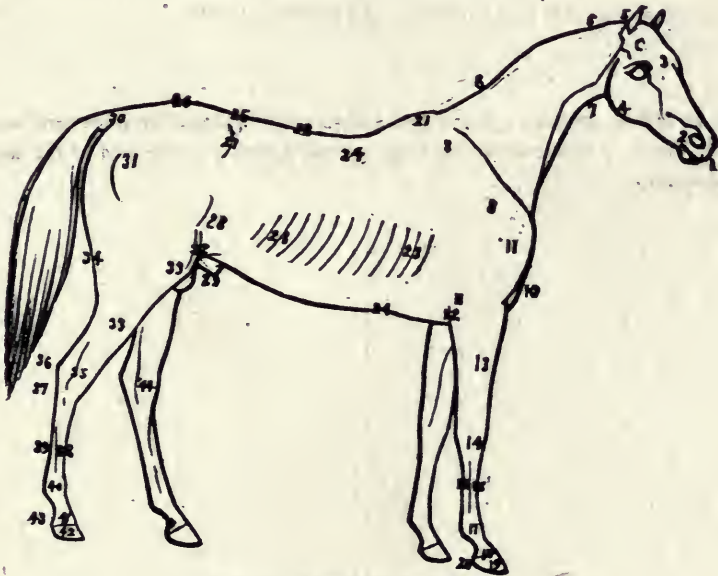


FIG. I.—POINTS OF THE HORSE.

HEAD.

1. Muzzle.
2. Nostril.
3. Forehead.
4. Jaw.
5. Poll.

NECK.

6. 6. Crest.
7. Thropple or windpipe.

FORE-QUARTER.

8. 8. Shoulder-blade.
9. Point of shoulder.
10. Bosom or breast.
11. 11. True-arm.
12. Elbow.
13. Forearm (arm).
14. Knee.
15. Cannon-bone.

16. Back sinew.
17. Fetlock or pastern-joint.
18. Coronet.
19. Hoof or foot.
20. Heel.

BODY OR MIDDLEPIECE.

21. Withers.
22. Back.
- 23, 23. Ribs (forming together the barrel or chest).
- 24, 24. The circumference of the chest at this point, called the girth.
25. The loins.
26. The croup.
27. The hip.
28. The flank.

29. The sheath.
30. The root of the dock or tail.

THE HIND-QUARTER.

31. The hip-joint, round or whirl-bone.
32. The stifle-joint.
- 33, 33. Lower thigh or gaskin.
34. The quarters.
35. The hock.
36. The point of the hock.
37. The curb place.
38. The cannon-bone.
39. The back sinew.
40. Pastern or fetlock-joint.
41. Coronet.
42. Foot or hoof.
43. Heel.
44. Spavin-place.

The relative proportions of, and exact shape desirable in each of these points, vary considerably in the several breeds. Thus, when speed and activity are essential, an oblique shoulder-blade is a *sine qua non*; while for heavy harness it can scarcely be too upright, enabling the pressure of the collar to be more easily borne, and allowing the animal to exert his strength at right angles to its long axis. Many men are good judges of hunters and hacks, but are almost wholly ignorant of the qualities desirable in a coach or cart-horse. There are some elements, however, which are wanted in any horse, such as big hocks and knees, flat legs with large sinews, open jaws and full nostrils. It will, therefore, be necessary to describe the points of each breed; but we shall here give those which are always to be attended to as being of importance in any kind, whether used for racing or hunting, for the road or for agricultural purposes.

Taking first the Head:—It should be known that the volume of brain contained within it determines the courage and other mental qualities of the individual. Now as, *ceteris paribus*, size is power, so without a wide forehead (which part marks the seat of the brain), you cannot expect a full development of those faculties known as courage, tractability, good temper, etc. The size of the muzzle is partly regarded as an element of beauty, and partly as a sign of high breeding. Hence, in the cart-horse, a coarse jaw and thick muzzle are not regarded. A large and patent nostril cannot be dispensed with in horses intended for fast work, and should be desired even in the cart-horse, for in drawing heavy loads on

a hot day, his breathing may be rendered almost as laborious as that of the highly-tasked race-horse or hunter. So also with the jaw; if there is not ample width between the two sides for the development and play of the larynx and windpipe, the wind is sure to be affected, and, in addition, the head cannot be nicely bent on the neck. A defect in this last point is the usual cause of that straight and inelegant setting on of the head which is so common, and which the practiced horseman avoids, as alike unsightly and prejudicial to the wind and the mouth; for a horse which *cannot* give way to the pressure of the bit is sure to become dull in his mouth, and therefore unpleasant to ride or drive. The eye is to be examined with a twofold purpose—firstly, as an index to the temper, the nature of which is marked by the expression of this organ; and secondly, in reference to its present state of soundness, and the probability of its continuing healthy. A full and clear eye, with soft, gazelle-like expression, is scarcely ever associated with a bad temper, and will most frequently continue sound, if the management of the horse to which it belongs, is proper in itself. The ear should be of medium size, not too small, nor too large, nor should it be lopped, though many good lop-eared horses have been known, and some very superior breeds, like that of the celebrated Melbourne, are notorious for this defect.

The Neck should be of moderate length, all beyond a certain dimension being waste, and even a moderate-sized head at the end of an extremely long lever being too much for the muscles to support. It should come out full and muscular, with a sweep between the withers and the

bosom, and should gradually diminish till it runs into the head, with an elegant bend just behind the ear. A very narrow throat suddenly bent at the upper part, marked as the thropple, is apt to be connected with roaring, and on that account is objected to by horsemen.

In the Fore-quarter there are several points to be attentively examined, and among these, the shoulder is regarded as of most consequence, when the horse under consideration is intended for the saddle. It is evident that unless there is length of the blade, and also of the true arm, there cannot be a full surface for the attachment and play of the muscles, nor can there be the same amount of spring to take off the jar which follows each foot-fall. The straighter the angle formed by the long axis of each of these bones, the less spring there will be. So, also, if the angle is not sufficient, the muscles of the shoulder-blade will not thrust forward the true arm, nor will the latter be sufficiently clothed with muscles (without being loaded) to act on the fore-arm, commonly known by the horseman as the arm. Hence it is found that with an upright shoulder not only is the stride in all the paces short and the action stumpy, but there is not that elastic movement which enables the horse to carry his body along rapidly and evenly, without rising alternately behind and before, and thereby jarring himself or his rider. On the other hand, the upright shoulder, loaded with a thick mass of muscles, is useful in the cart-horse, and to a certain extent also in the carriage-horse, in both of which the pressure of the collar requires a steady and comparatively motionless surface to bear it. It follows, therefore, that horses intended to have high, and at the same time forward action, should have oblique shoulders, for without them they will almost to a certainty either have very mean and low action, or, if they do bend their knees, they will put their feet down again nearly on the same place as they took them from, which peculiarity we so often see displayed in the cart breed, or those nearly allied to it. This is one of the most important uses of the obliquity of the shoulder-blade as it seems to us, and one which has not been generally admitted by writers on this branch of the subject, though all are ready to admit

that in some way or other this formation is essential to good action. Another reason for the obliquity of the shoulder in the riding-horse, is that without it the saddle is not kept back in its proper place, and the horseman's weight being thus thrown too forward, the action of the fore-quarter is impeded. Mere obliquity, however, is not sufficient for this purpose, for without a proper development of muscle the blade itself will not keep the saddle in its place. If, therefore, there is a hollow just behind the top of the blade, even if this is slanting enough, you must expect the saddle to slip forward, and should, in all doubtful cases, be careful to put one on before concluding a purchase. The point of the shoulder should be well developed, but not showing any rough protuberances, which are equally objectionable with a flat or ill-developed point. The length of the true arm is mainly dependent upon that of the blade; but sometimes, when this is oblique enough, the true arm is short and upright, and the elbow stands under, or only a little behind the shoulder point. This is a very faulty conformation, and is seldom attended with good action. The chief defect in the elbow is seen when it turns inwards and rubs so closely against the ribs that the finger can hardly be insinuated between them and it. Here the elbow is said to be tied, or confined, and the horse is very apt to turn his toes out; while the opposite formation is indicated by turned-in, or "pigeon" toes, and turned-out elbows, frequently accompanying long-standing rheumatism of the shoulders. It does sometimes happen, however, that the toes are turned in or out without affecting the elbow, but this is an exception to the rule. A long and muscular fore-arm is a sure accompaniment of strong and sweeping action, and should be carefully prized; in other respects there is little to be noted here. Next comes the knee, which should be broad, and when looked at from the front should be much wider than the limb above and below. It should taper off backwards to a comparatively thin edge, and should have a good development of the pisiform bone, which projects backwards at its upper part. The leg, immediately below the knee, should be as large as any other part, and not "tied in" there, which indicates a weakness of this

part. A bending of the knee backwards is called a "calf-knee," and is not objected to in cart-horses, in which it is by no means uncommon; but it is very apt to lead to strains of this joint in the race-horse or hunter. A knee naturally bending somewhat forward is much preferred by good judges, though, when it is the result of over-work, it is almost equally to be avoided with the calf-knee. Flat, and at the same time large cannon-bones, without gumminess, are of great importance, and if attended with a full-sized suspensory ligament, and with strong, clean, and free back sinews, the leg is to be considered faultless. The fetlock joint should be of good size and clean, whilst the pasterns should form an angle with the ground of between forty-five and sixty degrees. Lastly, the foot should be well formed, but the construction of this part being hereafter more fully described, we shall omit its consideration here.

In the **Middlepiece** the withers come first under notice. It is usual to desire them high and thin, but they are very commonly too much developed, and if the bony processes stand up like the edge of a razor, without muscle on them, they are to be regarded as objectionable rather than otherwise. The inexperienced horseman is apt to consider the existence of high withers as a sure sign that the saddle will be carried well back, but there are some horses whose withers are the greatest annoyance to the rider, for having upright and short shoulder-blades, together with high withers, the saddle rides forward upon the latter, and chafes them in spite of all the padding which can be introduced. In looking at this point, we believe the purchaser should almost entirely disregard it, excepting to take care that it is not too high for the formation and position of the shoulder-blades. If these are long, and therefore slanting, and especially if in addition to a proper position of the bones they are furnished with plenty of muscle, the withers may be disregarded, and the action may be expected to be good, even if they are so low as to show no rise between the neck and the back.

The volume of the chest is the measure not only of the capacity of the lungs, but of that of the large organs of digestion. Hence, unless there is a middlepiece of

proper size, the wind is seldom good, and the stamina of the individual will scarcely ever be sufficient to bear hard work. But there is a limit to the development of this part in those breeds which are required to move with much velocity, where weight is a great object; and if the body of the race-horse or hunter was as heavy as that of the dray-horse, the speed would be greatly reduced, and the legs would give way during the first severe gallop. So, also, a wide chest interferes with the free and rapid action of the shoulders and arms as they glide on the ribs; and an open bosom is almost always fatal to high speed. In the race-horse and hunter, therefore, capacity of chest must be obtained by depth rather than width; while in the cart-horse, a wide chest and a frame roomy in all directions is desired, so as to give good wind, and, at the same time, enable the animal to keep up his flesh while working eight or nine hours per day. For light, quick draught, a formation intermediate between the two is the proper one; the large frame of the cart-horse being too heavy for the legs to bear at a fast pace, and leading to their rapid destruction in trotting over our modern hard roads. The capacity of the lungs is marked by the size of the chest at the girth; but the stamina will depend upon the depth of the back ribs, which should be especially attended to.

A **short Back**, with plenty of ground covered nevertheless, is the desideratum of every practised horseman. Unless the measurement from the shoulder-point to the back of the quarters is somewhat greater than the height of the withers, the action is confined, especially in the gallop, for the hind legs cannot be brought sufficiently forward on account of the interference of the fore-quarter; and, indeed, from the want of play in the back, they are generally too much crippled in that respect. A horse "short above and long below" is the perfection of shape in this particular, but he is not very commonly met with. Where length below is seen, there is generally too much space between the last rib and the hip, while on the other hand coupled with a short back we too often see the legs all "jumped up together," and the action short and stumpy. Next to these points in the middlepiece it is important to pay atten-

tion to the upper line of the back, which should bend down a little behind the withers, and then swell out very gently to the junction with the loins, which can hardly be too wide and muscular. The inexperienced eye will often be deceived by the hips, for if these are narrow the muscles rise above them, and make the loin and back look stronger than they really are, the contrary being the case where the hips are wide and ragged. This latter formation; though not so elegant as the level hip, is prized by the man who wishes to be carried well to hounds, and he will jump at a horse which would be passed over with contempt by the tyro as "a great raw-boned brute." A slightly arched loin is essential to the power of carrying weight; a much arched, or "hog" back, is almost sure to give uneasy action from its want of elasticity.

In examining the Hindquarter, so much depends upon the breed, and the purposes to which the animal is to be put, that only a few general remarks can be given. Thus, for high speed, there should be plenty of length in the two bones which unite at the stifle-joint, without which the stride must be more or less limited in extent. The exact position of the hip-joint not being easily detected, the tyro has some difficulty in estimating the length from it to the stifle-joint, but he can readily measure the length from the root of the tail, either with his eye or with a tape, if he cannot depend upon his organ of sight. In a flat outline this will come to twenty-four inches in a horse of fifteen hands three inches, but measured round the surface it will be two inches more. Again, the lower thigh or gaskin should be of about the same length; but if measured from the stifle to the point of the hock it will be fully twenty-eight inches in a well-made horse of high breeding. These measurements, however, will be much greater in proportion than those of the cart-horse, who requires strength before all things, and whose stride is of no consequence whatever. In him the length of the upper or true thigh is generally as great as that of the thoroughbred, but the lower thigh is much shorter, and the horse stands with a much straighter hind leg, and consequently with his hocks having a very

slight angle. Muscular quarters and gaskins are desirable in all breeds; for without strong propellers, no kind of work to which the horse is put can be duly performed. The judge of a horse generally likes to look at the quarters behind, so as to get a full view of their volume, and unless they come close together, and leave no hollow below in the anus, he suspects that there is a want of constitution, and rejects the animal on that account. But not only are muscles of full size required, but there must be strong joints to bear the strain which these exert, and one of the most important of all the points of the horse is the hock. This should be of good size, but clean and flat, without any gumminess or thoroughpins, and with a good clean point standing clear of the rest of the joint; the "curby place" and the situation of spavin should be free from enlargement; but to detect these diseases a considerable amount of practice is required. Lastly, the hocks should be well let down, which depends upon the length of the thigh, and ensures a short cannon bone. The pasterns and feet should be formed in correspondence with those of the fore extremity, to which we have already alluded.

Such are the recognized points to be desired in the horse; but in spite of the general opinion of good judges being in favor of them, as we have described, no one can predicate with certainty that a horse possessing them all in perfection, will have a corresponding degree of action out of doors. No one who has bought many horses will be content with an inspection in the stable, even if the light is as good as that of the open air, for he well knows that there is often a vast difference between the estimate of the value of a horse which he forms indoors and out. Much of this depends upon the temper of the individual, for if he is dull and heavy, he will not "make a good show," though still he may be capable of being sufficiently excited at times, and many such horses are invaluable racers. Independently, however, of this element, it will be sometimes found that the frame which looks nearly perfectly symmetrical while at rest, becomes awkward and comparatively unsightly while in motion; and the horse which is expected to move well will often be sent

back to his stall with "That will do, thank you," after a single performance.

HORSE, Proportions of the Various Points.—The proportions of the component parts of the horse, as we have already remarked, vary a good deal in the different breeds. The following, how-

ever, may be taken as the most perfect; but they refer especially to the racer, hunter and hack, as well as to the lighter and more blood-like harness horses, and must not be strictly applied to the draught-horse in any of his varieties:

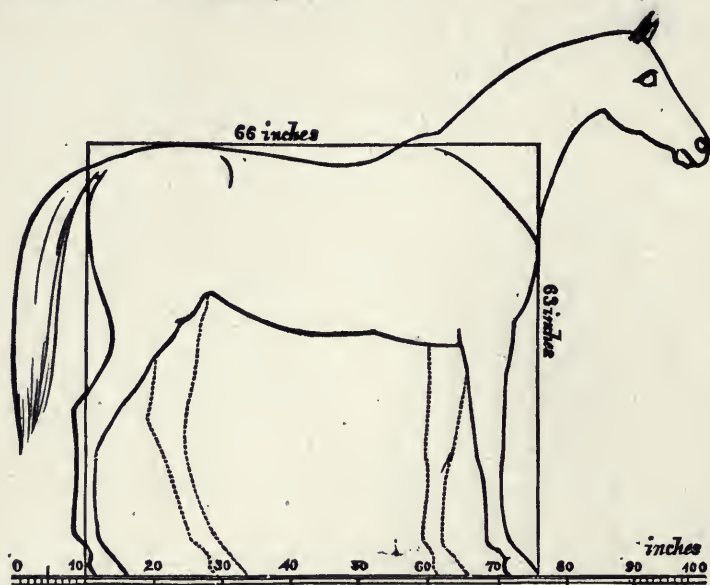


FIG. 2.

	Inches.		Inches.
Height at withers and croup, - - -	63	Width across the forehead, - - -	9½
Length from shoulder-point to quarter, -	66	From the withers to the hip, - - -	22
From the lowest part of the chest to the ground, - - -	36	From the stifle to the point of the hock, in the attitude shown in the plan, - -	28
From the elbow-point to the ground, - -	39	From the root of tail to stifle-joint, - -	26
From the withers to the pole, just behind the ears, in a straight line, - - -	30	From the point of the hock to the ground, -	22½
The same measured along the crest, - -	32	Length of arm from the elbow to the pisiform-bone, - - - - -	19½
Length of head, - - - - -	22	From the pisiform-bone to the ground, -	19½

Girth varies from 76 to 79.

Circumference of fore cannon-bone, 7½, 8, 8, 8, 8½ and 9 inches.

Circumference of arm just below the elbow, 16½ to 18 inches.

This scale is drawn in inches, and, in the outline, the horse is supposed to be fifteen hands three inches, or sixty-three inches high. The measurements are the average of those carefully taken from six horses considered to be perfect of symmetry. Two of these were celebrated stallions, two thoroughbred hunters, and two chargers of great value.

The scale which we have given differs in many particulars, though only slightly, from that which is usually found in treatises on the horse; but we have preferred

trusting to nature herself rather than to the observations of previous writers, which may be consulted by the reader at any time.

HORSE, Maturity.—The horse completes his dentition at five years old, when he may be said to be mature. At eight or nine years the lower teeth lose their marks or black concavities, after which there is no reliable evidence of age, which can, however, be tolerably accurately guessed at from the length of the front teeth or nippers, and from the gen-

eral appearance of the horse, especially about the eyes, as will be hereafter shown.

Mares are very commonly allowed to breed in their third year, being put to the horse at two years old. They often, however, come "in season" as yearlings, and many would then breed if allowed to be covered. It is found by experience that the foal robs the dam of some of the nourishment which is destined by nature to develop the maternal frame, and hence the young mare is injured in size and substance if she breeds before she has come very near maturity.

HORSE, Age, Average.—The average age of the horse, when allowed to live without the risk of accidents and disease which he incurs in his usual work, is about twenty-five years. Instances of greater longevity are recorded on good authority, and there is reason to believe that occasionally he has reached to thirty-five or even forty years, but these are rare exceptions, and there are few which live beyond the twenty-eighth year, while a large proportion die before the twenty-fifth. Stallions are over-fed and under-exercised in proportion, so that it is no wonder they become diseased, and seldom die from old age; but brood-mares are not so mismanaged, and it is found that they become quite worn out soon after their twentieth year; and even if allowed to live they waste away and die by degrees, generally somewhere between their twenty-third and twenty-eighth year.

HORSE, Moulting Periodical.—The horse sheds his coat once a year in all countries, and in our climate a second half-moult is performed in the autumn, when the summer short coat is partially shed. This second change consists, however, chiefly in a growth of the already existing hairs, which become coarser and longer, especially about the legs and under-parts of the body. At the same time the coat loses its gloss, and the color is less rich, blacks becoming rusty brown, and bays more yellow or sandy-colored than before. The hair of the mane and tail is constantly in a state of growth, and is not shed periodically.

HORSE, Development Mental.—In mental development the horse ranks below the dog, but he is capable of a considerable degree of education, though in coun-

tries where he is kept constantly confined he does not appear to great advantage in this respect. That he may be made to understand what is said to him is clear enough from the mode of managing farm horses, which are all taught to obey the voice. I have on one occasion seen a circus horse walk, trot and gallop at the word of command, and change his paces on the instant; but this feat I have never known performed by any other exhibitor, nor do I think it would easily be imitated. It requires a high order of intellect to distinguish between the three paces and change them on the instant, and if I had not myself witnessed the performance on two several occasions I should scarcely have credited it. The brain of this animal does not require much rest by sleep, and four or five hours in quiet are sufficient to keep him in health if he is not very hard worked. He readily sleeps standing, and some individuals never lie down; but this habit of sleeping standing should not be encouraged, as it greatly distresses the legs, and tends to produce fever of the feet, or some other mischief in the lower extremities.

HORSE, Stomach, Small.—One of the greatest peculiarities in the structure of the horse is the small size of his stomach, which is also of a very simple nature. He is likewise without a gall-bladder, showing that the digestion must be continuous and not interrupted by distinct intervals, as in the ruminants and carnivora. Nature has thus framed this animal, in order that he may be at all times able to exert his utmost speed, which he could not do with the mass of provender in his stomach which is carried by the cow or sheep. The same provision is shown in the udder of the mare, which is not larger than that of the goat or sheep.

HORSES, Breeding Mares, best kind of.—*First:* Size, symmetry, and soundness are mostly to be regarded in the mare—blood from the sire, beauty from the dam, is the golden rule. *Second:* She should have a roomy frame, hips somewhat sloping, a little more than the average length, wide-chested, deep in the girth, quarters strong and well let down, hocks wide apart, wide and deep in the pelvis. *Third:* In temper she should be gentle, courageous, free from all irritability and viciousness. *Fourth:* Previous to

putting her to the horse, she should be brought into the most perfect state of health, not over-fed, or loaded with fat, or in a pampered state, but by judicious exercise and an abundance of nutritious food and grooming, she should be in the very best condition. *Fifth:* During gestation she should have generous and nourishing, but not heating diet. For the first three or four months she may be worked moderately, and even to within a few weeks of her foaling she may do light work with advantage to her system.

HORSES, Feeding, directions for.—With regard to mere farm-horses, it is usually the habit to feed them entirely on hay or cut straw, with now and then a mash, giving them little or no oats or corn. It is certain, however, that this is a mistake. That the value of the work which the horse can do, and of the horse himself, arising from his improved condition and increased endurance, will be materially increased by the diminution of the quantity of the cheaper and less nutritious food given to him, and the addition of a smaller or larger portion of the more nutritive grain, which furnishes stamina and strength in a degree greatly in excess of its own increased value, may be assumed as facts.

Slow-working horses do not, of course, require so much nutriment of a high quality, as those which are called on to do quick work, and perform long distances; but, as a rule, all animals which have to do hard work, and much of it, must necessarily be so kept as to have hard flesh, and they cannot be so kept unless they are fed on hard grain.

HORSES, how to Judge and Select.—Having found a horse whose exterior conformation, size, and apparent strength seem suitable to your purpose, we will now proceed to give such information as will enable the buyer, by careful examination, to recognize those defects, blemishes, symptoms, and appearances which latent disease and injuries assume, and thus prepare him to detect the multitudinous impositions which have been resorted to by the lower class of dealers, to disguise indications of unsoundness.

Unless proper precaution is used in the examination of horses for purchase, the law will not protect a man for the consequences of his own neglect; and it has

been held that a warrantry against apparent defects is bad in law, the purchaser being expected not only to possess ordinary skill; but to exhibit ordinary caution.

A defective horse is dear at any price, whilst the value of a good one is, as compared with a bad one, as infinity to nothing. In choosing a horse, let the buyer be never so good a judge, and his inspection never so minute, he must take some things on trust. A perfect knowledge can only be obtained on trial, which should always be taken, if possible, but which is not always to be had. For instance, some horses, when turned of six or seven years old, are subject to a dry, chronic cough, which comes on at uncertain times, perhaps twice or thrice a day, sometimes after feeding or drinking; or changes of temperature may induce it, as when he comes into or goes out of stable. Occasionally a dose of physic, and in some cases a little attention to his diet, will prevent re-occurrence of his cough two or three days, or even weeks, when it will reappear.

With a respectable dealer, after using your eyes and discretion, you had better depend on the warrantry, and his character, than by any unnecessary display of suspicion, offensively question his honesty. Nevertheless, as the trade is taken up by needy gentlemen of good standing in society, and broken-down black-legs of respectable connections, who are ever ready to give a warrantry not worth a dump, or satisfaction if you are dissatisfied thereat; if you have reason to suspect the horse, or his master, the directions here laid down will be found useful. Always bear in mind that the observation of one symptom should induce the examiner to follow up the inquiry into those other symptoms which are characteristic of the suspected disease, defect, or unsoundness.

The best time to view a horse is early in the morning, in the stables, as then if there is any stiffness in the joints, or tendency to swelled legs, it will be most apparent.

The horse should always be examined from a state of rest. If there are any symptoms of his having been previously exercised, such as sweat about his withers, or his legs have been recently washed, it is advisable he should be left in his

stall till cool; for there is more than one species of lameness, which becomes less apparent after exercise, and where there is a tendency to swelled legs, a smart trot and grooming will fine his legs and render them clean.

This precautionary measure is more especially to be taken when you suspect your man; for in horse-buying we have to deal with gentry who are acquainted with the science of imposition in all its ramifications. A stable examination is the best for observing indications of wind-sucking, crib-biting, chronic cough, the state of the respiration, and for discovering vice.

For this purpose always have a horse shown quietly; when there is much noise and bustle there is generally something wrong, and when the animal is agitated, slight lameness will escape the eye.

The first thing to be observed is that when standing evenly the weight is thrown equally on both feet. If there be any complaint in the fore feet, one will probably be "pointed," that is, extended before the other, or he will frequently alter the position of them, taking one up, and setting the other down; or the hind legs will be brought under the body to relieve the fore feet of some portion of the weight. Any of these symptoms will direct your attention to the feet when you see him out.

To judge of his respiration, it is necessary to be acquainted with the indications of health. Observe if the flank alternately rises and falls with regularity. In health the respiration of the horse is from four to eight per minute, average six in the day time; during sleep it is seldom more than four. If quicker than ordinary, it betokens present fever; other symptoms will be developed, such as increased pulse, heat of mouth and dullness, while the delicate pink appearance which the membrane covering the partition of the nostrils assumes in health, will be increased in color.

But if none of these symptoms of ill health are present, and yet the horse heaves at the flank more than ordinary, if the weather be moderate, and the stable not oppressively hot, it is probable such a horse is thick-winded.

When inspiration appears to be performed readily and quickly as in health

by a single action, but expiration with difficulty by an irregular and prolonged movement, or double action, the respiratory muscles appearing as if interrupted in the act of expelling the air, and then the flank drops suddenly, it is a symptom of broken wind. His cough should then be tried. The cough of a broken-winded horse is a peculiar low, hollow grunt, difficult to describe, but when once heard easily recognized.

The cough can generally be elicited by pinching the *larynx* or *trachea*, though occasionally this fails, for some sound as well as broken-winded horses cannot be made to cough at all. In these cases, when there is any irregularity in the movement of the flank, which would lead to the suspicion of broken wind, and there is unusual hardness of the wind-pipe, which does not give way on pinching, it may be taken as a symptom of disorganization, in addition to the broken wind.

If the hair is rubbed off in some, especially about the head, flanks and tail, or he is observed rubbing himself against the sides of the stall, there is danger of his being mangy; and in this case his coat will be found rough and staring.

The absence of the vice of kicking and biting may be inferred from the manner of the groom when entering the stall, and by the quiet method with which he unclashes and dusts him over and combs out his mane and tail. If he be a biter, his head will probably be tied short to the neck, or the groom will seize hold of him short by the halter or bridle, sometimes giving him a shake or looking sternly at him. Desire to see his hind and fore feet, and by the manner in which he permits the groom to lift them, a guess may be made as to his quietness to groom his heels or shoe.

While the horse is in the act of being led out of the stable to the light, closely observe his manner and action; if the ears move in quick changes of direction, as if alarmed at every noise, and he hangs back on the halter, raising his feet higher than ordinary, and putting them down as if fearful and uncertain of his step, it leads us to suspect his eyes, though sometimes these symptoms will be observed when the eyes are perfect, if the stable has been a dark one.

When the horse is shewn out, notice if he stands firm on his feet, with his weight thrown boldly on his back sinews and pasterns. If there is any appearance of shaking or tottering of the fore limbs, indicative of gogginess, it will be endeavored to be disguised by the groom continually pulling at the bit to make him shift his legs and stand advantageously. A lame horse is never permitted to stand still a moment, and the groom, though pretending to soothe, is in reality agitating him, while the shrewd and crafty seller will most probably endeavor to withdraw your scrutiny from the defective point by calling your attention to his spirit or playfulness. If any of these maneuvers are apparent, be upon your guard. The groggy horse inclines a little forward at the knee, or it is readily bent by the least touch behind, he rests his weight on his toes, and when standing undisturbed brings his hind legs under him. Some young horses, before they had been backed, have this deformity from malformation of the knee; but if, in addition to this bending forward, there is any tremulous motion of the limbs, it is a decided proof of the existence of that most destructive affection, *Navicular disease*. Whatever his age, he should be rejected. NEVER BUY A TOTTERING HORSE.

Another deception is effected by standing a horse up hill; the shoulder is made more sloping, and dealers, to give that appearance, desire the near leg to stand before the other.

Though the dealer is perfectly justified in these little maneuvers to show off his goods to the best advantage, more especially in so fancy an article as a horse, which is no more than is done and allowed by every tradesman, the prudent purchaser will not please his eye at the expense of his judgment, but see the horse on level ground, and with his feet placed even.

If one foot is more upright than the other, that foot is diseased; the same weight is not thrown on it, and the horse never shams; if it is of a different temperature, active disease is going on; if an old standing complaint, the feet will be found of different size, and possibly the muscles of the arm and shoulder diminished in size.

Taking our position in front of the

horse, we examine his fore legs; that they are in proper position; that there is no weakness in the pasterns, or enlargement of the fetlocks; and that the feet are of the same size, and stand square to the front.

We judge of the general state of the animal's health by his breathing condition, the brightness of his eye, the color of the membrane lining the lid, and that of the membrane lining the nostril, which in health is of a pale pink. If it is a florid red, there is excitement of the system; and if it is pale, approaching to white, it is a sign of debility.

Each nostril should be alternately closed by the hand to ascertain that the air passages are not obstructed by polypus, or enlargement of the turbinated bones.

If there is any increased discharge from the nostrils, you will probably be told it proceeds from slight cold; in that case, an accelerated pulse and affection of the eyes are usually concomitants; nevertheless, as a precautionary measure, the branches of the under jaw should be felt for enlargement of the glands; if, although enlarged, they are moveable and tender, it is probably nothing more than a catarrhal affection. And here it may be necessary to observe that in deciding upon the disease with which the horse is afflicted, it is requisite to bear in mind the age of the animal. In examining the head of a young horse, should the space between the branches be hot, tumid and tender, the membrane of the nose intensely red, with profuse discharge from both nostrils, and cough and fever present itself, we may more than suspect strangles. Where, however, there is neither cough or fever, but one nostril, and that the left, affected, the discharge lighter in color, and almost transparent, yet clammy and sticky, and the gland on that side adherent to the jaw bone, glanders is indicated. In this case, should the lining membrane of the nostril be found pale, or of a leaden color, with small circular ulcers, having abrupt and prominent edges, there can be no second opinion on the subject.

But we caution the inexperienced examiner not to mistake the orifice of the nasal duct, which is situated in the inner side, just within the nostril on the continuation of the common skin of the muzzle.

zle, and which conveys the tears from the eye into the nose, for an ulcer; and warn him, in all suspicious cases, to be careful he has no chaps or sore places on his head or face; as this dreadful disease is

man, in case any of these symptoms make their appearance after purchase.

His crest should feel hard and full, and firmly and closely attached to his neck; if it be lax, he is out of condition.



FIG. 3.—AT ONE YEAR OLD.

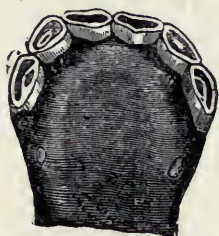


FIG. 5.—AT THREE YEARS OLD.

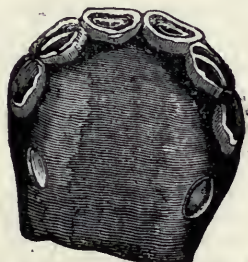


FIG. 7.—AT FIVE YEARS OLD.

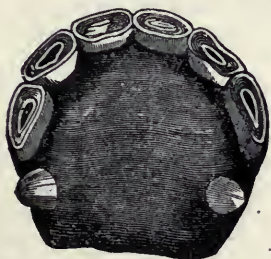


FIG. 9.—AT SEVEN YEARS OLD.



FIG. 4.—AT TWO YEARS OLD.

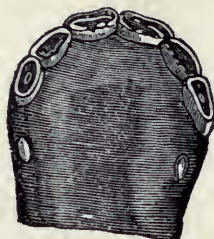


FIG. 6.—AT FOUR YEARS OLD.

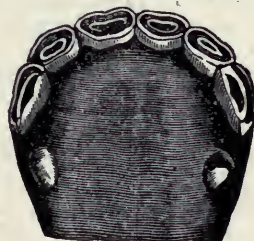


FIG. 8.—AT SIX YEARS OLD.

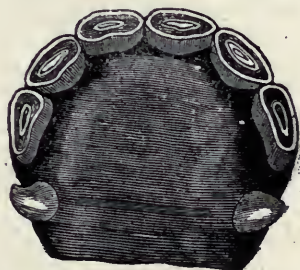


FIG. 10.—AT EIGHT YEARS OLD.

AGE OF THE HORSE, AS INDICATED BY THE TEETH.

unquestionably communicable to the human being. As few persons will buy a horse with any symptoms of actual disease, however slight, if they can help it, the inquiry is better left to a professional

man. His skin should feel kind, and look glossy, and the muscles of the body feel hard and spongy to the touch. In the old horse the head grows lean and fine, and the features more striking and blood-like, the

neck fine, withers short, and the back sinks; the lips exhibit a lean and shrivelled appearance, and the lower lip hangs considerably below the upper. In youth they are round and plump, and meet together, and the ridges of the roof of the mouth will be found prominent. In age, the middle of the nose will sometimes be found indented by the long-continued pressure of the nose-band of the headstall. In lifting his lip, if the incision teeth shut close, even, and are perpendicular, he is young. As he grows older they project forward in a horizontal direction, and the upper and under edges do not meet with evenness, the upper projecting over the under teeth. The longer his teeth are, the gums being dry and shrunk from them, the more advanced he is in age.

This appearance of his teeth cannot be altered by the arts of the dealer. In youth the teeth are flattened at front and rear, and long from side to side; at eight years old they are oval; as age advances they become round, and in extreme old age triangular, yellow and incrustated, and the tusks become blunt.

If there are any marks of extraordinary wear in the central teeth, there is reason to suspect crib-biting, and in old cribbers, the outer edge of the front teeth are worn away, and little pieces are sometimes broken off by the attrition against the manger; if such is the case, look to the neck for marks of the "crib-biting strap."

Dishonest dealers attempt to disguise age, by reproducing the mark in the corner teeth by means of a hot iron or caustic. The fraud is easily detected by a horseman, as it is usually over-done, and the marks do not correspond with the length, shape, and duration of the teeth, and the "bishops" horse is usually loth to have his mouth meddled with.

Having attentively looked over the horse as he stands, and discovered nothing objectionable to the eye, it is prudent to see him through his paces, before proceeding to ascertain, by careful examination, what defects, blemishes, etc., which may have a tendency to produce unsoundness, he is afflicted with; as the action of a horse, when closely observed, guides us to his defective points.

He should first be walked, and then trotted, without any whip near him, slow-

ly down the ride, allowing the animal to have the whole of the halter to himself; his head will then be entirely unconstrained, and any irregularities in his action are easily detected.

The action should be scrutinized most attentively immediately he steps off, as defects are then most visible, for not unfrequently lameness disappears after a few moments' exercise.

Should one of the fore feet be much affected, it will be evident, by the up and down motion of the head, and the different degree of force with which he puts his feet to the ground. Horses that are lame before, drop their heads when stepping on the sound leg, and raise it when the weight is thrown on the lame leg; but when they are lame behind, the action (though not perceptible) is reversed; they throw up their head a little when the sound leg comes to the ground, and depress it when the lame leg propels the body, and the motion of the lame leg is slow, while the sound one is jerked quickly forward to sustain the weight.

When both fore feet are equally tender (which is not uncommon in groggy horses) it is more difficult to judge of his action; it is not uneven, and the limp is not perceptible, but he steps short and feelingly, with a general appearance of contraction. Dishonest dealers, at fairs and auctions, resort to a scheme by which groggy lameness in one leg is disguised by making the motion even. It is known in various parts by the slang terms of diamonding, beaming, balancing, or wedging.

It is performed by removing the shoe of the sound foot, and paring out the sole until it yields to the pressure of the thumb. The shoe is then replaced, and a wedge of wood, a pebble, or a bean is driven in between the sole and shoe, until sufficient pain is produced to make the horse equally lame on both legs. Although the lameness is less evident, yet a person accustomed to the action of horses, will easily detect it, and if the animal is allowed to stand undisturbed, it will be evident something is wrong by his repeatedly shifting his legs.

Another trick of these ruffians, resorted to to conceal lameness, or to give an appearance of energy to the sluggard or worn-out horse, is the torture of the lash, termed firing. The poor animal, pre-

viciously to being shown, is so barbarously flagellated, that under the influence of terror of the further application of the whip, his attention is withdrawn from the disease, he feels not the lesser pain, but trots off heedless of his lameness, or at least showing it much less. Whenever there is much punishment, or a threat of it, while showing a horse, BE SURE THERE IS SOMETHING TO CONCEAL.

In his trot, if the action is good, the foot is boldly delivered with what may be almost termed an allegro movement. Its course is straightforward and downward, not dishing to either side; the motion should be from the elbow as well as the knee; the hind legs gathered well under the body, following with regularity and precision; the toes fairly raised from the ground, and spread pretty accurately in the impress of the fore feet; if they pass beyond, they are likely to over-reach. In the trot, he should go lightly with the fore feet, but strike the ground energetically with the hind, taking a long, darting stride, and shooting, as it were, the body forward.

In trotting, the horse that throws his legs confusedly about should be rejected, for though most young and uneducated horses have an ungraceful and disorderly action, the sluggard is never precise and uniform in his trot.

In criticising action, attention must be paid to breed, but it should be sufficiently high in a hack to clear all ordinary irregularities on the ground; if it is very high, look out for trace of having worn a knee-cap. Be careful to observe that he does not occasionally drop; a casual giving way on either leg, in the trot, is a sufficient hint to reject the animal; he will certainly fail when put to work.

Though the best horses may stumble, if, after tripping, he springs out as if he feared the whip or spur, you may justly suspect him to be an old offender, which will induce you to look to his knees and head. Observe that he goes clear in all his paces, and that one leg does not interfere with the other; horses that go very near are more likely to cut when tired.

The carriage of the head and tail are points to which the eye of a good judge will be directed. If the tail goes to and fro when in action, like the pendulum of

a clock, it is a good sign of blood and steadiness.

He should now be mounted, and the trial be repeated on the stones or hard road, or what is preferable, on a rough and stony declivity; for there are many cases of slight lameness which do not show on soft ground, at a walking pace, or when the horse is unburdened. If he step away boldly, the toe in a direct line with the body, the knee fairly bent, and his foot up and planted firmly down again on the ground, fearlessly and flat, without any dropping of his head, you may conclude him sound in action. His hind legs, well lifted up and tucked well under him, should follow his fore legs with regularity; and if in running him up hill he goes without dragging his toe, you may infer the same behind. In the gallop, if he takes up his legs quick and dashes in his haunches, not bringing his hind legs after him, his action is good. During this display of action, the examiner will have an opportunity of judging of the perfection of his wind; if he does not ride the animal himself, he should stand close to the horse at the moment he comes into the gallop.

The thick-winded horse breathes with difficulty and is soon distressed. The flanks heave much and rapidly; there is some little noise; but the laborious heaving of the flank is the principal indication. A horse unused to exercise, or if fat, or exercised on a full stomach, will show symptoms of thick wind; and it has been observed of great feeders, who never breathe freely until they have gone a mile or two, or begin to sweat, that they are able to do more work than others that do not labor under the same difficulty.

The wheezer, in addition to being thick-winded, utters a sound like an asthmatic person when a little hurried. Wheezing may frequently be heard while at rest in the stable.

The piper or whistler utters a shriller sound than the wheezer, but it is only heard after exercise, and that of some continuance; a short gallop up hill is sometimes necessary to develop it, but the whistler is soon distressed. "Never buy a whistler; he cannot improve on your hand, and he is almost sure to get worse," said Sir Henry Peyton to Nim-

rod, an opinion to which we most cordially subscribe; and the same advice may be given of all these affections of the air passages.

Roaring is not heard at rest. In the majority it is only developed by exertion, which quickens the breathing, and the noise is increased in proportion as the pace is accelerated, though in a few it is audible as soon as put into the trot. Knowing dealers, who wish to prevent the noise from reaching the ears of an experienced purchaser, when showing a "Bull" of good action, start the horse a considerable distance before putting him to the gallop, and in returning slacken the pace, so that the breathing becomes tranquil before the horse reaches the examiner; this is called "coming the long trot." Many of these lesions are consequences of inflamed lungs or diseased alterations of the air passages, and most of them are modifications of the same disease. Sometimes they exist in so slight a degree as to be discoverable only by quick and long-continued exertion; but, when suspected, they should be tried by a brushing gallop, though this is not always allowed.

The only other simple and practicable plan to get at the state of the breathing is the common way of making the horse cough, which, if gross and accompanied by a short groan, is conclusive, and the characteristic grunt, when alarmed, is not to be misunderstood. But the cough is not always marked, and, therefore, not infallible. If, therefore, there is any cause for doubt and suspicion, it is better to call in a professional man, more especially as the slighter affections are apt suddenly to terminate in the greater, without much warning, in a very short time.

We now proceed to search for blemishes and those indications of unsoundness, which are apparent to external examination, bearing in mind any symptoms or suspicious appearances in his action, that may lead us to suspect particular parts, which should then be subjected to the severest scrutiny.

Any scars about the head should direct attention to the knees, or they may lead one to suspect there may have been an attack of megrims or staggers.

The neck should be searched to ascertain that both jugular veins are perfect,

which is discovered by pressing on the lower part of the neck, with sufficient force to stop the return of blood from the head; if the vein be perfect, it will fill and swell from that point upward toward the head. The loss of one of them, if recent, predisposes the horse to staggers or apoplexy, and he cannot be turned out to grass or straw yard without risk. The withers should be examined for bruises from the saddle, as he is unserviceable as long as heat or swelling continues.

The slightest tendency to sore back makes a horse unserviceable for many months, and not unfrequently causes him to rear and plunge on mounting.

The shoulders should be examined for tumors. If there are any marks of setons or blisters about the points, it is probable he has been treated for shoulder lameness, and the attention of the examinant will be directed to the foot, which, ninety-nine times out of a hundred, is the seat of lameness before. If that is found round and strong, with the heels high, we may suspect navicular disease.

The chest and breast should also be searched for marks of rowels, setons and blisters, for the remains of them render it probable that the horse has been under treatment for inflamed lungs or chest affections, and should in prudence direct the purchaser to ascertain by a smart gallop whether the mischief is of a permanent nature, more especially if the horse is narrow-chested.

The knees should be examined with the utmost care—first, that they correspond in shape; and secondly, to ascertain whether the skin has been broken by falls; but it does not follow that a mark or scar indicates a stumbler, and an accidental blemish should not induce us at once to condemn a well-formed animal.

A broken knee may happen from a variety of causes. The safest horse may fall by an unavoidable accident, such as a false step, from any thing giving way under the foot, as a round stone, from fatigue and over-exertion, or from a bad rider. But a broken knee is a suspicious circumstance; it may be taken as an indication of existing or recent unsoundness, and the slightest mark, calls for the most careful observation of every part of the horse, of his make and action, and suggests the narrowest scrutiny of the legs and feet;

a tight shoe, a nail driven too close, or from bad shoeing. The toe being left too long open, causes a horse to trip, tenderness in the feet, contraction, groggy lameness, corns and thrush; a scar on the head above the eye (for a decided fall of the horse leaves unequivocal signs there) is a suspicious sign; when no trace of local disease can be found to account for them, the inquiry should be followed up into the horse's constitution, for the staggers or megrins may have occasioned the accident.

When a scar on the knee is observed in connection with low withers, a thick and upright shoulder and pasterns, with the legs inclined under the bone, he is unwise who does not take the hint that the faulty formation has not produced its natural consequence. To discover the integrity of the knee, is not so easy as some suppose, as occasionally the hair grows so well over the wound, as to leave it hardly discernible; but on minute inspection, when there has been a scar, an interception of the gloss is apparent, as if the hair grew in an oblique direction; should this be observed on bending the joint, the secret will be exposed.

The shank should be examined for splint, strained or enlarged flexors, and the marks of firing or blisters.

In inspecting the leg, the eye alone should not be trusted, particularly in hairy-legged horses; but after minutely comparing the appearance of the two limbs, the hand should be deliberately passed down both shanks before and behind; any difference before, or behind, points to a deviation from health.

In the sound flat limb, the tendon is well defined, perfectly distinct, and has a hard, tense feel that resembles the touch of a cord tightly strung. If the back sinews feel thick, the flexor tendons and their sheaths swelled and rounded, leaving no distinctive marks as it were between the one and the other, but all swelled into one mass with the bone, great mischief has at some time happened; either some of the ligaments have been ruptured, or there has been inflammation, effusion, and adhesion of the vaginal bursæ, or synovial sheaths of the flexor tendons; or such relaxation has taken place from strain and subsequent inflammation as will always keep him

weak. When the injury is recent, it is accompanied with more or less swelling, heat and lameness; by time and treatment the first are removed, but the swelling remains, and the thickening of the tendons shows the mischief that has been done. Whenever there is manifest alteration of structure here, and yet the animal is apparently sound in action, the purchaser should bear in mind that the soundness is often the effect of rest, and should the animal be again put to work he will become lame. And bear in mind in such case you cannot return him, for no man in his senses would give a special warranty against it.

Splints, if large, are apparent by the deviation of the outline of the leg; if small, the hand discovers them.

Every excrescence on the cannon bone, in horseman's language, is termed a splint. The true splint is in fact a local conversion into bone of a part of the temporary cartilage, connecting together the large and small metacarpal bones. The inflammation is set up by concussion or strain. Horses are lame from them while there is inflammation in the cartilage. But when the tumor is formed, the inflammation has subsided, and the periosteum has accommodated itself to the enlargement, the horse is no longer lame, nor more likely to become lame from that splint than one without; the same causes that produced the first, may produce a second.

The splint, if so large as to interfere with action, rendering the horse liable to strike, is objectionable, or so near the knee or ligaments as to interfere with their freedom of action; otherwise they are of very little consequence beyond the blemish destroying the line of beauty. The worst splints are those not discernible but by the lameness they produce.

Any marks of firing or blistering should make the purchaser cautious, and endeavor to ascertain the cause of the treatment; after blistering, the hair is sometimes a shade different in color, and stares a little, is shorter and bristly, and wants the natural gloss.

The fetlock joint, from being the principal seat of motion below the knee, and from its complicated structure, is particularly subject to injuries. The fetlock should be subjected to the strictest ex-

amination for enlargements, which are best ascertained by carefully comparing them with each other, as any difference in size is indicative of strained or even ruptured ligaments, and consequently permanent weakness of that important part.

If the injury is recent, there probably will be heat, and pain on pressure; and any signs of blistering or other treatment, though no enlargement or lameness is apparent, should induce the buyer to view the animal with the utmost suspicion.

If there are any sore or callous places about the fetlocks or pasterns, he is a cutter, and possibly the marks of the foot may be visible. If there is no malformation to account for it, it may have been done when fatigued, or it may have arisen from improper shoeing; his feet should then be examined.

If an old offence, he may probably have a peculiar shoe, rather thicker and narrower in the web on the inside than the outside, and nailed *only* on the *outside* of the foot, and round the toe; or the opposite shoe is found filed away or beveled off, with the hoof projecting a little over the shoe. Where the feet, though well formed, are placed closer than desirable in narrow-chested horses, and therefore apt to cut, particularly when tired, we sometimes find a shoe is adopted thinner on the inside than the outside.

At other times various ingenious devices, calculated rather to increase than remedy the evil, have been resorted to, such as putting on shoes narrower on the inside, and set within the crust, and the wall of the quarters reduced in thickness by the rasp. If none of these schemes have been resorted to, to obviate the defect, the horn of the opposite foot will sometimes be found polished by the attrition, for it is not the *shoe* that cuts once in a hundred times, *but the hoof*. In horses that interfere, we generally find the inside quarter lower than the outer, or the toes turned outwards—the fault being in the leg that receives the mischief while sustaining the weight, not in the *foot* that gives the blow. The tired horse throws his legs about, and frequently cuts himself; and it is the fault of most young, uneducated horses, especially if they have

been backed or inconsiderately worked too early.

If there are any symptoms of knuckling or inclination of the fetlocks forward, serious injury has happened.

The hair above and below the fetlock joint should be carefully searched for the scars left by the operation of *neurotomy* (the division of the nerves that supply the foot with sensation); pricking the fetlock with a pin if you have reason to suspect it has been destroyed. About the fetlocks are frequently found little puffy tumors, absurdly denominated wind-galls, from a supposition of the farrier that they contained wind.

Whenever parts move and press on each other, and between tendons, particularly about the extremities, there are placed little vesicles, or shut socks, technically termed *bursæ mucosæ*, containing synovia, or joint-oil, a lubricating fluid to prevent friction, in sufficient quantity for all ordinary purposes of the animal. But when the horse has been compelled to undergo exertion beyond that which is natural and beneficial, an increased supply of synovia is secreted, which distends the capsule: a repetition sets up chronic inflammation of the synovial membrane—morbid secretion and visible enlargement is the result. There are very few horses that have done much work that are without them.

Though rest and pressure will diminish them, when once enlarged, labor will be sure to reproduce them; they seldom occasion any local disturbance, and are of no consequence beyond the blemish, unless they are very large, and in most cases may be regarded as mere indications of hard work.

The pastern is the seat of a bony tumor termed ring-bone. It is the result of inflammation and partial conversion into bone of that portion of the cartilages of the foot which rise above and nearly encircle the coronet. These cartilages, extending backward considerably beyond the coffin bone, form the elastic frame of the posterior parts of the foot; they here take on the name of the *lateral cartilages*. When once ossified, inflammation is set up in this part; from its tendency to spread around the pastern joint, it has taken its name of ring-bone. When, however, the ossification appears only at the quarters,

it is termed *ossification of the lateral cartilages*, or side bones. It is discovered by their prominence and their rigidity, when pressed between the finger and thumb. Upon the integrity of these parts depend the elasticity and consequent usefulness of the foot. However trifling the apparent alteration of structure, it is a serious detraction from the efficiency of a hack; though on soft ground, at a slow pace, the draught horse will work apparently sound.

We now arrive at the foot, the foundation of the horse, and too much attention cannot be paid to it. If it is imperfect, all other perfections are valueless. The best way of judging whether there is any malformation of the feet, either natural or the result of disease, is to front the horse, and

PERPENDICULAR SECTION OF THE FOOT AND PASTERN.



FIG. 11.

- a* Flexor tendon, which continues by *b*, nearly down to *g*, where it is inserted in the coffin bone.
- c* Sesamoid bones.
- d* Ligament uniting sesamoid bone to large pastern.
- e* Navicular or nut bone.
- h* Elastic matter or sensible frog.
- f* Part of coffin bone where the flexor tendon is inserted.
- g* Ligament uniting navicular bone to coffin bone.
- k* Part to bleed in severe inflammation of foot.
- m m* The shank bone.
- r* Ligament extending from pasterns to knee.
- s* Tendon uniting pasterns to coffin bone.
- n* The large pastern.
- o* Small pastern or coronary bone.
- p* Coffin bone.
- q* Crust or wall.
- i* Horny sole.
- c* Elastic matter or sensible sole.

compare the two feet together. Small feet are objectionable, and so a very large foot, that is disproportionate to his size, is to be avoided.

Its wall should be round, smooth, level, and of a shining dark color; full in front, of a proper obliquity, and free from ribs or seams, and perfectly cool. Its proper obliquity ought to be at an angle of forty-five degrees with the plane of the shoe. If the angle is materially less, the sole is flat, or perhaps convex; if the angle exceeds it, the foot is contracted.

When the outward line or profile of the hoof is irregular, it marks what is called a "shelly foot." This is decidedly bad. If there are any protuberances or rings round it, they indicate that the feet have been affected with fever to such a degree as to produce an unequal growth of horn, which frequently leaves some injurious consequences in the internal part of the hoof, such as a deposition of lymph between the horny and cartilaginous processes, which connect the foot and hoof together. If there is any depression or hollow, it betrays separation of the foot from the hoof, and sinking of the coffin bowl, and the sole will be found bulging.

No man should trust to a superficial judgment of the foot, for though he may see the form and shape of the foot to be

SECTION OF THE FOOT OF THE HORSE.

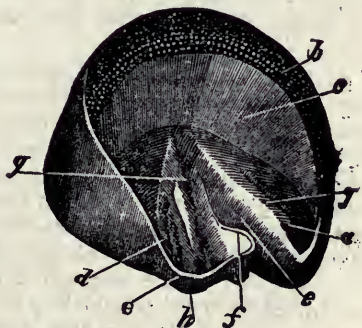


FIG. 12.

- a* The outside crust of the hoof.
- cc* Hollow surfaces on the inner part of the horny frog.
- b* Coronary ring.
- d* Horny plates on the inner surface of the crust.
- g g* The bars.
- d d* Continuation of horny lining.
- f* External cleft of the frog.
- h* Rounded part of heel.

promising, yet there are other things to be considered. It may be well formed, yet thin and weak; and those feet externally the most perfect, are sometimes contracted internally, and are liable to the insidious affection termed navicular, or joint capsular disease. Contraction is a serious defect; it is apparent and general, or occult (hidden) and partial.

When apparent externally, which is very common among high-bred horses, with light heads and necks, high in the withers with sloping shoulders, and that go near the ground, the foot presents more an oblong than a circular shape; the curved line towards the heels becoming straight, and the heels approaching each other. The frog is hard, dry, and compressed, the foot small, and the heels upright. Altogether the foot more resembles that of a mule than a horse.

But though a contracted foot is often an indication of past disease, and there is a diminution of elasticity, it by no means follows that it is an unsoundness, or incapacitates a horse from work. With care, such feet will work soundly to the end of their lives; for this change in shape has been effected by gradual and slow absorption and deposit; so that nature has had time to adapt the internal parts and accommodate itself to the change, for elongation of the foot has taken place. When such feet feel hotter than ordinary, distrust should be awakened, more especially if there is a marked difference between the temperature of one and the other. If there is indisputable pointing, then the horse is unsound.

Occult or partial contraction is not obvious externally, but there is diminished cavity of the horny box from increase of the sole in thickness. In this case we usually find the foot of a circular figure more upright than natural, and displaying unusual appearance of compactness of force and strength, the soles usually hard and thick; and if you have a firm, unyielding sole in a circular foot, it is a rock of danger and the forerunner of navicular disease.

The inner quarter of the hoof must be most minutely inspected for sand-crack; and it is not always easy, without minute scrutiny, to detect a sand-crack, where an attempt has been made to conceal it. A

month's run in marshy ground will often close it up, and low dealers, particularly at fairs and markets, and others who gain a livelihood by dealing in "screws," have a knack of neatly covering the crack with pitch, and the foot oiled, so as adroitly to conceal the crack. Any oily appearance about the hoof should excite suspicion, and any fissure at all resembling sand-crack should cause the horse to be peremptorily rejected. Cracks indicate a dry and brittle hoof. The heels should be examined for any cracks, or appearance of heat and tenderness, as they are exceedingly troublesome to cure.

The frog, in its healthy state, must be firm, yet pliable and elastic. If there is any smell, or if on squeezing the frog matter exudes, there is a thrush. By many people thrushes are considered of little importance; but when it is considered that where there is purulent matter there must have been inflammation; and that when a horse with a thrush steps on a stone, he frequently drops with the pain as if he was shot, to the peril of his rider and the ruin of his knees, it must be admitted they are serious objections in a saddle horse. If it can be ascertained that they are not of long standing, or that the horse has been placed in a situation so as to favor their approach, such as confinement in a hot moist litter, they are of no more consequence than so much diminution in his price as will cover the expense of keep and attendance while healing; but when a thrush accompanies a foot smaller than usual, the heels wind in, and the frog rotten, let him go as he will, he will not long remain sound.

The sole of the foot should be subject to close examination; in its healthy and natural state it is inclined to be concave, but if in connection with high heels an extraordinary concavity is present, it is a sign of internal contraction; if the sole is morbidly thick, and does not give way during great exertion, the elasticity of the foot must be diminished. If the sole is less concave than natural, or approaching to flat, the foot is weak.

If the foot appears to have been cut unusually deep at the angles where the shoe meets the inside heel, or if there is any peculiarity of shoeing at that part, the examiner may infer all is not right, and that he has corns; and if he waits

for the proof, send for the farrier to remove the shoe.

The stifle is very rarely diseased; but it should be examined for enlargement or any marks of firing or blistering; and the groin should not be overlooked for rupture.

The hock is one of the most important joints in the animal machine, and should always undergo a most rigid examination previous to purchase, as from its complicated structure, and the work it has to perform, it is the seat of lameness behind in nine cases out of ten.

When standing behind the horse, if one of the hocks is diseased, the observer will perceive the bone does not incline gradually, as in the sound limb, but there is an abrupt prominence. Though to the unpracticed eye this is not always perceptible on comparing them, yet by passing the hand down the inside of both hocks, this abruptness will be felt. If there is any tenderness or heat on pressure, or the marks of recent cutting on the inside of the fetlock, or unequal wear of the shoes, especially at the toe, you may suspect spavin. Sometimes both hocks present an enlarged appearance, though there is neither heat, pain nor lameness (for hock lameness is frequently intermittent), such hocks should always be looked upon with suspicion; they are, in fact, unsound: for though the animal may, with natural malformation or exostial growth, the result of disease, discharge his usual functions through life without a return of lameness in careful hands; yet the probability is he will fail if called upon for any unusual exertion, and that one day's extra work will ruin him forever. In this case the examinant must be guided by circumstances; if the horse has excellencies which counterbalance the defect, the price is correspondingly low, and if the work required is but moderate, he may be serviceable for many a year.

Certain forms of hock are more subject to disease; those approaching each other, termed low hocks, are predisposed to spavin and curb; those in which the point of the hock inclines too much backward, are liable to spavin; and when the hock is too upright, narrow and straight, it is subject to thoroughpin. Capped hock is a soft, fluctuating tumor on the point of the hock; it is an enlargement

of one of the *mucous capsules* which surround the tendons inserted into that part. It is produced by blows; lying on rough stones, or kicking in the harness or stable, and is therefore frequently a sign of vice.

Curb is a longitudinal swelling at the back of the hind leg, three or four inches below the hock, seen best from the horse's side; the enlargement is the result of a sudden strain of the annular ligaments, or inflammation of the sheaths of the tendon. It is attended with a good deal of lameness and swelling at first; but when that has subsided, and if any time has elapsed without a recurrence of the lameness, it is of no more consequence than the unsightly blemish; but it should be remembered that curby hocks are liable to spavin.

Thoroughpin is situated above the hock joint, between the flexors of the hock and foot, projecting on each side; it is of the same nature as wind-galls, being an enlarged mucous capsule, and is indicative of severe work or over exertion.

Bog, or blood, or spavin, is a swelling situated in front of the hock, towards the middle of the joint; it is also an enlarged mucous capsule, but deeper seated, over which one of the subcutaneous veins passing, the blood in which becoming obstructed in the return, increases the size of the tumor.

The shanks should be scrutinized for any symptoms of weakness, and the fetlocks for marks of cutting and wind-galls.

The front of the hind feet should be examined for fissure; it is a most serious defect, and generally produces lameness. Notice the way in which he is shod, as it leads to the discovery of lameness and defects in action; though in dealers' stables you will rarely see any peculiarity in shoeing.

If the toe of the hind foot is found to extend a little over the shoe, it is to prevent "hammer and click" from being audible. If the toes of the hind feet drag, or we find the shoe squared off or worn, we may suspect disease of the hocks; and if the inside of the shoe is beveled off, it is the sign of a cutter.

He should now be backed, to ascertain if he has received any injury of the spine. If he backs with difficulty, his hind quar-

ters swaying from side to side, and when compelled to retrograde suddenly he appears as if about to fall, he has received some injury. Some horses cannot be made to back, but when urged, rear on their hind legs. His loins should be searched for marks of setons, or blisters. Among stable-men it is termed "chinked in the chine," or rigged in the hock.

A singular symptom of diseased spine sometimes shows itself where nothing had been previously suspected; that is, of sometimes dropping when turned suddenly in the trot, the hinder quarters appearing as if paralyzed; in one case, after several ineffectual attempts to reproduce it, it was developed by a man startling him from a stable door as he trotted past it up the ride.

There are many blemishes and defects that render a hack unserviceable, which are of little or no consequence in harness. The greatest virtue in a gig horse is steadiness, which can only be ascertained by trial; and do not trust to the steadiness he evinces while the reins are in his owner's hands. The author of that admirable little work, "The Adventures of a Gentleman in search of a Horse," truly says, "whoever buys a carriage horse without first driving him himself, is a fit subject for a commission of lunacy; it is not enough to put him on the break, he should be harnessed at once to the carriage, and it is prudent to observe how he bears the ceremony of harnessing, and what kind of start he makes. Much may be predicted by his qualifications for draught, or at all events his familiarity with the collar, by the degree of quiet with which he allows himself to be put to.

If the ostler runs alongside of him at setting off, as is often the case, you may be sure the horse is distrusted; if you distrust it yourself, have nothing to do with him.

The horse should now be returned to the stable for the purpose of examining his eyes, the most favorable position for which is about half a foot within the stable door. There should be no back or side lights, or the rays, falling between the eyes of the examiner and the animal, will prevent him seeing distinctly. The head should be so placed that a moderate light should fall on the eye of the

horse, and the quantity of light can be easily regulated by bringing the horse's head more or less forward, until it is placed in the most favorable direction for observation.

Though every horseman can detect absolute blindness, yet the eye of the horse is susceptible of so many diseases, in which defective vision or partial blindness exists in such a form, long before the sight is lost, that it requires not only more observation than most people imagine, but a person unacquainted with its anatomical structure, and the different appearances it assumes, cannot perceive it at all. There are certain forms of the eye, and structural peculiarities, that show a constitutional predisposition to disease—thus, small sleepy eyes, of a blueish grey color, or when they have a flat, retracted, and sunken appearance, or those of a longish, oval figure, are predisposed to *ophthalmia*, or when the eyes appear full, with a fleshy circle around them, these are all symptoms of badness of eye, and are the forerunners of blindness, particularly in the heads of coarse and fleshy horses, with heavy countenances, who usually go blind with cataracts at seven years old.

Slight thickenings of the lid or puckering towards the inner corner of the eye, a difference in size, a cloudiness, or dullness of the iris, are several indications of disease, that a purchaser should beware of.

In examining the eyes, both must have an equal degree of light; if any difference is apparent between them, one must be diseased. The cornea, or transparent part of the eye, should be perfectly clear.

Specks are best detected by standing at the shoulder; if one is evident, and it can be clearly proved to be no more than the effect of accident, no importance need be placed on it. But it is impossible to ascertain this, and therefore the safest course is to assume that natural irritability and consequent inflammation of the eye is the cause.

Specks on the transparent cornea are generally the result of external injury; there is seldom more than one; when very small and near the circumference, they are of no consequence; but if large, or near the centre, they interfere with distinctness of vision, and make the horse

shy. If opaque or milky lines are traced on its surface, it bespeaks the remains of former inflammation.

But it is necessary to observe that horses, before they are six years old, have not that transparency in their eyes which they display afterwards, because, while young and growing, the vessels of the eye are full; therefore, before that age, it is not the brilliancy of the eye that denotes its goodness.

If there is an excess of tears, it denotes debility, and should occasion a more than ordinary scrutiny; in fact, all horses with weeping, dull, cloudy eyes, should be rejected as unsound.

It may be remarked, as a general rule, that all diseases of the eye are incurable. *Have nothing to do with a horse when the slightest trace of disease of the eye is visible.* As it is impossible, from a superficial examination, to distinguish between simple ophthalmia and inflammation of the conjunctiva, the cause of which has been a blow, or the introduction of some irritating matter, such as a piece of dirt or hayseed, which is curable by simple means, and the specific ophthalmia, as spontaneous affection, which ultimately terminates in cataract and blindness.

Viewed in front, the depths of the eye should be looked into; then sideways, which will assist in ascertaining the clearness and absence of specks on or within its surface.

Floating in the aqueous humor (which preserves the convexity of the cornea) is the *iris*, a muscular membrane, whose dilatation and contraction forms an oval aperture, termed the pupil, which varies in size according to the quantity of light which falls upon the eye.

The iris varies very little in color in the horse, though it bears some analogy to the color of the skin. It is rarely lighter than a hazel, or darker than a brown; except in milk white, cream-colored, or pied horses, when it is white, and they are termed wall-eyed. If it is of a pale variegated, cinnamon color, it is good.

The pupil or aperture of the iris is that horizontal, oblong, blueish opening which admits the light to the posterior chambers of the eye. It is important that the oval shape of the pupil is perfect, for if any irregularity or unevenness

is perceived, it is a symptom that the organ has received partial injury. In looking into the depth of the eye, through the pupil, in a strong light, it should exhibit a lively blueishness; in a moderate light, it should be perfectly transparent; if milky or turbid, it is the remains of former inflammation, which will probably recur.

In bringing the horse out of the stable to the light, if the pupil is large, it is a bad sign; by alternately shading and admitting light, if it enlarges and lessens under its stimulus, it is an infallible sign the eye is good. But if the retina is unmovable, the pupil larger than natural, and of one invariable size when shaded or exposed to intense light, though no disorganization is apparent, the eye appearing bright, of a peculiar glossy aspect, and of a greenish color, the animal is blind from the disease termed "glass-eye"—a palsy of the optic nerve.

A decided cataract, or opacity of the crystalline lens, or its capsule, is easily detected; but when very small, they may escape observation. It appears as a cloudy or pearly white substance within the pupil towards the bottom of the eye. If the pupil be round instead of a flat oval, it is an indication of cataract; when there is the slightest deep-seated cloudiness, the eye should be condemned; but if there is any white object before it, such as a white hat, neckcloth, waistcoat, or wall, the reflection on the cornea produces a mark, having so much the appearance of a cataract as to have misled many an experienced observer. Therefore, before deciding, hold the crown of a black hat against the eye, and observe at the same time if the mark disappears, which it will, if it is only a reflection.

If your examination has proved satisfactory, and you decide on purchasing, before you part with your money, learn something of the seller. For should your bargain not turn out as you anticipate, upon further acquaintance, trial, and second examination, you will know what chance of remedy you have against the vender.

The horse, if returned, must of course be in the same condition in which he was received, except so far as the disease for which he is returned may have progressed in the meantime.

It is advisable to inquire of the seller how he has been accustomed to diet and clothe the animal; whether his feet were stopped; and the same treatment should be pursued till his soundness is ascertained.

Note the temperature of the stable; if his new habitation should be hotter, it is probable you may induce an inflammatory attack of the lungs.

Beware of putting a saddle on a new horse that does not fit him; while the question of soundness is still doubtful, it is far better to use the saddle he has been accustomed to.

If his back becomes galled while trying him, which is not an unusual occurrence, the dealer will object to take him back, unless full compensation is made; and reasonably so, for he is unfitted for sale or for work till it is healed, which is not to be effected in a day; and it is also a point for calculation, whether he may not chance to fall sick, while standing in high condition in stable; in which case the dealer would be subjected to heavy loss.

It is therefore not prudent to remove his shoes, or in fact to do anything with the animal which may cause doubt or cavil, until you have finally decided upon keeping him.

MARE, BROOD, General Management of the.—When it has been decided to breed from a mare, if she is not already thrown out of work, it will often be necessary to cool her down, by turning her out to grass and taking away her corn, before she will become stinted. Thorough-bred mares are not, as a rule, allowed to take the horse while in work; but sometimes they are so constantly "in use" that no other means will enable the trainer to go on with his work of preparation. There is a wonderful difference in this respect: some animals are rarely "in use," once or twice a year being the outside; while others are so every nine days throughout the spring—the average perhaps being in that state at about intervals of two or three months, from the time of shedding their coats till the beginning of autumn. Again, some are not upset in their work by this natural process; while others refuse to feed, lose condition, and cannot be depended on for half their usual exertions. Either ex-

treme requires a change of feeding; for, on the one hand, the cool temperament is excited by the freedom of a run at grass, and on the other, the warmer one, is benefited by losing the heating qualities of her corn. At all events, it is found, in practice, that though the majority of maiden mares will become stinted while at work, yet that a large number require a run at grass before they will become in foal. As we before remarked, thorough-bred mares are generally entirely devoted to the stud from the time they are put to the horse; but there are many others of lower breeding which their owners desire to work on for some months afterwards. It is often apparent that the legs of a hack or harness-mare are wearing out, and her owner decides upon having a foal from her, but wishes to avoid the expense of keep from the spring, when he puts her to the horse, till the next January or February, varying, of course, with the time of foaling. All mares are the better for slow work up to within two months of foaling; but they should not be ridden or driven so fast as to occasion exhaustion. Cart-mares are generally used to within a few days of their time, taking care to keep them at light work and to avoid straining them. With these precautions, if the legs keep tolerably sound, a mare may be made to earn her keep for nine months out of the eleven, which are the duration of her pregnancy.

The time of sending the mare to the horse will vary with the purposes for which her produce is intended. If for racing, it is desired that she shall foal as soon as possible after the first of January; and as she carries her foal about eleven months, the first time of her being "in use" after the first of February is the period chosen for her. All other horses take their age from the first of May; and as this is the time when the young grass begins to be forward enough for the use of the mare, the breeder is not anxious to get his half-bred foals dropped much before that time. As, however, mares are very uncertain animals, he will do well to take advantage of the first opportunity after March, as by putting off the visit to the horse, he may be disappointed altogether, or the foal may be dropped so late that winter sets in before it has acquired strength to bear it. These re-

marks apply to maiden mares only; those which have dropped a foal are generally put to the horse nine or ten days afterwards, when almost every mare is in season. For this reason, valuable thoroughbred mares are often sent to foal at the place where the sire stands who is intended to be used next time. The traveling to him so soon after foaling would be injurious to both the dam and her foal, and hence the precaution we have named is adopted. The mare then remains to be tried at intervals of nine days, and when she is stinted the foal is strong enough to bear any length of journey with impunity. Mares and their foals commonly travel by road twenty miles, or even more, for this purpose; but they do not often exceed that distance, and about fifteen miles a day is quite as much as a nine days' old foal can compass without injury, and that done very quietly, the mare being led at a slow pace all the way.

MARE, FOAL, Treatment When In.—

When the mare is in foal, if not intended to be kept at work, she should be turned out in good pasture; but it should not be so rich and succulent as to disagree with her stomach, or make her unwieldy from fat. The former mistake is a constant cause of miscarriage, the bowels becoming relaxed from the improper nature of the food. On the other hand, if it is not sufficiently good, the mare will become thin, and will starve her foal in its growth. Mares that have been corned highly all their lives should have a feed or two daily, after they are six months gone, and especially if the autumnal grasses are not rich and plentiful. Most half-bred animals, however, do very well till about Christmas; after which hay and corn, with a few carrots, should be liberally given them, still allowing them to pick up what grass they can find in their paddocks. Excessive fat is a state of disease, and interferes with the due nutrition of the *fœtus*, while it is very dangerous at foaling-time, when it not only interferes with the process, but also tends to produce fever. Supposing the mare to be at work, she should have some kind of green food—lucerne being the best, and vetches, perhaps, the worst for the purpose, the latter being too heating, especially to the organs contained within

the pelvis. Any of the grasses or clovers answer well; and, after they are done, carrots form an excellent *succedaneum*, given sliced in a bran mash every night. By adopting these articles of food the mare is kept free from inflammation, and yet the foal is well nourished, which are the two essential points to be considered.

Excitement of every kind is a fertile source of "slipping" the foal, and everything which is at all likely to have that effect should be carefully avoided. The smell of blood is said to have a very prejudicial influence in this way; and there is no doubt that one mare miscarrying will in some mode affect others in proximity to her. Possibly the same cause may act on all, but it seems to be generally concluded that the act is really contagious, either from what is called sympathy, or in some other as inexplicable way. If a mare has "slipped" a foal in a previous pregnancy, double care should be taken, as she will be far more likely to do so again than another which has hitherto escaped the accident. It occurs most frequently about the fourth or fifth month, therefore extra care should be taken at that time. The suspected individual should be kept quiet by herself; but it is better to allow her the run of a small retired paddock than to confine her to her hovel, where, for want of exercise, she will become restless and anxious. Purging physic should not be given, unless it is absolutely necessary; and if the bowels are so confined as to require some stimulus of this kind, and bran mashes and other changes in the food fail to produce any effect, choice should be made of the mildest aperient which is likely to answer the purpose.

MARE, FOALING, Treatment After.—

In a healthy state the mare very soon recovers the efforts which she has made in bringing forth the foal; and, in fine weather, she may be allowed to enter her paddock on the second day afterwards, which is generally soon enough to suit the strength of the foal, though occasionally the young animal is very active within six hours after it comes into the world. For a couple of months, or perhaps less in some cases, the mare and foal are better kept in a paddock by themselves; but in a large stud this is

difficult when the foals come very quickly; and then several mares of quiet temperament are put together, still keeping separate those which are shy or vicious. Until the mare can get plenty of grass she should have carrots, bran mash,es, and a feed or two of oats, which at first are better given in the shape of gruel—the water with which this is made having the chill taken off. Rye grass is cultivated and cut for the mares daily by those who have early foals; but, though it is better than hay, it is not equal to good upland clover grass. Lucerne is excellent, but it cannot be grown so early as rye. We have already described (see Mare, the time of sending to horse,) the proper time for again putting the mare to the horse, so that we need not enter into that subject here. During the remainder of the time of suckling no special treatment is required, except to see that the mare is well fed and protected from the weather. At weaning-time she sometimes requires a dose or two of cooling medicine, but generally she is so nearly dry, that no interference is required.

MARE, FOAL, Early Treatment of the.—If the young animal is well formed and healthy, it will require no attention beyond that which we have specified as necessary for the dam. There are, however, several accidents to which it is liable; such as rupture either at the navel or flank, inversion of the feet, etc., all of which will be treated of in their proper places. About the time of the mare being "in use" the foal is generally purged a good deal, and a warm drench will often be required. At the end of a month, or sometimes earlier, the foal will eat bruised oats; and highly bred young stock are generally allowed, from this time, first a single quatern, and then by degrees two quaterns of oats. Half-breds, and even cart-horses, would be the better for this stimulus to development; but if it is begun it should be continued; and, unless the foal shows such promise that it is expected to turn out extraordinarily well, the extra expense will not be reimbursed. The half peck of oats cannot be put down as costing less than twenty dollars a year; and thus, at five years of age, the colt will have cost one hundred dollars more than if he

had been fed on hay or grass alone. Now, between a race-horse reared on corn and another confined to hay and grass, the difference in value would be a thousand per cent., and in first-class hunters, though not so great as this, it would be very considerable. But among inferior horses, on the average, would scarcely reach the sum we have named as the prime cost of the oats; and, therefore, in the depth of winter a quatern or half a peck is generally given with a little bran; yet, when there is good grass, this is neither necessary nor is it economical. Shelter from the weather should, however, be afforded to colts of all classes during the winter season; and unless they have this they soon grow out of form and lose flesh, however well they may be fed. It is now fully recognized that warmth and protection from the rain encourage the growth of all our domestic animals, but in none are they more influential than in the one which we are now discussing. A colt neglected in its first winter never recovers its proper shape, nor does it grow into the size or strength of body and limbs which naturally appertain to its breed. Independently, therefore, of the cruelty in exposing the young animal to a climate for which it is not fitted, the plan does not pay; and on the latter account, if not on the former, even the most heartless, who consider their own interests, will make suitable provision for protecting their young horse stock from the inclemency of our winter climate.

The foal should be handled from the very first week of its existence; but there is no occasion to use it roughly in accustoming it to the pressure of the hand on all parts of its body and limbs. If this process is very gradually commenced, no resistance will at any time be offered, and the foal will allow its feet to be picked up, and its head and ears to be rubbed, without taking offense. Grooms are sometimes in the habit of showing off their powers in this way, by taking the foal up in their arms; but this can do no good, and may possibly lead to injury of the walls of the abdomen. About the fourth or fifth month, and before weaning is commenced, a light head collar should be put on; and after the foal is accustomed to its pressure, by repeatedly

handling the part on successive days, a leading-rein should be buckled on, and the young thing enticed to follow the groom without any absolute coercion. At the same time it must be made to feel that resistance is useless; and if it begins to pull, it must on no account be allowed to get away, the groom yielding as long as the foal pulls straight back, but coercing it gently with a side strain. A carefully handled foal will rarely give any trouble in this way; but there is an astonishing variation in the power which different men have over the animal creation. Some will gain control without using the slightest violence, while others will be always fighting with their charge, and after all, will not be able to do nearly as much with them as their more quiet and clever rivals. The latter class should never be allowed to have anything to do with young horses; and though there may be occasional exceptions which require severe measures, yet if once a man is found resorting to violence with a foal which he has had the management of from the first, he should, in our opinion, be removed from his post; or, at all events, he should be carefully watched, and a repetition of the offense ought to be considered as a notice to quit. Long before the coming among us of Mr. Rarey, this was recognized amongst the most extensive breeders of horses in this country; and though cruelty was not unknown among them, any more than it is now, it was fully recognized as not only an unnecessary but an unsatisfactory means of mastering the horse.

MARE, FOAL, Weaning and After Treatment of the.—The usual age for weaning the foal is about the end of the sixth month, that time being selected because the dam is generally about "half gone" with her next foal and cannot bear the double drain upon her system. Nor does the foal benefit much by the milk after this age, the teeth and stomach being quite strong enough to crop and digest the succulent grasses that are to be had from August to October, those being the months during which the several breeds attain the middle of their first year. If the autumn is a dry one, and grass is scanty, a few steamed turnips or carrots may be mixed with bran and given to the foal night and

morning; but, as a rule, unless it is to be highly forced into its growth for the purpose of early using, it will require only the grass which it can pick up when it is turned out. Three or four foals are generally placed together in the same paddock for company, and in this way they miss their dams far less than if confined by themselves. Care should be taken that nothing is left within their reach which can do injury, every fence and gate being carefully examined to see that no projecting bolt, nail, or rail is likely to lay hold of their bodies or limbs as they gallop about in their play. Foals of all ages are mischievous animals, and the better fed they are the more inclined they seem to lay hold of anything which attracts their notice.

Besides the shelter of a hovel, which we have already insisted on, the foal requires throughout its first winter, good feeding proportioned to its breeding and the purposes for which it is intended. Racing colts are allowed three or four feeds of bruised oats with steamed carrots or turnips, and sometimes steamed hay; but the general plan is to give as much as they will eat of the best upland hay, in its natural state, after they have finished their allowance of corn. Young stock intended to be sold as hunters and first-class carriage horses are always allowed half a peck of bruised oats, and a few carrots and turnips will not be thrown away upon them. Hacks, and inferior young stock of all kinds, get through the winter upon hay and barley-straw, part being sometimes cut into chaff, and mixed with a quartern of bran, daily, and if they are very low in flesh, a few oats being added. During severe frosts the straw-yard is the best place for the foal, on account of the hardness of the ground in the fields, and here he will easily keep himself warm and dry, and he can be attended to according to his wants. Let the breeder, however, constantly bear in mind that a check given to the growth in the first winter is never afterwards entirely recovered, and that if the colt which has experienced it turns out well he would have been still better without it.

COLTS, BREAKING, How to.—Colts, generally, are not taken in hand early enough for breaking, and become wild

and unmanageable when breaking becomes necessary. Then they have to be reduced to obedience by violent and barbarous usage, by which they are often permanently injured, besides acquiring evil and mischievous habits. Breaking should begin so early and proceed so gradually that the horse will grow up in those habits of obedience and docility which give him really his highest value. The colt should be made docile and fearless by familiar handling and petting. No such thing as a whip should ever be allowed to touch the very young foals. But man, however, should always appear among his stock as master. Colts, and sometimes horses, are spoiled by being petted and played with by children and others, who, half afraid of them, do not maintain the proper attitude toward them. The feed for colts must not be heavy; during the first year they should depend upon the mare and what grass and fodder they pick up on the pasture, with one or two quarts of oats a day, after weaning and during the winter. Plenty of fresh air is an important requisite for horses, whether young or old.

After the colt is accustomed to being led about by the halter, it is time to begin his education as a trotter. He can be led on a trot around the yard, never being led too fast or too long. It should be made a game or play, and the colt should enjoy it, being always encouraged to trot and never allowed to break or run. After the first year the feed may be increased to four or five quarts of oats a day, decreasing it during the months of good pasturage and increasing it in winter. A suitable biting apparatus may now be put on, the reins substituted for the halter. The colt should be exercised on the road and made familiar with passing vehicles and the common sights and noises. When two years and a half old, the colt may be safely broken to go under the saddle. Before attempting to use him in that way, he may be accustomed to the saddle, and by occasionally placing a child on his back, while standing beside him, there will be no trouble in using him in that way at the proper time. Too much weight in the saddle is apt to affect the symmetry of the line of the back and otherwise injure a young horse, and a rider of light weight should

always be selected. After being accustomed to the road, under the saddle, the colt may be harnessed and driven with a well-broken horse. And after being thus accustomed to harness, the colt may be hitched to a sulky, but, as soon as it is safe, should be changed to a skeleton wagon. This is preferred to a sulky, as the weight of the sulky and driver presses too much on the back and loins. This is the time of the principal danger by over-driving. The young horse is going nicely to the skeleton wagon, and every time he shows a fine gait and burst of speed, the driver is anxious to keep it up, or make him do it again. These evidences of capacity and promise should make the driver doubly cautious; and the young horse be allowed to make only short spurts of speed, and those for a short distance, and very few at any one drive. Many young horses are urged and driven until they get tired of trotting; thus whole seasons are lost, and frequently they are put permanently back.

HORSE, Diet for the.—In acute diseases no food whatever ought to be given until improvement has taken place, and even then only in a sparing manner; the articles of diet most suitable are bran, oats, hay, carrots, Swede turnips, and green food, either grass or clover.

The bran may be given either dry or wetted, whichever way the animal prefers it.

Oats may be given mixed with the bran, either raw and crushed, or whole and boiled.

It is necessary to keep the animal without food or water half an hour before and after administering the medicine.

HORSE, Clipping, Singeing and Trimming.—The coat of the horse is changed twice a year, the long hair of the winter coming off in April and May, or sometimes earlier when the stables are warm and there is no exposure to severe cold. A slight sweat hastens this shedding, as every horseman knows by experience, and even in harness the hairs are cast in the face of the driver to his great annoyance on a windy day. Clipped horses are larger than others in shedding their coats, and present a most disagreeable mottled appearance, which makes the state still more noticeable. The long

hair on the legs is about a month later in coming off, and indeed it will not fall till midsummer, unless some more violent means than are used in ordinary dressing are adopted. With some breeds and individuals the winter coat is not very much longer and coarser than that of the summer; but all, save blind horses, show more or less difference in favor of the summer coat. Curiously enough, horses which are totally deprived of sight have almost invariably a good winter's coat, often better than that which they show at other seasons; but why this is so, no one has ever been able to explain, though we have never known the fact disputed. About the middle of October, or early in November, the summer coat is thrown off; but some of the hair appears to remain as a sort of undercoat, among which the long, coarse hairs of winter make their appearance. These continue growing for six weeks or two months if they are clipped or singed, and even after Christmas, if the weather is cold and the skin is much exposed, there will be an evident increase in length of some of the hair. In accordance with the growth of this on the body is that of the hair on the legs, which become feathered all the way down below the knees in the fore legs, and half way down the backs of the canna bones in the hind legs. Low-bred horses have more hair on those parts than thorough-breds; but even these latter, if they are not stabled tolerably warmly, exhibit a great deal of hair on their legs. Those who can see no possibility of improving on nature come to the conclusion that this long hair is a defence against the cold, which ought not to be removed, and they argue that clipping and singeing are on that account to be rejected altogether. But these gentlemen forget that the horse in his native plains has always a short coat, and that the winds and rains, which cause him here to throw out an extra protection, are not natural to him. Moreover, if the animal is left to follow his own impulses, even when turned out in this country, he will be all the better for his long coat, for while it has the great advantage of protecting him from the cold, it is not wetted by sweat, because he does not voluntarily gallop long and fast enough to produce that secretion. The natural protection is therefore

undoubtedly good for the horse when left in a state of nature; but when man steps in and requires the use of the horse for such work as will sweat him severely, he discovers that a long coat produces such great exhaustion, both during work and after it, that it entirely forbids the employment of the horse for hunting, or any fast work. We have many times found it impossible to extend a horse for any distance on account of his long coat, which distressed him so much as to make him blow directly, whereas on removing it with the clipping scissors he could gallop as lightly as a race-horse, and be able to go as fast and as far again as before. When this happens in the course of the week following the previous failure, the only change made being in the coat, there can be no mistake made, and a constant repetition of the same result leaves no room for dispute as to the beneficial effects of removing the hair. But, say the opponents of the plan, "All this may be true, yet it is unsafe to expose the clipped horse after he has been warmed, or indeed at any time." Experience tells a very different tale, and informs us that so far from making the horse more liable to cold, clipping and singeing render him far less so. Suppose one of ourselves to be exposed to a cold wind, should we rather have on a thin dry coat or a thick wet one? Assuredly the former, and undoubtedly the wearer of it would be less liable to cold than he who has the wet one on. So with the horse. As long as his winter coat can be kept dry he is protected by it, and the slow worker, who is not made to pull such heavy weight as to sweat him, will be all the better for its protection, but the moment the pace is sufficiently accelerated to warm the skin, the sweat pours forth, and is kept up in-doors by the matted mass of moist hair with which the horse is covered. In former days we have had horses wet for weeks together, from the impossibility of getting them dry in the intervals of their work. They would break out afresh when apparently cool, and by no possible means could they be thoroughly dried. This of course wasted their flesh to a frightful extent, but on clipping them it was soon put on again, showing the great advantage of the plan. A chronic cough almost always accom-

panies this state of constant sweat, and it will be lucky for the owner of a horse so treated if it does not become acute and put an end to the miserable existence of the poor, ill-treated brute. The case is not always fairly put, as for instance by Stewart in his *Stable Economy*, where he says, "A long coat takes up a deal of moisture, and is difficult to dry; but whether wet or dry it affords some defence for the skin, which is laid bare to every breath of air when deprived of its natural covering. Every one must know from himself whether wet clothing and a wet skin, or no clothing and a wet skin, is the most disagreeable and dangerous. It is true that clipping saves the groom a great deal of labor. He can dry the horse in half the time, and with less than half of the exertion which a long coat requires; but it makes his attention and activity more necessary, for the horse is almost sure to catch cold, if not dried immediately. When well clothed with hair he is in less danger, and not so much dependent on the care of his groom." Now, we maintain that this passage is full of fallacies and misstatements. The comparison is not between wet clothing and a wet skin, and *no clothing* and a wet skin; but, as we have before observed, between a wet long coat and a dry short one. The clipping removes the tendency to sweat, or if its secretion is poured out it ceases directly the exercise which produced it is stopped. But taking Mr. Stewart on his own terms, who has not experienced the relief which is afforded by taking off wet gloves and exposing the naked hands to the same amount of wind and cold? This is exactly the case as he puts it, and tells directly against his argument; but it is scarcely worth while to discuss the subject at length, for we know no horseman of experience in the present day who does not advocate the use of the scissors or the lamp, whenever the winter coat is much longer than that of the summer. That horses are occasionally to be met with which show but little or no change in the autumn we know full well; but these are the exceptions to the rule, being few and far between. The vast majority would have their hair from one to two inches long if left in its natural state, and they would then be wholly unfit for the uses to which

they are put. We may therefore consider that it is admitted to be the best plan to shorten the coat in the autumn, and all we have to do is to discuss the best modes of effecting the purpose, with a view to decide whether clipping or singeing is to be preferred.

Horse Clipping is seldom performed by any but the professed artist, inasmuch as it requires great practice to make the shortened coat look even and smooth. When a horse is well clipped his skin should look as level and almost as glossy as if he had on his ordinary summer coat; but inferior performers are apt to leave ridges in various directions, marking each cut of the scissors. It should not be done till the new hair has attained nearly its full length, for it cannot be repeated at short intervals like singeing. If it is attempted too soon the new coat grows unequally, and the skin in a fortnight's time looks rough and ragged. A comb and two or three pairs of variously curved scissors are all that are required, with the exception of a singeing lamp, which must be used at last to remove any loose hairs which may have escaped the blades of the scissors. Two men generally work together, so as to get the operation over in from sixteen to twenty hours, which time it will take to clip the average-sized horse properly. These men were formerly in great demand at the clipping season, and it was extraordinary how little rest sufficed them, but now the use of the gas singeing-lamp has nearly superseded that of the scissors, and clippers are not so much sought after. While the process is going on, the horse ought to be clothed as far as possible, careful men removing only so much of the quarter piece as is sufficient to expose the part they are working at, and no more. As soon as the whole body is gone over as well as the legs, the singeing lamp is lightly passed over the surface, which will leave the hair burned to such an extent as to require either washing or a sweat, which latter is generally adopted, in the belief that it has a tendency to prevent cold. Our opinion is, that this is a fallacy, and that soap and water used quickly and rapidly, followed up by a good strapping and the use of plenty of warm clothing, is far less likely to chill the horse, than the exhaustion consequent upon a

sweat. We have tried the plan repeatedly, and known it tried by others still more frequently, but we have never heard of any ill effects resulting. Very often a sweat is exceedingly inconvenient, either from the difficulty in getting ground, as happens in towns, or from the infirm state of the legs. But soap and water can always be obtained, and if carefully used there is not the slightest danger attending them. Of course, after the removal of a long coat the skin requires an extra protection in-doors in the shape of a double allowance of clothing, and it will be necessary to avoid standing still out of doors, though, as we have before remarked, on the whole the risk of taking cold by horses worked hard enough to sweat them is less if they are clipped than if they have their long coats on.

Horse Singeing requires less practice than clipping, but it cannot be done without some little experience of its difficulties, and a novice generally burns the skin as well as the hair. To keep a horse's coat in good order it must be singed several times during the autumn, beginning as soon as the new growth has attained a length of half an inch beyond what is usual. The singeing lamp is then passed lightly over the whole body, and soap and water being used, as we have described under the head of clipping, or a sweat given if that plan is preferred, the coat is left for a fortnight or two weeks till it has grown another half inch, when the process is repeated, and again a third, and even a fourth time if necessary. On account of these repeated applications of the lamp, the professed singer is not so often employed as the clipper, especially as the former's work is not so difficult to perform as that of the latter.

The lamp now in common use is attached to a wide copper comb made like a rake in principle, and is so arranged that the teeth raise the hair and draw the ends into the flame. Where gas is procurable the comb is attached to the gas pipe by a flexible tube, and the lamp consists merely in a number of holes perforated along the edge of the comb, so that a series of jets of gas are lighted, and burn so strongly, that the coat is completely removed as near the skin as the teeth of the comb raise it. If gas cannot be obtained, a wide wick of cotton is

inserted in a flat holder, and the ends protruding to the level of the teeth, while a reservoir filled with naphtha supplies them with that inflammable fluid, a constant flame is maintained, but not nearly equal in strength to that from gas. As the coat is not allowed to grow so long before it is singed, so the clothing need not be much increased after its removal, and, indeed, in well regulated stables, there is little or no change required. Singeing is performed in less than one quarter the time* of clipping, and a shilling's worth of naphtha is enough for one horse, unless his coat is unusually long.

Horse Shaving was introduced some years ago to a limited extent, but it requires so long a confinement of the horse after it was performed that it was soon abandoned. The hair is lathered and cut off with the razor as closely as from the human chin, and unless this is done exactly at the right time, the growth subsequently is too short or too long. Instances have been known in which horses have remained naked until the next spring, and were thereby rendered perfectly useless, as they were chilled directly their clothing was removed. The only advantage in shaving over clipping is to be found in the reduced labor required; a good razor, or rather set of razors, soon going over the surface. But the invention of singeing did away with this superiority, and the shaving of horses is therefore one of the fashions of a day which have now disappeared.

Horse Trimming.—The jaws, nostrils, ears, legs, mane and tail, are all more or less subjected to the care of the groom, who removes superfluous hairs from each or all by various means, as follows:

The jaws, nostrils and ears are singed, the last named not being touched inside, as the internal hairs are clearly a protection of the delicate lining membrane of the ear from the cold and wet. The long bristles of the nostrils may either be cut off, pulled out, or singed off, but the first plan is the easiest and the most humane. There are, also, some bristles about the eyes which are generally removed, but it is very doubtful whether many an eye would not be saved from a blow in the dark if they were left untouched. Fashion, however, dictates their removal, and her orders must generally be complied

with. The hair which grows an inch or more in length beneath the jaw, being of the same nature as the rest of the coat, can only be singed off with advantage, and it should be done as fast as it grows, especially if the singeing is not universal, or there will be a different color presented in these parts. Nothing gives a horse such a low-bred appearance as a goatlike beard, and the trimming of this part alone will completely alter the character of the animal where the hair has been at all long. The legs are trimmed partly by singeing, and partly either by clipping or pulling out the hairs. Great dexterity is required to manage this performance in a workmanlike manner, so as to avoid the stale and post-like appearance which is presented by a leg clipped all over (without a corresponding clipping of the body), and at the same time to remove all, or nearly all, the superfluous hair. In the summer a clipped leg is totally inadmissible, and even from the legs of a badly bred horse the hair may be pulled by gradually working at it for a little time every day with the fingers, armed with powdered resin. This prevents the hair slipping through them, and by its aid such a firm hold may be obtained that, as we said before, perseverance will enable the groom to clear the legs entirely, with the exception generally of a strong lock of hair behind the pastern. When this is very obstinate it is allowable to use the scissors to clear away the hair below the horny growth which is found there, but there should always be left a slight fringe round this, so as to avoid the sharp and stiff outline presented by the clipped leg. In the winter, the arms and backs of the knees, as well as the bosom and the insides of the quarters, will generally want singeing, whether the body is submitted to the lamp or not; but in the summer, even if any long hairs are left there, they are easily removed by the hand armed with resin. Unless general clipping or singeing is practiced, the front surfaces of the legs do not require trimming at any season of the year.

The mane is not usually cut, but formerly it was a very common practice to "hog" it, that is, to cut it to a sharp-pointed ridge, sticking straight upwards from the crest, and giving that part the appearance of extraordinary height,

Sometimes, however, the mane is very thick, and then for the sake of appearances, it is necessary to thin it, which is done by twisting a small lock at a time round the comb, and pulling it out; this gives some little pain, but apparently not much, and evidently not more than the trimming of the legs, and not so much as in pulling out the feelers or bristles growing out from the nostrils. A small lock of mane is generally cut just behind the ears where the head of the bridle rests, as it would otherwise lie beneath that part in an untidy manner.

In trimming the tail various methods are adopted, when it is cut square; for if the hairs are allowed to grow to the full length, no interference is necessary beyond an occasional clipping of their points to prevent them from breaking or splitting. A square tail, however, whether long or short, demands the careful use of the scissors or knife, without which the horse to which it belongs is sadly disfigured. Two modes are practiced—in the first, the tail is carefully combed out, and then allowing it to fall in its natural position, it is gathered up in the hand just above the part to be cut off, and here a sharp knife is drawn across it backwards and forwards, without notching it, till it passes clean through. The tail is then released, and any loose hairs projecting are removed with the scissors. The second mode is not so easy, but when well carried out is more satisfactory to the eye, inasmuch as it is capable of giving a sharper and more defined edge to the square tail. As in the first method, the tail is carefully combed out; it is then held by an assistant's hand, placed beneath the root of the dock, as nearly as may be in the position which it assumes in the animal out of doors. While thus poised the operator takes a pair of sharp scissors, and holding the blades horizontally open, he insinuates one of them through the middle of the tail at the place to be cut, passing it straight backwards, and cutting the hair quite level from the central line to the outside on his own left. Then reversing the blades, and keeping to the same level, he cuts towards the right, and if he has a good eye, and can use his hands in accordance with its dictates, he will have presented a very prettily squared tail.

On the other hand, if these organs are defective, or if he wants experience, he will have notched the end of the tail in a most unsightly manner. If the groom wishes to try his hand in this operation, he should get hold of a long tail, and begin far below the point where the squared end is intended finally to be. This will afford him five or six experimental cuts, and if he cannot satisfy himself, as he nears the proper length, that he will be likely to succeed, he can still call in the aid of a more skillful operator before it is too late. The hair of the tail grows so slowly, that two or three months are required to remove the disfigurement which is sometimes caused in this way, and consequently it behooves the groom to be doubly careful, for his own sake as well as his master's.

To make the mane lie smoothly on its proper side, which it sometimes obstinately refuses to do, it must be plaited in small locks, and the ends loaded with lead, if it cannot be made to lie down without. An experienced groom, however, will generally succeed in so managing the plaits that they lie close to the neck, which is all that can be effected by the aid of lead, but sometimes the hair is so obstinate that nothing else will effect the object in view.

HORSE, BANDAGES, Use and Application of.—Bandages are applied to the legs of the horse for three different purposes. First, to give support to the blood-vessels and synovial capsules; secondly, as a vehicle for applying cold lotions; and thirdly, for drying and warming them.

For the mere purpose of support either linen or flannel bandages may be put on, according to the weather, and the tendency to inflammation. The legs of seasoned old horses are seldom so prone to become hot as those of young ones, and excepting in very warm weather, flannel bandages seem to suit them better than linen. On the contrary, if flannel is applied to the legs of a colt, even if they are not inclined to inflame, they will become hot and uncomfortable, and he will learn to tear them off, in which some horses become perfect adepts. Whichever kind of bandage is put on, it should be previously tightly rolled with the strings inwards, then taking it in the

right hand, and unwrapping about six inches, they are laid against the cannon bone on the side nearest to the groom, so that the folds shall have a tendency to unroll *from* him and not *to* him. While the left hand keeps the end from slipping, the right passes the roll of bandage closely round the leg till it meets the left, when the latter, still pressing the end against the leg, lays hold of the roll, and allows the right to be brought back to meet it on the other side. After which the coils are repeated till the whole bandage is run out and the leg encased, one row being slightly above or below the level of the next, as may be required. The great art consists in avoiding unequal pressure, and yet giving sufficient to accomplish the purpose for which bandaging is designed. From the projection backwards of the pastern-joints, it is impossible to make the folds lie perfectly smooth, and there must be loose parts, which however are covered over by the next turn. No written description, however, will suffice to teach this little operation, and the young groom should watch a good bandager, and imitate him as exactly as he can. The strings at the end serve to tie the bandage on, and these also must neither be so tight as to cut the leg, nor so loose as to allow the bandage to fall down.

When cold lotions are to be applied by means of bandages, linen is the proper material, as flannel is too bad a conductor of heat, by evaporation, for the purpose. The whole bandage, after being rolled up moderately tight, should be dipped in cold water, or in the lotion which may be recommended, and then while quite wet, it is to be applied in the way which we have just described. The following lotion is useful for the purpose:

Take of Tincture of Arnica a wine-glassful; Nitre, one-half ounce; Sal Ammoniac, one ounce; Water, half a bucketful. Mix and use by dipping the bandages in before applying them, and wetting them with the solution afterwards by means of a sponge.

If the groom is careful, he may remove inflammations of the leg better by means of dipping them in cold water, or the above lotion may be applied with a sponge every half-hour, holding each leg over the bucket, than with the aid of band-

ages. A cold douche by means of a forcing garden engine is also extremely beneficial to the legs, but it must be used out of doors, as it will wet the litter and the walls of the stall if the water is splashed over them within doors.

For Drying and Warming the Legs when the horse is being dressed, flannel is the only proper material for bandages. Its modes of application is not of much consequence, provided the bandages are put on moderately loose, for tight pressure has a tendency to prevent the return of natural heat, which is so much desired. After wetting the legs the bandages should be applied somewhat more tightly, so as absorb the moisture as much as possible.

HORSE, FEET, Management of the.—

In the stabled horses the feet require constant care, for they are not only artificially shod, but they are allowed to stand on a material which is a much worse conductor of heat than the surface of the earth, by nature designed to bear them. Hence, if neglected, they either become hard and brittle, or they are allowed to be constantly wet, and then the soft covering of the frog is decomposed, and emits a disagreeably smelling discharge, which soon wastes it away, leaving no other protection to the sensible organ beneath, and constituting what is called an ordinary thrush. Again, it is found by experience, that not only must the shoes be renewed as they wear out, but even if no work is done, and consequently they are not reduced in size, they no longer fit at the expiration of about three weeks, and they must be removed, to allow a portion of the sole and crust being cut away before they are again put on. The groom must therefore attend to the following points: *First*, to prevent the feet from becoming too dry; *secondly*, to take measures against their becoming thrushy from wet; *thirdly*, to see that the shoes are removed at the end of every three weeks, or more frequently if necessary; and *fourthly*, to examine carefully every day that they are securely nailed on without any of the clenches having started up from the surface, so as to endanger the other leg.

Dryness of the Feet is prevented by the use of what is called stopping, which is composed either of cow-dung alone, or cow-dung and clay mixed, or of cow-dung and pitch. The first is by far the

most powerful application, but it moistens the sole too much if employed every night, and then produces the opposite evil in the shape of thrush. A mixture of equal parts of cow-dung and clay may be used every night with advantage, and this we believe to be the best of all stoppings. It should be kept in a strong box of wood, about a foot long and eight inches wide, with a handle across the top, and it should be applied the last thing at night to the soles of the fore feet only, by means of a thin piece of wood, a foot long and a couple of inches wide, with which the space within the shoe is completely stuffed. If the feet are obstinately dry, in spite of repeated stoppings with cow-dung alone, which will rarely be the case, a tablespoonful of salt may be added to the cow-dung, and this will never fail. For most horses stopping with cow-dung alone once a week is sufficient, but the groom can judge for himself, by their appearance, of the number of stoppings required. If three parts of cow-dung and one of clay are used, the feet may be stopped twice a week, or, perhaps, every other night, and if equal parts of each are adopted as the composition, almost any feet will bear being stopped every other night, with exception of flat or pumiced soles, which should never be stopped at all. On the night before shoeing, every horse, even if he has flat soles, will be the better for having his feet stopped, the application softening the horn so as to allow the smith to use his knife to slice it without breaking it into crumbling fragments. Several patents have been taken out for felt pads, to be soaked in water, and then soaked in the hollow of the shoe, but they do not answer nearly so well as cow-dung stopping, which has far more emollient qualities than mere water. We believe nothing has yet been discovered which has qualities at all equal to this old-fashioned natural remedy.

Thrushes are prevented by keeping the frogs free from ragged layers of elastic substances of which they are partly composed, and at the same time by maintaining a dry state of the litter on which the horse stands. We are now considering the management of the horse at grass, where thrushes are generally produced when the weather is very wet, or when the pasture is of too marshy a

character, but the frogs of the stabled horse, which ought never to be allowed to be so moist as to become decomposed. Some ulcerated conditions of the frog which are still considered to come under the general denomination "thrush," are due to several internal diseases of the bones of the foot, and are not caused by moisture at all. Still these are rare exceptions, and the ordinary thrush of the stable may be considered as invariably caused in the latter way. Cases are also occasionally to be met with in which, from general grossness of the system, the sensible frog throws off part of its horny covering, and secretes a foul matter instead. The management of these diseased conditions comes within the province of the veterinarian, and we shall therefore not enter upon its consideration; but the prevention of the mere decomposition of the external surface by moisture is a part of the duties of the groom, and so is the application of the proper remedies for it, as soon as the nature of the case is clearly made out. Here antiseptic astringents, which are quite out of place in inflammatory thrush, are the only useful applications, and by their means alone can decomposition be stopped. Of these Sir. W. Burnett's solution of chloride of zinc is the best, but in mild cases, Condy's fluid, which is the permanganate of potass, will answer well, and is not so poisonous in its nature if carelessly left about. Friar's Balsam, with as much of the sulphate of zinc dissolved in it as it will take up, is the old-fashioned grooms' remedy for the thrush, and a very good one it is, if carefully insinuated into the cleft of the frog on a piece of tow wetted with it. The grand principle, however, is to prevent thrush rather than to cure it, but when horses are bought, or come home from the grass with it, the curative method must be carried out.

The removal of the shoes at regular intervals, whether they are worn out or not, is a most important part of the duties of the groom. On examining the shape of the foot it will be seen that the diameter of the circle in contact with the shoe is greater than that of the coronet, and hence as the shoe is forced away from its original position, by the growth of the horn, it confines the walls to the extent of

the difference between the diameter of the foot at its old position and that of the part which it now occupies. For if two lines from the surface of the coronet on each side were continued through the outside surface of the crust to the new seat of the shoe, they would be far from parallel, and yet the shoe nails must have been carried on in perfect parallel lines on account of the unyielding nature of iron. For this reason a shoe, when it has not been removed at the end of a month, will be found to lie within the heel of one side or the other, by which to some extent contraction is prevented, but at the expense of the heel, into which the corresponding part of the shoe has entered. This is a frequent case of corns, and horses which have once been subject to that disease should have their shoes removed once a fortnight.

One of the most annoying accidents to the horseman is the loss of a shoe, whether it happens in the hunting field or on the road. Some horses can scarcely be prevented by any care of their grooms from pulling off a shoe in hunting when they get into deep ground, but on the road there is no such excuse, and the frequent loss of a shoe by the hack or harness-horse is sufficient to condemn the groom of carelessness in this particular. Every morning when the feet are picked out it is easy to look the shoes over and see if they are tight. The clenches also ought to be examined, and if they are not raised at all it may safely be predicated that the day's journey will be completed without the shoe being lost. A raised clench may severely cut a horse on the inside of the other leg, and in those who are predisposed to "speedy cut" it may cause severe injury, and perhaps occasion a fall of the most dangerous character.

HORSE, STABLE, Proper Treatment of the.—There is scarcely any point upon which there is so much difference of opinion, as in relation to the temperature of stables. Some contend for an amount of heat which would raise Fahrenheit's thermometer to 65° or 70°, while others would never have their stables, if they could help it, above 45°. So much depends upon the kind of horse in them, and the work he has to do, that is to say, whether he is much exposed to the cold or not, that no rule can be laid down

which is applicable to all stables, but we believe it may be asserted that none should be above 60° , or below 50° , if it can be avoided. There are days in the summer season, when the air out of doors in the shade stands at 90° or 95° , and, of course, in such weather, it is impossible, even with the doors and windows wide open, to keep the stable at a lower degree, or even within several points of those above stated. So also, with a thermometer scarcely above zero, it will be difficult to keep the air wholesome, and yet to prevent its temperature falling lower than 45° , which, at such seasons, feels very warm to those who come in from the external air. But, with these exceptions, we think the rule which we have laid down is a good one. The warmer the stable, the better the coat looks, till it is exposed to the weather, and even if it is so, it will take no injury if the horse is kept moving, but if not, it soon becomes chilled, and not only does the general health suffer, but the appearance also. There is, however, another, and very serious objection to hot stables, consisting in their ill-effect upon the legs and feet, which inflame much more readily in a warm atmosphere than in a cool one. We have often known horses stand severe rattling for months together, while standing in a stable which was so cold as to make their coats as rough as badgers, but when removed to warmer quarters, they have at once gone "all to pieces," their legs or feet becoming inflamed from missing the refrigerating effect of cool air after their daily work. The body may easily be kept warm enough by extra clothing, and, if necessary, a hood and breastplate may be worn all day and all night, but not even wet bandages will cool the legs if they are surrounded by hot air. On the whole, therefore, for the private gentleman's stable, including those for hunters, hacks, and carriage horses, we should advise a regular temperature to be preserved as near 55° of Fahrenheit as possible. In coming in from the external air this will appear very warm to the sensations, but it is far below the high state of heat at which many of our stables were kept, until within the last few years. We have often known 70° to 75° of Fahrenheit insisted on as the lowest which would suffice to get a hunter into condition, but practice

proves the reverse, and that with plenty of clothing he will do in a cool stable of the temperature we have recommended, far better than in one possessing a higher range. The celebrated "Nimrod" (Mr. Apperley) was a great advocate for a hot stable, which he thought ought never to be reduced much below 70° or 75° ; but his opinions, valuable as they undoubtedly are in the main, cannot be looked upon as in all points to be relied on.

HORSE.—Crib-biting is a diseased condition of the stomach, for which there has never yet been a cure discovered, except on the principle of restraint. It may, therefore, be considered under the present head. In crib-biting the teeth are applied to some fixed object—generally the manger, so as to afford a fulcrum for the muscles of the neck to act from, and by preventing this, or by contriving so that the contraction of the muscles of the neck shall give pain, the vicious habit is got rid of for the time. The most common method is to buckle a leather strap so tightly round the neck, just behind the jaw, that when the horse attempts to crib, he tightens the muscles of that part, and these being pressed against the strap, occasion such pain that the act is not completely carried out, and even if it is on the first occasion, the attempt is not repeated. The strap is buckled sufficiently tight to do this without much impeding the act of swallowing, or the flow of blood from the head, through the jugular veins to the body; but in confirmed cribbers no ordinary pressure will suffice, and then the head often becomes affected from the impediment which is caused to the return of the blood from the brain to the heart. To remedy this defect Mr. Cook Saddler, of England, two or three years ago, invented a neck strap, containing a number of prongs, which pass through holes in a spring guard, and unless this is strongly pressed, they do not touch the skin. It is applied by throat straps to an ordinary head collar, and in slight cases it is found to answer most perfectly; but when the vice has become confirmed, and the desire to indulge in it is very strong, the pain occasioned by the prongs is endured, and no effect at all is produced. It is not, therefore, of much use, as the common strap does no injury in those cases where Mr.

Cook's is effectual, and the latter will not avail when the plain strap is forbidden, on account of the extreme pressure required. We cannot, therefore, recommend any plan but such as will totally prevent the prehension of the manger, and this is accomplished by one of two ways. In the first of these, the manger itself is either concealed, or the corn and hay are placed on the ground, in a space slightly separated from the rest of the stall by a row of bricks, or other similar bodies, which cannot be laid hold of. To the concealed manger and rack there is the objection, that while the horse is feeding, he can go on cribbing without interruption, and as this is the time chiefly chosen for the act, success is only partly achieved. Placing the food on the ground is entirely successful in stopping the habit, but it leads to some waste of provender, as the horse is apt to tread upon it, after which he will refuse to eat it. By far the best preventive, in our opinion, is the bar muzzle, consisting in an iron frame work, covering the lips and nose, and suspended from the head by a leather head collar, so that the lips can reach the corn or hay, but the teeth are too wide to pass through the bars and seize the manger. This mechanical contrivance is entirely harmless, and perfectly effectual, the sole objection to it being the fact that it proclaims the wearer to every one who looks into the stable as a cribber. This may be a valid reason for rejecting its use for dealers' horses, but in a gentleman's stable, utility and humanity ought to have precedence of such a feeble argument. When the bar muzzle is adopted, it should always be kept on, excepting, of course, when the bridle replaces it for work or exercise, or while the head is being dressed.

HORSE, Kicking the Wall or Stall
Post is sometimes a very annoying trick, and though not always done in a vicious manner, it is objectionable, because the kicker is liable to lame himself, or one of his neighbors. In mares it is often of a sexual nature, and in them it is much more common than in geldings—the extent to which it is carried by them being generally greatest at the beginning and end of their being “in use.” At such times mares go almost mad, if they have an irritating neighbor, who keeps smelling them, and we once had one who

kicked herself to pieces in a paroxysm of this kind, which nothing but tying up the foreleg could restrain. There are several remedies in common use, but none can be relied on in all cases. Foremost among these is the use of gorse, nailed to the stall-post, which will almost invariably quiet a low-bred animal, especially if a gelding, but high-bred mares will sometimes kick at it all the more, for the punishment they receive. A padded leather strap, buckled round the canna bone, with a common sinker attached to it, or, instead of this, a few links of heavy chain, will generally keep the horse from kicking, because in making the attempt he gives his coronet and pastern a heavy blow. If, however, this plan is unsuccessful, it is liable to cause lameness, from the inflammation produced by the blows, and, therefore, the effect must be carefully watched. Few horses kick out with both legs, and a pair of hobbles buckled around the hind fetlocks will, in a vast majority of cases, put an end to the trick as long as they are worn, without any risk, or producing any serious annoyance, save only what is inseparably connected with the prohibition of the indulgence in the desire to kick. A narrow strap buckled round the part just above the hock, so as to confine the hamstring, will have the desired effect, by giving intense pain when any attempt to strike out is made, but it is a most annoying infliction to the horse, and generally prevents his lying down, from the necessity which there is for bending the hock in reaching the ground. We should, therefore, give the preference to the bunch of gorse, or if that is not readily procurable, to the sinker of wood or iron suspended to a strap round the leg.

HORSE, Scratching the Ear with the hind foot, the horse is very apt to get his leg over the collar rein, if the sinker is not heavy enough to keep the rein tightly strained between the head collar and the ring in the manger. Impatient animals, also, which are continually pawing at their litter, will sometimes get one of their fore feet over it, but this is not so serious an accident. To prevent the mischief occasioned in either case by the struggles to get free, especially when the hind leg is thus caught, the ring for the

collar reins is sometimes made to draw down with a spring-catch, which releases them when pulled in that direction, but in no other. When, however, the sinker is properly weighted, it is almost impossible for such an accident to occur; and this simple invention has now become obsolete.

HORSE, Tearing the Clothes off, is by means an unusual stable habit, and it is not one very difficult to cure. There are two effectual preventives, however: one of which consists in the regular employment of a rough horsehair cloth, made like that for hops, outside the rug and which is so disagreeable to the teeth, that no horse will attempt to tear it; the other is carried out by means of a pole of ash, about three-quarters of an inch in diameter, with an iron eye attached to each end. One of these is fastened, by means of a short leathern strap or buckle, to the side of the roller-pad, while the other has a strap or chain about a foot long, which attaches it to the head collar. The pole should reach about fifteen inches beyond the point of the shoulder, and it should be fixed on the side which is generally uppermost when the horse lies down, so as not to be under him in that position. It is a very simple and cheap apparatus, and any village blacksmith can make and apply it.

HORSE, Weaving is a mark of an irritable nervous system, beyond which it is harmless, but quite incurable. It consists in a perpetual moving of the head from one side of the manger to the other, with an action like that of a wild beast in his den. The constant friction soon wears out the collar reins when there are two, and on that account a single rein may be adopted in this particular instance with advantage.

HORSE, Eating the Litter is a peculiar appetite, which chiefly occurs either in those horses which are kept short of hay on account of their tendency to fatten, or when the animal possessing it has been stabled for a very long time together and requires a change. In the former case, nothing but the muzzle will be of the slightest service, but in the latter a run at grass, or soiling indoors for a month or two, will remedy the disorder of the stomach. Rock salt in the man-

ger will sometimes have the desired effect, producing a degree of thirst which will make dry litter distasteful.

HORSE, Kicking and Biting savagely are marks of actual vice, and scarcely come within the limits of the present section. Still the groom must know how to guard against them in the best way, so as to save himself from danger without unnecessarily punishing the horse. There are some animals which cannot be effectually restrained without severity, but on the average, kindness and firmness united will overcome any horse. Sometimes it is necessary to put on the muzzle while the dressing is going on, but this is chiefly because the skin is so irritable that the brush or whip excite sensations which lead to the use of the teeth or hind legs to prevent their recurrence.

HORSE, Bad Habits and Out-door Vices.—Out-door vices depend upon the temper of the individual, and include shying, rearing, kicking, lying down, plunging or bucking, shouldering, and running away. Bad habits arise from a defective formation of the body, and are confined to stumbling and cutting.

HORSE, Shying generally arises from timidity, but sometimes it is united with cunning, which induces the animal to assume a fear of some object for the sole purpose of finding an excuse for turning round. The usual cause for shying is doubtless the presence of some object to which the colt has not been accustomed, and if he has buck eyes, which render him short-sighted, it will be difficult to convince him of the innocent nature of the novel object. There are endless peculiarities in shying horses, some being dreadfully alarmed by one kind of object, which to others is not at all formidable. When a horse finds that he gains his object by turning round, he will often repeat the turning without cause, pretending to be alarmed, and looking out for excuses for it. This is not at all uncommon, and with timid riders leads to a discontinuance of the ride, by which the horse gains his end for the time, and repeats the trick on the first occasion. In genuine shying from fear, the eyes are generally more or less defective; but sometimes this is not the cause, which is founded upon a general irritability of the nervous system.

Thus, there are many horses which never shy at meeting tilted wagons, or other similarly alarming objects, but which almost drop with fear on a small bird flying out of a hedge, or any other startling sound. These last are also worse, because they give no notice to the rider, whereas the ordinary shyer almost always shows by his ears that he is prepared to turn round.

The best plan of treatment which can be adopted is to take as little notice as possible of the shying, and to be especially careful not to show any fear of its recurrence when a wagon appears in the distance. When the horse begins to show alarm, and not till then, the rider should speak encouragingly to him, and, if necessary, with a severe tone, which may even be supported by the use of the whip or spurs, if his own onward progress cannot be otherwise maintained. The principle which should be carried out is to adopt such measures as will get the horse to pass the object at which he shies somehow or other, and this should be effected with as little violence as possible, always commending in an encouraging tone as soon as the purpose is gained. Nothing has so great a tendency to keep up the habit as the plan so common among ignorant grooms, of chastising the shyer after he has passed the object of his alarm. If he can be persuaded to go quietly up to it and examine it with his muzzle as well as with his eyes, great good will be effected; but this can seldom be done with moving wagons, and heaps or stones are generally only alarming from defect of vision, so that each time they assume a new phase to the active imagination of the timid animal.

HORSE, REARING, How to Manage.

—In the British Sportsman we find the following hint respecting the management of a rearing horse, which strikes us as being worthy, as it is easy, of a trial. Whenever you perceive a horse's inclination to rear, separate your reins and prepare him. The instant he is about to rise, slacken one hand and bend or twist his head with the other, keeping your hands low. This bending compels him to move a hind leg, and of necessity brings his fore feet down. Instantly twist him completely round two or three times, which will confuse him very much, and completely throw him off

his guard. The moment you have finished twisting him around, place his head in the direction you wish to proceed; apply the spurs, and he will not fail to go forward. If the situation be convenient, press him into a gallop, and apply the spurs and whip two or three times severely. The horse will not perhaps be quite satisfied with the first defeat, but may feel disposed to try again for the mastery. Should this be the case, you have only to twist him, etc., as before, and you will find that in the second struggle he will be more easily subdued than on the former occasion; in fact, you will see him quail under the operation. It rarely happens that a rearing horse, after having been treated in the way described, will resort to the trick a third time.

HORSE, Rolling.—This is a very pleasant and perfectly safe amusement for a horse at grass, but cannot be indulged in the stable without the chance of his being dangerously entangled with the halter rein and being cast. Yet, although the horse is cast, and bruised, and half strangled, he will roll again on the following night, and continue to do so as long as he lives. The only remedy is not a very pleasant one to the horse, nor always quite safe; yet it must be had recourse to, if the habit of rolling is inveterate. "The horse," says Mr. Castley, "should be tied with length enough of halter to lie down, but not to allow of his head resting on the ground; because, in order to roll over, a horse is obliged to place his head quite down upon the ground."

HORSE, for Kickers, except when the habit is merely a mode of letting off superfluous spirits, severity is the only remedy, and a strong application of the whip down the shoulder the best means of using it. At the same time the snaffle-reins ought to be firmly held, and by their means the head kept up, for there is always a tendency to lower this part in the act of kicking; the gag-snaffle is very effectual for this purpose.

HORSE, Plunging may be described as a series of bounds into the air, which when they are made up and down in the same place, or nearly so, are called "bucking," from their resemblance to the playful antics of the deer. A bucking horse is very difficult to sit, but by sawing the

mouth with a twisted snaffle it may generally be stopped at once.

HORSE, Shouldering is an attempt to crush the leg of the rider against a wall, which some ill-tempered horses are fond of doing. It is easily avoided by pulling the horse's head round to the wall instead of from it.

HORSE, Running Away is too well known to need description. In some horses it is a species of temporary madness, and scarcely any bit, however severe, will stop them. When there is room and scope enough, the *remedy* is simple, but, unfortunately, runaway horses generally choose a crowded thoroughfare to indulge their fancies in. A gallop to a stand-still, with the free use of the spur or whip at the latter part of it, will sometimes prevent a recurrence of this vicious act; but where the tendency is very strong it will have little effect. Punishing bits only make some high-couraged horses worse, but the majority of runaways would be dangerous with a plain snaffle only, and yet there are some which will go quietly enough in it, while the adoption of a curb will rouse their tempers at once. Of course they can only be ridden with great care and judgment, and must never be roused unnecessarily. Fortunately the mouths of horses now are made so much more carefully than in former times, and their management is so much better understood, that we seldom hear of or see an accident from this cause, either in the saddle or in harness. The most essential part of the treatment of a runaway is the proper selection of a bit, which would be sufficient to control him without exciting opposition from the pain it gives.

HORSE, Stumbling arises from a variety of causes, and the nature of any particular case should be thoroughly investigated before any remedy is attempted. Sometimes it is merely dependent upon low or "daisy cutting" action, and then it is possible that it may not be attended with danger. We have known many horses which would stumble at least every half-mile, but yet they would travel for years with sound knees, the other leg being always ready to catch the weight. In other cases a stumble would only occur at rare intervals, but if the trip was made it was rarely recovered, and a fall was almost sure to follow. Again, it happens with

some horses that when they are fresh out of the stable their action is high and safe, but after a few miles the extensors of the leg tire and they are constantly making a mistake. Inexperienced judges are very apt to examine the action of the fore legs alone, while that of the hind quarter is of quite as much importance to safety, and is more so as regards the ease of the rider. Lameness is a frequent source of a fall, from the tendency to put the foot too soon to the ground in order to take the weight off the other. And lastly, upright pasterns will produce stumbling, when the shoulders are so formed that the foot is put down too near the centre of gravity.

The best plans for remedying these several conditions are as follows: If the cause is weakness of the extensors, no care can be of much service; all that can be done being to be on the look out for a trip and then to take the weight off the fore quarter as much as possible by sitting well back, at the same time using such an amount of sudden pressure on the bit as to cause the horse to exert himself, without any attempt to keep up the head by mechanical force, which is an impossibility. When laziness is the cause, the stimulus of the spur or the whip will suffice, and it often happens that a horse is safe enough at his top pace, while a slower one is full of danger. In lameness, of course, the only remedy is to wait till the foot or feet are sound again.

HORSE, Cutting depends either upon the legs being set on too near together, or on their joints not acting in a proper hinge-like manner. Many horses cut when in low condition, but are quite free from the defect when in flesh, and in such cases it is only necessary to let them wear a boot until they have had time enough to become fresh. Wherever horses "go close" care should be taken that the shoes do not project beyond the hoof, and the clenches of nails should be carefully watched, the groom seeing that they are filed down by the smith if they stand up at all above the level of the horn. Cutting may take place either on the prominent part of the fetlock-joint, or midway between it and the knee, or just below the latter, which is called "speedy cutting," and is very apt to cause a fall. A boot should be fitted to the leg in either case, and worn till the part

is thoroughly healed and all swelling has disappeared, when if any likely method of treatment has been adopted the horse may be tried without it, but no journey should be undertaken without one in the pocket in case it may be needed. A peculiar method of shoeing, called a feather-edged shoe, will often prevent this bad habit as long as it is adopted.

HORSE, Slipping the Halter.—This is a trick at which many horses are so clever that scarcely a night passes without their getting loose. It is a very serious habit, for it enables the horse sometimes to gorge himself with food, to the imminent danger of staggers; or it exposes him, as he wanders about, to be kicked and injured by other horses, while his restlessness will often keep the whole team awake. If the web of the halter, being first accurately fitted to his neck, is suffered to slip only one way, or a strap is attached to the halter and buckled around the neck, but not sufficiently tight to be of serious inconvenience, the power of slipping it will be taken away.

HORSE, Stubborn.—The brain of the horse seems to entertain but one thought; for this reason continued whipping is out of the question, and only confirms his stubborn resolve. But if you can in any manner change the direction of his mind, give him a new subject to think of, nine times out of ten, he will start without further trouble. As simple a trick as a little pepper, aloes, or the like, thrown back on his tongue, will often succeed in turning his attention to the taste in his mouth.

HORSE, Vicious, to Tie.—A horse that has contracted the habit of breaking loose when tied or in the stable, may be secured by the foot instead of the head, without fear or danger of escape.

HORSE, Tricks of Dealers.—Unless a person is accustomed to horses, it is one of the most foolish things imaginable for him to go to a regular horse dealer to purchase a horse—taking his word for everything. Of course some will act honorably, and you will find the horse all that he recommends, while others will deceive you, and do it in such a manner that until you get your horse home you will not discover the cheat. We give a number of tricks which are used by them in buying as well as selling:

TO MAKE A GOOD PULLING HORSE BAULK.—Take tincture of cantharides, two ounces; and corrosive sublimate, two drachms. Mix well and bathe the shoulders of the horse at night.

TO MAKE THE HORSE APPEAR AS LAME.—Take a hair from the tail and place it through the eye of a small needle; press the skin between the outer and middle tendon or cord of the front leg; shove the needle containing the hair through, then cut off the hair on each side, and let the foot down. In twenty minutes' time the horse will go lame.

TO MAKE A HORSE STAND BY HIS FOOD AND NOT TOUCH IT.—Take common tallow and grease the horses front teeth and roof of the mouth, and the horse will eat nothing until you have washed the tallow out.

TO CURE A HORSE OF THE CRIBS OR SUCKING WIND.—Saw between the upper teeth to the gums.

TO NERVE A HORSE THAT IS LAME.—About half way from the knee to the joint, on the outsides of the leg, make a small incision, and at the back part of the shin bone you will find a small white tendon or cord; cut this tendon or cord off, and sew up the incision with a stitch, and the horse will walk off on the hardest pavement without a limp.

TO MAKE A HORSE APPEAR AS BADLY FOUNDERED.—Around the fetlock, between the foot and the heel, fasten it around tight, and then smoothe the hair over the wires. In thirty minutes the horse will be lame. Do not leave the wire on over twenty minutes.

TO COVER UP THE HEAVES.—Give the horse one-third of a pound of small bird shot, and he will not heave until they pass through him.

TO MAKE A HORSE LOOK AS IF HE HAD THE GLANDERS.—Melt five ounces of butter, and pour it into the animal's ear.

TO DISGUISE LAMENESS.—When a horse is lame in one shoulder, it can be easily disguised by making a similar lameness in the corresponding leg, by taking off the shoe and replacing, first putting a bean between it and the foot.

TO MAKE A STAR ON A HORSE.—Take a piece of coarse tow-line, the same to be just the size of the proposed star; spread on it some warm pith, and apply it—the place to be first shaved; leave it on four days, when wash the spot with smart-

water or elixir of vitriol four times a day until well. When the hair grows, it will be white.

TO MAKE AN OLD HORSE APPEAR YOUNG.

—This you can do by filing down the teeth, the dark markings of which are done by hot irons, filling up the cavities over the eyes by puncturing the skin over the depressions, and filling with air through a tube, after which close the aperture, when the brow will become smooth—but only for a time, but long enough to dupe some poor victim. The white hairs are painted out, and the animal will present a very youthful appearance, but again only for a time.

TO PUT BLACK SPOTS ON A WHITE HORSE.

—Lime (quick), powdered, half a pound; litharge, four ounces. Well beaten, and mix the litharge with the lime. The above to be put into a vessel and a sharp ley is to be poured over it. Boil and skim off the substance which rises to the surface. This is the coloring matter, which must be applied to such parts of the animal as you wish to have dyed black. Red hair may be dyed black with a very similar composition. Thus, boil four ounces of lime with four ounces of fresh water; the scum that rises will have the same effect. If the hair be entirely free from grease, one night will be sufficient to stain it black.

HORSE, ORGANS, Classification of the

Various.—The body of the horse, like all the vertebrate animals, may be considered as made up of several distinct apparatuses or systems. Of these, the first is a machine composed of the bony skeleton, or framework, the various parts of which are united by joints and moved by muscles. Secondly, there are contained within the thorax the organs which supply the whole body with the means of nutrition in the form of blood, and purify this fluid. Thirdly, in the abdomen are presented to view the important organs which assimilate the food to the condition of the blood; while in the adjoining cavity, the pelvis, are the urinary and generative apparatuses. Fourthly, the nervous system may be considered as comprising the grand centre of the mental faculties, and, also, as presiding over and controlling the whole of the functions performed by the several organs; and fifthly, certain special organs, as, for example, those of sense,

and, likewise, the foot will complete the whole circle of systems to be reviewed. Each of these groups will, therefore, be described in a separate chapter.

HORSE, BONE, Structure of the.

The bones are composed of a tissue peculiar to them, enveloped by a membrane, the *periosteum*. They contain a semi-fluid of a fatty nature, the marrow, and are pierced in various directions by blood-vessels and nerves.

The proper tissue of the bones is made up of two distinct substances, either of which may be removed by artificial means, leaving the other entire. If, for instance, a bone is submitted to the heat of a furnace, it retains its shape and rigidity, but becomes much whiter in color, and is rendered extremely brittle. In fact, the mineral salts entering into its composition are left, but the animal matter binding them together is completely decomposed and carried off in a gaseous form. On the other hand, by immersing a bone for two or three weeks in diluted hydrochloric acid, the earthy salts are dissolved, while the animal matter is untouched. Here the bone retains its original shape, but it is soft and flexible; and instead of presenting its usual opaque, yellowish-white color, it is semi-transparent, and resembles the ordinary gelatine of the shops. According to Berzilius, bone is chemically composed of the following constituents—namely, cartilage, reducible to gelatine by boiling; blood-vessels; phosphate of lime; carbonate of lime; fluato of lime; phosphate of magnesia; soda, and chloride of sodium.

Considered mechanically, the bones form the framework of the animal machine. In the limbs they are hollow cylinders, admirably fitted by their shape and texture to resist violence and support weight. In the trunk and head they are flattened and arched, to protect the contents of the cavities they form, and to provide an extensive surface for the attachment of muscles. In certain situations their exterior is raised into projections called *processes*, which serve as levers for the muscles to act upon; in others they are grooved into smooth surfaces for the easy gliding of tendons, when these are stretched between the fleshy part of a muscle and one of its attachments. Lastly, they sometimes present a large hollow

for the lodgment of the belly of a muscle, as in the case of the scapula. These differently shaped bones may, therefore, be classed under the following three heads:

1st. The long bones consist of the humerus, radius, ulna, femur, tibia, and fibula; the metacarpal and metatarsal bones (called, in horsemen's language, the cannon bones), the phalanges (pastern bones), and the ribs. These bones are all divisible into a central cylindrical shaft, and two heads or extremities. The shaft is usually of a prismoid form, dense in texture, and presenting a longitudinal tube in the interior, called the medullary canal, which contains marrow. The heads are broad, to articulate with the next adjoining bones, and are covered with a thin layer of cartilage, which will be described in the chapter treating of the joints. Their outer surface is a hard, osseous layer, within which is a mass of cells containing red medullary matter, to be presently described.

2d. The flat bones are composed of two layers of dense tissue, one on each surface, having between them another of a cellular nature, called the diploe. As a matter of course, from their shape, they have surfaces, borders and angles; in addition to which they have projections, called processes, of various shapes. They consist of the chief bones of the head, the scapula and pelvis.

3d. The irregular bones comprise the lesser bones of the head and face, the vertebrae, sacrum, sternum, carpal and tarsal bones, the sesamoid bones, the bones of the foot, and the patellæ. They resemble the flat bones of their structure.

When microscopically examined, bone is seen to be made up of a dense and homogeneous substance (basis substance), in which are numberless minute cells (corpuscles of Purkinje). The basis substance is partially fibrous and slightly lamellated, the layers being concentric in long bones and parallel in flat; it is traversed in all directions (more especially in the long axis, where there is one) by canals (Haversian canals), which frequently branch and inosculate, giving passage to vessels and nerves. In certain situations the lamellæ separate, and leave between them spaces of various sizes, called *cancelli*. Besides entering into the composition of the ba-

sis substance, the lamellæ are collected concentrically round the Haversian canals the boundaries of which they form, generally to the extent of ten to fifteen layers. Both the compact and spongy tissues are, therefore, composed of the same elementary structure, the former being especially intended to afford resistance to violence with as little weight as is consistent with its office, for which reason it is hollowed into a tube; while the latter is enlarged as much as possible without unnecessarily adding to its weight, the problem being solved by its development in a circular form.

The Periosteum is a dense, fibrous membrane which covers every part of the surface of the bones, excepting their extremities when they enter into the composition of a joint, its place being then occupied by cartilage. (See JOINTS.) When this membrane covers the bones of the skull it is called *pericranium*, and when it invests the cartilages of the ribs it receives the name *perichondrium*. It is full of blood-vessels, especially in the young, and they freely communicate with those of the surrounding soft parts. Hence it is extremely liable to inflammation, either caused by injury to itself or to the parts which cover it.

The marrow, or medullary substance, is contained in the cavities formed within the bones, being of a yellow color and oily nature in the shafts of the long bones; and more or less red, from the admixture with blood, in the flat and irregular bones, and in the heads of the long bones. It is contained within the areolar meshes of a membrane, which lines these cavities, answering to the periosteum, which has been already described. This medullary membrane is of excessive tenuity, and is composed of blood-vessels ramifying in fine cellular tissues. The use of marrow in the animal economy is not very clearly demonstrated.

In the embryo, all the bones originally exist in the state of cartilage, being soft and flexible. By degrees vascular canals are developed within its substance, by the union of its cells in rows. These concentrate towards some one or more points, which in a long bone are one in the centre of the shaft and one at each extremity. Starting from this point (*punctum ossificationis*), fibres run out, embracing clusters

of cells, and sending branches between the individuals composing each group. In this manner the network, characteristic of bone, is formed, the cells uniting to form the permanent areolæ and Haversian canals. At first the contents of the cells are transparent, then granular, and finally opaque, from the pressure of amorphous mineral matter. The several ossified portions are quite distinct for a long time in the young animal, and may readily be separated by boiling or maceration.

HORSE, Skeleton, The Number of Bones Composing the.—The skeleton is composed of two hundred and forty-seven separate bones, which are united by joints to form the spine, thorax, pelvis, tail, and fore and hind extremities. The spine is finished anteriorly by the head, which is divided into the cranium and face, and contains the teeth. Suspended from the head is the os hyoides, which completes the number of bones. Thus :

The spine consists of 7 cervical, 18 dorsal, and 6 lumbar vertebræ—	
Total	31
The thorax is made up of the dorsal vertebræ, with 18 ribs on each side, and the sternum in the middle—	
Total	37
The pelvis comprises 2 ossa innominata (or ilium, ischium, and pubes), and 1 sacrum—Total	3
The tail contains on the average 17 bones	17
The fore extremity is made up on each side of the scapula, humerus, os brachii, and 8 carpal bones, 3 metacarpal, os suffraginis, os coronæ, os pedis, os naviculare, 2 ossa sesamoidea—Total on both sides.	40
The hind extremity has the femur, patella, tibia, fibula, 6 tarsal bones, 3 metatarsals, os suffraginis, os coronæ, os pedis, os naviculare, 2 ossa sesamoidea—Total	38
Bones of the cranium	10
Bones of the face and lower jaw ...	18
Teeth	40
Bones of the internal ear, 4 in each organ	8
Os hyoides, or bone of the tongue, made up of five sections	5

Grand total

HORSE, Diseases, General, Remarks.—

The diseases of bone are not commonly

attended by any constitutional disturbance, and neither require an examination of general symptoms, nor the adoption of any but local treatment, beyond that attention to the health which is always necessary. They may all be included under the heads of—1st. Exostosis, or increased growth of bone. 2d. Caries, or ulceration. 3d. Anchylosis, or unnatural union of two bones, in consequence of exostosis, or caries, or both. 4th. Fractures, or disunion by external force. Malignant diseases of the bone also occur very rarely in the horse, so that it will be scarcely necessary to occupy any space with their description, especially as they are perfectly incurable.

Exostosis is the result of increased action in the nutrition of the part, and is much more prevalent in young horses than in old. Indeed, after six or seven years of age it is very rarely met with, and never attacks the bones at that age for the first time. It may be recognized by a hard swelling of the part, which in recent cases is painful on pressure; but sometimes its site cannot be reached with the finger, and the disease can then only be detected by its effects. A blow upon any of the bones when unprotected by anything but skin will produce inflammation followed by exostosis; but the most ordinary cause is the over-stimulus of hard work. Heavy horses are more prone to exostosis than light ones, partly from the weight of their bodies and their high lumbering action jarring their limbs in a greater degree, but also from the more spongy and open texture of their bones which admit of the pressure of large blood vessels within them, and are thus more liable to congestion, and consequent morbid secretion. Exostosis is shown in the form of splints, ring and sidebone, and ossified lateral cartilages, as well as in the growths which occur occasionally in other parts of the body which have received no distinguishing name. The vitality of the new growth in exostosis is less than that of healthy bone, and as a consequence, when excessive inflammation is set up in the part, it will often die and be separated by absorption.

Caries (ulceration) occurs as a consequence of inflammation, and in the horse either results from external injury, as in poll evil and fistulous withers, or from

mismanagement, as in navicular disease, which latter affection will be considered under the diseases of the foot. It is always attended with pain, and in severe cases with the formation of sufficient matter to require an outlet, but in very restricted ulcerations, such as occur in navicular disease, the pus passes into the joint, and is reabsorbed with the synovia.

Anchylolysis, when it is the result of caries in the two adjacent surfaces of a joint, produces union between them, but in the horse it is generally of a secondary kind, the result of bony growths (exostosis), thrown out from the surfaces of the two bones near the joint, which coalescing, unite into one mass, and thus destroy all motion.

HORSE, Ossification of the Lateral Cartilages.—This is commonly known as ossification of the cartilages, or false ringbone, no other cartilages being subject to ossification, and these being therefore known *par excellence* as the cartilages. In heavy cart horses it often co-exists with ringbone and sidebone, especially the latter; but it also attacks well-bred carriage horses, and high-actioned hacks, which are comparatively free from those diseases.

The *symptoms* are more or less enlargement of the back of the coronet, and heel, the part feeling unnaturally hard and irregular or lumpy. If recent, there is generally increased heat on careful examination with the hand; but if old standing cases, there is nothing of the kind to be detected. Lameness is not always present, but if the horse is rattled over hard ground, he will be more likely to show the effects on the next day, by going short and sore, than if he were free from this disease.

The treatment should be confined to recent cases for in old standing ones, unless lameness shows itself, it is better to avoid any interference. A seton, with rest, has sometimes proved very efficacious, even in confirmed ossification, and repeated dressings with the biniodide of mercury ointment, will, in those cases where the inflammation does not run very high, afford the best chance of causing the absorption of some of the bone, for a complete cure is never effected. When there is much heat in the part, bleeding from the foot may be adopted, and afterwards the application of cloths dipped in

cold water, with the addition of a glass of tincture of arnica to a quart of water. In confirmed cases, where the parts have become callous, a leather sole to the shoe will take off the vibration, and should be used during the summer season. Scarification of the skin covering the enlargement with a lancet, encouraging the bleeding by warm water, and followed by the use of cold water as soon as the bleeding has ceased, will sometimes do wonders in recent cases. The scarification should be repeated at intervals of five or six days, taking care to avoid injury to the coronary substance near the hoofs, which is sometimes followed by troublesome sores.

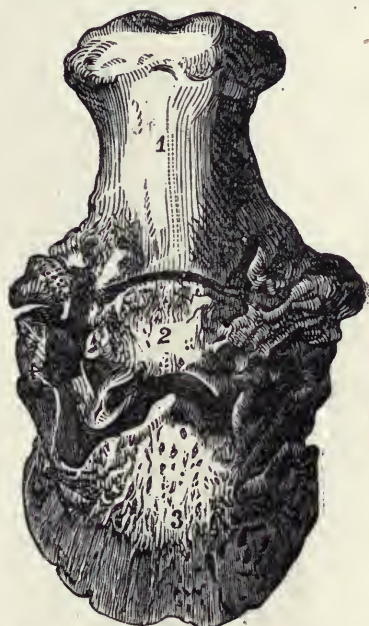


FIG. 22.—CASE OF RINGBONE AND SIDEBONE OCCURRING IN A HEAVY DRAY HORSE.

1. Os suffraginis.
2. Os coronæ.
3. Os pedis.
4. Complete union by ossific matter between the os pedis and os coronæ, but still incomplete in the joint above.
5. Complete union of the three bones.

HORSE, FOOT, Diseases of the.—The most practical division of this subject is based upon the structures affected, so that we may have diseases of the bones, of the joints, of the soft tissues, and of the hoof. A large portion of these are inflammations, or the results of inflammation.

Original inflammation of the bony tissue is comparatively rare, while that of periosteal investment of the bone is quite frequent. A variety of causes may account for this. Perhaps the most common is the evil of overwork. Hard driving on a hard road, as on a plank road, on the frozen ground, or on the ice, or the strain of draught at too heavy a load, may excite periosteal inflammation, and from this as a commencement we may have splint, spavin, ring-bone, nodes, etc.



FIG. 23.—SPLINT ATTACHING INTERNAL SMALL METACARPAL BONE.

1. Internal small metacarpal bone.
2. External small metacarpal bone.
3. Large metacarpal bone.
4. Bony growth constituting a large splint, and attaching the small to the large metacarpal bone.

HORSE, Splint (Fig. 20) is a bony tumor at some point about the cannon and splint bones. The *knee-joint* is formed at its inferior part, between the lower row of carpal bones and the cannon and splint bones, the two latter forming a considerable portion of the joint. As the leg is

flexed these bones slide upon the cannon-bone, contributing to the elasticity of the step. When the motion is violent and long continued, especially with striking upon a hard surface, irritation first and inflammation afterward may be produced in the periosteal membrane covering these bones. Bony matter is thrown out in the immediate vicinity of their adjacent surfaces, and the result is a sealing together of the bones and the formation of a bony tumor. Unfortunately the condition is frequently overlooked until the change is complete and the disease beyond a remedy, for when the bony union is thoroughly consolidated it cannot be remedied. For a time, while the deposit is fresh callus, and the circulation active, measures to abate the inflammation and to excite the absorption of the deposit may restore the integrity of the part.

HORSE, Ring-bone.—In the pathology of the disease splint and ring-bone are the same. They have the same causes, and are preceded by the same stages of



FIG. 24.—ANTERO-INTERNAL VIEW OF EXOSTOSIS CONSTITUTING SPAVIN.

1. Os scaphoides.
2. Os cuneiforme parvum.
3. Morbid growth of bone, constituting the disease known as bone spavin.
4. Large metatarsal or cannon bone.

morbid action; but, from the relation of parts, ring-bone, at its forming stage, gives rise to earlier and greater lameness. Attention is earlier called to the disease, and treatment is usually sooner applied. Splint may go on to its final stage of bony consolidation without giving rise to much lameness, and without attracting attention to the diseased part, which may escape observation unless the hand is passed over the small tumor, but in ring-bone usually the lameness appears with inflammation, and the earliest effusion over the region calls attention to the seat of the disease.

HORSE, Side-bone.—(See HORSE, RING-BONE.)

HORSE, Spavin (Fig. 22).—When it consists in the deposit of bony matter about the hock joint, and the consequent cementing together of the tarsal bones, or the destruction of the tarso-metatarsal joint, is a similar disease, having essentially the same causes. This form of disease may exist in every degree, from a slight exostosis near the joint to such an amount as will entirely destroy the joint, and so invade the soft tissues that the slightest movement is productive of great suffering.

Treatment.—Cure or alleviation is possible only in the first stages of the disease, so that on the occurrence of lameness for which the cause is not obvious, careful search should be made in the localities in which splint, ring-bone, or spavin may occur. Tenderness, and perhaps swelling, may be detected by careful examination. The first requisite is *rest*. Bathing with warm water should be promptly and perseveringly resorted to. The foot should be put into a bucket of warm water, which should be applied with a sponge to the locality of inflammation. Should there be pain, as shown by general uneasiness and constant movement of the limb, a poultice should be applied, moistened freely with a mixture composed of equal parts of the tinctures of aconite root, opium, and belladonna. The application of a mixture of one part chloroform and two parts sweet oil, may act as a revulsive. Later, when the pain has subsided, the tenderness somewhat abated, and only swelling remains, an ointment of one part of the iodide of lead with eight

parts of lard will be found useful in removing the swelling and remaining engorgements of the parts. When put again to use, the animal should be at first gently exercised and brought gradually to his work.

The abuse in driving, which gives rise to periostitis and the deposition of bone about the joints, may result also in ulceration of the cartilages and bones entering into the composition of the joints. The parts most usually affected are the knee, the hock, and the joints of the navicular bone, with the coronet or coffin bone. The commencement of the disease is an inflammation of the synovial membrane, which lines the bony surfaces between which the motion of the joints occurs. Prolonged lameness follows. Perfect rest at this time with proper treatment may remove the condition, but by neglect, and continued use, the disease is readily carried to its advanced stages. The inflammation extends to the cartilages covering the joint surfaces of the bones. The vitality of this tissue is so low that it readily breaks down under the inflammatory action, and is removed by the ulcerative process. From this condition perfect recovery is impossible. The best result possible is the formation of a blind spavin, by the cementing of two opposite surfaces of bone by an intermediate bony deposit. Instead of this, the ulcerative process may extend to the bony tissue itself.

HORSE, Laminitis.—Of the affections of the soft tissues, perhaps the most common is *laminitis*. This term applies to inflammation not only of the laminæ but of the entire fleshy portion of the foot. It is not always the most readily detected, and in some of its more common and milder forms it entirely escapes notice. The lameness is assigned to the shoulder or some other locality; but when we refer to the position of this tissue, between a dense bone and a dense unyielding horny envelope, and to its use to suspend the bone and consequent entire weight of the animal from the wall, and consider that it suffers some degree of pressure at every step, we can understand how the slightest morbid condition of the part, the congestion of its vessels, or irritation of its nerves may—nay, must—give rise to pain and consequent lame-

ness. Fortunately, in practice this is much less frequent than, theoretically, we might expect it to be. Any horse that has been driven for several hours upon a hard, or stony, or hot and sandy road, would seem to be fairly fitted for some degree of congestion of the soft tissues of the feet. At the close of such exertion he is stabled, perhaps upon a damp floor, or where a draft of air may blow upon him. No thought is given to the condition of his feet. He is fed, and perhaps he may have been moderately groomed; but of the entire animal no part has undergone so much exposure or hardship as the feet, and no part really needs so much attention.

Laminitis, or, as it has been called by writers, *fever of the feet*, or "*founder*," may exist in all degrees, from the simple congestion of the part to the most severe and disorganizing inflammation. It is mainly exhibited in the fore feet, being an uncommon disease in the hind feet. This is mainly due to the different kinds and degrees of force used in the action of the fore and hind legs and feet. In movement a much greater amount of weight comes upon the fore legs and feet, the direction of the blow upon the ground is different, and the consequent strain and pressure upon the soft tissues much greater.

If acute laminitis is present in one or both fore feet, it is manifested by the very obvious efforts of the animal to relieve itself from pressure. If one foot only is suffering, this is put forward and is so rested upon the heel that not only is pressure taken off, but the parts are relaxed to a still greater extent by the weight of the limb. At the same time, the foot is kept in continual motion, indicating extreme pain. There is heat in the hoof, and especially in the coronary band around its summit. There may also be tenderness in this tissue on pressure. If both fore-feet are affected, the animal endeavors as far as possible, by settling back over the hind feet, to take off the pressure from them. This attempt may also be shown by the continuous change from one foot to the other. In severe forms of the acute disease the entire system will sympathize with the local disease. The arteries supplying the part or parts will be found throbbing; the general ar-

terial circulation will be quickened; the pulse will become considerably accelerated, and the constitutional condition will be one of symptomatic fever.

The disease if unchecked may go on to the destruction of the soft tissues of the foot. Cases are on record in which the entire hoof has been shed by the separation of the soft from the horny foot. This is a rare termination, but the formation of an abscess and partial separation is not so uncommon. Before this result occurs, however, the disease has usually passed into the chronic form. Prompt resort to appropriate treatment may result in restoration to health.

By no means advocating indiscriminate blood-letting, we would in this case recommend the free local abstraction of blood, either from the toe of the afflicted foot, or from the plantar vein. If the case is a very severe one, a branch of the plantar artery of one side may be divided. The foot should be placed in a large bucket of warm water, and allowed to bleed in it. Care should be taken to keep up the temperature by frequent additions of hot water. When the foot is removed, it may be placed in a large poultice, having previously been drenched about the coronary border with a liniment composed of two ounces each of the tincture of aconite root, belladonna, and opium, with six ounces of soap liniment.

For the constitutional disturbance, the tincture of aconite root, fifteen to twenty drops in water, may be administered every hour or half hour until a decided impression is made upon the frequency and hardness of the pulse. Half a drachm of belladonna with fifteen grains of digitalis may be given every half hour, or in emergency the following draught may be given every hour until the proper impression is made on the system: Tinct. aconite root and tinct. belladonna fifteen drops each, and sulph. ether and laudanum half an ounce each. Later, saline medicines, such as the nitrate of potash, will aid in preventing secondary affections.

Laminitis may have a variety of terminations. First, it may terminate in a complete disappearance of all the symptoms, that is, by resolution, and there be a complete recovery. Second, it may pass into a chronic condition in which all the symp-

toms are of a mitigated character. When quiet, the pain is slight, and the heat is little, if any, in excess of the natural state. If the animal is allowed rest on a soft floor, or is turned to run in a paddock, the lameness may be scarcely obvious; but attempt to drive him, and, either while on the road or afterward, he becomes very lame again. This condition may continue almost indefinitely. Third, the inflammation may terminate in suppuration, which may be confined to a small region of the foot, and eventuate in a partial recovery, or it may be general and so extensive as to destroy the connection of the hoof with the soft tissues. Under the latter circumstances the hoof may be lost. When the destructive suppuration falls short of producing complete separation, it may be sufficient to permit of a change of relation of the coffin-bone to the hoof. A portion of the anterior attachments may be destroyed so that the bone may fall away from the horn. In a flat and weak foot this may cause a bulging of the sole, producing what is called the *pumice foot*. If the hoof is preserved, the space produced by the falling of the coffin-bone is filled by fleshy granulations. The foot, however, suffers permanently, and lameness is constantly present.

Such is the structure of the foot that, even when the damage is less than that just described, the suppuration continues and burrows in various directions, seeking an outlet. Except when the inflammation and suppuration are confined to a limited space in the sole of the foot, the discharge must escape from the crown. At some part of the coronal border of the hoof, swelling is perceived, which either opens of itself or is opened by the knife, which is preferable. When suppuration has commenced, the animal should receive better and more nutritious food, while stimulating injections to the opening may be useful. Should the sinuses become chronic, it has been recommended to trace their number and direction with a delicate probe, and then freely lay them open. To do this, the hoof must be softened by soaking in warm alkaline water, when it may be cut easily.

Limited suppuration of the soft tissues of the foot may occur from a variety of other causes, such as a wound made by

the shoe of one foot in the coronet of the other, or by the prick of a nail driven into the quick or so near it as to cause inflammation by pressure, or by a bruise made by the heel of the coffin-bone, to which the term corn is applied. In all these cases suppuration may follow inflammation, and the severity and extent of the trouble will depend upon the locality of the injury, and the distance the product of suppuration has to travel to reach a point of exit.

A fourth termination may be designated—that by *metastasis*. The inflammation being situated in the fibrous tissues of the foot is liable to leave that locality and to seize upon similar tissues elsewhere, and under unfavorable circumstances we may have resulting inflammation of the brain or pleura, or indeed of any of the fibrous tissues. A fifth termination may be in mortification, the result of which would be almost certainly fatal at an early period.

Laminitis may be *sub-acute* from its commencement. It is apt to take this form in old horses that have been subjected for a long time to hard work. Its approach is gradual, pain at first small, and lameness slight and not constant. The foot should be given the same treatment as in the more acute form. The warm bath should be used freely. Bleeding would probably be injurious, and any debilitating medicines must be withheld. The bowels may be loosened by fresh vegetable food, such as potatoes or carrots, and if pain is present one or two draughts in the day containing an ounce of sulphuric ether and a drachm of laudanum may be given. Plenty of good, nutritious food should be given. The horse should not be used on the road until all the symptoms have been absent for several days. He may be gently exercised on a soft sward as soon as the inflammation is subdued.

A permanent, incurable lameness often results from the continued use of a horse suffering from some degree of inflammation of the soft tissues of the foot. Whenever this condition is detected, the animal should be given rest, and subjected to treatment with a view to the cure of the disease.

HORSE, Fever of the Feet, (See HORSE, LAMINITIS.)

HORSE, QUITTOR.—We have spoken of a limited suppuration with sinuses between the hoof and the coffin-bone as the result of injury to the coronet, the prick of a nail, or a bruise, which form an abscess at the crown of the foot. To certain abscesses in this region, resulting from an ulceration of the deeper-seated cartilages, the term *quittor* has been applied. The local condition on which this disease depends differs widely from that causing a similar discharge in a healthy foot by direct injury. *Quittor* is a deep-seated lesion of the foot, seated in the cartilages, or perhaps even in the coffin-bone itself. It may follow the inflammation of injury, or it may originate in constitutional conditions. Neglected corns, increasing by continued bruising, may cause by pressure the ulceration and mortification of the cartilage, or even of the bone. Fracture of some part of the coffin-bone may eventuate in this disease. It rarely gets well without assistance. When it is diagnosticated, a well-informed veterinary surgeon should be called. The treatment is mainly by local injections, aiding nature to discharge the product of ulceration and stimulating to healthy granulations. Of course the animal is utterly unfit for use.

HORSE, CORNS.—We have spoken of corns. These make their appearance in two forms, the true and the false. The locality of the true corn is the angle caused by the inflection of the bars, and is between the bars and wall. In this space the posterior extremities of the coffin-bone move freely in the movements of the foot. By the irritation of frequent, prolonged and severe use a thickening of the laminae is produced. This hardness ultimately becomes a semi-corneous tumor. It may remain in this condition, or it may become a smooth, dense horn, more dense than any part of the hoof. It is a constant source of pain and consequent lameness.

The more common false corn is a bruise of the sensitive sole which lies directly under the heel of the coffin-bone. This occurs more frequently in feet having a flat, level sole, deficient in the arch. It may occur in any variety of foot which is kept badly shod. A shoe with a broad web level upon its foot-surface, and seated for its whole width upon the wall and

sole, will aid in the production of this form of disease. Several varieties of the false corn are described, but they are simply different stages of the same disease. The true corn is essentially incurable. For the false, in its early stages, the general principles of treatment to abate local inflammation may arrest the disease. If suppuration can be prevented, the duration of lameness will be much limited. Care should be taken that the shoe should have its bearing only on the solar border of the wall, and a very slight portion of the outer border of the sole. To this end, a shoe should be used with a narrow web, but little over half an inch in width; or the shoe with a wider web should be seated so that its bearing-surface would be narrow. Supposing the case has been neglected and suppuration has occurred, the pain and lameness will be great until the matter is evacuated. The sole must be carefully pared away until the horn is very thin, when an opening must be made through it, and the pus evacuated. If great pain is inflicted by the attempt, the foot should be soaked in a warm alkaline bath, by which the horn will be softened and the extreme tenderness abated. If possible, the foot should be kept in a poultice for a day or two, or three, according to the previous severity of the disease. After that the shoe may be reapplied, care being taken that the opening through the horn be so protected, that no dirt or gravel can enter.

A condition similar to false corn may exhibit itself in any portion of the ground surface of the foot as a result of a severe stone-bruise. If detected early, the warm foot-bath, with rest, will be sufficient treatment for it.

HORSE, THRUSH.—One of the most common of the diseases of the foot bears the popular name of thrush. Of its exact nature and locality perhaps no two hippopathologists agree. Mayhew, Youatt, Spooner, and others characterize the disease by one of its symptoms, and speak of it as "an offensive discharge from the cleft of the frog," to which is sometimes added "with disorganization of the horn." Both these are symptoms of the real disease, which is a low form of inflammation in the soft tissues of a tender frog. It exists in feet that have been allowed to stand in damp, ill-cleaned stalls,

where they are continually covered with wet manure. Running in a wet yard predisposes to it. Gamgee describes thrush as "a diseased condition of the villous membrane covering the frog," and says that it is, in its usual form, produced by filth and neglect.

The true seat of the disease is, we believe, in the superficial and less fibrous tissues of the sensitive frog. It is doubtful if true inflammation is present. Pain is usually present in inflamed tissues, and thrush is, to a remarkable degree, a painful disease. One of the properties of the sensitive frog is to secrete the tissue that becomes the horny frog. Now if, by reason of local or constitutional debility, the secretive action of the part is imperfect; if the secreted matter, lacking vitality instead of producing horn, breaks down into pus, or pus mingled with half-formed and decomposing horn, we should get just the condition we have in thrush.

In a healthy frog the cleft is so perfectly covered over by an arch of horn that fluid could escape only through an artificial opening; but in this diseased condition the horn is both in so imperfect a state from defect in its original secretion, and so disintegrated by the direct influence upon it of the diseased secretion, that the offensive pus escapes freely from it.

It has been claimed that contracted feet and too great and long continued paring of the frog, are the main causes of this disease. They undoubtedly predispose to it, as they contribute, by change of the form of the foot, to effect a change in the nutrition of the organ. But thrush is seen, perhaps, in a well-spread, open foot as frequently as in a contracted one. Constitutional condition has much to do with the local manifestation. An animal poorly nourished and cared for, other things being equal, will be more likely to exhibit the disease.

Any treatment that loses sight of the constitutional condition will fail to do its best work. First of all, the horse should be placed in a stall having a dry floor, or on a short and dry sward, covering a warm, sandy soil. Then he should have thoroughly nutritious diet, and, if the disease has been of long standing, alterative and tonic medicines may be given. Red

bark, sulphuret of antimony, and nitre, in the proportion of two parts of the first to one part each of the last two; or a ball, consisting of a quarter of a grain of strychnine, half a drachm of iodide of iron, half a scruple of extract of belladonna, and extract of gentian and powdered quassia sufficient to make it, may be given night and morning. The foot should be put into a bath of warm water and thoroughly cleansed; all dust and pus should be carefully removed from the commissures, and the part dried by the use of dry tow. Then into the crevices should be poured, once a day, a little of a solution of the chloride of zinc (three grains to the ounce of water). The foot is to be kept shod with calkins, so that a free space may be left under the foot for the circulation of the air. Cases will yield more readily to simply constitutional than to simply local treatment. A judicious combination of the two will have the happiest results.

HORSE, Canker of the Foot.—The condition of thrush neglected may pass into that of canker. Canker of the foot may be an original disease in low-bred, ill-conditioned horses, exposed in wet or filthy stables or yards, and poorly cared for. It more frequently, however, follows thrush which has been neglected. It commences in the same tissues, rapidly extending from the frog to the sole and and the laminated structures. The disease consists in destructive inflammation, with ulceration, which destroys the connection between the sensitive and horny sole and frog. After a time a foul fungus sprouts from the ulcerations, accompanied with exceedingly disagreeable discharge. The horn of the sole and frog becomes disorganized, and breaks down. The fungoid granulations, with the constitutional depravity which predisposes to them, constitute the disease.

The treatment consists in the removal by the knife, of all the detached horn, together with as much of the fungoid tissue as can be removed without the loss of too much blood, and the application of astringents and mild caustics, so applied as to remove the remaining fungus and to change the action of the part. Constitutional treatment, tonics and alteratives, with good care and nutritious food, will do much in causing a successful issue.

HORSE, Rheumatic.—It is believed that much of the obscure lameness to which horses somewhat advanced in years, and especially those that have had much severe driving and work, are subjected, is *rheumatic*. From the nature of the tissue composing the sensitive foot, so largely fibrous as it is, we might anticipate that from long-continued hard usage there would arise a degree of irritability in that tissue that would cause lameness. This condition must not be confounded with acute rheumatic fever, to which horses are sometimes subject, and which is a different disease. The disease of which we speak in this connection is an irritability and painful condition of the fibrous tissue, without any of the products or results of the inflammatory action.

The animal should be housed in a dry and airy stable, but sheltered from draughts of air, and should be blanketed. The feet should be treated to a warm bath, and then rubbed dry, and have an application of Fahnestock's liniment, and be bandaged. At the same time there may be given daily in meal an ounce of acetate of potash, with a scruple of powdered colchicum; or a draught of the following: Iodide of potassium, two ounces; liquor potassæ, one quart; of which two table-spoonsful may be given, night and morning, in a pint of water or mixed with feed.

There are several diseased conditions which manifest themselves in the horny foot. Of these the most important are the flat or convex sole, or the pumice-foot, and the sand-crack. The false quarter is in no very great degree different from the sand-crack. All diseases or malformations of the horn must originate in injury or in disease of the soft tissues from which the horn is a secretion.

HORSE, Pumice Foot.—The pumice-foot, which consists in a falling of the sole to a level with the solar border of the wall, or even so as to constitute a convex surface, is usually preceded and caused either by a destruction of the elastic laminæ attaching the coffin-bone to the horn, or to an elongation of the same, or else to a softening, spreading, and flattening of the entire hoof. Animals with natural flat feet—those that have been bred on marshy land, where their feet have been kept soft, are most

liable to exhibit this form. Probably nothing can restore this kind of foot; but care in shoeing may enable the animal to be of some service.

HORSE, Sand-crack.—Sand-crack is a fissure in the hoof, which begins at the coronet, the thin edge first breaking away. It is a disease of nutrition, the horn of the foot being secreted in diminished quantity and impaired quality. The break, small at first, is extended until it may divide the entire hoof. It usually occurs in the *quarter*, and perhaps most frequently at the inner quarter. It has been asserted that the whole difficulty is produced by bad shoeing. Low condition, impure state of the blood, and lack of care are predisposing causes. In this conjuncture slight injury to the coronet may be followed by such deficient secretion of horn at that place, that the weakened part may give way and sand-crack take place.

If possible the animal should be given entire freedom from work, and should be turned into a small paddock, or have a loose box, in which he may move somewhat. He should have nutritious food and sufficient green food or bran mash to keep his bowels free. During the early stages of the disease, and while efforts are being made to restore the soundness of the foot, the horse is better without shoes, as the natural movements of the parts tend to restore their vitality. The bar-shoes, recommended by some writers, are useful only in those cases of long standing which are essentially incurable, and where the horses are to be put to slow work. The part should be interfered with as little as possible; there should be no cutting, paring, or burning; and care should be taken to keep dirt, gravel, etc., from the open sore. The healthy condition of the open and granulating surface should be maintained by frequent washing with soap and water, and the application of the solution of chloride of zinc (three grains to the ounce of water). If the animal is in use, before being taken out the crack should be filled with lint saturated with the solution, which should be confined in place by a strip or cloth completely covered with tar. This should be removed as soon as the horse returns, and the wound be cleansed, if it is at all foul, and care-

fully dressed again. If treatment is commenced early, a fair degree of expectation of recovery may be entertained; but, in many cases, through neglect or lack of proper treatment, a permanent deficiency of the hoof remains. In such cases, by the use of a bar-shoe, properly adjusted, the animal may be made of some use.

HORSE, FOOT, Contraction of.—Contraction of the horn of the foot is a frequent cause of lameness. This may occur at some part of the coronary border, or may be in the quarters, or may be confined to the heels; the last being, perhaps, its most frequent locality. Contraction at the coronary border produces lameness mainly by pressure on the extensor tendon. Movement produces irritation and consequent pain, which is shown when the animal is at rest by his putting the foot forward. This position relieves the pressure upon the tendon, and gives partial relief from pain. Contraction at the quarters and heels may not always cause lameness. If the condition comes on very gradually, changes of the contained parts may so accompany it that little if any lameness will be caused simply by the contraction. Again, the contraction may be the consequence of other disease, and the result of a partial cure and a previous lameness lessened. Contraction may result from chronic founder or fever of the feet. It may be produced by long-continued stabling upon a dry plank floor. Thrushes may so demoralize the floor of the foot as to cause contraction. Too great and constant paring away the bars of the foot, may destroy their resistance to the approach of the heels, so the paring of the frog may destroy the function of that organ as an elastic spring to keep the heels open. The degree of lameness that follows the change of form produced by these, causes is not so great as when it results from inflammation of the elastic portions of the foot. The changes are more rapid, and pressure is made upon the sensitive portions of the foot. The horse indicates the amount of pain he suffers by the peculiar short and quick character of his step, and the gentle and light manner in which he places his feet upon the ground. When not in motion, he rests his feet forward, and is continually changing them. Contraction is apt

to be seen most frequently in highly bred horses with a naturally high and narrow foot. This is one of the causes of lameness in which the advice and probably the treatment of an educated veterinary surgeon are important. No definite directions for treatment can be given.

There are several other forms of the disease in the foot, but they are either so slight or so rare, or so little amenable to treatment, that we will not cumber this article with them. In closing, we advise that in all serious or doubtful cases of lameness an educated veterinary surgeon be called. If such a one is not obtainable, the advice of an educated physician may aid in determining the locality and cause of disease. This known, treat the case according to the suggestions of this article.

HORSE, Shoulder Lameness.—The heads of the bones adjacent to most of the joints of the body are more or less subject to exostosis, though not so frequently as those of the pastern bones and tarsus. Next to these probably comes the shoulder joint, the neighborhood of which is often the seed of this disease, but the *treatment* should be on the same principle as for spavin, omitting the subcutaneous scarification, which is not here practicable on account of the nature of the joint. Blisters, and especially with the biniodide of mercury, will be the most likely to succeed, but in most cases the cure will be only partial.

HORSE, Fistula of the Withers.—When a saddle has been allowed to press upon the spinous processes of the dorsal vertebræ, it produces inflammation, which, if neglected, leads to the formation of an abscess. But the situation of the part is such that the matter cannot escape, even if the skin over the points of the bones is perforated, and it has a tendency, by the force of gravity, to burrow down among the muscles which connect the shoulder-blade with the trunk. The consequence is, that there is extensive inflammation, and often lameness of the shoulder, which could readily have been prevented by using proper care before the mischief was done, or removed by the adoption of suitable treatment afterwards before the disease is confirmed.

The *symptoms* in the early stage (that is, before a fistula is established) are

merely an enlargement of the ends of the spinous processes, accompanied by heat and tenderness, but these go on until an abscess forms, which may be known to the touch by the fluctuating nature of the sensation which it gives on pressure by the fingers of each hand. As soon as this is made out, an opening should be made as low down as possible on the right side, taking care that it will allow all the matter to run out as fast as it forms. The reason why the right side should be chosen is, that most horses lie down on that side; but if the subject of fistulous withers is in the habit of lying on the left side, the opening should be made there in preference. When an actual fistula has been established, and the matter points before or behind the shoulder blade, a sufficiently large opening should at once be made, taking care again that there is no pouch below it which will permit any accumulation. It is better to divide even important muscles than to suffer this to exist. In recent cases the establishment of this dependent opening will alone suffice to effect a cure; but in those of long standing, the lining of the fistulous passage or passages has become converted into a substance almost resembling cartilage, and refuses to throw out healthy granulation, so as to lead to adhesion of its walls. Here a stimulus must be applied to their interior, which may be either mechanical, in the shape of a seton tape passed through from end to end and left there, or chemical, by means of injections. The latter are best composed of chloride of zinc (Sir W. Burnett's disinfecting fluid), diluted with water. One drachm of this should be mixed in a pint of water, and carefully injected into every part of the sinus twice or thrice a week.

HORSE, Poll Evil.—Poll evil is exactly similar in its nature to fistulous withers, being produced by a blow on the prominent ridge, which is situated on the top of the poll. The blow is generally produced in the stable, by the horse suddenly lifting his head and striking it against a low beam or the lintel of the door. Or it may be caused by frequently straining against the halter rein, and thus producing irritation and inflammation of the part. As the ligamentum colli is attached above, and anterior

to, the inflamed part, when matter forms it is confined and gives intense pain; besides which, it is a long time before it opens a passage by natural means. The symptoms are a painful swelling on the poll, of a soft nature, accompanied by the sense of fluctuation on examination, just like that described as accompanying fistulous withers. The treatment must be precisely similar to that described in the last section; but as the matter when formed lies very close to the spinal cord, some caution must be exercised in adopting stimulating injections, which are apt to produce severe inflammation, likely to extend to these important structures. So also in opening it, the knife should not be carried deeply into the situation of the spinal marrow, which here lies exposed, and is easily divided (as in the operation known by the name of pithing), but it should be used in a slanting manner, again selecting the right side in preference to the left. A seton is here the safest plan for promoting granulation and adhesion, and as the fistulous track is seldom very long, the tape will work its way gradually out, by which time the cure is effected.

HORSE, Caries of the Jaw.—The upper jaw, from its exposed situation, and the lower from the same cause, and also from the abuse of the bit, are liable to mechanical injury, which ends in caries (ulceration), or sometimes in necrosis (mortification), of the part. Caries of the lower jaw, between the tushes and grinders, is extremely common, owing to the barbarous punishment which is inflicted by the use of long levers to curb bits, together with tight curb chains. The bony plate forming the roof of the mouth is also often injured by the pressure of the part when a tight noseband is employed to keep the mouth shut. Either may be known by the existence of a sore of a peculiar character; there is a depression indicating a loss of substance, and in this lies a mass of unhealthy granulation (proud flesh), which is not attached to the surrounding surface, being only fixed to the bottom of the cavity, or perhaps partially on one side. A watery and offensive discharge goes on constantly, but this is lost in the saliva, and very often the only circumstance that draws attention to the disease is the con-

stant bleeding from the mouth, on the slightest contact of the bit. When this occurs, the mouth being full of pink froth, it should be carefully examined, and the state of things here described will generally be found to exist. The treatment should consist in the adoption of a bit pressing upon another part of the mouth, changing the curb for a snaffle. The wound should be kept open by the use of caustic (lunar) daily, which should be pushed deeply into it for a couple of seconds, and will destroy the unhealthy granulations. By continuing these measures, taking care not to do more with the caustic than necessary to keep down the fungus growth, a cure can always be effected in the course of time, without the aid of the trephine or chisel to cut away the diseased bone.

HORSE, Osteo Sarcoma.—The jaws are occasionally attacked by a malignant growth from their cellular structure of a substance partaking of the nature both of cartilage and bone. It increases sometimes to an enormous size, and forms a large, irregular tumor, which interferes terribly with their functions, often growing so as to prevent the closure of the teeth. The symptoms are entirely local, and when a large, unwieldy, and irregularly hard swelling on either of the jaws is met with, it may safely be set down as belonging to this class of disease. No treatment is of any avail except excision, which can rarely be carried through without rendering the horse unserviceable for his ordinary duties.

HORSE, Fractures.—Bones are not unfrequently broken in the horse; but as the accident generally occurs either during the violent exertion of the muscles of the limb, or from great external force, it follows that in most cases the injury to the soft parts is so great as to forbid the hope of a perfect reparation. When, for instance, a canna or pastern bone gives way during the shock sustained in coming down on hard ground from a leap, either at the moment of the fracture or before the horse can be stopped, the upper end pierces the skin, and also tears or bruises the tendons which alone connect it to the part below. In surgical language, the fracture is a compound one; and from the great tendency to contraction of the

muscles, the difficulty of bringing the disunited ends into apposition (or setting them) is immense. Moreover, the horse is very unmanageable when an attempt is made to confine him, and the means which are adopted to keep the fracture set must therefore be very complete as compared with those which will serve for the restoration of the human being who has sustained a similar accident. Hence, unless the animal is wanted for stud purposes alone, or unless the fracture is a simple one, with little displacement, it will seldom be worth the attempt to procure the union of a broken bone in the horse. Many cases are on record in which after a fracture of a canna or pastern bone a complete cure has been effected, but they must be considered as exceptional, and not as affording us much encouragement.

The symptoms of simple fracture are a greater or less degree of deformity of the limb, swelling, pain on motion, and a peculiar grating or jarring which is felt rather than heard, and which has received the name of "crepitus." The last symptom can only be made out when the broken ends of the bone can be brought together; but when this is impossible, the alteration of form is in itself sufficient to lead to a detection of the nature of the accident. In fractures of the head and spine there is no crepitus felt, and the effect upon the brain and spinal cord of pressure will be often the sole means of coming to a correct diagnosis. Fractures of the pelvis are very difficult to make out, unless the ala of the ilium is broken off, which is a common accident, for here the unnatural flatness of the hip, showing itself without any great difficulty of moving the hind leg of that side, plainly marks that there is no dislocation, and that the case can only be one of fracture. It is always the result of a blow, either when the horse is cast in a stall or in passing through a narrow door-way, or from a similar cause; and there will therefore be some swelling of the soft parts which will interfere with the examination at the time, but as nothing can be done to restore the broken portion to its place, and as there is no doubt about the diagnosis from dislocation, this is of little consequence. Fractures of the ribs cannot be readily detected; but as they almost always follow a kick on the part, and as

they do not require any treatment unless their broken ends press upon the important viscera of the thorax or abdomen, it will be well to wait for the symptoms which are caused by this mechanical irritation before resorting to bandages, &c. When a fracture occurs in any of the bones of the extremities, which are concealed by a large mass of muscle, the total inability to use the limb, and the loose way in which it is connected to the body, so as to allow it to be moved in any direction, indicate the general nature of the case without difficulty, though a careful examination must be made by a skilful surgeon before the exact particulars relating to it, can be ascertained.

The treatment will depend upon the bone which is broken, and whether the fracture is simple or compound. In most cases of the latter description none will avail, and the horse had better be destroyed; but if the owner is averse to this, it will be on the whole the best surgery, though apparently not very scientific, to encase the parts with adhesive plasters and tow, and then treat it as a simple fracture.

If the bones of the skull are fractured, unless there are symptoms of pressure on the brain, it is advisable to leave all to nature, simply keeping the patient quiet and low, and if in a high state of plethora, bleeding and physicking.

A broken lower jaw is by no means uncommon as the result of a kick. The best treatment is to set the fracture, and then mould some gutta percha to it, which may be confined behind by strips round the forehead and poll, and before by a padded strap passed through the mouth between the nippers and tushes, and beneath the tongue. The horse must be fed upon mashes and steamed food.

In fractures of the spine and pelvis nothing can be done beyond rest and lowering, if necessary, by bleeding and physic.

Broken ribs, when they cause inflammation of the lungs or liver by their sharp ends pressing upon these organs, may be treated by buckling two or three ordinary rollers abreast of one another tightly round the chest, so as to prevent the natural dilatation of the thorax, which takes place in inspiration, and which keeps up the irritation by constantly moving the

ends of the ribs. The general means necessary to adopt to relieve the internal mischief will depend upon its extent.

When either the scapula, humerus, or femur is broken, all that can be done is to sling the horse, and by bandages endeavor to bring the limb into as natural a position as possible, and keep it there. There must of necessity be great displacement of the ends of the bones, and these cannot by any means be brought into apposition; but the sides in contact with one another, as they over-ride, will unite in course of time, and this is all that can be achieved by the utmost efforts of the veterinary surgeon.

Fractures of the lower part of the tibia, of the radius, of the canna bones and the pasterns, if simple, must be treated by adjusting the ends (which is the chief difficulty, and will often require strong extension to be employed), and then adapting to the sides of the bones splints of wood or gutta percha. If, by the aid of assistants, the parts can be brought into a good position, these may be carefully adjusted to maintain it, and may be kept in place by tapes or straps fastened moderately tight around them. It is useless, however, to attempt a minute description of the means to be employed, which can hardly be understood without a demonstration. Many horses have recovered a fair use of the limb by application of splints, without slinging, as they will take care to avoid resting on that foot in consequence of the pain it gives; but under the care of an accomplished veterinary surgeon, slings will afford the best chance of recovery.

HORSE, Muscle, Tendon and Ligament, Diseases of.—Muscle is subject to simple atrophy, with or without fatty degeneration. The disease shows itself by a wasting away of the part, accompanied by a flabby feel to the touch. It should be treated by friction, gentle but regular work, and steel given internally, one drachm of the sulphate of iron powdered being mixed with the corn twice a day.

HORSE —Rheumatic Inflammation of a muscle or muscles is one of the most common of all the diseases to which the horse is subject. Most frequently it attacks the muscles of the shoulder, or of the loins, sometimes both those parts being involved at the same time. When acute it receives

the name of a chill, and is generally brought on by exposing the horse to a draught of air after work, or by immersing him in cold water up to his belly, with a view either to refresh him, or when the groom is lazy, to save him the trouble of cleaning. The symptoms are lameness or inability to use the part, the horse, when forced to do so, giving expressions of severe pain. If the shoulder is affected, the foot is not put to the ground, and when the leg is moved backwards and forwards by the hand, great pain is evidently experienced. In severe cases there is fever with accelerated pulse (70 to 80), accompanied often by profuse sweating, and heaving at the flanks, the legs remaining warm. After a short time the part swells, and is excessively tender. The treatment should be by a copious bleeding, if the horse is of a moderately strong constitution; indeed, in severe cases it should be carried on until the pulse is greatly reduced, and repeated the next day, if it returns to its original hardness and fulness. The bowels should be acted on as soon as it is safe to do so, and if the dung is very hard, backracking and clysters should be used, to accelerate the action of the medicine. The best aperient is castor oil, of which a pint may be given with an ounce of sweet spirits of nitre. When this has acted, if the kidneys are not doing their duty, a quarter of an ounce of nitre and a drachm of camphor may be made into a ball and given twice a day.

HORSE.—Chronic Rheumatism of the muscles is similar in its nature to the acute form, but, as its name implies, it is more lasting, and of less severity. It often flies from one part to another, attacking the ligaments and tendons, as well as the muscular fibres. It is seldom much under control, and attention should be paid rather to improve the general health than to subdue the local affection.

Small Tumors, of about the size of a pea, often form upon the tendons, especially the "back sinews" of the fore legs. They may or may not occasion lameness, but they are always to be regarded with suspicion. As long as they remain indolent, they are better left alone; but when they produce inflammation and pain, the best remedy is the biniodide of mercury ointment (see HORSE, SPLINTS).

HORSE, Cartilage and Synovial Membrane, Diseases of.—Cartilage is subject chiefly to ulceration. When this occurs, its cells become enlarged and crowded with corpuscles, which burst and discharge their contents; the intercellular structure at the same time splits into bands, which, together with corpuscles, form a fibro-nucleated membrane on the face of the cartilage. In old horses, the ulcerated cartilage covering the tibial surface of the astragalus is sometimes converted into a soft, fibrous substance, which ultimately assumes the appearance of hard and dense bone, commonly known as "porcellaneous or ivory deposit." It is accompanied by no symptoms of inflammation; the sole evidence of disease, during life being a stiffness of the joint, and a peculiar grating or crackling noise during all attempts at movement. When caries of the head of a bone has caused a loss of substance, the cartilage dies, and is gradually broken down by decomposition; but this cannot be said to be a disease of the cartilage itself. With the exception of the navicular disease (which will be included under the diseases of the foot), ulceration of the cartilage is not very common in the horse.

Acute Inflammation of the Synovial Membrane is seldom met with; but a chronic state, including an excessive secretion of synovia, is extremely common. The most usual situation is at the hock, where the swelling has received the name of bog-spavin and thoroughpin; but they also occur at the fetlock and knee-joints; in the former case being sometimes confounded with windgalls, which are inflamed bursæ mucosæ. (See WINDGALLS.)

Bog-Spavin is very apt to attack young horses, when they are over-worked, before being fully seasoned; but it may occur at all ages. It shows itself at the inner side of the joint, because here the ligaments are wider apart, and there is more room for distension. Its seat is the capsule between the tibia and astragalus, which is here unprotected by any strong fibrous covering, and readily yields to the gradual pressure of the secretion from its internal surface.

Thoroughpin may be either an increased secretion of the synovial capsule, between the astragalus and os calcis, or between the scaphoid and cuneiform bones, or of

the bursa mucosa lying between the tendo Achillis and the tendo perforatus. In the first of these cases, it often co-exists with bog-spavin, and synovia may be made to fluctuate from one bag to the other, the only line of demarcation being the astragalo-calcanean ligament.

Both bog-spavin and thoroughpin may exist, or either separately, without occasioning lameness; but where they are just established, there is generally some small degree of active inflammation, which causes a slight lameness on first going out of the stable, but soon disappearing.

The treatment should be by pressure, kept up for a long time, by means of a carefully-adjusted truss, alternated with cold affusion, and the use afterwards of tincture of arnica, diluted with water, as a wash. Subcutaneous scarification has succeeded in some few cases in causing the secretion to cease; but it has so often produced extensive inflammation of the joint that the operation is by no means to be recommended. Blistering with biniodide of mercury has also occasionally answered; but no plan is so successful, on the whole, as pressure, alternating with cold affusion.

Delicate young foals are subject to rheumatic inflammation of their synovial membranes, specially displayed in the knees and hocks, and apparently caused by exposure to cold. It seldom goes on to produce disorganization of the cartilages, but the capsular ligaments are distended with thin yellow synovia, causing considerable stiffness. The cellular tissue around the joints also becomes oedematous, and the legs fill all the way down to the feet. It is commonly known among breeders as the "joint evil," and though in itself it is not dangerous, yet it marks the existence of constitutional weakness which is likely to occasion some more fatal malady. The treatment should consist in attending to the general health by strengthening the mare, which is best done by giving her a drachm of the sulphate of iron in her corn twice a day. The joints of the foal should be rubbed with equal parts of soap liniment and spirits of turpentine, and it should be assisted to stand for the purpose of sucking at regular short intervals if it is unable to help itself. In aggravated cases, however, the foal is not likely to recover

its general strength, and it may be better to destroy it, but so long as it can stand and feeds well hopes may be entertained of the joints recovering.

HORSE, SHEATHS, Inflamed Tendinous.—Every practical horseman is aware that the sheaths in which the back sinews and other tendons are lodged are liable to inflammation and thickening, without the tendon itself being involved. By passing the hand down the leg, an irregular network may be felt surrounding the tendons, which move up and down without disturbing it; and the surrounding cellular membrane is also thickened, and becomes hard and unyielding. There may be considerable heat about the part, but often it is quite cool; and the disease may continue for months without any great lameness, and with nothing to draw attention to it (excepting a slight stiffness on leaving the stable) but the sensation communicated to the hand. At length, an unusually severe day's work sets up active inflammation, the leg rapidly fills, and there is so much lameness as to cause the horse to be thrown by. The treatment, in the early stage, should be the use of bandages, constantly kept wet with arnica and water, and nothing but walking exercise. After the thickening is fully established no remedy short of blistering, or a charge, will be of the slightest avail, with a rest of two or three months.

HORSE, MUCOSÆ, Inflamed Bursæ.—These synovial bags are liable to inflammation, either from hard work, as in windgalls and thoroughpin, or from blows, as in capped hock and elbow. The latter are said by some veterinaries to be serious abscesses; but there is no doubt that in all horses a subcutaneous bursa exists on the cap of the elbow and hock; and these become inflamed and filled with a very thin synovia, when they are bruised. They never extend beyond a certain size, and have no tendency to burst; nor are they inclined to a healthy termination of their own accord, but go in the same condition from year to year.

Windgalls, or puffs, are the most usual forms of these enlargements, and may be observed in the legs (hind as well as fore) of nearly every hard-worked horse, after a time. Great care in the management of the legs by bandaging will sometimes

keep them off, and some horses have naturally no tendency to form them; but in most cases, on examining the legs, just above the fetlock joints, of horses at work, a little oval bag may be felt on each side, between the back sinew and the bone. If recent, it is soft and puffy; but if the work is hard, and the windgall is of long standing, it will be as tense as a drum. The synovial bag has no communication with the fetlock joint; but there is another sac in front of the joint, and beneath the tendons of the extensors, which is often enlarged, though not so much so as the seat of the true windgall, and which is generally, though not always, continuous with the synovial capsule of the joint. The treatment consists in pressure by means of bandages, and the application of cold lotions, if the legs are hot and inflamed. Blistering and rest will remove them entirely; but no sooner is the horse put to work again than they return as badly as ever. There is no radical cure but subcutaneous puncture and scarification, and this will produce too much adhesion to be advantageously applied.

The form of thoroughpin in which the bursa mucosa between the tendo Achillis and the tendo perforatus is inflamed and filled with synovia, has been alluded to under the head of Horse Cartilage, and its treatment is there described. (See HORSE, THOROUGHPIN.)

Capped hock is also the result of a bruise of the superficial bursa, which is situated on the point of the hock, immediately beneath the skin. It indicates either that the possessor has kicked in the stable or harness; but it is more frequently caused in the former way than in the latter. The swelling is sometimes slight, being then just sufficient to show the point slightly enlarged, and to give a soft, puffy sensation to the fingers, where there ought to be nothing but bone felt beneath the skin. The bursa always rolls freely on the bone, and when large it can be laid hold of and shaken like a bladder of water. The treatment should be directed to abate any slight inflammation that may exist, if the case is established; but in recent ones it is doubly necessary to apply cold lotions, which, however, there is some difficulty in doing, owing to the prominent nature of the part. A piece

of stout calico or fine canvas may, however, be shaped into a cap, carefully fitting the point of the hock; and this being tied by several pieces of tape in front of the leg will allow not only of the application of cold lotions, but of pressure also. By this plan, continued for some weeks, considerable enlargements have been removed, but they are very apt to return on the slightest bruise. Setons through the bursa, and injections into its cavity of stimulating applications, have often been tried; but they generally do more harm than good, and nothing can be relied on but the conjoint use of pressure and cold applications. The best lotion is the following:

Take of Tincture of Arnica	- -	3 ozs.
Muriate of Ammonia	- -	2 "
Methylated Spirit of Wine	- 4	"
Water	- - - -	3 pints. Mix

Capped elbow is precisely similar in its nature to capped hock, and must be treated in the same way. It is also known by the name of capulet.

HORSE, Strains.—The fibres of muscles, ligaments, and tendons, and the fascia covering them, are liable to be overstretched, and more or less mechanically injured. This is called a strain, the symptoms of which are similar to the inflammation of the part occurring ideopathically. They are heat, swelling, and pain on pressure or movement, shown by flinching in the one case, and lameness in the other. In some cases there is considerable effusion of blood or serum, the former occurring chiefly in the muscles, and the latter among the torn fibres of the tendons or ligaments. The symptoms and treatment will depend upon the part injured, which will be found described under the following heads; but in most cases an embrocation composed of equal parts of laudanum, olive oil, spirit of turpentine, and hartshorn will be beneficial if applied after the first active inflammation has subsided.

HORSE, Strain of the Back and Loins.—When a young horse has been hunted or ridden with hounds over any kind of fence, he is very apt to over-exert himself in his awkward attempt to clear the obstacle, and next day he will often show a stiffness of the loins and back, which is seated in the large muscles connecting the pelvis with the thorax. He

is said to have "ricked his back," in the language of the stable, and if the mischief is confined to the muscles alone, he may generally be permanently cured, though he will be more liable to a return than an animal which has never suffered from any accident of the kind. If, however, the spinal cord is injured, either from fracture of the vertebræ, or from effusion of blood or serum pressing upon it, the case is different, and a perfect cure is seldom obtained. It is, however, very difficult to form a correct diagnosis between the one case and the other, and the treatment may generally be conducted with the hope that the more important organ is uninjured. When there is complete palsy of the hind extremities, so that the horse can neither feel nor use them in the slightest degree, the case is hopeless. (See DISEASES OF THE NERVOUS SYSTEM.) For the management of the strain of the loins, a full bleeding should be adopted, as it generally happens that the horse is plethoric and full of corn. Then apply a double fold of thick flannel or serge, dipped in warm water, to the whole surface of the loins, cover this over with a layer of India rubber sheeting, and let it remain on, taking care to renew the water if it has become dry. It generally produces a copious sweating from the part, followed by a slight irritation of the skin, both of which afford relief. In three or four days the flannel may be removed, and the embrocation alluded to above rubbed in two or three times a day, which will generally relieve the muscles so much that at the end of a week or ten days the horse is able to move quietly about in a loose box, and the cure may be left to time, aided by a charge on the back.

HORSE, Shoulder, Strain of the.—Shoulder strain was formerly very often chosen as the seat of lameness in the fore extremity, solely because the case is so obscure that it is beyond the knowledge of the unskillful examiner. Nevertheless, it is by no means so uncommon as is supposed by some writers, and perhaps it may be asserted that it is now more frequently passed over when it really exists, than the reverse. It generally is seated in the serratus magnus, or pectoralis transversus muscles, but it may also occur in the triceps, or, indeed,

in almost any of the muscles around the shoulder joint. The symptoms are very peculiar, and cannot well be mistaken by a careful observer who has once seen a case of shoulder lameness. In all other kinds (except the knee), the limb is freely moved while in the air, and no pain is expressed until the foot is about to touch the ground; but here the lameness is greatest while the knee is being protruded, and the limb is swung forward sideways, in a circular manner, which gives an expression of great imbecility. It also occasions great pain when the foot is lifted and drawn forward by the hand, just as in rheumatism of the part (see HORSE, RHEUMATISM). When the serratus magnus has been strained by a fall from a drop leap, or the pectoralis transversus by a slip, causing the legs to be widely separated, there is often great obscurity in the case; but the history of the accident will generally assist in forming a correct diagnosis. The treatment in the early stage will consist in bleeding from the plate vein, to the extent of five or six quarts of blood, followed by fomentations with hot water, if there is much heat and swelling, and giving a dose of physic as soon as the bowels will bear it. When the heat has disappeared, or at once, if there is none, apply the embrocation described for HORSE, STRAIN, and if this does not produce relief, add to it one quarter of its bulk of tincture of cantharides.

HORSE, Knee, Strains of the.—The knee, unlike its analogue in the human subject (the wrist), is seldom strained in the horse, in consequence of the strong ligaments which bind the bones of the carpus together. Still it sometimes happens that the internal lateral ligaments are overstretched, or, if in calf-kneed horses, the posterior common ligaments, or that connecting the scaphoid with the pisiform bone, or probably all these will suffer from over-extension. The accident may be recognized by the heat and swelling of the part affected, as well as by the pain given on using the joint. The anterior ligaments are seldom strained, but are liable to injury from blows received in various ways. The treatment should be conducted on the same principles as those of strains in the shoulder. Cold applications will seldom

do anything but harm in the early stage; but after hot fomentations have relieved the active mischief, by encouraging the effusion of serum into the surrounding cellular membrane, the former may be used with advantage. When the heat and other signs of active inflammation have disappeared, the biniodide of mercury ointment may be rubbed in, avoiding the back of the joint. (See HORSE, SPLINTS.)

HORSE, Fetlock, Strain of the.—This accident shows itself at once, in consequence of the superficial nature of the joint, by swelling, heat, soreness to the touch, and lameness. It may be very slight or very severe, but in the latter case it is generally complicated by strain of the back sinews, or suspensory ligament. The treatment will be precisely on the same plan as for strain of the knee. When the anterior ligaments of the fetlock joint are strained and inflamed, as so often happens with race horses, the condition is known as "shin sore."

HORSE, Coffin Joint, Strain of the.—Dissection proves that this joint is sometimes the seat of strain; but it is almost impossible to ascertain its existence with certainty during life. The diagnosis is, however, not of much consequence, as the treatment will be the same, whether the coffin joint, or the navicular joint is the seat of the mischief. In any case, if severe, bleeding from the toe should be had recourse to, followed by cold applications around the coronet, by means of a strip of flannel or felt, tied loosely round the pastern, and kept constantly wet. When the heat has subsided, the coronet should be blistered.

HORSE, Suspensory Ligaments, Strain of the.—The suspensory ligament not being elastic like the back sinews (which, though not in themselves extensible, are the prolongations of muscles which have that property), is very liable to strains, especially in the hunter, and to a less degree in the race horse. The accident is readily made out, for there is local swelling and tenderness, and in the well-bred horse, which is alone likely to meet a strain of this kind, the leg is rarely sufficiently gummy to prevent the finger from making out the condition of the ligaments and tendons. There is no giving way of

the joints as in "break down," but on the contrary the leg is flexed, and if the case is a bad one, the toe only is allowed to touch the ground. In ordinary cases, however, there is merely slight swelling of the suspensory ligament in a limited spot usually near its bifurcation, or sometimes in one division only close above the sesamoid bone to which it is attached. The horse can stand readily on that leg, but on being trotted he limps a good deal. Sometimes, however, there is a swelling of the feet without lameness, but in this case the enlargement is generally due to an effusion of serum into the cellular covering of the ligament, and not to an actual strain of its fibres. The treatment will depend greatly upon the extent of the mischief; if there is no great injury done, and the enlargement is chiefly from effusion of serum, rest and cold applications by means of bandages or otherwise will in the course of two or three months effect a cure. Generally, however, the case will last six or eight months before the ligament recovers its tone, and in a valuable horse no attempt should be made to work him before that time. Where the swelling is small, as it generally is, bandages have no power over it, as the projection of the flexor tendons keeps the pressure off the injured part. Here, dropping the leg in a bucket of water every hour will be of far more service than a bandage, and the sudden shock of the cold water will be doubly efficacious. After all heat has disappeared the biniodide of mercury may be used as a blister two or three times, and then the horse may either be turned out, or put into a loose box for three or four months, after which walking exercise will complete the cure.

HORSE, Back Sinews, Strain of the.—In this accident the position of the leg is the same as in strain of the suspensory ligament, and there is no giving way of the joints. The flexor tendons are enlarged, hot, and tender, and there is great lameness, the horse having the power to flex the joints below the knee, but resolutely objecting to extend them, by bearing what little weight is unavoidable upon his toe. The case is often confounded with a "break down," but it may readily be distinguished by the fact that in the latter the joints give way on

putting the weight upon them, whilst in mere strains they do not, and the tendency is to the opposite extreme. Frequently after a bad strain of the flexor tendons, the fetlock is "over shot," or beyond the upright, in consequence of the continued flexion of the joint, to prevent pressure upon the injured fibres, and in the management this result should be carefully guarded against. The injury is generally confined to the sheath of the tendons, which in most cases gradually puts on inflammatory condition for some time before actual lameness is observed. In bad cases, however, the ligamentous fibres which are given off by the posterior carpal ligament to the flexor tendons are ruptured, greatly increasing the amount of inflammation and subsequent loss of strength. In any case the tendons feel spongy, and slightly enlarged, and there is more or less soreness on pressure and on being trotted, but in the latter case exercise removes the tenderness, and very often temporarily causes an absorption of the effused fluid, which is again deposited during rest. This state of things goes on for a time, the groom doing all in his power to alleviate it by wet bandages, etc., but at last a severe race or gallop brings on an extra amount of inflammation, with or without actual strain of the fibres of the tendon, and then there can be no doubt about the propriety of rest and severe treatment. It often happens that both legs are slightly affected, but one being more tender than the other, the horse attempts to save it by changing legs, the consequence of which is that the comparatively sound tendons are strained, and he returns to this stable with both legs in a bad state, but with one of them requiring immediate attention. The treatment should be by local bleeding (from the arm, thigh, or toe), followed at first by warm fomentations, and in a few days by cold lotions. A high-heeled shoe (called a patten) should be put on the foot, so as to allow the horse to rest part of the weight upon the heel without distressing the tendon, and this will prevent him from over shooting at the fetlock joint, which he will otherwise be very apt to do, from constantly balancing his leg on his toe. After three or four days the hot fomentations will have done what is wanted, and a cold

lotion may be applied by means of a loose linen bandage. The best is composed as follows:

Take of	Muriate of Ammonia	- -	2 oz.
	Vinegar	- - - -	- ½ pint.
	Methylated Spirit of Wine	-	½ pint.
	Water	- - - -	2 quarts.

Mix.

With this the bandage should be kept constantly wet, the application being continued for a fortnight at least, during which time the patient must be cool, by lowering his food, and giving him a dose of physic. At the end of three weeks or a month from the accident, the leg must be either blistered or fired, the choice depending upon the extent of injury, and the desire to avoid a blemish, if such a feeling exists. The former is the more efficacious plan no doubt, but blistering will frequently suffice in mild cases. If, however, the tendons at the end of a month continue greatly enlarged, a cure can hardly be expected without the use of the "irons."

HORSE, Breaking Down.—Great confusion exists among trainers as to the exact nature of this accident, which is considered by the veterinary surgeon to consist in an actual rupture of the suspensory ligament either above or below the sesamoid bones, which, in fact, merely separate this apparatus of suspension into two portions, just as the patella intervenes between the rectus femoris and the tibia. Whichever part of the suspensory apparatus is gone (whether the superior or inferior sesamoidal ligament is immaterial), the fetlock and pastern joints lose their whole inelastic support; and the flexor tendons, together with their ligamentous fibres which they receive from the carpus, giving way, as they must do, to allow of the accident taking place, the toe is turned up, and the fetlock joint bears upon the ground. This is a complete "break down," but there are many cases in which the destruction of the ligamentous fibres is not complete, and the joint, though much lowered, does not actually touch the ground. These are still called breaks down, and must be regarded as such, and as quite distinct from strains of the flexor tendons. The accident generally occurs in a tired horse, when the flexor muscles do not continue to support the ligaments, from which cir-

cumstance it so often happens in the last few strides of a race. The symptoms are a partial or entire giving way of the fetlock joint downwards, so that the back of it either touches the ground or nearly so, when the weight is thrown upon it. Usually, however, after the horse is pulled up, he hops on three legs, and refuses altogether to put that which is broken down to the ground. In a very few minutes the leg "fills" at the seat of the accident, and becomes hot and very tender to the touch. There can, therefore, be no doubt as to the nature of the mischief, and the confusion to which allusion has been made is one of names rather than of facts. Treatment can only be directed to a partial recovery from this accident, for a horse broken down in the sense in which the term is here used can only be used for stud purposes or at slow farm work. A patten shoe should at once be put on after bleeding at the toe to a copious extent, and then fomentations followed by cold lotions should be applied, as directed in the last section. As there must necessarily be a deformity of the leg, there can be no objection on that score to firing, and when the severe inflammation following the accident has subsided this operation should be thoroughly performed, so as to afford relief not only by the counter-irritation which is set up, and which lasts only for a time, but by the rigid and unyielding case which it leaves behind for a series of years.

HORSE, Hip Joint, Stifle, and Hock, Strains of the.—The hip joint, or round bone, is liable to be strained by the hind feet slipping and being stretched apart, or by blows against the side of the stall, when cast, which are not sufficient to dislocate the femur, but strain its ligaments severely. The consequence is an inflammation of the joint, which is evidenced by a dropping of one hip in going, the weight being thrown more upon the sound side than upon the other. This is especially remarkable on first starting, the lameness soon going off in work, but returning after rest. The case, however, is a rare one, and its description need not, therefore, occupy much of our space. When it does happen, it is very apt to lead to a wasting of the deep muscles of the haunch, which nothing but compul-

sory work will restore to a healthy condition. The only treatment necessary in the early stage of strain of the hip joint is rest and cooling diet, etc.; but, after six weeks or two months, a gradual return to work is indispensable to effect a cure.

Strains of the stifle, independently of blows, are rare; but the latter often are inflicted upon this joint in hunting, leaving little evidence externally, so that it is almost always doubtful whether the injury is the result of a blow or strain. The symptoms are a swelling and tenderness of the joint, which can be ascertained by a careful examination; and on trotting the horse, there is manifested a difficulty or stiffness in drawing forward the hind leg under the belly. The treatment must be by bleeding and physicking in the early stage, together with hot fomentations to the part, continued every hour until the heat subsides. After a few days, if the joint is still painful, a large blister should be applied, or, what is still better, a seton should be inserted in the skin adjacent.

The hock itself is liable to strain, independently of the peculiar accident known as "curb." When it occurs, there is some heat of the part, with more or less lameness, and neither spavin, thoroughpin, nor curb to account for them. The injury is seldom severe, and may be relieved by fomentations for a day or two, followed by cold lotions, as prescribed for STRAIN OF THE BACK SINEWS.

HORSE, Curb.—The lower part of the posterior surface of the os calcis is firmly united to the cuboid and external metatarsal bone by two strong, ligamentous bands, called the calcaneo-metatarsal ligaments. The centre of these ligaments is about seven or eight inches below the point of the hock, and when a soft but elastic swelling suddenly makes its appearance there, it may with certainty be asserted that a "curb" has been thrown out. The accident occurs somewhat suddenly; but the swelling and inflammation do not always show themselves until after a night's rest, when the part is generally enlarged, hot, and tender. The precise extent of the strain is of little consequence; for whatever its nature, the treatment should be sufficiently active to reduce the ligaments to their healthy con-

dition. Some horses have naturally the head of the external small metatarsal bone unusually large, and the hock so formed that there is an angle between the large metatarsal bone and the tarsus, leaving a prominence, which, however, is hard and bony, and not soft and elastic, as is the case with curb. Such hocks are generally inclined to throw out curbs; but there are many exceptions, and some of the most suspicious-looking joints have been known to stand sound for years. Curbs are seldom thrown out by very old horses, and usually occur between the commencement of breaking-in and the seventh or eighth year, though they are not unfrequently met with in the younger colt, being occasioned by his gambols over hilly ground. The treatment should at first be studiously confined to a reduction of the inflammation; any attempt to procure absorption till this is effected being injurious in the extreme. If there is much heat in the part, blood may be taken from the thigh vein, the corn should be removed, and a dose of physic given as soon as practicable. The curb should then be kept wet (by means of a bandage lightly applied) with the lotion recommended for CAPPED HOCKS, and this should be continued until the inflammation is entirely gone. During this treatment, in bad cases, a patten shoe should be kept on, so as to keep the hock as straight as possible, and thus take the strain off the ligaments which are affected. After the part has become cool, it may be reduced in size, by causing absorption to be set up; which is best effected by the application of mercury and iodine (both of which possess that power), in such a large shape as to cause a blister of the skin. The biniodide of mercury has this double advantage, and there is no application known to surgery, which will act equally well in effecting the absorption of a curb. It should be applied in the mode recommended (see HORSE, SPLINTS), and again rubbed on at an interval of about a week, for two or three times in succession, when it will generally be found that the absorption of the unnatural swelling is effected; but the ligaments remain as weak as before, and nothing but exercise (not too severe, or it will inflame them again) will strengthen them sufficiently to prevent a return. Friction with the hand,

aided by a slightly stimulating oil (such as neats-foot and turpentine mixed, or neats-foot and oil of origanum, or, in fact, any stimulating essential oil), will tend to strengthen the ligaments, by exciting their vessels to throw out additional fibres; and in course of time a curb may be considered to be sufficiently restored to render it tolerably safe to use the horse again in the same way which originally produced it.

HORSE, Dislocation.—By dislocation is meant the forcible removal of the end of a bone from the articulating surface which it naturally occupies. In the horse, from the strength of his ligaments, the accident is not common; those that do occur being chiefly in the hip joint, and in that between the patella and the end of the femur.

Dislocation of the hip joint is known by the rigidity of the hind leg, which cannot be moved in any direction, and is carried by the horse when he is compelled to attempt to alter his position. There is a flatness of the haunch below the hip, but the crest of the ilium is still there, and by this the accident may be diagnosed from fracture of that part. No treatment is of the slightest avail, as the part cannot be reduced, and the horse is useless except for stud purposes. The accident is not very common.

Dislocation of the patella sometimes becomes habitual, occurring repeatedly in the same horse, apparently from a spasmodic contraction of the external vastus muscle, which draws the patella outwards, and out of the trochlea formed for it in the lower head of the femur. When the cramp goes off, the patella drops into its place again as soon as the horse moves, and no treatment is required. Occasionally, however, the dislocation is more complete, and nothing but manual dexterity will replace the bone in its proper situation. Great pain and uneasiness are expressed, and the operator must encircle the haunch with his arms and lay hold of the patella with both hands, while an assistant drags forward the toe, and thus relaxes the muscles which are inserted in it. By forcibly driving the patella into its place it may be lifted over the ridge which it has passed, and a snap announces the reduction.

HORSE, Wounds of Joints.—The knee is the joint most frequently suffering from wound, being liable to be cut by a fall upon it, if the ground is rough; and if the accident takes place when the horse is going at a rapid pace, the skin, ligaments and tendons may be worn through by friction against the plain surface of a smooth turnpike road. Whether the joint itself is injured, or only the skin, the accident is called a "broken knee," and for convenience sake it will be well to consider both under the present head.

When a broken knee consists merely in an abrasion of the skin, the attention of the groom is solely directed to the restoration of the hair, which will grow again as well as ever, if the bulbs or roots are not injured. These are situated in the internal layer of the true skin, and therefore, when there is a smooth red surface displayed, without any difference in the texture of its parts, confident hope may be expressed that there will be no blemish. If the skin is penetrated, either the glistening surface of the tendons or ligaments is apparent, or there is a soft layer of cellular membrane, generally containing a fatty cell or two in the middle of the wound of the skin. Even here, by proper treatment, the injury may be repaired so fully that the space uncovered by hair cannot be recognized by the ordinary observer, and not by any one without bending the knee and looking very carefully at it. The best treatment is to foment the knee well with warm water, so as to remove every particle of grit or dirt; go on with this every hour during the first day, and at night apply a bran poultice to the knee, which should be left on till the next morning. Then cleanse the wound, and apply a little spermacetti ointment, or lard without salt, and with this keep the wound pliant until it heals, which if slight it will in a few days. If the skin is pierced there will generally be a growth above it of red, flabby granulations, which should be carefully kept down to its own level (not beneath it,) by the daily use of blue stone, or if necessary of nitrate of silver. As soon as the wound is perfectly healed, if the horse can be spared, the whole front of the knee and skin should be dressed with James' blister, which will bring off the hair of the adjacent parts, and also

encourage the growth of that injured by the fall. In about three weeks or a month from its application, the leg will pass muster, for there will be no difference in the color of the old and new hair, as there would have been without the blister, and the new will also have come on more quickly and perfectly than it otherwise would.

When the joint itself is opened the case is much more serious, and there is a risk not only of a serious blemish, which can seldom be avoided, but of a permanent stiffness of the leg, the mischief sometimes being sufficient to lead to constitutional fever, and the local inflammation going on to the destruction of the joint by ankylosis. The treatment should be directed to cleanse and then close the joint, the former object being carried out by a careful ablution with warm water, continued until there is no doubt of all the dirt and grit having been removed. Then, if there is only a very small opening in the capsular ligament, it may be closed by a careful and light touch of a pointed iron heated to a red heat. Generally, however, it is better to apply some dry carded cotton to the wound, and a bandage over this, leaving all on for four or five days, when it may be removed and reapplied. The horse should be bled largely and physicked, taking care to prevent all chance of his lying down by racking him up. He will seldom attempt to do this, on account of the pain occasioned in bending the knee, but some animals will disregard this when tired, and will go down somehow. When the cotton is reapplied, if there are granulations above the level of the skin, they must be kept down as recommended in the last paragraph, and the subsequent treatment by blister may be exactly the same. By these means a very extensive wound of the knee may be often speedily cured, and the blemish will be comparatively trifling.

The knee is sometimes punctured by a thorn in hunting, causing great pain and lameness. If it can be felt externally, it is well to cut down upon it and remove it; but groping in the dark with the knife among important tendons in front of the knee is not on any account to be attempted. The knee should be well fomented, five or six times a day, until the

swelling, if there is any, subsides, and, in process of time, the thorn will either show its base, or it will gradually free itself from its attachments and lie beneath the skin, from which position it may be safely extracted with the knife.

HORSE, Thoracic Organs and their Appendages, Diseases of the.—The importance of soundness in the respiratory apparatus is so fully recognized, that in common parlance it is put before the organs of locomotion, a popular expression being "sound wind and limb." It is true that good wind is useless without legs; but the diseases of the latter are known to be more under control than those of the chest, and hence it is, perhaps, that the wind is so carefully scrutinized by all purchasers of horses. There is, also, much greater difficulty in ascertaining the condition of the lungs and their appendages, and the ordinary observer can only judge of them by an absolute trial; while the state of the legs may be seen and felt, and that of the feet can be tolerably well ascertained by a very short run upon hard ground. So, also, with the acute diseases of these parts; while the legs and feet manifest the slightest inflammation going on in them by swelling and heat, the air-passages may be undergoing slow but sure destruction, without giving out any sign that can be detected by any one but the practiced veterinarian. In most of the diseases of the chest there is disturbance of the breathing, even during a state of rest; but in some of them, as in roaring, for instance, no such evidence is afforded, and the disease can only be detected by an examination during, or immediately after, a severe gallop.

HORSE, Catarrh, or Cold.—Catarrh may be considered under two points of view—either as an inflammation of the mucous membrane of the nasal cavities, accompanied by slight general fever; or as an ephemeral fever of three or four days' duration, complicated with this condition of the nose. The latter is, perhaps, the more scientific definition, but for common purposes it is more convenient to consider it as mainly consisting in the most prominent symptom. There is invariably some degree of feverishness, sometimes very considerable, at others so slight as to be easily passed over. Usually

the pulse is accelerated to about forty or fifty, the appetite is impaired, and there is often sore throat, with more or less cough. On examining the interior of the nostrils, they are more red than natural; at first dry and swollen, then bedewed with a watery discharge, which soon becomes yellow, thick, and, in bad cases, purulent. The eyes are generally involved, their conjunctival coat being injected with blood, and often some slight weeping takes place, but there is always an expression of sleepiness or dullness, partly owing to the local condition of the organ, and partly to the general impairment of the health. The disease is caused in most instances by a chill, either in the stable or out, but sometimes, even in the mildest form, it appears to be epidemic. The treatment will greatly depend upon the severity of the seizure; usually, a bran-mash containing from six drachms to one ounce of powdered nitre in it, at night, for two or three consecutive periods, will suffice, together with the abstraction of corn, and, if the bowels are confined, a mild dose of physic should be given. In more severe cases, when there is cough and considerable feverishness, a ball composed of the following ingredients may be given every night:

Take of Nitrate of Potass	- - 2	drachms.
Tartarised Antimony	- 1	drachm.
Powdered Digitalis	- ½	drachm.
Camphor	- - - 1½	drachm.

Linseed meal and boiling water enough to make into a ball.

If the throat is sore, an embrocation of equal parts of oil, turpentine, tincture of cantharides, and hartshorn, may be rubbed in night and morning.

Should the disease extend to the bronchial tubes, or substance of the lungs, the treatment for bronchitis or pneumonia must be adopted.

The stable should be kept cool, taking care to make up for the difference in temperature by putting on an extra rug; water should be allowed *ad libitum*, and no corn should be given.

Sometimes the discharge becomes chronic, and it is then known by the name *ozena*.

HORSE, Influenza, or Distemper.—This may be considered to be an epidemic catarrh, but the symptoms are generally more severe and leave greater prostration of strength behind them. They also re-

quire more careful treatment, which must be specially adapted to the attack, for remedies which will arrest the disease in one year will totally fail the next time that the epidemic prevails. The fever of late years has had a tendency to put on the typhoid type, and bleeding, which formerly was often beneficial, is now completely forbidden. The symptoms are at first similar to those already described as pertaining to common catarrh, but after a few days the accompanying fever is more severe than usual, and does not abate at the customary period. The appetite is altogether lost, and the appearance of the patient is characteristic of severe disease rather than of a trifling cold. It is, however, chiefly from the fact that a number of horses are seized with similar symptoms, either at the same time or rapidly following one another, that the disease is recognized. It usually prevails in the spring of the year, or in a wet and unhealthy autumn. Sometimes almost every case runs on to pneumonia, at others the bronchial mucous membrane alone is attacked; but in all there is extreme debility in proportion to the apparent nature of the disease. The ordinary appearances exhibited in recent epidemics have been as follows: The first thing observed is a general slight shivering, accompanied by a staring coat. The pulse is weak and slightly accelerated, but not to any great extent; the mouth feels hot; the eyes and the nostrils are red; the belly is tucked up; there is no appetite; cough, to a varying extent, begins to show itself; and there is generally a heaving of the flanks. The legs and feet are not cold as in pneumonia, but beyond this they afford no positive signs. The cellular membrane around the eyes, and of the legs, generally swells about the second day, and often the head and limbs become quite shapeless from this cause. In the early stage the bowels are often relaxed, but afterwards they are as frequently confined. Sore throat is very a common complication, but it is not by any means an invariable attendant on influenza. It is, however, somewhat difficult to ascertain its existence, as in any case there is no appetite for food. The treatment should be conducted on the principle of husbanding the strength, and, unless urgent symptoms of inflammation show themselves,

the less that is done the better. If the trachea or larynx is involved only slightly, counter-irritation, by means of a liquid blister, must be tried, without resorting to strong internal medicines; but if serious mischief ensues, the case must, to a certain extent, be treated as it would be when coming on without the complication of influenza, always taking care to avoid bleeding, and merely acting on the bowels by gentle aperients, and on the skin and kidneys by the mildest diaphoretic. The following is the ordinary plan of treatment adopted:

Take of Spirit of Nitric Ether	-	-	-	1 ounce.
Laudanum	-	-	-	4 drachms.
Nitrate of Potass	-	-	-	3 drachms.
Water	-	-	-	1 pint.

Mix, and give as a drench night and morning.

By constantly offering to the horse thin gruel (taking care that it does not become sour), and no plain water, sufficient nourishment may be given, as his thirst will induce him to drink.

During the stage of convalescence the greatest care must be taken. At first, as soon as the cough has somewhat subsided, a mild stomachic ball will be desirable, such as the following:

Take of Extract of Gentian	-	-	-	6 drachms.
Powdered Ginger	-	-	-	2 " Mix.

Afterwards, if the case goes on favorably, and the appetite returns, the restoration may be left to nature, giving the horse by degrees his usual allowance of corn, and adding to his morning and evening feed one drachm of sulphate of iron in fine powder. It must not be attempted to give this until the appetite is pretty keen, or the horse will be disgusted, and will probably refuse his corn altogether.

Should typhoid symptoms be clearly established, the case must be treated according to the directions hereafter laid down for typhus fever.

HORSE, Bronchitis.—Bronchitis is an inflammation of the mucous membrane lining the bronchi, and almost invariably extending to these parts through the trachea, from the larynx and nasal passages, which are primarily affected as in ordinary cold. The membrane in the early stage becomes filled with blood, and as a consequence the diameter of the tubes is diminished, attended by some difficulty and increased rapidity of breathing. After a time a frothy mucus is poured out

from it, and this still further interferes with respiration, and necessitates a constant cough to get rid of it. These symptoms are always present, but they will vary greatly in intensity, and in the rapidity with which they progress, from which circumstances bronchitis is usually said to be acute or chronic, as the case may be. In the acute form there are also several variations, and veterinary writers are in the habit of again subdividing it into acute and sub-acute, but the two leading divisions are sufficient for all practical purposes. It begins with the usual premonitory appearances of a severe cold, accompanied by a staring coat, and entire loss of appetite. The breathing is somewhat quicker than natural, and the pulse is raised to sixty or seventy. The legs remain of the usual temperature, and there is a hard, dry cough, the lining membrane of the nostrils being intensely red, and in severe cases dry and swollen. On auscultation there is a dry rattling sound, very different from the crepitation of pneumonia, and as soon as mucus is secreted, succeeded by gurgling, and soap bubble sounds easily distinguished when once heard. If the attack goes on favorably, the cough becomes loose, and there is a free discharge of mucus, both from the lungs, as evidenced from the nature of the cough, and from the nostrils, as shown by the running from them. On the other hand the prognosis is unfavorable when the breathing is very laborious, with the legs extended, and the cough constant and ineffectual in affording relief. Should no relief be afforded, death takes place a week or ten days after the onset of the disease from suffocation. The treatment should depend greatly upon the urgency of the inflammation, which only an experienced eye can judge of. If slight, nitre and tartar emetic internally, and a blister (to one or both sides, according to the extent of the bronchi involved), will suffice, but in severe cases blood must be taken at the onset, or it will be impossible to control the inflammation. Bleeding should be avoided if it is judged prudent to do so, for of late years the type of diseases has changed so much in the horse that he is found to bear loss of blood badly. Nevertheless, it is not wise to lay down the rule that it is never desirable. The bowels must be

acted upon by the ordinary physic ball, resorting to raking and clysters, if the time cannot be afforded for the usual laxative preparation. For the special control of the morbid state of the membrane the following ball will be found advantageous :

Take of	Digitalis	- - - -	½ drachm.
	Calomel	- - - -	½ drachm.
	Tartar Emetic	- - -	60 to 80 grains.
	Nitre	- - - -	2 drachms.

Mix with treacle, and give twice a day.

Should the disease continue after the blister is healed, a large seton may be put in one or both sides with advantage.

CHRONIC BRONCHITIS seldom exists except as a sequel to the acute form, and after adopting the balls recommended for that state, it may be treated by attention to the general health, a seton in the side, and the exhibition of an expectorant ball twice a day, composed of the following materials ;

Take of	Gum Ammoniacum	- -	½ ounce.
	Powdered Squill	- -	1 drachm.
	Castle Soap	- -	2 drachms.

Mix and make into a ball.

HORSE, Epizootic Aphæ.—This contagious malady of stock belongs to the class of zymotic diseases, or, in other words, it is caused, like specific fevers generally, by the introduction into the system of a poison germ, which propagates itself, and increases in the blood and tissues in a manner allied to the growth of a ferment in a saccharine solution. During this reproduction of the virus in such fevers, the system passes through a series of successive stages of disease, the nature and duration of which are determined by the character of the particular poison taken in, and during which the poison germs (contagious principles) are given off abundantly by one or other or all of the secreting surfaces. Hence, like other zymotic diseases, this is altogether specific in its cause, its nature, and its mode of propagation. As known in Western Europe and America, this disease is invariably due to a virus or contagion thrown off by some animal suffering from the disease; it is always manifested by a slight preliminary fever, and a period of eruption and decline, and these are respectively of constant and well-defined duration. These different periods of the disease are characterized by varied manifestations. The first period is that

of incubation, during which the poison germs are in the body of the animal, and propagating themselves there, but have not yet affected the constitution so as to impair the functions, or give rise to the more manifest symptoms of illness. Toward the end of this period, however, the thermometer shows an increase of temperature, in the interior of the body, of about two degrees beyond the natural standard. This period lasts twenty-four to forty-eight hours, though in rare cases it may apparently extend to a week.

It is followed by the period of eruption, which is first manifested by the redness, heat, and tenderness of the udder and teats, of the space between the hoofs, and of the membrane of the mouth. In the course of one day more, these parts are found to be the seat of numerous hemispherical elevations or blisters, caused by the effusion of a clear, yellowish fluid from the blood-vessels beneath the cuticle or scarfskin. These increase in size for the next two or three days, burst, and dry up.

The period of decline is marked by the drying and scabbing over of the sores caused by the rupture of the blisters, and by the reproduction of the lost cuticular covering or scarfskin. The elevated temperature, which had declined somewhat on the appearance of the blisters, now entirely subsides, unless maintained by exposure, or the irritation of the sores by dirt or other bodies. This period has passed and the disease is at an end by the fifteenth day, in favorable cases.

CAUSES.—The only known cause of itself capable of inducing the disease is contagion, or contact of a sound animal with the virus discharged from the sores of an aphthous patient. Many accessory causes may be named, such as a wet, muddy season, which insures the contact of the virus deposited on the soil with the skin about the top of the hoofs; the accumulation of cattle in large fairs or markets; the aggregation of large numbers of live stock for the supply of armies in the field; travel of stock by rail or road, and the like. Yet these are but means of the diffusion of poison, while no one of them, nor all taken together, can call the disease into existence where the poison is not already present. Though prevalent extensively in Europe during or after

almost every great war since 1695, it did not reach Great Britain till 1839, when it was brought by some Dutch cattle imported into London. In the same year it was brought by Dutch cattle to Cork, Ireland; and, as free trade in continental cattle was established four years after, it has been since steadily maintained by the constant importations. In 1841 it was first reported in Denmark, a country which breeds its own stock, and rarely imports any. In the year 1872 was the first time it appeared on American soil, and it has not yet reached the great stock ranges of Australia. In Great Britain it spreads widely every year, after the great autumn markets, in which home and foreign store cattle mix freely; and yet there are in that country many breeding districts into which strange stock are never taken, and where the disease has not yet penetrated. It prevails very frequently on cattle dealers' farms in the same country.

Such comprehensive facts as these narrow the list of real causes down to the simple contact of the virus with a healthy animal. This virus, however, is perhaps the most contagious known. It is often carried on the clothes, boots, and hands of men; on the fibres of hay or straw; preserved on the walls, floors, mangers, and other fittings of buildings; on stable utensils; in yards, parks, roads, and railroad cars; on drinking troughs; or it may be carried on the legs or bodies of dogs, chickens, rats, and other animals which themselves escape the infliction. In short, any solid body may retain and be a bearer of this contagion. Fortunately, it does not spread to any extent in the atmosphere. Nothing is more common than to find a herd on one side of a road struck down by the disease, while another in a field on the opposite side of the road remains perfectly healthy. It may be carried by a strong wind in the form of the virulent saliva, or the virus may dry up on light bodies, such as paper, hay, etc., which are afterward borne off by the wind. It may be carried by men or animals, or by water running from the diseased to the healthy lot; but, in the absence of such agencies, the breadth of a common road is amply sufficient to circumscribe the disease.

SUSCEPTIBILITY OF DIFFERENT ANIMALS.—Cloven-footed animals appear to

be the natural victims of this disease, and all species are about equally obnoxious to its attacks; but it may be communicated to many if not all other warm-blooded animals by inoculation or by contact of the virulent discharges with their mucous membranes.

Its transmission to man has been noticed during almost every great outbreak since that of 1695. Cases of the disease in man have been seen in Albany and at South Dover, Dutchess County, New York, during the outbreak in 1872. It shows itself in man by slight feverishness, and the formation on the tongue and inside the lips and cheeks, and sometimes on the hands, of small blisters, rarely amounting to the bulk of a lentil. In children and young animals, feeding exclusively on milk, diarrhoea and fatal inflammation of the stomachs and bowels occasionally supervene. It is further to be dreaded that the malady, gaining a lasting hold on the dairies of our large cities, may swell the lists of mortality of the infant population by inducing those fatal diarrhoeas and enteritis reported by Hubner, Balfour, and Watson.

In CHICKENS it has been frequently noticed. Chickens were attacked in December, 1870, on the farm of Mr. Eighmie, La Grange, Dutchess County, New York. Drinking the castaway milk is probably the common cause. DOGS and CATS have been noticed by Lagar, Younghusband, and others, to suffer from drinking the milk. A shepherd dog at Mr. Eighmie's suffered from the disease, and another, Mr. Preston's, South Dover, New York, had only partially recovered when seen by the writer.

SYMPTOMS.—The victims may be usually picked out from a herd, twelve to twenty-four hours before they show distinct signs of the disease, by the increase of temperature indicated by a clinical thermometer introduced into the rectum and retained there for three minutes.

In CATTLE the eruption may be concentrated on the mouth, (including the muzzle and nostrils) on the udder and teats, or on the space between the hoofs, though it usually attacks all of these parts simultaneously, and in rare cases even extends to the general integument or to the mucous membrane of the throat, stomach and bowels, or other internal organs.

The symptoms are slight shivering or roughness of the coat, neglect of feeding and rumination, redness, heat, swelling and tenderness of the pasterns, teats and mouth, arching of the back, and a crouching, hesitating gait, accumulation of a white froth around the margin of the lips, and a loud smacking noise made by the tongue and lips. On the second or third day the blisters may be seen on the gums, on the dental pad behind the upper lip, on the tongue, on the teats, and around the upper borders of the hoofs and between them. In twenty-four to thirty-six hours more—sometimes at once—these burst, the cuticle is detached, and raw pink sores are left, most noticeable on the mouth and teats. With care the process of healing goes on rapidly, and is completed about the fifteenth day. Complications are rare, unless as the result of neglect, and consist in inflammation and loss of the udder; extensive formation of matter beneath the hoofs, causing them to be shed; extension of disease to the sinews, bones and joints of the foot, with wide-spread destruction of parts; eruption on the stomach or bowels, with dangerous or fatal inflammation; or implication of the womb with abortion or long-continued weakening discharges.

In SHEEP the feet are mainly affected, and the malady bears a strong resemblance to foot-rot, and, under neglect, may merge into this.

SWINE also suffer severely in the feet, and, as they are too commonly neglected and left on mud and filth, shedding of the hoofs is frequent. When the mouth suffers they champ the jaws, and frothy saliva collects around the lips.

The general system of treatment which has proved successful has been such as would be indicated in cases of severe cold or influenza. The stables should be thoroughly ventilated, and disinfectants, such as chloride of lime, carbolic acid, or bromo-chloralum, freely used. The horses are to be kept well blanketed, their bowels gently open by the use of bran mash, and, if necessary, aperients. The nostrils should be sponged out several times a day with a weak solution of carbolic acid, or bromo-chloralum is also used as a wash for the

throat. The following prescription is used quite commonly:

Nitrate potash	- - - - -	1½ ounces.
Tartarized antimony	- - - - -	1½ "
Digitalis	- - - - -	½ "

Pulverize together, and make twelve powders; give one morning and night. If the case is not very bad omit the digitalis.

In cases where the soreness has reached the throat, the following is used:

Linseed oil	- - - - -	1½ ounces.
Turpentine	- - - - -	1½ "
Liquor ammonia fort	- - - - -	1 "

Mix altogether in a four-ounce bottle and apply to the throat.

The same veterinary surgeon who recommends the above prescriptions remarks:

So long as the disease is confined to the larynx there is very little danger, but should it descend to the lungs—which will be indicated by the continued standing up of the animal, cold extremities and labored breathing—a half-pound of mustard should be mixed with two ounces of turpentine and water to the consistency of thick cream, and the mixture rubbed well in behind the fore-legs or over the region of the lungs. The legs should be bandaged, if cold. If the pulse should be over fifty-five per minute, fifteen drops of Fleming's tincture of aconite should be given every two hours, and if the breathing still continues labored and the pulse grows more rapid, apply the mustard again, and give one and a half drachms of calomel for two mornings.

The homœopathic treatment which has been employed with the greatest success by those who prefer that system, is aconite and stibium in the first stage of the disease, and arsenicum and nuxvomica in the more advanced stages.

HORSE, Cough, Common.—Common cough is generally subdued without much difficulty, though it often becomes of most serious consequence if neglected. It is accompanied by a heightened pulse, a slight discharge from the nose and eyes, a rough coat and a diminished appetite being its symptoms. The horse should be kept warm, fed on mashes, and should have a dose or two of medicine. If the cough be very obstinate bleeding may be necessary.

The following further directions by the same author contain valuable information for all owners of horses:

In giving medicine, if balls are used, they should never weigh above an ounce and a half, or be above an inch in diameter, and three in length. The horse should be lashed in the stall, the tongue should be drawn gently out with the left hand on the off side of the mouth, and fixed there, not by continuing to pull at it, but by pressing the fingers against the side of the lower jaw. The ball is then taken between the tips of the fingers of the right hand, the arm being bared and passed rapidly up the mouth, as near the palate as possible, until it reaches the root of the tongue, when it is delivered with a slight jerk, the hand is withdrawn, and the tongue being released, the ball is forced down into the œsophagus. Its passage should be watched down the left side of throat, and if it do not pass immediately, a slight tap under the chin will easily cause the horse to swallow it. The only safe purgative for a horse is Barbadoes aloes, or the flour of the Croton bean, for some peculiar purposes, but its drastic nature renders it undesirable as a general aperient. When aloes are used, care should be taken to have them new, as they speedily lose their power, and they should be freshly mixed. Very mild doses only should be used; four or five drachms are amply sufficient, if the horse has been prepared, as he should be, by being fed, for two days at least, entirely on mashes, which will cause a small dose to have a beneficial effect, equal to double the quantity administered to a horse not duly prepared for it. The immense doses of eight, nine, ten, and even twelve drachms, which were formerly in vogue, and which are still favored by grooms, hostlers and carters, are utterly exploded; and it is well known that eight or nine good fluid evacuations are all that can be desired, and far safer than twice the number.

Four and a half drachms of Barbadoes aloes, with olive or linseed oil and molasses, sufficient to form a mass in the proportion of eight of the aloes to one of the oil and three of the molasses, is the best general ball, though often four drachms given after a sufficiency of mashes or green food, will accomplish all that is needed or desirable. Castor oil is a most dangerous and uncertain medicine. Linseed oil is not much better. Olive oil is safe, but weak. Epsom salt is inefficient, except in

enormous doses, and is then dangerous. It is, however, excellent, given in clysters of weak gruel, which, by the way, except where very searching and thorough purging is required, as in cases of mange or grease, is by far the safest, most agreeable and mildest way of purging the horse and evacuating his bowels. Where, however, his intestines are overloaded with fat, where he shows signs of surfeit, or where it is necessary to prepare him to undergo some great change of system, as from a long run at grass to a hot stable, or *vice versa*, a mild course of two or three doses of physic, with a clear interval of a week between the setting of one dose and the giving of another, is necessary, and cannot be properly dispensed with.

HORSE, Cough, Chronic in.—By this term is understood a cough that comes on without any fever or evidences of the horse having taken cold. It differs in this respect from chronic bronchitis, which generally supervenes upon the acute form, and is always attended in the early stage by feverishness. It appears probable that chronic cough is dependent upon an unnatural stimulus to the mucous membrane, for it almost always makes its appearance when much corn is given without due preparation, and ceases on a return to green food. It is, therefore, very commonly termed a stomach cough. The symptoms are all summed up in the presence of a dry cough, which is seldom manifested while in the stable, but comes on whenever the breathing is hastened by any pace beyond a walk. Two or three coughs are then given, and the horse perhaps is able to go on with his work, but after resting for a few minutes, and again starting, it comes on again, and annoys the rider or driver by its tantalizing promise of disappearance followed by disappointment. Very often this kind of cough is caused by the irritation of worms, but any kind of disorder of the digestive organs appears to have the power of producing it. The usual treatment for chronic bronchitis seems here to be quite powerless, and the only plan of proceeding likely to be attended with success, is to look for the cause or the irritation, and remove it. Sometimes this will be found in a hot stable, the horse having previously been accustomed to a cool

one. Here the alteration of the temperature by ten or fifteen degrees will in a few days effect a cure, and nothing else is required. Again, it may be that the corn has been over-done, in which case a gentle dose of physic, followed by a diminished allowance of corn, and a bran-mash twice a week, will be successful. If the stomach is much disordered, green food will be the best stimulus to a healthy condition, or in its absence a few warm cordial balls may be tried. The existence of worms should be ascertained in doubtful cases, and if they are present, the proper remedies must be given for their removal. Linseed oil and spirits of turpentine, which are both excellent worm remedies, are highly recommended in chronic cough, and whether or not their good effect is due to their antagonism to worms, they may be regarded as specially useful.

A very successful combination is the following mixture:

HORSE, Costiveness.—Ordinary cases can generally be conquered without medicine, by diet, such as hop or bran mashes, green meat and carrots; but where it is obstinate, the rectum should be cleared of dry fœces by passing the naked arm, well greased, up the anus; and the bowels should be then thoroughly evacuated by clysters of thin gruel, with half an ounce of Barbadoes aloes, or half a pound of Epsom salts dissolved in it. If the patent syringe be used the injection will reach the colon and cœcum, and dispose them also to evacuate their contents.

Take of Spirits of Turpentine	- -	2 ounces.
Mucilage of Acacia	- -	6 ounces.
Gum Ammoniacum	- -	½ ounce.
Laudanum	- - -	4 ounces.
Water	- - - -	2 quarts.

Mix, and give half-a-pint as a drench every night: the bottle must be well shaken before pouring out the dose.

HORSE. Laryngitis, Roaring, Whistling, etc., in.—One of the most common diseases among well-bred horses of the present day is the existence of some mechanical impediment to the passage of the air into the lungs, causing the animal to “make a noise.” The exact nature of the sound has little or no practical bearing on the cause that produces it; that is to say, it cannot be predicated that roaring is produced by laryngitis; nor that

whistling is the result of a palsy of some particular muscle, but undoubtedly it may safely be asserted that all lesions of the larynx, by which the shape and area of its opening (rima glottidis) are altered and diminished, are sure to have a prejudicial effect upon the wind, and either to produce roaring, whistling, wheezing, or trumpeting, but which would result it might be difficult to say, although the precise condition of the larynx were known, which it cannot be during life. Until recently veterinary surgeons were puzzled by often finding on examination of a roarer's larynx after death no visible organic change in the opening, and many were led to imagine that this part could not be the seat of the disease. On a careful dissection, however, it is found that a muscle or muscles whose office it is to dilate the larynx is wasted and flabby (crico-arytenoideus lateralis and thyro-arytenoideus). The other muscles are perhaps equally atrophied, but as their office is to close the opening, their defects are not equally injurious, and at all events are not shown by producing an unnatural noise. The cause of this wasting is to be looked for in the pressure upon the nerve which supplies these muscles, and which passes through an opening in the posterior ala of the thyroid cartilage, so that whatever causes a displacement of that part will mechanically affect the nerve. For these several reasons it will be necessary to examine, first of all, into the several kinds of inflammation, etc., to which the larynx is subject, and then to investigate as far as we may the nature, mode of detection, and treatment of the several conditions known to horsemen by the names of roaring, whistling, etc., which are only symptoms of one or other of the diseases to which allusion will presently be made.

By acute laryngitis is meant a more than ordinary inflammation of the larynx, and not that slightly morbid condition in which the mucous membrane of that organ is always involved in "the passage of a cold into the chest." In the latter state the ear detects no unusual sound, and indeed there is plenty of room for the air to pass. But in true laryngitis, on placing the ear near the throat, a harsh, rasping sound is heard, which is sufficient at once to show the nature and urgency of the symptoms. The mucous membrane is

swollen, and tinged with blood; the rima glottidis is almost closed, and the air in passing through it produces the sound above described, which, however, is sometimes replaced by a stridulous or hissing one. In conjunction with this well-marked symptom there is always a hoarse cough of a peculiar character, and some considerable fever, with frequent respiration, and a hard, wiry pulse of seventy to eighty. The treatment must be of the most active kind, for not only is life threatened, but even if a fatal result does not take place, there is great danger of permanent organic mischief to the delicate apparatus of the larynx, generally from the effusion of lymph into the sub-mucous cellular membrane. A full bleeding should at once be practised, and repeated at the end of twelve hours if there is no relief afforded and the pulse still continues hard. The hair should be cut off the throat, and the tincture of cantharides brushed on in a pure state until a blister arises, when the part may be constantly well fomented, to encourage the discharge. Large doses of tartar emetic, calomel, and digitalis, must also be given, but their amount and frequency should be left to an experienced veterinarian, the preliminary bleeding and blistering being done in his absence to save time. It is a case in which medicine must be pushed as far as can be done with safety, and this cannot well be left to any one who is not well acquainted with its effects, and with the powers of the animal economy. Cruel is the only food allowed during the acute stage, and there is seldom time to have recourse to aperient physic until the urgent symptoms are abated, when an ordinary dose may be given. During convalescence the greatest care must be taken to prevent a relapse, by avoiding all excitement either by stimulating food or fast exercise.

Chronic Laryngitis may occur as the result of the acute form above described, or it may come on gradually, without any violent inflammation preceding it. In either case the symptoms are similar in their nature to those met with in the acute form, but less in degree. The noise made is not nearly so harsh, and can often hardly be heard on the most careful examination. The peculiar, harsh, grating cough is, however, always present, and by

it the nature of the case may generally be easily made out. The disease often accompanies strangles, although in nine cases out of ten it is overlooked by the careless attendant. Very commonly, however, it makes its ravages in so insidious a manner that no suspicion is felt of its presence, until the horse begins to make a noise, though he must in all probability have shown by the cough peculiar to the complaint that it has been working its way for some weeks at least. Such cases chiefly occur in the training stable, and are due, according to our belief, to the enormous quantity of oats which it is now the fashion to give to colts from the earliest period of their lives, increased to seven and eight feeds a day during the second year. Continued spirit-drinking has precisely the same effect upon the human being, and the harsh, stridulous cough of the confirmed drunkard marks the existence of ulceration of the larynx, in the only way which he will allow it to be displayed, for he is not, like the horse, made to exert his powers of running, whether his wind is good or bad. There is, of course, a considerable difference between the two diseases, but there is sufficient analogy between them to explain why the stimulus of over-coming should affect the larynx in preference to any other part. It would be difficult to show the connection between the two in any other way, beyond the simple fact that roaring has become general in an exact proportion to the prevalence of the present fashion of feeding. The advocates of the plan will say that though the two have come in together, yet it is merely a coincidence, and not a consequence, the one of the other; but if it can be shown that in man a similar cause produces a similar effect, the argument is strengthened to such a degree as to be almost unanswerable. But whatever may be the cause there can be no doubt that the treatment is most troublesome and often baffles the skill of the most accomplished veterinarian. Blistering is not so useful as counter-irritation by a seaton, which must be inserted in the loose skin beneath the jaw, as close as possible to the larynx. This alone will do much towards the cure, but no pains must be spared to assist its action by a cooling regimen, consisting of bran mashes, and if in the spring or summer,

green food, or in the winter, carrots. Corn must be entirely forbidden, and the kidneys should be encouraged to act freely by two or three drachms of nitre given in the mash twice a day. When the case is very intractable, the nitrate of silver may be applied to the part itself by means of a sponge fastened to a piece of flexible cane or whalebone. The mouth should then be kept open with the ordinary balling iron, and the sponge rapidly passed to the situation of the top of the larynx, and held there for a second, and then withdrawn. We have succeeded in curing two obstinate cases of chronic laryngitis by this plan, but some little risk is incurred, as in one of them imminent symptoms of suffocation presented themselves, but soon went off. We should not, therefore, recommend the application excepting in cases where all other means have failed, and in which there is reason to believe that the patient is likely to become a permanent roarer or whistler. The nitrate of silver has great power in producing resolution of inflammation in mucous surfaces, and in this disease little or nothing can be effected by general measures. The solution should be from ten to fifteen grains in the ounce of distilled water.

Roaring is the bugbear of the purchaser at the hammer, and not without good reason. The most experienced veterinarian or dealer will often fail to ascertain its existence, in spite of all the artifices he may call into play. Not the slightest sound is heard during a state of quiescence, or even when the horse is trotted or galloped for the short distance which "the ride" will afford. The blow on the side given with an artistic effect elicits no grunt, and yet the animal is a confirmed roarer, and not worth a shilling perhaps for the purpose to which he is intended to be devoted. On the other hand, many a sound horse is condemned as a roarer for giving out the obnoxious grunt; and though there is no doubt that this sign may be relied on in a great many cases, yet it cannot be accepted as either negatively or positively a certain proof. The only real trial is the noiseless gallop on turf or plough, when the ear can detect the slightest sound, and can distinguish its exact nature, and the precise spot from which it proceeds. Many a horse will, when he is excited, make a harsh noise in

his breathing, accompanied by a kind of "gluck," proceeding from a spasmodic flapping of the velum palati; but on galloping him all this goes off, and he may probably exhibit excellent wind. Such cases we have many times known, and they would be condemned as unsound by those who have had little experience, or are content with a careless and inefficient trial. Stallions are particularly prone to make this kind of noise, and it is extremely difficult to ascertain their soundness in this respect by any means which can be safely resorted to. The causes of roaring are of three kinds: 1st, Inflammation, which has left a thickening or ulceration of the mucous membrane, or a fungous growth from it; 2d, Paralysis of the muscles; and 3d, An alteration of the shape of the cartilages of the larynx, produced by tight reining.

In roaring produced by an ulcerated or thickened condition of the mucous membrane, or by a fungous growth, the sound elicited is always the same in proportion to the rapidity of respiration. None of the ordinary expedients by which the breath is introduced in a modified stream (such as a full meal, or pressure on the nostrils or windpipe), will be of much avail, and the horse roars sturdily whenever his pace is sufficiently accelerated. If a horse so affected can be made to grunt by the blow on the side, the sound will always indicate the disease, for it will be harsh and rough, and not the natural grunt of the animal. It is usually supposed that no treatment can be of the slightest avail here; but I believe that sometimes the continued application of nitrate of silver would be followed by a certain amount of amelioration, the extent of which it is impossible to guess at without a trial. In any case, when the animal is rendered almost worthless by disease, it is fair to try experiments which are neither expensive nor cruel; and from the effect of the remedy in those cases in which it has been used, we are led to expect that it may prove beneficial in those of longer standing. Setons, blisters and embrocations are all useless, as has been proven in numberless cases; and beyond the palliation which can be afforded by employing the horse only at such a pace as his state will allow, nothing else can be suggested. In some cases the roarer will be able to

do ordinary harness work, which, however, in hot weather, will try him severely; in others he may be so slightly affected as to be fit to hunt in a country where, from its nature, the pace is not very severe; but by confirmed roarers the slow work of the cart is all that can be performed without cruelty.

Where paralysis of the muscles that open the rima glottidis is the seat of the roaring, no plan has yet been suggested which is of the slightest avail. In the first place, it is extremely difficult, and indeed almost impossible, to diagnose the affection, and we know of no means by which paralysis can be ascertained to exist during life. Hence, although it is barely possible that by the use of strychnine the nerve might be stimulated into a restoration of its functions, yet as the case cannot be ascertained, it is scarcely wise to give this powerful drug in the hope that it may by chance hit the right nail on the head. This paralytic condition seems chiefly to attack carriage horses, and probably arises from the pressure made by the over-curved larynx upon the laryngeal nerve as it passes through the opening in the thyroid cartilage. Many veterinary writers have looked to the recurrent branch of the par vagum to explain the loss of power, but we believe it is rather to the laryngeal nerve that the mischief is due. It must be remembered that carriage-horses are not only reined up for hours while doing their daily work out of doors, but they are also often placed in the same position, or even a more constrained one, by the coachman in the stable, in order to improve their necks. One horse of his pair perhaps has naturally a head better set on than the other, and he wishes to make nature bend to his wishes by compelling the other to do that which the shape of his jaw forbids without a sacrifice. The mouthing tackle is put on in the stable with this view, and the poor horse is "kept on the bit" for three or four hours early in the morning, during which time his larynx is pressed between his narrow jaws into a most unnatural shape. The consequence is, either that the nerve is pressed upon, and the muscles to which it is supplied are paralyzed, as in the condition which we are now considering, or the cartilages are permanently disfigured, which is the subject of

the next paragraph. When the paralysis is established, we believe no means but the internal use of strychnine are at all likely to be beneficial.

An alteration in the shape of the cartilages, so as to permanently change their form, is, we believe, the least common of all the causes of roaring. Pressure for a very long time will be required to effect this, and far more than suffices to paralyze the nerve. Cases, however, are recorded, and the parts have been preserved, so that there can be no doubt of their occasional occurrence. No treatment can be of the slightest service.

Although roaring, in all its varieties, may be said to be generally incurable, yet it may be greatly palliated by general attention to the state of the lungs and stomach, by proper food, and by the use, while the horse is at work, of a special contrivance, of a most ingenious nature, published by a Mr. Reeve, but said to have been in use for many years among the London omnibus and cab men. At all events, Mr. Reeve deserves the credit of having laid the matter before the profession, and of explaining the true principle upon which it acts. He says, in his paper upon the subject: "I thought it possible to so modify the atmospheric supply to the lungs, that, during exercise, the volume of air when it arrives at the glottis, should not exceed that which passed through its opening when the horse was tranquil, and which (from the fact of the sound being absent) does not at that time produce roaring. A strap was accordingly made to pass around the nose of the horse, just over the region of the false nostrils, and buckle beneath the lower jaw. To the inner surface of this strap, and immediately over the false nostril on each side, was fixed a body resembling in shape the half of a hen's egg, cut longitudinally. When applied, these bodies pressed upon the triangular spaces formed by the apex of the nasal bones and upper jaw, thus closing the false nostrils, and partly diminishing the channel of the true ones. The result was highly gratifying; for the patient, which previously could not travel without stopping every minute to take breath, now travelled, to all appearance, without inconvenience or noise. At first the strap seemed slightly to annoy the horse; and when-

ever it became displaced, the roaring would again commence. A slight modification, however, overcame every difficulty; the strap instead of being buckled around and under the jaw, was fastened on each side of the bit; and, to prevent its descent, another was carried from its centre, and fastened to the front of the harness-bridle." Mr. Reeve asserts that the effect was all he could have wished, and that the horse on which he had tried the plan, "which previously had been entirely useless, now performs his work in a heavy brougham, and gives great satisfaction. The roaring is stopped, and, with the usual speed, there appears no impediment to respiration." He concludes: "I have paid particular attention to this case, and am inclined to think, that when by the compression we have neutralized the action of the false nostrils, the object is effected without the necessity of further narrowing the nasal passage."

Few people would care to drive a roarer, if they could help it, even with the aid of the nasal compress; but if necessity compels such a proceeding, it is well to know how the poor animal may be used with least annoyance to himself and his master.

HIGHBLOWING is a perfectly healthy and natural habit, and cannot be confounded with roaring by any experienced horseman. It is solely confined to the nostrils; and the noise is not produced in the slightest degree during inspiration, but solely during the expulsion of the air, which is more forcible and rapid than usual, and accompanied by a vibratory movement of the nostrils, which is the seat of the noise. Roaring, on the contrary, continues during inspiration as well as expiration; and by this simple test the two may readily be distinguished. Most highblowers have particular good wind, of which the celebrated Eclipse is an example; for there is no doubt that he was addicted to the habit.

WHISTLING (AND PIPING, which is very similar to it) are produced by the same causes as roaring, in an exaggerated condition. Thus a roarer often becomes a whistler as the rima glottidis is more and more closed by disease; on the other hand, the whistler is never converted into a roarer. The noise made is seldom a decidedly shrill whistle, but it has more

resemblance to that sound than to roaring, and the name may well be retained as descriptive of it. Whistlers are always in such a state of confirmed disease, that treatment is out of the question—indeed, they can only be put to the very slowest kind of work.

WHEEZING is indicative of a contracted condition of the bronchial tubes, which is sometimes of a spasmodic nature, and at others is only brought on during occasional attacks after exposure to cold. The treatment should be that recommended for chronic bronchitis, which is the nature of the disease producing these symptoms.

TRUMPETING is not very well defined by veterinary writers, and we confess that we have never heard any horse make a noise which could be compared to the trumpet, or to the note of the elephant so called.

The question relating to the hereditary nature of roaring is one which demands the most careful examination before a reliable answer can be given to it. It would be necessary to select at random a number of roaring sires and dams, and compare their stock with that of an equal proportion of sound animals, which would be a Herculean task, beyond the power of any private individual. Nothing short of this could possibly settle the dispute; but, as far as opinion goes, it may be assumed that there are strong authorities against the hereditary nature of the diseases which produce roaring. That it is often the result of ordinary inflammation, which in itself can scarcely be considered hereditary, is plain enough; and that it is also produced by mismanagement in tight-reining is also admitted, which latter kind can scarcely be supposed to be handed down from sire to son; but that it is safer, when practicable, to avoid parents with any disease whatever, is patent to all.

HORSE, Pneumonia and Congestion of the Lungs in.—The theoretical definition of pneumonia is that it consists of inflammation of the parenchyma of the lungs, independently both of the mucous lining to the air passages, and of the serous covering of the whole mass. The mucous membrane ceases abruptly at the terminations of the bronchial subdivisions, and consequently the air cells are not lined with a continuation from it.

Hence there is an extensive cellulo-fibrous area, which may be the subject of inflammation, without implicating the mucous surface. Until within the last fifteen or twenty years, it was commonly supposed that the air cells were all lined by mucous membrane, and that the parenchyma was confined to an almost infinitesimally thin structure, filling up its interstices; but the microscope has revealed the true structure of the lungs, and has shown that there is a well-founded distinction between bronchitis and pneumonia, upon the ground of anatomy, as well as observation. Still, it cannot be denied that the one seldom exists to any great extent, or for any long period, without involving the adjacent tissue; and broncho-pneumonia as well as pleuro-pneumonia are as common as the pure disease.

PNEUMONIA, OR PERIPNEUMONY, must be examined, with a view, first, to its intensity, whether acute or sub-acute; and secondly, as to its effects, which may be of little consequence, or they may be so serious as to completely destroy the subsequent usefulness of the patient. It is not, therefore, alone necessary to provide against death by the treatment adopted, but due care must also be taken that the tissue of the lungs is not disorganized by a deposition of lymph, or of matter, so as to lead, in the one case, to a consolidation of the air cells, and, in the other, to the formation of a large abscess, and consequent destruction of substance. The former is a very common sequel of pneumonia; and probably there are few attacks of it without being followed by a greater or less degree of hepatization, by which term the deposit of lymph is known, from its causing the lungs to assume the texture of liver. In very severe cases, gangrene of the lungs is induced; but as death almost always speedily follows this condition, it is not necessary to consider it, excepting as bearing upon the fatal results.

The cause of pneumonia may be over-exertion, as in the hunting-field, especially in an unprepared horse; or it may come on as a primary disease after exposure to cold; or it may follow upon bronchitis when neglected and allowed to run on without check. In the two first cases it appears to be produced by the great congestion of blood which takes place in the

fine network of vessels of which the lungs are in great part composed. The blood in the one case is collected by the increased necessity for its aëration with a failing circulation, as in over-exhaustion, or in the other it is forced inwards upon the vital organs by the chill which the skin has received. The capillaries are then roused to act beyond their strength, and an inflammatory condition is established as a reparatory effort of nature, which may possibly stop short as soon as the object is accomplished, but more frequently goes on beyond this, and an attack of pneumonia sets in with more or less intensity, according to circumstances. For these reasons, when the lungs are evidently congested no pains should be spared to relieve them by causing the skin to act, before the aid of nature is invoked, since it can never be certain that she will stop short at the proper point.

Congestion of the lungs is too often neglected and allowed to go on to inflammation. Veterinary surgeons, indeed, are seldom called in before this stage has run its course and inflammation is established. It is true that every horse owner endeavors to ascertain all the particulars relating to it, because he is constantly in fear of having to treat it, and he would gladly benefit by the advice and experience of those more competent to treat it than himself. But the great mass of horse-masters are wholly ignorant of its action, and we shall therefore endeavor to lay down instructions which may be beneficial to those who are so unlucky as to have a horse with congested lungs, either caused by over-exertion or by a chill, or by a combination of the two, as most frequently happens.

When a fat "dealer's horse," that is, one made up for sale and not for use, is ridden in a sharp burst across the country, his lungs are, most unfortunately, tried; for he is not only loaded with blood containing an excess of stimulating materials (or in a state of plethora, as it is called), but his heart and blood-vessels are not prepared by previous exercise to carry on the circulation when unusual demands upon them are made. The consequence is, that as soon as he has gone half a dozen miles, he not only tires, but, if pressed, his gallant spirit carries him on until the blood collects and stagnates in

his lungs, from a defect in the circulating apparatus, and he becomes absolutely choked from a want of that decarbonization which is necessary to his very existence. Air is taken freely into his lungs, but the circulation almost ceases in them, and in spite of his hurried breathing, as shown by his panting sides, he is almost as completely suffocated as if a cord was tied round his neck. On examining his eyes and nostrils they are seen to be turgid and purple, the vessels being filled with carbonized blood, while the heart beats rapidly but feebly, and the countenance is expressive of anxiety and distress. In this state many a horseman finds his steed every winter, and a pretty dilemma he is in. The question of treatment is a serious one even to the most experienced in such matters, but one thing is quite clear, that the more urgent the case the more danger there is in having recourse to the lancet. Bleeding to the extent of a few pounds will sometimes relieve a trifling case of exhaustion, but in a really severe one it will take away the only chance which remains. The best plan is to give the animal plenty of air, turn his head to the wind, and if any kind of fermented liquor can be obtained, give him a little at once. Neat spirits are apt to cause increased distress from spasm of the larynx, but it is even better to risk this than to let the exhaustion continue. If, therefore, the horse is incapable of walking to the nearest farm-house or inn, the better plan is to leave him with a light covering on him of some kind, and at once to proceed to procure a quart of ale or wine, whichever can be obtained the most easily. One or the other of these, slightly warmed, and spiced if possible, should be poured down his throat, which can readily be done, as he has no power to resist, and then in a few minutes he may generally be induced to move quietly on towards the nearest stable. Here he must remain all night if the attack is a bad one, or if he recovers soon he may be walked quietly home. When he reaches his stable, in the evening or the next morning early, if the pulse rises and is hard and jerking, he may be bled with advantage, but rarely should this be done for some hours after the first attack. Congestion is essentially produced by debility, and although an abstraction of blood re-

lieves the vessels of a part of their load, it increases their weakness in a still greater degree, and they are less able to do their work, diminished though it may be, than they were before. Hundreds of over-worked horses have been killed by the abuse of the lancet in the hunting-field, but the principle on which their treatment should be conducted is better understood now than formerly.

When congestion shows itself as the result of a chill, the following symptoms are displayed: First and foremost there is rapid and laborious breathing, the horse standing with his legs wide apart, his head thrust straight forward, and his flanks heaving. The skin is generally dry, but if there is any sweat, it is a cold one. The legs are icy cold, and also the ears. The whites of the eyes and lining of the nostrils are of a purplish hue, but not very deep in color. The pulse is slightly accelerated (from forty to fifty), but not hard and incompressible; and lastly, the attack is of recent duration. These signs, however, are not to be fully relied on as marking congestion rather than inflammation, without having recourse to an examination of the lungs by means of the ear. Placing it against the side of the chest, in inflammation there would be certain marked sounds, presently to be described, whilst in the state we are now considering they are wholly absent, and all that is heard is the usual respiratory murmur slightly increased in intensity. It is of the utmost importance to make out exactly the nature of the case, for the treatment should be very different in congestion and inflammation. If in the former condition the blood can only be drawn into the skin, relief is at once afforded and all danger is at an end; but in the latter, though some slight advantage would be gained, the progress of the disease would not be materially checked. To produce this determination of blood to the skin without loss of time, is sometimes very difficult; but by the application of hot water and blankets, it may generally be accomplished. Two men, supplied with a tub of very hot water and plenty of clothing, should be rapid in their movements, and proceed as follows: Have an assistant ready to strip the patient when ordered, then dipping a blanket in the water, it is taken out and partially wrung,

leaving as much water in its meshes as it can hold without dropping; as soon as it is cool enough for the human hand to bear its pressure it should be gently, but quickly, laid upon the horse's back, and the rug, which has just come off, while still warm, placed over it, with two or three more over all, the number depending upon the temperature of the air. Another smaller rug may, in the same way, be wetted and applied to the neck, covering it with two or three hoods, but taking care to avoid pressure upon the windpipe. The legs also should be wrapped in flannel bandages, made as hot as possible before the fire, but dry. In the course of half an hour, if the skin of the parts uncovered does not become warm, and show evidences of sweating coming on, another rug must be dipped in the same way and substituted quickly for the first. Usually, however, the desired effect is produced within twenty minutes, and then great care and some little tact are required to manage the operation. If the sweating is allowed to go on beyond a certain point exhaustion is produced, attended by almost as much danger as inflammation; while on the other hand, in attempting to moderate the action of the skin, risk is incurred of a chill, and thus upsetting all the benefit which might otherwise have been derived. But by throwing open the doors to the external air, which may freely be admitted as soon as the skin acts, and by reducing the number of additional rugs, the amount of sweat given off may be kept within due bounds, and in the course of two or three hours the previously wetted rug or blanket may be removed, and a dry, warm one substituted for it, but the assistants must be quick and handy in effecting the change. Many a case of inflammation of the lungs, kidneys, or bowels might be stopped *in limine* by the adoption of this plan; but the misfortune is that it requires all the skill and tact of the veterinary surgeon, first of all to diagnose the case; and afterwards to manage its treatment. Still, if a master will undertake the superintendence of the operation himself; and is accustomed to disease, there is little risk of failure.

The symptoms of acute pneumonia are a quick and distressed respiration, averaging about sixty inspirations in the minute.

Pulse quick (from seventy to eighty-five), hard, often small, but always compressible. Nostrils distended, and the lining membrane red (except in the last stage, when suffocation is imminent). Cough short, and evidently giving pain, which occasions it to be checked as much as possible. Legs and ears generally cold, often icy. Feet wide apart, evidently with an instinctive desire to dilate the chest as much as possible. On putting the ear to the chest, if the attack is very recent, there will be merely a greatly increased respiratory murmur; but when fully developed there may be heard a crepitant rattling, which is compared to the crackling of a dried bladder; but we confess that we could never make out the similarity between the two sounds. In the latter stages, this is succeeded by an absence of all sound, owing to the consolidation of the lungs, or by mucous rattles depending upon the secretion of mucus. On tapping the exterior of the chest with the ends of the fingers (percussion), the sound given out is dull in proportion to the extent of mischief, the effect of pneumonia being to convert the spongy texture of the lungs into a solid substance like liver. The treatment will greatly depend upon the stage of the disease, the age and constitution of the horse, and the nature of the prevailing epidemic, if there is one. In modern days bleeding is very badly borne, either by man or horse, nevertheless, few cases of genuine pneumonia will be saved without it. Sufficient blood must be taken to make a decided impression on the circulation, without which the inflammation will not be mastered. The quantity necessary for this cannot be fixed, because the effect will vary so materially that the abstraction of three or four quarts of blood in one case will do no more than double or treble that quantity in another. A large orifice must be made in the vein, and it must not be closed until the lining membrane of the nose or the white of the eye is seen to have become considerably paler. It may possibly even then be necessary to repeat the operation six hours afterwards, or next day, according to the symptoms. The rule should be followed of taking enough, but not a drop too much, for blood removed from the circulation takes a long time to replace. With regard to

medicine, tartar emetic is the only drug which seems to have much influence over pneumonia, and it must be given every six hours in drachm doses, with from half a drachm to a drachm of powdered digitalis, or white hellebore, to keep down the pulse, and two or three drachms of nitre, to increase the action of the kidneys. Unless the bowels are confined no aperient should be given, and if necessary only the mildest dose should be used. The diet should consist of bran mashes, gruel, and a little hay, or green food if the season of the year allows. A cool, airy stable and warm clothing are indispensable in this disease. When the first violence of the attack has subsided, a large blister on the side of the chest will afford great relief, and when it ceases to act, if the disease is not entirely cured, a second may be put on the other side.

Sub-acute pneumonia differs in no respect from the acute form, excepting in degree, and the symptoms and treatment will vary only in proportion.

The terminations of pneumonia may be death, or resolution (by which is to be understood a disappearance of the symptoms without leaving any mischief behind), or hepatization, or abscess. The last named sequel may be very serious in extent, but if an opening is made by nature for the discharge of its contents into the bronchial tubes the horse may recover, and his wind may be sufficiently good for any purposes but the race course or the hunting field. Hepatization is always attended with thick wind, but in other respects the health may be good, and the horse may be suited to ordinary work. In process of time some of the lymph is absorbed, and a considerable improvement takes place, but it never entirely disappears, and a horse which has once suffered from pneumonia, attended by hepatization, remains permanently unsound.

HORSE, Pleurisy in.—This disease is characterized by a very peculiar respiration, the expirations being much longer than the inspirations, owing to the pain which is given by the action of the muscles necessary for the latter, while the former, if the chest is allowed quietly to fall, is almost painless. Nevertheless, the breathing is quicker on the whole than natural, being from forty to fifty per minute. The pulse is quick, small and in-

compressible. Nostrils and eyes of a natural color, and the former are not dilated. The countenance is anxious, and the legs are rather drawn together than extended, as in bronchitis and pneumonia, and they are not colder than usual. There is a short hurried cough, with great restlessness, and the sides are always painful on pressure; but this symptom by itself is not to be relied on, as it is present in pleurodynia, which will be presently described.

The treatment should consist of copious bleeding, followed by a mild purgative, and the same ball as recommended for pneumonia, with the addition of half a drachm of calomel. Blisters are not desirable to be applied to the sides of the thorax, as there is so little space between the two surfaces of the pleura and the skin that they are apt to do harm by immediately irritating the former, rather than to act beneficially by counter-irritation of the skin. A large rowel may, however, be placed in the breast with advantage.

Hydrothorax, or water in the cavity of the chest, is one of the sequels of chronic pleurisy, the serum thrown out being the means by which a serous membrane relieves itself. It can be detected by the entire absence of respiratory murmur, and by the dullness on percussion. No treatment is of any avail but tapping, which may be readily and safely performed (if the diagnosis is correct) by passing a trocar between the eighth and ninth ribs, near their cartilages. If, however, an error has been committed the lung is wounded, and death will most probably ensue.

HORSE, Pleurodynia in.—Between this disease and pleurisy there is some similarity in the symptoms; but in their nature, and in the treatment required, they are widely separated. It is, therefore, necessary that they should not be confounded, for in the one case blood-letting and other active measures may be unnecessarily adopted, and in the other a fatal result will most probably occur for want of them. In pleuritis there is a quick pulse, with general constitutional disturbance, which will serve to distinguish it from pleurodynia, besides which, it is rarely that we meet with the former without some other affection of the lungs co-existing. When, therefore, a horse is evidently suffering from acute pain in the

walls of the thorax, unaccompanied by cough, hurried breathing, quick pulse, or fever, it may safely be diagnosed that the nature of the attack is a rheumatism of the intercostal muscles (pleurodynia), and not pleurisy. In treating it bleeding and tartar emetic must be carefully avoided, and hot mustard and vinegar rubbed into the sides will be the most likely remedy to afford relief.

HORSE, Pythisis in.—When a horse has long been subject to a chronic cough, and, without losing appetite, wastes away rapidly, it may be assumed that he is a victim to pythisis, and especially if he is narrow-chested and has long shown signs of short wind. On examining the chest by the ear, it will be found to give out sounds of various kinds, depending upon the exact state of the lungs; but in most cases there will be great dullness on percussion, owing to the deposit of tubercles, in which the disease consists. In a confirmed case no treatment will avail, and the poor animal had better be destroyed. When the attack is slight, the progress of the disease may be stayed by counteracting inflammation in the ordinary way, avoiding loss of blood when possible. Hemorrhage, from the breaking down of the substance of the lung, by which a large blood vessel is opened, is a common result of pythisis, and will be alluded to under the head of the DISEASES OF THE VESSELS OF THE LUNGS, which see.

HORSE, Broken-wind.—A broken-winded horse can be detected at once by any horseman possessed of experience, from the peculiar and forcible double expiration. Inspiration is performed as usual, then comes a rapid but not violent act of expiration, followed by a forcible repetition of the same, in which all the muscles of respiration, auxiliary and ordinary, are called into play. This is, of course, most marked when the horse has been galloped, or even when he is at rest the double expiration is manifest at almost any ordinary distance from the observer: The disease almost (if not quite) invariably consists in emphysema, or entrance of the air into unnatural cells, which is retained there, as the urine is in the bladder, from the valvular nature of the openings, and cannot be entirely expelled, nor in the slightest degree,

without calling into play all the muscles of the chest. The presence of unchanged air is a constant source of irritation to the lungs, and although sufficient may be expired easily enough to carry on their functions while the body is at rest, yet instinctively there is a desire to get rid of the surplus, and hence the two acts of respiration. Immediately after this second act the muscles relax, and the flank falls in, and this it is which catches the eye in so remarkable a manner. On examination after death, the lungs are found to remain enlarged, and do not collapse as in the healthy condition. They are distended with air; and this is especially the case when the emphysema is of the kind called interlobular, in which the air has escaped into the cellular membrane. In the most common kind, however, the cells are broken down, several being united together, while the enlargement pressing upon the tube which has opened into them diminishes its capacity, and prevents the ready escape of air. This is the vesicular emphysema of pathologists. The former is generally suddenly produced by a severe gallop after a full meal, while the latter is a slow growth, and often occurs at grass, as a consequence of neglected chronic cough, the constant muscular efforts appearing gradually to dilate the cells.

The treatment can only be palliative, as there is no recognized cure for the disease, though M. Hew, of Chaumont, has lately published a report of ten cases in which treatment by arsenic given with green food or straw, and in some cases bleeding, was perfectly successful. The arsenic was given to the extent of fifteen grains daily, and at the end of a fortnight the symptoms of broken wind were completely removed; but as the horses were not subsequently watched, it is impossible to say whether the cure was permanent. It is known, however, that one of them relapsed after three months, but speedily yielded to a repetition of the treatment. It may certainly be worth while to try the experiment of the effect of arsenic where a broken-winded horse is valuable in other respects. The medicine is not expensive, and the length of time necessary for the treatment is not very great. Broken-winded horses should

be carefully dieted, and even then confined to slow work. The food should be in small compass, consisting chiefly of wheat-straw chaff, with a proper quantity of oats, and beans may be added if the animal is not very young. The water should never be given within an hour of going out of the stable, but it is better to leave a constant supply, when too much will never be taken. Carrots are peculiarly suited to this disease, and a diet of bran mixed with carrots, sliced, has sometimes been known to relieve a broken-winded horse most materially.

HORSE, Wind, Thick in.—Thick wind is the horseman's term for any defective respiration, unaccompanied by a noise, or by the signs of emphysema just alluded to. It usually follows pneumonia, but it may arise from chronic bronchitis, occasioning a thickening of the mucous membrane lining the bronchial tubes, and thus lessening their diameter, or it may accompany phthisic when the deposit of tubercles is extensive. No treatment will be of any service except such as will aid the play of the lungs mechanically, by avoiding overloading the stomach, as mentioned in the last section.

HORSE, Diaphragm, Spasm of the, in.—Some horses, when at all distressed by the severity of their gallops, communicate to the rider a most unpleasant sensation, as if some internal part was given a sudden blow or flap. This is not only a sensation, but a reality, for the diaphragm being naturally weak, or overstrained at some previous period, acts spasmodically in drawing in the air. If the horse thus affected is ridden onwards afterwards, he will be placed in danger of suffocation and death, either from rupture of the diaphragm, or from its cessation to act, or from its permanently contracting and refusing to give way during expiration. There is no cure for the weakness which tends to produce the spasm, and all that can be done is to avoid using the horse affected with it at any very fast pace, and over a distance of ground. Urgent symptoms may be relieved by a cordial drench, such as the following:

Take of Laudanum	- - - - -	6	drachms.
Ether	- - - - -	1½	ounce.
Aromatic Spirits of Ammonia	- - - - -	3	drachms.
Tincture of Ginger	- - - - -	3	drachms.
Ale	- - - - -	1	pint. Mix.

Or if there is any difficulty in giving a drench, a ball may be made up and given.

Take of Carbonate of Ammonia	-	1	drachm.
Camphor	- - - - -	½	drachm.
Powdered Ginger	- - -	1	drachm.

Linseed meal and boiling water sufficient to make into a ball.

Either of the above may be repeated at the end of three hours, if relief is not afforded. Increased strength may be given to the diaphragm by regular slow work, and the daily mixture of a drachm of powdered sulphate of iron with the feed of corn.

HORSE, Heart, Diseases of the.—The horse is subject to inflammation of the substance of the heart (carditis) of a rheumatic nature, and of the fibro-serous covering (pericarditis), but the symptoms are so obscure that no one but the professional veterinarian will be likely to make them out. Dropsy of the heart is a common disease in worn-out horses, and hypertrophy, as well as fatty degeneration, are often met with among well-conditioned animals.

HORSE, Blood Vessels of the Chest and Nose, Diseases of the.—The horse is very subject to hemorrhage from the nose, coming on during violent exertion, and many a race has been lost from this cause. Fat, over-fed horses are the most likely to suffer from hemorrhage; but most people are aware of the risk incurred in over-riding or driving them, and for this reason they are not so often subject to this accident (for such it is rather than a disease), as they otherwise would be. It is unnecessary to describe its symptoms, as the gush of blood renders it but too apparent, and the only point necessary to inquire into is, whether the lungs or the nasal cavities are the seat of the rupture of the vessel. In the former case the blood comes from both nostrils, and is frothy; while in the latter it generally proceeds from one only, and is perfectly fluid. The treatment should consist in cooling the horse down by a dose of physic and a somewhat lower diet; but if the bleeding is very persistent, and returns again and again, a saturated solution of alum in water may be syringed up the nostril daily, or, if this fails, an infusion of matico may be tried, which is far more likely to succeed. It is made by pouring half a pint of boiling

water on a drachm of matico-leaves, and letting it stand till cool, when it should be strained, and is fit for use.

Hemorrhage from the lungs is a far more serious affair, and its control requires active remedies if they are to be of any service. It may arise from the existence of an abscess in the lung of a phthisical nature, which implicates some considerable vessel; or it may be caused by the bursting of an aneurism, which is a dilatation of a large artery, and generally occurs near the heart. The treatment can seldom do more than prolong the life of the patient for a short time, and it is scarcely worth while to enter upon it. Bleeding from the jugular vein will arrest the internal hemorrhage, and must often be resorted to in the first instance, and there are internal medicines which will assist it, such as digitalis and matico; but, as before remarked, this only postpones the fatal termination.

HORSE, Abdominal Viscera and their Appendages, Diseases of the.—Though not often producing what in horse dealing is considered unsoundness, yet diseases of the abdominal viscera constantly lead to death, and frequently to such a debilitated state of the body that the sufferer is rendered useless. Fortunately for the purchaser, they almost always give external evidence of their presence, for there is not only emaciation, but also a staring coat and a flabby state of the muscles, which is quite the reverse of the wiry feel communicated to the hand in those instances where the horse is "poor" from over-work in proportion to his food. In the latter case, time and good living only are required to restore the natural plumpness; but in the former the wasting will either go on until death puts an end to the poor diseased animal, or he will remain in a debilitated and wasted condition, utterly unfit for hard work.

HORSE, Mouth and Throat, Diseases of the in.—Several parts about the mouth are liable to inflammation, which would be of little consequence in itself, but that it interferes with the feeding, and this for the time starves the horse, and renders him unfit for his work, causing him to "quid" or return his food into the manger without swallowing it. Such are lampas, vives or enlarged glands, barbs or paps, gigs, bladders and flaps—all

which are names given to the enlargements of the salivary ducts—and carious teeth, or inflammation of their fangs. Besides this, the horse is also subject to sore throat, and strangles, which are accompanied by constitutional disturbance, and not only occasion “quidding,” if there is any slight appetite, but they are also generally accompanied by a loss of that function.

HORSE, Sore Throat.—When the throat inflames, as is evidenced by fullness and hardness of this part, and there is difficulty of swallowing, the skin covering it should immediately be severely sweated, or the larynx will be involved and irreparable injury done. The tincture of cantharides diluted with an equal part of spirit of turpentine and a little oil, may be rubbed in with a piece of sponge, until it produces irritation of the skin, which in a few hours will be followed by a discharge from the part. Six or eight drachms of nitre may also be dissolved in the water which the horse drinks, with some difficulty, but still as he is thirsty he will take it. Sometimes eating gives less pain than drinking, and then the nitre may be given with a bran mash instead of the water.

HORSE, Strangles.—Between the third and fifth year of the colt's life he is generally seized with an acute swelling of the soft parts between the branches of the lower jaw, accompanied by more or less sore throat, cough and feverishness. These go on increasing for some days, and soon an abscess shows itself, and finally bursts. The salivary glands are often involved, but the matter forms in the cellular membrane external to them. The treatment should be addressed to the control of constitutional symptoms by the mildest measures, such as bran mashes with nitre in them, abstraction of corn, hay tea, etc. At the same time the swelling should be poulticed for one night, or thoroughly fomented two or three times, and then blistered with the tincture of cantharides. As soon as the matter can plainly be felt it may be let out with the lancet; but it is very doubtful whether it is not the best plan to permit the abscess to break. The bowels should be gently moved by giving a pint, or somewhat less, according to age, of castor oil, and afterwards two or three drachms of

nitre, with half a drachm of tartar emetic, may be mixed with the mash twice a day, on which food alone the colt should be fed, in addition to gruel, and a little grass or clover if these are to be had, or if not, a few steamed carrots. The disease has a tendency to get well naturally, but if it is not kept within moderate bounds it is very apt to lay the foundation of roaring or whistling. Any chronic swelling which is left behind may be removed by rubbing in a weak ointment of biniodide of mercury (half drachm to the ounce.)

HORSE, Colt, Distemper. (See HORSE, STRANGLES.)

HORSE, Lampas.—Lampas is an active inflammation of the ridges, or “bars,” in the roof of the mouth, generally occurring in the young horse while he is shedding his teeth, or putting up the tushes. Sometimes, however, it comes on, independently of this cause, from overfeeding with corn after a run at grass. The mucous membrane of the roof of the mouth swells so much that it projects below the level of the nippers, and is so tender that all hard and dry food is refused. The treatment is extremely simple, consisting in the scarification of the part with a sharp knife or lancet, after which the swelling generally subsides, and is gone in a day or two; but should it obstinately continue, as will sometimes happen, a stick of lunar caustic must be gently rubbed over the part every day until a cure is completed. This is far better than the red hot iron, which was formerly so constantly used, with good effect, it is true, and not accompanied by any cruelty, as the mucous membrane is nearly insensible, but the caustic is more rapid and effectual in stimulating the vessels to a healthy action, and on that score should be preferred. If the lampas is owing to the cutting of a grinder, relief will be afforded by a crucial incision across the protruding gum.

HORSE, Barbs, Paps, Etc.—The swelling at the mouth of the ducts may generally be relieved by a dose of physic and green food, but should it continue, a piece of lunar caustic may be held for a moment against the opening of the duct every second day, and after two or three applications the thickening will certainly disappear.

HORSE, Vives.—Where vives, or chron-

ically enlarged submaxillary glands, are met with, the application of the ointment of biniodide of mercury, according to the directions given for splints (see HORSE SPLINTS), will almost certainly cause their reduction to a natural state.

HORSE, Gastritis.—Gastritis (acute inflammation of the stomach) is extremely rare in the horse as an idiopathic disease; but it sometimes occurs from eating vegetable poisons as food, or from the wilful introduction of arsenic into this organ, or, lastly, from kicking off corrosive external applications, which have been used for mange. The symptoms from poisoning will a good deal depend upon the article which has been taken, but in almost all cases in which vegetable poisons have been swallowed there is a strange sort of drowsiness, so that the horse does not lie down and go to sleep, but props himself against a wall or tree with his head hanging almost to the ground. As the drowsiness increases he often falls down in his attempt to rest himself completely, and when on the ground his breathing is loud and hard, and his sleep is so unnaturally sound that he can scarcely be roused from it. At length convulsions occur and death soon takes place. This is the ordinary course of poisoning with yew, which is sometimes picked up with the grass after the clippings have dried, for in its fresh state the taste is too bitter for the palate, and the horse rejects the mouthful of grass in which it is involved. May-weed and water parsley will also produce nearly similar symptoms. The treatment in each case should be by rousing the horse mechanically, and at the same time giving him six or eight drachms of aromatic spirit of ammonia, in a pint or two of good ale, with a little ginger in it. This may be repeated every two hours, and the horse should be perpetually walked about until the narcotic symptoms are completely gone off, when a sound sleep will restore him to his natural state.

Arsenic, when given in large doses, with an intention to destroy life, produces intense pain and thirst—the former, evidenced by an eager gaze at the flanks, pawing of the ground, or rolling; and sometimes by each of these in succession. The saliva is secreted in increased quantities, and flows from the mouth, as the throat is generally too sore to allow of its

being swallowed. The breath soon becomes hot and fetid, and purging then comes on of a bloody mucus, which soon carries off the patient by exhaustion, if death does not take place from the immediate effect of the poison on the stomach and brain. Treatment is seldom of any avail, the most likely remedies being large bleedings, blisters to the sides of the chest, and plenty of thin gruel to sheathe the inflamed surface of the mucous membrane, which is deprived of its epithelial scales.

Corrosive sublimate is sometimes employed as a wash in mange, or to destroy lice, when it may be licked off, and will occasion nearly the same symptoms as arsenic. The treatment consists in a similar use of thin starch or gruel; or, if the poison has recently been given wilfully, of large quantities of white of egg.

HORSE, Arsenic.—(See HORSE, GAS-TRITIS.)

HORSE, Corrosive Sublimate.—(See HORSE, GASTRITIS.)

HORSE, Poison.—(See HORSE, GAS-TRITIS.)

HORSE, Staggers, Stomach.—The exact nature of this disease has never been clearly made out, and it is now so rare that there is little chance of its being satisfactorily explained. The symptoms would chiefly lead one to suppose the brain to be implicated; but there is so close a sympathy between that organ and the stomach, that we can easily account in that way for the cerebral manifestations. A theory has been propounded, that it is seated in the par vagum, or pneumogastric nerve; and as all the parts with which that nerve is connected are affected, there is some ground for the hypothesis; but it is not supported by the demonstration of anatomy, simply, perhaps, because of the difficulty in the way of prosecuting the pathology of the nerves. The first onset of the disease is marked by great heaviness of the eyes, soon going on to drowsiness; the head dropping into the manger, even while feeding is in progress. It generally makes its appearance after a long fast; and it is supposed by some writers to be owing to the demands made by the stomach on the brain, when in an exhausted condition for want of its usual supplies. This theory is supported by the fact that, in the present day, when every horsemas-

ter knows the danger of working his horses without feeding them at intervals of five, or at most six hours, the stomach staggers are almost unknown. Even when the disease shows itself at grass it is almost always manifested directly after the horse is first turned out, when he gorges himself with much-coveted food, which has long been withheld, and his brain is affected in a manner similar to that which follows a long fast from every kind of food. In a short time, if the affection of the brain is not relieved, that organ becomes still more severely implicated, and convulsions or paralysis put an end to the attack. During the course of the disease the breathing is affected, and there is generally an almost total cessation of the secretions of bile and urine, which may either be the cause or the effect of the condition of the brain. With this state of uncertainty as to the essence of the disease, it is somewhat empirical to lay down any rules for its treatment; and, as we before remarked, it is now so rare that they are scarcely necessary. If care be taken to feed the horse properly, he will never suffer from stomach staggers in the stable; and at grass, the attack is seldom observed until he is beyond the reach of any remedies. Still, it may be as well to observe, that the usual plan of proceeding has been to take away blood, so as to relieve the brain, and to stimulate the stomach to get rid of its load, by the use of warm aperients, such as the following :

Take of Barbadoes Aloes - - 4 to 6 drachms.
Tincture of Ginger - 3 drachms.

Dissolve the aloes in a pint of hot water, then add the tincture, and when nearly cool give as a drench.

HORSE, Dyspepsia.—Every domestic animal suffers in health if he is constantly fed on the same articles, and man himself, perhaps, more than they do. Partridges are relished by him early in September, but *toujours perdrix* would disgust the most inveterate lover of that article of food. Dogs are too often made to suffer from being fed on the same meal, flavored with similar flesh or broth, from one month to another. It is well known that cattle and sheep must change their pasture, or they soon lose condition; and yet horses are expected to go on eating oats and hay for years together without injury to health; and at the same time

are often exposed to the close air of a confined stable, and to an irregular amount of exercise. We cannot, therefore, wonder that the master is often told that some one or other of his horses is "a little off his feed;" nor should we be surprised that the constant repetition of the panacea for this, "a dose of physic," should at length permanently establish the condition which at first it would always alleviate. It is a source of wonder that the appetite continues so good as it does, in the majority of horses, which are kept in the stable on the same kind of food, always from July to May, and often through the other months, also. The use of a few small bundles of vetches, lucerne, or clover in the spring is supposed to be quite sufficient to restore tone to the stomach, and undoubtedly they are better than no change at all; but at other seasons of the year something may be done towards the prevention of dyspepsia by varying the quality of the hay, and by the use of a few carrots once or twice a week. In many stables, one rick of hay is made to serve throughout the whole or a great part of the year, which is a very bad plan, as a change in this important article of food is as much required as a change of pasture when the animal is at grass. When attention is paid to this circumstance, the appetite will seldom fail in horses of a good constitution, if they are regularly worked; but without it, resort must occasionally be had to a dose of physic. It is from a neglect of this precaution that so many horses take to eat their litter, in preference to their hay; for if the same animal was placed in a straw-yard for a month, without hay, and then allowed access to both, there would be little doubt that he would prefer the latter. Some horses are naturally so voracious that they are always obliged to be supplied with less than they desire, and they seldom suffer from loss of appetite; but delicate feeders require the greatest care in their management. When the stomach suffers in this way it is always desirable to try what a complete change of food will do before resorting to medicine; and, if it can be obtained, green food of some kind should be chosen, or if not, carrots, or even steamed potatoes. In place of hay, sound wheat or barley

straw may be cut into chaff, and mixed with the carrots and corn; and to this a little malt-dust may be added, once or twice a week, so as to alter the flavor. By continually changing the food in this way, the most dyspeptic stomach may often be restored to its proper tone, without doing harm with one hand while the other is doing good, as is too often the case with medicine. The use of the fashionable "horse-feeds" of the present day will serve the same purpose; and if the slight changes I have mentioned do not answer, Thorley's or Henri's food may be tried with great probability of success.

HORSE, Bots.—The larvæ of the *æstrus equi*, a species of gadfly, are often found in large numbers, attached by a pair of hooks with which they are provided, to the cardiac extremity of the stomach; they are very rarely met with in the true digestive portion of this organ, but sometimes in the duodenum or jejunum in small numbers. A group of these larvæ, which are popularly called bots, are truly represented below, but sometimes nearly all the cardiac extremity of the stomach is occupied with them, the interstices being occupied by little projections, which are caused by those that have let go their hold, and



FIG. 25. GROUP OF BOTS ATTACHED TO THE STOMACH.

have been expelled with the food. Several of these papillæ are shown on the engraving, which delineates also the appearance of the bots themselves, so that no one can fail to recognize them when he sees them. This is important, for it often happens that a meddlesome groom

when he sees them expelled from or hanging to the verge of the anus, as they often do for a short time, thinks it necessary to use strong medicine; whereas, in the first place he does no good, for none is known which will kill the larvæ without danger to the horse; and in the second, if he will only have a little patience, every bot will come away in the natural course of things; and until the horse is turned out to grass, during the season when the *œstrus* deposits its eggs, he will never have another in his stomach.

The *œstrus equi* comes out from the pupa state in the middle and latter part of summer, varying according to the season, and the female soon finds the proper nidus for her eggs in the hair of the nearest horse turned out to grass. She manages to glue them to the sides of the hair so firmly that no ordinary friction will get rid of them, and her instinct teaches her to select those parts within reach of the horse's tongue, such the hair of the forelegs and sides. Here they remain until the heat of the sun hatches them, when, being no larger in diameter than a small pin, each larva is licked off and carried down the gullet to the stomach, to the thick epithelium, to which it soon attaches itself by its hooks. Here it remains until the next spring, having attained the size which is represented in the engraving during the course of the first two months of its life, and then it fulfills its allotted career, by letting go and being carried out with the dung. On reaching the outer air it soon assumes the chrysalis condition, and in three or four weeks bursts its covering to become the perfect insect.

From this history it will be evident that no preventive measures will keep off the attacks of the fly when the horse is at grass, and, indeed, in those districts where they abound, they will deposit their ova in the hair of the stabled horse if he is allowed to stand still for a few minutes. The eggs are, however, easily recognized in any horse but a chestnut, to which color they closely assimilate, and as they are never deposited in large numbers on the stabled horse, they may readily be removed by the groom. Unlike other parasites, they seem to do little or no harm, on account of the insensible nature of the part of the stomach to which they

are attached, and moreover, their presence is seldom discovered until the season of their migration, when interference is uncalled for. On all accounts, therefore, it is unnecessary to enter into the question, whether it is possible to expel them; and even if by chance one comes away prematurely it will be wise to avoid interfering by attempting to cause the expulsion of those left behind.

HORSE, Bowels, Inflammation of the.

—There are two divisions of the abdominal serous sac, one of which lines the walls of the cavity, and the other covers the viscera which lie in it. In human medicine, when the former is inflamed, the disease is termed *peritonitis*, and when the latter is the subject of inflammatory action it is called *enteritis*. But though in theory this distinction is made, in practice it is found that the one seldom exists without the other being developed to a greater or less extent. Veterinary writers have generally taken the nomenclature adopted in human anatomy and pathology, but in regard to the inflammations of the bowels, they define *peritonitis* as inflammation of the peritoneal or serous coat, and *enteritis* as inflammation of the muscular coat. Our own belief is, that during life it is impossible by any known symptoms to distinguish the exact *locale* of any inflammation of the bowels but that of their mucous lining, which will presently be described, and that wherever the actual serous covering of the bowels is involved the muscular fibres beneath it will be implicated, but the serious and fatal symptoms manifested in such cases are not dependent upon the latter, but are due entirely to the lesions of the serous coat. We have examined numberless fatal cases of supposed enteritis, and have uniformly found signs of inflammation of the serous investment, sometimes implicating the muscular fibres beneath, and often extending to the peritoneal lining of the walls of the abdomen, but we have never yet seen marks of inflammation in the muscular tissue without the serous covering being affected to a much greater extent. We believe, therefore, that the distinction is erroneously founded, and that, theoretically, the same definition should be made of the two diseases as is in use by human pathologists, though practically this is of little importance.

There is no well made out inflammation of muscular tissue (except that of the heart) in which the symptoms are so urgent and so rapidly followed by a fatal issue as in the latter stages of the disease described by Mr. Percivall under the head enteritis, as follows: "The next stage borders on delirium. The eye acquires a wild, haggard, and unnatural stare—the pupil dilates—his heedless and dreadful throes render approach to him quite perilous, he is an object not only of compassion but of apprehension, and seems fast hurrying to his end—when all at once, in the midst of his agonizing torments, he stands quiet, as though every pain had left him and he were going to recover. His breathing becomes tranquillized—his pulse sunk beyond all perception—his body bedewed with a cold, clammy sweat—he is in a tremor from head to foot, and about the legs and ears has even a dead-like feel. The mouth feels deadly chill—the lip drops pendulous, and the eye seems unconscious of objects. In fine, death, not recovery, is at hand. Mortification has seized the inflamed bowel—pain can no longer be felt in that which a few minutes ago was the seat of most exquisite suffering. He again becomes convulsed, and in a few more struggles less violent than the former he expires." Analogy would lead any careful pathologist to suppose that such symptoms as these are due to some lesion of a serous and not a muscular tissue, and, as we before remarked, we have satisfied ourselves that such is really the case. We have seen lymph, pus, and serum effused in some cases of enteritis, and mortification extending to a large surface of the peritoneal coat in others, but we have never examined a single case without one or the other of these morbid results. It may be said that so long as the symptoms are correctly described their exact seat is of no consequence; but in this instance it is probable that the ordinary definition of enteritis as an inflammation of the muscular coat may lead to a timid practice in its treatment, which would be attended with worse results. We have no fault to find with the usual descriptions of the two diseases, or with their ordinary treatment, but we protest against the definition which is given of them.

An examination of the cause of inflammation of the bowels is the only means by which the one form can be distinguished from the other. If it has been brought about from exposure to cold, or from over-stimulating medicines given for colic, the probability is that the serous covering of the intestines themselves is chiefly involved; while if it has followed castration it may generally be concluded that the peritoneal lining of the abdominal muscles has taken on inflammatory action by immediate extension from the serous lining of the inguinal canal, which is continuous with it. In each case, however, the symptoms are as nearly as may be the same, and without knowing the previous history, we believe no one could distinguish the one disease from the other—nor should the treatment vary in any respect.

The symptoms of peritoneal inflammation vary in intensity, and in the rapidity of their development, but they usually show themselves in the following order: At first there is simple loss of appetite, dulness of eye, and a general uneasiness, which are soon followed by a slight rigor or shivering. The pulse becomes rapid, but small and wiry, and the horse becomes very restless, pawing his litter, and looking back at his sides in a wistful and anxious manner. In the next stage all these signs are aggravated; the hind legs are used to strike at but not touch the belly; and the horse lies down, rolls on his back and struggles violently. The pulse becomes quicker and harder, but it is small. The belly is acutely tender and hard to the touch, the bowels are costive, and the horse is constantly turning round, moaning, and regarding his flanks with the most anxious expression of countenance. Next comes on the stage so graphically described by Mr. Percivall in the passage which we have quoted, the whole duration of the attack being from twelve to forty-eight hours in acute cases, and extending to three or four days in those which are denominated sub-acute.

In the treatment of this disease, as in all those implicating serous membranes, blood must be taken largely, and in a full stream, the quantity usually required to make a suitable impression being from six to eight quarts. The belly should be

fomented with very hot water, by two men holding against it a doubled blanket dipped in that fluid, which should be constantly changed, to keep up the temperature. The bowels should be back-raked, and the following drench should be given every six hours till it operates, which should be hastened by injections of warm water.

Take of Linseed Oil - - - - 1 pint.

Laudanum - - - - 2 ounces.

If the first bleeding does not give relief in six or eight hours, it must be repeated to the extent of three or four quarts, and at the same time some liquid blister may be rubbed into the skin of the abdomen, continuing the fomentations, at short intervals, under that part, which will hasten its operation. The diet should be confined to thin gruel, or bran mash, and no hay should be allowed until the severity of the attack has abated.

To distinguish this disease from colic is of the highest importance, and for this purpose it will be necessary to describe the symptoms of the latter disease, so as to compare the two together.

HORSE, Peritonitis.—(See HORSE, BOWELS, INFLAMMATION OF.)

HORSE, Enteritis.—(See HORSE, BOWELS, INFLAMMATION OF.)

HORSE, Colic.—In this disease there is spasm of the muscular coat of the intestines, generally confined to the cæcum and colon. Various names have been given to its different forms, such as the fret, the gripes, spasmodic colic, etc., but they all display the above feature, and are only modifications of it, depending upon the cause which has produced it. In spasmodic colic the bowels are not unnaturally distended, but in flatulent colic their distension by gas brings on the spasm, the muscular fibres being stretched to so great an extent as to cause them to contract irregularly and with a morbid action. Sometimes, when the bowels are very costive, irritation is established as an effort of nature to procure the dislodgement of the impacted faecal matters, and thus a third cause of the disease is discovered. The exact nature and cause are always to be ascertained from the history of the case, and its symptoms, and as the treatment will especially be conducted with a view to a removal of the cause, they are of the highest impor-

tance. The symptoms in all cases of colic, by which it may be distinguished from the last described disease, are as follows. In both acute pain is manifested by stamping, looking at the flanks, and rolling; but in enteritis the pain is constant, while in colic there are intervals of rest, when the horse seems quite easy, and often begins to feed. In both the poor animal strikes at his belly; but in the former he takes great care not to touch the skin, while in the latter (colic) he will often bring the blood by his desperate efforts to get rid of his annoyance. In enteritis the belly is hot and exquisitely tender to the touch, but in colic it is not unnaturally warm, and gradual pressure with a broad surface, such as the whole hand, always is readily borne, and generally affords relief. The pulse also is little affected in colic; and lastly, the attack is very much more sudden than in peritoneal inflammation.

Sure are the general signs by which a case of colic may be distinguished from inflammation of the bowels, but beyond this it is necessary to investigate whether it is pure spasmodic colic or produced by flatulence, or by an obstruction in the bowels.

In spasmodic colic all the above symptoms are displayed, without any great distension of the abdomen; and if the history of the case is gone into, it will be found that after coming in heated, the horse has been allowed to drink cold water, or has been exposed in an exhausted state to a draught of air.

In flatulent colic the abdomen is enormously distended; the attack is not so sudden, and the pain is not so intense, being rather to be considered, in the average of cases, as a high degree of uneasiness, occasionally amounting to a sharp pang, than giving the idea of agony. In aggravated attacks the distension is so enormous as to leave no doubt of the nature of the exciting cause. Here also the spasms are often brought on by drinking cold water while the horse is in a heated and exhausted state.

Where there is a stoppage in the bowels to cause the spasm, on questioning the groom, it will be found that the dung for some days has been hard and in small lumps, with occasional patches of mucus

upon it. In other respects there is little to distinguish this variety from the last.

The treatment must in all cases be conducted on a totally different plan to that necessary when inflammation is present. Bleeding will be of no avail, at all events in the early stages, and before the disease has gone on, as it sometimes will, into an inflammatory condition. On the other hand, stimulating drugs, which would be fatal in enteritis, will here generally succeed in causing a return of healthy muscular action. The disease is indeed similar in its essential features to cramp in the muscles of the human leg or arm, the only difference being that it does not as speedily disappear, because it is impossible to get at the muscular coat of the intestines, and apply the stimulus of friction.

As soon as a case is clearly made out to be of a spasmodic nature, one or other of the following drenches should be given, the choice being made in proportion to the intensity of the symptoms:

1. Sulphuric Ether - - - - - 1 ounce.
Laudanum - - - - - 2 "
Compound decoction of Aloes - - 5 "
Mix and give every half hour until relief is afforded.
2. Spirit of Turpentine - - - - - 4 ounces.
Linseed oil - - - - - 12 "
Laudanum - - - - - 1½ "
Mix and give every hour until the pain ceases.
3. Aromatic Spirit of Ammonia - - 1½ ounces.
Laudanum - - - - - 2 "
Tincture of Ginger - - - - - 1½ "
Hot Ale - - - - - 1 quart.
Mix and give every hour.

Hot water should also be applied to the abdomen, as described under the head of Enteritis, and if an enema pump is at hand, large quantities of water, at a temperature of 100° Fahrenheit, should be injected *per anum*, until in fact the bowel will hold no more without a dangerous amount of force.

In flatulent colic the same remedies may be employed, but the turpentine mixture is here especially beneficial. The use of warm water injections will often bring away large volumes of wind, which at once affords relief, and the attack is cured. Sometimes, however, the distension goes on increasing, and the only chance of recovery consists in a puncture of the cæum, as it lies high in the right flank, where, according to French veterinary writers, it may often be opened

when greatly distended, without dividing the serous covering. The operation, however, should only be performed by an experienced hand, as it is one of great danger, and a knowledge of the anatomy of the parts concerned is required to select the most available situation.

The treatment of impaction must be completely a *posteriori*, for all anterior proceedings with aperient medicines will only aggravate the spasms. Injection of gallons of warm water, or of gruel containing a quart of castor oil and half a pint of spirit of turpentine, will sometimes succeed in producing a passage, and at the same time the spasm may be relieved by the exhibition at the mouth of one ounce of laudanum and the same quantity of sulphuric ether. If there is any tenderness of the abdomen, or the pulse has a tendency to quicken, it will be better to resort to bleeding, which alone will sometimes cause the peristaltic action to be restored in a healthy manner. The case, however, requires great patience and judgment, and as no great good can often be effected, it is highly necessary to avoid doing harm; which can hardly be avoided if the remedies employed are not at once successful.

When the urgent symptoms of colic in any of its forms are relieved, great care must be exercised that a relapse does not take place from the use of improper food. The water should be carefully chilled, and a warm bran mash should be given, containing in it half a feed of bruised oats. Nothing but these at moderate intervals, in the shape of food or drink, should be allowed for a day or two, and then the horse may gradually return to his customary treatment, avoiding, of course, everything which may appear to have contributed to the development of colic.

HORSE, Diarrhœa and Dysentery.—A distinction is attempted to be made between these two diseases—the former name being confined to an inflammation of the mucous membrane of the small intestines, while the latter is said to reside in the large. It is very difficult, however, if not impossible, to distinguish the one from the other by the symptoms during life, and in ordinary practice they may be considered as one disease, the treatment depending in great measure on the ex-

citing cause. This in most cases is to be found in the use of too violent “physic,” or in not resting the horse after it has begun to act until some hours after it has completely “set.” Sometimes it depends upon the cells of the colon having long been loaded with fæces, which causes, at length, their mucous lining to inflame, the consequent secretion having a tendency to loosen them and procure their dismissal, either by solution or by the forcible contraction of the muscular coat. This last disease is known by the name of “molten grease” to old-fashioned farriers, the clear mucus which envelopes the lumps of fæces being supposed to be derived from the internal fat that is generally plentifully developed in the highly fed horses that are especially subject to the attack. For practical purposes, therefore, we may consider the different forms under the head of superpurgation, diarrhœa, and dysentery, meaning by the last name that condition which is brought about by and attended with a discharge of lumps of hard fæcal matter enveloped in mucus.

Superpurgation is sometimes so severe as to place a delicate horse in great danger. When the action of the bowels has gone on for three or four days consecutively, and there is no disposition to “set,” the eyes become staring and glassy, the pulse is feeble, and the heart flutters in the most distressing manner, the mouth has a peculiarly offensive smell, the tongue being pale and covered with a white fur having a brown centre. The abdomen is generally tucked tightly up, but in the later stages large volumes of gas are evolved, and it becomes tumid.

The treatment should consist in the exhibition of rice, boiled till quite soft, and if not taken voluntarily, it should be given as a drench, mixed into a thin liquid form with warm water. If the case is severe, one or two ounces of laudanum may be added to a quart of rice milk, and given every time the bowels act with violence. Or a thin gruel may be made with wheat meal, and the laudanum be mixed with that instead of the rice. A perseverance in these remedies will almost invariably produce the desired effect if they have not been deferred until the horse is very much exhausted, when a pint of port wine may be sub-

stituted for the laudanum with advantage.

In diarrhœa resulting from cold, or over-exertion, the treatment should be exactly like that prescribed for superpurgation, but it will sometimes be necessary to give chalk in addition to the remedies there alluded to. The rice or flour-milk may be administered as food, and the following drench given by itself every time there is a discharge of liquid fæces:

Take of	Powdered Opium	- - -	1 drachm.
	Tincture of Catechu	- - -	½ ounce.
	Chalk Mixture	- - -	1 pint.

Mix and give as a drench.

During the action of these remedies the body must be kept warm by proper clothing, and the legs should be encased in flannel bandages, previously made hot at the fire, and renewed as they become cold.

In dysentery (or molten grease) it is often necessary to take a little blood away, if there is evidence of great inflammation in the amount of mucus surrounding the fæces, and when aperient medicine does not at once put a stop to the cause of irritation by bringing the lumps away from the cells of the colon. Back-raking, and injection of two ounces of laudanum and a pint of castor oil with gruel, should be adopted in the first instance, but they will seldom be fully efficient without the aid of linseed oil given by the mouth. A pint of this, with half a pint of good castor oil, will generally produce a copious discharge of lumps, and then the irritation ceases without requiring any further interference.

Whenever there is diarrhea or dysentery present to any extent, rice-water should be the sole drink.

HORSE Strangulation and Rupture.—

Mechanical violence is done to the stomach and bowels in various ways, but in every case the symptoms will be those of severe inflammation of the serous coat, speedily followed by death, if not relieved when relief is possible. Sometimes the stomach is ruptured from over-distension—at others the small intestines have been known to share the same fate, but the majority of cases are due to strangulation of a particular portion of the bowels, by being tied or pressed upon by some surrounding band. This may happen either from a loop of bowel being forced through

an opening in the mesentery or mesocolon, or from a band of organized lymph, the result of previous inflammation—or from one portion of the bowels forcing itself into another, like the inverted finger of a glove, and the included portion being firmly contracted upon by the exterior bowel, so as to produce dangerous pressure (intussusception), or, lastly, from a portion or knuckle of intestine forcing its way through an opening in the walls of the abdomen, and then called hernia or rupture, which being pressed upon by the edges of the opening becomes strangulated, and if not relieved inflames, and then mortifies. None of these cases are amenable to treatment (and indeed they cannot often be discovered with certainty during life, the symptoms resembling those of enteritis), except strangulated hernia, which should be reduced either by the pressure of the hands, or by the aid of an operation with the knife—which will be described under the chapter which treats of the several operations. Whenever inflammation of the bowels is attended with obstinate constipation, the walls of the abdomen should be carefully examined, and especially the inguinal canal, scrotum, and navel, at which points in most cases the hernia makes its appearance. A swelling at any other part may, however, contain a knuckle of intestine, which has found its way through the abdominal parietes in consequence of a natural opening existing there, or of one having been made by some accidental puncture with a spike of wood or iron. The swelling is generally round, or nearly so, and gives a drum-like sound on being tapped with the fingers. It feels hard to the touch in consequence of the contents being constricted, but it gives no sensation of solidity, and may be generally detected by these signs. None but an educated hand can, however, be relied on to distinguish a ventral hernia from any other tumor. When it occurs at the scrotum or navel the case is clear enough.

HORSE, Worms.—Intestinal worms in the horse are chiefly of two species, both belonging to the genus *ascaris*. Bots, as inhabiting the stomach, have already been described with that organ; and, moreover, they should never be confounded with what are called properly and scientifically, “worms.” Of these, the larger spe-

cies resembles the common earthworm in all respects but color, which is a pinkish white. It inhabits the small intestines, though it is sometimes, but very rarely, found in the stomach. The symptoms are a rough, staring, hollow coat—a craving appetite—more or less emaciation—the passage of mucus with the fæces, and very often a small portion of this remains outside the anus, and dries there. That part generally itches, and in the attempt to rub it the tail is denuded of hair; but this may arise from vermin in it, or from mere irritation of the anus from other causes. When these several symptoms are combined, it may with some degree of certainty be supposed that there are worms in the intestines, but before proceeding to dislodge them, it is always the wisest plan to obtain proof positive of their existence, by giving an ordinary dose of physic, when, on watching the evacuations, one or more worms may generally be discovered if they are present. When the case is clearly made out the plan of treatment is as follows:

Take of Tartar Emetic	-	-	-	1 drachm.
Powdered Ginger	-	-	$\frac{1}{2}$	"
Linseed Meal	sufficient to make into a ball with boiling water.			

One should be given every morning for a week, then a dose of physic, linseed oil being the most proper. Let the stomach rest a week; give another course of balls and dose of physic, after which let the horse have a drachm of sulphate of iron (powdered) twice a day with his feed of corn.

There is no medicine which is so effectual for moving worms in the horse as tartar emetic, and none which is so entirely innocuous to the stomach. Calomel and spirit of turpentine were formerly in use as vermifuges, but they are both dangerous drugs; the former, if given for any length of time, causing great derangement of the stomach and liver; and the latter often producing considerable inflammation after a single dose, if sufficiently large to cause the expulsion of the worms. Linseed oil given in half-pint doses every morning is also an excellent vermifuge, but not equal to the tartar emetic. If this quantity does not relax the bowels, it may be increased until they are rendered slightly more loose than usual, but avoiding anything like purgation.

The smaller species of intestinal worm chiefly inhabits the rectum, but is occasionally found in the colon and cæcum. It produces great irritation and uneasiness, but has not the same prejudicial effect on the health as the larger parasite. It is about one to two inches in length, and somewhat smaller in diameter than a crow quill. These worms are commonly distinguished as *ascarides*, but both this species and the round worm belong to the genus *ascaris*. The term *thread worm* is more correctly applied, as they are not unlike sections of stout thread or cotton. The only symptom by which their presence can be made out is the rubbing of the tail, when if, on examination, no vermin or eruption, is found in the dock, it may be presumed that worms exist in the rectum. The remedy for these worms is by the injection every morning for a week of a pint of linseed oil, containing two drachms of spirits of turpentine. This will either kill or bring away the worms, with the exception of a few which are driven by it higher up into the colon, but by waiting a week or ten days (during which time they will have re-entered the rectum) and then repeating the process, they may generally be entirely expelled. The sulphate of iron must be given here, as before described.

HORSE, Liver, Diseases of the.—The liver or the horse is less liable to disease than that of any other domestic animal, and the symptoms of its occurrence are so obscure that it is seldom until a post-mortem examination that a discovery is made of its existence. This unerring guide, however, informs us that the liver is sometimes unnaturally enlarged and hard, at others softened, and in others again the subject of cancerous deposits. It is also attacked by inflammation, of which the symptoms are feverish; rapid pulse; not hard, and generally fuller than usual; appetite bad; restlessness, and the patient often looking round to his right side with an anxious expression, not indicative of severe pain; slight tenderness of the right side; but this not easily made out satisfactorily. Bowels generally confined, but there is sometimes diarrhoea. Very frequently the whites of the eyes show a tinge of yellow, but anything like jaundice is unknown. The treat-

ment must consist in the use of calomel and opium, with mild purging, thus :

Take of Calomel,

Powdered Opium, of each one drachm.

Linseed Meal and boiling water enough to make into a ball, which should be given night and morning. Every other day a pint of linseed oil should be administered.

The diet should if possible be confined to green food, which will do more good than medicine; indeed, in fine weather, a run at grass during the day should be preferred to all other remedies, taking care to shelter the horse at night in an airy, loose box.

HORSE, Kidneys, Diseases of the.—

These organs are particularly prone to disease, and are subject to inflammation; to diabetes, or profuse staling; to hæmaturia, or a discharge of blood, and to torpidity, or inaction.

Inflammation of the kidneys (*nephritis*) is generally produced by an exposure of the loins to wet and cold, as in carriage-horses standing about in the rain during the winter season. Sometimes it follows violent muscular exertion, and is then said to be caused by a strain in the back, but in these cases there is probably an exposure to cold in a state of exhaustion, or by the rupture of a branch of the renal artery or vein, as the inflammation of one organ can scarcely be produced by the strain of another. The symptoms are a constant desire to void the urine, which is of a very dark color—often almost black. Great pain, as evidenced by the expression of countenance and by groans, as well as by frequent wistful looks at the loins. On pressing these parts there is some tenderness, but not excessive, as in rheumatism. The pulse is quick, hard and full. The attitude of the hind quarters is peculiar, the horse standing in a straddling position with his back arched, and refusing to move without absolute compulsion. It is sometimes difficult to distinguish nephritis from inflammation of the neck of the bladder, but by attending to the state of the urine, which is dark brown or black in the former case, and nearly of a natural color in the latter, the one may be diagnosed from the other. To make matters still more clear, the oiled hand may be passed into the rectum, when in nephritis the bladder will be found contracted and empty (the

urine being so pungent as to irritate that organ), while in inflammation or spasm of its neck, it will be distended, often to a large size. The treatment to be adopted must be active, as the disease runs a very rapid course, and speedily ends in death if neglected. A large quantity of blood must at once be taken. The skin must be acted on energetically, so as to draw the blood to its surface. The application of hot water, as recommended in Pneumonia (See HORSE, PNEUMONIA), may be tried, and in many cases it has acted like a charm. Failing the means for carrying out either of these remedies, the loins should be rubbed with an embrocation consisting of olive oil, liquor ammonia and laudanum in equal parts, but cantharides and turpentine must be carefully avoided, as likely to be absorbed, when they would add fuel to the fire. A fresh sheepskin should be warmed with hot (not boiling) water, and applied over the back, and the liniment should be rubbed in profusely every hour, restoring the skin to its place immediately afterwards. Mustard is sometimes used instead of ammonia, and as it is always at hand, it may form a good substitute, but it is not nearly so powerful an irritant to the skin as the latter, especially when evaporation is prevented by the sheepskin, or by a piece of any waterproof article. A mild aperient may be given, linseed oil being the best form, but if the bowels continue obstinate, and it is necessary to repeat it, eight or ten drops of croton oil may be added to a pint of the oil, great care being taken to assist its action by raking and injection, the latter being also useful as a fomentation to the kidneys. The diet should consist of scalded linseed and bran mash, no water being allowed without containing sufficient linseed tea to make it slightly glutinous, but not so much so as to nauseate the patient. If the symptoms are not greatly abated in six or eight hours, the bleeding must be repeated, for upon this remedy the chief dependence must be placed. A mild and soothing drench, composed of half an ounce of carbonate of soda, dissolved in six ounces of linseed tea, may be given every six hours, but little reliance can be placed upon it. The inflammation either abates after the bleeding, or the horse dies in a few hours.

HORSE, Diabetes.—Diabetes of late years has been much more frequent than was formerly the case, and especially among race-horses and hunters, probably owing to the enormous quantities of corn which they are allowed in the present day. But whatever may be the cause, the symptoms are clear enough, the horse constantly staling and passing large quantities of urine each time. The treatment should be conducted on the principle that the cause should if possible be ascertained and removed. Mowburnt hay will often bring on diabetes, and new oats have a similar tendency in delicate horses. In any case it is wise to make a total change in the food as far as it can possibly be done. Green meat will often check it at once, and a bran mash containing a few carrots have a similar chance of doing good. With these alterations in the quality of the food, attention should also be paid to the quantity of the corn, which should be reduced if more than a peck a day has been given, and beans should be substituted for a part of the oats. Half a drachm of the sulphate of iron (powdered) should be mixed with each feed (that is, four times a day), and the horse should be well clothed and his legs warmly bandaged in a cool and airy (but not cold and draughty) loose box. By attention to these directions the attack may generally be subdued in a few days, but there is always a great tendency to its return. Should it persist in spite of the adoption of the measures already recommended, the following ball may be tried:

Take of Gallic Acid - - - $\frac{1}{2}$ drachm.
Opium - - - - - 1 drachm.

Treacle and Linseed Meal enough to make a ball, which should be given twice a day.

HORSE, Hæmaturia.—Hæmaturia, like diabetes, is easily recognized by the presence of blood in greater or less quantities passed with the urine. It is not, however, of the bright red color natural to pure blood, but it is more or less dingy, and sometimes of a smoky brown color, as occurs in inflammation. Bloody urine, however, may often be passed without any sign of that condition, and therefore unaccompanied by pain, or any other urgent symptom. The causes are exceedingly various. Sometimes a parasitic worm (*Strongylus gigas*) has been discov-

ered, after death from hæmaturia, in the kidney, and was apparently the cause of the mischief. At others, this organ has been found disorganized by cancer or melanosis—and again a sharp calculus has been known to bring on considerable bleeding, and this last cause is by no means infrequent. The symptoms are the existence of bloody urine, unaccompanied by pain or irritation, marking the absence of nephritis. As to treatment, little can be done in severe cases, and mild ones only require rest, a dose of physic, and perhaps the abstraction of three or four quarts of blood. Green food should be given, and the diet should be attended to as for diabetes. If the urine is scanty, yet evidently there is no inflammation, two or three drachms of nitre may be given with the mash at night, but this remedy should be employed with great caution.

HORSE, Kidneys, Inaction of.—Inaction of the kidneys is so common in every stable that the groom seldom thinks it necessary even to inform his master of its occurrence. An ounce of nitre is mixed and given with a bran mash as a matter of course, and sometimes more violent diuretics are resorted to, such as powdered resin and turpentine. Very often the kidneys are only inactive because the horse has not been regularly watered, and in those stables where an unlimited supply is allowed this condition is comparatively rare. There is no harm in resorting to nitre occasionally, but if it is often found necessary to employ this drug, the health is sure to suffer, and an alteration in the diet should be tried in preference. At all events, if it is given, the horse should be allowed to drink as much and as often as he likes, without which the stimulus to the kidneys will be doubly prejudicial, from being in too concentrated a form.

HORSE, Bladder, Diseases of the.—The bladder is subject to inflammation of its coats or neck—to spasm—and to the formation of calculi.

Inflammation of the bladder (cystitis) is not very common, excepting when it is produced by irritants of a mechanical or chemical nature. Thus, when the kidneys secrete a highly irritating urine, the bladder suffers in its passage, and we have the two organs inflamed at the same time.

Again, when cantharides have been given with a view to stimulate exhausted nature, or when they are absorbed from the surface of the skin, as sometimes happens in blistering, the bladder is liable to become inflamed. The symptoms are—a quick pulse—pain in the hind quarter, evinced by the looks of the animal in that direction—and constant straining to pass the urine, which is thick and mixed with mucus, or in aggravated cases with purulent matter. The treatment to be adopted if the case is severe will consist in venesection, back-raking, and purgation with linseed or castor oil, avoiding aloes, which have a tendency to irritate the bladder. Linseed tea should be given as the sole drink, and scalded linseed mixed with a bran mash as food. The following ball may also be given, and repeated if necessary:

Take of Powdered Opium - - - 1 drachm.
Tarter Emetic - - - 1½ drachm.
To be made up into a ball with Linseed Meal and boiling water, and given every six hours.

Retention of urine may be due either to inflammation of the neck of the bladder, occasioning a spasmodic closure of that part, or there may be spasm unattended by inflammation and solely due to the irritation of some offending substance, such as a calculus, or a small dose of cantharides. The treatment in either case must be directed to the spasmodic constriction, which is generally under the control of large doses of opium and camphor, that is, from one drachm to two drachms of each, repeated every five or six hours. If the symptoms are urgent, bleeding may also be resorted to, and when the bladder is felt to be greatly distended, no time should be lost in evacuating it by means of the catheter, which operation, however, should only be entrusted to a regular practitioner accustomed to its use.

Calculi in the bladder are formed of several earthy salts, and present various forms and appearances, which may be comprised under four divisions: 1st. The mulberry calculus, so named from its resemblance to a mulberry, possessing generally a nucleus. 2d. A very soft kind resembling fullers' earth in appearance, and being chiefly composed of phosphate of lime and mucus. 3d. Calculi of a white or yellowish color, rough externally

and easily friable. And 4th. Those which are composed of regular layers, and which are harder than the second and third varieties.

The mulberry calculus, from its extremely rough surface, occasions more irritation than other forms, but during life it is impossible to ascertain the exact chemical nature of the calculus which may be ascertained to exist. These calculi sometimes attain an immense size, weighing several pounds. The symptoms are a difficulty of voiding the urine, which generally comes away in jerks after great straining and groaning. The horse remains with his legs extended for some time afterwards, and evidently indicates that he feels as if his bladder was not relieved. Often there is muco-purulent matter mixed with the urine, which is rendered thick and glutinous thereby, but this only happens in cases of long standing. The treatment must be either palliative or curative. If the former, it should consist in the adoption of the means employed for subduing irritation and inflammation of the bladder which have been already described. The cure can only be effected by removing the stone. This requires the performance of a difficult and dangerous operation (lithotomy), the details of which can be only useful to the professed veterinary surgeon, and we shall therefore omit them here.

HORSE, Generative Organs, Diseases of the.—Balanitis, or inflammation of the glans penis, (*Balanos*, glans,) is very common in the horse, being brought on by the decomposition of the natural secretions, when they have been allowed to collect for any length of time. At first there is merely a slight discharge of pus, but in process of time foul sores break out, and very often fungus growths spring from them, which block up the passage through the opening of the sheath, and cause considerable swelling and inconvenience. These are quite distinct from warts, which occur in this part just as they do in other situations. The treatment requires some skill and experience, because mild remedies are of no use, and severe ones are not unattended with danger. The parts must first of all be well cleansed by syringing, or if the end of the penis can be laid hold of, by washing,

with a sponge. The following wash may then be applied, and it should be repeated every day:

Take of Solution of Chloride of Zinc 2 drachms.
Water - - - - 1 pint. Mix.

If the morbid growths are very extensive, nothing but amputation of the penis or the use of corrosive sublimate will remove them. Severe hemorrhage sometimes follows both of these measures, but it seldom goes on to a dangerous extent. Still it is scarcely advisable for any one but a professional man to undertake the operation.

In the mare the vagina is sometimes inflamed, attended with a copious yellow discharge. An injection of the wash mentioned in the last paragraph will generally soon set the matter right. At first it should be used only of half the strength, gradually increasing it, until the full quantity of chloride of zinc is employed.

Inversion of the uterus sometimes follows parturition, but it is very rare in the mare. The uterus should be at once replaced, using as little force as possible, and taking care before the hand is withdrawn that it really is turned back again from its inverted position.

Nymphomania occurs sometimes in mares at the time of being "in use," and goes on to such an extent as to render them absolutely regardless of pain, for the time being, though not to make them lose their consciousness. They will kick and squeal till they become white with sweat, and no restraint will prevent them from trying to continue their violent attempts to destroy everything behind them. These symptoms are especially developed in presence of other animals of the same species, whether mares or geldings; but the near proximity of an entire horse will be still worse. If placed in a loose box, without any restraint whatever, they generally become more calm, and when the state is developed, such a plan should always be adopted. It is chiefly among highly-fed and lightly-worked mares that the disease is manifested; and a dose of physic, with starvation in a loose box, away from any other horse, will very soon put an end to it in almost every instance.

HORSE, Phrenitis, or Mad Stagers.—Phrenitis seldom occurs, except in over-fed and lightly-worked horses, nor among them is it by any means a common dis-

ease. The early symptoms are generally those of an ordinary cold; there is heaviness of the eyes, with a redness of the conjunctiva, and want of appetite. After a day or two occupied by these premonitory signs, which will seldom serve to put even the most experienced observer on his guard, the horse becomes suddenly delirious, attempting to bite and strike every one who comes near him, regardless of the ordinary influences of love and fear. He plunges in his stall, attempts to get free from his halter rein, and very often succeeds in doing so, when he will stop at nothing to gain still further liberty. If unchecked, he soon dashes himself to pieces, and death puts an end to his struggles. The only treatment which is of the slightest use is bleeding till the horse absolutely falls, or till he becomes quite quiet and tractable, if the case is only a mild one. Immediately afterwards a large dose of tartar emetic (two or three drachms) should be given, followed in an hour or two by a strong physic ball; or, if the case is a very bad one, by a drench, containing half a pint of castor oil and six or eight drops of croton oil. Clysters and back-raking will of course be required, to obviate the risk of hard accumulations in the bowels, but where there is great violence, they cannot always be employed, and the case must take its chance in these respects. The diet should be confined to a few mouthfuls of hay or grass, with a plentiful supply of water.

HORSE, Epilepsy and Convulsions.—

These diseases, or symptoms, are not often met with in the adult, but in the foal they sometimes occur, and are not unattended with danger. The young thing will perhaps gallop after its dam round and round its paddock, and then all at once stop, stagger, and fall to the ground, where it lies, struggling with more or less violence, for a few minutes or longer, and then raises its head, stares about, gets up, and is apparently as well as ever. It is generally in the hot days of summer that these attacks occur, and it appears highly probable that the direct rays of the sun playing on the head have something to do with it. Death seldom takes place during the first attack, but sometimes after two or three repetitions, the convulsions go on increasing, and the foal becomes comatose and dies. A mild dose of linseed oil is the

only remedy which can be safely resorted to, and as it is supposed that worms will sometimes produce these convulsive attacks, it is on that account to be selected. Epilepsy is so very rarely met with in the adult, and of its causes and treatment so little is known, that we shall not trouble our readers with any account of them.

HORSE, Megrims.—This term is used to conceal our ignorance of the exact nature of several disordered conditions of the brain and heart. In fact, any kind of fit, not attended with convulsions, and only lasting a short time, is called by this name. The cause may be fatty condition of the heart, by which sudden faintness and sometimes death are produced, or it may consist in congestion of the vessels of the brain, arising from over-work on a hot day, or from the pressure of the collar, or from disease of the valves of the heart. Attacks reputed to be megrims have been traced to each of these causes, and as in every case the horse, while apparently in good health, staggers and falls, and after lying still for a few minutes (during which there is seldom an opportunity of examining the state of the circulation) rises as well as before, there is no chance of distinguishing the one from the other. The most usual symptoms are the following: The horse is perhaps trotting along, when all at once he begins shaking his head as if the bridle chafed his ears, which are drawn back close to the poll. The driver gets down to examine these facts, and observes the eyelids quivering, and the nostrils affected with a trembling kind of spasm. Sometimes the rest will allow of the attack going off, but most frequently the head is drawn to one side, the legs, of that half of the body seem to be paralyzed, and the horse making a segment of a circle goes down, lies a few minutes on the ground, and then rises as if nothing had happened beyond a slight sweating, and disturbance of the respiration. Treatment can be of little avail, however, unless a correct diagnosis is made, for remedies which would be suited to congestion would be prejudicial to a diseased heart. If the attack has happened while in harness, the collar should always be carefully inspected, and if at all tight it should be replaced by a deeper one. A diseased state of the valves of the heart ought to

be discoverable by auscultation, but it requires a practised ear to do this, and the directions for ascertaining its presence are beyond the scope of this book. The only plan which can safely be adopted, is to take the subject of megrims quietly home to his stable, and carefully examine into the condition of all his functions, with a view to improve the action of any organ which appears to be out of order, whatever it may be. If all seems to be going on well—if the appetite is good, and the heart acts with regularity and with due force, while the brain seems clear, and the eye is not either dull or suffused with blood—nothing should be attempted; but the horse being subject to a second attack, as proved by manifold experience, should be put to work in which no great danger can be apprehended from them. He is not safe in any kind of carriage, for it can never be known where the fall will take place; and as a saddle-horse he is still more objectionable, and should therefore be put to some commercial purpose, in executing which, if he falls, the only injury he can effect is to property, and not to human life.

HORSE, Rabies, Hydrophobia or Madness.—One reason only can be given for describing this disease, which is wholly beyond the reach of art; but as the horse attacked by it is most dangerous, the sooner he is destroyed the better; and for this reason, every person who is likely to have any control over him should be aware of the symptoms. As far as is known at present, Rabies is not idiopathically developed in the horse, but must follow the bite of a rabid individual belonging to one or other of the genera *canis* and *felis*. The dog, being constantly about our stables, is the usual cause of the development of the disease, and it may supervene upon the absorption of the salivary virus without any malicious bite, as has happened according to more than one carefully recorded case. The lips of the horse are liable to be ulcerated from the action of the bit, and there is reason to believe that in the early stages of rabies, these parts have been licked by a dog, the saliva has been absorbed, and the inoculation has taken place just as it would do from any other wound. It is difficult to prove that this

is the true explanation of those cases where no bite has been known to have occurred, but as the mouth has in each instance been shown to have been abraded, there is some reason for accepting it as such. To proceed, however, to the symptoms; Mr. Youatt, who has had great opportunities for examining rabies, both in the dog and horse, describes the earliest as consisting in "a spasmodic movement of the upper lip, particularly of the angles of the lip. Close following on this, or contemporaneous with it, are the depressed and anxious countenance, and inquiring gaze, suddenly, however, lighted up, and becoming fierce and menacing from some unknown cause, or at the approach of a stranger. From time to time different parts of the frame, the eyes, the jaws, particular limbs, will be convulsed. The eye will occasionally wander after some imaginary object, and the horse will snap again and again at that which has no real existence. Then will come the irrepressible desire to bite the attendants or the animals within its reach. To this will succeed the demolition of the rack, the manger, and the whole furniture of the stable, accompanied by the peculiar dread of water, which has already been described. Towards the close of the disease there is generally paralysis, usually confined to the loins and the hinder extremities, or involving those organs which derive their nervous influence from this portion of the spinal cord; hence the distressing tenesmus which is occasionally seen." How paralysis can produce tenesmus is not very clear, but of the very general existence of this symptom there can be no doubt. The dread of water, as well as of draughts of cold air, is also clearly made out to exist in this disease (as in human rabies), and the term hydrophobia will serve to distinguish it better than in the dog, where it is as clearly absent. Whenever, therefore, these symptoms follow upon the bite of a dog, unless the latter is unquestionably in good health, rabies may be suspected, and the bare suspicion ought always to lead to the use of the bullet, which is the safest way of killing a violent horse. There is only one disease (*phrenitis*) with which it can be confounded, and in that the absence of all consciousness and, in milder cases, of

fear, so that no moral control whatever can be exercised, marks its nature, and clearly distinguishes it from rabies, the victim to which is conscious to the last, and though savage and violent in the extreme, is aware of the power of man, and to some extent under his influence.

HORSE, Tetanus, Lock Jaw.—Tetanus, one form of which is known as lock jaw, has its seat apparently in the nervous system, but, like many other diseases of the same class, the traces it leaves behind are extremely uncertain, and are displayed more on the secondary organs, through which it is manifested, than on those which we believe to be at the root of the mischief. Thus the muscles, which have been long kept in a state of spasm, show the marks of this condition in their softened and apparently rotten condition. They, in fact, have had no interval of rest, during which nutrition could go on, and have lost much of the peculiarity of structure which enables them to contract. The stomach often shows marks of inflammation, but as all sorts of violent remedies are employed, this may be due to them rather than to idiopathic disease. The lungs also are generally congested, but here, like the state of the muscles, it may be a secondary effect of the long-continued exertions of the latter, which nothing but the absence of all important lesions of the brain and spinal cord would induce the pathologist to pay the slightest attention to.

Tetanus may be either idiopathic or symptomatic, but the former condition is somewhat rare. It almost always follows some operation, or a severe injury in which a nerve has been implicated, the most frequent causes being the piercing of the sole by a nail, or a prick in shoeing, or the operations of docking, nicking, castration, etc.

The symptoms are a permanent rigidity of certain voluntary muscles, and especially of the lower jaw (whence the popular name, lock jaw). The mouth is kept rigidly shut, the masseter muscles feeling as hard as a deal board. One or both sides of the neck are rigid, in the former case the head being turned to one side, and in the latter stretched out as if carved in marble. The nostrils are dilated; the eyes retracted, with the haws thrust forward over them; the ears erect

and stiff, and the countenance as if horror-struck. At first the extremities are seldom involved, but as the disease progresses their control is first lost, and then they become rigid, like the neck and head. The patient is scarcely able to stand, and plants his feet widely apart to prop himself up, while at last the tail also becomes a fixture. The pulse varies a good deal, in some cases being quick, small, and hard, and in others slow and labored. The bowels are generally costive, and the urine scanty; but this last symptom is not so well marked as the state of the bowels alluded to. The treatment should be of a twofold nature, partly palliative and partly curative. Since the introduction into use of chloroform we have possessed a drug which invariably enables us to remove the spasm for a time, and if it does nothing more, it gives room for other remedies to act and relieve the patient from the horrible tortures which are occasioned by the spasm, while it also allows the muscular and nervous powers to be recruited. When, therefore, a case of tetanus occurs in a horse of any value, an apparatus for applying chloroform (described under the chapter on OPERATIONS) should be procured, and the animal at once placed under its influence. This done, the whole length of the spine should be blistered with tincture of cantharides, and an active aperient should be given, consisting, if practicable, of a pint of castor oil, and six or eight drops of croton oil. This may be pumped down the throat by the usual syringe and tube, if the front teeth can be separated; but if this cannot be done, some solid cathartic must be selected, though there is often as much difficulty in forcing a ball down as in passing an elastic tube. Failing in either of these, two drachms of calomel, and the same quantity of tartar emetic should be slightly damped, and placed in the mouth as far back as possible, in the hope that they may be gradually swallowed; the bowels should be raked, and copious injections of castor oil and turpentine, mixed with several quarts of gruel, should be thrown up. If these remedies fail, nature must be left to her own resources, and they will sometimes be found equal to the task, for many cases have recovered after having been

given up as beyond the reach of our art. Opium, henbane, digitalis, hellebore, and a host of other drugs have been tried; sometimes with, and sometimes without success, and perhaps it is worth while, after the bowels have been well relieved, to give a full dose of one or other of these powerful remedies, such as two drachms of solid opium; but we confess that we think little reliance is to be placed on them, and we prefer the adoption of chloroform every six hours, continued for about two or three hours and gradually withdrawn, leaving the cure to the action of the blister and purgatives.

HORSE, Apoplexy and Paralysis.—

Usually these are only different degrees of the same disease, but there are exceptions, in which the latter is produced by some chronic affection of the spinal cord or brain. As a rule, both depend upon pressure made on the brain by an overloaded state of the vessels, commonly known as congestion, or by extravasation of blood, in which it escapes from them.

Paralysis is marked by a loss of power over the muscles of a part, and may be confined to one limb or organ or extend to more. It is a symptom of pressure on, or disorganization of, some part of the nervous system, and must be considered as such, and not as a disease of the affected muscles. Thus it requires a knowledge of anatomy to trace it to its seat, without which its treatment would be conducted on false principles. By far the most common form of paralysis is hemiplegia, or paralysis of the muscles of the hinder extremities and loins, generally arising from an injury to the spine. Sometimes the body of a vertebra is broken, and the parts being separated, their edges press upon the spinal cord and produce the disease. At others the vessels within the canal have received a shock, and the serous membrane secretes (or allows to ooze out) a bloody fluid which presses upon the cord, and produces the same effect, but in a more gradual manner. In India, a disease known there as Kumree causes paralysis of the hinder extremities, and is due to inflammation of the membranes, which secrete a bloody serum. In this country, however, paraplegia is very rare, excepting as the result of accident.

When a horse falls in running, and

never moves his hind legs afterwards, but lies with his fore legs in the position to get up, groaning and expressing great pain and distress, it may be concluded that he has fractured or dislocated his spine and that the case is hopeless. Sometimes, however, after lying for a few seconds, he slowly and with difficulty rises and is led to a stable, but after two or three hours lies down and cannot be got up again. Here there will be some difficulty in ascertaining whether the mischief is confined to a strain of the muscles or is situated within the vertebral canal. If the former is the case, the pain is extreme, and generally there will be some quivering or slight spasm of one or more of the muscles of the hinder extremity, which feel naturally firm, while in paralysis they feel soft and are as quiet as they would be after death. By attention to these signs the two cases may be distinguished, but when the case is made out to be true paralysis the treatment is not likely (even if successful in preserving life) to bring about a useful restoration to healthy action. In valuable horses an attempt may be made by bleeding, physicking and blistering to produce an absorption of the effused serum or blood, but the recovered animal is seldom worth the outlay, and too often as soon as he is put to any kind of work is subject to a relapse. The most humane, and certainly the most economical plan is to put him out of his misery at once by a pistol ball or knife; but if it is determined to try what can be done towards effecting a cure, no better means can be adopted than those we have alluded to.

HORSE, Sleepy Staggers—(See HORSE, APOPLEXY.)

HORSE, String Halt.—This is a peculiar snatching up of the hind leg, and is supposed to depend upon some obscure disease of the sciatic nerve. It, however, is very doubtful whether this explanation is well founded, and there is evidence that in some cases the hock itself has been affected. The extensor pedis seems to be the muscle most severely implicated, though not the only one which is thrown into spasmodic action. No treatment is of the slightest avail. Horses with string halt are able to do any kind of work, but it is considered to be a form of unsoundness.

HORSE, Ear, Diseases of the.—Deafness is sometimes met with in the horse, but we know of no symptoms by which its precise nature can be made out; and without ascertaining the seat of the disease, it is useless to attempt to treat it.

Sometimes from a blow on the external ear inflammation is set up, and an abscess forms; but all that is necessary is to open it, so that the matter can readily flow out as fast as it forms, without which precaution it will not readily heal.

HORSE, Eye, Inflammation of the.—This important organ is subjected to three forms of inflammation, to opacity of the lens, and to paralysis of the nerve called amaurosis

Simple inflammation is the most common of all the diseases to which the horse's eye is subject, and it precedes most of the others. It is always the result of any injury of this part, or of cold; and it shows itself if there is a tendency to inflammation of this organ, whenever the horse is in a state of plethora. The symptoms are an intolerance of light, so that the eye is kept half closed, by which it looks smaller than the other; a gummy secretion glues the lids together at the angles; the eyelids are slightly swollen, showing a distended state of their veins; and there is more or less watering or overflowing of tears. When the lids are separated, their internal surface looks more red than natural, and the white of the eye is covered with a net-work of fine red vessels. After the second day the transparent cornea loses its clearness, and becomes muddy, sometimes over the whole surface, and at others in specks. If the disease is allowed to go on unchecked, the cornea is involved, and the lining membrane of the aqueous humour follows; a secretion of pus takes place into the chamber, or the cornea ulcerates, and the contents of the eye escapes. The treatment should be a copious bleeding from the jugular vein, followed by a ball, such as

Take of Common Physic Ball	- -	2 drachms.
Tartar Emetic	- - -	1 drachm.

Mix and give every six hours.

This not only acts on the intestines, but it keeps up a constant nausea, and so tends to lower the action of the heart. The eye should be bathed with warm water frequently; and, if the mischief be severe, a seton should at once be put into

the skin covering the upper jaw, about two inches below the eye. On the next day, if "the white" still looks red, the bleeding must be repeated; and, if the bowels are much moved, the tartar emetic may be continued without the aloes, while if they are obstinate, the dose of the latter may be increased. When the acute symptoms have somewhat diminished, a camel's hair brush may be dipped in wine of opium, and the eye gently touched with it daily, which will generally complete the cure. The diet must be low, corn being forbidden entirely, and the stable should be kept very cool and airy.

Purulent ophthalmia is confined to the conjunctiva, and it may be recognized by the profuse discharge of purulent fluid which takes place. The eyelids are much swollen, and the white of the eye is covered with a puffy red membrane, which rises up above the level of the cornea, sometimes in fungoid excrescences. This form of inflammation is generally epidemic, and sometimes runs through a stable without a single exception. The treatment should be, at first, similar to that recommended for simple inflammation; but when it reaches the chronic stage, a more powerful stimulus is required to restore the vessels to a healthy condition. A wash, composed as follows, must therefore be applied:

Take of Nitrate of Silver - - - 6 grains.
Distilled Water - - - 1 ounce.

Mix, and drop a little into the eye from a quill daily.

Iritis, or inflammation of the iris, generally known as specific ophthalmia, is the most formidable of all the diseases to which the eye is subject, and, if not checked, rapidly disorganizes it; while it also, even when running an unusually favorable course, is very apt to produce opacity of the lens or its capsule (cataract). This pest of the stable is, undoubtedly, often brought on by over stimulations, first of the whole body, through the food, and, secondly, of the eyes themselves, through the foul emanations from the accumulated urine and dung. But these would produce no such effect in a horse, unless he were predisposed to ophthalmia; and we find that cattle and sheep are often fed to an enormous degree of obesity, in far closer and worse ventilated stalls, without any prejudicial

effect upon their eyes. It may, then, be assumed, that these organs in a horse have a tendency to put on inflammation; but though these words are true they explain nothing of the real cause, and only serve to conceal our ignorance of it. There is another question bearing upon this subject, which is of the highest importance. Is the stock of blind horses more liable to blindness than that of sound ones? This has been discussed so often that it is scarcely possible to throw any fresh light upon it, chiefly because it is so difficult to rely upon the facts adduced *pro* and *con*. Blindness is often the result of accident, and such cases are believed to be exceptional, and not at all likely to hand down the disease; but, on the contrary, we are inclined to believe that many of them show a marked tendency to its development; for an accident never destroys both eyes, and when one follows the other, it is a pretty sure sign that there is a tendency to ophthalmia. On the whole, it may, we think, be assumed, that the tendency to specific ophthalmia is handed down from generation to generation, and, consequently, that the offspring of a horse who has gone blind from that cause is peculiarly prone to it. Its symptoms appear very rapidly, the eye having been quite right over night, looks contracted and almost closed next morning, and on inspecting it closely "the white" looks of a deep red, the cornea looks muddy, and the colored part of the eye (the iris) has lost its bright color, and often shows one or two white specks upon it (these must not be confounded with the specks on the cornea). As the disease advances, the intolerance of light is very great, the cornea and iris become gradually more muddy, and either lymph is thrown out on the latter in the shape of white patches, or pus is secreted and fills the chamber of the aqueous humour, in part or wholly. If the treatment is sufficiently energetic, these signs abate, the pus or lymph is absorbed, and the eye recovers its transparency; but there are generally some traces left behind. Bleeding (either from the jugular or the angular veins of the face), moderate purging, and a seton, are the remedies best calculated to effect this object, conjoined with an airy stable and a light diet. Unfortunately, however, iritis is almost

sure to return on the restoration of the usual food, and exposure to the elements; and hence it is of the utmost consequence in purchasing a horse to examine his eyes for the marks left behind by it. If the case is hopeless, it becomes a question whether or not it will be wise to put an end to the inflammation by destroying the affected eye, for it is well known that if it goes on for any length of time, the other, sound eye, becomes affected. The only difficulty consists in feeling assured that there is really no chance of recovery; for when once the eye is finally condemned, the sooner it is opened and its contents evacuated, the sooner will the horse return to his work, and the more chance has the other eye of escaping. The operation is very simple, and merely requires a sharp-pointed knife to be passed into the anterior chamber from one edge of the cornea, and driven back 'till it cuts into the lens, when it is to be brought out on the other side of the cornea, and the whole of the humours will escape on making pressure upon the upper eyelid.

In injuries of the eye, fomentation with warm water should be carried on for half an hour, and then omitted for three or four hours, after which it may be repeated again and again, at similar intervals. Great care should be taken to remove any extraneous bodies, such as particles of dust, etc.

Cataract, or opacity of the lens, is very commonly the result of iritis, its capsule having been coated with a layer of white lymph, deposited by the inflamed vessels; but it also sometimes makes its appearance without being preceded by any of the signs of inflammation. In the former case the early symptoms are those of iritis, but in the latter, the opacity often goes on increasing, without the owner of the horse, or his groom, having his attention drawn to the eyes, until he finds that he is nearly blind. This progress is generally marked by the development of an unusual timidity; the previously bold animal is alarmed at objects advancing on the road, and covered carts and wagons, of which he formerly took no notice, occasion him to shy in the most timid manner. On examining his eyes carefully, instead of the beautifully clear pupil, with the reflection of tapetum lucidum shining through it, there is seen either a mass

of dull white, generally more opaque in the centre, or an appearance of mottled, semi-transparent soap, or, lastly, one or two distinct white spots, not quite circular, but with irregular edges. In confirmed cataract, the white pupil can be seen at any distance; but in the very early stage, only a practised eye can detect the opacity, which, however, is so manifest to him, that he wonders it is not visible to every one else. The reason of this difficulty of detecting the alteration of structure seems to be, that inexperienced examiners look at the eye in such a manner that they are confused by the reflection on it of their own faces, hiding all beneath. If, however, they will turn their heads a little more to one side, this will disappear, and they cannot fail to perceive the disease. When cataract is clearly proved to exist, all idea of treatment may be abandoned, as nothing but an operation can procure a removal of the opacity; and that would leave the horse in a more useless condition than before, since he could see nothing clearly, and would only be subject to continual alarms. In the human being, the operation is performed with great success, because the lens which is sacrificed can be replaced externally by means of convex glasses; but in the horse nothing of the kind can be done. Hence, it is useless to dream of effecting any improvement in this disease; and if both eyes are the subject of cataract, the horse is incurably blind. But supposing there is a cataract in one eye only, is the other sure to go blind, or may a reasonable hope be entertained of its remaining sound? Here the history of the disease must be examined before any opinion can be formed. If the opacity followed an accident, there is no reason for concluding that the other eye will become diseased; but if it came on idiopathically, either preceded by inflammation or otherwise, there is great risk of a repetition in the sound eye. Nevertheless, instances are common enough of one eye going blind from cataract, while the other remains sound to the end of life; and those are still more frequent in which the one sound eye continues so for six or seven years.

HORSE, Amaurosis.—This is a palsy of the nervous expansion called the retina, produced by some disease, either func-

tional or organic, of the optic nerve, which is generally beyond the reach of our senses, in examining it after death. The symptoms are a full dilatation of the pupil, so that the iris is shrunk to a thin band around it, and is so insensible to the stimulus of light, in confirmed cases, that, even when the eye is exposed to the direct rays of the sun, it does not contract. In the early stages, this insensibility is only partial; and though there is such complete blindness that the horse cannot distinguish the nature of surrounding objects, yet the pupil contracts slightly, and the inexperienced examiner might pass the eye as a sound one. The unnaturally large pupil, however, should always create suspicion; and when, on closing the lids and re-opening them in a strong light, there is little or no variation in its size, the nature of the disease is at once made apparent. The treatment of amaurosis must depend upon the extent to which it has gone, and its duration. If, recent, bleeding and a seton in close proximity to the diseased organ will be the most likely to restore it. Sometimes the disease depends upon a disordered condition of the stomach, and then a run at grass will be the most likely means to restore both the affected organs to a sound state. Generally, however, an amaurotic eye in the horse may be considered as a hopeless case.

HORSE, Buck Eye.—A buck eye is, strictly, rather a congenital malformation than a disease; but practically, in reference to the utility of the animal, it matters little. It depends upon an excess of convexity of the cornea, by which the focus of the eye is shortened too much, the image being thus rendered indistinct as it falls on the retina. No treatment can be of the slightest use.

HORSE, Surfeit.—An eruption of the skin, which shows itself in the form of numerous small scabs, matting the hair, and chiefly met with on the loins and quarters, is known by this name. Doubtless, it has been supposed to arise from an excess of food, causing indigestion; but it often comes on in horses which, apparently, are quite free from that disorder. The most common cause appears to be, sweating the horse when he is in a gross or plethoric condition, and then exposing him to a chill. Colts are very subject to

surfeit while being broken, as are horses fresh from grass during the summer, when they are usually over-fat, and require great care in reducing this plethoric condition. The usual course of the eruption is for the scabs to dry and gradually loosen, when the hair of the part is slightly thinned by being pulled out in dressing, a fresh crop of pustules forming, and, to the casual observer, keeping up the appearance of a permanent state of the original scabs. Surfeit is not confined to gross horses, as it sometimes makes its appearance in those which are low in condition, exhibiting the same appearance to the eye; but, on examination, the secretion from the skin will be found to be thinner, and of a more purulent nature. The treatment must greatly depend upon the state of the general health. If the horse is very gross, it may be desirable to take a little blood away; but this will seldom be necessary, and never is desirable. Physic seems to do little immediate good; and, indeed, it is very doubtful whether any treatment is of much service, excepting such as will gradually bring the horse into working condition. The disease, in most cases, has its origin in obstruction of the sebaceous and perspiratory pores; and until these are restored to their proper functions, by gradually exercising them, little good can be done. Unfortunately, the very means which will accomplish this object are apt to increase the disease for a time; but still this must be put up with, as a matter in which no choice can be made. Regular exercise and grooming must be fully attended to, using the whisp only in dressing the skin, when the eruption shows itself, and carefully avoiding the brush and currycomb. By acting on the kidneys, more good will be done than by purging physic, which seems to be of little or no service in any case but when the stomach is greatly out of order. An ounce of nitre may be given with a mash twice a week, or the following balls may be administered:

Take of Nitre,	- - - -	3 drachms.
Sulphur,	- - - -	3 drachms.
Sulphuret of Antimony	- -	2 drachms.
Linsed Meal and Water enough to form two balls.		

HORSE, Hidebound.—This is essentially a disorder of the skin produced by

sympathy with the stomach. It rarely occurs in any horse but one sadly out of health, from a deficiency either in the quantity or quality of the food. Sometimes it comes on in the latter stages of consumption or dysentery, without any previous mismanagement; but in the vast majority of cases, the cause may be laid to the food. The skin of a horse in health feels supple, and on his sides it may readily be gathered up by the hand into a large fold, but in hidebound, it is as if it were glued to the ribs, and were also too tight for the carcass which it invests. The name, indeed, is expressive of this state, and the disease can scarcely be mistaken when once seen, or rather felt. Coincident with this condition of the skin, there is also, generally, either a distended state of the abdomen from flatulence, or a contracted and "tucked up" appearance from diarrhœa. The treatment should be addressed to the digestive organs, the state of which must be carefully examined, and, if possible, rectified. A pint of linseed, scalded, and mixed with a bran mash every night, or scalded malt given in equal quantities with the corn; or, in the spring time, vetches, clover, or lucerne, will do more than any medicine; but when there is a deficient appetite, or the bowels or stomach, or either of them, are evidently much weakened and disordered, a stomachic ball once or twice a week will do good. The remedies appropriate to these several conditions will be found under their respective heads. (See HORSE, DIARRHŒA.)

HORSE, Mange.—Mange corresponds with the itch of the human subject in being produced by a parasitic insect, which is an acarus, but of a different species to that of man, and of a much larger size, so as to be readily visible to the naked eye. It is generally produced by contact with horses previously affected with the same disease, but it appears highly probable that a poor, half-starved animal, allowed to accumulate all kinds of dirt on his skin, will develop the parasite, though how this is done is not clearly made out. The whole subject of parasites is wrapt in mystery, which modern researches appear likely to fathom, but hitherto little progress has been made except in the history of the metamorphoses of the tape-worm, from the anal-

ogy of which some idea may be formed of the probable modes of production of other parasites. When caused by contagion, as certainly happens in the vast majority of cases, the first symptoms noticed will be an excessive itching of the skin, which is soon followed by a bareness of the hair in patches, partly caused by constant friction. The disease usually shows itself on the side of the neck, just at the edges of the mane, and on the insides of the quarters near the root of the tail. From these parts the eruption extends along the back and down the sides, seldom involving the extremities excepting in very confirmed cases. After a time the hair almost entirely falls off, leaving the skin at first bare and smooth, with a few small red pimples scattered over it, each of which contains an acarus, and these are connected by furrows, along which the acari have worked their way to their present habitation. In process of time, the pimples increase in number and size, and from them a matter exudes which hardens into a scab, beneath which, on examination, several acari may readily be seen, moving their legs like mites in a cheese, to which they are closely allied. At first the mangy horse may keep his health, but after a time the constant irritation makes him feverish; he loses flesh, and becomes a most miserable object; but such cases of neglect are happily rare in the present day. The treatment must be addressed to the destruction of the life of the acarus, which, as in the human subject, is rapidly destroyed by sulphur, turpentine, arsenic, hellebore, and corrosive sublimate. Some of these drugs are, however, objectionable, from being poisonous to the horse, as well as to the parasite which preys upon him, and they are, therefore, not to be employed without great and urgent necessity, in consequence of the failure of milder remedies. The following recipes may be relied on as perfectly efficacious, the former being sufficient in mild cases, and the latter being strong enough in any:

1. Take of Common Sulphur - 6 ounces.
Sperm or Train Oil - 1 pint.
Spirits of Turpentine - 3 ounces.
Mix and rub well into the skin with a flannel, or in preference with a painter's brush.
2. Take of Compound Sulphur Ointment, 8 ounces.
Train or Sperm Oil - 1 pint.
Spirit of Turpentine - 3 ounces.
Mix and use as above.

One or other of the above dressings should be well rubbed in every third day for at least three or four weeks in bad cases, and two in trifling ones, when the inflammation resulting from the acari and also from the application may be allowed to subside, in the hope that all the parasites are killed, in which case the eruption disappears, but the hair does not always come on again as quickly as ever. All the stable fittings around the stall or box in which the horse has been standing should be thoroughly washed over with a solution of corrosive sublimate, made as follows:

Take of Corrosive Sublimate - - - 1 ounce.
Methylated Spirit of Wine - 6 ounces.
Water - - - - - 1 gallon.

Dissolve the sublimate in the spirit by rubbing in a mortar, then mix with the water, and use with a brush, stirring it up continually to prevent its settling.

The clothing should be destroyed, as it is scarcely possible to cleanse it completely from the parasites; but if it is determined to risk a return of the disease, it should be thoroughly washed, and when dry, saturated with spirit of turpentine.

When the health has suffered from the irritation of mange, a few tonic balls may be required, but generally the removal of the cause will be sufficient.

HORSE, Lice.—In former days lice were not uncommon in the horse, but now they are comparatively rare. Still they are occasionally met with, and their presence is readily ascertained, being of a considerable size, and easily seen with the naked eye. They may be destroyed by rubbing into the roots of the hair white precipitate, in powder, taking care to avoid sweating the horse or wetting his skin for some days afterwards.

HORSE, Mallenders and Sallenders.—These eruptions are both of the same nature, differing only in the locality where they are displayed. The former shows itself in the flexure at the back of the knee, and the latter at the bend of the hock. The symptoms are shown in the appearance of a foul scurf mixed with a few thin scabs, the skin underneath being stiff and unyielding. They are generally brought on by washing the legs and leaving them undried. The treatment required is merely the application of the following ointment, which should be well rubbed in every night:

Take of Cerate of Superacetate of
Lead, - - - - - 2 ounces.
Take of Creosote - - - - - 10 drops.
Mix and use as above.

If the skin continues to be very hard and stiff, a little glycerine should be brushed on two or three times a week.

HORSE, Warbles, Sitfasts and Harness Galls.—When the saddle has galled the skin beneath it the inflammation resulting is called a "warble," and if this is neglected, so as to cause a troublesome sore, the term "sitfast" is applied. The effect produced is similar to a harness gall, and there is not the slightest necessity for inventing names to distinguish each stage of cruelty in the rider, for if attention is paid to the warble, no sitfast will ever make its appearance. Prevention is better than cure, and it may almost always be effected by the adoption of the plan of always keeping the saddle on (after loosing the girths) for a quarter of an hour or twenty minutes. Sometimes, however, in spite of this precaution, the skin of the back swells, and when a heavy man has been riding for six or eight hours on a horse unaccustomed to his weight, the cuticle will perhaps peel off, bringing the hair with it. When the swelling is considerable it should be fomented for an hour, and then bathed with a lotion composed of one drachm of tincture of arnica in a half pint of water. The saddle should never be reapplied until the skin is quite cool, and free from all inflammation, even if considerable inconvenience is thereby suffered. The same treatment will also apply to harness galls. Oiling the inside of the collar will often prevent the shoulder from suffering excoriation.

HORSE, Grubs.—The larva of some beetle, but of what species we do not know, is occasionally met with in the horse, causing a small lump about the size of a raisin, and usually on the back. This obstinately continues for months, if its nature is not understood, in spite of all ordinary applications. At last a white larva or grub, with a black head, and very similar in everything but size to the maggot found in the nut, makes its appearance, and either escapes to fall to the ground and become a chrysalis, or else it is squeezed out by the groom, which is easily done as soon as the head

is visible. When discovered previously, an opening may be made with the point of the penknife, and then the larva may be gradually squeezed out, avoiding too much haste in the operation, which will only retard the process.

HORSE, Bites and Stings of Insects.—

Horses are liable to be stung by hornets, wasps and bees. If there are only one or two stings made no interference is necessary, but sometimes a larger number of poisonous punctures have been effected, and then the best treatment is the application of spirit of turpentine and laudanum in equal proportions.

The bites of the gadfly are so troublesome in their effects that it is sometimes desirable to prevent them if possible. This is effected by making a strong infusion of the green bark of the elder, and washing the flanks, etc., with it before going out.

HORSE, Swelled Legs.—The skin of the legs and the cellular membrane beneath it are liable to two kinds of swelling, one of which is of an inflammatory character, while the other is solely due to a deposit of serum (œdema), owing to the non-performance of their office by the kidneys. Both kinds are much more frequent in the hind legs than the fore, but especially the former.

Inflammatory swelled leg, sometimes called weed, is generally accompanied by a certain amount of feverishness, and comes on suddenly, almost always showing itself on the inside of the hind leg, which is hot and extremely tender. It is not a very common disease, and merely requires the ordinary low treatment, by purging physic, and, if necessary, bleeding. Should it continue for more than two or three days after these are tried, an ounce of nitre may be given every night in a bran mash.

Ordinary swelling of the legs, or œdema, occurs in every degree, from a slight "filling," to which many horses are always subject, whether they work or stand in the stable, to an enlargement extending up to the stifles and elbows, sometimes rendering the legs almost as round and as hard as mill-posts. When horses are first brought in from grass their legs almost always fill more or less, and until they are regularly seasoned to their work there is seldom that clean condition of the sus-

pensory ligaments and back sinews which one likes to see even before the daily exercise is given. The œdema appears to depend partly upon a deficient action of the kidneys, but chiefly on the vessels of the legs not acting sufficiently without constant walking exercise, such as is natural to the horse when at liberty, and which he takes at grass. Half an hour's walking will generally produce absorption completely, so that a daily remedy is forthcoming; but as a rule, whenever there is this tendency to "filling" of the legs, the cellular membrane is not the only tissue in fault, but the tendons and the joints are also liable to inflammation. The treatment will greatly depend upon the exact cause. If the swelling is only due to the change from grass to the confinement of a warm stable, time alone is wanted, taking care not to over-work the horse, in the meantime. Bandages will always assist in keeping down the swelling; but they should not be used without necessity, as when once the horse becomes accustomed to them, his legs can hardly be kept fine without their aid. If weakness is the cause, a drachm of sulphate of iron given in the corn twice a day will often strengthen the system, and with it the legs. Diuretics may be adopted as an occasional aid to the kidneys, but they should be of the mildest kind, such as nitre, or they will do more harm, by weakening the body generally, than good by their stimulus to the kidneys. Indeed, they are often the sole cause of the legs filling, for some grooms use them so continually, whether they are wanted or not, that the kidneys become diseased and refuse to act, which is a sure forerunner of œdema. Where swelling of the legs is confirmed, bandages must be regularly applied as recommended in article HORSE, BANDAGES, USE AND APPLICATION OF, which see.

HORSE, Chapped Heel.—When a horse suffers from œdema of the legs, he is particularly prone to an eruption of a watery nature in the cleft between the heels and behind the lesser pastern. Those also whose legs are washed and not dried are still more prone to it, especially if the hair is white. The skin cracks, and, in bad cases, is so inflamed and swollen that the leg cannot be bent without great pain, and often there is a bleeding from the

cracks, caused by the action of the limb, but only to a sufficient extent to show that blood has escaped. The treatment must be local as well as general if the eruption is not entirely due to mismanagement. In any case, the part should be dressed with cerate of acetate of lead, a little of which should be rubbed in every night. Next morning some glycerine should be brushed on an hour at least before the exercise, and renewed before the daily work is commenced. This will prevent all risk of the skin cracking, while the ointment will act beneficially on the vessels of the heart. In addition to these applications, the general health should be attended to if in fault, and tonics or diuretics should be given, as the case may require.

HORSE, Grease.—The eruption known as grease is sometimes only an aggravated form of chapped heels, and is often preceded by them. At others the appearance of the disease is ushered in by constitutional symptoms, such as feverishness, oedema of the limbs and hide-bound. The first local symptom is a slight swelling of the skin of the heels and adjacent parts, which soon cracks, and from the fissures there exudes an offensive discharge which looks greasy, but is really watery, being of a serous nature. It inflames every part that it touches, and has a tendency to cause a spread of the eruption in all directions, but chiefly downwards. The legs go on swelling to a frightful extent, and are thereby rendered so stiff and sore that great lameness is produced. If this stage is neglected the whole surface ulcerates, and a fungoid growth makes its appearance, chiefly from the original cracks. The discharge becomes purulent and has a most foul smell, and the leg can with difficulty be bent at all. Finally, the fungous excrescences cover the whole of the diseased skin, being of a bright red color, and slightly resembling grapes in form, from which circumstances this stage has been called "the grapes." It is now very rare to meet with grease in any of its forms except in the cart-stable, where the hairy legs of its inmates render them peculiarly prone to its attacks, from the time required to dry them when wet. They are so difficult to clean without water that the carters may well be excused for using it, but if they

do they ought carefully to dry the legs afterwards. The treatment when grease is established must be founded upon the same principle as in chapped heels. The skin must be kept supple, and at the same time stimulated to a healthy action. For the former purpose glycerine is most valuable, being far more efficacious than any greasy dressing, such as we were obliged to employ before the discovery of this substance. In all the stages of grease, this latter agent may be employed, and as it is readily soluble in water it can be washed off and renewed as often as it may be desired. The discharge is so foul and irritating that it ought to be thoroughly removed at least once in twenty-four hours; and one of the chief advantages of the use of glycerine is that it so greatly assists this cleansing process from its solubility in water. In addition to this emollient plan, some stimulus must be selected, and none answers so well (in all stages but the very earliest) as chloride of zinc. When, therefore, the heels are in that state that it is almost doubtful whether the disease is the mere chap or absolute grease, the treatment recommended for the former may be tried, but should this fail, the groom should at once proceed to cut the hair of the skin which is diseased as short as possible. Then let him take some soap and warm water and gently wash the parts with a sponge till the skin is perfectly clean and free from scab or scurf, taking care to remove every particle of soap by well rinsing it. Next dry the leg, and them with a small paintbrush rub gently into the inflamed parts enough of the following lotion to damp them, but not to wet them thoroughly:

Take of Chloride of Zinc	- - -	30 grs.
Water	- - -	1 pint. Mix.

A quarter of an hour afterwards apply a little glycerine over the whole, and keep the parts sufficiently supple with it. If there is much discharge the cleansing may be repeated night and morning, followed by the chloride of zinc, but in most cases once a day will be sufficiently often. If the ulcerated or inflamed skin does not put on a healthy appearance in a few days, the lotion may be increased in strength, using forty, fifty, or sixty grains to the pint, as required; but the remedy will be found to be almost a specific, except for the grapy form, if properly proportioned

in strength. When the fungoid growths are very extensive, nothing but their removal, either by the knife or by the actual or potential cautery, will suffice. The least painful plan is to slice them off to a level with the skin and then just touch the bleeding surface with a hot iron, which will have the doubly good effect of stopping the bleeding and inducing a healthy action. The glycerine may then be applied, and next day the leg may be treated in the same way as for ordinary grease, described above. When the disease is of long standing, local applications may cure it for a time; but either it will return, or there will be some other organ attacked, unless the unhealthy state of the blood is attended to. It must be remembered that during the existence of grease, this vital fluid is called upon to supply the materials for the secretion which is constantly going on. Now, if on the cessation of the demand for them the blood still goes on obtaining its supplies from the digestive organs, it becomes over-loaded, a state of plethora is established, which Nature attempts to relieve in some one or other of her established modes by setting up disease. To avoid such a result arsenic may be given internally, for this medicine has a special power in counteracting this tendency. How it acts has never yet been made out, but that it does exert such a power is thoroughly ascertained, and if the doses are not too large it is unattended by any injurious effect. Indeed, for a time it seems to act as a tonic. The arsenic should be given in solution and with the food, so as to procure its absorption into the blood without weakening the stomach. A wine-glassful of liquor arsenicalis (1½ oz.) should be poured over the corn twice a day, and continued for a couple of months, when it may be discontinued with a fair hope of its having had the desired effect. Should the skin, however, look inflamed, a second course of it may be given, and it will be found that if it is given with the corn it will not be followed by any injurious consequences.

HORSE, Warts.—Warts are, generally, only to be considered as eyesores; for, unless they appear on the penis, they are not injurious to health; nor do they interfere with work unless they happen to appear on the shoulders beneath the col-

lar in a harness horse, which is very rare indeed. They are, doubtless, very unsightly, and, for this reason, it is often desired to remove them, which may be done by first picking off the rough outer surface, so as to make them bleed, and then rubbing in, with a stiff brush, some yellow orpiment, wetted with a little water. This will cause considerable inflammation, and in a few days the wart will drop off, leaving a healthy sore, which soon heals. Sometimes the whole wart does not come away on the first application, in which case a second must be made. When the glans penis is completely covered with warts, the best plan is to amputate it, as it requires the greatest caution and tact to remove them by arsenic or any other caustic without destroying, also, as much of the penis as is taken away by the knife.

HORSE, False Quarter.—When, from an accident, the coronary substance is permanently injured, it ceases to secrete sound horn, and a stripe of the crust, defective in strength, runs all the way down from the coronet to the plantar edge. This generally happens at the inner quarter, and is owing to the horse treading on his coronet; but it may also occur on the outside, either from the tread of another horse, or from some kind of external violence. The result is similar to that of a sandcrack; there is no strength in the affected heel, and lameness is produced. The treatment is very much the same as for sandcrack. In the first place, the pressure must be taken off the quarter, and a bar-shoe applied, so as to convey the weight on the frog, as described under the head of sandcrack. The heel of the affected quarter should be lowered, and thus further injury will be prevented. The next thing to be done is to stimulate the coronet to a healthy action by blistering it, which must be done two or three times, taking care that the blister is not of too violent a nature, and that the skin heals before a second is applied. By these means, a cure may sometimes be effected; but it takes considerable time, and until the quarter is reproduced in full strength, or nearly so, the bar-shoe should be continued. By its use, any horse with a sound frog can travel very well on the road, even if the quarter is entirely and permanently separated from the toe by

inefficient horn; and without it, the chance of a cure is not to be reckoned on.

HORSE, Foot, Disease of.—In countries where the roads are hilly and rough, this is a common trouble, and it is doubtless caused by disease of that part of the foot which centers round the navicular bone (a small bone in the center of the foot), and is caused by constant and irritating jars upon this highly sensitive part. To the cutting of the frog and the removal of that elastic cushion, provided by nature for the protection of these delicate parts, is due the prevalence of this disease, which unfortunately is rarely curable. An unerring symptom is the throwing forward of the foot by the horse when in the stable, or pointing, as it is called, mentioned as belonging to this case. Absolute rest, with good feed, cooling bandages to the leg, stuffing the hoof with cow-dung, making a soft bed of wet clay for the fore-feet to rest in, and rubbing the hoof with glycerine to soften and cool the crust, are the best remedial measures. It is a mistake to suppose the horse's foot is a solid mass of horn; if one is dissected, it will be found a very different thing indeed, and it should be treated accordingly.

HORSE, Founder—(See HORSE, LAMINITIS).

HORSE, Seedy Toe.—This term is so generally employed among horsemen, that though the state which it describes is one of the ordinary consequences of laminitis, we prefer to give it a distinct section. We have already described its nature in the preceding page, and have only now to allude to its treatment. This may generally be so conducted as to restore the shape of the foot, if the inflammation has not lowered the toe of the pedal bone, as shown at fig. 1; for if this has taken place, although it is perhaps possible to get rid of the cavities in the horn, the relative positions of the bony parts cannot be changed. When, however, as is often the case, a moderately small hollow has been formed between the layers of the wall, and the foot retains a tolerably healthy shape, by cutting away all the external horny walls, exposing the parts in contact with the laminae, and resting the horse in a loose box, the secreting surface will form a new wall, without any spongy texture, in the course

of three or four months, if the coronary band is constantly stimulated by external applications. To effect this, the horse should be put to stand on red deal sawdust, without shoes; and his coronets, after being gently stimulated by a mild liquid blister, should be kept dressed with tar ointment, which should also be applied to the exterior of the horn. It is seldom, however, that a foot which has been thus treated is sufficiently sound to bear hard work.

HORSE, Navicular Disease.—This formidable disease, called also the navicular joint lameness, and navicularthrititis, is the chief danger to be apprehended from a good-looking strong foot, just as the open flat one is prone to laminitis, and is rarely subject to disease in the navicular joint. The reason of this immunity on the one hand, and the contrary on the other, is this. The open foot, with a large spongy frog, exposes the navicular bone and the parts in contact with it to constant pressure in the stable, so that these parts are always prepared for work. On the other hand, the concave sole and well-formed frog are raised from the ground by our unfortunate mode of shoeing, and when the whole foot is exposed to injury from battering, and, in addition, the tendon which plays over the navicular bone presses it against the os coronæ, the unprepared state in which this part is allowed to remain is sure to produce inflammation, if the work is carried far enough. Thus in each case the weak part suffers; but occasionally, though very rarely, the foot with an arched sole contracts laminitis, and the flat one is attacked by navicular disease; the exceptions, however, are so few that they may be thrown out of the calculation, and from the shape of the foot alone it may almost invariably be pronounced, when a horse is known to be subject to chronic lameness, whether its seat is in the laminae or in the navicular joint.

When a foot is examined after death which is known to have been the subject of navicular disease, the parts implicated are invariably either the navicular bone, or the soft parts in contact with it, or often all together. Most frequently on dividing the tendon of the flexor perforans, and turning it down so as to expose the back of the joint between the navicular

and coronal bones, that part will be greatly thickened and inflamed, the tendon being often adherent to it. In the healthy condition there ought to be no adhesion of the fibres of the tendon to any part of the navicular bone but its postero-inferior edge, to which the tendon is fixed by some few fibres, the bulk passing to be inserted in the os pedis. The posterior face of the navicular bone should be beautifully smooth, and lined by synovial membrane, which forms a lubricating sac for it to play upon, and thus take off the friction between the



FIG. 27.—ULCERATION OF THE POSTERIOR SURFACE OF THE NAVICULAR BONE.

1. Lower or plantar surface of pedal bone.
2. Small specks of exostosis.
3. Carious patch.

tendon and the bone. Such is nature's provision against mischief in this delicate part of the machinery of the foot, which she keeps in order by the constant supply of synovia or joint oil. But when the sac is not stimulated to a healthy action by the pressure of the frog below it in doors and out, synovia is no longer secreted in proper quantity, and as soon as the horse is put to hard work, inflammation takes place for want of it. The result is some one of the consequences of inflamed joints. Either ulceration takes place in the postero-inferior surface, where the tendon glides over it as shown in fig. 27 (at 3), sometimes ending in caries of the bone itself; or adhesion takes place without ulceration of the tendon with the surface of the bone, or there are small exostoses thrown out, see fig. 27 (2); or lastly, there is simple inflammation without either adhesion or ulceration, and in

this stage the disease is amenable to treatment without leaving any trace behind.

The symptoms of navicular disease are the same, whether the mischief has extended to ulceration or not; but the history will guide us in ascertaining how far it has gone. Of course they vary in degree, for there may be only a slight extent of ulceration, or a high degree of simple inflammation; but in the former case the lameness will not be so marked as in the latter, though the prospect of recovery will be much less. There is always more or less lameness; but, in consequence of its affecting both feet, it is not so marked to the careless observer as in some much more trivial cases where only one is diseased. The distinguishing sign, though not absolutely infallible, is the pointing of the toe, and a peculiar rounding forward of the fetlock joint, so as to relieve the navicular bone of any weight. In laminitis, the object of the sufferer is to relieve all pressure as much as possible, by bringing the hind legs under the body, and by bearing the weight of the fore quarter on the heels. Here, the reverse of the latter attitude is observed—the heels are not allowed to take any pressure, and the toes alone are placed at all firmly on the ground. This is marked in the stable by the pointing of the toe (in each foot alternately, if both are diseased, but in the one only, if they are not both affected). Out of doors, the toes dig into the ground, the heel never being brought firmly down; and frequent stumbles mark the difference between this species of lameness and laminitis. The subject of navicular disease generally walks sound; but the moment he is trotted, he goes as if his legs were tied together, his stride being shortened in a remarkable manner, but without exhibiting the peculiar fumbling gait of the foundered animal. As in his case, soft ground suits him, and he has no fear of plough, because his sole is hard and unyielding. Many tolerably confirmed cases of navicular disease may, therefore, be driven, except when the ground is hard, supposing, of course, that they are kept off the road; but no plan of management will enable them to bear the jars incidental to harness-work or hacking. When one foot only is the subject of navicular disease, it often happens that it is smaller altogether than the

other; but it is somewhat difficult to say whether this is a cause or a consequence of inflammation. One thing is quite clear, that many horses are met with, still perfectly free from lameness, in which there is a difference of size in their fore feet; but whether or no these are afterwards invariably the subjects of navicular disease, it is almost impossible to ascertain. It is, however, the general opinion, founded on experience, that when this variation exists, navicular disease is extremely likely to attack the smaller foot, if it is not already there; and for this reason, horses with such feet are generally avoided by the intending purchaser.

The treatment of navicular disease, as before remarked, is only successful in the early stage, before either ulceration or adhesion has taken place. If a horse with strong, concave soles suddenly becomes lame, points his toe, and shows other signs that his navicular bone is inflamed, he should be treated in the usual way suited to inflammation, and at the same time liberty should be given to the vascular tissues to expand, by reducing the substance of the horn. Bleeding at the toe has the double good effect of abstracting blood, and at the same time weakening the sole, so as to allow of the expansion which is desired. The operation should, therefore, at once be performed; at the same time, the whole sole may be reduced in thickness, and the heels lowered in proportion. The foot should then (after the shoe is tacked on) be placed in a cold bran poultice, which will soften the horn; and the system should be reduced by the exhibition of the medicines recommended under LAMINITIS. Next day, if the pulse continues high, more blood may be taken; but, in ordinary cases, it is better at once to insert a seton in the frog (see Figure 27,) and trust to this for relieving the chronic inflammation remaining, by its counter-irritation. But when the disease itself is mastered, there is still a good deal to be done to prevent the injurious effects which are so apt to follow. The horse contracts a habit of stepping on his toes, to prevent hurting his navicular structures; and hence the frog is not used, the heels of the crust and the bars are not strained, and there being no stimulus to the soft parts which

secrete them, they waste and contract in size. If the human hand is allowed to lie idle, the palm and the insides of the fingers are covered with a delicate cuticle, which affords so poor a protection to the cutis, that, on using it with any kind of hard work, it actually separates, and leaves an exposed surface, which speedily inflames. But by gradually exposing the same hand to pressure, a thickened and tougher cuticle is secreted; and this will bear any moderate amount of pressure or friction without injury. Nevertheless, even the hand so prepared must be continually stimulated by work, or the skin returns to its original delicate state, and is then exposed to the same risk of injury as before. So it is with the horse's foot, even in a state of health; but this is far more marked after an attack of disease. The tendency then is to produce the natural horny growths of a smaller substance than before; and if the secreting surfaces are not stimulated by pressure, they become doubly idle, and the frog, as well as the adjacent parts beneath the navicular bone, shows a wasted and shrivelled appearance. To avoid the risk of these ill consequences, the horse should be placed, for two or three hours daily, on a bed of wet clay, which will allow the shoe to sink into it, but will yet be tenacious enough to make firm and steady pressure on the frog, while its low temperature will keep down inflammation. No plan is of so much service in producing what is called expansion of the heels and growth of the frog as this; not, as is commonly supposed, from the clay mechanically pressing the heels out, but from the stimulus of its pressure causing the soft parts to secrete more horn, and of a sounder quality than before.

Should these remedies fail in restoring the foot affected with navicular disease to a healthy state, recourse can only be had to the operation of neurotomy, which is perfectly efficacious in removing the lameness; and if there is no ulceration, and merely an adhesion of the tendon to the bone, it will, by causing the horse to step more on his heels, effect an absolute improvement in the shape of the foot, and hence it has sometimes been considered to have produced a cure. Where, however, there is caries of the bone, or even ulceration of the synovial membrane,

the disease progresses even faster than before the operation, and in process of time the joint becomes mechanically unfit to perform its duties.

HORSE, Legs and Feet, Accidents to the.—These parts are subject to a variety of accidents, trifling perhaps in the cause which produces them, but serious in their effects, from the lameness which ensues. The chief of these are ordinary cutting, speedy cutting, and pricks of the foot either from putting the sole down upon a nail or a piece of glass, or driving a nail improperly in shoeing. Bruises and overreaches also come under this head.

Ordinary cutting may occur either before or behind, the latter being the more common. It is often met with in poor horses, where the flesh is so reduced in substance that the legs are brought nearer together than in a proper condition. Here all that is required is patience, till the legs are restored to their proper relative position, taking care in the meantime that there is no permanent injury done. Usually the inside of one or both feet strike the fetlock joint of the other leg in passing it, but sometimes the blow is given higher up, and it may occur anywhere on the cannon bone except just below the knee, when it is called "speedy cutting," which will be separately considered. Sometimes this blow on the cannon bone is either the cause or the effect of a splint, the blow of the foot having a tendency to produce exostosis (see **SPLINTS**). But if a splint is thrown out on a part of the cannon bone which comes in the way of the natural action, the horse whose foot previously passed clear of that part of the other leg will hit it, and not only give pain, but cause a considerable access of inflammation in the previous enlargement. In the treatment, therefore, of cutting, it is necessary to prevent the habit being continued from the swelling produced either by a splint or by previous blows. A horse, perhaps, either from weakness or bad shoeing, hits his legs and produces considerable swelling and soreness. Here, unless the swelling is reduced or protected, there is no chance of preventing the cutting, because there is a projection of the swollen soft parts right in the way of the other foot. No alteration of the shoeing, and no increase of strength or flesh, will be of service until

the inflammation is reduced, and the sore, if any exists, is healed, and this can only be done either by rest or by protecting the leg with a boot. The latter is the better plan, and wherever a horse cuts it is, in our opinion, advisable to let him wear a boot for some weeks, until the skin is quite sound again and reduced to its proper thickness. A piece of an old rug folded round the leg so as slightly to overlap, and then tied with a tape and turned down over the fetlock joint, is quite sufficient to serve this temporary purpose, and being soft it is well calculated to protect a swollen joint; but if it is worn any length of time, the pressure of the tape and the friction of the grit from the road wear away the hair, and cause an unsightly appearance, which is sometimes permanent. If, therefore, the cutting is not rectified completely in the course of a month or six weeks, a leather or india-rubber boot should be nicely adapted to the joint and buckled round it, the flat surface of the strap not having so injurious an effect as the tape of the cloth boot. When the cutting takes place above the joint, a pad must be adapted to its inside, and fastened round the cannon bone by two or three buckles, according to the height at which the injury takes place.

Such is the best mode of guarding against the injury done by cutting, but we must also consider how it can be entirely prevented. In the first place, it should be carefully ascertained by what part of the foot or shoe the blow is given. Most commonly it will be found, by chalking the inside of the foot, that a small patch is rubbed clear of chalk, about half an inch above the middle of the quarter, and corresponding with the hindmost nail hole, especially when four inside nails are used. When this is the hitting point, if great care is taken to avoid driving in a nail there, the tendency to cut can never be increased as it often is by a raised clench, and at the same time the rasp may safely be used to reduce the thickness of the hoof at least the eighth of an inch, or often much more. The crust is usually here about three-eighths of an inch thick, and very often it is so sound that it will bear to be rasped down till there is only one-eighth left, provided it has not to bear

the pressure of a nail near it, and that the reduction is not carried up too near to the coronet. In the hind foot the quarter is fully half an inch thick, and it therefore will bear reduction better even than the fore foot. Sometimes the blow is given by the shoe itself, which is fixed on so as to overlap the crust, and then the remedy is simple enough, for this ought never to occur, and can easily be prevented by any smith. But supposing, in spite of these precautions, the cutting still continues after the horse is restored to his natural strength and flesh, can anything be done by shoeing? In most cases this question may be answered in the affirmative, by the use of what is called a feather-edged shoe, which will be described under the head of shoeing. By its aid the heels are both raised, not the inner one only (which is entirely useless and even prejudicial, for then the ground surface of the shoe is not a true plane), but both heels, the inner one being narrower, and having no nail holes beyond the two near the toe, so that there is no danger of the web projecting; nor is there any nail hole required, with the fear of a clench rising, or of the crust being weakened so as to prevent its being thinned to a proper degree. By thus raising the heels (in the hind foot especially), the fetlock is less bent, and as in horses that cut there is almost always a tendency in their fetlock joints to bend inwards as well as backwards, this diminution of the angle will not only straighten the leg in a forward direction, but it will also increase the distance between the joints, which is the object to be desired. In the fore foot the obliquity in this direction is not so frequent, and then the high heel will be of no use; indeed, it is only when the toes are too much turned out that this plan of shoeing the fore foot is ever successful. When cutting occurs before, unless there is this turn out, it is better to put the shoes on in a perfectly level manner, and trust to the reduction of the thickness of the quarter, and the absence of the third nail. If, with these precautions, the horse, when in good condition, still strikes his fore legs, it will be better to put up with the constant use of a boot. Generally, however, if the inflammation is first subdued, and the foot is shod in a perfectly true and level manner, taking

care to rasp away the particular part which strikes the other leg, it will be found that the cutting is avoided.

Speedy cutting is more dangerous than ordinary cutting, because the pain given by the blow is generally more severe, and is often so great that the horse falls as if he were shot. On examining the leg of a confirmed speedy cutter there is always apparent a small scab or bruise on the inside of the cannon bone, immediately below the knee; but in slight cases rest may have been used to allow the skin to heal, and then no mark may possibly be left. A careful examination will, however, generally detect a small bare place, partially concealed by the growth of the adjacent hair. In bad cases the periosteum is swollen, and there is a considerable enlargement of the surface of the bone. In the management of slight cases of this kind of cutting the action should be examined while the hoof is covered with chalk, and the latter should be treated in the same way as already described. If, however, this fails, as it generally does in this form of cutting, there is no remedy but to put on a regular speedy-cut boot, in which there is a pad buckled on the inside of the leg, and reaching from the knee to the fetlock. It must be of this length, because otherwise it cannot be kept in its place, as the leg allows it to slip down until it reaches the larger circumference presented by the joint. Where there is pain and swelling, caused by the contusion, it must be treated in the ordinary way, by the application of cold water and the tincture of arnica, a wine-glassfull of the latter in two quarts of water.

Pricks in shoeing occur from the want of skill in the smith, who drives the nail too near the laminae, and sometimes even absolutely wounds them. It may be that the nail in its passage upwards is not within an eighth of an inch of these delicate parts, and the horse may not have flinched during the driving of it, but when he is put to work the nail opposes a hard, unyielding line to the soft parts, inflammation is established, and possibly even matter is formed which may end in quittor. When, on the day after shoeing, a horse which was previously sound goes lame, and the foot is hot to the touch, it may generally be assumed that

a nail or nails have been driven too near to the quick, unless there is evidence of laminitis from other causes. On tapping the crust with a hammer, the horse will flinch at some particular spot, and there is the nail which is in fault. Sometimes there is little inflammation as yet set up, but the pressure of the nail is sufficient to cause lameness, and in either case the shoe should be taken off. Then, if there is reason to suppose that matter has formed, the opening from which the nail came out should be enlarged, and the matter allowed to escape. If, however, the foot has been merely "bound," it may be either left to nature, with a shoe lightly tacked on, and a wet "swab" round the coronet, or it may be placed in a bran poultice, which is the safest plan.

When a nail is picked up on the road the prognosis will depend upon the part which it has penetrated. If it has entered deeply into the toe of the frog, the probability is that the navicular joint has been wounded, or probably the tendon of the flexor at its insertion into the pedal bone, either of which are very serious accidents. If the wound is further back there is less risk of permanent injury, as the bulbous heels or cushion of the frog will bear a considerable amount of injury without permanent mischief. In any case the treatment should consist in cutting away the horn round the opening, so as to allow of a free escape of matter if it forms. At the same time inflammation should be kept under by cold "swabs" to the coronet, or by putting the whole foot into a bran poultice.

Over-reaches, when slight, may be treated by the application of Friar's balsam, or tincture of arnica in full strength, which will have a tendency to dry them up and prevent suppuration. If, however, the heel is very much bruised, a poultice must be applied, but even then a little tincture of arnica should be sprinkled on it. When the bruise is so severe that a slough or core comes away the wound may be dressed with a piece of lint, dipped in a solution of nitrate of silver, eight grains to the ounce of distilled water, and over this a bran poultice. In most cases, however, it is better to foment the part well and then apply the tincture of arnica neat.

A bruise on the thin sole will some-

times cause matter to form, in which case the horn must be cut away and the case treated as for quittor. (See HORSE, QUITTOR.) Before matter forms the horn should be reduced, and the foot placed in a cold bran poultice.

HORSE, Snow Balling, to prevent.—Clean their hoofs well, then rub thoroughly with thick soap suds before going out in the snow.

HORSE, Interfering.—To prevent interfering in a horse who is turned out in the front feet, the shoe should be applied to fit closely on the inside, and the nails applied round the toe and to the outside. In some instances a small piece of leather placed betwixt the sole and the shoe, and allowed to project outwards, has a very good effect in preventing interfering.

HORSE, Knee-Pan Displaced.—Feed the horse well on oats, barley and sound hay; give him a drachm of powdered phosphate of iron daily in his food; keep in a stall with a perfectly smooth and level floor, and not less than 5½ or 6 feet wide; apply a shoe with a bar welded to the toe, projecting two or three inches, and then let it be turned up; rub the joint with an ointment made of one drachm of powdered cantharides to one-half ounce of lard, repeating the application the next day if it has not blistered. When a blister rises wash it off with soap and warm water, and then anoint the part daily with lard, until the scab and other effects have passed off, when another blister may be applied.

HORSE, Feet, Scaling in Summer.—To prevent horses' feet from scaling or cracking in summer, and enable the shoes to be carried a longer time without injury, the French practice is to coat the hoofs once a week with an ointment composed of equal proportions of soft fat, yellow wax, linseed oil, Venice turpentine and Norway tar; the wax is melted separately before mixing.

HORSE, Fevers.—The horse is very rarely subject to fever as a disease of itself, independently of inflammation, under which head we have already described catarrhal fever, both of the simple kind and when epidemic, and known as influenza. Indeed, all the important inflammations of the body are attended with fever; but in them the local affections are evidently more serious than the general

disturbance of the system, which we call by the name of fever. By many veterinarians it is doubted whether fever ever shows itself in the horse without inflammation; but occasionally it may be observed under the form of simple fever, presenting all the symptoms which accompany ordinary inflammation, but without any such complication, and more rarely of the typhoid form, which now sometimes attends influenza and other epidemics.

Simple fever shows itself by dullness and reluctance to move, a staring coat, and cold legs and feet, with increased warmth of the body. The pulse is quick, soft and variable—breathing a little accelerated, but not much—appetite entirely lost—bowels confined, and urine scanty. These symptoms continue for two or three days, and then either go on into the typhoid form, or they are complicated by inflammation in some organ of the body. The treatment merely consists in giving a mild dose of physic, followed by a febrifuge drink, such as the following:

Take of Spirit of Nitrous Ether - 1 ounce.
 Nitre - - - - - 3 to 5 drachms.
 Tincture of Ginger - - 2 drachms.
 Camphor Mixture - - 6 ounces.

Mix, and give twice a day.

Typhoid fever sometimes appears as an epidemic, occurring either as a sequel to influenza, or in its pure form, without any complication. The latter condition is, however, extremely rare. In its early stage it can scarcely be recognized or distinguished from simple fever; but in the course of two or three days the strength is so much reduced, the breath is so fetid and the mouth is loaded with such a black discharge from the tongue and gums, that the nature of the disease is clearly manifested. The pulse is very low, the languor increases, and there is often more or less delirium. The course of the disease is extremely rapid, and in five or six days a strong horse will sink beneath its powers, refusing food, and dying without any attempt to rally. The treatment should be of the most generous kind, as soon as the bowels have been gently moved, which should be effected, if possible, by injection. Then give a ball two or three times a day, composed thus:

Take of Carbonate of Ammonia - $\frac{1}{2}$ to 1 drachm
 Powdered Ginger - - - 1 drachm.
 Powdered Yellow Bark - - 3 drachms.

Syrup enough to make into a ball.

This should be washed down with a quart of ale caudle, and hay tea should be allowed as the drink *ad libitum*; or, if there is diarrhœa, rice water may be used in the same way. Few cases, however, will recover, in spite of every exertion and careful treatment on the part of the attendant.

HORSE, Anasarca.—Anasarca, or moor-ill, occurs chiefly among horses turned out in marshes or low commons, and may readily be known by the general swelling of the body, increasing by gravitation in the legs during the standing posture, but showing itself chiefly in the lower side of the body in the early morning, when the horse has been lying down all night. The disease is now rare, but it occasionally appears under the circumstances above described. The treatment must be by acting on the kidneys, the following being a useful recipe for the purpose:

Take of Nitre - - - 4 drachms.
 Powdered Resin - - 3 drachms.
 Ginger - - - 1 drachm.
 Spirit of Nitrous Ether $1\frac{1}{2}$ oz.
 Warm Water - - - 2 Pints.

Mix and give as a drench every night.

HORSE, Moor-ill, (See HORSE, ANASARCA).

HORSE, Glanders.—This frightful constitutional disease appears to consist in the generation of some poisonous matter in the blood, which nature attempts to throw off by establishing a discharge in the nostrils. It is perfectly incurable, and therefore it is only necessary to study its symptoms, with a view to distinguish it from ozena, with which alone it is liable to be confounded. Its chronic character and insidious onset will serve to distinguish it from catarrh and strangles.

At its commencement, it seems to be confined to the internal lining of the nostrils, which is not reddened, as in chronic catarrh (ozena), but presents a leaden or purple color, sometimes of a deep shade, but at first generally very light and pale. This is accompanied by a thin acrid discharge, transparent, and without odor. Generally one nostril only is affected, which in this country is more frequently the left, and in France the right; but why this should be so has never yet been even conjectured with any appearance of probability. This state of things usually only lasts for a few weeks,

but it may go on for an indefinite time, and is recognized as the first stage; during which the health does not suffer, and the horse can, and often does, go on with his ordinary work. It may be distinguished from ozena by the purple color of the lining membrane, and by the transparency and freedom from smell of the discharge.

In the second stage, the discharge increases in quantity, and though still watery and transparent, it is slightly sticky, indicating the presence of mucus. The lymphatic glands below the jaw enlarge, and become adherent to the bone, feeling hard to the touch, and almost like exostosis. Here the permanent character of the discharge and the adherence of the glands to the bone are the diagnostic signs from ozena.

In the third stage, the discharge increases rapidly, and becomes yellow and opaque—in fact, it is pure pus. If the nose is carefully examined, its lining membrane will be seen to present one or more sores, with depressed centres and ragged edges, and surrounded by small varicose vessels leading to them from all directions. In proportion to the extent of the local mischief, constitutional disturbance is displayed. The appetite fails—the horse loses flesh and spirits—the coat is turned the wrong way—the skin is hide-bound, and the legs fill slightly during the day, but go down at night—the nose is, at last, frightfully ulcerated, the sores spreading to the larynx—ulcers break out on the body—and the horse finally dies, worn to a skeleton.

When the diagnosis of the disease is confirmed, as it is undoubtedly highly contagious, both to other horses and to man himself, the patient ought to be destroyed. By the use of green food, his life may be prolonged for a time, and a certain amount of work may be got out of him; but the risk of contagion is too great to be incurred, and no man who regards his own welfare, and that of his neighbors should keep a glandered horse.

HORSE, Farcy.—This disease appears to depend upon the development of the same poison as in glanders; but the attempt at elimination is made in the skin, instead of the mucous membrane lining the nose. A horse inoculated with glanders may exhibit farcy, and vice versa; so that the essence of the disease is the same, but its seat is a different tissue.

Farcy usually shows itself first by one or two small hard knots in the skin called "farcy buds." These soon soften, and contain a small quantity of pus; but as this is rapidly absorbed, the lymphatics which convey it into the circulation inflame; and at a short distance another bud is formed, and then another, and another. These buds are usually met with in the thin skin covering the inside of the thighs and arms, or the neck and lips. They vary from the size of a shilling to that of a half-crown; and as they increase in numbers, the skin becomes oedematous. In process of time, the general system suffers, as in glanders, and the horse dies, a miserable, worn-out object. No treatment can be relied on to cure the disease; and as it is equally contagious with glanders, every farcied horse ought at once to be destroyed. The hard nature of the buds, and the thickened lymphatics extending like cords between, clearly make known the nature of the disease.

HORSE, Chloroform, Administration of.

—The use of chloroform to procure insensibility to pain is a great aid to the operator on the horse, who without it acts under great difficulties, owing to the nervous twitch which the poor animal gives at each touch of the knife. Under chloroform, however, he lies as if dead; and as long as its effects continue, the most elaborate dissection may be conducted with comparative ease. There is some little danger of over-doing this powerful agent, but the risk is not so great as is generally supposed, and with ordinary care it is more than 1,000 to 1 that no injurious effects produced.

The best and most simple apparatus for the purpose of administering chloroform is a common wire muzzle, to the upper edge of which a strip of leather six inches deep is stitched, and so arranged that it may be buckled round the upper part of the jaws. This insures that all the air inspired shall pass through the wires, and by covering them with a cap of very loose flannel, in which a few holes are cut to facilitate respiration, the muzzle may be made ready for use. The horse is first cast, after which the above apparatus is put on and buckled round the jaw, when

on sprinkling the chloroform over the cap of flannel, it may be applied or removed in an instant, and the amount of anæsthesia regulated accordingly. Without some guard such as the wire affords, the chloroform runs over the nostrils and lips, and blisters them to a serious extent; but when it is used, such an accident can only occur from over-saturating the flannel. The necessary quantity of this powerful agent must be employed; but when once it is found that a prick of a pin or other pointed instrument is borne without shrinking, the flannel may be withdrawn, and the operation quickly commenced, taking care to have an assistant ready to put it on again if the horse shows signs of returning sensibility to pain. Six or eight ounces of chloroform must be provided, as the quantity required is rather uncertain, the average dose being about three or four ounces.

If casting is objected to, either from the absence of hobbles, or from fear of injury to the horse, a soft bed of straw should be provided, and a strong halter must be put over the muzzle with two cords, one of which should be held by a man on each side. These will serve to guide the horse in falling; but it is extremely difficult to make sure of his going down where he is wanted to lie; and there is also considerable time lost in securing him after he is down, which the safety of the operator imperatively requires. The effect of the chloroform must therefore be kept up for a much longer time than if it is given after the horse is cast and secured.

HORSE, Confining the Horse, Methods

of.—There are various plans adopted by veterinary surgeons to bind the horse's limbs, so that he cannot injure himself or them when undergoing an operation. Even when chloroform is employed, some coercion of this kind must generally be adopted, as directed in the last section; for if it is given in the standing position, the horse is very apt to injure himself in falling, which is often accompanied by powerful convulsive motions, and moreover he cannot with certainty be placed in a suitable position. The plan adopted by Mr. Rarey is seldom suitable, because it can only be employed on subjects taught to go down without resistance, for the severe struggle which the untaught

horse makes before he submits is calculated to produce injurious constitutional disturbance, and, moreover, it would sadly increase any of the various diseases of the limbs for which operations are so often performed. Sometimes, however, it might advantageously be introduced into veterinary surgery, as for instance in castration, when the colt will not suffer his hind legs to be touched, but even then it will be necessary to throw him two or three times, or he will be in such a state of arterial excitement that inflammation will be likely to follow. The usual methods of confinement are: 1st. The hobbles. 2d. The side line. 3d. The trevis, or break. 4th. The twitch and barnacles.

Hobbles consist of four broad padded leather straps, provided with strong buckles, and long enough to encircle the pasterns. To each of these an iron ring is stitched, and to one of them a strong, soft rope, six yards in length, is securely attached. Provided with four, or, if possible, five assistants, the operator buckles the hobble with the rope attached to the near fore leg, and the remaining three to the other legs. Then passing the rope through their rings, and through the first also, it is held by three assistants, the nearest of whom stands about a yard from the horse, so as to pull upwards as well as away from him; a fourth assistant holds him by the head to keep him quiet, and to be ready to fall on it as soon as he is down, and the fifth stands at his quarters, ready to push him over on his off side. This place is sometimes occupied by the operator himself when he is short of hands. CASTING should never be attempted on any hard surface, a thick bed of straw being necessary to prevent injury from the heavy fall which takes place. The hind legs should be brought as far forward as possible before beginning to pull the rope, and when the men do this they should do it "with a will," but without jerking, so as to take the horse off his guard, when he will resist much less stoutly than if he is allowed more time. As soon as the legs are drawn up together, the man at the quarters is quite safe from injury, and he may lean forcibly against that part, and force the horse over to the off side, upon which he falls; the assistant at the head keeping that part

down, no further struggling takes place, and he is secured by passing the end of the rope under the hobble rings between the fore and hind legs, and securing it with a hitch. Something more, however, is necessary to be done before any of the usual operations can be performed, as all of the legs are at liberty to a certain extent and the scrotum cannot be reached in safety. The following further precautions must therefore be taken, varying according to the part to be operated on.

For CASTRATION the horse should be cast on his near side, with a web halter in the usual place of a collar. The rope of the halter is then passed through the ring of the hobble on the off hind leg, and using it as a pulley the foot is drawn forcibly forward beyond the arm and firmly secured to the webbing round the neck, and bringing it back again it may be passed round the thigh above the hock (which should be guarded from friction by a soft cloth or leather), and again secured to the webbing. By these precautions the scrotum is completely exposed, and the hind legs cannot be stirred beyond the slight spasmodic twitch which extends to the whole body.

To perform any operation on the fore leg, it must be taken out of its hobble, and drawn forward upon the straw by a webbing attached to its pastern, where it must be held by an assistant, the horse having little or no power over it in this position.

The hind leg is secured in the same way as for castration, unless the fetlock is to be fired, when webbing must be applied to the thigh above the hock only. With most horses, however, firing can be performed without casting, by buckling up the fore leg, or by having it held by a competent assistant.

When the horse is to be released, the hobbles are quietly unbuckled in succession, beginning with the undermost hind leg.

Several improved hobbles have been invented, but they are suited rather for the veterinary surgeon than for the ordinary horsemaster, who will only require them for castration and minor operations.

The side line is sometimes used for securing one hind leg thus: the long rope and single hobble only are required, the latter being buckled to the hind pastern,

which is to be secured. The rope is then passed over the withers and brought back round the bosom and shoulder of the same side as the leg to which it is secured, and then passed inside the first part of the rope. By pulling at the end of this cord the hind leg is drawn up to the shoulder, and secured there with a hitch, but the plan is not nearly so safe as casting.

The trevis or break consists of four strong posts driven into the ground, at the corners of a space six feet long by three feet wide. They are strongly braced together by wooden stays, three feet six inches from the ground on three sides, the fourth being left open for the horse to enter, after which this also is made good by a padded bar passed through stout iron rings fixed at three feet from the ground to the uprights. By means of this framework, to which sundry rings are bolted, the body of the horse is first securely confined by two broad bands under the belly and two above the shoulders and croup. Thus he can neither rear nor kick to any extent sufficient to free himself, and all that is necessary is to lay hold of any limb selected for operation, and confine it to one of the uprights, or to some other convenient point. This is the best plan to be adopted for firing and other operations on the legs, and if the belly-bands are wide, strong, and secure, chloroform may be administered in it, without the horse going down.

The twitch is a short stick of strong ash, about the size of a mopstick, with a hole pierced near the end, through which is passed a peice of strong but small cord, and tied in a loop large enough to admit the open hand freely. This is passed over the upper lip close to the nostrils, and then, by twisting the stick, compression is made to a painful extent, which will keep horses quiet for any slight operation. Sometimes it is placed on the ear in preference, but in either case the effect is dependent on the pain produced.

Barnacles consist in the application of pressure by means of the handles of a pair of pincers inclosing the muzzle, and held firmly by an assistant. They are, however, not so useful as the twitch.

HORSE, Bleeding.—In the early part of the present century bleeding was re-

sorted to on every appearance of the slightest inflammation, and often without the slightest necessity. Many horses were regularly bled "every spring and fall," to prevent mischief, as was supposed; but at last it always happened to every horse which lived long enough, that the more frequently blood was taken, the more the operation was required, and when it was absolutely wanted to lower the heart's action, such a quantity of blood must be taken that the system was reduced to a dangerous degree. Stallions were constantly submitted to this treatment, and mares as long they were worked, so that in course of time it has happened to the horse, as it has also to man himself, that the horrid abuse of the lancet for two or three consecutive generations has completely changed the type of the diseases to which they are both subject. Inflammation does not now follow the same course that it used to do, but is of a much milder type, and the attendant fever is inclined to assume the typhoid character, if lowering measures are pushed to any great extent. An attempt has been made to account for this change in human diseases by the alteration in the habits of the present generation, which are certainly more temperate than those of the previous one; but in the case of the horse the reverse holds good, for he is now stimulated by more corn than ever. The only point, as far as we can make out, in which the horse and his master have been similarly maltreated, is in the abuse of the lancet, which undoubtedly may account for the change in the type of their diseases to which we have alluded, and it is, therefore, reasonable to refer it to this cause. But though this powerful agent has been thus abused, we must not be deterred from having recourse to it when severe inflammation occurs in the horse. Sometimes there is no time to wait for the effects of a slower remedy, even if there is one which will be sufficiently powerful to control the heart's action. The only sensible plan in such case is to choose the lesser of the two evils, and to save life, or the integrity of the organ attacked, as the case may be, by abstracting blood, always remembering that this is to be avoided as long as it is safe to do so, but that when it is decided on, a sufficient quantity must be taken to produce a sensible effect, without which

there is no attendant good to counterbalance the evil.

Bleeding is either performed in the jugular vein, when the whole system is to be affected; or when a part of the body only is inflamed, it may be desirable to abstract blood locally, as for instance from the toe or from the plate vein, in inflammation of the foot, and in ophthalmia from the vein which lies on the face just below the eye.

The instruments used are either the lancet or the fleam, the former being the safer of the two, but requiring some practice to manage it properly. In bleeding from the jugular vein, a string is sometimes tied round the neck below the part to be opened, which is four or five inches below the fork in the vein in the upper part of the neck. The skilled operator, however, makes pressure with his left hand answer the purpose of causing the vein to rise, and during this state either uses the lancet with his right or the fleam with the aid afforded by the blow of a short stick, called a "blood stick." When the blood begins to flow, the edge of the bucket which catches it is pressed against the same part, and as long as this is continued a full stream will run until faintness occurs. After sufficient blood has been taken, the two lips of the wound are raised between the fingers, and a small common pin passed through both, when the point is cut off and some tow is twisted round, by which the edges are kept together and the pin is retained in position. In a couple of days the pin may be withdrawn without disturbing the tow, and the wound will heal with little or no deformity. Sometimes the blood continues to flow beneath the skin after it is pinned, and a swelling takes place in consequence, which is called ecchymosis. When this happens, cold water should be freely applied and the head kept up by racking to the manger.

The quantity of blood necessary to be taken will vary according to circumstances, and can scarcely be fixed from the appearance of the blood drawn, but a repetition of the operation may be decided on if the clot of the blood, after standing, is very concave at the top (cupped), or if it is very yellow (buffed), and especially if both these signs are present. In inflammation of a severe character less

than six quarts of blood will seldom lower the pulse sufficiently to be of much service, and sometimes seven or eight quarts even must be taken from a large, plethoric animal.

Inflammation of the vein will sometimes supervene upon bleeding, the symptoms being a slight swelling appearing in the evening, or the next day, with a little oozing from the wound. These are soon followed by a hard, cord-like enlargement of the vein, which feels hot to the touch, and the parts at the angle of the jaw swell considerably. The consequence generally is that the vein is obliterated, occasioning some disturbance to the circulation, especially when the head is held down, as it is at grass. The treatment consists in cold applications as long as there is heat, the lotion recommended (see HORSE, CAPPED HOCK) being generally useful. When the heat has subsided, and the vein remains enlarged, the biniodide of mercury will procure the absorption of the new deposit, by rubbing it in as recommended. (See HORSE, SPLINTS.)

HORSE, Firing.—The purpose for which the heated iron is employed is twofold; first, to produce immediate counter-irritation, by which the previous inflammation is reduced; and secondly, to cause the formation of a tight compress over the part, which lasts for some months. It is the fashion to deny the existence of the latter effect of this operation; but every practical man must be aware that it follows upon firing to a greater or less extent, according to circumstances, but always lasting for a few months, until the skin stretches to its previous condition. The blemish which it leaves, and the pain which it occasions, both during and after the application of the iron, should cause it to be avoided when any equally useful substitute can be employed; but, unfortunately, there are many cases where it stands without a rival, as being at once the safest and the most efficient remedy which can be adopted. Blisters and setons can be made to cause the same amount of counter-irritation; but the inflammation accompanying the former often extends beneath the skin, and increases the mischief it was intended to relieve; while the latter has no effect whatever in producing pressure

upon the parts beneath. The pain of firing can be relieved entirely at the time of the operation by chloroform; but the subsequent smarting is quite as bad, and this is beyond the reach of any anæsthetic. Independently, however, of the interests of the master, it is also to the advantage of the horse to get thoroughly cured; for if he is not, he will either work on in misery, or he will be consigned to the knacker's yard; and, therefore, the adoption of the most efficacious plan of treatment, even if somewhat the most painful, is the best for both.

Firing may be performed standing, by the use of the side line for the hind leg, or by fixing up one fore leg when the other is to be operated on. There is, however, nothing like the break or trevis, where more than a slight extent of surface is to be lined. The firing-iron should have a smooth edge, about the thickness of a worn shilling; and it should be heated to the point when it shows a dull red in the dark. When the disease for which the irons are used is slight, the skin should not be penetrated; but in bad cases, where the mischief is great, and particularly when it is wanted to have a good permanent bandage, the cauterization must be deeper; but this requires some practical knowledge to decide. The hair of the part should be cut very closely with the scissors, or shaved; then, having secured the leg, the iron is to be steadily but rapidly passed in parallel lines over the skin, making just the proper pressure which is required to burn to the requisite depth. A light brown mark should be left, which shows that the proper effect has been produced; and the color should be uniform, unless it is desired to penetrate deeper at certain parts, which is sometimes practised with advantage. The lines are sometimes made in a slanting direction round the leg, and at others straight up and down; but it is useless to describe the details of this operation, which can only be learned by watching its performance by another hand. Badly done, firing is always an eyesore; but when the lines are evenly drawn, and they have healed without any sloughs, caused by irregular or excessive pressure, they show that a master-hand has been at work, and that the poor beast has been treated scientifically. In very

severe diseases, a blister is sometimes applied over the part, immediately after the firing; but this can seldom be required, and as it aggravates the pain tenfold, it should be avoided, if possible. On the following day, a little neat's foot oil should be gently rubbed, or brushed with a feather, over the leg; and this should be repeated daily, until the swelling which comes on has nearly subsided. Less than three months' rest should never be allowed for the operation to have its full effect, as, if the horse is put to work before that time has elapsed, the disease will almost certainly return. Indeed, it is far better to allow double this time, especially if the horse is wanted for fast work.

HORSE, Setons and Rowels.—Setons are pieces of tape or lamp cotton, passed through and beneath the skin, leaving the two ends hanging out, either tied together or with a knot upon each. The latter is the safer plan, as the loop is always liable to be caught on a hook or other projecting body. The needle with which the passage is effected has a spear point, slightly turned up, and an eye at the other end, through which the tape or cotton is threaded. The ordinary one is about nine or ten inches long, and by its means a tape or piece of lamp cotton, smeared with blister cerate, may be passed through a long track of the cellular membrane, by pinching up the skin into a fold, and piercing this close to the body with the needle, which is then to be carried straight through. On drawing the tape out of the eye, it must be tied in a large knot at each end, which will prevent its slipping out. In three or four days, a profuse discharge will come on, and it must be kept up, if necessary, by repeated applications of blister cerate, or digestive ointment, as may be necessary. The ends should be sponged occasionally, to remove the accumulated matter.

A smaller curved needle, about five or six inches long is used for introducing a seton into the frog, or beneath the eye. For the former operation, a twitch is first applied, and the foot is then buckled up to the arm. The needle then, armed with the tape, greased with blister cerate, and a little oil to lubricate the surface, is thrust in at the heel and out at the cleft of the frog, taking care not to go deep enough

to wound the tendon as it passes over the navicular bone. The needle is then forcibly drawn through, and the tape knotted, as already described. The openings must be kept clean by sponging daily; and in three or four weeks the tape will have nearly worked its way out, when it may be withdrawn.

Rowels are now seldom employed, being very unmanageable plans for causing counter-irritation. An incision, about an inch long, is made in the skin, selecting a part where it is loosely attached, and into this a blunt instrument, called a "cornet," is pushed, and worked about in all directions, until the skin is separated from the subjacent parts for a circle with a diameter of from two to three inches. Into this a piece of thick leather of that diameter, with a hole in the middle, is inserted, previously having smeared it with blister cerate; and the part is then left to nature. In a few days, a discharge of matter comes on, which must be washed off occasionally; and in the course of time, the leather, if allowed, would find its way out by ulceration. Before, however, this takes place, it is generally removed.

HORSE, Blistering.—When it is decided to blister any part, the hair should be cut off as closely as possible; the ointment is then rubbed in with the hand for ten minutes, leaving a good quantity smeared on the surface. If the legs are to be blistered, the heels should be protected by lard. Considerable itching is caused after the first two or three days, and many horses, if allowed, gnaw the part to such an extent as to cause a serious blemish. It is therefore necessary to keep the head away, which is done by putting a "cradle" on the neck. The irritation of loose straw is very aggravating, and the stall or box should either be bedded with tan, or sawdust, or with used litter, so damp as to lie smoothly. It is generally the practice to put the blistered horse on a bare floor; but he will often do great harm to his legs and feet (which are of course unsound, or they would not be treated in this way), by constantly stamping from the pain occasioned while the blister is beginning to rise. When the legs are stiff and sore from the swelling, he stands still enough, but at first there is nothing of this kind to keep him quiet.

James' blister, which is very mild, and useful for trifling diseases of the legs, or for bringing on the hair after "broken knee," can generally be used without a cradle; but even with it horses will sometimes gnaw themselves, and it is better not to run any risk. At the end of a week, some neatsfoot oil should be applied every morning, with a feather or soft brush, to keep the scabs as supple as possible. The various formulas for blisters will be given in the list of DOMESTIC ANIMALS, MEDICINES FOR.

HORSE, Castration.—For removing the testicles several methods of operation have been proposed; but hitherto none has been tried which is so successful as the old plan, in which the division of the cord is performed by a heated iron with a sharp edge. In human surgery the spermatic artery is tied, and all danger of hæmorrhage is over, because the small amount of bleeding which takes place from the artery of the cord is of no consequence, as it cannot enter the cavity of the peritoneum. In the horse, on the other hand, the inguinal canal communicates with that cavity, and if the ligature is used, there is a double danger of inflammation—first, from effused blood; and secondly, from the irritation of the ends of the ligature. This plan, therefore, is now generally abandoned, though some few practitioners still adhere to it, and the choice rests between two methods of removal by cautery, namely, the actual and potential—the former giving more pain at the moment when the heated iron is applied, but the latter being really far more severe, as the caustic is a long time in effecting a complete death of the nerve and other sensitive parts. Torsion of the vessels has been also tried, but it is often followed by hæmorrhage, and, moreover, the pain which is caused during the twisting of the artery is apparently quite as great as is given by the heated iron. We are all inclined to fancy that fire occasions more agony than it really does, but those who have in their own persons been unfortunately able to compare the effects of the two kinds of cautery, have uniformly admitted that the actual is less severe than the potential, if the two are used so as to produce the same amount of cauterization.

The best period for performing the operation on the foal is just before wean-

ing, provided the weather is mild. If, however, his neck is very light, and the withers low, its postponement till the following spring will give a better chance for the development of these parts. The cold of winter and heat of summer are both prejudicial, and the months of April, May, September, or October should always be selected.

No preparation is required in the "sucker," but after weaning, the system always requires cooling by a dose of physic and light food before castration can safely be performed. Horses which have been in training, or other kind of work attended with high feeding, require at least three weeks' or a month's rest and lowering, by removing corn, mashing, &c., together with a couple of doses of physic, before they are fit to be castrated.

For the ordinary method of operating, a pair of clams should be provided, lined at the surfaces where the compression is made, with thick layers of vulcanized india-rubber. This material gives a very firm hold without bruising the cord, and causing thereby inflammation. A large scalpel and a couple of irons will complete the list of instruments, over and above the apparatus necessary for casting the horse. (See CASTING.) The horse being properly secured according to the directions there given, and a twitch being put on the lip in case he should struggle much, the operator, kneeling on the left side, grasps the testicle so as to make the skin of the scrotum covering it quite tense. A longitudinal incision, about three inches long, is then made down to the testicle, which, if care has been taken that there is no rupture, may be rapidly done—a wound of its surface not being of the slightest consequence, and giving far less pain than the slow niggling dissection of its coverings, which is sometimes practised to avoid it. The testicle can now be cleared of its coverings, and the hand laying hold of it gently, the operator raises it from its bed, and slips the clams on each side of the cord, at once making the proper pressure with them, which should be sufficient to prevent all risk of the part inclosed slipping from between its jaws. Great care should be taken that the whole of the testicle, including the epididymis, is external to the clams; and as soon as this is satisfactorily ascertained,

the cord may be divided with the ordinary firing-iron at a red heat. To make sure that no hæmorrhage shall occur, some operators sear the artery separately with a pointed iron; but if the division is slowly made with the heated iron, and avoiding any drag upon the cord, no such accident will be at all likely to follow, though very rarely it will happen in spite of every care. The clams may now be removed, and the other testicle treated in the same way; after which the hobbles are cautiously removed, and the patient is placed in a roomy, loose box, where he can take sufficient exercise to insure the gravitation of the discharge, but no more.

The French plan, by means of caustic, requires two pieces of wood, each about six inches long and an inch square, with a notch or neck at each end, to hold the twine by which they are tied together, and a groove in the two opposite surfaces, to hold the caustic. This is composed of one part of corrosive sublimate and four of flour, made into a paste with water, and it is introduced while moist into the grooves, which it should completely fill. The horse is then secured as before, the cord is exposed, the pieces of wood are adjusted on each side, and firmly held together with the pincers by an assistant, while the operator binds their ends together with waxed string. The testicle may now be removed with the knife, if the string has been tied sufficiently tight; but unless the operator has had some experience, it is safer to let it remain on till it comes away by the ulceration of the cord. This is the uncovered operation, the covered one being performed with the same instruments, as follows. The scrotum is grasped, and opened, taking care to avoid wounding the tunica vaginalis reflexa, or outer serous investment, but cutting down to it through the skin, dartos muscle, and cellular membrane. These are to be carefully dissected back, until the cord can be isolated without wounding its serous investment (tunica vaginalis), which is so thin that it is easy to ascertain with certainty the nature of its contents by examination with the fingers. If there is no hernia, the caustic can at once be applied to its outside in the same way as before; and if there is, it must be pushed back into the cavity of the abdomen, by a little careful manipulation.

Some veterinary surgeons operate in a similar way to one or other of the two last described plans, with the omission of the caustic, which they maintain is wholly unnecessary, for there must be sufficient pressure to cause a sloughing of the cord. There is certainly some truth in this argument, but if the pressure has not been sufficient to cause the sloughs, the caustic will assure that essential process, and thus it renders the operation safer, though it somewhat increases the subsequent local inflammation. The plan without the caustic is almost precisely the same, as far as safety is concerned, as that formerly adopted by country farriers, called "twitching," in which two pieces of wood were applied on each side of the base of the scrotum, and tied firmly at each end. The pain, however, occasioned by the pressure on so large a surface of skin is intense, and the operation is on that account indefensible, besides which it is not nearly so successful as either the ordinary English or French operations.

HORSE, Docking and Nicking.—These operations on the tail are subject to the fashion of the day, the former being used for the purpose of shortening its length, which is inconvenient to the rider or driver in dirty weather, and the latter for altering its carriage, when this is too low for the taste of the owner. Nicking is, however, very seldom practised in the present day, and never to the extent which was the fashion fifty years ago. Herbert says: "These barbarous methods of depriving the horse of his natural form and appearance, in order to make him conform to the fashion of the time, are, fortunately, very fast going into disuse. If the tail of the horse were given to him for no good purpose, and if it were not a design of nature that he should have the power of moving it forcibly to his sides, there might be some excuse for cutting it off, within a few inches of his body, or for separating the muscles at its sides to lessen this power; but that this is not the case, must be acknowledged by all who have seen how a horse, whose tail has been abridged by 'docking,' or weakened by nicking, is annoyed by flies.

"If a horse has a trick of throwing dirt on his rider's clothing, this may be prevented by cutting of the hair of the tail, below the end of the bones, as is the

custom with hunters in England, where the hair is cut squarely off about eight or ten inches above the hocks.

"No apology is offered for not giving in this work a description of these two operations; they are so barbarous and so senseless that they are going very rapidly out of fashion, and it is to be hoped that they will ere long have become obsolete, as has the cropping of the ears, formerly so common in England.

"A more humane way of setting up the horse's tail, to give him a more stylish appearance, is by simply weighting it, for a few hours each day, in the stall, until it attains the desired elevation. This is done by having two pulleys at the top of the stall, one at each side, through which are passed two ropes, which come together and are fastened to the tail, the ropes having at their other ends weights (bags of sand or of shot are very good for the purpose), which must be light at first, and may be increased from day to day. The weighting should be continued until the tail has taken a permanent position as desired. It is true that this method requires a somewhat longer time than that of cutting the muscles, but while it is being done, the horse is never off his work, and he suffers infinitely less pain.

"The method of nicking or pricking, as usually performed in this country, is not quite so cruel or so hazardous as the cutting of the muscles, described in Stewart's 'Stable Book.'

"The tail has four cords, two upper and two lower. The upper ones raise the tail, the lower ones depress it, and these last alone are to be cut. Take a sharp penknife with a long slender blade; insert the blade between the bone and under cord, two inches from the body; place the thumb of the hand holding the knife against the under part of the tail, and opposite the blade. Then press the blade toward the thumb against the cord; and cut the cord off, but do not let the knife cut through the skin. The cord is firm, and it will easily be known when it is cut off. The thumb will tell when to desist, that the skin may not be cut. Sever the cord twice on each side in the same manner. Let the cuts be two inches apart. The cord is nearly destitute of sensation; yet, when the tail is pricked in the old manner, the wound to the skin and flesh

is severe, and much fever is induced, and it takes a long time to heal. But with this method the horse's tail will not bleed, nor will it be sore, under ordinary circumstances, more than three days; and he will be pulleyed and his tail made in one-half of the time required by the old method."

HORSE, Unnerving.—The nerves distributed to the foot are sometimes divided for navicular disease, as they lie on each side of the bone above the fetlock joint. No one, however, should attempt this operation without having previously seen it performed, as it requires considerable dexterity for its due execution. We have described such operations as can be wanted in the country, where a veterinary surgeon cannot always be reached, but unnerving is never required there, and we shall therefore omit any detailed account of it.

HORSE, Hernia, Reduction of.—Hernia is sometimes strangulated; that is to say, the protruding portion of bowel is confined in its situation by such pressure on its neck as to cause danger of mortification. Under such circumstances, if it is found to be impossible to return the bowel by careful manipulation, an operation must be performed. This consists in carefully dissecting through the coverings of the bowel, and when it is exposed a long and narrow guarded knife (*Bistouri cache*) is passed by the side of the intestine through the opening into the abdomen, and then making the blade prominent it is withdrawn, and the fibres causing the pressure are divided. This usually allows of the bowel being passed back again into the abdomen, when the operation is completed by bringing the parts together with one or two stitches.

When hernia occurs in the colt either at the naval or scrotum, it is often desired to effect a cure by returning the bowel and causing the opening to close by adhesive inflammation. If the colt is uncut the performance of the covered operation on the French plan (see CASTRATION) will generally succeed, great care being of course necessary to return the intestine before the clamps are applied. In umbilical hernia, a similar plan has been tried, but the adhesion is too superficial to be of much use; and the only successful method is the passage of one or two

skewers through the opposite edges of the opening, and then winding some waxed twine round them, with a moderate degree of force. This should not be sufficient to cause mortification, or the opening will only be increased in size, and the bowel will protrude without any covering of skin; but it should be just sufficient to cause adhesive inflammation; experience in such matters alone enabling the operator to hit upon the right amount.

In all operations for hernia, chloroform is of great assistance, as it prevents the risk of a protrusion of the bowel while the knife is being used, which will otherwise sometimes happen during the struggles of the horse.

HORSE, Physic, Administration of.—Medicine may be given to the horse either in the solid form as a ball, or liquid, and then called a drench, or as a dry powder, when in small compass and with little taste, mixed with the corn or mash. Sometimes also a small quantity of a tasteless liquid, such as liquor arsenicalis, may be given with the food.

In giving a ball place a halter on the head with a knot, so that the jaws may be widely opened. Then turn the horse round in the stall and back him up to the manger, lay hold of the tongue and draw it out of the mouth, grasp it with the left hand, which must also hold the halter-cord so short that the strain is partly taken off the tongue, and then holding the ball in the right hand with the fingers inclosing it like a cone, and, the arm bare, it should be rapidly carried to the back of the mouth and deposited there, holding the head up till it is seen to pass down the gullet. Cautious grooms use a balling iron, which gags the mouth and protects the arm, but a handy man will have less difficulty in introducing his hand than in inserting the gag, unless the horse is a determined biter, when it may be absolutely necessary. In that case the gag is insinuated with as much ease as a bit in a flat direction, and the handle being suddenly depressed, the mouth gapes and the teeth cannot be brought together. Then holding its handle together with the halter in the left hand, the right easily introduces the ball into the pharynx.

In giving a drench, two persons are necessary, the operator standing at the

right shoulder, while the assistant is ready to steady the head and aid him on the left. The operator raises the head with his left hand beneath the jaw, and with his right he forces the lip of the horn into the side of the mouth, and, raising the small end, pours the contents in. If the horse is violent, a twitch must be placed on the nose and held by the assistant. The horn must not be passed far into the mouth, or any unnecessary violence used, for fear of producing a cough; in which case the hand must be instantly lowered. A neglect of this precaution will probably cause some of the liquid to pass into the larynx:

HORSE—Clysters are most valuable agents, if properly administered. The best syringe for the purpose is Read's, by which any quantity may be thrown up; and in colic, some gallons of warm water are sometimes required to produce the desired effect. For an ordinary opening clyster, a handful or two of common salt may be dissolved in five or six quarts of warm water.

HORSE—Back-Raking is effected by passing the greased hand and arm into the rectum and withdrawing any hardened feces which may have accumulated there. When the quantity of these is great, the hand must be passed several times, until it cannot reach any more. Whenever physic is given to an unprepared horse, as is sometimes necessary in severe disease, this precaution should never be neglected. Mr. Gamgee, of Edinburgh, is of opinion that this operation is more safely and easily performed by the aid of instruments, supporting his views by the assertion that the introduction of the hand gives unnecessary pain. On one or two occasions we have certainly seen a shoulder of mutton at the end of a human arm, and this would perhaps cause some little difficulty; but no hand of average size is nearly so large as the mass of dung usually passed; and those who are not above doing a dirty job when duty requires it, well know by experience that the hand and arm may be passed to the shoulder without giving any pain whatsoever. Instruments are useful when they cannot be dispensed with, but they are always liable to cause laceration.

HORSE, Bowels, Loose.—In cases of

chronic diarrhoea a good remedy is to put powdered charcoal in the feed, and if the disease depends on a digestive function—the liver included—give a few doses of the following:

Powdered Golden Seal	- - - - -	2 ounces.
Ginger	- - - - -	1 "
Salt	- - - - -	1 "

Dose, $\frac{1}{2}$ ounce twice a day.

HORSE, Clicking.—This is noticeable by a disagreeable clicking noise made by the horse striking the toe of his hind shoe against the inner edge of the fore one. To prevent this annoying habit, shoe the hind foot short at the toe—that is to say, set the shoe as far back as you can with safety and security. The fore shoe should be forged narrow, with the inner margin filed round and smooth.

HORSE, Flies, to keep from.—Procure a bunch of smartweed and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of bruised weed, especially on the legs, neck and ears. Neither flies nor other insects will trouble him for twenty-four hours. The process should be repeated every day. A very convenient way of using it is to make a strong infusion by boiling the weed a few minutes in water. When cold it can be conveniently applied with a sponge or brush. Smartweed is found growing in every section of the country, usually on wet ground near the highways.

ANOTHER.—Take two or three small handfuls of walnut leaves, upon which pour two or three pints of soft and cold water; let it infuse one night, and let it boil for a quarter of an hour; when cold it will be fit for use. No more is required than to moisten a sponge, and before the horse goes out of the stable let those parts which are most irritable be smeared over with the liquor, viz: between and upon the ears, the flank, etc.

HORSE, Heaves.—This disease is indicated by a short, dull, spasmodic cough, and a double-jerking movement at the flank during expiration. If a horse suffering from this disease is allowed to distend his stomach at his pleasure, with dry food entirely, and then to drink cold water, as much as he can hold, he is nearly worthless. But if the food be moistened, and he be allowed to drink a moderate quantity only at a time, the disease is much less troublesome.

Take one pound and a half of good ginger for a horse. Give two table spoonfuls a day, one in the morning and the other in the evening, mixed with bran. This recipe has been selling at five dollars to the eastward, where the efficacy of the above medicine has been proved in the cure of several cases of obstinate heaves. Another remedy is to feed no hay to the horse for 36 or 48 hours, and give only a pailful of water at a time. Then throw an armful of well cured smart weed before him and let him eat all he will. In all cases where the cells of the lungs are not broken down great relief, if not a perfect cure, will follow. Another remedy is sunflower seed, feeding one or two quarts of the seed daily.

HORSE, Hoof, Cracked.—The horse must be laid up from work, if possible. The shoe must be removed. The edges of the crack must be pared away at the upper part, so that a distinct separation is made between the crack and the coronet, or between the old horn of the hoof and the substance from which the new horn grows. No union can ever be formed of the parts separated by the old crack, so that a new start must be had. Blistering ointment may be applied to the coronet, to encourage the new growth, and the hoof should be smeared with tar and bound up, to prevent injury by blows or accidents. (See HORSE, NAVICULAR DISEASE.)

HORSES, How to Save from Barns on Fire.—Horses are frequently burned to death when barns or stables are on fire, owing to the impossibility of leading or driving them out of the building while their eyes are dazzled by the blaze. But we are assured that by simply covering their eyes with a bag, a coat, or a pocket-handkerchief, they may be led out of danger without trouble or difficulty. They will readily come out if the saddle and bridle, or harness to which they are accustomed, be thrown over them as usual.

HORSES, Palsy in.—The stream of nervous influence is sometimes stopped, and thence results palsy. Every organ of motion and of sense is paralyzed.

Palsy in the horse generally attacks the hind extremities. It commences generally in one hind leg, or perhaps both are equally affected. The animal can scarcely walk.

Commence with bleeding. Continue until the pulse begins to falter or the horse to reel. To this should follow a dose of physic—strong, compared with the size of the animal. The loins should be covered with a mustard poultice frequently renewed. The patient should be warmly clothed, supplied plentifully with mashes, but without a grain of corn in them; and frequently injections should be had recourse to.

HORSE, Tongue, Sore to Cure.—By making use of a little tar, once a day, rubbing on the tongue of the sound horses with a mop, is an effectual preventive; for the diseased horse, take a common tablespoonful of the spirits of turpentine and pour it on the tongue, as far down as practicable, then with a mop well saturated with the spirits of turpentine, mop every part of the tongue; after this make use of the tar in the way above mentioned as a preventive; this done once or twice a day, for two or three days, has never failed making a cure.

HORSE, Tongue, Lolling of the.—Rivet a section of a knife from a mowing-machine on his bit; dull the edges, and make everything smooth. The knife running up in his mouth prevents him from drawing his tongue far enough back to get it over the bit. Carelessness in breaking colts is the cause of it.

HORSE, Big Head.—When this disease occurs, every care must be taken to improve the general health. Let work be regular and moderate. Have the stable clean, dry, and well ventilated. Feed on sound hay and oats, either bruised or cooked. Under no circumstances give the horses Indian corn. Four or five pounds of linseed cake may be given daily. Give every day in the feed two drachms of phosphate of iron, and four drachms of powdered gentian.

HORSE, Big Shoulder.—(See HORSE, BIG HEAD.)

Horse, Big Leg.—Apply the Blister (see BLISTER, LIQUID IN MEDICAL RECEIPTS) every third hour until it blisters. In three days wash the leg with linseed oil. In six days wash it clean with soap and water. Repeat the last operation every six days until the swelling goes down. If there should be any callous left, apply Spavin Ointment. (See HORSE, SPAVIN.)

HORSE, Breast, Sore.—This generally

occurs in the spring, at the commencement of plowing. At times the fault is in having poor old collars, and not having the collar properly fitted to the horse's breast; and at others, the hames are either too tight or too loose. There is a great difference in horses about getting chafed or galled, and at times it has seemed to be impossible to keep their breasts from getting sore, but a thorough application of strong alum water or white oak bark to the breast of the animal, three days before going to work, will toughen the flesh, so that the same will not get sore. Another excellent plan is, when you let your team rest for a few moments during work, to raise the collar, pull it a little forward, and rub the breast thoroughly with your naked hand.

HORSE, Blood, Fullness of.—When this condition appears, the eyes appear heavy, dull, red or inflamed, and are frequently closed as if asleep. The pulse is small and oppressed; the heat of the body somewhat increased; the legs swell; the hair also rubs off. Horses that are removed from grass to a warm stable, and full fed on hay and corn, and not sufficiently exercised, are very subject to one or more of these symptoms. By regulating the quantity of food given them, by proper exercise, and occasional laxatives a cure may soon be effected.

HORSE, Gravel.—Steep one pound of hops in a half gallon of water, and give it as hot as the horse can bear it.

HORSE, Founder, To Cure.—Clean out the bottom of the foot thoroughly, hold up firmly in a horizontal position, and pour in a tablespoonful of spirits of turpentine, if the cavity will hold that much; if not, then pour in as much as it will hold, without running over. Touch the turpentine with a red hot iron (this will set it on fire), hold the hoof firmly in this position till it burns out, and be careful that none of the turpentine runs on the hair of the hoof, lest the skin be burned. This will give speedy relief, and the animal will be ready for service in a short time. Another way, is to mix a pint of the seed of the sunflower in his feed, as soon as the founder is discovered. Still another plan is adopted by some of standing the animal up to his belly in water a short time daily, for six or seven times.

HORSE, Hoof-Bound.—Cut down several lines from the coronet to the toe all around the hoof, and fill the cuts with tallow and soap mixed; take off the shoes, and (if you can spare him) turn the animal into a wet meadow, where his feet will be kept moist. Never remove the sole or burn the lines down, as this increases instead of diminishing the evil.

HORSE, Hair, Loss of.—To promote the growth of hair, where the skin has been deadened by bruises or rubbing, take of quinine eight grains, finely powdered galls ten grains, powdered capsicum five grains, oil of almonds and pure lard of each one ounce, oil of lavender twenty drops; mix thoroughly, and apply a small quantity to the denuded parts two or three times a week. Where there is falling out of the hair of the mane and tail, take glycerine two ounces, sulphur one ounce, acetate of lead two drachms, water eight ounces. To be well mixed, and applied by means of a sponge.

HORSE, Halter Pulling.—A new way to prevent horses pulling at the halter, is to put a very small rope under the horse's tail, bringing the ends forward, crossing them on the back, and tying them on the breast. Put the halter strap through the ring, and tie to the rope in front of the breast. When the horse pulls, he will, of course, find himself in rather an uncomfortable position, and discontinue the effort to free himself.

HORSE, Ringbone, Remedies.—Pulverized cantharides, oils of spike, origanum, amber, cedar, Barbadoes tar, and British oil, of each two ounces; oil of wormwood one ounce spirits of turpentine four ounces, common potash half ounce, nitric acid six ounces, oil of vitriol (sulphuric acid) four ounces, and lard three pounds. Melt the lard and slowly add the acids; stir well and add the others, stirring until cold. Clip off the hair, and apply by rubbing and heating in; in about three days, or when it is done running, wash off with suds and apply again. In old cases it may take three or four weeks, but in recent cases two or three applications will cure.—2. Take half pint spirits of turpentine, half ounce bluestone, half ounce of red precipitate. Shake well and use every morning; and keep the hoof well greased. This will not only take off the hair, but cause a

severe blister, which, after healing, if there still be signs of lameness, repeat the remedy.

HORSE, Scratches.—If a horse's blood is pure he will not have the scratches. Give him a tablespoonful of saltpetre every day for fifteen days, and be careful about his taking cold while feeding it. It opens the pores, so that he will take cold very easy. Along with this take pure, dry white lead, pure oxide of zinc, and glycerine, of each half an ounce; fresh lard (free from rancidity) $1\frac{1}{2}$ ounce. Mix the white lead, oxide of zinc and glycerine to a uniform, smooth paste, then add the lard, a little at a time, till a uniform, smooth ointment is formed. Wash the parts with Castile soap and water, and dry with a cloth, then apply the ointment two or three times daily with the fingers. Wash once in two or three days, and dry the spot well before dressing again.

The horse should stand on a plank floor kept clean and dry; and if used, all dust, sand and dirt should be washed off, so that the affected parts may remain clean. If these directions are strictly carried out, it will seldom, if ever, fail to cure the very worst cases within a reasonable time.

HORSE, Sweeny.—A horse is said to be sweenied when the muscles of the shoulder appear to have perished away, and the skin seems to be attached closely to the shoulder-blade. These symptoms may arise from chronic lameness in the foot or other part of the limb. In such case, of course it is of no use to apply remedies to the shoulder. Cure the foot, and the shoulder will come right, although stimulants and rubbing will expedite it. But genuine sweeny is quite different from the above, although the appearances are the same. It is caused by hard drawing in a collar that is too large; or where no whiffletree is ever used, but the traces are hitched directly to the thills, as in "jumpers," as they are called; or by jumping fences, or the like. The presence of real sweeny may be discovered by moving the horse in a circle, or causing him to step over bars, when you can generally determine the seat of the lameness. For such cases irritants with friction, is the proper treatment. Blistering liniment, or seton,

or a piece of leather inserted under the skin, will cure, with rest.

HORSE, Warts on Nose.—Dissolve one-half pound of alum in a quart of water, with a brush or cloth wet the warts twice each day for four days, and they will disappear. Another remedy is to smear the warts with salted butter.

HORSE, Water-Farcin.—Symptoms: The horse is dull and loses his appetite, and swells along the belly or chest and between the fore legs. To cure: Rowel in the breast and along each side of the chest, as far as the swelling goes. Leave the rowels in until the swelling goes down; give a spoonful of cleansing powders morning and night.

HORSE, Wen, To Cure a.—Take equal parts of soft soap and slacked lime, well mixed. Lance the wen at the time of making the application, or two or three days after. Two or three applications will cure.

HORSE, Wind in, to Improve.—It will be found, if tar water and powdered charcoal are mixed with horse's feed, that it will have a most beneficial effect on his wind and condition.

HORSE, Nasal Gleet or Running at the Nose.—Take one-half pound rosin, one-half pound blue vitrol, and four ounces ginger; grind them together to powder, and give the horse a spoonful two or three times a day.

HORSE, Baulky, to Cure.—A sure and complete remedy to cure a baulky horse, is to silently take a rope and tie one end to his tail and the wagon, making it so that when you start him the rope will be so short that the whole strain of the pull will be upon the rope and tail. This is an effectual remedy. The horse will pull to save his tail—and he will never repeat the operation again. A city passenger railway in Philadelphia, which owned nearly fifty baulky horses, gave \$1,000 for this receipt on condition that it operated as recommended, and out of the fifty horses forty-nine were completely cured of "baulkiness" on the first trial.

If a horse baulks and refuses to go forward buckle, a strap around his fore foot below the fetlock and pull gently but firmly and steadily forward. It will not be difficult to move forward the foot, and the horse will be compelled to go forward to recover his position.

HORSES, Shoeing in Winter.—In Canada, where the winter is never of less duration than five months, they shoe their horses in the following manner, which serves for the whole winter: The smith fixes a small piece of steel on the fore-part of each shoe, not tempered too hard, which turns up about one-fourth of an inch, in the shape of a horse's lancet; the same to the hinder-part of the shoe, turned up a little higher than the fore-part, tempered in the same manner. In going up a hill the fore-part gives a purchase that assists the horse, and in going down prevents him sliding forward.

HORSE, Itch.—To cure a horse afflicted with itch, first reduce his daily allowance of food, putting him on a low diet; and then give him a teaspoonful of a mixture of equal parts of sulphur and antimony, and at the end of a week or ten days the sores will have disappeared, and the horse will be covered with a fine coat of new hair.

HORSE, Collar, How to Fit.—An excellent plan, and one that will not injure the collar, is to dip it in water until the leather is thoroughly wet, then put it on the horse, secure the hames firmly, keeping it there until it becomes dry. It is all the better if heavy loads are to be drawn, as that causes the collar to be more evenly fitted to the neck and shoulder. If possible, the collar should be kept on from four to five hours, when it will be perfectly dry, and retain the same shape ever afterwards; and as it is exactly fitted to the form of the neck, will not produce chafes nor sores on the horse's neck.

HORSE, When Unsound.—Any of the following defects constitute unsoundness in a horse:

Lameness of all kinds and degrees. Diseases of any of the internal organs. Cough of every kind, as long as it exists. Colds or catarrhs, while they last. Roaring, broken wind, thick wind, grease, mange, farcy and glanders; megrims or staggers, founder, convex feet, contracted feet, spavins and ringbones, enlargement of the sinews or ligaments, cataracts and other defects of the eyes, impairing sight.

The following may or may not occasion unsoundness, according to the state or degree in which they exist: Corns, splints, thrushes, bog-spavins, thorough-pins, wind

galls, crib-biting. Curbs are unsoundness, unless the horse has worked with them for some months without inconvenience.

Cutting, particularly speedy cutting, constitutes unsoundness when it cannot be remedied by care and skill. Quidding, when a confirmed habit, injures the soundness of a horse.

Defects, called blemishes, are : Scars from broken knees ; capped hocks, splints, bog-spavins, and thorough-pins ; loss of hair from blisters or scars, enlargements from blows or cutting, and also specks or streaks on the corner of the eye.

Vices are : Restiveness, shying, bolting, running away, kicking, rearing, weaving, or moving the head from side to side, stringhalt, quidding, slipping the halter.

HORSE, Water for.—Water is usually given three times a day ; but in summer, when the horse sweats much, he should have water four or five times ; under ordinary circumstances, two rules will guide the attendant. The first is, never to let the horse get very thirsty ; the second, to give him water so often and in such quantity that he will not care to take any within an hour of going to fast work. The quantity of water which a horse will drink in twenty-four hours is uncertain ; it varies so much that one will drink quite as much as other two or three. It is influenced by the food, the work, the weather, and the number of services ; the demand for water also increases with the perspiration. Horses at fast work, and kept in hot stables, need a large allowance, which must be still larger in hot weather ; horses of slow work may be permitted to take what quantity they please ; but to those of fast work occasional restriction is necessary. Restriction is always necessary before fast work. A few quarts given an hour before going to work ought to suffice. Water should always be given before rather than after grain. Water your horses from a pond or stream rather than from a spring or well, because the latter is generally hard and cold, while the former is soft and comparatively warm. The horse prefers soft, muddy water to hard water, though never so clear.

HORSE, Cleaning.—When brought in from work, warm with exertion, the horse must be rubbed down and then blanketed ; but we would not blanket a horse in a good stable, as a general rule, except in

extremely cold weather. A sharp toothed curry comb is the dread of a fine skinned horse, and the brush and straw wisp answer the same purpose much better, if used as frequently as they should be. Mud should not be allowed to dry on the legs of a horse ; it is the cause of half the swelled legs, scratches, and other affections of the feet with which they are afflicted.

HORSE, Harness, Care of.—First take the harness apart, having each strap and piece by itself, and then wash it in warm soap-suds. When it has been cleaned, black every part with the following dye : one ounce extract of logwood, twelve grains of bichromate of potash, both pounded fine ; put it into two quarts of boiling rain water, and stir until all is dissolved. When cool it may be used. You can bottle and keep for future use if you wish. It may be applied with a shoe-brush, or anything else convenient. When the dye has struck in, you may oil each part with neatsfoot oil, applied with a paint-brush, or anything convenient. For second oiling use one-third castor oil and double that quantity of neatsfoot oil, mixed. A few hours after wipe clean with a woolen cloth, which gives the harness a glossy appearance. The preparation will not injure the leather or stitching, makes it soft and pliable, and obviates the necessity of oiling as often as is necessary by the ordinary method.

HORSE, Shoeing.—Few horseshoers understand thoroughly the anatomy of the horse's foot. The great mistake is made in attempting to trim the hoof to fit the shoe, whereas the shoe should be made to fit the hoof. Very little trimming is needed if the shoe is made right. The frog should never be touched by the buttress, if the foot is healthy, as Nature has intended that to be the spring or cushion to first receive the blow when the foot is set down on the road, to guard the knee and shoulder from the concussion.

Nothing can be more barbarous than the carving and cutting of a horse's foot before shoeing, though on his skill in this many a farrier prides himself. The idea that the frog must not be allowed to bear on the ground—that the sole must be thinned till it "springs on the thumb," is a most pernicious one.

As you value your horse do not let the blacksmith even scrape the dirt off the frog. It would be better if he could not see it, because, if anything fit to be called a frog, he will beg, argue, and try every means to persuade you to let him cut it. Do not turn your back to him while he has the foot in his lap and knife in his hand, or else off comes a portion of the frog. If the frog is left to itself it will, when Nature gets ready, shed itself; but the difference between shedding and cutting is, that before shedding the under frog is protected by a suitable covering, but when cut it is exposed to the action of the air and water, which causes it to crack, leaving those "rags" which the blacksmiths love so well to cut. Do not open the heels, as it increases the resistance offered to contraction.

The summer shoe needs to present a flat surface to the ground. Make it of the same width and thickness from the toe to the heel. Have the seating deep, so as to prevent the sole pressing upon the shoe as it descends. Have a clip at the toe to prevent the shoe slipping back; but none at the sides, as they not only destroy too much of the hoof, but prevent expansion. Have the fullering deep to receive the nail-heads, and have the nail holes straight—neither inclined inwardly or outwardly. Have only five nails to hold on the shoe—two on the inner, and three on the outside. Place the two on the inner side about $1\frac{1}{2}$ inches from the top; those on the outside may be placed further back toward the heel. The reason is, that when the foot strikes the ground it expands to relieve the horse of the shock of his weight, and the inner side being thinner than the outside, the expansion is greater. By placing the nails far back we prevent that expansion, thereby cramping the foot, which makes the animal step short and quick, like one with tight boots. If we take an old shoe, we find at the heels that it is worn down, and also that it is smaller and bright, which is not done by the shifting of the shoe, as you only find it at the heels, by the action of the foot while expanding and contracting. Of course, this action wears upon, but the foot is continually growing.

On fitting the shoe, do not let it burn the foot, as it makes a strong foot brittle,

and on a weak one hurting the horse. Be sure it fits close to the foot. Bring in the heels, as they do not, but the nails prevent expansion. Do not get the nails larger than necessary; bring them out low down in the crust, and make the clinchers very broad. Rasp below but not above the clinchers, as the foot above is covered—if healthy—with a varnish which excludes the air and water.

The hind shoe need not be so broad, but a little higher at the heels. In this put seven nails, as the hind legs propel and the front legs receive the weight.

The winter shoe needs toe and heel pieces to prevent the horse from slipping. Have the inner cork not quite so sharp as the outer one, so that if he steps upon the other foot it will not cut it.

The outside of the hoof ought not to be at all touched by the rasp, save at the very edge, as rasping tends to thicken the hoof and make it coarse and clumsy. Shoes should be made just as light as they possibly can be to answer the purpose. Ordinarily they are one-third too heavy. A horse's hoof should be carefully cleaned every day, and oiling the hoof once or twice a week is recommended.

HORSE, Training.—If you wish to control your horse study his character, as horses, like men, differ in their disposition, and each one has to be understood to be controlled.

1. **LEARNING HIM TO PACE.**—Buckle around his hind legs a four or five pound weight (lead is the best); after which ride the animal briskly, at the same time twitching each rein of the bridle alternately; soon he will be thrown into a pace. After training him in this manner several times, detach the weights, and in their stead place two pound weights, and use these several times; then change for something still lighter; leather, padding, or even something still lighter, will answer the purpose, and these let him wear until he is perfectly trained, and you will have a smooth and easy pacer.

2. **TO MAKE HIM TROT.**—Use rollers on the front feet. These rollers should be made of wood or horn, made round, about the size of a hickory-nut, with a small hole bored by a gimlet in the centre of each, and about a dozen of them strung on a string or narrow strap. The

string or strap should be much smaller than the hole. Then tie or buckle very loosely around the fetlock joint next to the hoof, so that they can play loosely up and down when the animal is moving. As soon as the horse finds that there is something on his feet, he will naturally think that there are stones in his road, and will lift them up higher, and throw them out further, and soon he will learn to be a good trotter.

Another mode is, that a small or medium-sized flat is the best and greatly superior to the track system for teaching the horse or colt to gather quickly. Always use a very light skeleton wagon or gig in training.

3. TO MAKE HIM SIT ON HIS HAUNCHES.—First learn the horse one idea, and this is, that you are his master, and that he must obey you, so that when you say "ho!" he will stand still. Then, having already learned him to lie down, let him attempt to rise, and when he gets up on his fore legs, say the word "sit!" and make him understand that you want him to stop at that point of his rising. Teach him to hold his position, and always use the same word for whatever feat you wish the animal to perform—if to sit, use the word "sit," and if to lie down, use the word "down."

4. TO MAKE HIM FOLLOW YOU.—Take your animal to the stable, and there place on him a surcingle and a bridle with short reins, which may be checked up a little and fastened on the surcingle. Then lead him about the yard for fifteen or twenty minutes, after which let go of the bridle, but still continue to caress him, at the same time saying constantly "come." If he seems to rebel, or lags behind, give him a light cut behind with a long whip, but in doing this do not change your position from being ahead of him. Continue this plan until you have been successful.

5. TO TEACH HIM TO PICK UP A HANDKERCHIEF.—Place on the ground or stand a white cloth handkerchief containing a quantity of oats; lead the horse around the yard, and when he comes to the spot where you have placed the handkerchief let him take some of the oats. This is the first and most important lesson, and its object is to fix in the mind of the horse a connection between the handker-

chief and the oats. Continue this practice each day for several weeks and he will soon learn to stop as readily in a trot or gallop as in a walk. After you feel that so far is a success, the handkerchief must be doubled over and tied in a knot; the animal shakes it to get at the grain, but not being successful he takes it up from the ground, which is just what you want. When the horse has done this a number of times and finds that though he can shake nothing out, but yet at each time he receives a reward of a handful of oats, he may be trusted to perform before an audience. The last step is to persuade the horse to carry the handkerchief to his master, and that is an easy task. Of his own will he will keep hold of the handkerchief until the same is taken from his mouth, and but little difficulty will be experienced to coax him to walk a few steps, when he knows that by so doing he will be rewarded with a handful of oats or a carrot for his obedience.

6. TEACHING HIM TO STAND.—Take the horse, and over his back throw a strap, and fasten the same to his right fore-foot. Lead him about, and when you wish to stop him say "whoa," and at the same moment pull down the strap, which will throw him on his three feet, which will bring him to a sudden halt. Then put him in harness with the foot-strap on, and drive him a few yards. The moment he attempts to move take his foot and say "whoa." Get into the carriage and out again; rattle the thills and make all kinds of noises. Make him understand, by pulling his foot each time he attempts to move, and this can be done in a very short time.

7. TAMING, PREPARATIONS FOR.—Have in separate bottles a quantity of finely grated horse-castor, and oils of rhodium and cummin. Keep the bottles well corked. Place some of the oil of cummin on your hand and approach the animal on the windy side. He will then move towards you, after which rub some of the cummin on his nose; then give him a small quantity of the castor on anything he is fond of, and while he is about taking it watch your chance and get on the point of his tongue from seven to ten drops of the oil of rhodium. He is then at your service, and will do almost anything you desire. Follow up this advan-

tage by all the attention and kindness possible, and you will soon have him entirely under your control.

HORSE, Taming and Breaking, Rarey's

Plan.—The apparatus which is required is, first of all, an ordinary snaffle or straight bit in the mouth, without which nothing could be done with any vicious horse; and if any animal is to be "Rarey-fied," the preliminary operation is to get this into the mouth. In vicious animals, however, this is no easy matter, and the best way is to entice the animal up to a wagon loaded with hay; under which the operator should hide himself, and while the animal is busily eating, he should slip his arm through the wheel, and quietly and cautiously

buckle the leg strap (See No. 1) on his leg.

As soon as this is done the horse is innocent of all mischief except with his teeth, for he cannot kick on three legs, and even his mouth may be kept away from the

operator by drawing on the off rein. To bring him speedily to submit to the power of the operator, the other leg must also be confined, which is

effected by first buckling on a surcingle, as represented in the engraving below, and then catching the off fetlock in the running noose of leg-strap No. 2, which is made in the annexed form. Provided with this second strap in his pocket, and having already applied the leg-strap No. 1, and the surcingle as shown below, the

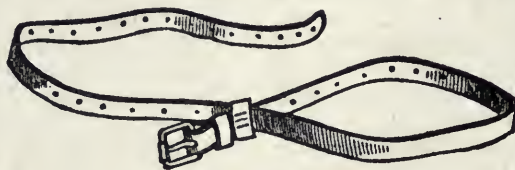


FIG. 28.—RAREY'S LEG STRAP. NO. 1.

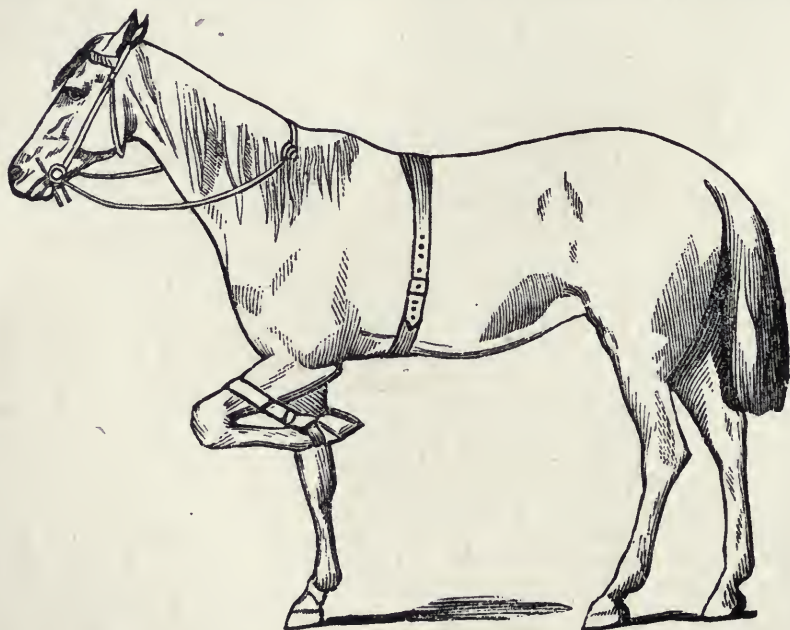


FIG. 29.—THE HORSE, WITH THE LEG STRAP AND SURCINGLE ON.

subject under manipulation is either induced to drop his off foot into the noose, or it is slipped round his ankle, while the off rein is held by the other hand to keep the teeth off the operator. As soon as this loop is firmly drawn round the leg, the other end is slipped through the

surcingle under the belly, and entire control of the horse is only a work of time. The arrangement of these straps is well shown in the engraving, where the horse is sketched ready for the final struggle. Up to this time, almost every horse will be tolerably quiet and unresisting, some

squealing when any approach is made to their elbows to tighten the surcingle, and others when the strap No. 2 is slipped through it. Few, however, plunge much; and if they are made to hop on three legs, they are able to go on for so long a time, without producing the necessary amount of fatigue, that the operator would be tired before his pupil. It may be observed that with a violent horse, it is always better to let him feel his want of power for doing mischief with the near fore leg strapped up, and the slight degree of fatigue which a few minutes' hopping will produce, before the second strap is called into play, especially if the operator has not acquired great skill in the use of the apparatus. When this is done, and the second strap is ap-



FIG. 30.—MR. RAREY'S STRAP. NO. 2.

plied, and slipped through the surcingle, as shown in figure 31, taking care to put a stout glove on the right hand, the left rein is taken in the left hand, and gently jerked—using, if necessary, the usual slight stimulus with the tongue, to make the horse move, which he can only do by

raising the off fore leg off the ground in the action known as hopping. The moment this begins, the right hand firmly draws the off leg up to the surcingle, and keeps it there, when the

horse must either bound into the air on his hind legs, or he must go down on the ground, supported from falling on his side in the attitude of kneeling. To avoid mischief, therefore, the loose box or yard where the operation is carried on should be thickly bedded with

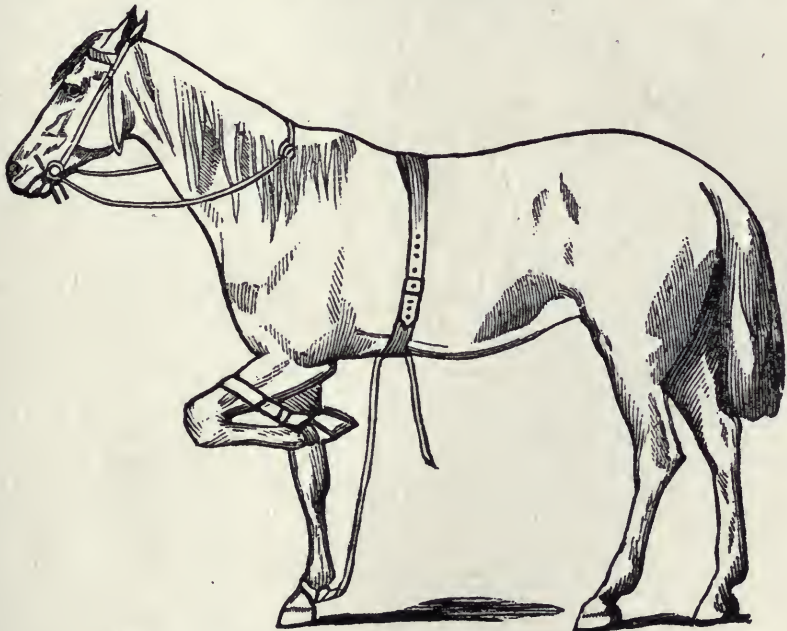


FIG. 31.—THE HORSE IN THE POWER OF HIS MASTER.

straw; for no knee-caps are stout enough to protect the joints from injury on hard ground; nor, if they escape being bruised, will the shock to the body on falling be at all safe. Even straw can hardly be relied on, if the floor beneath is of brick, stone,

pebbles, or hard natural soil; for it is apt to give way during the struggles of the horse, and allow the knees to reach it without the intended protection. When, therefore, there is no tanned riding-school, or other similar surface, at command, a

good solid bed of manure (which is always to be had where horses are) should be spread a foot thick at least, and over this clean straw may be laid. To return to the subject of the operation, whom we left with the alternative of bounding in the air on his hind legs, or falling on his knees in the annexed attitude, the chief art in managing this part of the process is to keep firm hold of the strap attached to the off leg close to the surcingle; the hand being protected by the glove, can easily prevent it from slipping through during the struggles of the horse, and at

the same time serves as a *point d'appui* for the operator, so that he can follow the movements of the bounding animal in whatever direction he may progress. The operator must on no account attempt to stand away from his patient, nor must he advance before the girth-place; but keeping close to this he is in no danger, provided he has sense and the ability to give way if the horse should throw himself down towards his side. The rein, being still held in the left hand, prevents the horse falling away from the operator, and is also used by him as a means of guiding



FIG. 32.—THE HORSE BOUNDING ON HIS HIND LEGS.

the animal, if he happens to progress in a direction which is not desired. Nothing else is to be attempted till the horse has quite exhausted all his energies, which those possessed of high courage will soon do; but low-bred animals are very apt to turn sulky, and, refusing to plunge, remain on their knees, in spite of every kind of stimulus which can be given them short of severe punishment with the whip, which is to be avoided, as opposed to the principles on which the whole process is founded. By taking time with these brutes, they may always be made to tire themselves, for the kneeling position is very irksome to them, and the most stubborn will give a plunge now and then to relieve

themselves, though they will not follow up one with another as speedily as a thoroughbred. Sooner or later (the time varying from ten minutes to two or three hours), the tail begins to tremble, the flanks heave, and a profuse perspiration breaks out, which are signs that the horse of himself desires the recumbent position, and will lie down of his own accord, if not pulled over by the right hand of the operator.

Let them wait till the horse is thoroughly tired, and then only interfere to such an extent as to keep him leaning towards their side, by laying hold of the right rein instead of the left, as shown in the engraving Fig. 32; and drawing the

head away from themselves. Mr. Rarey generally used the right hand for this purpose, when he wished to throw his patient before he was exhausted, because he could in that way employ more force; and, at the same time, his dexterity was such, that if a bound was made, he was always ready to hold the strap attached to the off foot before the horse could get fairly on his hind legs. In which ever way the task is accomplished, the effect is apparently the same—the horse lies extended on his side, panting and sweating, in the most exhausted condition; but, of

course, showing more of these symptoms of distress the longer he has been kept resisting the restraints put upon him. Now comes the test of the practical ability of the operator; for whereas before he had only plain directions to carry out, he has at this stage to judge how far his efforts are successful. If he takes off the straps too soon, the patient is patient no longer, but rises rapidly, and perhaps rewards him by planting a severe blow on his ribs. It is here that Mr. Rarey displayed his great skill to perfection. Apparently by intuition, he knew when his



FIG. 33.—THE HORSE ON HIS KNEES, ABOUT TO FALL ON HIS SIDE.

pupil was mastered; but, as he was always ready to explain, it was really by two symptoms that he judged whether he had gained the mastery or not. One of these was the expression of the eye, which it would be difficult to describe, and which experience alone could adequately convey to those who wish to understand it; but the other, being readily tested, is within the reach of every one. This consists in the entire flaccidity of the muscles of the neck and limbs; and until this is ascertained to have been obtained, the straps should not be entirely removed. Mr. Rarey's plan of proceeding at this stage was the following. A second or two after the horse went down, he let him

raise his head, and then dragged it down again to the ground by the mane. On repeating this once, twice, or thrice, the animal would give in as far as that part was concerned; and being rewarded with a pat of the hand, the head remained still on the ground, and that part was "gentled." Next removing the leg straps, the fore legs were separately gently rubbed downwards; and on being lifted, and let fall, as if dead, they also were passed as in a similar satisfactory state. While in this state, the horse lies in the attitude and with the expression which is very well represented in the accompanying sketch, and there he will gladly lie as long as he is permitted to do so. But he is not to be allowed to

recruit his powers; and as soon as he had gone through the tricks which we have described, Mr. Rarey made him rise, and then showed that the power which he had gained was not lost as soon as the animal stood on his legs again. Calling for a saddle, it was in every case shown to the horse, and put first on his head, then on his neck, and finally in its proper place. The animal then always submitted to be mounted, and even allowed the dangerous plan recommended and adopted by Mr. Rarey, of standing close to the hind-quarter while putting the foot in the

stirrup to be carried out without kicking, which before the "Rareyfication" most of the vicious brutes operated on in public would probably have done.

By this plan, it is indisputable that any active man, of good temper, but possessed of firmness and courage, and accustomed to deal with horses, may gain such a control over even the most vicious, that he can do what he likes with them in doors. No one who has examined into the matter can doubt Mr. Rarey's power, nor can he refuse him the merit of improving upon the old system of controlling the



FIG. 34.—THE HORSE TAMED.

horse, by the addition of the second leg strap, which adds so much to the power of the human arm, that the most violent and muscular horse has no chance whatever. The secret lies in two essential natures; first, that the horse must never be coerced or resisted, unless the man is certain of success in controlling him; and, secondly, that when the former is thoroughly convinced of his powerless condition, and his muscles are tired out, the latter interferes and relieves him of his trammels, "gentles" him, gives him kind words, and at length encourages him to rise. The effect is marvellous—the most vicious brute, who would previously tear any man to pieces, after he is thus first

coerced, and then "gentled" and relieved, appears to grow fond of his master, and follows him about like a dog.

MULE, Splint on.—To remove these bony formations, the treatment consists in repeated blistering. Having first cut the hair short, rub a little of the following ointment into the skin, covering the splint every night until a free watery discharge is produced from the surface:

Take of Biniodide of Mercury	- -	2 drachms.
Lard	- - - - -	1 ounce.
Mix.		

If, after an interval of a fortnight, the splint does not appear much reduced in size the ointment should be re-applied and repeated at similar intervals.

COLTS, Their Care and Management.

—Much harm arises from improper weaning. A good method is, when the colt is four or five months old, to put a strong halter upon him, place him in a stall, and put his mother in an adjoining stall, with a partition between, so arranged that they can see each other, and, if possible, get their heads together. The first day let the colt nurse twice—the next day once. Feed the mare upon dry hay and dry feed, and about half milk her two or three times a day until dry. Feed the colt upon new-mown grass or fine clover hay, and give him a pint of oats twice per day, and in about two weeks you will have your colt weaned, and your mare dry, and your colt looking as well as ever. When he is one year old he has as much growth and development of muscle as one two years old weaned in the usual manner. When the mare becomes dry, colt and mare may be again turned in pasture. An opinion generally prevails among farmers that, from the time the foal is taken from its dam up to coming maturity, it should not be “pushed,” as the saying is, nor fed on grain, for fear it would injure one so young and tender. This accounts for the great number of moping or spiritless and unthrifty colts, that are scarcely able to drag one leg after another. Their very appearance, cadaverous and pitiful looks, seem to convey to the mind of every sensible man that they are the victims of a wretched system of starvation, which enervates the digestive organs, impairs the secretions and impoverishes the blood. Hence the deficiency in the development of bone and muscle. The muscles and tendons, being so illy supplied with material for growth and development, become very weak and afford but little support to the bones and joints, so that the former become crooked and the latter weak—defects which no after feeding, no skill in training can counteract. It must be known to breeders that from the time of birth up to maturity, colts require food abounding in flesh-making principle, nitrogenous compounds—oats, corn, etc.; otherwise they must naturally be deficient in size, symmetry and powers of endurance. Therefore they should be regularly fed and watered, and their food should consist of ground oats, wheat bran, and sweet hay, in quantities suffi-

cient to promote their growth. Finally, proper shelter should always be provided for them. They should not be exposed, as they often are, to the vicissitudes of the weather, under the false notion of making them tough and hardy. Equally unwise is it to confine colts to close, unventilated and filthy stables, deprived of light, exercise and pure air. They should be groomed every day; a clean skin favors the vitalization of the blood. They should be permitted to gambol about as much as they choose. Exercise develops muscle, makes an animal active and spirited, and increases the capacity of the lungs and chest. By the above means, and proper attention to the principles of breeding, the business of raising colts may become both creditable and profitable.

COLT, to Prevent from Jumping.—

Pass a good stout surcingle around his body; put on his halter, and have the halter strap long enough to go from his head between his fore legs, then through the surcingle and back to one of his hind legs. Procure a thill strap and buckle around the leg between the foot and joint; fasten the halter strap in this—shorter or longer, as the obstinacy of the case may require. It is also useful to keep colts from running where there is likely to be danger from the result. If the thill strap should cause any soreness on the leg, it may be wound with a woollen cloth, and it would be well to change from one leg to the other occasionally.

COLT, Callus in.—This is considered a sure remedy:

Take of Bitter Sweet	- - - - -	I ounce.
Skunk Cabbage	- - - - -	I “
Blood Root	- - - - -	I “

Steep and mix with lard; make an ointment and apply once or twice a day.

HORSES, Stables for.—The floor of the stable should be level, or nearly so. When otherwise, it causes the horse to hang back, because the incline causes his loins and hind parts to ache intolerably, and he hangs back in order, if possible, to get his hind legs beyond the gutter, diminishing, by many degrees, his standing up hill. The best bedding is straw—fine shavings from a planing mill, or sawdust (pine sawdust being the best, and oak sawdust the worst.) They should

be allowed to stand on the naked floor as little as possible.

HORSE, Stables, to Deodorize.—Sawdust, wetted with sulphuric acid, diluted with about forty parts of water, and distributed about the stable, is a good deodorizer. Keep the mixture in shallow earthenware vessels.

HORSE, Blanketing.—In reference to blanketing horses in winter it is without doubt true that blanketing keeps a horse's coat smoother in winter, and, therefore, fine carriage and saddle horses will continue to be blanketed, no matter how injurious it may be. But where horses are kept more for service than show, the blanketing had better be dispensed with. Keeping them constantly covered makes them tender and liable to take cold. It is far better to give them a warm stable and plenty of straw for bedding and good food, and leave the blankets to be used only when they are compelled to stand for any length of time out of doors on a cold winter's day. Also, when they come in from work steaming hot, they should be allowed to stand a short time, until they are partially cooled off—then put the blankets on for an hour. Be careful and not delay putting on the blanket until they are chilled.

HORSE, Poor, how to Fatten.—Many good horses devour large quantities of

hay and grain, and yet continue poor, and the more they eat the poorer they appear to grow. The fault is, that the food is not properly assimilated. If the usual feed has been unground grain and hay, nothing but a change will make any desirable change in the appearance of the animal. In case oil meal cannot be obtained readily, mingle a bushel of flaxseed with a bushel of barley, one of oats, and another bushel of Indian corn, and let it be ground into fine meal. This will be a fair proportion for all his feed. Or the meal or barley, oats and corn, in equal quantities, may at first be procured, and $\frac{1}{4}$ of all cake mingled with it when the meal is sprinkled on cut feed. Feed 2 or 3 quarts of the mixture 3 times daily with a peck of cut hay and straw. If the horse will eat that amount greedily, let the quantity be gradually increased, until he will eat 4, 5 or 6 quarts at every feeding 3 times a day. So long as the animal will eat this allowance the quantity may be increased a little every day. But always avoid the practice of allowing the horse to stand at a rack well filled with hay. In order to fatten a horse that has run down in flesh, the groom should be very particular to feed the animal no more than he will eat up clean and lick his manger for more. Follow the above suggestions and the result will be satisfactory.

CATTLE :

DISEASES AND MANAGEMENT OF.

CATTLE, Age of, How to Ascertain by their Teeth.—The calf is usually born with two fore or cutting teeth, and at a month old, the whole eight are cut. The age is then guessed at by the wearing down of these teeth, until the calf is eight months old, when they begin to become narrower and smaller. At eight months the two centre teeth are smaller than the rest; and from that time until eighteen months the others gradually diminish, until the whole are very considerably lessened in size and stand apart from each other.

At two years old the two middle teeth are pushed out, and succeeded by two permanent ones; at three there are four permanent teeth; six at four years; and all the eight at five, when the animal is said to be full-mouthed; but he is not actually so until six years old, when all the eight are level.

A good judge of cattle will generally determine the age with considerable accuracy for many years after that. From six to nine he will be guided by the wearing down of the teeth, and after that by the diminution in their bulk, as in the milk teeth. At nine the two middle fore teeth are evidently smaller and narrower than the rest; at ten the two next are so; and so on until twelve, when, as in the steer of two years old, the teeth again begin to stand singularly apart from each other.

CATTLE, Age by the Horns.—The surface of the horn continues nearly smooth until the expiration of the second year of the animal's life, when a wrinkle or circle of thicker horn begins to be formed around the base. This is fully completed in a twelvemonth, and another ring then begins to appear, so that if the perfect rings or circles are counted, and two added to them, the age of the beast is supposed to be ascertained. These rings, however, are not always clear and

distinct, and it is very easy to remove one or two of them with a rasp, at least to the unpracticed eye, when the animal begins to be unmarketably old. In addition to this, a well-known fact should be stated, that if a heifer takes the bull at about two years old, the first ring is formed a twelvemonth before its usual time, and, consequently, she would always appear to be, reckoning by her horns, a twelvemonth older than she really is.

After all, the age, as denoted by the horn, can only be calculated in the cow; these rings do not begin to appear in the ox or bull until the animal is five years old, and then they are frequently too confused to be accurately counted.

CATTLE, Bleeding, its Utility, and in what cases Necessary.—Bleeding is a most useful and powerful remedy in the cure of inflammatory complaints. It lessens the quantity of blood in the vessels, and diminishes nervous power. The following are the chief diseases in which bleeding is required:

1. Where animals in a thriving state rub themselves until the hair comes off, and the spot is covered with a dry scab; while at the same time the eyes appear dull, languid, red, or inflamed, the breath hot, and the veins puffed up, and considerably larger than usual.

2. In all kinds of inflammatory diseases, as of the brain, lungs, kidneys, bowels, eyes, womb, bladder, shape, and udder, or in swelling of the joints.

3. In the disease called blain, and in which bleeding, not only general but local, and local far more than general, has the best possible effect, the tumefaction usually almost immediately subsiding, and the beast speedily recovering.

4. When the glands or kernels between the jaws, or those of the throat, are enlarged, and especially if they are only

recently affected, immediate recourse should be had to bleeding, for otherwise the lungs will probably become diseased, and dangerous or consumptive hoose will speedily ensue.

5. In bruises, hurts, wounds upon the head, strains in different parts, and all other accidents that may occur to the animal, and in which there is reason to apprehend considerable inflammation, bleeding will be proper.

6. In violent catarrh or cold, bleeding is employed; but, in slight cases, a few fever drinks will restore the animal.

7. The yellows, when attended with feverish symptoms, or constipation of the bowels, requires bleeding.

The manner of performing this operation is too well known to require any description.

The *Fleam* is an instrument in general use for oxen, and the jugular or neck vein is that which is mostly opened. Local bleeding is, however, in many cases particularly serviceable. In inflammation of the eye, the eye-vein is frequently cut; in foot-halt, we sometimes bleed at the toe; and in inflammation of the bowels, or udder, or even of the chest, blood is advantageously taken from the milk-vein.

The quantity of blood that it may be proper to take away at one time cannot here be determined; but must be regulated by the size, strength, and condition of the animal, and the disease under which he labors. In many inflammatory complaints, too much can hardly be taken, provided the bleeding is stopped as soon as the patient appears likely to faint or to fall down. A strong, healthy beast will bear the loss of five or six quarts of blood, without the least injury. Larger cattle, that are attacked with inflammatory complaints, will profit by the abstraction of a greater quantity; seven or eight quarts may be taken away with decided advantage: but when it is necessary to repeat the bleeding, the degree of fever and the strength of the beast will regulate the quantity. The blood should flow from a large orifice, for sudden depletion is far more powerful in its operation, than when the blood is suffered slowly to trickle down. The blood must never be allowed to fall upon the ground, but should be received into a measure, in order that the quantity taken may be known. No ab-

solute quantity of blood should ever be prescribed, but when extensive bleeding is demanded, the stream should flow until the pulse falters, or intermits, or the animal begins to heave violently, or threatens to fall, or other circumstances show that the system is sufficiently affected. The beast should not be permitted to drink cold water immediately after bleeding, nor to graze in the field: the former has sometimes induced troublesome catarrh, and the latter may cause the orifice to open again. If this operation is performed in the summer season, it will be most prudent to fetch the cattle out of the pasture towards evening, in order that they may be bled; and, after that, to let them stand in the fold-yard all night, and drive them back to the field on the following morning.

CATTLE, Diarrhoea, or Purging.—

Purging is produced by various causes: by change of food, from dry to green meat, or from short to luxuriant pasture; by poisonous plants, bad water, or unknown atmospheric agency.

It is not always to be regarded as a disease, nor should the farmer be always anxious to stop it. It may be an effort of nature to discharge something that is injurious; it may exist while the beast enjoys almost perfect health, and is even thriving.

The farmer will not regard an occasional fit of purging; he will only attack it if it is violent, or if it continues too long. In the first case it indicates some disordered state of the bowels, or the presence of some offending matter in them, and he will endeavor to remedy this; not as is too often done by attempting to arrest the discharge as speedily as he can—not by the exhibition of astringent medicine—but by giving a mild dose of physic, in order to assist nature in her effort to get rid of some evil. Nothing so much distinguishes the man of good sense from the mere blunderer as the treatment of purging.

From half to three-quarters of a pound of Epsom salts should be given with the usual quantity of ginger. The next day he may probably administer a little astringent medicine. The Astringent Drink (see No. 17 DOMESTIC ANIMALS, MEDICINES FOR) will be effectual, and not too powerful.

In the second case also, when purging

has long continued, and the animal is beginning to become thin and weak, the practitioner must begin with physic. There is probably some lurking cause of intestinal irritation. He should give the quantity of Epsom salts just recommended, or perhaps he will more prudently give from half a pint to a pint of castor oil. It will usually be a good practice to give a rather smaller dose on the following day, and after that he may safely have recourse to the astringents. The animal should be brought into a cow-house or enclosed yard, where it can be sheltered from the weather, and kept partly or altogether on dry meat.

It is of great consequence that diarrhoea or simple purging should be distinguished from another disease with which it is too often confounded. They are both characterized by purging. That which has been just considered, is the discharge of dung in too great quantity, and in too fluid a form; but that which will form the subject of another chapter, dysentery, is the evacuation of the dung, mingled with mucus, or mucus and blood. In diarrhoea the dung is voided in large quantities, and in a full stream; it has sometimes an offensive smell, and is occasionally bloody; but dysentery is often accompanied by a peculiar straining; the dung is not so great in quantity, and it is more offensive, and more highly charged with blood.

The one is an accidental thing—not always to be considered as a disease—and often ceasing of itself when the purpose for which nature set it up—the expulsion of some acrid or injurious matter from the alimentary canal—has been accomplished; the other is an indication of an inflammatory affection of the larger intestines, difficult to be controlled, often bidding defiance to all means, and speedily destroying the animal. Diarrhoea occurs at all times of the year, and particularly after a sudden and great change of pasture; dysentery is a disease almost peculiar to the spring and autumn alone. It must be confessed, however, that diarrhoea is sometimes the precursor of dysentery in its worst form.

CATTLE, Stone in the Urinary Passages, or Bladder.—There seems to be a greater disposition to the formation and retention of calculi, or stones, in the urinary passage of the ox than of the horse.

The manner in which cattle gather their food, the half-cutting, and half-tearing, by which the roots of a portion at least of the herbage are taken into the mouth and swallowed, and the propensity which almost all cattle have to swallow earth in order to prevent the acid fermentation of the food in the paunch—these things account for the more frequent collection of sand and gravel in the bladder of cattle than of horses.

This sand and gravel is the foundation of, or the preparation for, the future formation of stone in the bladder; and when the stone begins to form it is far more likely to be detained, and to accumulate in size, in the bladder of the ox than that of the horse, because the urethra is very much smaller and more curved in its course.

Stone in the bladder may be suspected when there is much fever, accompanied by a frequent turning of the head and earnest gaze on the flanks; when the hind limbs tremble, and there are ineffectual endeavors to pass urine, or it is evacuated in small quantities, and mingled with blood.

The suspicion may very easily be reduced to certainty, by examining the bladder with the hand introduced into the rectum, or last gut. The bladder of the ox, as has already been described, lying so much more in the pelvis than the bladder of the horse does, the stone cannot fail of being felt if there is one.

The presence of stone in the bladder having been thus proved, that farmer will pursue the most judicious course who sends the beast immediately to the butcher, for no medicine will dissolve it, and the animal will lose condition every day.

The retention of a small calculus in some part of the urethra occurs much oftener than is generally suspected. The symptoms would be nearly the same as those of stone in the bladder, except that the stoppage of urine would be more complete. On examination, the stone will be easily felt, and generally in the double curvature of the penis. An incision may be made upon it, and it may be thus easily extracted. Two or three sutures, according to the size of the calculus, having been passed through the edges of the wound, it will usually heal in a few days.

CATTLE, Seton, Mode of Inserting a.—

The seton is commonly made of tow and horse hair plaited together, or cord or coarse tape alone, or leather. It should be tolerably thick, and eight, ten, or twelve inches in length. Before inserting the seton, it should be dipped in oil of turpentine. The seton being now prepared, an assistant is to hold the animal, while the seton-needle, with the cord affixed to it, is plunged into the upper edge of the brisket or dewlap, and brought out again towards its lower edge: the space between the two openings should be from four to eight inches. The seton is to be secured by fastening a small piece of wood, or tying a large knot at either end of the cord. Matter will begin to run the second day, and, after that, the cord should be drawn backwards and forwards two or three times every day, in order to irritate the parts, and by this means increase the discharge.

When setoning is had recourse to in inflammatory complaints, the cord should be dipped in the following blistering ointment:

Take yellow basilicon	- - - - -	1 ounce
Cantharides, in powder	- - - - -	3 drachms
Spirit of turpentine	- - - - -	2 fluid drachms

This ointment will be found to act efficaciously and quickly in stimulating the parts to action, and hastening on the suppurative process.

The root of the common dock forms a very good seton, and one that will act speedily and powerfully; but the best of all, where a considerable effect is intended to be produced, is the root of the black hellebore. This will very quickly cause considerable swelling as well as discharge.

CATTLE, Cold and Cough—Hoose.—A simple cold, attended by slight cough and discharge from the nostrils, is easily removed. Warm housing, a few mashes, and the cough and fever will usually succeed.

(See No. 1 DRINK IN DOMESTIC ANIMALS, MEDICINE FOR.)

There are few things, however, more dangerous, if neglected, than cough or hoose; and there are few maladies that are so often neglected.

The farmer will go into the cow-house, or into the pasture, again and again, and hear some of his cows coughing, and that perhaps hardly, or hollowly, or painfully;

but, while they continue to chew the cud, and do not waste in flesh, he thinks little about it, and suffers them to take their chance.

The inflammation is slight; the animal is scarcely ill at all; the cough remits and returns, with or without his observation. He adds to it, perhaps, by improper treatment. He exposes the beast unnecessarily to cold or wet; or he crowds his cattle into stables shamefully small compared with the number of the animals, and the air is hot and nauseous, and charged with watery fluid thrown off from the lungs and from the skin. The cough increases, it becomes hoarse, and harsh, and painful; and that affection is established which oftener lays the foundation for consumption and death than any other malady to which these animals are exposed.

That farmer is inattentive to his own interests who suffers a cough, and especially a hoarse, feeble cough, to hang about his cattle longer than he can help. He should be warned in time, before his cows are getting off their feed, and becoming thin, and are half dry; for then it will generally be too late to seek for advice, or to have recourse to medical care: the disease has fastened upon a vital part, and the constitution is undermined.

Cough occasionally assumes an epidemic character—from sudden changes of the weather, chiefly and particularly in the spring and the fall of the year: it then spreads over a great part of the country, and is often particularly severe.

The symptoms of epidemic cold or catarrh, or influenza, as it is sometimes called, are frequently serious. The beast is dull and heavy, with weeping at the eyes, and dry muzzle; the hair looks pen-feathered, or staring; the appetite fails; the secretion of milk is diminished; there is considerable heaving of the flanks; the pulse is from 60 to 70, and the bowels are generally costive or sapped.

Cattle that have been tenderly managed during the winter, and cows after calving, are very subject to it, especially if they have been poorly fed, or driven long distances, and exposed to a cold, piercing wind.

It will be necessary to commence the treatment of this disease with bleeding. From four to six quarts of blood should be taken, and then a dose of physic ad-

ministered. The purging drink will be a good purgative medicine in such a case. (See No. 2, DOMESTIC ANIMALS, MEDICINES FOR.)

After that the purging drink No. 1 should be given morning and night, the drink No. 2 being repeated if the bowels should be costive.

It will be proper to house the beast, and especially at night; and a mash of scalded bran with a few oats in it, if there is no fever, should be allowed. It is necessary carefully to watch the animals that are laboring under this complaint; and, if the heaving should continue, or the muzzle again become or continue dry, and the breath hot, more blood should be taken away and the purging drink repeated. At the close of the epidemic catarrh the animal will sometimes be left weak and with little appetite. It should be well ascertained whether the fever has quite left the beast, because listlessness and disinclination to move, and loss of appetite, and slight staggering, may result as much from the continuance of fever as from the debility which it leaves behind. If the muzzle is cool and moist, and the mouth not hot, and the pulse sunk to nearly its natural standard, or rather below it, and weak and low, the purging drink may be ventured on; but No. 1 must be returned to if there is the slightest appearance or increase of cold or fever. (See No. 3, DOMESTIC ANIMALS, MEDICINES FOR.)

There is another way in which the worms may with greater certainty be got rid of. There are some substances which are immediately destructive to worms when brought in contact with them. Some of these medicaments may be taken into the circulation of the animal with perfect safety to him, and probably death to the worms. Among those which most readily enter into the circulation after being swallowed is the oil or spirit of turpentine. The breath is very soon afterward tainted with its smell, which shows that a portion of it has passed into the lungs. Therefore, when other means have failed, and the continuance of the violent cough renders it extremely probable that worms are in the air passages, the turpentine drink for worms may be resorted to. (See No. 5, DOMESTIC ANIMALS, MEDICINES FOR.)

This may be repeated every morning without the slightest danger; and even

when we are a little afraid to give longer by the mouth, it may be thrown up in the form of an injection. A pint of lime water every morning, and two tablespoonfuls of salt every afternoon, have also been administered with advantage when worms are present in the windpipe.

Should the case appear to be obstinate, the exhibition of half doses of physic every second or third day will often be useful, with the stimulating drink, morning and night, on each of the intermediate days. (See No. 6, DOMESTIC ANIMALS, MEDICINES FOR.)

A seton in the dewlap should never be omitted; and if the disease seems to be degenerating into inflammation of the lungs, the treatment must be correspondingly active.

The termination of hoose that is most to be feared is consumption. That will be indicated when the discharge from the nose becomes purulent or bloody, and the breath stinking, and the cough continues to be violent, while the beast feeds badly, and the eyes begin to appear sunk in the head, and he rapidly loses flesh. The best remedy here, so far as both the owner and the animal are concerned, is the pole-axe of the butcher; for in the early part of the disease the meat is not at all injured, and may be honestly sold. If, however, it is wished that an attempt should be made to save the animal, the cough and fever drink may be given daily, more attention should be paid to the warmth and comfort of the beast, and if the weather is favorable it should, after a while, be turned into a salt marsh, either entirely or during the day.

CATTLE, Influenza in.—(See CATTLE, COLD AND COUGH.)

CATTLE, Catarrh in.—(See CATTLE, COLD AND COUGH.)

CATTLE, Inflammation of the Lungs.—When common catarrh has been neglected, it will sometimes run on to inflammation of the lungs, or the beast may be attacked with this disease without any of the previous symptoms of catarrh. This is a very serious complaint, and requires the most prompt and decisive treatment.

The symptoms are dullness, shivering, and cough that is particularly sore; the ears, roots of the horns, and legs are sometimes cold, but not invariably so, as the quantity of cellular membrane about the

legs is often sufficient to keep them warm in spite of the nature of the complaint; the breath and mouth are hot; the mouth is generally open, and there is a ropy discharge from it; the beast will often lie down, and can scarcely be induced to move; the flanks heave very laboriously, and the head is protruded, showing the great difficulty of breathing. The pulse is not always much increased in number, but is oppressed, and can sometimes scarcely be felt.

Inflammation of the lungs is caused by the perspiration being obstructed from sudden and great changes of the weather, especially when accompanied with wet. Cattle that are driven long distances, and then exposed to the cold and damp air of the night, are particularly liable to it. In most cases it can be traced to the cattle being imprudently exposed to cold; but when the cause is not so apparent, it oftenest attacks those that are in good condition.

Young cattle, and particularly calves, are more subject to this disease than older ones; and in them it must be principally attributed to their being in a state of plethora, that is, having a redundancy of blood in their systems.

Sometimes the membrane covering the lungs and lining the chest is the part principally attacked; the disease is then termed *pleurisy*, and is in this form often complicated with rheumatism, but it is more usual for the substance of the lungs to be affected in common with their envelopments.

Copious bleeding is the remedy most to be depended on for subduing the inflammation, and should be had recourse to as soon as the disease is discovered. The beast should be put into a cool cow-house well littered, and immediately bled. If the difficulty of breathing and other symptoms are not much relieved in six or eight hours after the first bleeding, it should be repeated. A third or fourth bleeding may in bad cases be requisite. In this disease, more than in any other, the person who attends the cattle should be present when the beast is bled. It is impossible, by looking at the patient, and considering the symptoms, to say what quantity of blood ought to be taken away; but, as a general rule, and especially in inflammation of the lungs, and at the first

bleeding, the blood should flow until the pulse begins to falter, and the animal seems inclined to faint. The faltering of the pulse will regulate the quantity of the after-bleedings. Little bleedings of two or three quarts, at the commencement of inflammation of the lungs, can never be of service; from six to eight quarts must be taken, or even more, regulated by the circumstances that have been mentioned, and the blood should flow in a large, full stream.

A seton should be set in the dewlap immediately after the first bleeding, and the purging drink No. 2 given. Four drachms of nitre, two of extract of belladonna, and one of tartarized antimony, may afterward be administered twice a day in a drink.

In very severe cases, the chest has been fired and blistered with advantage.

Warm water and mashes must be regularly given two or three times a day.

When the beast has recovered, it will be proper, as much as possible, to avoid all those causes which induced the complaint. The animal should for a short time be housed during the night, and, if the weather is very unsettled, kept up altogether or turned out for a few hours only in the middle of the day.

CATTLE, Pleurisy.—(See CATTLE, INFLAMMATION OF THE LUNGS.)

CATTLE, Rheumatism, or Joint-Felon.

—The early symptoms of this complaint are those of common catarrh, with no great cough, but more than usual fever; by degrees, however, the animal shows some stiffness in moving, and if the hand is pressed upon the chine or any part of the back, the beast will shrink, as if this gave him pain. When the complaint goes no farther than this, it is called *CHINE-FELON* in many parts of the country; but generally, in two or three days, the animal appears stiffer in the joints; these afterwards begin to swell, and are evidently painful, particularly when he attempts to move. Sometimes the stiffness extends all over the body, and to such a degree that the beast is unable to rise without assistance.

This is generally termed *JOINT-FELON*. Old cows are very subject to it, and especially a short time before calving; but milch cows and young cattle are oftener attacked by it in the spring of the year.

It is mostly occasioned by the animal being kept in a state of poverty during the winter, and suddenly exposed to the vicissitudes of the weather in the spring, or to the inclemency of the north or northeasterly winds, especially in low situations.

This disease sometimes comes on suddenly, and is present in a very acute form, being in fact a severe chill; these acute symptoms may subside, and be succeeded by others, milder but more obstinate. Sometimes abscesses will form amongst the muscles, or the sheaths or bodies of the tendons; and the capsular ligaments of the joints are often distended with synovia. These symptoms are particularly unfavorable.

As soon as the disease makes its appearance, the beast must be taken to a warm cow-house or stable, or some situation sheltered from the severity of the weather. The Sulphur Purging Drink No. 7 (See DOMESTIC ANIMALS, MEDICINES FOR,) should then be given.

The bowels having been gently opened, Rheumatic Drink (See No. 8, DOMESTIC ANIMALS, MEDICINES FOR,) which may cause some determination to the skin, and increase the insensible perspiration, should be administered.

If there should be much fever at any period of the complaint, the Sulphur Drink must be exchanged for the PURGING DRINK, No. 2, and three or four quarts of blood taken away.

If any of the joints should continue swelled and painful, they should be rubbed twice a day, or for a quarter of an hour each time, with the gently stimulating Rheumatic Embrocation, (See No. 9, DOMESTIC ANIMALS, MEDICINES FOR.)

Should a scaly eruption break out on the joints, or any part of the legs, after the beast has apparently recovered, the Healing Cleansing Ointment (See No. 10, DOMESTIC ANIMALS, MEDICINES FOR,) will generally clear off the scurf, heal the cracks or sores, and cause the hair to grow again.

If stiffness or swelling of the joints should remain after the inflammation and tenderness are removed, the joints should be well rubbed morning and night with a gently stimulating Camphorated Oil, (See No. 11, DOMESTIC ANIMALS, MEDICINES FOR,) embrocation.

When a beast has had one attack of rheumatism, he will be always subject to its return, and therefore should be taken more than usual care of in cold, variable weather; and should he appear to have a slight catarrh, or to walk a little stiffer than usual, he should be housed for a night or two, and should have a warm mash, and the Cordial Rheumatic Drink; (See No. 12, DOMESTIC ANIMALS, MEDICINES FOR,) which, however, would be very improper in hoose or cold, or rheumatism connected with any degree of fever.

CATTLE, Chine-Felon.—(See CATTLE, RHEUMATISM.)

CATTLE, Inflammation of the Liver.—

This is a disease to which cattle are often subject than is imagined, and particularly those that are in high condition and stall-fed: the symptoms, however, are usually sufficiently distinct to guide the attentive observer.

When the milch cow is attacked there is a diminution of the milk, and it has a rosy appearance and saltish taste after being separated from the cream. The animal has a heavy appearance, the eyes being dull, the countenance depressed, with a stiffened, staggering gait; the appetite is impaired, and the membrane of the nostrils and the skin is of a yellow color. Sometimes the respiration is much disturbed; at others it appears tranquil; but the pulse, though unusually quickened, is rarely hard or full. The bowels are generally constipated, though sometimes purging exists. Rumination is usually disturbed, and occasionally altogether suspended. To these will occasionally be added the characteristic symptoms of pain on pressure on the edge of the short ribs on the right side. In acute inflammation of the liver the most frantic pain has been exhibited; but this is rarely the case.

A high degree of fever will indicate the propriety of bleeding, but it should not be carried to too great an extent, but may be repeated. After bleeding, one or two drachms of calomel, with a scruple of opium, and two drachms of ginger, may be given in gruel, and a few hours afterwards twelve ounces of Epsom salts and half a pint of linseed oil. The calomel and opium may be repeated twice a day, and the purgative also until the bowels are sufficiently operated on. If,

however, purging be present from the first, a few ounces only of Epsom salts should be given, but a drachm each of calomel and opium, repeated twice a day; and if the purging continue the case may be treated as one of diarrhœa. (See **CATTLE, DIARRHŒA.**) The sides in this disease should be blistered, and setons may also be inserted.

Inflammation of the liver frequently leaves after it a great deal of weakness, and tonics are clearly indicated. The best medicine that can be given is (See **No. 13, DOMESTIC ANIMALS, MEDICINES FOR.**)

No hay, and light corn, should be given in inflammation of the liver; but the diet should consist of mashes and green meat.

It has been stated that fat beasts, or such as are in good condition, are very liable to this disease, and particularly those that have been fed much on oil-cake. It is more frequent in hot than in cold weather, and in store cattle that have been over-driven, or worried in woodland pastures by the flies. Sudden change of weather; the exposure to considerable cold, of a well-fed beast that had been well housed, or indeed anything that has a tendency to excite fever, will produce inflammation in an organ that has been over-worked, or is disposed to disease from the undue secretion of bile in the rapid accumulation of flesh and fat. Chronic inflammation of the liver is characterized by symptoms similar but more moderate than those detailed. The debility gradually increases, and death often succeeds. The same treatment should be pursued, with the exception of bleeding.

CATTLE, the Yellows, or Jaundice.—

This is a far more common disease than the last, and almost as dangerous, because, although it is not marked by any acute symptoms, or accompanied by much fever, it creeps on insidiously, and fastens itself on the constitution, beyond the power of medicine to eradicate it; or it is the consequence and the proof of some disease of the liver, which is equally difficult to cure. It may be produced by inflammation of the liver, or too great secretion of the bile, or stoppage of the vessels through which the bile should flow into the bowels. If its passage is obstructed,

it is thrown back again upon the liver, and there taken up by the absorbents, and carried into the circulation, and communicates a yellow color to the blood; and as the blood, by means of capillary the vessels, is carried to every point and part of the body, so the yellow hue of the disease spreads over the whole of the frame.

This obstruction is sometimes effected by the undue thickness of the bile; sometimes by hardened bile or gall-stones; and in not a few cases it is caused by a greater secretion of bile than can find its way into the intestines, and which, consequently, accumulates in the liver, until it is taken up by the absorbents, and carried into the frame in the manner that has just been described.

At the beginning of the disease there is considerable dulness and languor, and loss of appetite. The cow wanders about by herself, or is seen standing by the side of the hedge or the fence in a most dejected manner. The quantity of milk is generally lessened; the bowels are costive; and the fore-teeth are sometimes loose: milch cows are more subject to it than oxen, and particularly in the latter end of the year. Sudden change of weather frequently gives rise to it, and especially if the animal has previously exhibited symptoms of ill-health.

The treatment and the hope of cure depend upon the causes and degree of the disease, and which should be most carefully ascertained. If it has followed symptoms of fever, probably indicative of inflammation of the liver, it may be difficult to remove, because it is an indication of the ravages which disease has made in the organ. Should the pulse be strong as well as quick, moderate bleeding will be judicious, but not otherwise. The bowels should then be freely opened by means of the **PURGING DRINK** (No. 2), and kept open by half doses of it administered as occasion may require. In this disease, oftener than in any other to which cattle are subject, stomachics are useful to rouse the digestive organs to their proper tone and power. Mingled with them, or at other periods of the day, medicines may be given which are supposed to have a direct effect on the liver, and a tendency to restore its healthy action; therefore, while the **TONIC DRINK** (No. 13) is given in the morning, the **DRINK FOR THE YEL-**

lows may be given at night. (See No. 14 DOMESTIC ANIMALS, MEDICINES FOR.) If, on pressing the sides, the animal evinces pain, we may suspect some inflammation of the liver; and a blister on the sides, but particularly the right side, will be useful.

After the yellowness is removed, and the beast restored to health, the TONIC DRINK (No. 13) should be given twice in the week, for a month. This will contribute to restore the weakened appetite, and particularly will bring back to the cow the proper flush of milk.

CATTLE, Inflammation of the Brain in.

—This is not a very frequent, but a most frightful disease. It is commonly known by the names phrenzy or sough. It is most prevalent among well-fed cattle, and particularly in the summer months. In the early period of it the beast is dull and stupid. He stands with his head protruded, or pressed against something for support. He refuses to eat, ceases to ruminate, and is in a manner unconscious of surrounding objects. Now and then he will stand motionless for a long time, and then suddenly drop; he will start up immediately, gaze around him with an expression of wildness and fear, and then sink again into his former lethargy. All at once, however, his eyes will become red, and seemingly starting from their sockets; the countenance will be both anxious and wild; the animal will stagger about, falling and rising again, and running unconsciously against everything in his way: at other times he will be conscious enough of things around him, and possessed with an irrepressible desire to do mischief. He will stamp with his feet, tear up the ground with his horns, run at every one within his reach, and with tenfold fury at any red object; bellowing all the while most tremendously, and this he will continue until nature is quite exhausted; a sudden and violent trembling will then come over him, he will grind his teeth, and the saliva will pour from his mouth; he will fall, every limb will be convulsed, and he will presently die.

CAUSES.—It proceeds most commonly from a redundancy of blood in the system, called by farmers an overflowing of the blood; and this is induced by cattle thriving too fast when turned on rich pasture grounds, or their being fed too quickly

in order to get them into condition for show or sale. It is sometimes occasioned by the intense heat of the sun, when cattle have been turned into the fields where there has been nothing to shade them from its influence. It may be brought on by severe contusions on the head, or by the cattle being harassed and frightened, when driven along the road, or through large towns.

The chief or the only cure is bleeding. The neck vein should be opened, on each side, if possible, and the blood should be suffered to flow until the animal drops. It is absurd to talk of quantities here; as much should be taken as can be got, or at least the blood should flow until the violence of the symptoms is quite abated.

To this a dose of a STRONG PHYSIC DRINK (see No. 15 DOMESTIC ANIMALS, MEDICINES FOR) should follow.

If the violence, or even the wandering, should remain, another bleeding should take place six hours afterwards, and this also until the pulse falters, and the purging should be kept up: doses of 1 ounce epsom salts, and $\frac{1}{2}$ drachm each of calomel and opium, mixed in $\frac{1}{2}$ pint linseed oil, should be given twice a day.

Although it is very difficult to produce a blister on the thick skin of the ox, it should be attempted if the disease does not speedily subside. The hair should be closely cut or shaved from the upper part of the forehead and the poll, and for six inches on each side down the neck, and some of the Blister Ointment (See No. 16 DOMESTIC ANIMALS, MEDICINES FOR,) well rubbed in.

When the blister is beginning to peel off green elder or marshmallow ointment will be the best application to supple and heal the part. A little of it should be gently smeared over the blistered surface morning and night.

A seton smeared with the above ointment may be inserted on each side of the poll in preference to the application of a blister.

Although the violence of the disease, and of its remedies, will necessarily leave the beast exceedingly reduced, no stimulating medicine or food must on any account be administered. Mashies and green meat, and these in no great quantities, must suffice for nourishment, or, if the animal, as is sometimes the case, is

unable to eat, a few quarts of tolerably thick gruel may be horned down every day; but ale and gin, and spices, and tonic medicines, must be avoided as down-right poisons. Even the treacle and the sugar in the gruel must be prohibited, from their tendency to become acid in the debilitated stomach of the animal recovering from such a complaint.

Every symptom of the disease having vanished, the beast may very slowly return to his usual food; but, when he is turned out to pasture, it will be prudent to give him a very short bite of grass, and little or no dry meat. Nature is the best restorer of health and strength in these cases; and it is often surprising not only how rapidly the ox will regain all he has lost, if left to nature, and not foolishly forced on, but how soon and to what a considerable degree his condition will improve, beyond the state in which he was before the complaint.

The ox that has once had inflammation of the brain should ever afterwards be watched, and should be bled and physicked whenever there is the least appearance of staggers or fever. The safest way will be to send him to the butcher as soon as he is in sufficient condition.

Sometimes the disease does not run its full course. There is but a slight degree of inflammation, or there may be sudden determination or flow of blood to the head from some occasional cause, and without inflammation. This is known by the name of **STAGGERS** (which see).

CATTLE, Phrenitis. (See **CATTLE, INFLAMMATION OF THE BRAIN.**)

CATTLE, Staggers, or Swimming in the Head.—The symptoms are heaviness and dullness; a constant disposition (See **CATTLE, INFLAMMATION OF THE BRAIN**) to sleep, which is manifested by the beast resting its head upon any convenient place; and he reels or staggers when he attempts to walk. If this disease is not checked by bleeding, purging, and proper management, it will probably terminate in inflammation of the brain or inflammatory fever.

It mostly attacks those cattle that have been kept in a state of poverty and starvation during the winter season, and in the spring of the year have been admitted into too fertile a pasture: hence is produced a redundancy of blood in the sys-

tem, which, on the slightest disturbance, or even naturally, gives rise to the disease.

The cure must be attempted by taking four, five or six quarts of blood from the animal, according to the size and strength; the Physic Drink must then be administered, and Purging Drink No. 2 continued in half doses every eight hours until the full purgative effect is produced. If the animal is not relieved in the course of two hours from the first bleeding, the operation must be repeated to the same extent, unless the beast should become faint; and the bowels must be kept in a loose or rather purging state by No. 2. As soon as the bowels are opened, the **FEVER DRINK** No. 1 should be given morning, noon and night until the patient is well. Nothing more than a very little mash should be allowed, and all cordials should be avoided as absolutely destructive to the beast.

When the animal appears to be doing well, he must very slowly be permitted to return to his usual food. He should for some weeks be put into short and scanty pasture; the seton should be continued in the dewlap, and occasional doses of Epsom salts administered.

CATTLE PLAGUE.—Chloride of copper is now extensively used in Germany as a preventive against the cattle plague. The mode of administering the specific is as follows: A solution is first made by dissolving one quarter of an ounce of the green crystallized salts in spirits of wine. In this solution a pad of cotton is soaked for a little while, and is then laid on a plate and set on fire in the centre of the stable, the animals' heads being turned toward the flame so as to make them breathe the fumes. The operation is performed morning and evening, and a spirit lamp filled with the solution left burning in the stable every night. The liquid is also administered internally, with the addition of one-half an ounce of chloroform for the above quantity, a teaspoonful being put into the animal's drink three times a day.

CATTLE, Sore Mouth in.—Take a weak solution of carbolic acid, say 1 to 5 drops to the ounce of water, washing the mouth every few hours, allowing a little to be swallowed, and following this with mild tonics and food that will not irritate the mouth.

CATTLE, Dysentery, Slimy Flux or Scouring Rot.—It just has been observed that this disease is most prevalent in the spring and autumn, particularly in low, wet and swampy situations. It is one of the most fatal diseases to which oxen, and dairy cows in particular are subject, and destroys more than any other malady.

It begins with frequent and painful efforts to expel the dung, which is thin, slimy, stinking and olive-colored. The animal, as appears from his restless state, suffers much pain, frequently lying down and soon rising again. There is also a frequent noise in the intestines. If the disease is neglected, or improperly treated, the beast gradually gets thin, although for a while he retains his appetite, and continues to ruminate; at length he evidently begins to get weak, rumination is imperfectly performed and the food passes from him half digested. As this disease is often the consequence of a previous affection of the liver, considerable tenderness will be discovered on the spine, a little beyond the shoulders. This is one of the methods, and a very good one, by which the farmer endeavors to ascertain whether a beast which he is thinking of purchasing has the scouring rot. As the disease proceeds the dewlap hangs down and has a flabby appearance; the dung runs off with a putrid and offensive smell, and, as it falls upon the ground, rises up in bubbles, and a membranous or skinny-like substance is often seen upon it; this is occasioned by the natural mucus, which was given to defend the bowels, being discharged. In proportion to the quantity of mucus that mingles with the feces, the whole is rendered more adhesive, and the bubbles are larger, and remain longer on the dung. When this is the case the disease is always obstinate, and generally fatal. The hair all over the body soon appears pen-feathered or staring. Feverish symptoms also accompany the complaint; the eyes become dull and inflamed, there is much working of the flanks, and the pulse is quick.

The causes of this dreadful malady are—taking cold at the time of calving; long journeys; exposure to sudden vicissitudes of the weather; and, after being over-heated in traveling, being turned into damp pastures, etc. Poor keep is a very frequent cause, and especially when con-

nected with exhaustion from constant milking; and it is more especially the consequence of the cows being badly fed in the winter. Some cold wet lands are particularly liable to give the rot; yet where the land and treatment are similar, it prevails more in some dairies than in others, depending much on the breed of the cattle. Old cows that are fed on sanded pastures are very subject to this complaint.

In all cases the animals should be taken from grass and put into a large cow-house, or an open yard, where they can be sheltered from the weather, and kept on dry food, such as good hay, ground oats, barley and beans. An equal proportion of each of the three last articles and of linseed cake will make an excellent food for cattle laboring under dysentery. A quantity proportionate to the size and appetite of the patients should be given two or three times a day, or if they are much reduced and their appetite is quite gone, a thick gruel should be made of these ingredients, and administered three or four times a day.

This disease consists in inflammation of the lining membrane of the large intestines. It will then be evident that bleeding, proportioned to the suddenness and violence of the attack, and the apparent degree of fever, should be first resorted to.

If the eyes are inflamed, with heaving of the flanks, and painful twitchings of the belly, accompanied by severe straining and apparent gripings in the expulsion of the excrement, the abstraction of blood is indispensable.

The PURGATIVE DRINK No. 2 should precede the use of every other medicine, in whatever state the bowels may be. It will prepare for the safer use of astringents. In almost every case there will be something in the bowels, which, if it did not cause the disease, contributes to keep it up. The proprietor of cattle, and he who professes to treat their diseases, should know that there can be nothing more dangerous than to attempt suddenly to stop a violent purging, especially one that assumes the character of dysentery. Let that which offends in the bowels be first got rid of, and the disease will sometimes cease of itself, or, if it does not,

astringents may then be administered with safety.

The safest and the most effectual astringent mixture for the scouring rot is that which was recommended for diarrhoea. It may be given once or twice in the day, according to the violence of the complaint.

Ale should never be given in these cases. The astringents may be commenced twenty-four hours after the purgative has been administered.

If the disease does not speedily yield to this treatment, it will not be prudent to continue the use of such large quantities of astringent medicines for any considerable time. The astringent drink, with mutton suet (see No. 18 DOMESTIC ANIMALS, MEDICINES FOR) may then be given, and continued morning and night for five or six days.

When the dysentery is stopped, the beast should very slowly and cautiously be permitted to return to his former green food. Either during the night or the day, according to the season of the year, he should be confined in the cow-house, and turned out twelve hours only out of the twenty-four. Water should be placed within reach of the animal, in the cow-house, and, if possible, in the field; for there are few things more likely to bring on this disease, or more certain to aggravate it, than the drinking of an inordinate quantity of water after long-continued thirst.

These precautionary measures should be continued for a considerable time; for there is something very treacherous in this malady, and it will often suddenly return several weeks after it has been apparently subdued.

In those cases, and they are much too numerous, which totally resist the influence of the medicines already recommended, other means should be tried. The ALUM WHEY has sometimes succeeded. (See No. 19 DOMESTIC ANIMALS, MEDICINES FOR.)

This may be administered twice every day.

The disease may not yield even to this. It will then be evident that it is the consequence of some other disease, and, probably, of the liver, the vitiated bile secreted by which is keeping up the purging. It is almost a forlorn hope to attack such a

case; but the beast may be valuable, and, at all events, we cannot be worse off. The only medicine that can have power here is mercury, for it seems to exert its chief influence on the liver and the discharge of bile. The mildest, and at the same time the most effectual, form in which it can be administered, is that of the blue pill, half a scruple of which may be given morning and night, rubbed down with a little thick gruel. There is very little danger of salivation: yet it may be prudent to give half a pound of Epsom salts every fifth or sixth day; and most certainly to give them every second day, and discontinue the blue pill, if the mouth should become sore, or the breath stinking, or there should be a more than usual discharge of saliva from the mouth.

In many cases there is found a schirrous state of the third and fourth stomachs in cattle that have died of, or been destroyed for this disease.

CATTLE, Red-water in.—The nature of this disease has been very much misunderstood. It consists of a discharge of high-colored urine, and therefore has been attributed to an inflammatory affection of the kidneys. It will generally be found to begin in another organ, the liver, and to be connected, in the first stage at least, far more with disease of that gland than of the kidney.

There are evidently two distinct species of red-water.

One, but which occurs most seldom, begins with decided symptoms of fever. There is shivering, succeeded by increased heat of the body; the muzzle dry; working of the flanks; urine of a red color, evidently tinged with blood, and occasionally consisting almost entirely of blood, discharged in small quantities, and frequently with considerable pain; loss of appetite. As the disease proceeds, the animal loses strength; the bowels become constipated or very loose; and the urine of a dark color, approaching to black.

Very early in the complaint the loins become exceedingly tender, and the animal shrinks when they are pressed upon; some heat is likewise felt there, showing evidently the seat and nature of the disease. It sometimes proceeds from cold, particularly when beasts are turned into low pasture grounds at the spring of the year. It also frequently seizes young cattle

that are feeding, or in good condition; for a fullness of blood in the system renders them more liable to the complaint.

Sometimes inflammation of the kidneys proceeds from external injuries, such as a violent bruise across the loins, in consequence of other beasts ramping on them, or a severe blow in the region of the kidneys.

The discharge of bloody urine may either proceed from inflammation of the kidneys or a rupture of some of the blood-vessels, and in either case blood is discharged with the urine, and may be often detected in clots; whilst in the other kind of red-water, although the urine is dark in color, it does not contain blood. The former disease is more frequent with bulls and oxen, and the latter with milch cows.

When the kidneys are inflamed, and the animal evinces tenderness on pressing the loins, the treatment should consist of blood-letting, purging, and the application of sheep-skins and stimulants to the loins. But in some cases where blood is discharged with the urine without any inflammatory appearances, the exhibition of **ASTRINGENTS and STIMULANTS** (See No. 20 **DOMESTIC ANIMALS, MEDICINES FOR**) have effected a cure.

True Red Water is a disease of the digestive organs, principally of the liver; and the dark color of the urine is owing to the presence of vitiated bile, probably loaded with carbon, and not to blood, as used to be supposed.

The more frequent causes are connected with the nature of the pasture. There are some farms or particular parts of the farm, where red-water is almost sure to follow when cattle are turned upon them. Low marshy grounds are apt to produce it, and also pastures with much woodland, and especially in the latter part of autumn, when the leaves are falling. Some have said that elm-leaves are apt to cause red-water; others attribute the disease to the oak; and many more to some of the numerous species of ranunculuses that abound in our marshy and woodland pastures. The truth of the matter, however, is, that no one knows what plant is most concerned in the affair; and all that the farmer can do is to observe what pastures most frequently produce red-water, and at what season of the year, and to use

them as much as he can for other stock in the dangerous seasons.

A removal from a poor to a luxuriant pasture, or from a low marshy situation to a dry and lofty locality, are frequent causes of red-water; and it often occurs after a long succession of dry weather.

Cows that are dried of their milk are often attacked by it, when put into luxuriant pasture, while, perhaps, it does not affect those that are still milked. The reason of this is plain enough: the superfluous nutriment not being carried off by the udder in the form of milk, the digestive organs are deranged, and the secretions of the liver become vitiated.

A cow that has once had an attack of red-water is very liable to a repetition of the complaint. The farmer is obliged to take a great deal of care properly to manage the change of pasture with her, and, notwithstanding all his care, she will probably have two or three attacks of the disease every year. It will behoove him to consider how far it is prudent to keep such an animal. No beast that is subject to periodical complaints of any kind should be kept, for it may easily be prepared for the butcher, and disposed of with little or no loss to the farmer.

The symptoms of red-water are at first purging, which is usually followed by constipation; the appetite is impaired; the pulse and breathing quickened; and the former, though bounding at the heart, is often weak. The membranes of the nostrils and eyelids are pale, and the legs cold; the milk is diminished and rumination ceases. The urine, from being brown, often becomes black, and the disease is, in this state, often denominated black-water.

The red and the black water are diseases that require prompt and careful treatment; for, although, in some slight cases, the beast does not seem to be much affected by either, and works or yields her milk as well as ever, yet ere long it preys upon the constitution, and the animal gradually wastes away.

It is folly to wait in order to see whether nature will effect a cure. Except in beasts suddenly put upon more than usually rich pasturage, it never is or can be a salutary discharge. It must be preying upon the system and wasting the strength, and the sooner it is got rid of

the better. It attacks milch cows oftener than others, and it is more injurious to them than to others. While it lasts it often materially lessens the quantity of milk, and, even after it is removed, the animal is slow in returning to her former strength.

The first thing to be done is to remove the cause of the disease. The pasture should be changed. A more open and a drier situation should be found, and where the grass, although succulent and nutritious, is not very plentiful. If there is considerable fever, or the animal should appear to be really ill from the discharge, she should be taken under shelter, and fed on mashes, with a very little hay; or a few turnips or carrots may be allowed her, if they are in season.

Bleeding is often necessary at the onset of this disease, but it should always be practiced with moderation, and in many cases abstained from altogether. About two hours after bleeding the Stimulating Drink, No. 21, (See DOMESTIC ANIMALS, MEDICINES FOR,) should be administered.

A quarter part of this drink may be given every six hours, until the bowels are freely opened, and the medicine may be assisted by clysters. The successful treatment of the disease very much, altogether, depends on early and thoroughly opening the bowels. If this is early accomplished, the animal will almost certainly recover. If it is neglected, or the constipation cannot be overcome within the first two or three days, the termination will probably be fatal.

When the bowels are properly acted on, mild Stimulating Drink (See No. 22 DOMESTIC ANIMALS, MEDICINES FOR,) may be exhibited.

If, with the amendment of the other symptoms, the urine should appear black, a diuretic—such as one ounce of nitre—may be given with the above drink, or even the more powerful stimulant, spirit of turpentine, in doses of one or two ounces.

If, after the bowels have been well opened, and the fever is somewhat abated, the discharge of blood still continues, and in as great a quantity as before, it will be right to have recourse to astringents, yet such as will not irritate and stimulate the kidneys; and even

these should be administered cautiously. Constipation attended the early and most violent stage of the disease—some remission, at least in the fever and the pain, if not much diminution of discharge, attended the removal of the constipation: it must, therefore, be dangerous to confine the bowels again. The Mild Astringent (See No. 23, DOMESTIC ANIMALS, MEDICINES FOR,) will be as efficacious as any.

This may be given morning and night, for a week, cautiously watching the state of the bowels, and suspending the astringent, and even having recourse to physic, if the bowels should again be confined.

The recovery of the animal is denoted by the restoration of the pulse and breathing to the natural standard, and the return of the appetite, together with the healthy appearance of the urine. It is essential, however, to exercise the greatest caution with regard to the food for some little time, bearing in mind that the digestive organs have been greatly impaired.

CATTLE, Black-Water.—See CATTLE, RED-WATER.

CATTLE, Thrush.—See CATTLE, BLAIN.

CATTLE, Black Tongue.—See CATTLE, BLAIN.

CATTLE, Rinderpest.—Dr. Hope, in a communication to the British Association, stated the result of certain experiments upon cattle with carbolic acid during the prevalence of rinderpest in 1867. Of about two hundred and seventy cows under his charge, the majority were attacked by the disease; but by injecting a solution of carbolic acid, either through the mouth or rectum, he was enabled to save one hundred and eleven of them. The remainder, not so dealt with, died, or had to be slaughtered.

COWS, Puerperal Fever.—See Cows, MILK FEVER.

CATTLE, Cud in, Loss of.—Loss of Cud is a species of indigestion, and may be brought on by the animal's eating greedily of some food to which it has unaccustomed. Loss of cud and loss of appetite are synonymous: The following is a compound for loss of cud:

Golden Seal, powdered.....	1 ounce.
Caraway, powdered.....	2 “
Cream of Tartar.....	½ “
Mix. Divide into six powders and give one every four hours in a sufficient quantity of camomile tea.	

COWS, Garget in, or the Downfall in the Udder of.—This is a disease of the utmost consequence to the owners of neat cattle. Young cows in high condition are most liable to it, especially at the time of calving. Such as are aged are chiefly subject to it during hot and sultry weather, particularly those which are fattened for the shambles; when this is the case, the loss is considerable, for a summer's keep is generally thrown away.

This disorder makes its appearance in one or more quarters of the udder, which become swollen, hard, hotter than usual, and painful when pressed. If the patient is a milch-cow, the secretion of milk is lessened, and mingled with blood, pus, and corruption. At other times the flow of milk is totally stopped, and the tumefied quarter proceeds to a state of supuration. It not unfrequently happens that the hind extremities, at the same time, become swollen and inflamed, especially about the hip joint, hock, and fetlock, which disables the animal from getting up, almost from moving.

It is inflammation of one or more quarters of the udder, and is most commonly induced by the animal catching cold. It particularly attacks those cows that have a redundancy of blood in the system, or are of a gross habit of body. Young heifers are not always exempt from it.

It will be necessary, as soon as the downfall is discovered, to bring the animal out of the pasture, and take away from three to five quarts of blood, according to her size or strength. If she is bled at night, it will be proper on the next morning to give her the PURGING DRINK, No. 2, or if a stout beast, PHYSIC DRINK No. 15.

The cow should be sparingly fed for a day or two on mashes with a little hay, and afterwards turned on rather short pasture. As this is a disease either confined to, or most violent and dangerous in, cows that are in high condition, it will be quite necessary to keep the patient for a while on spare diet. The ground oats, and barley, and clover-hay, and oil-cake, that are sometimes given, cannot fail to aggravate the complaint.

Mercurial Garget Ointment.—The ointment should be well rubbed into the

affected quarter, immediately after milking, but it must be carefully washed off again with warm water before the milk is drawn.

This ointment will penetrate into the diseased part of the udder, and be of very great service.

In obstinate cases the Iodine Ointment (see No. 25 DOMESTIC ANIMALS, MEDICINES FOR) has been applied to the indurated udder with great success.

A portion, varying from the size of a nut to that of a filbert, according to the extent and degree of the swelling and hardness, should be well rubbed into the affected part morning and night.

It may sometimes be advisable to give the hydriodate internally, and from eight to twelve grains may be administered morning and night in a little gruel, with very good effect.

During the continuance of the disease, the bowels must be kept open with half-doses of PURGING DRINK No. 2. The FEVER DRINK, No. 1, will also be useful, or one or more decidedly diuretic, as Diuretic Drink. (See No. 26 DOMESTIC ANIMALS, MEDICINES FOR.)

After the purulent and bloody discharge has ceased, and the teat seems to be free from inflammation, and nearly of its natural size, color, and softness, it will be prudent to continue the ointment daily, and this last drink occasionally for two or three weeks at the least.

Cases, however, will occur, either neglected at the beginning, or the beast being too fat, and very much disposed to inflammation, in which the teat and the whole quarter will long continue hard and swelled, and tender, and will get worse and worse. The whole of the affected part must then be carefully examined, to ascertain whether there is matter within, and whether it is pointing, *i. e.*, whether there is a part a little more prominent and softer than the rest. If this is detected, it should be freely opened with a lancet or penknife, the matter suffered to flow out, and the wound dressed with Tincture of Aloes or Friar's Balsam. Slight incisions with a lancet, where matter cannot be detected, will often be serviceable. The flow of blood should be encouraged by fomentations with warm water. The teats are sometimes cut off

in obstinate cases of this kind; but that should, if possible, be avoided, for the quarter will be lost, and there will be a serious diminution in the quantity of milk as long as the cow lives. The teat may be cut deeply in order to let out the matter. This wound will readily heal again, and the quarter will be as useful as ever.

If the udder appears grangrenous, it should be scarified with a lancet, and a solution of chloride of lime applied, whilst the strength of the animal should be supported by tonic medicine.

When the cow dies it is generally from mortification, to prevent which it is often necessary to remove not only the affected teat, but the whole of the quarter. A skillful man, more competent than a common cow-leach, should be employed for this purpose.

A frequent but unsuspected cause of this disease is the hasty and careless mode of milking, which is often adopted. A considerable quantity of milk is left in the bag, particularly when a cow gives her milk slowly. This is not only a loss to the farmer, from so much less milk finding its way to the dairy room, and from the quantity of milk regularly secreted in the udder of the cow gradually diminishing; but the milk curdles in the teats and produces swellings, and lays the foundation for *garget*.

The **SORE TEATS**, to which some cows are subject, is a very different disease, and often a very troublesome one. It usually occurs a little while after they have calved. If it happens in the summer the animals are so badly tormented by the flies that it is difficult to milk them; and the discharge from the cracks and wounds passing through the hand in the act of milking, and mingling with the milk, renders it disgusting, if not unwholesome.

The ointment for Sore Teats will generally be found effectual. (See No. 27 DOMESTIC ANIMALS, MEDICINES FOR.)

A little of this should be rubbed on the teats morning and night after milking; and if the flies tease the animal much, a small quantity of aloes or assafoetida may be mixed with the ointment. The latter is the more effectual, but its smell is very unpleasant.

The teats are sometimes so sore that it is necessary to hobble the cow, in order to make her stand; but this is seldom

effectual; for the legs of the cow get sore, and she kicks worse than ever. Kindness and patience are the best remedies. It is never of any use to beat or ill use a cow for this fidgetiness at milking. She will either at the time do mischief in return, or she will at some other opportunity take her revenge.

There is another variety of disease to which the udder of cows is liable, somewhat different from that described, termed **WEEDS**. It is attended by considerable fever and constitutional disturbance, commencing with a shivering fit, which, after some hours, is succeeded by a hot fit, in which all the symptoms of fever are present—the cow hangs her head and refuses to feed, and the udder is painful, hot, and swollen. If relief is not soon obtained, an abscess forms, and one or more quarters become cold, black, and insensible; the udder becomes disorganized, and the animal is lost.

The first thing to be done is to administer a Warm Stimulant. (See No. 28 DOMESTIC ANIMALS, MEDICINES FOR.)

Sometimes this draught alone will effect a cure, but the body should be clothed and the cow well nursed. On the following day, if the bowels are constipated and the cow appears dull, a purgative should be given. The udder must be fomented with warm water for an hour at a time, several times a day, and if it is much swollen, it should be suspended with cloths passing over the loins. It may also be rubbed with a liniment composed of hartshorn and oil. It is of much importance that the fomentations should be as hot as can be borne, and applied in good earnest to the part affected, and for a long time together.

COWS, Sore Teats.—See COW, GARGET.

COWS, Weeds.—See COW, GARGET IN.

COW, Before and during Calving, Treatment of the.—It is an old and true saying, and the truth of it is nowhere more evident than in the treatment of the milch cow, that the prevention of an evil is better than the cure. The difficulty of calving, and the mortality afterwards, are in a great measure to be traced to the improper management of the cow. So far as the udder is concerned, there is a plan usually adopted, and a very necessary one—the cow is dried six or eight weeks before calving. Two reasons are given

for this: the first is, that after a long period of milking, the strength and constitution of the cow require a little respite. A more important reason, however, is, that from some cause that has never been fully explained, the mixture of the old milk, and the new secretion that nature prepares for the expected calf, produces frequently great irritation and inflammation in the udder, and obstinate garget is apt to ensue.

During the early period of gestation the animal may, and should be, tolerably well fed, for she has to provide milk for the dairy and nourishment for the foetus; yet even here there should be moderation and care; but when she is dried her food should be considerably diminished. She should not be too fat or full of blood at the time of calving, for that is the frequent cause of difficult labor, garget, milk-fever, and death. There are few things in which the farmer errs more than in this. There may be an error in starving her before she calves, but it is a much more dangerous one to bring her in too high condition.

Some cows are apt to *slink* their calves, or to produce them dead before their time. This generally happens about the middle of their pregnancy. If about that time a cow is uneasy, feverish, off her food, or wandering about in search of something for which she seems to have a *longing*, or most greedily and ravenously devouring some particular kind of food, she should be bled and physicked with Purging Drink No. 2. If she is not quieted, she should be bled and physicked again in the course of three or four days. She should be immediately removed from the other cows; for should she slink her calf among them, it is not improbable that some, or even all, of the others will do the same. This is not easily accounted for, but it is perfectly true. The cow that slinks her calf will often require much attention. She should always be physicked, and in most cases bled, and after that the best thing to be done with her is to fatten her for the butcher; for she will probably do the same again, and teach others the habit.

When the ninth calendar month has nearly expired (see COWS, GESTATION IN,) the cow should be diligently looked after. She should be brought as near to the house as can be conveniently done; she

should lose three or four quarts of blood, unless she is very poor, and she should most certainly be physicked. It will be better if she can be separated from the other cows; and, although it may not be prudent to house her entirely, there should be some shed or shelter into which she may go.

When it appears that labor is close at hand, she should be driven gently to the cow-house, and for a while left quite alone. She will do better by herself than if she is often disturbed by one and another looking in upon and watching her. If, however, she is discovered in the act of calving in the homestead, she should not be moved, however exposed may be her situation. It would sometimes be dangerous to drive her even a hundred yards.

The usual symptoms of the approach of calving are uneasiness, slight lifting of the tail, lying down and getting up, the evident labor-throe, gentle at first, and increasing in force, and the commencement of the protrusion of the membranes from her shape. The still earlier symptoms, and preceding the labor by a few days, are enlargement of the udder, and redness of the space between her shape and the udder.

The labor having actually commenced, the membranes will more and more protrude until they break, and the fluid by which the calf is surrounded will escape. If her pains are strong, the cow should for a while be scarcely meddled with; but if an hour or more elapses, and no portion of the calf presents itself, the hand, well greased, should be introduced, in order to ascertain the situation and position of the calf. The natural position is with the fore-feet presenting, and the muzzle lying upon the fore-legs. If the foetus is found in this position, and advanced into the passage, some time longer should be allowed to see what nature will do; and the strength of the animal may, if necessary, be supported by some gruel, with which a pint of warm ale has been mixed, being horned down. As soon, however, as the throes begin to weaken, and before that, if no progress has been made, manual assistance must be rendered.

Here it will be recollected that there are two objects to be accomplished—the

saving of the lives of both the mother and the young one, and that, consequently, the means at first employed should be gentle. The hand should be introduced, and the fore-legs of the calf laid hold of and drawn down, the efforts of the operator being employed at the moment of the throes of the mother. If the legs are brought forward a little way, care should be taken that the head is accompanying them. The hand will sometimes be sufficient for this purpose. If the head cannot be moved by the hand, a cord must be procured with a slip knot at the end, which is to be passed carefully into the passage, and, the mouth of the young animal being opened, fastened round his lower jaw. The end of this must be given to an assistant, who should be instructed to pull gently, but firmly, at the moment of the throes, while the principal operator is endeavoring to draw on the feet.

Should not this succeed, it will appear that, either from the narrowness of the pelvis, or the size of the fœtus, there will be difficulty and danger in accomplishing its extraction. The operator must then begin to think less of the safety of the calf, and endeavor to secure that of the mother. Two other large cords or ropes must be procured, and one fastened round each leg. The service of two assistants will now be required. One should pull at the head, and the other the feet, while the operator ascertains the progress that is made; too much force, however, should not immediately be used, for the chance of saving the young one must not yet be given up. This not succeeding, greater power must be applied, until the assistants begin to use their full strength, pulling steadily, and with the pains of the cow, if they still continue.

In the natural position of the calf, the young one is almost uniformly extracted by these means, and its life is preserved; for both the mother and her progeny will, without serious injury, bear the employment of more force than would by some be thought credible. When the womb is unable to discharge its contents, and the throes are diminishing, or perhaps ceasing, much benefit may be derived from the administration of the ergot of rye, which appears to act as a stimulus specifically on the uterus; two drachms of this med-

icine, finely powdered, may be given in a pint of ale, and repeated several times, if required, with intervals from half an hour to an hour.

The fœtus is not, however, always presented naturally, and it is the duty of the operator to ascertain its exact position in the womb. This he will not find much difficulty in accomplishing.

The most usual false position is the presentation of the head, while the feet of the calf are bent and doubled down under his belly, and remain in the womb. A cord must be passed as before around the lower jaw, which is then pushed back into the womb. The operator now introduces his hand, and endeavors to feel the situation of the feet. He is generally able to find them out, and to fix a cord round each pastern, or at least about the knee, and then he can usually bring them into the passage. The head is next to be brought forward again by means of the cord; and, the three cords being afterwards pulled together, the fœtus is extracted. Should the calf have been long fixed in the passage, and be evidently much swelled, it is certainly dead; the head may then be opened in order to lessen its bulk, and the extraction accomplished as before.

When the feet present, and the head is doubled under the rim of the passage, the case is more difficult, and the calf is very rarely saved: indeed it may be reckoned to be dead if it has remained in this position for any considerable time. Cords are first to be placed round the feet; the hand must be afterwards passed into the womb, and the situation of the head exactly ascertained, and the cord passed round the lower jaw. The calf being then pushed farther back into the womb, the head must be brought into the passage, and, the three ropes being pulled together, the delivery effected as quickly as may be, without the exertion of more force than is necessary.

The last false presentation we shall mention is that of the breech, the tail appearing at the mouth of the shape. The hand is to be passed into the uterus, and the cords fastened round each hock. The calf is then to be pushed as far back as possible into the womb, and the hocks, one after the other, brought into the passage, the ropes being shifted as soon as

possible to the fetlock. With the exertion of considerable force, the calf may now be extracted, and sometimes without serious injury.

By studying these cases the operator will be enabled to adapt his measures to every case of false presentation; and they are numerous. Great force must sometimes be used to effect the extraction of the calf. The united efforts of five or six men have been employed, and (although such practice can scarcely be defended in any case), a horse has sometimes been attached to the cords. The foetus has been necessarily destroyed, but the mother has survived: too often, however, she has evidently fallen a victim to this unnecessary violence. If by the united force of two or three men the foetus cannot be brought away, any ruder and more violent attempt must always be fraught with danger, and will often be fatal. The safer way for the mother—yet that is attended with considerable risk—is to cut off some of the limbs of the foetus. One or possibly both shoulders may be separated, slipped, and then the head and trunk may, without much difficulty, be brought away. The knife must be one that can be concealed in the hand, and that is hooked at the end, and rounded and thick at the back; but, notwithstanding that, there is much danger of wounding the womb, which is forcibly pressing on the hand of the operator.

Labor is not unfrequently prevented by the diseased state of the entrance or neck of the womb, which becomes hard and scirrhous, and thus prevents the calf from escaping. When this is found by examination to be the case, an operation should be performed, which consists in dividing the contracted entrance by means of a small knife passed up, protected by the hand and fingers. Considerable care must be exercised so as not to cut too deeply; and it is better to divide the stricture slightly in several places.

From the violent efforts of the cow, or from unnecessary artificial violence, the uterus, the calf-bed, may protrude, and be absolutely inverted. The case is not desperate. The part must be cleaned from blood and dirt, and supported by a sheet; then, the operator beginning at the very fundus or bottom of the womb, it may be gradually returned by the union of some

little ingenuity and a great deal of patience. The animal should be copiously bled before this is attempted, in order to relax the passage; and the application of cold water for a considerable time may contract the womb itself, and render its return more easy. A stitch or a couple of stitches should be passed through the lips of the shape, in order to prevent a repetition of the protrusion, and the Anodyne Drink (See No. 29 DOMESTIC ANIMALS, MEDICINES FOR,) administered.

If the cow has calved unseen and unattended, she will, like every other quadruped, set diligently to work to devour the cleansing, and lick the new-born animal clean. This, however, is often carefully prevented when there is the opportunity of so doing. The calf is taken immediately away, and the cleansing thrown on the dung-heap. We act contrary to nature in this. She would not have given to herbivorous animals this propensity to eat the placenta, had not some useful purpose been effected by it. Cleanliness was one object, the next was either to support the strength of the animal, or to have an aperient or salutary influence on her. The mother and the young will be happier if they are left to pursue the dictates of nature. Many a cow has fretted herself into a fatal fever from the sudden loss of her little one, and many a calf has died from the neglect of that cleanliness which the mother could best effect.

A great deal has been said of the necessity of cleansing the cow after calving, or the removal or expulsion of the placenta. There is much error in this. The placenta comes away with the calf; and it is that natural discharge from the womb, continued during several days, and which is observed to a greater or less extent in all quadrupeds, that gives the notion of anything being retained. Medicine, nevertheless, is necessary in order to prevent that access of fever to which the cow in high condition is liable; but that medicine should be administered, not in the form of a stimulating cordial, from the false supposition that the animal wants support after the fatigue and pain it has undergone, but in that of a purgative, in order to prevent an attack of fever to which the animal is so naturally exposed after parturition, and which is so often

hastened and aggravated by absurd management.

The mother requires little care after calving, except that of protection from too great severity of weather, and this more especially if she had been much nursed before parturition. A warm mash may be given daily for a little while, but otherwise she may return to her previous and not too luxuriant feed. The state of her udder, however, should be examined: if it is at all hard, she should be milked twice every day, and the calf should be put with her several times in the day at least, if not altogether. Perhaps she will not let it suck, especially if it is the first calf, on account of the soreness of her teats, and her being unaccustomed to the duties of nursing. She must then be carefully watched at sucking time, and the bag, if it is very hard, and kernelly, and sore, must be fomented with warm water, or, if necessary, the GARGET OINTMENT, No. 24, or OINTMENT FOR SORE TEATS, No. 27 (DOMESTIC ANIMALS, MEDICINES FOR) must be rubbed into the part principally affected.

COW, Milk Fever, or the Drop.—This is a disease almost peculiar to cows in high condition at the time of calving: whether young or old, all are liable to be attacked by it; they are, however, rarely attacked until after they have had several calves: and it is stated that the short-horned breed is more liable to it than others. Whenever it takes place, either at home or in the field, it is distressing to the animal, as well as troublesome to the owner, for the beast is seldom able to rise during several days. The puerperal or milk fever is most frequent during the hot weather of summer. The cows most liable to be attacked by this fever have large udders, that have been full of milk for several days before calving. It is a very dangerous disease when severe, and often proves fatal even under the most judicious treatment.

The milk fever most commonly appears about the second or third day after calving, but the cow is occasionally down within a few hours of parturition. It is first recognized by the animal refusing her food, looking dull and heavy; then follows protrusion of the eye, heaving of the flank, restlessness, and every symptom of fever. In a few hours, or on the next day at the

latest, the cow begins to stagger; is weak in the loins; palsy steals over the whole frame; and she falls, unable to rise again. It is in this advanced stage that the complaint is too often first observed; the previous symptoms are not taken notice of, and the beast is almost past cure before the owner is aware of her illness. From this seeming palsy of the hinder limbs, and sometimes of the whole frame, the disease is very appropriately called dropping after calving.

There are evidently two varieties of this disease, one being considerably more dangerous than the other. In the severer kind, the brain, as well as the spinal marrow, is affected, whilst the milder disease is principally confined to the loins.

In the former kind, we first notice a staggering gait, the breathing then becomes irregular and disturbed, the eyes full and glassy, and the pupil dilated. The animal, after reeling about for some time, falls, and frequently never rises again. She then becomes, in great measure, unconscious; the head is turned on one side; sensation appears partially lost, so that, if liquids are given with the horn, they often enter the windpipe without occasioning coughing. The hind legs become entirely paralyzed, and the fore ones are sometimes affected in a similar manner. The pulse is generally very quick, but weak; the appetite is altogether lost; rumination ceases; and the bowels are obstinately constipated. If the animal dies, it is generally within forty-eight hours from the commencement of the symptoms, and indeed sometimes only a few hours afterwards. In some cases, the animal will lie in a state of insensibility; in others, she exhibits considerable pain and distress. The cow is unable to discharge either her urine or dung, the nerves influencing these offices being paralyzed. On examining the bodies of cows that have died from this disease, the principal mischief has been found in the brain and spinal cord; in the latter, chiefly at the region of the loins. The womb, in the greater number of instances, has been found in the same state as it usually is after parturition; but, in some cases, it presents the appearance of the most intense inflammation. In such cases, it appears that the inflammation of the womb is superadded to the other disease.

In the milder form of the complaint it

is, to a greater extent, a local malady: the spinal cord at the region of the loins is affected; but the brain is comparatively exempt; and thus, though the hind extremities are paralyzed to a great extent, yet the insensibility is by no means general, and consciousness is retained. In both the severe and mild form the digestive organs are altogether deranged, and in fatal cases the third stomach is found loaded with hard, indigestible food, and the other viscera are often found inflamed.

The cause of the disease has not been ascertained, but it appears connected with a high-state of condition, and is best prevented by keeping the cow short of food some days previous to her calving.

The treatment of this disease must be modified according to the severity of the symptoms, and the fact of its being the milder or the severer affection. It is important also to ascertain whether the secretion of milk has ceased; as it has been ascertained that when this is the case the disease is fatal, and when not so the cow recovers. If the pulse is strong, it will be proper to bleed to the extent, perhaps, of four or five quarts. The principal expectation of relief, however, must be placed on the exhibition of strong Purgative Drink. (See No. 30 DOMESTIC ANIMALS, MEDICINES FOR.)

One-half of this draught may be repeated twice a day until the bowels are properly opened. In the severer affection it will be proper to add from ten to twenty drops of the croton oil to the first draught; and even two drachms of carbonate of ammonia and ten grains of cantharides have been conjoined with advantage. It is of importance to administer the draught slowly and carefully; and when the cow is any way unconscious it will be better to give it by means of Read's syringe, putting the tube half way down the neck, so as to prevent any of the medicine getting into the windpipe, where it has been known to produce fatal inflammation. The action of the physic should be assisted by frequent clysters, and the bladder should be emptied from time to time by a catheter. A blistering liniment should be rubbed on the course of the spine: in the milder disease it may be limited chiefly to the loins, but in the severer affection it should extend from the

head to the tail, and be often repeated. It is astonishing what a vast quantity of purgative medicine may often be administered in this disease without producing any effect, the stomachs being in such a torpid state.

In the milder disease, the treatment must be similar in its nature, though not so powerful as that here recommended; the croton oil may be dispensed with, and the blistering application confined to the loins.

The cow should be made as comfortable as possible. A good bed of straw should be got under her, and her fore-quarters should be considerably raised, so that the dung and urine may flow away. It not unfrequently happens, that as soon as the cow begins thoroughly to purge she gets up and walks about, although still continuing for a while in a very weak state.

In order to make her as comfortable as possible, the cow should be shifted from side to side twice in the day; all filth of every kind should be carefully removed, a warm cloth thrown over, and warm gruel or linseed tea frequently offered to her with mashes, if she will eat them.

It will be a very bad symptom if she begins to swell, and there are frequent belchings of very foetid gas. If the digestive powers are thus weakened there is but little hope. The Cordial Drink, (See No. 31 DOMESTIC ANIMALS, MEDICINES FOR,) should then be given, still continuing the purgative medicine if necessary.

This, in the form of a ball, will probably find its way into the paunch. Half the quantity of the above ingredients should also be given morning and night as a drink, in a pint of warm ale, and the same quantity of thin gruel.

If the cow should continue to swell, relief must be obtained by means of the flexible pipe for that purpose; and if the proprietor has the pump which should accompany the pipe, some gallons of warm water in which a little ginger has been boiled may be thrown into the paunch, in order wash out a portion of its contents. Should not the pipe be at hand, an opening may be made into the paunch at the flank with a sharp-pointed knife, in the usual manner; or, if the case is becoming absolutely desperate, the op-

erator will be justified in enlarging the opening so as to admit the hand, and gradually take out the greater part of the undigested food. The edges of the wound should then be brought together and held by two or three stitches, the divided skin and the wall of the paunch being included in each stitch.

There is one thing that should not be omitted, and that is, the attempt two or three times every day, to bring back the milk, by diligently stroking the teats. As the drying up of the milk is the earliest symptoms of the attack of the disease, so the return of it is the happiest promise of recovery.

If the cow does not get up on the third or fourth day, there is but little chance that she ever will. The case, however, should not be abandoned, for she has done well even after the fourteenth day.

If the udder is hard and knotty the CAMPHORATED OIL, No. 11, should be well rubbed over it twice a day; and if it is very hot and tender, fomentations of warm water should be used, but no cold lotion is admissible in such a case.

As the cow is frequently unwilling, and sometimes unable, to take sufficient nutriment herself, some nutritious food should be horned in; and there is nothing better than good thick gruel. Two or three quarts given four times every day will be enough. All sweet things, which farmers are so apt to give, should be omitted; the food in the paunch is sufficiently ready to ferment, without giving any sugar.

A cow laboring under milk fever should scarcely ever be left. She naturally gets very tired of coughing so long, and sometimes attempts to shift herself, and would get sadly bruised if assistance were not afforded; besides which, in the early stage of the disease, and occasionally afterwards there is some affection of the brain, and the animal is half unconscious of what she does, and would beat herself dangerously about if care were not taken of her.

We must again repeat, that prevention is better than cure; and that the best preventive of milk fever is not to let her be in too high condition, but to take four or five quarts of blood from her, and give

her a physic drink eight or ten days before the expected time of calving.

COWS, Milk Mirror in.—The Milk Mirror of Guenon is the upward-growing hair on the back part of the under and the inside of the hind legs. An examination of any cow will show that the line where the hair meets the downward-growing hair of the immediately adjacent parts of the body, is well defined by what is called a "quirl," and the hair included within the quirl, and covered by the upward-growing hair, is the Milk Mirror. The shape of the mirror is very different in different races, and generally assumes one of two or three different forms. As a general rule, the size of the mirror bears a pretty constant proportion to the amount of the yield of milk, and constitutes perhaps the simplest indication of the general dairy qualities of any individual animal.

The great value of Guenon's system depends on the fact that in calves which, neither by the texture of their hides nor the conformation of their bodies, nor, indeed, by any of the general marks on which we depend in the selection of dairy animals, give an indication of their future milking qualities, it is possible by a sole dependence on the character of the escutcheon to predict with considerable certainty their future usefulness for the dairy.

CATTLE, Colic in.—Colic is occasioned by a want of physiological power in the organs of digestion, so that the food, instead of undergoing a chemico-vital process, runs into fermentation, by which process carbonic acid gas is evolved.

SYMPTOMS.—The animal is evidently in pain, and appears very restless; it occasionally turns its head, with an anxious gaze, to the left side, which seems to be distended more than the right; there is an occasional discharge of gas from the mouth and anus.

TREATMENT.—Give the following carminative:

Powdered aniseed, half a teaspoonful,
" cinnamon, " "

To be given in a quart of spearmint tea, and repeated if necessary.

CATTLE, Vermin on.—See CATTLE, MANGE.

CATTLE, Warbles.—See CATTLE, MANGE.

CATTLE, Hoove, Eoven, or Blown.—

This disease is a distention of the rumen, or first stomach, by the gas which is extracted from certain substances undergoing the process of fermentation within it. The herbage is hastily gathered at first, and received into the rumen, in order to undergo there a process of maceration, by means of which it may be more perfectly ground down, and all its nutritive matter extracted when it is subjected to a second mastication.

The rumen has been described as divided into various compartments, and its coats containing a strong muscular structure. By the action of these muscles the food is made slowly to traverse these compartments in the order in which it was received; and the journey, in the ordinary state of health, occupies sufficient time for the herbage to be to a certain degree macerated or softened, but not for that process of fermentation to be set up, to which all vegetables are liable.

Supposing an ox to be suddenly turned into new and luxuriant pasture, he sets to work, and gathers the herbage rapidly and greedily; so much so that the stomach is unable to propel forward the different portions of food as they are received, but becomes overloaded and clogged, and at length ceases altogether to act upon its contents. The food remains longer in the stomach than nature designed that it should, and it begins to ferment; and while fermenting, throws out a quantity of gas, which distends the stomach almost or quite to bursting. Thence arises the danger of sudden change of pasture from an inferior to a better quality, and the numerous cases of distension of the stomach and death which occur when the fog-grass is plentiful and succulent, or the beast has without preparation or care been turned upon clover or turnips.

Some animals, however, are subject to hoove, but in a slighter degree, without this change of pasture. Many a weakly cow has occasional swellings of the paunch where there has been little or no change of food. The stomach, also, is subject to disease—it sympathizes with disease of every other part; and one of the first and most frequent results of an unhealthy state of it is the production of an acid, which wonderfully accelerates and increases the process of fermentation and the develop-

ment of gas. Hence it is that distension of the stomach is an accompaniment of almost every malady to which cattle are liable. No case of difficult parturition, or of dropping after calving, or of milk fever, occurs without some degree of distension of the paunch, either from the stomach being so weakened as to be unable to force the food along, or from its secreting this unnatural and unhealthy acid, so favorable to the progress of fermentation.

The symptoms of hoove are sufficiently known. The beast seems to swell, and that to an enormous extent; the breathing is very laborious, and the animal is evidently in great distress, and threatened with immediate suffocation, from the pressure of the distended stomach against the diaphragm diminishing the cavity of the chest, and rendering it impossible for the lungs to expand. The difficulty of breathing increases with the distension of the stomach and the pressure on the lungs, and the animal is inevitably lost if relief is not soon obtained.

This relief consists, and can alone consist, in relieving the stomach from the distension. But how is this to be accomplished? Medicine seems to be almost or quite thrown away. If a drink is given, not a drop of it will find its way into the paunch, the entrance to which is so firmly closed that it seems scarcely possible that even a ball should now break through the floor. A very stimulating drink, passing into the fourth stomach, and exciting it, may, by sympathy, induce the paunch to act; yet it is difficult to conceive how that viscus can possibly act while its fibres are put thus violently upon the stretch.

Something might have been done by way of prevention. If, when the cattle had been turned into the fresh pasture, they had been carefully watched, and removed again to the straw-yard, before the paunch had been too much gorged, and this had been repeated two or three times, the appetite would have been blunted and hoove prevented.

Some farmers, an hour or two before they have turned such cows as are of a greedy disposition into a fresh pasture, give them a cordial drink. The stomach is stimulated by this, and induced to contract in time upon its contents; and this

contraction has reminded the animal of the necessary process of rumination, or has rendered it almost impossible for him to continue to feed until some portion of the contents of the stomach has been returned and remasticated.

If the farmer will adopt such a plan, the Cordial Drink, No. 46, is as good as any that can be given. (See DOMESTIC ANIMALS, MEDICINES FOR.)

I must confess, however, that, although I would not absolutely condemn such a practice, I would much rather trust to simpler and more effectual precautions. I would take care that the change of food should not be too sudden nor too great. If there was an evident difference in the nutritive quality of the two pastures, I would be carefully on the watch, and remove the beast to shorter grass, before material mischief could be effected.

Suppose, however, that the mischief is done; the stomach is distended, and the animal is evidently threatened with immediate suffocation. Nothing but mechanical means will now be of avail.

Some drive the animal about. This is sadly cruel work; for he seems to be scarcely able to move, and appears as if he would be suffocated every moment. This has, however, been sometimes successful, especially if the beast is *made* to trot; for, by the motion and shaking of the stomach thus produced, the roof of the paunch has been forced a little open, and a portion of the air has escaped, and some of the food with it, and the stomach has been relieved from a part of its distension, and has been enabled to act upon the remaining food, and the process of rumination has recommenced. It is, however, dangerous work; for in the act of moving with the stomach so distended, either it or the diaphragm upon which it is pressing, is in danger of being ruptured.

Some have resorted to an operation. Midway between the last rib and the haunch-bone, the distended paunch will be felt pressing against the flank. A lancet or a pocket-knife has been plunged into the animal at that spot, which has passed through the skin and the wall of the belly, and entered the paunch. The vapor has then rushed out with a hissing noise, and steamed up four or five feet high, and some of the contents of the bowels have been forced up with the gas,

and the flanks have fallen, and the beast has evidently become less, and has been so much relieved that he has begun to ruminate, and has done well. The wound is left open for a while, that any newly-formed gas may escape; it then soon heals of itself, or would almost immediately if its edges were brought together by a slip of adhesive plaster.

It, however, too frequently happens, that, although present relief has been obtained, and the beast has ruminated and eaten, it has in a few days begun to show symptoms of indisposition, and has become feverish, and drooped, and died. We account for this by some of the gas, and, perhaps, a portion of the food, getting into the belly, between the paunch and the flank, and falling down among the intestines, and causing irritation and inflammation there.

Some have adopted even rougher and more effectual methods of remedying the evil. They have not contented themselves with simply puncturing the paunch, but they have cut a hole into it through the flank large enough to introduce the hand; and so they have not only liberated the air, but have taken out the fermenting food by pailfuls. They have even gone so far as to pour in water, and fairly wash the paunch out. They have then brought the edges of the wound together by passing a few stitches through it, and including the substance of the flank and the wall of the paunch in each stitch, and afterwards covered the wound with adhesive plaster, and it has readily healed, and no bad consequence has ensued. In desperate cases, as when the paunch seems to be filled with a mass of food that will continue to ferment, and cannot be got rid of either by rumination or by physic, this bold mode of treatment may be adopted. The paunch has few blood-vessels, and little sensibility, and will bear great injury without any fatal consequence. But this expedient has not always succeeded. Inflammation has ensued, and carried the animal off. Besides this, the paunch, being suspended by these stitches, and afterwards hanging thus from the flank, is kept permanently out of its place, and is unable freely and fully to contract afterwards upon its contents: thus inflammation has ensued: and the subsequent want of condition in some

of these animals, and the difficulty of fattening them thoroughly, is easily accounted for.

Some farmers go a little more judiciously to work. They thrust a flexible stick, or a cart-whip, down the throat, and through the floor of the passage beneath, and the roof of the paunch, and thus enable some of the gas to escape; and this, perhaps, would be effectual, if the stick could be kept there long enough, and the stomach did not close around it.

CATTLE, Inflammation of the Bowels, with Costiveness.—Inflammation of the bowels is by no means an uncommon disease among neat cattle, and frequently proves fatal to them from injudicious treatment. It is a complaint easily recognizable on account of the peculiar symptoms by which it is attended.

The animal is continually lying down and getting up again immediately, and, when up, he strikes at his belly with the hind feet. The bowels are obstinately constipated: the dung, if any is voided, is in small quantities—hard, covered with mucus, and that sometimes streaked with blood—and the urine is generally voided with difficulty. The pulse is quicker than natural, and there is much heaving at the flanks.

It is distinguished from colic by the great degree of fever that evidently attends it, the muzzle being dry and the mouth hot. The animal becomes speedily weak, he falls or throws himself down suddenly, and when he rises he does it with difficulty, and he staggers as he walks. The lowness and weakness appear more speedily and decidedly than in almost any other disease.

The attack is sudden, like that of colic. The animal quits his companions and hides himself under the hedge. If he is in the plow, he all at once becomes deaf to the voice of the driver, and insensible to the goad. He trembles all over—his skin becomes hot—his back and loins are tender—his ears and horns are hot. Everything indicates the highest degree of local inflammation and general fever.

The disease mostly arises from sudden exposure to cold; and especially when cattle go into rivers or ponds after being heated and fatigued. It is sometimes pro-

duced by change of pasture and feeding too much on dry and stimulating diet.

The first thing to be done, and that which admits of no delay, is to bleed; from six to eight quarts of blood at least should be taken away. Immediately afterward the Physic Drink (see No. 15 DOMESTIC ANIMALS, MEDICINES FOR,) should be administered, and its effect promoted by half doses of Purging Drink, No. 2, given every six hours. This is a very dangerous disease, and the measures pursued must be of the most decisive kind. The symptoms succeed each other rapidly, and if one day is suffered to pass without proper means being taken, the beast is irrecoverably lost.

The third stomach or manyplus will generally be found, after death, choked up with dry food, hardened between the leaves of which that stomach is composed. It will be necessary to wash this well out before the proper path to the fourth stomach can be opened. In order to effect this, plenty of thin gruel, or water with the chill taken off, should be given; or, if the beast will not drink it, several quarts of it should be horned down. Clysters of warm water or thin gruel, with a purging powder dissolved in them, should likewise be administered.

After having bled the animal once copiously, and, if the fever has not subsided, a second, or even a third time, the farmer should in this disease of high inflammation of the bowels, and strangely obstinate costiveness, found his only hope of saving the animal in producing purging, and to this purpose his whole attention should be directed.

If it should not be accomplished after the third dose of the medicine, a pound of common salt may be given. The water or other liquid which the beast will probably be induced to drink will assist in purging him. Should not this succeed, a pound and a half of castor oil must be administered.

The patience of the attendants will sometimes be almost worn out—they must, however, persist. Clysters, numerous, and in great quantity, must be administered. The Epsom salts and the castor oil will not do harm in whatever quantities they are given; it will not be prudent, however, to repeat the common salt. During the whole of this time the

cordial drink of the cow-leech must be avoided as a dose of poison.

The farmer or the attendant must not be deceived by the passage of a little liquid dung in a small stream, for that shows that there is yet much hardened fæces clinging round the intestines, and which must be removed, and, therefore, he must pursue the measures recommended until the dung is expelled in considerable quantities, and in a large, full stream, and without much straining. There has generally been something more than usual wrong in the food or management when this sad constipation is observed. Either the animal has been kept too much and too long on dry food, or he has been turned into fresh pasture (and particularly in the autumn) in which there are oak-trees or some astringent vegetables. The cause must be removed, or the disease will return.

The state of the bowels of a beast that has once been sapped, should be observed for some time afterward, and gentle aperients occasionally administered; cold water should not, for a little while, be permitted, and strict attention should be paid to the diet.

Inflammation of the bowels, however, will in a few cases occur without all this costiveness, and yet produced by nearly the same causes. The other symptoms are the same, but the danger is not so great. The beast should be bled and physicked, kept moderately warm, and have warm water with bran mash.

CATTLE, The Blain, Etc., Etc.—This is by no means an unfrequent disease, and is commonly known by the name of **BLAIN**, **HAWKES**, or **GARGYSE**.

The animal appears dull and languid, the eyes red and inflamed, with tears trickling from them. A swelling begins about the eyes, and occasionally appears on other parts of the body; but the characteristic symptom is, that there are generally blisters under the tongue, or at the back part of the mouth; the pulse is quicker than natural; there is more or less heaving of the flanks; and the bowels are sometimes constipated. When the complaint is not checked at the outset, there is often a copious flow of saliva from the mouth, mixed often with a purulent, bloody, stinking discharge; the beast becomes extremely weak and reduced,

and is in danger of being suffocated by the great and rapid enlargement of the tongue.

CAUSES.—Those cattle are the most subject to this complaint that are in high condition, and feeding on rich pasture grounds. It appears in many cases to be brought on by a redundancy of blood in the system, or from the beast taking cold while in that state. It is most prevalent in the summer months, especially when the weather is hot and sultry, but it occurs at all times of the year, and in pastures of every kind, yet oftenest in low, marshy situations.

This is a disease which must not be trifled with for a moment. We have known it prove fatal in the course of one day; and when neglected at the beginning it has speedily assumed a malignant character, which baffled every attempt to arrest its progress.

The remedy, and, often a very expeditious one for this disease, is to cut deeply, and from end to end, the bladders that will be found along the side of and under the tongue. They will appear to be filled with a glutinous matter, and, although there may not be much bleeding from them at first, considerable bloody fluid will gradually ooze out, the swelling of the mouth and head will subside, and the beast will be very much relieved. All the curious operations of thrusting sticks and tar down the throat have this for their object, to break these bladders, but which is most easily and completely effected by the knife.

If, however, much fever has accompanied the enlargement of the tongue, it will be prudent to take away five or six quarts of blood, and to give a physic drink, and particularly if, on the day following the operation, the beast should continue to be feverish. The mouth may likewise be washed with a solution of the chloride of lime in water, in the proportions of one drachm of the chloride to a quart of water, while the mouth is very offensive; and with equal parts of tincture of myrrh and water afterward, in order to promote the healing of the ulcer.

If the fever continues, the Fever Drink No. 1 may be given morning and night, and the bowels kept open by the Purg-ing Drink No. 2, or Sulphur Purg-ing Drink No. 7.

Should considerable weakness and loss of appetite remain when the fever seems to be subdued, the Tonic Drink (see No. 32, DOMESTIC ANIMALS, MEDICINES FOR,) may be given.

This may be repeated daily, or twice a day, as circumstances may require.

It will sometimes happen that the animal will for some days refuse to eat, on account of the soreness of the mouth. Thin gruel should always be placed within his reach, and plenty of thick gruel administered with the horn.

The person that has to attend on cattle that have the blain should take care that none of the discharge from the mouth comes in contact with any sore place, for very troublesome ulcers have been produced by this means. If there is any fear that a sore place has been thus inoculated, the lunar caustic should be applied to it.

CATTLE, Blood, Blood-striking, Black-leg, Quarter Evil, or Black Quarter.—The disease which we are now to describe is indicated by these curious names, and a great many more, in various parts of the country. Very few of these names, however, are misplaced, for they indicate some variety, or symptoms, or stage of this dreadful malady. It would be much better recognized by the title of INFLAMMATORY FEVER.

Its attack is confined almost entirely to animals that are in high condition, or rapidly improving; we should say, too high condition, and too rapidly improving. In some instances the disease will give some warning of its approach, but, generally, the beast appears to be to-day perfectly well, and to-morrow he will be found with his head extended, his flanks heaving, his breath hot, his eyes protruding, his muzzle dry, his pulse quick and hard—every symptom, in short, of the highest state of fever. He utters a low and distressing moaning; he is already half unconscious; he will stand for hours together motionless, or if he moves, or is compelled to move, there is a peculiar staggering referable to the hind limbs, and generally one of them more than the other: by and by he gets uneasy, he shifts his weight from foot to foot, he paws faintly, and then lies down. He rises, but almost immediately drops again. He now begins to be, or has already been,

nearly unconscious of surrounding objects.

There are many other symptoms from which the different names of the disease arose. On the back or loins, or over one of the quarters, there is more or less swelling; if felt when it first appears it is hot, and tender, and firm, but it soon begins to yield to the touch, and gives a singular crackling noise when pressed upon. One of the limbs likewise enlarges, sometimes through its whole extent, and that enormously. It, too, is at first firm, and hot and tender, but it soon afterwards becomes soft and flabby, or pits when pressed upon, *i. e.*, the indentation of the finger remains. When examined after death, that limb is full of red putrid fluid: it is mortified, and seems to have been putrefying almost during the life of the beast. Large ulcers break out in this limb, and sometimes in other parts of the body, and almost immediately become gangrenous; pieces of several pounds in weight have sloughed away; three-fourths of the udder have dropped off, or have been so gangrenous that it was necessary to remove them, and the animal has been one mass of ulceration. The breath stinks horribly; a very offensive, and sometimes purulent and bloody fluid runs from the mouth; the urine is high-colored or bloody, and the fæces are also streaked with blood, and the smell from them is scarcely supportable.

In this state the beast will sometimes continue two or three days, at other times he will die in less than twelve hours from the first attack. In a few instances, however, and when the disease has been early and properly treated, all these dreadful symptoms gradually disappear, and the animal recovers.

It is to a redundancy, or overflowing of the blood, the consequence of the sudden change from bad to good living, that this disease most commonly owes its origin. It is most prevalent in the latter part of the spring and in the autumn; and very often, at these seasons of the year, proves destructive to great numbers of young cattle in different parts of the States. It is sometimes, however, seen in the winter and the early part of spring, when the cattle are feeding on turnips. Some situations are more subject to this complaint than others. It is most frequent in low,

marshy grounds, and pastures situated by the side of woods.

It is a disorder of high condition and over-feeding. The times of the year and the character of the cattle prove this. It occurs in the latter part of the spring, when the grass is most luxuriant and nutritive, and in the autumn, when we have the second flush of grass; and the animals attacked are those principally that are undergoing the process of fattening, and that have somewhat too suddenly been removed from scanty pasturage and low feeding to a profusion of herbage, and that of a nutritious and stimulating kind. The disease sometimes occurs when the cattle have been moved from one pasturage to another on the same farm; but more so when they have been brought from poor land, at a distance, to a richer soil. There are in the latter case two preparatory causes—the previous poverty, and the fatigue and exhaustion of the journey.

This disease rarely admits of cure, but fortunately it may in general be prevented. If the malady is discovered as soon as it makes its appearance, the beast should be immediately housed, and then from four to eight quarts of blood taken away, according to the age and size. Two hours after bleeding give the PURGING DRINK No. 2 which will be found of a proper strength for young cattle from the age of one to two years.

The bleeding should be repeated in three or four hours, if the animal is not materially relieved; and a third bleeding must follow the second, if the fever is unabated. There must be no child's play here; the disease must be knocked down at once, or it will inevitably destroy the beast. The physic likewise must be repeated until it has had its full effect.

As soon as the bowels are well opened the Fever Drink, No. 1, should be administered, and repeated morning, noon and night, all food except a little mash being removed.

At the first appearance of the disease the part principally affected should be fomented several times in the course of the day with hot water, and for at least an hour each time. For this purpose there should be two or three large pieces of flannel in the water, that after one of them has been applied thoroughly hot

and dripping to the part affected, another equally hot may be ready when this gets cold.

As soon as the fever begins evidently to subside, and the beast is more himself, and eats a little, the fever medicine must not be pushed too far. It should be remembered that this is a case of highly inflammatory disease, which soon passes over, and is often succeeded by debility almost as dangerous as the fever. The ox, therefore, must not be too much lowered; but, the fever abating, mildest Tonic Drink (See No. 33 DOMESTIC ANIMALS, MEDICINES FOR,) should be given.

If this does not bring back the fever it may be safely continued once every day until the ox is well; or the quantities of the gentian may be increased, and the emetic tartar lessened, and at length altogether omitted, the nitre being still retained.

A seton (of black hellebore root if it can be procured) should be inserted into the dewlap; and, if the beast can be moved, it should be driven to much scantier pasture.

Should not the disease be discovered until there is considerable swelling, and a cracking noise in some tumefied part, a cure is seldom effected. Bleeding at this stage of the complaint, can seldom be resorted to, or, at least, one moderate bleeding only should be practiced, in order to subdue any lurking fever that may remain. If a cure is in these cases attempted the Tonic Drink should be given, which may invigorate the system by its cordial and tonic powers, and prevent the mortification extending.

The swelled parts should be frequently bathed with equal portions of vinegar and spirits of wine, made as hot as the hand will bear; or, if ulceration seems to be approaching, slight incisions should be effected along the whole extent of the swelling, and the part bathed with spirit of turpentine, made hot.

If ulceration has commenced, accompanied by the peculiar fœtor that attends the disease, the wounds should be first bathed with the Disinfectant Lotion (No. 34, DOMESTIC ANIMALS, MEDICINES FOR.)

The hot spirit of turpentine should be applied immediately after this, and continued in use until either the mortified

parts have sloughed off, or the sore begins to have a healthy appearance. The tincture of aloes or Friar's balsam may then follow.

Since so little can be done in the way of cure, we next anxiously inquire whether there is any mode of prevention. The account which we have given of the disease immediately suggests the prevention, viz., to beware of these sudden changes of pasture; now and then to take a little blood from, or to give a dose of physic to, those beasts that are thriving unusually rapidly, and, whenever the disease breaks out on the farm to bleed and to purge, and remove to shorter and scantier feed every animal that has been exposed to the same exciting causes with those that have been attacked. The farmer should be particularly watchful during the latter part of the spring and the beginning of the autumn; he may thus save many a beast, and the bleeding and the physic will not arrest but rather assist their improvement. He who will not attend to a simple rule like this will deserve the loss that he may experience.

CATTLE, Murrain, or Pestilential Fever.—The treatment would be, first, and the most important thing of all, to separate the diseased from the sound: to remove every animal that seemed to be in the slightest degree affected to some isolated portion of the farm where contact with others would be impossible. It would be imprudent to remove those that appeared to be unaffected, because it would be impossible to know that the virus did not lurk in their veins, and thus the poison might be conveyed to other parts of the farm. The sick only should be taken away, and that as speedily as possible.

In the early stage of the disease there can be no doubt of the propriety of bleeding. The fever which, according to every account, characterizes the first attack, should, if possible, be subdued; otherwise its prolonged existence would aggravate, if it did not cause, the subsequent debility. The animal should be bled, in proportion to his size, condition, and the degree of fever; he should be bled, in fact, until the pulse began to falter or he began to stagger. The blood should be taken in as full a stream as possible, that the constitution might be

more speedily and beneficially affected. When the blood flows slowly, a quantity may sometimes be taken away before the animal begins to feel it, the loss of which would afterwards produce alarming debility; but if the blood flows freely, the beast will show symptoms of faintness—the effect we wish to produce—before one-fourth of the quantity is drawn that would be lost if it ran in a slow stream. We want to attack and subdue the fever, without undermining the strength of the frame.

Then we should with great propriety administer a brisk purgative. If fetid and obstinate purging so soon follows, we should be anxious to get rid, if we can do so, of a portion of the offending matter; and therefore a pound or twenty ounces of Epsom salts should be given in a sufficient quantity of thin gruel.

Next, as it is a disease so much and so early characterized by debility, we should attend to the diet. Green succulent grass would scarcely be allowed, because it would probably not a little increase the purging; but mashes of bran, with a little bean-meal, carrots, or sweet old hay, should be given in moderate quantities. The animal should be coaxed to eat; for it is necessary that the constitution be supported against the debilitating influence of such a disease. The animal should not be at first drenched, for this might produce nausea and disgust for food; but if two or three days should pass, and the beast should obstinately refuse to eat, plenty of warm thick gruel must be forced upon him. As for medicine, we scarcely know what to advise. The fact stands too clearly upon record, that nineteen animals out of twenty, seized with the murrain, have died. That on which we should put most dependence would be the Drink for Murrain. (See No. 33, DOMESTIC ANIMALS, MEDICINES FOR.)

This may be repeated every six hours, until the purging is considerably abated; but should not be continued until it has quite stopped.

The purging being abated, we must look about for something to recall the appetite and recruit the strength, and we do not know anything better than the Tonic Drink for Murrain. (See No. 36, DOMESTIC ANIMALS, MEDICINES FOR.)

There cannot be a more proper means adopted than a seton in the dewlap, made with the black hellebore root. The mouth should be frequently washed with a dilute solution of the chloride of lime. The ulcerated parts, if they are fetid, should have the same disinfectant applied to them, and the walls and ceiling, and every part of the cow-house should be washed with it.

One caution should be used with respect to the food; while the beast should be coaxed to eat, in order to support him under the debilitating influence of the disease, it is only on the supposition that he ruminates his food. Until he begins again to chew the cud, we are only injuriously overloading the paunch by enticing the animal to eat. Until rumination is re-established, the food should consist of gruel, or any other nutritive fluid, and should be so administered that the greater part of it may pass on into the fourth stomach, without entering the first. When the animal appears to be recovering, he should be gradually exposed to cool and open air, and very slowly permitted to return to his usual food.

When the disease is quite subdued, the cleansing of the cow-house should be seriously undertaken, and thoroughly accomplished. Let every portion of filth and dung be carefully removed, the walls, and the wood-work, and the floor carefully washed with water, or soap and water, and then every part washed again with a lotion, in the proportion of a quarter of a pound of the chloride of lime, in powder, to a bucket of water. This will be better than any fumigation that can be possibly applied. Should, however, the chloride of lime not be at hand, then the simple and cheap Fumigation (See No. 37, DOMESTIC ANIMALS, MEDICINES FOR), on which very considerable dependence can be placed, may be resorted to.

The salt should be put in an earthen vessel, and placed in the middle of the cow-house, and the oil of vitriol gradually poured upon it. They should be stirred well together with a stick, and the person preparing the thing should retreat as quickly as he can, to prevent himself from suffering by the fumes of the chloride, closing the door carefully after him, every window and aperture having been

previously closed. In a few hours he may enter the cow-house again, and remove the vessel without any serious inconvenience.

CATTLE, Horn Ail in, or Hollow Horn.

—If the animal is chill, shivering, or has a rough, staring coat, and if the horn is unnaturally cold, give an injection of three quarts of warm water, repeating it if it is thrown off. Administer by the mouth several quarts of warm gruel, containing six or eight ounces of whisky, brandy or gin; or, if attainable, four ounces of sweet spirits of nitre, or five drachms of carbonate of ammonia. Blanket the patient warmly from head to tail, and actively hand-rub the limbs. A good plan is to heat dry bran, salt, and sand in a stove; put it in a long, broad bag, and lay it along the beast's spine from shoulder to rump; or wring a thick rug out of very hot water, lay it over the animal's back from head to tail, cover it with several dry rugs or buffalo-skins, and bind them closely to the skin with surcingle, that the heat may be retained. The limbs, meanwhile, may be actively rubbed and then tied up in warm flannel bandages, loosely applied, so as not to impede the circulation. In half an hour the patient will usually be in a glow of warmth and covered with perspiration. The coverings must be removed gradually, one by one, and the damp one quickly replaced by an ample dry one, after one and a half to two hours. Dangerous inflammations in the chest, abdomen, etc., may often be warded off by these measures, when taken in the initial stage; and though a little more troublesome than the gimlet surgery, it has the compensating claims of being at once rational and successful.

Real horn-ail is a disease of very rare occurrence, but it may sometimes exist. Matter collects inside of the horn, and even in the forehead, in larger quantity than can be readily discharged through the nostrils. It may be recognized by the discharge from the nose of whitish or yellowish matter, and sometimes pure blood; by the heat and tenderness of the root of the horns and forehead; by the hanging head, the partially closed eyes, great dullness and listlessness; and by the absence of a hollow sound when the forehead is gently tapped with the tip of

the middle finger. Boring the horn with a gimlet or sawing off must not be employed as a remedy. "The treatment should be absolute rest, a dose of opening medicine, a semi-liquid, more stimulating diet, the application of cold water, or even hot fomentations, steadily maintained, to the forehead, steaming the nostrils by hot water vapor, and, in obstinate cases, opening the cavity in the interval between the eyes, and syringing it out daily with a mild astringent lotion until a healthy action has been established." The operation of opening the forehead should be performed by a veterinary surgeon.

CATTLE, Glands, Inflammation of.—

There are numerous glandular bodies distributed over the animal structure. Those to which the reader's attention is called are, first, the parotid, situated beneath the ear; secondly, the sub-lingual, beneath the tongue; lastly, the sub-maxillary, situated just within the angle of the jaw. They are organized similar to other glands, as the kidneys, etc., possessing arteries, veins, lymphatics, etc., which terminate in a common duct. They have also a ramification of nerves, and the body of the gland has its own system of arterial vessels and absorbents, which are enclosed by a serous membrane. They produce a copious discharge of fluid called saliva. Its use is to lubricate the mouth, thereby preventing friction; also to lubricate the food and assist digestion.

Inflammation of either of these glands may be known by the heat, tenderness, enlargement and difficulty of swallowing. They are usually sympathetically affected, as in hoose, catarrh, influenza, etc., and generally resume their natural state when these maladies disappear.

TREATMENT.—In the inflammatory stage warm teas of marshmallows, or slippery elm, and poultices of the same, are the best means yet known to reduce it; they relax constricted or obstructed organs, and by being directly applied to the parts affected, the more speedily and effectually is the object accomplished. Two or three applications of some relaxing poultice will be all that is needed, after which apply:

Olive Oil, or Goose Grease.....	1 gill.
Spirits of Camphor.....	1 ounce.
Oil of Cedar.....	1 "
Vinegar.....	½ gill.

Mix. To be rubbed around the throat as occasion may require. All hard or indigestible food will be injurious.

CATTLE.—Inflammation of the Bladder.—This disease does not often occur in cattle, except from eating acrid and poisonous herbs, or when cows are near their time of calving. In the first case, there are frequent and violent, but ineffectual, efforts to stale. There is true and proper inflammation of the neck of the bladder. This may be occasioned by cold, but is more frequently produced by the animal having fed on healthy pastures, and on the hot and stimulating plants that abound there. The *broom* is a frequent cause of this disease.

It is of much consequence to be enabled to distinguish this from inflammation of the bladder itself. In the early stage of inflammation of the neck of the bladder no urine will be voided, while it will be discharged much more frequently than usual, and apparently in larger quantities in true inflammation of the bladder; and when at length, in inflammation of the neck of the bladder, urine is voided, it is after much straining, and is evidently and forcibly squeezed out from the over-distended but closed vessels. The most certain way, however, of distinguishing the one from the other, is to introduce the hand into the rectum; the distended bladder will then be plainly felt below. It may sometimes be detected by examination of the outside of the belly.

The course to be pursued is sufficiently plain—the bladder must be emptied, or more fluid will pour into it until it actually bursts. For some time before the fatal termination of the complaint in the rupture of the bladder, not only the constant straining, but the heaving of the flanks, the quickness of the pulse, the loss of appetite, the cessation of rumination, and the shivering fits, will sufficiently indicate the extent of the danger. The better way of emptying the bladder is, if possible, to relax the spasm of its neck. It is the spasmodic action of the sphincter muscle of the neck of the bladder that is the cause of the obstruction. A very large bleeding will sometimes accomplish this; but it must be a large one, and continued until the animal is exhausted almost to fainting.

To bleeding, physic should succeed, in order to lower the system, and relax the spasm; but no medicine must be given that would in the slightest degree increase the flow of urine. Sulphur, or aloes, or both combined, would be indicated here.

Should not the flow of urine be re-established, mechanical means must be resorted to. Here a skilful practitioner should be consulted. The water may be readily drawn from the cow by a catheter; but in the ox, from the curvature of the penis, this would be a very difficult affair. Some have recommended to cut down upon the penis, behind the bag, and lay open the urethra, and so pass a catheter into the bladder; but this will produce a wound, difficult to heal from the passage and excoriation of the urine. Others would puncture the bladder through the rectum, and others through the belly; but both operations may be accompanied and followed by various unpleasant circumstances.

The farmer, nevertheless, having fully ascertained the nature of the case, may often evacuate a great portion of the urine in a very simple way. The bladder of the ox lies more in the pelvis than does that of the horse—it is more easily felt than in the horse—it is more readily pressed upon by the hand—and the muscle at the neck of the bladder is much weaker; so that the hand being introduced into the anus, and gentle pressure made upon the bladder, a great quantity, or almost the whole, of the urine may be forced out, without danger.

A catheter may be introduced into the bladder of a cow without difficulty.

Inflammation of the bladder itself is a disease more frequent, and from the same causes, namely, cold and acrid herbs. Here the animal should be bled and physicked, and fomented across the loins, and every diuretic medicine carefully avoided. The Drink for Inflammation of the Bladder may be administered with good effect, after the bleeding and purging. (See No. 42, DOMESTIC ANIMALS, MEDICINES FOR.)

It should not, however, be forgotten, that in cows that are near parturition this discharge of urine is not unfrequent, and arises from irritation of the bladder, caused by the pressure of the fetus, or from sympathy with the uterus, now much

excited, and not from actual inflammation. When she has calved, this will gradually cease; or a dose of salts, followed by one or two of the powders just recommended, will afford immediate and considerable relief. In some cows this incontinence of urine has been produced by the retention of a dead calf in the womb beyond the natural period, and it being at the same time in a state of putrefaction. The mingled influence of long-continued pressure, and of proximity to a large body in a state of decomposition, will occasionally produce a state of extreme irritability. The animal should have warm mashies once or twice daily.

CATTLE, Eye, Diseases of the.—Oxen are very apt to receive injuries about the eye, as wounds penetrating into the orbit of the eye, or even fractures of the orbit. The principal thing is to prevent or abate inflammation, by fomentations or poultices, and a little physic, and to leave nature pretty nearly to herself. Either from injury or from a disposition in the bullock to throw out tumors of every kind, there are frequently bony enlargements about the eyes of oxen. It will be easily seen how far they are a nuisance to the animal, or impede the sight; and if it is necessary to remove them, the aid of a professed practitioner on cattle should be obtained, as an important vessel may be divided, or a sad blemish left.

Soft, fungous tumors sometimes grow out of the orbit, or from the bone around. These can only be got rid of by the use of the knife, and that should be placed in a skilful hand; but even in the most skilful hands, the knife often fails; or, rather, there is a disposition to reproduction in these tumors, which it is impossible to repress.

The eyelids of the ox are very subject to disease. Sometimes there is scaldiness around the edges; sometimes a row of pustules resembling the stye of the human being: both of these diseases are frequently a great source of annoyance. They appear early in the spring of the year, and continue during the summer and the greater part of the autumn, and disappear as winter comes on. A solution of white vitriol, in the proportion of a drachm to a pint of water, will often be a useful application. If this fails, the

nitrated ointment of quicksilver may be smeared over the lid, taking care that none of it gets into the eye. It will, however, be necessary at times to prepare for the use of these by washing the part with a goulard lotion for a few days.

Young oxen are subject to warts, which are frequently sadly teasing. They would probably disappear after a while, but, in the meantime, they are unsightly, and much annoy the animal by getting between or within the lids. They may either be clipped off with the scissors, touching the root afterwards with the lunar caustic, that the wart may not be reproduced; or—the best way when practicable—they may be removed by tying a ligature of fine strong silk tightly round the pedicle, or root.

The eye itself is not unfrequently inflamed, and sometimes very acutely. The horse has a little shovel, concealed in the inner corner of the eye, which he is enabled to protrude whenever he pleases over the greatest part of the eye, and by aid of the tears to wipe and wash away the dust and gravel which would otherwise lodge in the eye and give him much pain. When the haw is swelled in disease, the ignorant farrier too often cuts it away, not knowing that it is the mere effect of inflammation, and that a little cooling lotion would probably abate that inflammation, and lessen the swelling, and restore the part to its natural size and utility. The ox has something of the same contrivance, but it is not so movable or so effectual; and, when he travels over a dusty road in the heat of summer, he sadly suffers from the small particles of dirt and the insects that are continually flying into his eye. This is unobserved by the careless driver, and inflammation is established, and the eye weeps, and becomes dim, and sometimes blindness follows.

This portion of the eye, or this third eyelid, seems to be peculiarly subject to disease. Little swellings and ulcers, and fungous growths appear upon it; and a fungous, like that just described, springs up and almost covers the eye. This is sometimes in a manner epidemic on various farms.

But from other causes, and of the nature of which we know little, INFLAMMATION OF THE EYE is produced, and goes and

comes as in the horse, time after time, the attack being gradually more severe, and the intervals between the attacks shorter, until, as in the horse, the inflammation extends to the internal part of the eye, and the lens becomes opaque, and cataract ensues, and the ox is incurably blind.

All these must be dealt with as other inflammations are. In order to combat general inflammation of the eye, bleeding, physicing and fomentations are the principal weapons employed. The blood should be taken from the jugular, for that is supplied by veins coming from the inflamed parts. If the bleeding is ever local, the lid should be turned down, and the lining membrane lightly scarified. A few drops of blood thus obtained will often do a great deal of good. The fomentation having been continued for a day or two the Sedative Eye Lotion (See No. 43, DOMESTIC ANIMALS, MEDICINES FOR,) should be used, a few drops of it being introduced into the eye two or three times every day.

There cannot be a better sedative in the early stage of inflammation of the eyes.

In many cases this alone will effect the temporary or perfect removal of the inflammation; but should the eye not improve, or should it appear to become insensible to the influence of the tincture, try the other Sedative Eye Lotion. (See No. 44, DOMESTIC ANIMALS, MEDICINES FOR.)

The inflammation being subdued by the one or the other of these applications, or even bidding defiance to them, and assuming a chronic form, the Strengthening Lotion for the Eye, (See No. 45, DOMESTIC ANIMALS, MEDICINES FOR,) a lotion of a different character must be had recourse to.

When the inflammation runs high, the transparent part of the eye is apt to ulcerate, and a fungous substance sprouts, and sometimes protrudes through the lids. This should be lightly touched with a solution of nitrate of silver, or, if it is very prominent, it should be cut off, and the base of it touched with the caustic.

A seton in the dewlap will always be beneficial in inflammation of the eye, and it should either be made of the black

hellebore root, or a cord well soaked in turpentine.

Of one circumstance the breeder of cattle should be aware—that blindness is an hereditary disease, and that the progeny of a bull that has any defect of sight is very apt to become blind.

If the case is neglected, inflammation of the eye will sometimes run on to cancer, and not only the eye, but the soft parts around it, and even the bones, will be affected.

When this termination threatens, the globe of the eye will usually turn to a bottle-green color, then ulceration will appear about the center of it, and either the fungous of which we have spoken will sprout, and the eye will become of three or four times its natural size, or it will gradually diminish and sink into the orbit. The fluid discharged from it will be so acrid that it will excoriate the parts over which it runs, and the lids will become swollen and ulcerated.

The radical cure, and the most humane method to be adopted with regard to the animal, is to remove the eye. Here the assistance of a veterinary practitioner will be indispensable.

If the owner does not think proper to adopt this method, let him at least try to make the poor beast as comfortable as he can. The part should be kept clean, and when there appears to be any additional inflammation, or swelling, or pain, the eye should be well fomented with a decoction of poppy-heads. Let none of the stimulating ointments or washes of the farrier be used. This would be cruelly punishing the animal, when no good purpose could possibly be effected.

Sometimes the centre of the eye is not so much affected as the haw at the inner corner of it. When that part merely *enlarges* from the inflammation, or the eye generally, the digitalis or the Goulard wash will usually abate the swelling; and he would be both ignorant and cruel who would remove it on account of simple enlargement accompanying inflammation; but when it becomes hard and schirrous, and especially if fungous granulations begin to spring from it, the case assumes a different character. No sedative or other lotion will lessen the schirrous or the fungous tumor. It must be removed by an operation—it must be cut away.

The method of accomplishing this by a skillful practitioner is not difficult. The beast must be thrown, and the head held firmly down by an assistant. The operator then passes a curved needle, armed with a double strong silk, through the body of the tumor, and, drawing a portion of the silk through it, gives the needle and the end of the silk to be held by another assistant. He pulls the silk gently, but firmly, until he draws the tumor as far as possible from the corner of the eye, so that the attachment of its base may be seen. The operator then with a knife dissects it out, or with a pair of scissors snips it off. No bleeding of any dangerous consequence will follow, and the blood that is lost will abate the inflammation, and ease the pain which the animal had previously endured. The removal by ligature is a slow and not always effectual method of proceeding; for it may not be possible to apply it accurately around the very base of the tumor, and then the enlargement will probably be reproduced. It is also necessary to tighten the ligature every day, or every second day, and at each time the contest with the beast must be renewed if this mode of removing the tumor is adopted.

CATTLE, Choking.—Cattle are extremely liable to become choked when feeding on turnips or other roots, and many are in consequence destroyed. A round object, such as a potato, is more likely to occasion suffocation than a more irregular body, as it produces greater pressure on the windpipe, and is embraced more closely by the œsophagus. The appearances attending choking can scarcely be mistaken. The animal evinces great distress, tries to bring up the obstructing body, slavers at the mouth, pokes its nose, and draws up the neck. After awhile the abdomen swells from the inflation of the paunch with gas. Sometimes the beast will die in a very short time, but the urgency of the case depends much on the situation and the size of the obstructing body.

If the rumen is so distended as to threaten immediate suffocation, it will be proper to puncture it; but this, if possible, should be avoided. It will next be desirable to ascertain the situation of the obstruction. Sometimes it will be found

that the body is impacted at the back of the mouth or beginning of the œsophagus; in these cases by using a balling-iron the object can frequently be removed by passing up the hand.

If, however, the substance is situated low down the tube, it will be desirable to force it onwards. For this purpose half a pint of oil should be given to lubricate the passage as much as possible, and then the beast, being properly secured, and a gag placed in the mouth, a flexible tube or rod, with a knob at the end, should be carefully passed down the œsophagus until it reaches the body; a steady pressure should now be employed to force it onwards; but this should be done patiently, so as not to injure the parts. By alternately resting and trying again, the object will generally be removed.

If the object is situated near the mouth, but not sufficiently so as to be reached by the hand, it can best be removed by means of an instrument invented by Mr. Simonds, and which is constructed so as to embrace the obstructing body by a forceps, concealed in the bulb at the end of the tube, and thus to remove it upwards by the mouth.

After forcing the object into the stomach it will be desirable to let the probang remain a short time, if the animal is hoven, to afford an exit for the gas; and this may be assisted by pressing the flank.

No solid food should be allowed for several days afterwards, as there is great danger of a repetition of the choking until the muscles entirely recover their tone. Sometimes, after all attempts of removing the body by the methods before described have failed, it will be proper to do so by means of an operation which has been performed with success; and this consists in making an incision through the skin into the œsophagus, sufficiently large to extract the body. Great care must be exercised, so as not to injure the important nerves and blood-vessels situated near the part. The beast should be cast for the operation, and the wound carefully sewed up afterwards, and for several days the food should consist principally of gruel.

CATTLE, Locked-jaw.— Fortunately this is not a very frequent disease among cattle; but it is a very fatal one when it

does occur. If the attendant is careful, he will observe the symptoms of this malady one or two days before it is thoroughly and incurably established. There will be a stiffness of gait in the beast—he will walk unusually wide behind—there will be difficulty of turning—permanent cocking of the tail, except when that is interrupted, or accompanied by a singular tremulous motion of it. The animal can scarcely, and, after awhile, not at all, bend his neck to graze; but he will stand with his head protruding, and his ears stiffened, and unnaturally fixed in a somewhat backward direction. Rumination gradually ceases, or is performed slowly and painfully. At length the jaws become firmly closed, and the neck perfectly stiff. The eyes are strangely fixed, and with some degree of squinting, and the expression of the countenance is peculiarly anxious. The breathing is considerably affected, and there is much labor of the flanks.

The animal will linger on in this dreadful way for eight, or nine, or ten days, almost every muscle of the body being painfully cramped, and the poor creature unable to take a morsel of food, until at length it dies, exhausted by the violent contraction of the muscles and by starvation.

The usual cause of locked jaw is some neglected or unobserved wound, particularly in the feet. Working oxen, therefore, are most subject to it. Several weeks sometimes pass between the infliction of the wound and the appearance of this disease. Working oxen that have been exposed to cold and wet, after being heated in drawing, frequently have locked jaw. It has been said that locked jaw is occasionally produced by eating some poisonous plants. We much doubt the accuracy of this; and in many, and probably the majority of instances, the cause is altogether unknown.

The treatment is indicated by the nature of the disease. It is a most violent action of the nerves of motion, either of a part or the whole of the frame. The most likely means to quiet this is the loss of blood, and that in a large quantity. Therefore, the ox should be bled as soon as the complaint is discovered, and bled until his pulse falters, and he staggers, and threatens to fall.

The bleeding will usually relax the muscles of the jaw to a certain degree, and for a little while; and advantage must be taken of this to give the Strong Physic Drink. (See No. 47, DOMESTIC ANIMALS, MEDICINES FOR.)

Generally the jaw will be now sufficiently relaxed to permit the introduction of the thin neck of a claret bottle into the mouth.

The bowels having been opened, those medicines must be resorted to which have the readiest and most powerful effect in quieting the nervous system. These are, as it regards cattle, the Anodyne Drink for Locked Jaw. (See No. 48, DOMESTIC ANIMALS, MEDICINES FOR.)

This medicine should be administered three or four times every day, care being taken that the bowels are kept open, either by means of aloes or Epsom salts.

The bleeding should be repeated on the second day, if the animal is not evidently relieved; and as much blood should be again taken as the patient can bear to lose.

The stable or cow house should be warm, and the animal covered with two or three thick rugs. If considerable perspiration can be excited, the beast is almost sure to experience some relief.

While all this is done to lower the action of the nervous system, the strength of the beast must be supported. He will not, or rather he cannot eat; but he often looks very wistfully at his food. Let a good mash, a little at a time, and moister than usual, be placed before him, a portion of which he will try hard to suck up. If he manages this tolerably well he needs not to be forced with gruel or any other nutriment; but if his jaws are too firmly fixed for this, the small end of the pipe of Read's pump should be introduced into the mouth, and as much thick gruel pumped down as the attendant pleases. When the poor animal has been hungry two or three days through utter impossibility of eating, he will gladly enough submit to this operation, and almost offer himself for it.

It will be almost labor in vain to endeavor to stimulate the skin, or to raise a blister. Two, three or four setons in the dewlap have been useful; and benefit has been derived from shaving the back along the whole course of the skin, and cauter-

izing it severely with a common firing-iron. If it should be found impracticable to administer either food or medicine by the mouth, they must be given in the form of clysters. Double the usual quantity of the medicine must be given, on account of the probable loss of a portion of it, and the small quantity that the absorbents of the intestines may take up; but too much gruel must not be injected, otherwise it will probably be returned. A quart will generally be as much as will be retained, and the clyster may be repeated five or six times in the course of the day.

Should the progress of the disease have been rapid, and the symptoms violent; or should it be found to be impossible to give medicine by the mouth, or cause them to act by injection, the most prudent thing will be to have recourse to the butcher. The meat will not be in the slightest degree injured, for it is a disease that is rarely accompanied by any great degree of fever.

CATTLE TRACHEA, Inflammation of the.—See CATTLE, THROAT, INFLAMMATION OF THE.

CATTLE, Bronchitis in.—Bronchitis consists in a thickening of the fibrous and mucous surfaces of the trachea, and generally results from maltreated hoose or catarrh.

SYMPTOMS.—A dry, husky, wheezing cough, laborious breathing, hot breath and dry tongue.

TREATMENT.—Warm poultices of slippery elm or flaxseed, on the surface of which sprinkle powdered lobelia. Apply them to the throat moderately warm; if they are too hot they will prove injurious. In the first place, administer the following drink:

Powdered Liquorice.....	1 ounce
Powdered Elecampane.....	½ “
Slippery Elm.....	1 “

Boiling water sufficient to make it of the consistence of thin gruel.

If there is any difficulty in breathing, add half a teaspoonful of lobelia to the above, and repeat the dose night and morning. Linseed or marshmallow tea is a valuable auxiliary in the treatment of this disease. The animal should be comfortably housed, and the legs kept warm by friction with coarse straw.

CATTLE, “Blasting.”—See CATTLE HOOVE.

COWS, Foot-rot in.—This disease makes its appearance sometimes between the claws of the foot, often in the heel, and extending up the leg, causes extreme lameness, loss of flesh and loss of milk. It often runs through a whole dairy, and its appearance is becoming every year more common. Make an ointment of lard and red precipitate, one part of the latter to four of the former, to be applied to the affected parts and rubbed in; or in bad cases, when the disease is in the heel and upon the leg, worked in by holding a hot iron near the foot. The foot should be cleaned before the application, by washing well with soap and soft water. One application, if thorough, will generally effect a cure; but if all parts are not reached by the ointment, a second application should be made in forty-eight hours.

CATTLE, Pleuro-Pneumonia, Cure of.—Sir W. Miles writes to the Wincanton Bety Sessions, Somerset county, in England, that after having had the pleuro-pneumonia in his herd for nearly eighteen months, he has arrested its progress by causing the herd to inhale carbolic acid night and morning, which stopped the disease. The acid was mixed with water, and sprinkled with a watering pot on saw-dust, put under the fore feet of the cattle when tied up. Cures are also reported by causing the cattle to inhale the fumes of sulphur.

COW, to Dry of Her Milk.—It is often necessary to dry up the milk when cows are wanted speedily to fatten, and this is now and then found to be a difficult matter, especially with large and gross beasts. If the flow of milk is suffered to continue it may overload the udder, and produce inflammation of it, or garget, or general fever, or inflammation of the lungs, or foul in the foot.

The best time to dry the cows is very early in the spring, when they are eating dry meat. A good dose of physic, followed by mild astringent drinks, will usually settle the business, especially if she is moderately bled before the physic is given. Alum in the form of whey (see **ALUM WHEY**, No. 19), or dissolved in water, will be the most effectual, as well as the safest astringent. Six drachms will be the medium dose. The cow may be milked clean when the astringent is given, and then turned on some dry upland pasture.

Two days afterwards she should be examined, and if the udder is not overloaded, nor hard nor hot, the milking may be discontinued; but if the udder is hard and full, and especially if it is hot, she should be fetched home, cleanly milked, and another astringent drink given. The third drink, if it is necessary to give one, should be an aperient one, and after that the **DIURETIC DRINK**, No. 26, every second day.

The milking should only be resorted to if the state of the udder absolutely requires it, for every act of milking is but encouraging the secretion of milk.

COWS, Holding Back the Milk.—Laying a wet rag on the back of the cow that holds back her milk is a very good remedy. Another writer says a weight laid on the back—as a bag of earth or sand, or a chain in the bag—will make her give her milk. As all the remedies in vogue for the vice relate to an application to the back there may be something in it.

CATTLE, the Mange.—Mange may be generated either from excitement of the skin itself, or through the medium of that sympathetic influence which is known to exist between the skin and organs of digestion. We have it, appears to me, an excellent illustration of this in the case of mange supervening upon poverty—a fact too notorious to be disputed, though there may be different ways of theorizing on it.

Mr. Blanie says: “Mange has three origins—filth, debility and contagion.”

The most effectual application is Mange ointment, No. 54, of which sulphur is the principal ingredient. Some mercurial ointment, however, must be added, but in no great quantity, for cattle will lick themselves, and salivation may ensue. There is nothing so injurious to the milk, or to the fattening of the beast, as salivation, even in a slight degree.

This should be well rubbed in with the hand daily, wherever there is mange, the hair being carefully separated where the affected part is covered by it. No possible danger can happen from the prolonged use of this ointment if the animal is not exposed to severe cold.

Alterative medicine will materially assist the cure, and may be given without

injury to the milk, and without any precaution being needed. (See *Alterative Drink*, No. 55, *DOMESTIC ANIMALS, MEDICINES FOR.*)

Connected with mange, generally accompanying it, and often producing it, are *LICE*. The presence of these vermin argues extreme negligence, and is an absolute disgrace to the farmer. They rapidly spread from cow to cow; the slightest touch transfers some of them from one beast to another; they are crawling continually in the stable or on the the pasture; and although they are never originally bred in the skin of a diseased animal, yet in one that has been half-starved or mangy, and whose coat clings to the skin, and will not come off when nature usually sheds it, these vermin find too favorable a shelter. They are both the consequence and the cause of mange, and other affections of the skin. Myriads of them are sometimes found on the poor beast, teasing it almost to death.

The mange ointment above recommended will often be effectual in destroying them, or should it not be sufficiently powerful, a weaker kind of mercurial ointment for vermin (See No. 56, *DOMESTIC ANIMALS, MEDICINES FOR.*) may be applied.

Some prefer a lotion. The best Lotion for Vermin, is No. 57, *DOMESTIC ANIMALS, MEDICINES FOR.*

This is strong enough to kill the vermin, but cannot possibly injure the beast. An ointment, however, is best, for it can be more thoroughly rubbed among the hair, and into every lurking place which the vermin may occupy. A portion of the liquid is often lost in the act of applying it. The ointment or the lotion should be used daily, and three or four dressings will generally remove the nuisance.

Scotch snuff has been dusted on the beast with partial good effect; the animalculæ have been thinned, but not extirpated. The snuff cannot possibly reach half of them.

While the lice are attacked, the condition of the animal should, if possible, be improved. Poverty and bad condition are sad encouragers of these pests. The alternative drink just recommended may be advantageously combined with tonics. (See *Alterative Tonic Powders*,

No. 58, *DOMESTIC ANIMALS, MEDICINES FOR.*)

WARBLES may here be not improperly considered. The breeze, or gad-fly, or ox-fly, appears about the end of the summer, and is a sad annoyance to the ox. At the very hum of the insect the cattle will gallop distractedly over the field, and sometimes do themselves serious injury. When the fly has the opportunity of alighting on the beast, he chooses the back or the loins, and piercing the skin, deposits an egg under it. Some venom is also distilled into the wound, for a tumor is shortly afterwards formed, varying from the size of an hazel-nut to that of an egg. It is a kind of abscess, for it speedily bursts and leaves a little hole on the top of it for the grub, which is now hatched, to breathe, and where he lives on the fatty matter that he finds in this curious abode.

These warbles are often a sad nuisance to the animal. He licks them when he can get at them, and rubs himself violently on anything within his reach.

Country people sometimes get rid of them by compressing them between the finger and thumb and forcing the maggot out. Others, with more certain effect, either pull off the scab around the mouth of the tumor, or open it with a lancet or pen-knife, and then pour in a few drops of spirit of turpentine, or introduce a heated needle.

The farmer is scarcely aware how much injury this fly does to the hide, for, although the holes may apparently close up that part will always be weak.

CATTLE, Throat Inflammation of the.—In many cases, if attended to immediately, nothing more will be necessary than confining the animal to a light diet, with frequent drinks of linseed tea, warmth and moisture applied locally in the form of a slippery elm poultice, which may be kept in close contact with the throat by securing it to the horns. But, in very severe attacks, mullein leaves steeped in vinegar and applied to the parts, with an occasional stimulating injection, together with a gruel, are the only means of relief.

CATTLE LARYNX, Inflammation of the.—See *CATTLE, THROAT, INFLAMMATION OF THE.*

CATTLE, Poisons.—In the early part of the spring, and before the different vegetables have attained their proper growth and smell, cattle are liable to be injured, and even destroyed, by eating poisonous plants; and especially when they are turned into fresh pasture. In some countries, and in some seasons, when particular plants have prevailed, a great many cattle have been lost, and it has appeared as if some epidemic disease was raging, until a botanist, accidentally coming into that part of the country, has discovered the true cause of the malady. It is a great pity that farmers and graziers are not sufficiently acquainted with botany to know the different plants, wholesome and poisonous, that are growing in their fields.

Some have thought that cattle are poisoned by drinking from stagnant pools, full of venomous insects and of every kind of decomposition from animal and vegetable substances. We doubt the truth of this; for the cow seems to be naturally one of the foulest drinkers among our domesticated quadrupeds. She will often choose the most filthy puddle in the straw-yard in preference to the clearest running stream. Nature would not have given her this propensity for foul and putrid drink if it was prejudicial to her.

The symptoms of empoisonment vary with the plant that has been devoured. In general the animal moans sadly, as if in dreadful pain; or a sudden stupidity comes upon it—or violent convulsions. After eating the yew-clippings, cattle are often perfectly delirious; and in almost every case the belly more rapidly swells than it usually does in hoove.

It is plain that there can be no case in which more speedy and decisive measures are needed; and yet very little can be done, except that useful instrument, far too little known, Read's patent pump, is at hand. The pipe should be introduced into the paunch, so that the extricated gas which causes the swelling may escape. After this a quantity of warm water should be thrown into the stomach, sufficient to cause sickness, and thus get rid of a part, at least, of the offending matter. Then, by introducing the pipe only a part of the way down the gullet, a physic-drink may be gradually introduced, which will thus pass on to the fourth stomach,

and cause speedy purging. The Strong Physic Drink (See No. 47, DOMESTIC ANIMALS, MEDICINES FOR), will be the most effectual purgative. It will usually be advisable to bleed moderately; drinks of vinegar and water, not exceeding half a pint of vinegar at a time, should be administered if it is suspected that the poison is of a narcotic kind, and the purging should be kept up by repeated small doses of the aperient medicine. When the poison seems to be nearly evacuated, the CORDIAL DRINK, No. 31, will be beneficial in giving to the stomach.

Cattle are exposed too much to the influence of poisons of another kind, used under the form of medicines. Corrosive sublimate and tobacco-water have destroyed many a valuable ox. An antidote is in these cases usually quite out of the question, for the constitution is fatally affected before the owner knows anything of the matter.

Cattle in the neighborhood of lead-mines have been dangerously affected from the effects of this ore in the grass. Difficult respiration with loud wheezing is one of the most prominent symptoms, the beast losing its appetite, pining away, and at length dying of suffocation or attacked by epileptic symptoms. Large doses of Epsom or Glauber's salts with linseed oil, and followed by opium, are the best remedies. The smoke from copper-mines has also produced sad disease amongst animals in the neighborhood; it causes swellings of the joints of a painful description. An early removal to another soil forms the best treatment.

Ranking under the general term of poisons, we may mention the bites of venomous reptiles. The beast is generally stung about the head or feet, for it is most likely to disturb these reptiles either in the act of browsing, or as it wanders over the pasture. Cattle bitten in the tongue almost invariably die. They are suffocated by the rapid swelling which takes place. The udder has occasionally been stung; but the supposed bites on the teats are, far oftener than otherwise, the effect of garget.

The country remedy is not a bad one, viz., to rub the part well with a bruised onion. Some follow this up by cramming another onion down the throat. A better

application is the Embrocation for Bite of Serpents. (See No. 49, DOMESTIC ANIMALS, MEDICINES FOR.)

A quart of olive oil should also be given to the animal, mixed with an ounce of hartshorn. Oil of turpentine may be used when hartshorn cannot be procured; but it is not so much to be depended upon.

The stings of hornets, wasps, and bees, in some cases produce much temporary swelling and pain. If the part is well rubbed with warm vinegar, the inconvenience will soon subside.

Leech-bites may be mentioned here. While the animal is drinking from some stagnant pool, a leech will occasionally fasten itself on the muzzle, and afterwards creep up the nostril, and produce a very considerable, and, in some cases, dangerous, bleeding by its bites. If the leech can be seen, or it is in a manner certain that it has insinuated itself into the nostril, a little strong salt and water should be injected up the nose, which will immediately dislodge the intruder, if it can be brought into contact with it.

CATTLE, Wounds.—From the horns of their companions, and from the brutal violence of those who look after them, cattle are often exposed to wounds. The treatment of them is generally simple enough, except in a joint, or the neighborhood of one.

The first thing is to clean the wound from all dirt and gravel, which would cause irritation, and prevent the healing of the part. A good fomentation with warm water will effect this, and at the same time will help to abate any inflammation which may probably have arisen.

Next is to be considered the state of the wound. Is it a lacerated or punctured one? If it is a lacerated wound, we must try how neatly we can bring the divided parts together. If there are any portions so torn as to prevent us from doing this completely, they should be removed with a knife or a sharp pair of scissors. Then, when the edges are brought well together, they should be retained by passing a needle and strong waxed twine deeply through them, making two, or three, or more stitches at the distance of half an inch from each other. A surgeon's crooked needle, or a glover's large triangularly pointed needle, will be

necessary for this purpose. A little dry, soft, clean tow should then be placed over the wound, and the whole covered by a bandage closely, but not too tightly applied. Let none of the farrier's abominable tents, or pledgets of tow, be introduced; the intervals between the stitches will be quite sufficient to permit the escape of any matter that may be formed. The wound should not, if possible, be opened for two days after the first dressing.

When it is at length examined, let none of the hot torturing applications of the furrier be used. If it looks tolerably healthy, and is going on well, it may be dressed with tincture of myrrh and aloes, or with the HEALING OINTMENT, No. 10, or with both; a pledget of tow soaked in the tincture being put immediately on the wound, and more tow, with the ointment spread upon it, placed over this.

If proud flesh should begin to spring, the wound should be first washed with a strong solution of blue vitriol, and then dressed with the tincture; or if the discharge is very offensive, the wound should be well bathed with the DISINFECTANT LOTION, No. 34, and then the tincture applied.

If it is a punctured wound, its direction and depth must be carefully ascertained. Fomentations of marsh-mallows, or poppy-heads boiled in water, should be applied for a few days, in order to abate inflammation, and the tincture of aloes and myrrh should be injected into the wound morning and night; the injured parts being covered if the flies are troublesome, but otherwise left open. If the wound runs downwards and the matter cannot escape, but collects at the bottom, and seems to be spreading, a seton should be passed into the original orifice, and directed as far as the very lowest part of the sinus, or pipe, and there brought out. There is never occasion for the introduction of lint into these wounds: if they are well syringed with the tincture to the very bottom, and a seton passed through the sinus, should one happen to be formed, they will do very well.

From the yoke being too heavy, or not fitting the neck, the shoulders of oxen will sometimes get sadly wrung, and deep ulcers will be produced, resembling fistulous withers in the horse. These ulcers are very troublesome to deal with. The

secret, however, of properly treating them is to pass a seton through the very bottom of the ulcer, in order that the matter may flow freely out: then, in the majority of cases, the wound will readily heal, or if it should not, the diabolical scalding mixtures of the farrier are never wanted. If we allowed any scalding mixture, it would be boiling tar, because tar boils at a very low degree of temperature. The surface of the wound would be sufficiently stimulated, and the life of the part would not be destroyed; but he who pours in his boiling oil, or his corrosive sublimate, deserves never more to possess, or to be permitted medically to treat, a beast. In obstinate cases diluted acid (one part of nitric acid and two of water) may be applied over the surface of the ulcer, with a pencil or sponge.

When a tumor is forming on the shoulder from the pressure of the collar, every attempt should be made to disperse it. A saturated solution of common salt will often be useful, or sal-ammoniac dissolved in eight times its weight of water; but the best discutient application is the Discutient Lotion (See No. 50, DOMESTIC ANIMALS, MEDICINES FOR).

The part should not only be wetted with this embrocation, but gently yet well rubbed with it.

Should the swelling still increase, and, on feeling it, matter should evidently be formed, the sooner the tumor is opened the better, and the best way to open it is to pass a seton from the top through the lowest part of it.

Oxen are very apt to be wounded in the feet. If this is soon discovered, all that will be necessary is to apply a pledget of tow wetted with tincture of aloes, confining it between the claws with a bandage, or to touch the part lightly with the butyr of antimony. When the application of the caustic is necessary, there is no need to apply it with the severity used by some, so as to corrode the parts to the very bone.

If the wound is extensive, and accompanied by much swelling, heat, and pain, and especially if the beast should begin to lose its appetite, and to heave at the flanks, it will be prudent both to physic and to bleed.

If much contusion or bruise attends the wound, and which is very likely to

happen when cattle are gadding about and breaking out of their pastures in summer, and especially when strange beasts are intermixed, the previous fomentation will be more than usually necessary, in order to prevent inflammation, and to disperse or favor the escape of the effused blood. The fomentations, should be continued during half an hour at each time, and repeated three or four times in the day. The flannels should be applied dripping wet, and as hot as the hand can bear them.

If the wound penetrates the cavity of the chest, as it sometimes will when one beast gores another, it will be necessary to bring the parts more accurately together, and to confine them by closer stitches; a piece of adhesive plaster should then be placed over the wound, and secured by the application of proper rollers or bandages. If the air is suffered to pass in and out of the wound for any considerable time, the edges of it will be indisposed to unite together and to heal, and the pleura or lining of the chest will probably become inflamed by the unnatural presence of air in the cavity of the chest.

Should the belly be wounded, and a portion of the bowels protrude, it will be necessary to calculate the probability of being able to return them into their proper situation, and healing the wound; for in many of these cases the best thing the farmer can do is to send the animal at once to the butcher. If a cure is attempted, all dirt and clotted blood should be carefully removed from the protruded intestine with a sponge and warm water. It must then be cautiously returned into the belly, and the edges of the wound brought together and secured by the close stitches. After that, rollers or bandages must be passed round the belly, and which, being removed only while the wound is dressed, must remain until a cure is completed, and for a few days afterwards.

In all these cases a veterinary surgeon should be consulted. He alone is able to give an accurate opinion as to the probability of a cure, and to guard against a thousand accidents and annoyances that are likely to occur in the treatment of such a case.

Many persons are frightened when

they see the profuse bleeding which sometimes takes place from deep or lacerated wounds. Except some large arterial trunk is divided, there is little or no danger of the animal bleeding to death. When a certain quantity of blood is lost the stream will flow slowly, and a coagulum, or clot of blood, will be formed in the vessel, and plug it up, and afford a mechanical obstruction to the hemorrhage. Sufficient blood, however, may be lost to interfere materially with the condition of the beast, and to leave considerable and lasting weakness behind. We are therefore anxious to stop the bleeding as soon as we can.

Where the situation will admit of it, a dossil of lint, placed upon or in the wound, and secured by a firm bandage, will often be effectual. If the vessel is but partly closed by the pressure of the lint, yet that may be sufficient to produce a coagulation of the blood, and the consequent stoppage of the stream.

The next preferable way of proceeding is to endeavor to pass a ligature round the bleeding vessel. This is often practicable by means of a tenaculum or any hooked instrument, by which it may be drawn a little from its situation, and some waxed silk or twine passed round it. Sometimes it may be laid hold of with a pair of forceps or small pincers, and so secured; or, should neither of these methods be practicable, a crooked or glover's needle, armed with waxed silk, may be plunged into the flesh or cellular membrane in two or three places around the wound, and when the silk is tightened the vein or artery will probably be compressed and closed. The hot iron is sometimes applied, but usually a great deal too hot, so as to destroy the life of the part, instead of simply searing it, and thus causing renewed hemorrhage when the dead part is thrown off. As for styttic powders or lotions, they appear to have little or no effect in stopping profuse bleeding in cattle.

The bleeding is generally arrested with most difficulty when the horn is broken off in some of the fights among the cattle. The bone of the horn is full of blood-vessels, and it is only by plaister after plaister or tar that a compress is made all round the horn, and through which the blood cannot penetrate. These

plaisters should not be removed for many days, otherwise the bleeding from such a vascular part will return.

Of all the wounds, however, to which the cattle are occasionally exposed, the most dangerous are those about the joints, and especially when the joint itself is penetrated. The ox is not so subject to this as the horse; but the fetlock and the knee are occasionally deeply wounded, and the joint laid open, either by falling, or by being brutally wounded by a fork.

Here, as in all other wounds, the first thing to be done is carefully to wash away all dirt and gravel. The probe must then be introduced; and the depth to which it will penetrate, and, more particularly, the grating sound which will be heard when it comes into contact with the bone, will generally determine whether the joint has been injured. If any doubt remains about this, a poultice should be applied. This will not only abate or prevent inflammation, but if the joint has been penetrated the synovia, or joint oil, will escape and appear upon the poultice in the form of a glairy, yellowish fluid. Then there is no doubt as to the course to be pursued. The flow of this must be stopped, and that immediately. It was placed there to be interposed between the ends of the bones, and thus to prevent them rubbing against each other, and becoming irritated or inflamed. The membrane with which the heads of the bones are covered is in the highest degree sensitive, and with the slightest injury produces inflammation, attended by the extremest torture. There is no agony equal to that caused by an opened joint. We must then confine the interposed joint oil, and prevent this dreadful friction between the membranes.

There are two ways of accomplishing this. That which seems to be the most humane is to place a small compress on the part, exactly covering the wound; to bind it down tight, and not to remove it for many days. Yet it has often happened that when the compress has at length been taken off, the joint oil has flowed as quickly as before; therefore, we believe, we must go back to the old method, and apply the hot iron to the wound. The iron, being of a dull red heat, should be run lightly across the surface of the

wound in various directions, the consequence of which will be that so much inflammation and swelling will usually be produced as fairly to block up the orifice with that which soon becomes organized, or converted into the same substance as that in contact with which it is placed, and thus the opening into the joint is securely and for ever stopped; or, should the joint oil in a very few cases afterwards flow a little again, a re-application of the iron will put an end to the business: the sore may then be treated as a common wound.

In many cases a lotion composed of corrosive sublimate dissolved in spirits of wine, applied several times a day to the surface of the wound, only until the joint oil disappears, will answer the purpose better than the hot iron. In very severe cases, where the carcass of the animal is of trifling value, and it is, therefore, desirable to attempt a cure at all risks, the application of a paste made with flour, and firmly bound round the part by a number of linen bandages, will, by preventing the flow of joint oil, succeed in closing the joint in many cases: the bandages, however, should not be removed for several weeks, and if necessary the animal may be slung.

Should, however, the wound be very large, and the opening into the joint large too, it will usually be prudent to destroy the animal at once, especially if it is in tolerable condition. A dead horse is worth comparatively little, but a dead ox, fairly slaughtered, will produce its full value. Therefore, the possibility of a cure not being effected, or of the animal materially losing condition while the cure is attempted to be performed, should always be taken into account; and in cases where the meat is not injured, it should be inquired whether the expense and trouble, and the sufferings of the animal, should not be at once terminated by the butcher.

In every joint case it will be prudent to bleed, and administer a dose of physic, and use all proper means to prevent or abate fever.

CATTLE, Strains and Bruises.—The ox is not so subject as the horse to strains, for his work is slower and usually less laborious. The horse is seldom strained at slow and steady work, and

that only is generally exacted from the ox. The principal cause of strain in these animals arises from their contests with, or their riding or ramping each other.

In recent strains, attended with lameness and heat, the Embrocation for Strains (See No. 57, DOMESTIC ANIMALS, MEDICINES FOR) is one of the best that can be used.

Bathe the part frequently with this embrocation. There cannot be a better application for strains or bruises in the horse or cattle, or even in the human being, when the skin is not broken. When the heat and tenderness have somewhat subsided, and only weakness of the part remains, the RHEUMATIC EMBROCATION, No. 9, will be serviceable.

Frequent fomentations with warm water should precede the use of these embrocations. In bad cases it may be prudent to give a doze of physic, or even to bleed.

For very deeply-seated strains a more powerful application may be necessary. Then use the Strongest Embrocation for Strains. (See DOMESTIC ANIMALS, MEDICINES FOR.)

This should be well rubbed in morning and night. It is not intended absolutely to blister the animal; and should the embrocation cause much redness or tenderness, it may be lowered with an equal quantity of olive oil.

After all, a considerable degree of weakness and lameness will occasionally remain, and especially about the hips and loins. A strengthening plaster (See No. 53, DOMESTIC ANIMALS, MEDICINES FOR), will be very useful here. It is best applied in the form of a charge.

A little short tow is then placed over this, before it gets cool, and which, adhering to it, forms a thick coat over it. The charge acts as a support to the part, and as a permanent bandage. It can never do harm; and many an old strain, or lameness, or rheumatic affection, has been effectually removed by it. It should remain on the part two or three months, in order to insure its full success; and after the application of the charge, the beast should be turned out.

Although not exposed so much as the horse to strains generally, yet there is one joint—the fetlock—in the ox, which

often suffers. The division of the lower part of the leg into two bones materially weakens this joint; therefore it is not unusual to see enlarged fetlocks, and a considerable accumulation of bone about them. The mild and the strong embrocation must in turns be diligently applied, and these failing of success, recourse must be speedily had to the blister, or the firing iron; but, if these should not be successful, and the lameness is so considerable as to injure the condition of the animal, relief can be obtained by dividing the nerve which supplies the foot above the fetlock, thereby removing pain and lameness by destroying sensation.

Fractures of the leg sometimes occur; they have been successfully treated by bandaging the parts, and keeping the animal quiet.

The leg, too, has even been *amputated* with success, a wooden leg being afterwards substituted.

CATTLE, Cancerous Ulcers.—There seems to be a natural disposition in cattle to the formation of tumors on various parts of the body. They are mostly found in the neighborhood of joints, and generally either hanging loose, or slightly adhering to the parts beneath. They sometimes grow to an excessive size. In some cases they are evidently constitutional, for many of them appear on different parts. They do not seem to give much pain to the animal, and occasionally they continue month after month without being of any serious inconvenience; they then suddenly break, and a malignant ulcer ensues, which speedily degenerates into a cancerous one.

The tumors are sometimes smaller, and fixed to the parts beneath by a broad base, and which are chiefly found about the face, on the cheeks, or under the eyelids, or in the channel between the jaws. These are more likely to break than the others, and when they break, are far less manageable. The fluid that is discharged from them is thin and excoriating, and the wounds are covered with proud flesh, springing again as quickly as it is removed. If they are attacked before they break, they will generally be got rid of.

As an external application, nothing is superior to the Iodine Ointment. (See

No. 25, DOMESTIC ANIMALS, MEDICINES FOR.)

At the same time a drachm of the tincture of Iodine may be given in a little gruel morning and night, at or soon after the time of feeding; or the Hydriodate of Potash, beginning with four grains morning and night, and gradually increasing the dose to twelve grains. This preparation of Iodine is preferable to the tincture; but the internal and the external use of the Iodine must be continued at least three or four weeks, before any decisive benefit will be obtained. The tumors will frequently disappear altogether; but the ointment and tincture must be used for at least a month before any decisive good can be expected.

If the tumors at the end of that time should not be evidently diminishing, the veterinary surgeon should begin to think about removing them with the knife. They are seldom fed by any very considerable vessel, and may usually be taken away without the slightest danger. It will, however, be prudent to give the tincture of Iodine for three weeks or a month after the operation, in order to remove the constitutional tendency to a return of the tumor.

It will in the majority of cases be useless to attempt to heal these tumors when they have once broken. Strong ointments, and caustics of all kinds, have been tried, but the ulcer has daily spread and gone deeper and deeper, until it became necessary to destroy the animal. If anything is attempted in the way of healing the ulcers, the wound should be washed before every dressing with the tincture of Iodine, lowered with four times its weight of water, and the Healing Cleansing Ointment, No. 10 (See DOMESTIC ANIMALS, MEDICINES FOR) be daily applied.

These tumors are often very troublesome to treat, and the preferable way will generally be to remove them as soon as possible with the knife, except more should be found on any other part of the beast, in which case the removal of the principal tumor would only hasten the growth of the rest. Mercurial ointment will have no effect on these tumors; except to irritate them, and cause them to grow faster, and sometimes it will salivate and seriously injure the beast.

CATTLE, Angle Berries.—These are little warty tumors growing on various parts of the skin. They are unpleasant to the eye, and they sometimes become very sore.

They are a sad nuisance about the teats, and often render the cow very difficult to milk; and, on the eyelids, they are a source of perpetual torment to the animal. The easiest and surest way to remove them is to tie a piece of waxed silk firmly round the base of each, and to tighten it every day; by means of this the tumor will drop off, and rarely grow again; there will be no bleeding, and the neighboring parts will not be inoculated.

If they are so numerous and large that it is necessary to have recourse to the cautery, the heated iron should be immediately applied to the angle berry. The bleeding will thus be readily stopped, and the tumor will not sprout anew.

If they are early attended to, and before they have reached any considerable size, they will gradually disappear when they are daily touched with the nitrate of silver, either in substance or in the form of a strong solution. The strong nitrous acid will answer the same purpose. When there is an inveterate disposition to the growth of these berries, the iodine may be given, as already directed, with every prospect of success.

CATTLE, Clue-bound, Fardel-bound.—These are different terms for costiveness, to which cattle are often subject, and especially in the beginning of almost all inflammatory complaints. The dung gets more tenacious and harder, and is forced away in very small quantities. There is considerable dryness of the muzzle, heat of the mouth, quickness of the pulse, anxiety of the countenance, and every indication of fever. Sometimes the disease is evidently in the bowels principally or entirely; at other times it is only the symptom or accompaniment of other diseases. It always requires immediate attention, and may be considered as highly dangerous. Bleeding will be very useful, not only as lowering the fever, but disposing the purgative medicine to act more speedily. After bleeding, the bowels should be attacked in good earnest. The physic drinks already recommended should be given—at first, the mild Purg- ing Drink, No. 2. If that, repeated after

an interval of six hours, is not successful, the Strong Physic Drink, No. 47, should be tried; and if that also fails, a pound of common salt should be administered, and repeated four hours afterwards. This will seldom deceive, in extreme cases, although, from its irritating the bowels a little too much, it is not a purgative to be recommended in ordinary cases.

The action of the purgatives will be hastened, and generally secured, by the use of injections. Half a pailful of warm water, in which Epsom salt or common salt has been dissolved, may be thrown up every two or three hours.

After the obstruction has been once overcome, the continued exhibition of mild purgatives will be prudent, for the costiveness is too apt to return. The Sulphur Purg- ing Drink, No. 7, will be the best medicine for this purpose. The food should be mashes principally, or young succulent grass.

CALVES, Canker in the Mouth.—The teeth of the young calf follow each other in rapid succession and, as is the case with the human infant, the cutting of the teeth is attended by soreness of the mouth, and disinclination to eat. Numerous pimples often appear about the gums and membrane of the mouth, and these are often run together, considerable ulceration follows, and the animal pines away through lack of nutriment. The gums and tongue are sometimes considerably swollen, and no small degree of fever is excited. The first business is to evacuate the bowels. Epsom salts will here also constitute the preferable medicine, given in doses of one or two ounces, and repeated daily until the proper effect is produced. As a local application, equal parts of tincture of myrrh and water may be advantageously applied to the mouth, or a solution of common alum in water in the proportion of half an ounce of alum to a pint of water. Should any considerable degree of fever accompany the soreness of the mouth, the fever drink already recommended may be given in half doses, with a scruple of magnesia added to each.

CATTLE PHARYNX, Inflammation of the.—See CATTLE, THROAT, INFLAMMATION OF THE.

OXEN, Breaking.—The sooner this is commenced the more complete will be the command of the teamster. It would be well, if convenient, to have them named and haltered, and taught to stand and to start, to “gee” and to “haw,” when not more than a year old, and slightly worked in the summer and autumn after they are two. Gee and haw are the terms used in most parts of the country. The first indicates that the yoke is to incline off to the right, or from the near side, on which the driver should always take his stand. The yoke, however, should not be put on their necks until they are to be worked, as they might acquire a habit of running off in it, which it will be found very difficult to correct.

The proper time “for putting them to work, is at three years old; and such as have not been handled, as above recommended, while growing, should be driven round the field for a day or two, before being yoked, so as to tire them.” The propriety of this is proved by the greater ease with which they are broken, when taken and yoked directly out of a drove, before they have time to recruit from the fatigue of traveling. Instead, then, of being yoked two together, they should be tied by the horns (with a rope slipped over and resting on the top of the head) to the side of a house, taking care that there be no place for the horns to become entangled, and stand tied in this manner till they cease to pull by the cord, which will in most cases be in a day or two. They may then be led very readily, and taught to turn, stop, or start, singly, just as a colt may be, instead of coupling two together at first, which any man in the care of horses would condemn, as being most likely to end in the destruction of one or both, which has not unfrequently happened with young steers when forcibly yoked together in the first instance.

When two young cattle “are yoked and turned loose with their tails tied together to run and plunge about, they are almost certain to acquire a habit of running away; and even should this not be the case, one, and sometimes both, lose a part of their tail in these violent exertions. When they are sufficiently broken to the halter, they may be placed side by side, for the purpose of receiving the

yoke, having reference to their relative size, strength, and mastership; because, if one is stronger and more free than the other, he should be placed on the off-side that the team may rather incline to, than from the driver.”

If one should be larger than the other, he will be likely to be stronger and more free; and, should they be put to the plow, the furrow ox being the larger, the yoke will be kept nearer a level than in the other case. It requires but little observation to see that they are easier to be turned to the right, or made to “gee,” than to the left, or to “haw,” or “come hither” therefore, if the master-ox be on the off-side, he will assist in controlling the near or left one in “coming round;” but when reversed, and the master-ox on the near side, and he not altogether willing to “come here,” the team is some time stationary; for let the then off-ox be never so willing to obey the voice of the driver, the horn of the near one speaks a contrary language, equally intelligible. After the yoke is put on securely, their tails should be well tied together, and they suffered to stand tied as before until a strong pen is built round them, not more than sixteen or eighteen feet in diameter, taking care that the ends of the rails do not extend inwardly. The ropes should then be loosed, if possible, in such a way that they will not be sensible of it. Here they will soon learn to turn themselves about, without one violent exertion, or the least fright. They should be tied up as before, at night, their tails untied, and the yoke removed, to be replaced in the morning as before; and the day following they may be led or driven in a larger space. By this time the cause will be gained in a manner calculated to insure a prime pair of cattle. They may now be attached to something light, and led about for a few hours, daily and gradually increasing the draft, and greasing their necks occasionally, to prevent galling. When put to the cart or harrow with others already broken, contrary to the usual practice, they should be placed before instead of behind them; by which arrangement it will be found that if frightened the old cattle will not let them run; but, if otherwise, they, by running against the older ones, may frighten them also.

In Kentucky they practice another mode of breaking steers, which is thus described: Where the establishment is a large one, and there are some to be broken in every year, the fixture and practice here recommended would seem to be eligible and judicious. "Get a strong post, eight feet long by two thick; plant it three and a half feet in the ground, well rammed; round or level the top of the post and leave a pin to it, or make a mortice and insert a strong two-inch pin of tough wood in it, perpendicularly at the top, six or eight inches long. Then get a tough sapling twenty-five feet long; measure off at the small end of it the usual length of a yoke, and bore the holes for your bows. Then bore three holes, or more if you choose, four, eight and twelve feet from the other end of the sapling, of the size of the pin in the top of the post, giving the shortest lever first, draw your steers up, let them be young or old, gentle or wild, it makes no difference; yoke them to the end of the pole; but instead of tying their tails together, if you wish to avoid bob-tailed oxen, tie their loins together with a good rope, wrap up their head halters, clear the front, and let them go; round and round they will go with a rush; drunk—drunker still they grow, until groaning, down they drop. For a while they lie panting and looking wild; at length they leap as if suddenly frightened, rush round and round again, grow drunk and drop again. Leave them, they will repeat the experiment, until reeling, they will stop or stand. In a few hours you may lead them around by their halters. Uncouple them from the pole, or yoke them to your cart, and drive them where you please with safety.

CATTLE, Cow, Bulling in, to Produce, and Treatment of Bull-Burnt.—It sometimes happens that the cow will not stand to the bull at the time that the farmer wished, so that either the calf is dropped a month or two after the most convenient and profitable time, or the most valuable season for making butter and cheese is lost. Some cows are thus backward because they have been previously starved; a week or fortnight's better keeping will usually effect the desired purpose. Indeed, if the animal has been well kept, and is in good health, there will be little trouble from her unwillingness to asso-

ciate with the bull, but occasionally some of a contrary nature.

Many recipes have been given by various authors to hasten the period of the cow being in season. A very common thing with the farmer is to give the cow that is wanted to take the bull a quart of milk immediately after it has been drawn from a cow that is in season. Two or three good cordial drinks, such as Cordial Drink No. 31 will be more serviceable. A few malt mashies, oats, carrots, etc., may likewise be given. We would earnestly advise the farmer never to have recourse to cantharides. It is a dangerously stimulating medicine; some cows have had suppression of urine quickly following the exhibition of it, and others have died from inflammation of the sexual parts.

On the other hand, cows should not be too fat at this time, because they will frequently then not stand the bulling. A fat cow should have a dose or two of physic and be bled; a lean cow requires better keeping.

The sheath and penis of the bull occasionally becomes swollen and tender, and full of little ulcers, with fetid ichorous discharge. The animal can seldom be managed unless he is thrown, when the yard should be drawn out, and all the sore places bathed with the Lotion for Bull-Burnt. (See No. 54, DOMESTIC ANIMALS, MEDICINES FOR.)

A few application of this will give speedy relief, and heal the sores.

The shape of the cow will sometimes inflame and swell, accompanied with considerable pain at the time of staling, and also a thin ichorous discharge. The part should be washed with this lotion, or a little of it injected up the shape with a syringe.

CATTLE, Cow-Pox.—This disease used to be generally confounded with sore teats, until, Jenner discovered its preservative power against small pox. Other scientific men have since proved that it is identical with small-pox—that it is, in fact, the small-pox of the cow.

It appears under the form of pustules or vesicles on the teats, which are easily broken in milking, and which, left alone, break of themselves, and discharge a thin, unhealthy fluid. The pustules are surrounded by a broad circle of inflamma-

tion, and if neglected, or roughly handled, occasionally run into ulcers, very foul, and difficult to heal.

At the time of, or a little before, the appearance of the pustules, the animal droops, refuses to feed, ceases to ruminate, and labors under considerable fever. The eyes are heavy and dull; the cow moans and wanders about by herself, and her milk materially lessens, and at length is almost suspended.

It will rarely be prudent to bleed, but the bowels should be fairly opened, and the FEVER DRINK, No. 1 given once or twice in the day, according to the apparent degree of fever. The teats should be frequently washed with warm water, and the Lotion for Cow-pox applied morning and night. (See No. 60, DOMESTIC ANIMALS, MEDICINES FOR.)

If the ulcers become very foul, and difficult to heal, they must be treated in the way recommended for garget.

It is well known that these eruptions give a similar disease to the milker. Pustules appear about the joints of the hand, and the ends of the fingers; and there is sometimes considerable fever, pain in the head and limbs and loins, shivering, vomiting, and a quickened pulse. The pustules burst in three or four days, and sometimes become troublesome sores difficult to heal; and if unfortunately the patient should have rubbed his cheek or his lips with the diseased hand, the ulcers will appear there also.

It was the observation that persons who had had this disease of the cow were usually exempt from small-pox, which led to the most important discovery in medicine that has been made in modern times.

There is another eruption on the teat of the cow that bears no inconsiderable resemblance to the true cow-pox, and that has been confounded with it. The pustules are smaller: they are not so round, nor so deep; nor have they the blue color of the others, and they contain pus or matter from the very first. They will readily yield to the Ointment for Sore Teats, No. 29.

Even without any application to them, the scabs usually peel off in a few days, and the skin underneath is quite sound. If, however, these are carelessly rubbed

off in the act of milking, troublesome ulcers are apt to ensue.

It is of much importance to the farmer to be able to distinguish between these two eruptions. The first is contagious, and may be communicated to the milkmaid, and, by her, to other cows. It is the true cow-pox. The second is not contagious, and is readily got rid of.

CATTLE, Rabies, Hydrophobia.—This dreadful disease is produced by the bite of a rabid or mad dog. The time that may elapse between the bite and the appearance of the malady varies from three weeks to three or four months.

The symptoms of its approach are dunness; loss of appetite; the eyes are anxious, protruding and red; the animal frequently and pitifully lows, and is continually voiding its dung or its urine. Saliva drivels plentifully from the mouth, but after a day or two the discharge dries up, and is succeeded by thirst almost insatiable; there is no hydrophobia or dread of water at any time. Presently weakness of the loins and staggering appear; these are succeeded by palsy of the hind limbs, and the animal lingers six or seven days, and dies.

In some cases the beast is dreadfully ferocious; he runs furiously at every object, stands across the path bellowing and tearing up the ground, and violently attacks and gores his companions.

There is no cure; the most prudent thing is to destroy the animal as soon as the disease is sufficiently plain. Care should be taken that the saliva of the rabid ox is not received on a wound or abraded part, for it has produced the disease in other animals. Any wound on which it has fallen should immediately have the lunar caustic applied to it.

When a mad dog has been known to bite an ox, or a cow, there is a possibility of their escape, for the hide is thick, and the hair is thick too, and the skin may not be penetrated, or the tooth may have been cleaned in passing through the hair. They should be most carefully examined, and especially about the part on which they were seized by the dog, and if the minutest scratch can be found, the hair must be cut off round it, and the lunar caustic applied. That being done effectually, and every bite being discovered and operated on, the animal is safe;

but it is possible, or rather it is too probable, that every bite will not be discovered, considering how thickly the skin is covered by hair. It is, therefore, the safest course, if the beast is in tolerable condition, to sell it at once to the butcher, for it will not be fit for the shambles after rabies has once appeared. Medicine would be completely thrown away in these cases.

CALVES, Young, the Diseases Incident to.—When the calf is dropped, proper care should be taken of the cow by providing her with a comfortable place to lie down; she should also be suffered freely to lick her calf, for this will not only make her fond of it, but the young animal will be thoroughly cleansed, and raised much sooner than it otherwise would, and the mother, in eating the cleansing, will obtain that medicine which nature designed for her.

It is usual to take away a quart of the first milk, called the beastings, before the calf is allowed to suck. After this the young animal may be allowed access to the cow, but regulated by the plan of suckling or bringing up on which the grazier may determine. The calf should remain with the mother during a few days at least, or until the milk is proper for the purposes of the dairy.

The mother's first milk is of an aperient quality, and sufficiently so to cleanse the bowels of the calf from the black, sticky substance which they contain when first dropped. If this should not be effected, a little opening medicine, such as *Aperient Drink for Calves*, (See No. 61, *DOMESTIC ANIMALS, MEDICINES FOR*.) will be necessary.

The Epsom salts are as efficacious as any kind of oil for purging young cattle, as well as far less expensive than most oils. Custom, however, has sanctioned the almost general use of castor oil in these cases, and there is no objection to it.

After the first or second day, it will be prudent to tie the calf in a corner of the hovel, that it may not be always sucking the mother, for it might overgorge itself with milk, which would coagulate in the fourth stomach, and choke it up, and produce disease, and even death. If it is evident that the cow would yield more milk than the calf should have, it is the

custom, and very properly, to take away a portion of it from her, two or three times in the day, before the young one is unfastened.

The time that the calf, after this, remains with the mother is chiefly regulated by the system which the breeder usually pursues, but reference should always be had to the state of the cow's udder. If it is perfectly free from knobs, or kernels, or hardness, the calf may be removed at a comparatively early period; but if any induration of the teats appears, the young animal should be permitted to suck a while longer. The frequent sucking will prevent the milk from curdling in the udder; and also the friction and shaking of the bag, by the jolting of the calf's head in the act of sucking, will contribute not a little to the dispersion of the tumors. We have already spoken of garget, and shown that a very prevalent cause of it is the weaning of the calf too soon.

Few things are more injurious than the exposure of the young calf to wet and cold. It lays a foundation for rheumatism and hoose, which no medical treatment can afterwards remove.

Bleeding from the navel string is not an uncommon complaint among calves, and it is a very troublesome one. The first thing to be done is to pass another ligature round the string nearer to the body; for if the bleeding is not stopped the life of the young animal will sometimes be endangered. It may happen, however, that the first ligature may have been nearer to the belly than it ought to have been, so near indeed, that another cannot be passed within it. A pledget of lint that has been dipped in a decoction of galls (half a dozen galls bruised, and boiled in half a pint of water), should be placed over the part, and confined with a proper bandage. This will be far preferable to the blue vitriol, and oil of vitriol, which some cow-leeches are so fond of applying. It will stop the blood, but not eat into and destroy the part.

From the application of the caustic, or even of the second ligature, a great deal of swelling will sometimes take place. This should be well fomented until inflammation is pretty nearly subdued. The after-treatment will depend on circumstances. If there is a solid tumor, the fomentation, or a poultice, must be con-

tinued until the swelling breaks, or points so decidedly that it may be opened with a lancet. Poultices must then be applied until the matter has fairly run out, after which a little Friar's Balsam will usually complete the cure.

In consequence of the bleeding and discharge of matter, the calf will sometimes be exceedingly reduced; some tonic medicine will then be necessary. The TONIC DRINK, No. 3, given in half doses, will be serviceable, and at the same time the calf should be forced with good oat-meal or pea-meal gruel.

CALVES, Diarrhœa.—One of the most frequent and fatal diseases to which young calves are subject is diarrhœa, or violent purging. It occurs most frequently when the young animal is from a fortnight to six weeks old, and is in the majority of cases the consequence of neglect. The calf has been too early exposed to cold and wet, or has been half starved, and then one full and hearty meal often disarranges the whole alimentary canal. It is bad policy to stint the calf too much in its quantity of milk. The loss of two or three calves in the course of a year will more than swallow up the supposed saving resulting from a system of starvation.

At the time of weaning, or when the food is changed from milk to gruel or porridge, diarrhœa and dysentery are very apt to occur, and are subdued with great difficulty. The weaning and change of food should be effected slowly, and with a great deal of caution. The new milk should be mixed with the skim milk or gruel which is afterwards to be substituted, and the quantity of the one gradually diminished, while the other is as cautiously increased.

The symptoms of diarrhœa in calves are, continual purging; the matter discharged is covered with more than its natural quantity of mucus; sometimes it is bloody, and often fetid; the animal loathes its food, staggers as it walks, and becomes rapidly thin. Towards the last stage of the disease the dung is more and more fetid and bloody, a greater portion of mucus mixes with it, and at length the discharge seems to be composed of mucus and blood, with scarcely any mixture of natural fecal matter. When this occurs there is little or no hope of cure.

The principal thing is to treat these dis-

eases in time, before the mucous coat of the intestines becomes so inflamed that a bloody discharge ensues which soon wears the animal down.

Much acidity in the stomach and bowels attends all these complaints; therefore, it is necessary to get rid of it, first of all, by the administration of a mild purgative, and afterwards by the exhibition of chalk, or some other medicine with which the acid will readily combine. Two ounces of castor oil, or four of Epsom salts, may be given.

Opium in some form or other must always be united with the chalk. It is of no use to get rid of one complaint when others are lurking and ready to appear. It will not be sufficient to neutralize the acidity of the stomach; the mouths of the vessels that are pouring out all this mucus and blood must be stopped; and we have not a more powerful or useful medicine than this in our whole catalogue of drugs. It acts by removing the irritation about the orifices of the exhalent vessels, and when this is effected they will cease to pour out so much fluid. Other astringents may be added, and a carminative mingled with the whole to recall the appetite, and rouse the bowels to healthy action. The CALVES' DIARRHŒA MEDICINE (see No. 62, DOMESTIC ANIMALS, MEDICINES FOR,) will present the best combination of all these things.

This will be the proper dose for a calf from a fortnight to two months old. If the animal is older, the dose may be increased one-half. The common Dalby's Carminative is not a bad medicine, although a dear one, and may be given in doses of half a bottle at a time, when it happens to be at hand, and the case is urgent, and the drugs which compose Recipe No. 62 cannot be immediately procured.

When these preparations have been given some time, and have failed to stop the purging, we have known the CALVES' PURGING TO STOP (see No. 63, DOMESTIC ANIMALS, MEDICINES FOR,) given with very good effect. This may be given morning and night.

When constant and violent straining accompanies the expulsion of the dung, an injection of a pint of thick gruel, with which half a drachm of powdered opium has been mixed, will be very useful.

Diarrhoea will often in the early stage be accompanied not only by inflammation of the bowels, but much general fever. This will be known by much panting, heat of the mouth, and uneasiness, the animal lying down and getting up again, rolling, or kicking at its belly. It will then be prudent to bleed. A pint will be the proper quantity to be taken from a calf under a month; after that an additional ounce may be taken for every month. When, however, the diarrhoea has been long established, and the calf is getting weak and rapidly losing flesh, it would be madness to bleed; the strength of the animal would be more speedily exhausted, and its death hastened. Chalk, or starch, astringents, and carminatives will then afford the only rational hope of success. After the cure has been completed, much care should be taken respecting the diet of the animal; and it will sometimes be useful to give him a lump of chalk and another of salt in his feeding place, to lick them when he likes.

CALVES, Costiveness in.—This disease occasionally attacks young calves a few days after they are born. It is then caused by coagulation of milk in the fourth stomach, which is completely distended by the solid curd, and the passage through it obstructed. There is not often any remedy for this. The most likely method to succeed is to pour in plenty of warm water in which Epsom salts have been dissolved, by means of the stomach-pump so often recommended. The first dose may consist of two ounces of the salts dissolved in two or three quarts of water; after which ounce-doses may be given every six hours, likewise in the same quantity of water, until the bowels are opened.

The costiveness of calves is generally produced by bad management. Either the calf is suffered to suck too plentifully, or put to a cow whose milk is too old, or fed with new milk from the dairy promiscuously. All these things are injurious, and thousands of young animals have been destroyed by them.

When costiveness occurs in calves of two or three months old, it is usually when they have been too suddenly changed from fluid food, as gruel or porridge, to that of a dryer and more stimulating kind, and consisting princi-

pally of hay. This is a dangerous complaint; for there is not only obstruction usually in the *manyplies*, or third stomach, which is employed in rubbing down the hard fibrous food, and now becomes overloaded and clogged, but the paunch itself is generally filled with undigested food, and rumination has ceased.

Here again everything depends on diluting the hardened mass, and opening the bowels. The first dose of medicine should consist of a quarter of a pound of Epsom salts, dissolved in a gallon of warm water. It will not be forgotten that by introducing the pipe a little way, or far down the gullet, the medicine may be thrown at once into the third and fourth stomachs, or into the first. If it is introduced only a little way, and the pump worked gently, the fluid will pass on through the canal at the base of the gullet, which was described in the early part of the work, and enter the third stomach. Flowing through this in considerable quantities, it will perhaps dissolve, and wash out the hardened mass contained between the leaves of the *manyplies*, while the salts will open the bowels, and by emptying them, solicit the food forward from the gorged stomachs.

If, after the bowels have been well opened, rumination should not return, it will be prudent to have recourse again to the stomach-pump, the tube of which should now be pushed farther down the gullet until it enters the paunch. Plenty of warm water being now pumped in, and with some force, it will stir up the contents of the paunch, and cause them to be disgorged into the canal leading to the true stomach; or vomiting will be excited, and the greater part of it thus brought away. The stomach will probably act upon the little that remains, rumination will again be established, and the animal will speedily recover.

There are few things so dangerous to young cattle as being thus sapped or costive. It is the foundation of fever, and of many a serious complaint. As soon as the dung is observed to be hard, a mild dose of physic should be given to every calf. A little attention to this would keep the breeding stock in good order; and their preservation, and health, and rapid thriving would abundantly repay the little additional trouble and expense.

Farmers in general, however, are shamefully careless here; and no notice is taken of half the diseases under which their stock of every kind plainly and evidently labor, until they are past all cure. It is also matter of general observation, that a calf that has a considerable tendency to costiveness is slow in getting fat and preparing for the market.

All cattle are subject to occasional costiveness, and which should be removed as early as in the calf, as being the frequent root of much evil. It is either one of the symptoms of the beast laboring under inflammatory fever, or it lays the foundation for inflammatory fever. A purge of Epsom salts, or even of common salt, if the other should not be at hand, will not cost much, and would save the life of many a beast; let not the farmer, however, follow up the farrier's practice of giving a cordial drink two or three days after the physic, under the notion of removing flatulence, and promoting digestion, and invigorating the system. The fever, of which this costiveness is either the forerunner or the cause, would only be hastened and aggravated by this absurd system of stimulation.

CALVES, Hoose in the.—This disease in the adult animal has already been considered; in the calf it assumes different and more aggravated symptoms, and is more speedily connected with consumption and death. The moment a calf is observed to cough violently, he should be removed from the pasture, and put under

tolerably warm shelter and taken care of. A bleeding and a dose of physic, and a fever powder, will then usually restore the animal to perfect health.

At times the hoose is epidemic among cattle, and hundreds of them die. Proper treatment at first will, in the majority of cases, remedy the evil; but should the animal get rapidly worse, and his cough be peculiarly violent and distressing, care should be taken to examine the first that happens to die, on the farmer's own estate, or that of his neighbor, and if the windpipe and the air tubes below should be found filled with the worms which have already been described, recourse should be had to the spirit of turpentine, which will often succeed in destroying them. The principle on which the turpentine acts has been already explained. The Receipt No. 64, Calves, Hoose in, (See DOMESTIC ANIMALS, MEDICINES FOR,) will be found a good formula for its administration to calves from six to twelve months old.

A cure has also been obtained by the exhibition of half a pint of lime-water every morning and a table spoonful of salt the same afternoon. The origin of these worms has not yet been satisfactorily developed; but it is supposed that the eggs are taken with the water, absorbed by the blood vessels, and thus enter the windpipe, where they are hatched; but one thing is certain, that in nine cases out of ten the farmer may attribute all the losses he sustains to neglect of the calf, or premature exposure of him to cold and wet.

S H E E P :

DISEASES AND MANAGEMENT OF.

THIS HAS been a sadly neglected branch of veterinary inquiry and practice. The nature and treatment of the diseases of sheep form little or no part of the instruction given in some of our veterinary schools, and seldom come under the cognizance of the surgeon afterwards. The shepherd undertakes the treatment of foot-rot, and scab, and hoof; and with regard to the other maladies to which this animal is subject, they are either suffered to take their course, or, if a veterinary practitioner is ever employed, it is when the disease is firmly established, or the whole flock infected, and medical aid is fruitless. This is much to be lamented, and very absurd; for although an individual sheep may not be worth much, yet a numerous flock forms no inconsiderable portion of the farmer's wealth, and the frequent mortality among these animals is a very serious loss to him.

The internal structure of the sheep so nearly resembles that of the ox, that we will content ourselves with referring to the anatomy of the ox, as described in the early part of this work. The diseases of both have a very great resemblance in their nature, and cause, and progress, and medical treatment. The same drugs are administered to both. There cannot be a better purgative for sheep than Epsom salts: there is no better fever medicine than the digitalis, emetic tartar, and nitre. The principal difference is in the quantity to be administered; a sixth or eighth part of the usual dose for cattle will be sufficient for the sheep. The quantity of blood taken will depend on the size of the animal and the nature of the disease. Four ounces would be a fair average bleeding from a lamb, and a pint from a full grown sheep. Shepherds are apt to bleed from the eye-vein; but the blood generally flows slowly, and, after

all, the proper quantity will not always be obtained. The best place for bleeding is from the jugular, as in cattle. A ligature should be tied round the neck, and then the vein will rise so evidently that it cannot possibly be mistaken. The vein should be opened with the lancet commonly used for the human being: the orifice should be large, and the blood obtained as quickly as possible.

SHEEP, Lambing Season.—The ewe goes with lamb five months. With the best care a great deal of danger attends this early lambing, and even at a later period a few cold nights are fatal to many of the lambs. There is nothing that requires more reformation than the treatment both of the ewe and the lamb at the time of weaning.

During the time of gestation more attention is required than is generally paid. To enable the ewe to produce her lamb with comparative safety, she should not be too well fed. One of the most prevalent causes of puerperal fever, or dropping after calving, in the cow, is her too high condition. It is more particularly so with the ewe; and there are few things that the farmer should be more careful about than that the fair, but not unusual or forced, condition of the animal is preserved. A week or two before the time, a little better keep may be useful in order to give them sufficient strength for the lambing. It is a kind of middle course which the farmer has to pursue, and the path is not very difficult to trace: too high condition will dispose to fever; on the other hand, with too poor keep the ewe will not have sufficient strength to go through the process safely, nor will she have milk enough for the lambs. If the dam has not sufficient support previously, the lamb will be weakly when it is dropped, and will not thrive well afterwards.

When the time of yearning approaches, a little care may prevent a very great loss to the farmer. The ewes should be brought as nearly home as possible. They should be sheltered from the wind, it it be only a high and thick hedge; but a kind of shed, however rudely constructed would abundantly pay the expense of building it. At night, particularly, they should be folded in some sheltered place.

The care of the farmer or lamher will vary a great deal according to the period of the year and the state of the weather. In the early lambing the greatest losses are at the beginning; they arise principally from cold. In March or April the latter part of the lambing season is most dangerous, for there is more abundant keep, and more tendency to inflammation.

The *clatting* of the ewes is a very useful practice now. They are thrown, and a portion of the wool is removed from their tails and udders. The sticking together of the wool from the purging to which the ewe is often subject in the early part of the spring, when the grass is fresh, has lost many a lamb. When the udders are thus cleaned, the lamher will more easily perceive the stain on the part, which, and which alone, will sometimes tell him whether the ewe has yeaned; for it is no uncommon thing for a young ewe to desert her lamb, and be found grazing with the rest of the flock as unconcernedly as if nothing had happened.

An experienced lamher will almost always tell when the ewe is about to year. If he finds her soon afterwards taken with labor pains, and they continue to succeed each other regularly, and she remains lying down, he will take care not to disturb her; but if a couple of hours pass, and the lamb is not produced, he carefully examines her. If the nose and the tips of the toes have presented themselves, and the lamb seems to be in a proper position, but the head is large, or the passage is narrow, he leaves her again for another hour; but if there is evidently a false presentation, he introduces one or two fingers, or his hand, well guarded with oil, puts the young one in the proper position, and nature speedily effects the rest.

The principal art of the lamher is to know when he should interfere. In every

case of false presentation his help should be ready and immediate; but otherwise he should very rarely meddle with the ewe, except the mother is nearly exhausted, or the life of the young one appears to be in danger. One moment's observation will discover the state of the mother; and the degree of protrusion of the tongue of the young one, and its color, will not often deceive with regard to him. When the tongue hangs far from the mouth, and is getting livid or black, it is high time for the lamher to interfere.

The lamher should use as little violence as possible; but then he should recollect that the ewe will often bear a great deal of force being applied without the slightest injury to her, and sometimes with no great danger to the little one. The exhausted state of the one or the other will regulate the degree of force. When there is much exhaustion, no time is to be lost, and some strength should be applied in the extraction of the lamb.

The state of the weather, too, will somewhat regulate this. In cold weather more time may be allowed. The process of parturition is then slower. In warm weather there is more tendency to fever, and the ewe should not be suffered to exhaust herself too much.

Unnatural presentations are often very awkward things to have to do with. The ewe should be driven into the pound, and after having rested a few minutes, some of the fingers, or the hand, if it is small, should be introduced into the vagina. If only one leg presents, and the shoulder thus forms an obstruction, the other leg will generally be easily laid hold of and brought down. If the neck is bent, and the crown of the head presents itself, it may be pushed back, and the two fore-paws brought into the passage, and then the muzzle will naturally follow. If the foetus lies sideways, the cord and the position of the legs will enable the shepherd to distinguish between the spine and the belly. The turning is sometimes a difficult thing; but practice will often give the lamher a great deal of cleverness in this operation.

In extreme cases, and when the lamb is evidently dead, it may be necessary to introduce a blunt-pointed knife into the uterus, and cut the little animal to pieces.

The greatest care must be taken that the mother is not wounded, for that would produce inevitable death. When the lamb has been thus taken away piecemeal, a little physic—an ounce of Epsom salts, with a few grains of ginger—should be given to the mother, who should then be left undisturbed for several hours.

The ewe, and especially if she was in high condition, is occasionally subject to **AFTER-PAINS**. Some of the country people call it **HEAVING**. It continues many hours, and sometimes exhausts and destroys the animal. It is particularly dangerous if she has been too well kept, and much force has been used in extracting the lamb. Twenty drops of laudanum should be given in a little gruel, and repeated every second hour until the pains abate. It will always be prudent to bleed the ewe, if she is not better soon after the second dose of the laudanum.

The womb is sometimes forced out of the orifice, when great force has been used in extracting the lamb. It must, if necessary, be cleaned with warm water, and carefully returned by a person with a small hand. Gentle and continued pressure will effect this much sooner and safer than the application of the greatest force. It will, however, again protrude if a couple of stitches, with tolerably strong twine, are not passed through the lips of the orifice. If the womb is thus returned before it has been much bruised, or inflamed by hanging out, there will be little danger to the mother, and she may suckle her lamb as usual. When she has accomplished that, she should be fattened, for the same accident would almost certainly happen at her next parturition.

Attention should now be paid to the lamb, and it requires it even more than the mother. It is want of care that causes the loss of more than four-fifths of the dead lambs. The principal evil is exposure to cold. If the weather is severe, great numbers of lambs are often lost in a single night. A few hurdles with straw, or a warm quick hedge, or a shed for them to go into, would save the greater part of them. The farmer needs but to use a little observation in order to be convinced how eagerly the ewes and the lambs seek that shelter, and how safe they are compared with others that are exposed. Some breeds are more hardy

than others, but the hardiest of them will not endure absurd and cruel neglect and exposure. Let the farmer think of the sudden change from the warmth of the mother's womb to the driving sleet, and the cold wet ground; he will not wonder that so many of his lambs are palsied and starved to death.

The lambs are not quite out of danger when a day or two has passed after they have dropped. They live for the first week or fortnight on the mother's milk, and then begin to imitate their parent and graze a little; indeed, they have not their teeth up to enable them to graze at first. They should not be put on too good pasture at this early period, for the change of food is often dangerous. A lamb of a fortnight old will often sicken suddenly, refuse the teat, cease to ruminate, swell, heave, and die in less than twenty-four hours. On being examined, the stomach will sometimes be found enormously distended, at other times there will be little food in it, but there always is a great deal of bile in the upper intestines, with inflammation there, the evident cause of death, and produced by the change of food. Those who die at this early period are often called *gall-lambs*, from the great quantity of bile found in their intestines. When, at three or four months old, the lamb is perfectly weaned, he is subject to a similar complaint, and from a similar cause. The lamb should certainly have better pasture when he is deprived of his mother's milk, but the change should not be sudden or violent.

Physic will evidently be required here, such as Epsom salts in doses of half an ounce every second or third day; and if there is much swelling, the stomach-pump will be used with advantage, both in extracting the gas, and in injecting warm water into the stomach with an intention either to cause vomiting or to wash out the contents of the stomach.

The operation of **CASTRATION** is a very simple one in the sheep, and yet is often attended with danger—sometimes resulting from the unskilfulness of the operator, and at other times from some unfriendly state of the atmosphere. We have known on the same farm, and the same gelder being employed, that in one year not a lamb has been lost, and in the following year several scores. Generally speaking,

however, the fatal result is to be attributed to bad management. The younger the lambs are the better, provided they are not very weak. From ten days to a fortnight seems to be the most proper time, or, we may say, as soon as the testicles can be laid hold of. We would advise the farmer never to set apart a day when the whole or the greater part of his male lambs are to undergo the operation, for many of them will then be too old, and he will assuredly lose some of them. He should take them as soon as they are ready, although there may be only a few at a time.

The lamb being well secured, the scrotum or bag is to be grasped in one hand high up, and the testicles pushed down as low as possible: two incisions are then to be made across the bag at the bottom of it, and the testicles forced out. The gelder now often takes the stones between his teeth, and bites the cord asunder. This is a nasty and a cruel way of proceeding. The better way is to draw the testicles down an inch or more from the scrotum, and then to cut through the cord close to the scrotum with a knife that is not very sharp. Scarcely a drop of blood follows when the cord is thus separated; the end of the cord retracts into the bag, and there is not half the danger of inflammation which there is when the cord is gnawed and torn by the teeth.

Except the lambs are very weakly, and the ewes much exhausted and emaciated, it will not be requisite to give any medicine after yeaning. In the great majority of cases the animals will do a great deal better without it. Should, however, tonic medicine be necessary, we know nothing better than the TONIC DRINK. (See No. 65, DOMESTIC ANIMALS, MEDICINES FOR.)

If the ewes will not feed well at all, they should be forced with good gruel, and the best is made of equal parts of oat and linseed meal.

LAMBS, Coagulation of the Milk.—We have spoken of this when treating of the diseases of calves. The lamb is, if possible, more subject to this curdling of the milk than the calf is, and it carries off the finest and best of the flock. The farmer likes to see his lambs growing fast; but it is possible to make more haste than good speed. The lamb may have excess of nutriment, and particularly of its mother's milk. When a lamb thrives at an extra-

ordinary rate, the bag of the mother should be examined, and if it is too large and full, it will be prudent to milk away daily a little of its contents, otherwise the yet weak stomach of the young animal may have more coagulated milk in it than it can digest. All the milk that is swallowed by the young lamb coagulates in the stomach, and if it accumulates too fast, the stomach will become perfectly choked with it, and the lamb will be destroyed. Two pounds of curdled milk have been found in the stomach of a lamb. When a thriving lamb, with a healthy mother having a full bag, begins all at once to be dull, and stands panting and distressed, and can scarcely be induced to move, and is considerably swelled, it is probably from this cause.

In this disease there is often apparent purging of a light color, which is, in fact, the whey passing off, whilst the curd accumulates and produces obstinate constipation.

The first thing to be done is to administer an alkali, to dissolve the mass, such as magnesia, in doses of half an ounce twice a day; after which two to four drachms of Epsom salts, with a little ginger, dissolved in warm water, and the warm water often repeated, if necessary, by means of the stomach-pump as useful for them as for cattle. When the bowels have thus been opened, and the curdled milk has in some measure passed off, the stomach may be strengthened by occasional doses of the Tonic Drink for Cattle. (See No. 32, DOMESTIC ANIMALS, MEDICINES FOR.) The ewe and lamb should then be turned into scantier pasture.

LAMBS, Diarrhoea.—There is not a more destructive disease among young lambs than this. It frequently attacks them when they are not more than a day old, and carries them off in the course of another day. Oftener it does not appear until they are nearly a week old, and the lambs have not then a much better chance. But if they are two or three months old, and have gained a little strength, they may, perhaps, weather the disease. The causes are various, but not always difficult to discover. They are generally referable to the neglect and mismanagement of the farmer. It may be the consequence of absurd and cruel ex-

posure to cold. For sheep generally—and more particularly for lambs—we once repeat it, and we would impress it on the mind of the farmer and the practitioner, shelter and comfort are the first and grand things to be considered. I do not mean confinement in a close and ill-ventilated place, but that defence from the wind and snow which it would cost the farmer little to raise, and for which he would be amply paid in one season. If it probably arises from cold, the remedy is plain—better shelter, and, for a few days, housing.

It is sometimes attributable to want of proper support. The ewe, if it be her first lamb, may have deserted it, or she may have little milk to give it; and the combined influence of starvation and cold produces diarrhoea sooner than anything else. Warmth and new cow's milk are good remedies, but the best method to cure or prevent is to give them daily a few messes of wheat in the sheaf; a regular quantity of salt at all times. If it occurs in the winter, steep, in brine, ripe hay, in the seed; wheat chaff is good, as is a small quantity of oats, and a few pine or hemlock tops. Keep them a few days on ripe hay or corn fodder.

Not unfrequently the mother's milk seems to disagree with the lamb. It is naturally aperient. It may occasionally be too much so. If her teats are full, and she evidently has plenty of milk, this will probably be the case. She should be fed on dry meat for a day or two, or should be turned out only during the day, and housed at night, when she should be allowed a little hay. While the food is altered the bowels should be well cleansed. There may be something amiss about the ewe, which causes the milk to be thus purgative and unwholesome. The best purgative for sheep is the Purgine Drink. (See No. 66, DOMESTIC ANIMALS, MEDICINES FOR.)

This being given to the mother will will likewise be of service to the lamb, by helping to carry off any acidities or crudities from the stomach or bowels.

In a disease so fatal, and which runs its course so rapidly no time is to be lost, and therefore Astringent Medicine (see No. 67, DOMESTIC ANIMALS, MEDICINES FOR,) should be administered to the lamb as speedily as possible.

If the animal should still linger on, and

the purging should not be much abated, it is probable that the milk of the mother is most in fault. The lamb should then be taken from her, and fed with cow's milk boiled, to every pint of which a scruple of prepared chalk has been added, the astringent drink being continued as before.

If the purging abates, the medicine should be immediately suspended, or not given so frequently, lest costiveness should follow, a disease which we shall presently describe, and which is also very fatal.

The lamb with diarrhoea should be docked on the first appearance of the disease, if the operation had not been previously performed, and the hair should be carefully cut away under the tail, otherwise it is liable to become clotted. It will adhere together, and form an obstruction about the anus, so that the faeces cannot be discharged. The least ill consequence of this will be very great soreness about the part; but in many cases the animal will die in consequence of the obstruction, before the existence of it is suspected.

The color of the discharge will considerably influence the mode of treatment. If it is of an olive-green color, the drink should be persevered in; and on every third day half a table-spoonful of castor oil should be administered. If this is of a white color, it may probably proceed from coagulation of the milk, and should be treated as advised in a previous page.

If the lamb is two or three months old, the medicine should be correspondingly increased, and he has a better chance. If he is five or six months old, he will only be lost through the negligence of the farmer or attendant. The same means must be pursued; but another thing must be added, and that of the greatest importance—a change of pasture from a succulent to a bare and dry one. The removal to a stubble-field is a frequent and very successful practice.

LAMBS, Costiveness in.—When no evacuation appears to be effected, but the animal is continually straining, two circumstances must be carefully examined into; first, whether there is the obstruction of which we have just spoken, utterly preventing the discharge of the dung, and a speedy remedy being at hand, namely, the removal of the clot-

ted wool; or whether after the staining, some drops of liquid feces may not be perceived; this, although often mistaken for costiveness, clearly indicates a very different state of the bowels; they are actually relaxed—too much so, and the straining results from irritation about the anus.

Actual costiveness, however, is not an unfrequent complaint, and must be speedily attacked; for it is either the accompaniment of fever, or it will very speedily lead on to fever. The existence of fever should be carefully inquired into; heaving of the flanks, restlessness, and heat of the mouth will be sufficient indications of it. Bleeding in proportion to the degree of fever, and the age and strength of the lamb should then be had recourse to. Next, the bowels must be opened; one-fourth of the Purging Drink (See No. 66, DOMESTIC ANIMALS, MEDICINES FOR,) will be the best thing that can be given, and it should be repeated every sixth hour until the desired effect is produced. The lamb should be turned into greener and more succulent pasture, and especially where there is any fresh flush of grass; and if, after a while, he should altogether refuse to eat, he may be drenched with gruel, in which a little Epsom salts should always be dissolved. While this affords nutriment, it will cool the animal and open the bowels.

LAMBS, Staggers in.—Many lambs are lost from this disease, and the farmer most certainly has here no one to blame but himself. It attacks the most thriving lambs, and especially when they are about three or four months old; and it arises from the farmer making a great deal more haste than usual in fattening them for the market. It resembles the blood in cattle, and is usually produced by the same causes.

The lamb will appear to be in perfect health. All at once he will stand still, heaving violently at the flanks, and with the head protruded; or he will wander about with great uncertainty in his walk and manner; he will then all at once fall down and lie struggling upon his back until he is helped up, or dies. Sometimes he is very much convulsed.

Bleeding must be resorted to immediately, and afterwards the bowels well opened by means of the Purging Drink.

To this some cooling febrifuge medicine, such as Cooling Fever Drink, (See No. 68, DOMESTIC ANIMALS, MEDICINES FOR,) should succeed.

On examination after death, the head will be found to be the principal part diseased; the vessels of the brain will be distended with blood, and there will sometimes be water in the ventricles.

We have seen half a dozen lambs in staggers in the same field at the same time. They had all been exposed to the same cause; and when the disease had begun in one or two it spread among the rest by the strange and often too powerful influence of sympathy.

SHEEP, Red-Water in.—The disease recognized under this name is very different from that described in the cow, for here it consists in an accumulation of red, dish-colored fluid (whence its name is derived) in the cavity of the abdomen, and frequently in the chest and heart-bag likewise. This water accumulates in consequence of inflammation of the serous membrane which lines these cavities. In many places the disease is termed water-brazy. It is most prevalent at the latter end of autumn or the beginning of winter, and is generally observed among sheep that are in the most thriving condition, and especially if they have been turned into new and rich pasture, and by the side of a copse or wood. Sometimes it is very sudden in its attack, and speedily fatal. In some fine flocks we have seen it destroy the animal in twenty-four hours. In other cases it is less violent, and also slow in its progress. The sheep is first observed to be off its feed, dull, disinclined to move; it loiters behind, and pants, and is restless. The flanks are tucked up, and there is often costiveness, though sometimes purging. This disease is still more common in lambs than in sheep, and in them often appears in the spring of the year, when they are first put on turnips with the ewes. In farms where pasturage is scarce, the disease is a very frequent visitor, and may be considered to be produced by the application of cold, either externally or internally, or probably both.

In the treatment of this disease it is very important to remove the animal to a dry and comfortable situation. Bleeding should then be freely employed and a

laxative medicine. (See No. 69, DOMESTIC ANIMALS, MEDICINES FOR.)

In addition to this, the abdomen should be well fomented with hot water—a lamb, indeed, may be placed altogether in a warm bath.

Every shepherd should have a little horn, made of that of a sheep, and which will hold about the usual quantity of medicine given as a drink; or at least the quantity which the horn will hold should be carefully ascertained, and then a large bottle of the mixture may be taken into the field, and the proper dose given to as many of the sheep as may seem to require it, without the trouble of measuring it every time.

If the animal recover, a change of food must be afforded, and a short, sweet pasture should be preferred.

SHEEP, Sturdy, Giddiness, or Water in the Head.—This is a very singular, and also a very fatal disease. It commonly attacks yearlings; a two or three-shear sheep is generally exempt from it. The animal becomes dull; separates himself from the rest of the flock; is frightened at the most trifling circumstance, and at the least noise; he runs round and round, but always in one direction; holds his head on one side; if there is a brook in the field, he stand upon its banks, poring over the running stream, and nodding and staggering, until he frequently tumbles in; or he breaks from his fit of musing, and gallops wildly over the field, but with no certain course, and with no determinate object. Soon his appetite fails, or he evidently feels so much inconvenience when he stoops to graze, that he gives up eating altogether; and then he wastes rapidly away: he seems to be half stupid, and at length dies a mere skeleton.

The disease generally attacks the weakest of the flock. It is in some measure connected with a peculiar state of the atmosphere. It is most prevalent after a moist winter, and cold, ungenial spring. It usually begins in the spring, continues through the summer, and disappears as the winter approaches. It is dependent partly on the season, but more on the health and strength of the animal. It may be prevented by good upland pasture; and is most common in low and marshy ground. It is not contagious,

nor does it seem to be hereditary. Having once attacked the animal, and gradual loss of flesh having commenced, the case is hopeless.

All medicine will be thrown away in such a case. It is the consequence of pressure on the brain by a strange, bladder-like-formed animal; and it would be more for the advantage of the owner to destroy the sheep, however out of condition it may be, than to commence any desperate and fruitless course of medicine.

Various methods have been tried in order to break this bladder, such as hunting the sheep with dogs, and frightening him half to death, throwing him into a gravel-pit, and various other absurd as well as brutal methods. They who pursued this course much oftener succeeded in breaking the animal's neck than rupturing the bladder. At length some persons bethought them of getting at, and puncturing or removing, this bladder by some operation. They thrust iron wires or skewers up the nostril, and into the brain, and sometimes succeeded in effecting their purpose. If they hit upon the nuisance, and pierced its envelope or skin, they were made aware of it by a greater or smaller quantity of water flowing from the nostril, and they could always tell on which side the hydatid lay, by the sheep inclining his head that way. They could also sometimes tell the precise situation of the bladder; for after being a long time inclosed between the skull and the brain, and pressed upon both, and pressing upon both of them in turn, not only in consequence of that pressure was a portion of the brain below destroyed and absorbed, but even the bone above was softened, nothing but a yielding membrane sometimes remaining over a particular spot. Some surgeons suggested that this membrane should be punctured, and it was done so with the lancet, or, oftener, by a heated sharp-pointed wire, and thus the creature beneath was wounded and destroyed. Others improved upon this method of operating. A surgeon's trephine was used, and a circular piece of the skull taken out at the place where it was softened, and thus the hydatid was bodily removed; and when this was carefully done, and the bladder was not broken, the hydatid, by

slight but sufficiently distinct motion, when put into warm water, showed that it was alive.

Both these operations occasionally succeeded, but the instances of failure were so numerous, that the farmer's interest still required that he should kill every sheep, unless a favorite, or very valuable one, as soon as he was evidently sturdied, and before he had wasted and become unfit for the market.

There may, however, be some prevention, although no cure; and that prevention consists in good and sufficient, and upland pasture, yet in some untoward seasons even this will not avail with unhealthy and weakly animals. Habitual shelter from the sleet and snow of winter is another and very important means of prevention. The unfeeling abandonment of the sheep to all the inclemency of the coldest weather is the fruitful source of the majority of the diseases, and of the most fatal ones, to which these animals are subject.

This malady is sometimes accompanied by palsy. Every continued pressure on the brain is apt to produce loss of power over some of the limbs; but in this case the palsy is variable; it shifts from limb to limb, and from side to side, and, unlike simple palsy, is generally attended by partial blindness, and by the greatest degree of stupidity.

We repeat it again, that no medicine can be of the least avail in destroying the *blob*, as it is called in some parts of the country; but if either of the operations is tried, one of the purging drinks may be useful in abating inflammation; and whether the skull is punctured or trephined, a pitch plaster over the wound will preserve the sheep from being tortured by the flies.

SHEEP, Inflammation of the Brain in.

This, although a frequent disease of the sheep, and of the same part, and almost as fatal as that which has been just described, is accompanied by such different symptoms, that it is scarcely possible to confound them. Inflammation of the brain generally attacks the healthiest sheep, and of all ages, and more in hot weather than in the early part of spring. There is no character of stupidity about this affection, no disinclination to move, no moving round and round without any

determinate object; but the eyes are protruding, bloodshot, and bright; and there is an eager and ferocious, not a depressed and anxious countenance. The animal is in constant motion; he gallops about, attacking his fellows, attacking the shepherd, and sometimes quarrelling with a post or tree; he is laboring under wild delirium, and this continues until he is absolutely exhausted. He then stands still, or lies down for a while panting dreadfully, when he starts afresh, as delirious and as ungovernable as before.

The first and the grand remedy is bleeding; and that from the jugular, and copiously, and to be obtained as quickly as possible. The guide as to the quantity will be the dropping of the animal. To bleeding, physicking will of course succeed, and the sheep should be removed into a less luxuriant pasture. This also is one of the diseases that should be attacked at its very commencement. Violent inflammation of the brain and its membranes will very soon be followed by serious disorganization; and if water once begins to be formed under the membranes, or effused in the ventricles, the case is hopeless. Here also the attention of the farmer should be directed to *preventives*. One case of goggles may be accidental; but if two or three are seized with inflammation of the brain, the farmer may be assured that there is something wrong in his system of management, and that which, in the majority of cases, is the root of the evil, is too rich pasture, probably succeeding to spare feed. A dose of salts should, therefore, be given to each sheep, and the pasture of the whole should be changed.

SHEEP, Inflammation of the Lungs in.

—Is not unfrequently the result of a common cold, not attended to, the disease extending itself to the lungs: it more commonly appears in the spring of the year; its symptoms are dullness, hanging of the ears, quick breathing, cough, and discharge from the nostrils. The animal should be bled freely from the neck—a pint in general will not be too much for a full grown animal to lose. After this a dose of salts should be given, and should be followed by the fever drink (see No. 68 DOMESTIC ANIMALS, MEDICINES FOR) once a day.

SHEEP, Blown or Blast in.—This is of as frequent occurrence among sheep as oxen, and it is as fatal. The cause is the same, the removal of the animals from poor keep to rich and succulent food. When sheep are first turned on clover, or even on any pasture more nutritious than that to which they have been accustomed, if they are not watched and kept moving during the day, and folded elsewhere at night, they are too apt to overload the paunch, so that it can no longer contract upon and expel its contents; fermentation then ensues, and the extrication of gas; the paunch is distended to the utmost, and the animal is often suffocated. The remedy of the farmer is the same here as with the ox—paunching, or thrusting a sharp pen-knife into the paunch, between the hip bone and the last rib on the left side, when the gas with which the stomach is distended will escape. The objection to this practice is likewise the same as in oxen—that when a portion of the gas has escaped, the stomach will no longer be firmly pressed against the side, and the wounds in the side and the paunch will no longer exactly correspond; a portion of the gas, and of the contents of the stomach too, will then pass into the cavity of the abdomen, and (although the animal may seem for a while to recover) will be an unsuspected source of inflammation, and even of death.

The common elastic tube, so strongly recommended by Dr. Duncan, is preferable to the knife; the gas will escape as completely, and without possibility of danger. It is passed down the gullet into the paunch. The stomach-pump, however, is here likewise a far preferable instrument, for, as was remarked when treating of the hoof in oxen, the acid fluid which is probably in the stomach may be pumped out, or sufficient warm water pumped in to excite vomiting, and thus free the stomach of its oppressive load. If neither the pump nor the tube is at hand, a stick with a knob at the end of it should be passed by the shepherd into the paunch, which, separating the muscular pillars that constitute the roof of this stomach, is far preferable to the knife.

When a sheep is first seized with the blown or blast, he will often be relieved by being driven gently about for an hour

or two and put into a bare pasture. In the act of moving, these pillars will be occasionally separated a little from each other, and the gas will escape; but the animal must not be galloped or driven by dogs, lest the stomach should be ruptured.

The animal having been relieved, or the contents of the stomach evacuated, a purgative should always be administered, and that combined with some aromatic. The physic for blown (see No. 71, DOMESTIC ANIMALS, MEDICINES FOR) will be useful.

The same treatment recommended for cattle for this disease is likewise equally desirable for sheep, the dose being about one-sixth or one-eighth less in quantity.

SHEEP, the Yellows or Jaundice in.—Sheep are subject to several sad affections of the liver, among which ranks that destructive disease, the rot. Jaundice is a less formidable malady, but often sufficiently destructive. It consists of a superabundant discharge of bile, or an obstruction of the biliary tubes; and in either case a considerable quantity of bile enters into the circulation, penetrates into the capillary vessels, and thus tinges the skin. A superabundant discharge of the bile is the most frequent cause.

The liver seems to be a very tender organ in fatted and pampered sheep, and easily inflamed or put out of order. In the half-starved, half-wild varieties of sheep, inflammation of the liver and jaundice seldom occurs; but too high living exhibits injurious consequences in this organ first of all. It is often seen, after sheep have been moved into fair but not too luxurious pasture, that if they have escaped the blown, a yellowness has soon begun to steal over the eyes and the mouth, and the skin generally; and the animal has been dull, and has disliked to move, and has sometimes been purged, but more frequently costive, and the urine has been of a dark, yellow-brown color. The liver could not maintain its healthy state under this injudicious increase of nutriment. When the farmer and the shepherd have either neglected to observe this, or to adopt the proper treatment, many of the sheep have died in a few days. On examination after death, marks of intense inflammation have appeared everywhere, but more particularly

in the liver, which has been of a red-brown color, and double its natural size, and is broken to pieces with the slightest force.

If it is taken in time, this is not a disease difficult to treat. On the first decided yellowness being observed, the animal should be removed to a bare field, and should have the purging Drink (See No. 66, DOMESTIC ANIMALS, MEDICINES FOR,); half doses of it should also be repeated for several successive mornings, so that the bowels may be kept in a relaxed state. Mercury will not be wanted. Calomel is rarely a safe medicine, and is a very uncertain one for sheep. A little starvation and plenty of purgative medicine will be all that is required. Should the animal appear to be considerably weakened, General Tonic Drink, (See No. 72, DOMESTIC ANIMALS, MEDICINES FOR,) will be used.

SHEEP, Cold, and Discharge from the Nose, etc., in.—Here again, from the cruel and impolitic abandonment of the sheep, hundreds of them are lost during the winter. When they are drenched to the skin by continual rains, or half smothered with snow, and have not even a hedge a yard high to break the biting blast, can it be wondered that cold and cough should be frequent in the flock; and that it should be severe and unmanageable, and even occasionally run on to inflammation of the lungs, and consumption and death? We are not an advocate of close housing, or too much nursing. We are aware that we may thus render the sheep unnaturally tender and more exposed to catarrh and all its consequences; but we would tell the farmer, that the fleece of the sheep, however thick, is an insufficient protection in cold and wet weather, and an open and bleak situation.

The symptoms of catarrh are heaviness, watery eyes, running from the nose. The discharge is thick, and clings about the nostril, and obstructs it, and the sheep is compelled to suspend its grazing almost every minute, and with violent efforts blow away the obstruction. Cough frequently accompanies this discharge; and if there is much fever, it will be shown by loss of appetite and rapid weakness.

There is a discharge from the nostrils which sometimes attacks the whole flock,

and if it is not attended by wasting in flesh or loss of appetite, the farmer does not regard it; for he knows from experience, that, in spite of all he can do, it will probably last through the winter, and disappear as the spring advances. When, however, he perceives this nasal gleet, he should keep a sharp look-out over his flock, and if there is one that stays behind, or will not eat, he should catch him, and remove him to a warmer situation, and bleed him, and give him the laxative and fever drinks, and nurse him with mash and hay. If a second or a third sheep should fail in the same manner, he must indeed look about him; there is danger to all, for the inflammation has spread itself from the throat down the windpipe to the air-passages of the lungs, and a very dangerous disease, called bronchitis, is produced. He must move the whole flock to a more sheltered situation. He must move them to a pasture of somewhat different character. He must take them from their turnips or their hay, and give them what other food his farm will afford. He should, if he will take the trouble to do so (and he would be amply repaid for that trouble), bleed them all round, and physic them all. This is strange doctrine to the farmer, who is accustomed to look on and let things take their course. It is, however, good advice, and he will find it so, if he will but follow it. Yet let him not, in his determination to rouse himself and do something, listen too much to the suggestions of the shepherd or the farrier. Let him not give any of those abominable cordial drinks, which have destroyed thousands of sheep. Warmth, housing at night, littering with clean straw, and warm gruel if the animal will not eat or drink, are not only allowable, but useful: nay, we would allow a little ginger or a little ale with the medicine; but not those compounds of all manner of hot and injurious spices, which would kindle a fire in the veins of the animal, if it were not blazing there before.

Experienced sheep-breeders recommend a dose of tar, to be repeated for foul noses, but lest that be neglected, it is recommended as a good precaution, under all circumstances, to have some small saplings or small trees bored with a large auger at proper distances, and the holes to

be kept supplied with common salt. Let the edges of these holes be smeared with tar, and thus the sheep in the act of getting the salt will tar his own nose. There can be no doubt that this would be a good and wholesome practice as an item of general management. Few farmers attend as they ought to do, to having their stock regularly and plentifully salted, and there is known to be something in tar and in resinous plants, as pine and cedar, particularly healthy for sheep.

SHEEP, Influenza in.—Sometimes a catarrh assumes an epidemic form, and appears as the *influenza*. This disease may be distinguished from a cold, or from bronchitis, by the discharge from the nostrils being more profuse and the eyes nearly closed, great uneasiness of the head, and a sudden prostration of strength. Sometimes the animal will run round in a circle, and a rattling will be heard in the windpipe; the symptoms will be soon followed by death.

Bleeding should in general be abstained from in this disease, but half an ounce of Epsom salts, with one drachm of gentian, should be given dissolved in gruel; but if the sheep purged before, instead of the above the strengthening drink (see No. 70, DOMESTIC ANIMALS, MEDICINES FOR) should be given, and be assisted by good nursing and care.

SHEEP, Rot in the.—This disease is the very pest of the sheep, and destroys more of them than all the other maladies put together. There are few winters in which it may not be safely said that many hundred thousands perish by it. The cause seems to be better understood than it used to be, and on many a pasture that had formerly obtained a fatal celebrity for rotting sheep, they may now feed securely; yet almost as many sheep die of the rot as there ever did.

The symptoms of the rot in the early stage are exceedingly obscure. There is little to indicate the existence of the disease, even to the most accurate observer. This is one cause of the mischief that is done; for it prevents the malady from being attacked when only it could be conquered. The earliest symptom is one that is common to a great many other diseases, and from which no certain conclusion can be drawn, except that the animal is ill, and labors under fever. The

sheep is dull, he lags behind in his journey to and from the fold, and he does not feed quite so well; but these are as much early symptoms of the staggers as of the rot.

This, however, goes on for some time, and then a palish yellow hue steals over the skin, easy enough to be seen when the wool is parted, and most evident in the eyelids, and that which is generally called the white of the eyes. The lips and mouth are soon tinged, but not to so great a degree. The sheep does not otherwise appear to be ill. If he does not eat much, he does not lose flesh; on the contrary, he seems to gain condition, and that for several weeks.

This thriving period soon passes over, and the sheep begin to waste much more rapidly than they had acquired condition. First, there is a perceptible alteration in the countenance—a depressed, unhealthy appearance, accompanied by increased yellowness. The tongue especially becomes pale and livid. The animal is feverish; the heat of the mouth, and the panting, and heaving of the flanks, and general dullness, sufficiently indicate this. Some degree of cough comes on; some discharge from the nose; or the breath begins to be exceedingly offensive. The sheep is sometimes costive; at other times it purges with a violence which nothing can arrest, and the matter discharged is unusually offensive, and often streaked with blood. And now the soft mellow feel of the sheep in condition is no longer found, but there is an unhealthy flabbiness; even where there is but little left between the skin and the bone, there is a flabby—a kind of *pitty* feeling; the parts give way, but they have lost their elasticity, and they do not plump up again; there is also a crackling sound when the loins or back are pressed upon. The farmer knows what this is, and what he is to expect, both in the sheep and the ox; very few of them recover after this crackling has once been heard.

At an uncertain period of the disease the sheep usually become what the graziers call *choked*, that is, a considerable swelling appears under the chin. If this is punctured, sometimes a watery fluid escapes, and sometimes matter; and occasionally the swelling bursts, and an ulcer, very difficult to heal, follows.

The bowels, which are variable at first, become at length very relaxed. A fetid purging comes on of all colors, and which pursues its course in defiance of every astringent.

The wool begins to fall off in patches; it is loose all over the animal, and easily pulled off, and there is a white scurfiness adhering to its roots. The disease now still more rapidly proceeds; and while the sheep loses flesh every day, and every rib and every bone of the back can be plainly felt, his belly increases—he gets dropsical. The end is not then far off.

The progress of the disease is more or less rapid, according to the violence of the attack, or the strength or weakness of the sheep, or the care that is bestowed on him, or the utter neglect to which he is abandoned. The animal occasionally dies in two months after the first evident symptom of rot, but usually four or five or six months elapse before the animal is perfectly exhausted.

The farmer is not much accustomed to examine his sheep after death. It would be better for him if he paid more attention to this, for he would discover the nature, and probably the cause, of many a complaint that is committing sad ravages in his flock. The appearances exhibited in the sheep that has died of the rot are very singular. There appears to be dropsy, not only in the belly, but all over the animal. Wherever the knife is used, a yellow watery fluid runs out; and the consequence of the existence of this fluid everywhere is, that the muscles, and that which should be firm, honest fat, are yielding, and flabby, and unwholesome. When the belly and chest are opened, the heart is pale, and soft, and flabby, and often to such a degree that we wonder how it could have continued to discharge its duty. The lungs are more or less gorged with blood; and there are a great many hard knotty points, of various sizes (tubercles) in them and on them, some of which have probably broken, and the lungs are full of ulcers; or when this is not the case, the lungs are studded with innumerable little knotty points of a dark color.

The principal disease, however, is in the liver, which is much enlarged, often of double its natural size, broken down by the slightest touch, sometimes black

from inflammation and congested blood, and at other times of an unhealthy lividness; but that which is most remarkable, which is characteristic of the disease, is, that its vessels are filled with flukes, curiously-shaped things like little soles, which are swimming about in the bile in every duct, and burrowing into every part of the liver. Several hundreds of them are sometimes contained in one liver. A few of them may occasionally be found in the upper part of the intestines, but there only.

The upper part of the liver is frequently speckled like the body of a toad; indeed this has been so often remarked, that the examiner, if he does not find flukes, and sometimes when he does, looks out for the toad's liver. The liver is so diseased and corrupted, that if an attempt is made to boil it, instead of becoming hardened, it falls all to pieces, or is in a manner dissolved. Abscesses are oftener found in the liver than in the lungs, and to an extent sufficient to destroy the sheep without any other cause. Sometimes there are knots in the liver as well as in the lungs—small, round, hardened lumps—and in a few cases they are so numerous that it is almost impossible to find a sound part.

If the farmer would accustom himself to observe these things, and carefully examine every sheep that dies in the autumn, he would sometimes detect the existence of this disease in his flock before he would otherwise have been aware of it. Nay, he should not confine his examination to this, but should observe the appearance of the inside of every sheep which he may kill for the use of his family about that time. It should be a practice never omitted, and however seemingly healthy the animal may die, whatever quantity of suet may cover the kidneys, if the liver is dappled with white spots, or if the vessels of the liver are thickened, and if there are flukes, however small, floating about in the bile, that sheep was certainly rotted; and if one sheep is rotted, the greater part of the remainder will probably follow. Aware of this, and at this early period of the disease, the grazier may, either by hastening the fattening process, or shifting the pasture, or adopting medical treatment, put many scores of pounds into his

pocket, which would otherwise be irrecoverably lost.

The history of the rot is plain enough here. It prevails, or rather it is found only in boggy, poachy ground. On upland pasture, with a light sandy soil, it is never seen: and in good sound pasture, in a lower situation, it is only seen when, from an unusually wet season, that pasture has become boggy and poachy. It is also proved to demonstration, that land that has been notoriously rotting ground, has been rendered perfectly sound and healthy by being well underdrained, that is, by being made dry. There are hundreds of thousands of acres, on which a sheep, forty years ago, could not pasture for a day without becoming rotten, that are now perfectly healthy.

We can also tell the kind of wet ground which will give the rot. Wherever the water will soon run off, there is no danger; but where it lies upon the surface of the ground, and slowly evaporates, the rot is certain. One part of a common shall be enclosed; or if it has not been drained, at least the hollows in which the water used to stand are filled up, and the surface is levelled: no rot is caught there. On the other side of the hedge there are these marshy places, these little stagnant ponds, where evaporation is always going forward, and the ground is never dry—a sheep cannot put his foot there without being rotted. These are plain, palpable facts, and they are sufficient for the farmer's purpose, without his puzzling his brains about the manner in which wet ground produces diseased liver.

He may be assured that it has nothing to do with the animal's feeding on stimulating or poisonous herbs. It has nothing whatever to do with the food. It depends on the wetness or dryness of the pasture.

How is it, then, that when so great a part of the country is underdrained, the rot should continue to be almost as prevalent as ever? Why is it not so prevalent where the ground has been properly underdrained? There are fields in every well-managed farm in which the rot is never known; there are others in which it still continues to depopulate the flock.

The draining may not be equally effectual in both. It might have been carelessly, superficially performed in the

one case; or the soil of the two pastures may be very different. The one may be light and porous, and a little draining may effect the purpose: the soil of the other may be heavy and tenacious, and drains not more than a yard asunder would scarcely keep it dry. What is more to the purpose, but less thought of, there may be little nooks and corners in the field that have not been underdrained. A few minutes' trampling upon them will be fatal to the sheep, and one or two of them upon the whole farm will render all the labor bestowed on every other part absolutely nugatory.

It is surprising how soon the animal is infected. The merely going once to drink from a notably dangerous pond has been sufficient. The passing over one suspicious common in the way to or from the fair, and the lingering only for a few minutes in a deep and poachy lane. Then it can easily be conceived what mischief one or two of these neglected corners, in which there may be little swamps perhaps only a yard or two across, may do in a farm in other respects well managed, and perfectly free from infection.

The disease of the liver, terminating in or constituting the rot, is, then, dependent on moisture, and that retained for a certain time on the surface of the ground, so that the process of evaporation may have commenced; it is also probable that the decomposition of vegetable matter growing on the surface has much to do in producing the complaint.

If sheep-breeders would get more into the habit of having oxen to turn upon the aftermath of their low and dangerous pastures, instead of venturing so frequently to send their sheep there, because they cannot afford to lose that portion of the crop, they would not suffer the grievous losses which sometimes almost break them down.

The preventive, then, seems plain enough. On good sound ground the sheep need not fear the rot; and other stock should be kept on the farm to pasture on the suspicious or dangerous places. The draining should be effective where it is attempted, and no nook or corner should escape.

Can anything be done by way of cure? Probably there may, and a great deal

more than the farmer imagines. All, however, depends upon the stage of the disease. The liver may be diseased; but it must not be disorganized; it must not be tuberculated or ulcerated; and the flukes must not have burrowed too deeply into it. The farmer, from habitual observation of his flock, must have discovered it at the very commencement of its attack, or he must have been made aware of it by the examination of some sheep that died, or that had been slaughtered for the use of his family. Then he may do good. Good is often done without his help. A succession of dry weather will often stop, or at least retard, the ravages of the rot. If moisture be the cause of it, he must remove that cause. He must change the pasture, and drive his flock to the driest ground his farm contains; and besides this, he must give a little dry meat—a little hay. Some have advised to feed the suspected sheep altogether on hay. This is carrying the matter a little too far; for in the prime of the season the sheep will pine for the grass, and rapidly lose condition for want of it. A change to a thoroughly dry pasture will sometimes do wonders. At all events, it is worth trying. The animals must, however, be carefully watched, and if it is not evident from their more cheerful countenance and manner, and the diminution or disappearance of the yellowness, that the disease is giving way, advantage must be taken of their present condition, and they must be turned over to the butcher. Let the farmer at least do something: let him either sell them at once, reckoning, and generally rightly, that the first loss is the least; or let him set to work and endeavor to combat the disease; but do not let him stand with folded arms, and suffer the best of his flock to dwindle away one after another.

As for the medical treatment of the rot in sheep, there are a great many nostrums, but few, if any, have stood the test of extensive experience. This has partly arisen from a cause which has already been hinted at—the disease not being recognized and attacked before it has made much inroad on the constitution, and when, or perhaps when only, it will yield to medicine. But we believe that with regard to the fairest cases every medicine has occasionally failed, or failed almost

as often as it has succeeded. We must in no case despair; the disease has sometimes been suspended, and the sheep has recovered. Let not, however, the practitioner be deluded into the use of calomel, or blue pill, or any preparation of mercury, because the rot is an affection of the liver. Mercury rarely seems to agree with the herbivorous animals in any form. We have seen it do much harm in some affections of the liver, and we have known many animals destroyed by the use of it.

There is, however, a drug, or, rather, a very common and useful condiment, which we believe has entered into the composition of every medicine by which this complaint has been successfully treated; we mean common salt. The virtues of this substance are not sufficiently estimated, either as mingled with the usual food, or as an occasional medicine. All herbivorous animals are fond of it. It increases both the appetite and the digestion. Cattle will greedily eat bad forage that has been sprinkled with it, in preference to the best fodder without salt; and it seems now to be a well-ascertained fact, that domesticated animals of all kinds thrive under its use, and are better able to discharge the duties required from them.

The consideration of this induced the use of salt in various complaints, and especially in the rot, which is an affection of one of the most important of the digestive organs; and it has not deceived the expectations that were raised as to its sanative power.

As, however, the rot is a disease accompanied by so much debility, and wasting of flesh as well as of strength, tonics and aromatics are usually mingled with the salt; but first of all of the bowels are evacuated by some of the usual purgatives, and the Epsom salts are the best. The Mixture for the Rot (See No. 73, DOMESTIC ANIMALS, MEDICINES FOR,) should then be tried.

A table spoonful of this mixture should be given morning and night for a week, and then the Second Mixture for the Rot (See No. 74, DOMESTIC ANIMALS, MEDICINES FOR,) may be given at night, while the former is continued in the morning, and by which the flukes may be destroyed as the worms in the bronchial tubes

sometimes are in the hoose of young cattl

The morning dose should be given on an empty stomach, and the evening dose before the night's feed is given, if the animal is housed.

All the hay should be salted, and some have recommended that even the pasture should be impregnated with salt. This is easily managed. A little plot of ground may be selected, or a portion of a field hurdled off, and salt scattered over it as equally as possible, and in the proportion of ten bushels to an acre. Three weeks afterwards the sheep may be turned on it to graze, stocking the ground after the rate of ten sheep to an acre; in the meantime the field from which they are taken may be brined in the same manner. When they have eaten the grass quite close, they may be changed back to the other plot, and so on as often as may be necessary, strewing at each change five bushels of salt per acre on the pasture. The sheep will fatten at a rapid rate if the disease is not too much advanced, and the disease will sometimes be arrested even in the worst cases.

It must, however, be confessed, that although sheep are often saved from the rot by the use of salt, they have rarely been perfectly restored to their former health. The taint is left; they are more disposed to receive the infection from a slight cause; and, six or twelve months afterwards, they frequently die of hoose or inflamed bowels; therefore, it will be the interest of the farmer to fatten them as soon as possible, and sell them to the butcher. The butcher will always tell by the appearance of the liver whether the sheep had at any former time been rotted. In some few cases lambs have been procured from ewes thus cured, but they have seldom lasted longer than one or two seasons.

SHEEP, Blindness in.—Sheep are more subject to diseases of the eye that lead on to blindness than many persons who are most accustomed to them imagine. It is a singular circumstance, and not so well known as it ought to be, that if the eyes of a flock of sheep are carefully examined, half of them will exhibit either disease then present, or indications of that which existed at no very distant date.

Inflammation of the eye, which consti-

tutes the commencement of the disease, may arise from various causes. Sheep driven fast to a distant market have suddenly become blind; those who have been chased about by dogs, have at no great distance of time lost their sight, and especially if, in both cases, they were afterwards exposed in a damp and bleak situation. The violent driving, while it produced fever, determined an undue quantity of blood to the head; it pressed, or perhaps was effused upon the origins of the nerves of the eye; and the after neglect confirmed the fever, and aggravated the mischief.

At other times, this seems to be an epidemic complaint. The greater part of the flock is suddenly afflicted with sore and inflamed eyes, and particularly at the latter end of the year, and when the weather has been variable, yet cold and moist. Some have thought that this complaint is infectious, but it is at least epidemic. A white film gradually spreads over the eyes, which the animal generally keeps closed, while at first a watery fluid, and afterwards a thicker mucous matter, is discharged from them. The film increases until the whole of the eye is of a pearly whiteness. If proper means are adopted, and often if nothing is done, inflammation abates, and the eye begins to clear, usually commencing at the upper part of the eye, and gradually proceeding downward until the whole of the organ is once more transparent, with the exception, perhaps, of a diminutive spot or two, or a discoloration of part of the iris. Many of the sheep, however, do not perfectly recover the sight of both eyes, and some remain totally blind, either from the continuance of the opacity, or that, while the eye becomes clear, the optic nerve is palsied, the pupil does not dilate, and there is *gutta serena*.

The first thing to be done is to bleed from the vein at the corner of the eye. There will be the double advantage of bleeding generally and of drawing blood from the inflamed part. The shepherd should take the sheep between his knees, and then, placing the animal with his rump against the wall, he will have full command of him. If he now presses upon the vein with his left hand, about two inches from the angle of the jaw,

and opposite to the third grinder, he will see it rise as it descends from the corner of the eye, and runs along the cheek. He should puncture it about an inch or rather less from the eye. Some shepherds recommend that the blood should be suffered to run into the eye, but this is a ridiculous notion. It must do harm rather than good.

Next give the Purgative Drink (See No. 66 DOMESTIC ANIMALS, MEDICINES FOR,) and repeat if necessary, in three or four days. No other medicines will be required.

No stimulating application should be made to the eye. It is too often the practice among shepherds to apply sugar or salt, or white vitrol; but this worse than uselessly tortures the poor animal; it increases the inflammation, and causes blindness where it would not otherwise have occurred. A drop or two of the vinous tincture of opium may be introduced into the eye, two or three times daily; or a teaspoonful of laudanum may be added to a half pint of water, and the eyes frequently washed with it.

It will be quite time enough to think of stimulants if the eye should remain cloudy after the inflammation has subsided, and then the Lotion for Cloudiness of the Eye (See No. 83 DOMESTIC ANIMALS, MEDICINES FOR,) is the strongest that can be permitted.

Although, perhaps, it would be prudent to send the sheep decidedly and confirmedly blind to the butcher, lest they should perchance be drowned in a ditch, or some serious accident should occur to them, yet it is pleasing to observe how well they shift for themselves, and what little harm comes to them. For the first few days they are awkward and confused, but, after that, they keep to their own walk, and take with the others, or even by themselves, the accustomed way home; and some one of the flock takes the blind sheep under his protection, and is always at his side in danger, and tells him the way that he is to go by many a varied and intelligible bleat.

SHEEP, Epilepsy in.—This is somewhat different from staggers, as the animal does not remain quietly on the ground, but it suffers from convulsions, it kicks, rolls its eyes, grinds its teeth, etc. The duration of the fit varies much; sometimes it ter-

minates at the expiration of a few minutes; at other times, a quarter of an hour elapses before it is perfectly conscious. In this malady there is a loss of equilibrium between the nervous and muscular systems, which may arise from hydatids in the brain, offering mechanical obstructions to the conducting power of the nerves. This malady may attack animals in apparently good health. We frequently see children attacked with epilepsy (fits) without any apparent cause, and when they are in good flesh.

The symptoms are not considered dangerous, except by their frequent repetition.

The following may be given with a view of equalizing the circulation of the nervous action:

Assafoetida..... $\frac{1}{2}$ tea-spoonful.
Gruel made from Slippery Elm...1 pint.

Mix while hot. Repeat the dose every other day. Make some change in the food. Thus, if the animal has been fed on green fodder for any length of time, let it have a few meals of shorts, meal, linseed, etc. The water must be of the best quality.

SHEEP, Kidneys, Inflammation of the in.—A derangement of these organs may result from external violence, or it may depend on the animal having eaten stimulating or poisonous plants.

Its symptoms are, pain in the region of the kidneys; the back is arched, and the walk stiff and painful, with the legs widely separated; there is a frequent desire to make water, and that is high colored or bloody; the appetite is more or less impaired, and there is considerable thirst.

The indications are, to lubricate the mucous surfaces, remove morbid materials from the system, and improve the general health.

We commence the treatment by giving:
Poplar Bark, finely powdered....1 ounce.

Pleurisy Root, " "1 tea-spoonful.

Make a mucilage of the poplar bark, by stirring in boiling water; then add the pleurisy root; the whole to be given in the course of twenty-four hours. The diet should consist of a mixture of linseed, boiled carrots and meal.

SHEEP, Sore Nipples, in.—Lambs often die of hunger, from their dams refusing them suck. The cause of this is sore nipples, or some tumor in the udder, in which violent pain is excited by the tugging of the lamb. Washing with poplar bark, or anointing the teats with powdered borax and honey, will generally effect a cure.

SHEEP, Foot-Rot in.—Although this disease resembles the last in name, it is altogether different in character. It is not so fatal as the liver rot, but it is sadly annoying; it is of very frequent occurrence, and it seems to be increasing.

It is, like the rot, peculiar to certain pastures; but there is more variety in this than is found with regard to the rot. There we must have stagnant water, and the process of evaporation going forward. For the production of the foot rot we must have soft ground, and it does not seem much to matter how that softness comes about. In the poachy and marshy meadow, in the rich and deep pasture of the lawn, and in the yielding sand of the lightest soil, it cannot, perhaps, be said that it is almost equally prevalent, but it is frequently found. Soft and marshy ground is its peculiar abode. The native mountain sheep knows nothing about it: it is when the horn has been softened by being too long in contact with some rich and moist land, that the animal begins to halt. This softness is connected with unnatural growth of horn, and with unequal pressure; and the consequence is that some part of the foot becomes irritated and inflamed by this undue pressure, or the weakened parts of the horn, too rapidly and unevenly growing, are broken off, and corroding ulcers are produced. Although there would not appear to be any great wear and tear of the foot in this soft land, yet the horn becomes so exceedingly unsound and spongy, that small particles of sand or gravel make their way through the softened mass, and penetrate to the quick. It not unfrequently happens that injuries of this sort are produced unconnected with and independent of the foot-rot, and they may be cured much easier, but by very similar means. The hardness or the sponginess of the horn depends altogether on the dryness or moisture of the soil in which the animal has fed. Large, heavy sheep, having comparatively thinner hoofs than lighter ones, are more subject to the disease.

True foot-rot more frequently begins from above than below. The horn is rendered softer, weaker, and more luxuriant by exposure to wet: the foot, from being kept wet and cold, is exposed to re-action with any change of weather,

and inflammation is thus excited within the foot, which often ends in suppuration, and this occasions those troublesome ulcers that are sometimes witnessed.

The first symptom of the disease is the lameness of the sheep. On the foot being examined this morbid growth is almost invariably found. The foot is hot, and the animal shrinks if it is firmly pressed. It is particularly hot and painful in the cleft between the two hoofs; and there is generally some enlargement about the coronet. There is always an increased secretion, usually fetid, and often there is a wound about the coronet discharging a thin, stinking fluid: sometimes there is a separation of the horn from the parts beneath, and that too frequently preceding the dropping off of the hoof. In comparatively a few cases the hoof seems to be worn to the quick at or near the toe. The lameness rapidly increases, and often to such a degree indeed that the sheep is unable to stand, but moves about the field on its knees. The soft portions of the foot, and sometimes the very bones of it, slough away, and drop off.

All this is necessarily attended by a great deal of pain, and the animal shows how much it preys upon him by his moaning, and refusing to eat, and ceasing to ruminate, and most rapidly wasting. Irritating fever comes on, and after the poor creature has crept about the field on his knees for a few weeks, he dies from irritation and starvation.

Of one thing the farmer may be assured—that the foot-rot is exceedingly infectious. If it once gets into a flock, it spreads through the whole. Some valuable writers have denied this; but there is scarcely a farmer who has not had woful experience of the truth of it. Even on the driest soil, the greater part of the flock have become lame in a very few weeks after a diseased sheep has come among them. There are, however, some instances in which a sheep with the foot-rot has grazed among others during several months, and no disease has ensued; and some curious experiments would make it appear that under particular circumstances it is difficult to produce foot-rot by inoculation. But these are exceptions to the general rule; and he who trusts to the non-contagiousness of

foot-rot will suffer as assuredly as the man who, deluded by some of the mischievous theories of the day, believes that he may keep a glandered horse in his stable with impunity.

The treatment of foot-rot is simple enough, and, in the early stage of the complaint, usually successful. The foot must be carefully examined, and every portion of horn that has separated from the parts beneath thoroughly removed, and the sore lightly touched with the butyr (chloride) of antimony, applied by means of a small quantity of tow rolled round a flat bit of stick, and then dipped into the caustic. A stronger, and oftentimes a better, application is made by dissolving corrosive sublimate in spirits of wine. Hydrochloric acid is also a very useful caustic for foot-rot. If a fungus is sprouting at the place where the horn separates from the foot, it must be first cut away with the knife, and then the root of it touched also with the caustic; or, what is still better, it may be removed by means of a hot iron. It is necessary, indeed, to be rather sparing with the use of the knife throughout the disease. There will seldom, except in very bad cases, be necessity for binding the foot up; indeed, the animal will generally do better without this. It will be seen by the altered color of the part whether the caustic has been applied with sufficient severity, and the dry surface which will be formed over the sore will protect it from all common injury better than any covering.

To these must be added that reasonable and successful practice of removing the sheep to higher ground. Sheep among whom the foot-rot is beginning to appear are sometimes completely cured by being driven to higher and dryer ground. Some farmers, and with a great deal of advantage, have their flocks driven four or five times daily along a hard road. They thus accomplish two purposes—they wear away the irregularly formed horn, the unequal pressure of which has irritated and inflamed the foot, and the remaining horn is hardened, and enabled better to resist the influence of the moist or soft ground. Where the ulceration is extensive, means must be adopted similar to those recommended for the treatment of foul in the foot in

cattle; but in most cases it will be more profitable to the farmer to destroy the sheep that has bad foot-rot, if it is in tolerable condition, rather than rely on a cure that is uncertain, and during the progress of which the animal very rapidly loses flesh and fat.

If, however, he is determined to attempt a cure, let him wash the foot well from all grit and dirt, and then cut off every loose and detached piece of horn, and every excrescence and fungus, and cover the wound with the Caustic Astringent Powder for foot-rot. (See No. 75, DOMESTIC ANIMALS, MEDICINES FOR.)

This should be sprinkled over the sore, and a little dry tow placed upon it, and bound neatly and firmly down with tape. The animal should afterwards stand in a dry fold-yard for four-and-twenty hours.

On the next day the tape should be removed, and if the surface is tolerably regular, it may be touched, as already directed, with the butyr of antimony; but if any fungus remains, the powder must be applied another day. The fungus no longer continuing to grow, a light dressing with the butyr should be continued every second day until the animal is well. Some prefer a liniment or paste to the powder, and it is made by mixing the powder with a sufficient quantity of honey. The farmer may use which he pleases; but a firm and equable pressure being produced by the tape is the principal thing to be depended upon.

The sheep-master should as carefully avoid the ground producing foot-rot, as that which causes the fatal affection of the liver; and he should attempt the same method of altering the character of the low and moist ground by good underdraining. The effect of this, however, is far from being so certain and beneficial as with regard to the rot. The water which would stagnate on the surface may be drained away with tolerable ease, but the soil cannot be rendered hard and dry, or, if it could, that would not be an advantageous change. The sheep might not have the foot-rot, but the ground would be comparatively unproductive.

If the farmer intends to drive his sheep a considerable distance to the market or fair, he will prepare them for the journey by a few days' removal to harder and

firmer ground, or, perhaps, by driving them a short distance, daily, on the still harder public road.

The farmer should not only take his sheep from light sandy soil in long-continued dry weather, because they would starve there, but because then alone that soil would give them the foot-rot; its yielding nature will not sufficiently keep down the growth of horn, and many a particle of sand will insinuate itself into the soft and spongy horn, and produce inflammation. For the same reason he should avoid dry old pasture at the season when the dews are heaviest, because then moisture would most abound there.

In grounds that are disposed to give the foot-rot, the farmer would find it advantageous to have the hooves of his sheep rasped or pared once every fortnight or three weeks. This is not often done, but it appears reasonable, and would not be very expensive. In unclosed or mountainous countries, where the sheep have particular tracts, gravel might be scattered in sufficient quantity to wear and harden the horn.

Quite a number of remedies are given as being, or having been, in successful operation in different parts of this country and in Europe.

The most common and popular remedy now used in Central New York is: 1 lb. blue vitriol; $\frac{1}{4}$ lb. (with some, $\frac{1}{2}$ lb.) verdigris; 1 pint of linseed oil; 1 quart of tar. The vitriol and verdigris are pulverized very fine, and many persons, before adding the tar, grind the mixture through a paint-mill. Some use a decoction of tobacco boiled until thick, in the place of oil.

The following is reported by Australian inspectors of sheep as an efficacious remedy for foot-rot:

Mix carbolic acid with an adherent and greasy substance, thus forming a plaster which will adhere to the foot of the sheep for two or three days, prevent contact of air, and allow time for production of the desired healing effect. Where this particular method of individual application is not practicable on account of the number of diseased sheep, a trough may be filled with the medicated mixture and the sheep (their feet having been carefully pared) made to pass through it,

when their feet become impregnated with the substance.

SHEEP, Sore Head.—This disease is connected with, or often produced by, the striking of the fly, and especially in woody countries. Next to the tail, the head is the part most frequently and seriously attacked, and in defending themselves from their tormentors, the sheep are continually striking their heads with their hind feet, until at length a considerable sore or ulcer is formed. No sooner is this done than the fly persecutes the poor animal with tenfold fury, anxious to lay its eggs on or near the wound; and the ulcer will often spread so far and so rapidly as to be very difficult to heal, and occasionally it will destroy the sheep.

The first thing to be done is to procure a cap or covering for the head, made of soft leather, or of brown paper, if leather cannot be procured. This should be cut so as to protect the whole of the head, and yet not to come too close to the eyes. Then use the Ointment for Sore Heads. (See No. 79, DOMESTIC ANIMALS, MEDICINES FOR.)

While this ointment is warm and soft, it should be thickly spread upon the leather, and the cap fitted to the head. If this be done in the evening, when the fly begins to cease to torment the sheep, the animal will be quiet, and the ointment will gradually cool, and stick close to the head.

Some spread the ointment over the head without the cap, making a kind of charge, a few flocks of wool being scattered over the top of it; and if it should be somewhat too liquid for this purpose, it is stiffened by the addition of a little yellow resin. It is difficult, however, to confine the ointment to the sore when it is thus applied, and it is very apt to run over the eyelid and the face, to the great annoyance of the animal.

SHEEP, Appetite, Loss of.—This is generally owing to a morbid state of the digestive organs. All that is necessary in such case is, to restore the lost tone by the exhibition of bitter tonics. A bountiful supply of camomile tea will generally prove sufficient. If, however, the bowels are inactive, add to the above a small portion of extract of butternut. The food should be slightly salted.

SHEEP, Rheumatism.—See SHEEP, FOUNDERING.

SHEEP, Scab.—The general prevalence of scab in this country gives importance to a brief examination of this subject.

The scab of sheep, like scabies, the itch of man, is caused by an insect. The mange affecting the horse, ox, dog, and cat, also, depends upon the presence of insects. There are different insects, known as acari, infesting different animals, having destructive characteristics in each, and generally confined to that species of animals, yet the mange from a dog is said to have been communicated to man, and a horse has been infested with mange by means of the skin of a mangy cat.

The sheep acarus does not bore galleries in the skin, but remains on the surface, clinging to the wool, and finding shelter among the masses of scab produced by the drying of exudations from the wounds inflicted by these parasites. Experiment has shown that increase of temperature hastens the hatching of their ova; fourteen days, according to Professor Brown, of England, sufficed to hatch a lot in a bottle "carried in the trousers pocket," while two months' time was required with some kept under glass in a room. The young have six legs; the fully grown, after several changes of skin, have eight. The microscope reveals sucking-caps or disks in the legs, enabling the parasite to cling to the wool and skin of the sheep; and renders beautifully apparent the action of these structures, showing, as the feet advance, how the disks are expanded to grasp the surface of the substance over which the acarus is moving, apparently retaining their hold in obedience to the volition of the animal. Thus its structure adapts it for crawling over and adhering to the skin, instead of burrowing beneath it. Burrowing acari, like the itch insect in man, are always armed with cutting teeth, set in strong jaws, and their legs are very short. The body of the female of the sheep acarus is larger than that of the male, rounder in form, the fourth pair of legs are developed nearly as well as the third, and are supplied with terminal sucking disks. Mature mites are visible to the naked eye as pellucid points of the size of a pin's head.

Various experiments have been made

to ascertain the rapidity of the growth and reproduction of these parasites. The young acari have been detected in fourteen days from the direct transference of the acarus to the skin of the sheep. In a month the disease had spread over a space of five inches; in ten to twelve weeks pretty nearly over the whole body. A greater or less amount of time may be required under different circumstances of temperature, and other modifying influences.

Symptoms.—The first sign of the existence of scab is rubbing against any projecting body within reach; as it extends, sheep bite themselves, kick with their hind feet at their sides and shoulders. If one is caught and the hand placed on the mouth, while infected parts are scratched, gratification is evinced by nibbling at the hand, and when the infection is severe or general this nibbling movement is regarded as an infallible sign. Examination will disclose spots on the skin, white and hard, the center marked with yellow points of exudation, which adheres to the wool, matting the fibers together. The wool may be firm on these spots, and no scabs are seen at this stage. Then the yellow moisture, evaporating, gives place to a yellow scab, which adheres firmly to the skin and wool. Raw places appear at points which the animal can reach with his teeth and hind feet. The disease is complicated in summer by the presence of the larvæ of the blow-fly, the maggots burrowing under the scab. The animal becomes nervous, excited to wildness, and cannot obtain properly either food or rest, thus losing flesh and becoming reduced to a skeleton, from constant irritation and lack of nutrition, only the strongest animals recovering, if left without treatment.

Remedies.—Destruction of the parasite and its eggs is the only object of remedial treatment. Arsenic and mercury are often employed very effectually, but they are poisonous, and therefore injurious and dangerous to the sheep. These and other solutions are used both as washes and dips. Sudden changes of weather and locality, or a deficiency of food after such treatment, often induce serious or fatal results, which cannot be guarded against. Whole flocks have thus been lost. Mercurial ointment, with olive oil

and a little turpentine, is popular in England, nevertheless, and is regarded as improving the yield of wool. Experiment proves that the acarus will live in arsenic and sulphur for some hours; potash is more fatal, and tobacco is more deadly still, killing in a few minutes. But carbolic acid is probably the most potent remedy used. When combined with one hundred times its bulk of water, it has killed acari in two minutes; when used with fifty times its bulk of water, a degree of potency harmless as a dip, it kills in forty to ninety seconds. Professor Brown thus describes the manufacture of the carbolic acid dip, which, it is claimed, has never failed when properly used.

First, it is necessary that carbolic acid should be obtained of uniform strength, and experience has proved that the crystalline product is less efficacious in the destruction of parasites than the liquid residue, which is sold under the name of terebané, or cresylic acid, which can always be obtained of the manufacturers. The liquid is, when fresh, of a very light straw color, becoming dark brown on exposure to the atmosphere. The pure carbolic acid was employed in many experiments, at first with only partial success, but even had it proved to be superior to the liquid terebane, the price would have been a serious objection; terebane, however, is very much cheaper, and in every experiment was found to be more active as a remedial agent than the pure carbolic acid, while its fluid condition at all temperatures renders it more easy of manipulation.

To effect perfect combination between the terebane and the water used for dilution care is essential, as imperfect mixtures are capable of doing injury, and may cause the death of some of the sheep, particularly of those which are first introduced into the bath. The reason of this is obvious. An incomplete mixture allows the separation of the terebane, which floats on the surface of the fluid in the form of a brownish, oily, or rather tarry scum; the first few animals which are dipped become covered with the undiluted acid, which acts at once and energetically as a caustic, causing prostration and death, unless immediately on observing the symptoms of distress, means are taken to wash off the

agent with warm water and soap; this treatment is not, however, at all times successful.

An accident of the kind never ought to occur, and, in fact, never can occur if the dip is properly prepared and used. It is scarcely probable that agriculturists will attempt to make the compound, and the following directions, therefore, may be taken as meant for the instruction of the practical chemist or the veterinary surgeon who has charge of the diseased flock:

A quantity of terebane, proportioned to the number of sheep to be dipped, is to be placed in a convenient vessel of iron or earthenware, and, if possible, the vessel should be suspended in a larger one containing water, and so arranged that heat can be applied. In all chemical laboratories a water-bath will be available; but for the purpose of making small quantities of the dip, an iron bucket suspended in an ordinary copper filled with water, which may be kept hot, but not up to the boiling point, will answer perfectly well. As soon as the terebane is placed in the temporary water-bath, a certain proportion of soap; one bar weighing over two pounds to each gallon of terebane, is to be added. The mixture should be stirred with a wooden rod until the soap is entirely dissolved, care being taken that the fluid does not boil. When the solution is complete the compound should be removed from the fire, and as soon as it ceases to give off vapor, oil of turpentine is to be added in the proportion of one pint to each gallon of terebane. The mixture, when cold, may be poured into carboys or casks ready for use.

While the above remedies may be entirely efficacious, and are to be recommended as the best, it may not be amiss to give a few which have been popular heretofore:

An infusion of arsenic, half a pound of the mineral to twelve gallons of water. The sheep should be washed in soap-suds and then dipped in the infusion.

Mercurial ointment, incorporated thoroughly with four times its weight of lard, rubbed upon the head and upon the skin (the wool being carefully parted) in parallel lines from head to tail, four inches apart. The mixture applied should not exceed two ounces, and a half an ounce

may be enough for a lamb. A light second application is sometimes necessary.

One pound of sulphur gradually mixed with half a pound of oil of tar, the mixture rubbed down with two pounds of lard, may be applied in the same way. Some would prefer this, because not poisonous, if sure to be effectual.

Another mixture contains half a pound of corrosive sublimate, three-fourths pound of white hellebore, six gallons whale oil, two pounds rosin, and two of tallow. This is powerful, and should be sparingly applied. Tobacco decoctions are much used in this country and quite effectually, if thoroughly applied after the wool is taken off.

A correspondent in New York, who did not succeed with the tobacco wash, effects cures with a mixture (well rubbed in) of one ounce subcarbonate of potash, two ounces lac sulphur, one ounce oil of tar, and one pint of whale oil.

Chancellor Livingston found the following specific: A decoction of tobacco, one-third as much lye of wood ashes, with as much lard as the lye would dissolve, a small quantity of tar, with one-eighth of the whole by measure of the spirits of turpentine, applied, after rubbing hard with a shoe-brush, to break down the scabs, by rubbing the parts affected, two or three times, at intervals of three days.

ANOTHER REMEDY.—From that eminent agriculturist, Mr. George Geddes, to the New York Tribune, is so full and complete that we copy it entire:

M. Walz, a German, was the first to establish the true character of the disease; a minute insect (*acarus*) does the mischief. If by any means one of these insects is put upon the fibre of the wool of a living sheep it at once travels to the skin and burrows within it, where it remains until about the tenth or twelfth day, when a little swelling commences, and by the sixteenth day a pustule breaks and liberates the insect, and if it is a female, she comes forth with her young that have hatched in the skin of the unfortunate sheep. These at once spread themselves over the skin and bury themselves and propagate their kind, and, unless interfered with by man, go on in their work until the animal is covered with sores, which so torture it that it constantly rubs

itself against posts or any convenient thing, and scratches itself by using its feet, or tears its flesh off by its teeth, and finally dies in misery.

There is an old and true saying: "One scabby sheep will spoil a whole flock." The disease once introduced spreads rapidly, for every post or other projecting object in the field or shed or yard to which the diseased animal may be confined has very soon enough of these *acari* to attach themselves to the wool of every sound sheep that may happen to touch these objects or lie down on ground that has before been occupied by diseased sheep. M. Walz found that while the very young insects died by being long kept in a dry place, the old and mature ones would live when so exposed through a whole winter.

The two remedies most used by farmers to destroy insects on their domestic animals are spirits of turpentine and the juice of tobacco. These two substances combined and properly applied will kill the *acari* certainly, as has been repeatedly proven by owners of large flocks that had become severely afflicted with scab. A letter before us from Wyoming Territory says that the signers thereof had a flock of 1,200 sheep that was purchased a year and more ago, and soon after purchase symptoms of scab appeared. Six hundred pounds of damaged unmanufactured Wisconsin-grown tobacco was purchased, and the sheep dipped in the juice soon after shearing, without good result, "for our sheep are troubled worse with the disease now than a year ago." This is a hard case, and the cure a big job, but it is practicable. To show that it is possible, we will give the history of a case, all the facts of which I have taken some pains to learn: Fifteen years ago Major Davis Cossitt, of Onondaga Hill, New York, well known as a wool-grower and sheep-breeder, allowed a passing drove of sheep to be confined in his yards during one night, having no suspicion of danger from disease. The following winter his own sheep, to the number of six hundred, were kept in these yards that the drove had for but one night occupied several months before. Sickness kept the owner confined to his house during the early part of the winter, and when at last he was able to visit his

flocks he saw at the first glance that they were thoroughly infected with scab. The usual efforts were made to apply spirits of turpentine and tobacco to the diseased parts as they could be reached while the wool was unshorn, and with the usual unsatisfactory result. Much wool was lost, and great injury to health was suffered, until the spring came and the sheep could be sheared. As soon as the shearing was done Major Cossitt adopted the following course of treatment:

A large quantity of the stalks of tobacco plants, from which the leaves had been stripped and sold, as the only merchantable part, and the stalks thrown away as of no value, were procured from his neighbors who largely cultivated tobacco. These stalks were cut into convenient lengths and placed in a large kettle, and boiled until the water was black with their juice. A platform was made large enough to place upon it a sheep, having a bottom made tight, and over that, and about two inches from it, another floor made of slats so near each other that the sheep could not put their feet between. This platform was placed on benches of convenient height, and was a little inclined toward a large tub (half hog-head); and so placed that all the fluid that drained from the sheep ran into the tub. This was to save waste. The tub having in it a sufficient quantity of tobacco-juice to fully immerse a sheep, a little spirits of turpentine—say one gill—was added, and a sheep dipped in all over up to his eyes, and held there until every part of his skin is thoroughly wet. The animal was then laid on the platform and all sore places thoroughly rubbed by the hands of the men employed, so that the very bottom of the sores was reached, and in some cases some blood followed. The sheep was then liberated, and quite likely showed marked signs of being in the condition that ambitious boys sometimes find themselves when, anxious to be men, they first form the acquaintance of this poisonous plant. I have heard of sheep actually dying under treatment, and I have seen them very sick when kept too long in the tub.

The water in the tub was kept as hot as it could be and not burn the sheep, by from time to time adding new from the kettle over the fire; and about every

sixth sheep that was dipped, a new supply of spirits of turpentine of about a gill was added. The turpentine floats on top of the water, and for this reason must be supplied in small quantities and often. Mr. Cossitt put every one of his large flock through this laborious course of treatment, whether there were found or not any sores on each, and at the end of the week he repeated the treatment, and after another week the whole thing was the third time gone over, and the fourth time at the end of a fortnight from the third. Thus, in four weeks from shearing, every sheep had been four times dipped and scraped where necessary. No signs of scab were ever again seen in this flock; though, to make all safe, the sheep were all (young lambs as well as shorn sheep) dipped once the year after, and again once the third year immediately after shearing. It may be that the first year's four dippings were sufficient, but if this was so the benefits derived by destroying all ticks, and the promotion of a healthy condition of the skin generally, justified the cost of the operation here, where tobacco-stems can be had for nothing. Many wool-growers think this annual dipping in tobacco-juice pays in the increased quantity and improved condition of the wool of the next fleece.

ANOTHER REMEDY.—Rub soft soap on the back pretty thickly, after shearing in the spring, and let them take the rain; for a month or two the soap will be partially melted, and will run down over the whole body when it rains; this will effectually kill the insect and cure the scab.

SHEEP, Lice Ticks and Flies.—Sheep, and especially if they are neglected and poor, are often sadly annoyed by these vermin. They frequently precede the scab; the dreadful itching which they occasionally cause, prepares for or produces the scab, or they multiply most rapidly when the skin is fouled by the scab. The sheep-louse is too well known to every shepherd; it is of a brownish or reddish color, with a flat body, and three legs on either side; the tick has a large round body, and small chest and head, which he buries deep into the skin, and by means of which he holds so fast as to be with difficulty torn off. The lice are propagated by means of eggs or nits; the origin of the tick is not so well understood.

They are both injurious to the wool, and also to the health of the animal, from the constant irritation which they produce. The louse is more injurious than the tick. The tick only buries his head in the skin; the lice burrow, and form their nest in or under it. They collect together, and a scab soon rises, whence a glutinous matter proceeds. The scab continues to increase until it is of the size of a sixpence, and undermines and destroys the roots of the wool, and the fleece comes off in patches. The itching becomes intolerable, and the sheep rub themselves eagerly against every thing within their reach, and tear off the wool by mouthfuls. The lice are thickest about the throat and under part of the neck, and when this is the case, it has sometimes happened that the sheep has been seriously injured, or even destroyed, in a very curious way. He bends his head down as closely as he can to get at the vermin, and then some of the wool entangling itself about the teeth, the head becomes fixed, and the animal is said to be bridled. If he is not observed and relieved, the head will be held until the muscles are seriously injured, so that he can no longer comfortably bend his neck to graze, or until he is absolutely destroyed.

Many washes have been invented to destroy these insects, but few of them have perfectly succeeded. That which seems to have the best effect is the Arsenical Wash for Sheep Lice. (See No. 76, DOMESTIC ANIMALS, MEDICINES FOR.)

The infected sheep should be immersed in this, the head only being kept out; and while he is in the liquid the fleece should be well rubbed and moulded, so that the wash shall penetrate fairly to the skin. When taken out of the tub, the fluid should be pressed as thoroughly as possible out of the fleece, which will then do for another of the flock; and the sheep should be kept from cold and wet for a few days.

Other persons prefer the Mercurial Wash for Lice. (See No. 77, DOMESTIC ANIMALS, MEDICINES FOR.)

These washes, however, are not always safe, and they are very troublesome in their application. The ointment which we have recommended for the scab is more easily applied, and more effectual.

It may be rendered more fluid, and consequently more easily rubbed in by being mixed with an equal weight of neats-foot oil; and it should be as carefully applied over every part as it would be in the act of smearing, for the vermin will speedily collect and burrow in any spot which the ointment may not have reached. The tick is many times as large as the louse, but not so frequently found. When not gorged with blood it is flat, but when bloated it is round, and brown or black, and varies in size from a pin's head to a small bean. When one of them fastens itself upon the sheep, it seems to retain precisely the same situation for some weeks, or even months, and yet the young ticks are found round the old ones, resembling numerous red points, but becoming brown as they increase in size. They, too, select the sheep that is debilitated by want of proper nourishment or by disease.

The tick is more frequent on some grounds than on others. On some farms, even although badly managed, it is seldom found; on others it is scarcely to be got rid of, even although the sheep should be healthy. It would seem as though it were bred in the ground, and that one part only of its existence is spent on the sheep. Some shepherds set diligently to work, and pick them off. This, however, is an almost endless task. Others dress the sheep with turpentine, which usually destroys them; but the scab ointment is the surest remedy, as well as preventive.

The sheep is tormented by two species of flies. The one endeavors to lay its eggs on the muzzle, and thence, speedily hatched by the moisture and warmth of the breath, the animalcule, or larva, creeps up the nostril, and finds its way into the frontal sinuses, or some of the cells above the nose, and there fastens itself, and lives and grows, until it becomes a large worm; it then creeps again down the nostril, assumes the form of a grub, burrows in the earth, and in due time appears in the form of a fly. It is only during the time of the depositing of the egg that the sheep are disturbed or injured, and then they may be seen huddling together on the barest part of the pasture, with their noses close to the ground, and by continual shaking of the head and

stamping, endeavoring to prevent the depositing of the egg. When the little worm has reached its destined situation, it seems no longer to trouble the animal; and these bots are found in the heads of some of the largest and fattest sheep. This is the destined place of this worm, and nature would not make it destructive, or even much annoying, to the animal by which it is to be supported.

Another species of fly, or perhaps several other species, are far more troublesome and injurious. At some uncertain time after shearing, and seemingly oftener occurring to those that were early than to those that were later sheared, the sheep will be struck with the fly. This will be discovered by the uneasiness of the animal. It is not the itching of scab, for it is before the usual appearance of that disease, and when the sheep was shorn there was not the least appearance of it. The sheep will hang down their heads, stand for awhile as if listening, then bow up their backs, violently shake their tails, stamp furiously with their feet, gallop away for a short distance, and then turn round and try to bite the affected part. The tail is evidently the part oftener attacked.

On being caught, there will probably be found little lumps or bladders on various parts, but particularly about the tail; and if these are pierced, they will be found to contain numerous little maggots. If there are any sores about the animal made in the shearing, they will become full of maggots in different stages of maturity, and these vermin will crawl through the wool, over almost every part of the body.

In warm weather they are peculiarly annoying and destructive. We have seen them spreading from the root of the tail to the head of the sheep, deepening every sore, eating even through the sound skin in various places, and penetrating to the very entrails.

A sheep struck by the fly should not be neglected a single day, for the maggots will sometimes do irreparable mischief in a very short space of time. The wool should be cut off round the places where the maggots seem principally to prevail, and they should be carefully picked out; but this will not effectually destroy them; for many will crawl far

away out of the reach of the looker. Some ointment or powder must be applied, which will at the same time heal the sores and destroy the maggot. An application of this kind may be obtained in some of the preparations of lead. The Fly Powder (See No. 78, DOMESTIC ANIMALS, MEDICINES FOR) will be very useful.

While one man holds the sheep by the head, let another have a dredger or pepper-box containing some of the powder in his right hand, and a stick in his left; let him introduce the stick near the tail of the animal, and draw it gently along the back as far as the head, raising the wool, and scattering in the powder as he proceeds. Then let him dip his hand in some of the coarsest whale oil, and smooth down the wool again, smearing the whole of the fleece with the oil. This will not only destroy the maggots, but prevent the future attack of the fly. There are few flies that will approach anything that smells strongly of this oil; it would, therefore, be a good practice to smear the sheep with a little of it after shearing. No injury could possibly be done to the wool, but, on the contrary, its growth would be promoted.

If, however, the flies have made any deep wounds or ulcers, some of the powder should be mixed up with tar, and the ointment gently rubbed on the sores. Another good way is to dip the lambs in a decoction of tobacco, just strong enough to kill ticks in a minute or two. One man takes the lamb by the forelegs and head, and dips him in the vessel so as just to leave the head out. It is then raised and held over the kettle while another presses the liquor out of the fleece back into the kettle.

Maggots originating from fly-blows on wounds, may be prevented by dressing the wound with tar, and may be destroyed by an application of honey, when spirits of turpentine would prove ineffectual.

SHEEP, Erysipelas.—See SHEEP, SCAB.

SHEEP, Stretches.—See SHEEP, INDIGESTION.

SHEEP, Shearing.—Sheep should be sheared before they are turned out to pasture. This prevents a loss of wool by their shedding it on bushes, etc., and it is also cleaner and freer from grit or sand.

SHEEP, Itch.—See SHEEP, SCAB.

SHEEP, Diarrhœa, or Purging in.—The full-grown sheep is almost as subject to purging as is the lamb, but it is not so difficult to be cured, nor is it so fatal. A sheep can scarcely be turned into fresh pasture in the spring without beginning to scour, and especially when warm weather is succeeding to cold, and the grass shoots rapidly; but this in most cases is beneficial rather than injurious. It rouses the digestive organs to full and healthy action, and the sheep that scours a little when first turned into the meadow or on the marsh, is sure to thrive more quickly afterwards. The purging, however, must not be too violent, nor continue too long.

The looseness caused by feeding on young succulent grass, seldom lasts more than a few days; but if it should continue longer, the sheep must be removed to inferior pasture, and a little hay allowed them if they can be induced to eat it: some dry sound old seeds should also be put before them, and the astringent powder (See No. 80 DOMESTIC ANIMALS, MEDICINES FOR) administered.

A favorite remedy with some farmers, and succeeding in slight cases, but inefficient in severe ones, is suet boiled in milk. Others give a very curious medicine: it consists of the lime dug out of an old wall, and mixed with tar. What good purpose the tar can answer, we cannot conceive, and the lime would be superseded by the prepared chalk recommended in the last recipe.

When the disease abates, the sheep must not be turned out again on their former pasture, but on the best old grass land which the farm will yield; and even then, a little good hay and corn should be daily allowed them.

The farmer should be careful that he does not confound the consequence of the diarrhœa with costiveness. When there is much mucous discharge, it is very sticky, and adheres to the wool under the tail, and glues it to the rump, thus forming a mechanical obstruction to the passage of the dung. The sheep straining very hard, careless observers have supposed that he was costive, and have given him a strong dose of physic, and thus added fuel to the fire.

There is but one form of the disease under which all hope is precluded, and

that is when it is connected with chronic cough or confirmed hoose. That animal may be patched up for a little while, but he will most assuredly perish.

It is necessary to make a distinction between diarrhœa and dysentery, the latter being attended with considerable fever and the evacuations are often slimy and bloody; and the disease sometimes terminates fatally in a few days. It sometimes follows diarrhœa, but is generally produced by change of food or pasture and exposure to bad weather. Lambs are rather more liable to the disease than sheep, and it has been found to attack them very frequently on coming from low lands to high. The treatment should consist in giving Mild Laxatives (See No. 81 DOMESTIC ANIMALS, MEDICINES FOR).

SHEEP, Dysentery, (See SHEEP, DIARRHŒA).

SHEEP, Indigestion and Debility in.—Bad management, and that alone, causes the appearance of these complaints in a flock. When sheep have been overdriven, and excessively wearied; or ewes have had twins, and have afterwards been kept with their lambs on scanty pasture, where there was not enough even for the mother; or have weaned very early, before there was any flush of grass; or, during the winter, have not yet been supplied with a proper quantity of hay or corn—in all these cases, the sheep are apt to pine away. They do not seem to relish their food, but wander over the field picking a little here and there, the belly being tucked up and the back bowed.

The remedy for this is simple enough if the sheep have not been neglected too long. It is plain that the powers of digestion are weakened or suspended, and the object to be accomplished is to rouse them once more to their proper tone and action. A mild purgative should lay the foundation for this. Half the Purging Drink (See No. 66 DOMESTIC ANIMALS, MEDICINES FOR) should be given, and this followed up by tonics or stomachics. Some farmers content themselves with giving a little good caudle for two or three successive days, and with general good effect, except that its sweetness is objectionable. The Tonic Drink for Debility (See No. 82 DOMESTIC ANIMALS, MEDICINES FOR) will be preferable.

Repeat the half-dose of physic a week

afterwards, and put the sheep on fresh and good pasture.

SHEEP, Dizziness in.—Mr. Gunther says: "Sheep are often observed to describe eccentric circles for whole hours, then step forwards a pace, then again stop, and turn round again. The older the disease the more the animal turns, until at length it does it even in a trot. The appetite goes on diminishing, emaciation becomes more and more perceptible, and the state of exhaustion terminates in death. On opening the skull there are met, either beneath the bones of the cranium or beneath the dura mater, (the membrane which lines the interior of the skull), or in the brain itself, hydatids varying in number and size, sometimes a single one, often from three to six, the size of which varies; according as these worms occupy the right side or the left, the sheep turns to the right or left; but if they exist on both sides, the turning takes place to the one and the other alternately.

The animal very often does not turn, which happens when the worm is placed on the median line; then the affected animal carries the the head down, and though it seems to move rapidly it does not change place. When the hydatid is situated on the posterior part of the brain, the animal carries the head high, runs straight forward and throws itself on every object it meets.

TREATMENT.—Take

Powdered Worm Seeds.....1 ounce.

" Sulphur..... $\frac{1}{2}$ "

" Charcoal.....2 "

Linseed, or Flaxseed1 pound

Mix. Divide into eight parts, and feed one every morning. Make a drink from the white Indian hemp (*asclepias incarnata*), one ounce of which may be infused in a quart of water, one-fourth to be given every night.

SHEEP, Grub-in-the-Head.—The Grub-in-the-head is the grub of the gadfly of the sheep. The egg is deposited within the nostrils of the sheep, where it is immediately hatched by the warmth and moisture; and the larvæ crawl up the nose to the sinuses, where they attach themselves to the membrane and remain until the next year, feeding upon the mucus.

Some farmers protect their sheep measurably from the attacks of the grub, by plowing a furrow or two in different por-

tions of their pastures. The sheep thrust their noses into this on the approach of the fly. Others smear their noses with tar, or cause them to smear themselves, by sprinkling their salt over tar. Those fish oils which repel the attacks of flies might be resorted to. Blacklock suggested the dislodgement of the larvæ from the head, by blowing tobacco smoke up the nostrils—as it is said to be effectual. It is blown from the tail of a pipe, the bowl being covered with cloth. Tobacco-water is sometimes injected with a syringe for the same purpose. The last should be prevented from entering the throat in any considerable quantity.

SHEEP, Leaping.—The manner of treating rams has lately received a very great improvement. Instead of turning them loose among the ewes at large, as heretofore, and agreeably to universal practice, they are kept apart, in a separate paddock, or small enclosure, with a couple of ewes only each, to make them rest quietly; having the ewes of the flock brought to them singly, and leaping each only once. By this judicious and accurate regulation, a ram is enabled to impregnate near twice the number of ewes he would do if turned loose among them, especially a young ram. In the old practice, sixty or eighty ewes were esteemed the full number for a ram. [Over-taxing the male gives rise to weak and worthless offspring.]

"The period during which the rams are to go with the ewes must be regulated by climate, and the quantity of spring food provided. It is of great importance that lambs should be dropped as early as possible, that they not only be well nursed, but have time to get stout, and able to provide for themselves before winter sets in. It is also of good advantage to the ewes that they may get into good condition before the rutting season. The ram has been known to live to the age of fifteen years, and begins to procreate at one. When castrated, they are called wethers; they then grow sooner fat, and the flesh becomes finer and better flavored."

SHEEP, Fractures, Wounds and Bites in.—It is not often that the sheep gets a broken bone by any fault of his own, but the shepherd is sometimes a brutal fellow. If he is a youngster, he is too frequent-

ly, designedly mischievous; and in the struggle between a sheep and the dog a leg has now and then been broken. The treatment of fracture below the elbow or the hock is easy enough. The broken limb must not be roughly stretched or handled, but the divided edges of the bone must be brought gently and as perfectly opposite, and close, and fitting again to each other as possible, and kept together by some strips of adhesive plaster or pitch spread upon leather wound round the part. Over this splints should be placed, reaching a little beyond the joint, above and below, and these confined with more plaster, or with waxed thread. A little lint or linen rag should have been previously placed under the end of the splints, to prevent them from excoriating or injuring the part beneath. This being done, the leg should not be meddled with until the bandage becomes loose, which will be in about ten days. The splints must be replaced once, and at the expiration of another ten days, the edges of the bone will generally be found to have united; the animal, however, should be kept for a little while longer as quiet as possible, and if the bone is not quite firm, the strips, without the splints, should be once more bound round it.

Sometimes considerable swelling will take place after the splints have been employed. They may have been put on a little too tight, or they do not press equally. They should not, however, be taken off at once, for the bones beginning to unite may again be separated during the removal of the bandages; but, with a sharp and strong pair of scissors, two or three notches should be cut through the edge of the bandage above and below. This will generally afford sufficient room for the re-establishment of the circulation, and the swelling will subside, without the fracture having been disturbed.

If it should be a compound fracture, that is, if a portion of the bone should protrude through the skin, either the setting of the bones must be deferred until the wound is healed, or the bandages must be so applied, that the wound can be readily got at for the purpose of dressing. This, however, is so difficult a matter that it will be prudent to destroy the animal that has a bad compound fracture.

Sheep are far oftener subject to wounds than they ought to be, from the ferocity of the shepherd's dog, encouraged by his brutal master needlessly to worry the flock. They are too frequently seriously lamed, and the ears almost torn from their heads. The proprietor of sheep should never forgive wanton cruelty of this nature.

The treatment of wounds in sheep is very simple, and consists mostly in avoiding the burning irons and caustics, of which the farrier, and sometimes the shepherd, are too fond.

The first thing is to clean the wound thoroughly with a sponge and warm water, and to remove those parts which are much lacerated, or in a manner torn off. If it is a simple cut wound, and the edges are not far separated, all that will be necessary to be done will be to apply daily a little tincture of aloes, and to cover the part, that the flies may not deposit their eggs on the sore. If it is a wide and gaping wound, the edges of it must be brought as nearly and accurately together as possible, and confined by one or two or more stiches passed through them with a crooked needle and waxed thread, and which the shepherd should always carry with him. The only dressing wanted here will be the tincture of aloes, with occasional fomentations if there is much inflammation; but the wound should be more carefully covered from the flies, either by a bandage or pitch plaster, or for a small wound, a little tar will answer.

No dependence is to be placed on the accounts which are given by some authors of the udders of the ewes being sucked by snakes. The reptile has never been seen thus employed; but sheep are sometimes bitten by the viper, and a few have been destroyed by the swelling having been neglected, and inflammation widely spreading. It is difficult at all times to discover the accident. Whenever a sheep is lamed, the affected limb should be well examined; and at other times, if he is evidently ill, and the illness accompanied by local or general swelling, careful search should be made into the nature of the mischief. The wound inflicted by a viper will be very small, but there will be swelling and heat about it, and a great deal of tenderness.

The best application is oil of turpentine, which should be well rubbed over and around the part; while a quarter of an ounce of hartshorn, and four ounces of sweet oil, may be given to the animal, and repeated in half an hour if the part should continue to swell, or the sheep appear to be seriously ill. Some shepherds, when they suspect an accident of this kind, rub the part well with an onion, and doubtless with considerable effect; the turpentine, however, is more effectual, and should be obtained as speedily as possible.

SHEEP, Scours in.—In scours, the surface evaporates too little of the moisture, and should be relaxed by diffusible stimulants in the form of ginger-tea. The treatment that we have found the most successful is as follows: take four ounces raw linseed oil, two ounces of lime water; mix. Let this quantity be given to a sheep on the first appearance of the above disease; half the quantity will suffice for a lamb. Give about a wine glass full of ginger tea at intervals of four hours, or mix a small quantity of ginger in the food. Let the animal be fed on gruel, or mashes of ground meal. If the above treatment fails to arrest the disease, add half a teaspoonful of powdered bayberry bark. If the extremities are cold, rub them with the tincture of capsicum.

SHEEP, Foundering.—In this malady, the animal becomes slow in its movements; its walk is characterized by rigidity of the muscular system, and, when lying down, requires great efforts in order to rise.

CAUSES.—Exposure to sudden changes in temperature, feeding on wet lands, etc.

INDICATIONS OF CURE.—To equalize the circulation, invite and maintain action to the external surface, and remove the cause. To fulfill the latter indication, remove the animal to a dry, warm situation.

The following anti-spasmodic and diaphoretic will complete the cure: Powdered lady's slipper (*cypridium*,) 1 teaspoonful. To be given every morning in a pint of warm penny-royal tea.

If the malady does not yield in a few days, take powdered sassafras bark, one teaspoonful; boiling water, one pint; honey, one teaspoonful. Mix, and repeat the dose every other morning.

SHEEP, Age of, How to Tell.—The age of sheep may be known by examining the front teeth. They are eight in number, and appear during the first year, all of a small size. In the second year the two middle ones fall out, and their place is supplied by two new teeth, which are easily distinguished, being of a larger size. In the third year, two other small teeth, one from each side, drop out, and are replaced by two large ones, so that there are now four large teeth in the middle, and two pointed ones on each side. In the fourth year, the large teeth are six in number, and only two small ones remain, one at each end of the range. In the fifth year, the remaining small teeth are lost, and the whole front teeth are large. In the sixth year, the whole begin to be worn; and in the seventh—sometimes sooner—some fall out and are broken.

SHEEP AND LAMBS, Care and Management of.—1. Keep sheep dry under foot with litter. This is even more necessary than roofing them. Never let them stand in mud or in snow. 2. Do not starve them during the winter, but by an abundance of food keep them in good condition. A more painful sight than the flocks of many farmers, near the close of the winter, cannot be witnessed. When a farmer has more sheep than he can properly keep or sell, he should kill the surplus when winter sets in, even if he should get nothing from them but the pelts. 3. Furnish an ample supply of water, convenient of access, during the winter months. 4. Always try to avoid letting any of your sheep or lambs have any sudden change of food. 5. Take up lamb bucks early in the summer, and keep them up until the December following, when they may be turned out. 6. Drop or take out the lowest bars as the sheep enter or leave the yard, thus saving broken limbs. 7. Count every day. 8. Begin feeding grain with the greatest care, and use the smallest quantity at first. 9. If a ewe loses her lamb, milk her daily for a few days, and mix a little alum with her salt. 10. Let no hogs eat with the sheep, by any means, in the spring. 11. Give lambs a little mill feed in time of weaning. 12. Never frighten sheep if possible to avoid it. 13. Furnish sow rye for weak ones in cold weather, if

possible. 14. Separate all those that are weak, thin or sick from those that are strong, in the fall, and give them special care. 15. If any one of your sheep is hurt, catch it at once and wash the wound; and, if it is fly-time, apply spirits of turpentine daily, and always wash with something healing. If a limb is broken bind it with splinters, but not tight enough to interfere with the circulation of the blood. 16. Keep a number of good bells on the sheep. 17. Do not let the sheep spoil their wool with chaff or burrs. 18. Cut tag-locks in early spring. 19. For scours, give pulverized alum in wheat bran; prevent by taking great care in changing dry for green feed. 20. If one is lame, examine the foot, clean out between the hoofs, pare the hoof if unsound, and apply a wash of carbolic acid. 21. Shear at once any sheep commencing to shed its wool, unless the weather is too severe, and save carefully the pelt of any sheep that dies. 22. If sheep are given pine boughs once or twice a week, they will create appetite, prevent disease, and increase their health. 23. Their general health during the grazing season will be promoted by giving the sheep tar, at the rate of a gill a day for every twenty sheep. Put the tar in a trough, sprinkle a little fine salt over it, and the sheep will consume it with eagerness. 24. The best sheep to keep, both for wool and mutton, is the American merino.

SHEEP, Catarrh in.—The following is asserted to be a sure cure for this disease. Take a quill from a hen's wing, immerse the feather end in spirits of turpentine, run it up the nostril of the sheep the whole length of the feather end, and twist it round before withdrawing it; wipe it off clean each time before immersing. One application will cure ordinary cases; the second or third, at intervals of two or three days, will cure the worst.

SHEEP, To Fatten for Winter.—Other things taken into consideration, large sheep fatten more easily and profitably than small sheep, and full grown animals than those that have not reached maturity. Two-year-old wethers are the most profitable to fatten, and it is a matter of considerable surprise that so few of our farmers breed them. Sheep will fatten readily in winter on good clover hay alone; we do not mean the dark looking,

burnt-up stuff, commonly called by that name, but what an American farmer would call "hay," cut when in full bloom, and cut in such a manner as to retain all its juices before they are turned into woody fibre, and of a good green color. A sheep of say 120 lbs. live weight, will consume 21 lbs. of clover hay per week, and increase in weight 2 lbs. Allowing that it would ordinarily consume 10 lbs. to keep it in good stationary condition, an expenditure of 7 lbs. of hay extra will produce 1½ lbs. of mutton, worth, in the spring, 10 cents, so that the extra feeding is literally realizing to the farmer at the rate of nearly \$30 per ton for his hay. No other stock, we think, will give such a return for the trouble of fattening as this.

If it is desired to fatten sheep rapidly, the addition of a small quantity of oats to their food will be of great service; a gallon of oats once a day, among twenty sheep, will be a great help to fattening. Fattening sheep do not require very warm quarters—in fact, they will not bear close confinement, but their quarters must be dry, well ventilated, and abundantly littered with clean straw; they must be fed regularly, kept quiet, have access to water, and an occasional taste of salt. It will be found that when the weather is very cold they will require to consume somewhat more food than at other times, in order to counteract the waste of substance used in generating heat for their bodies, otherwise they will lose instead of gaining on cold or stormy days.

SHEEP, To Protect from the Gad Fly. In August and September this fly lays its eggs in the nostrils of sheep, where they are hatched, and the worms crawl into the head, and very frequently they eat through to the brain. In this way many sheep are destroyed. As a protection smirch their noses with tar. Lay some tar in a trough or on a board, and strew fine salt on it—the sheep will finish the operation. The tar will protect them, and what they eat will promote their health.

SHEEP, Rheumatism in.—This disease consists in a peculiar inflammation of the muscles of the body very frequently causing considerable pain when they are called into action. It is usually caused by exposure to cold, and sometimes shifts from

one foot to another, occasionally degenerating into a slow or chronic form, and attacking the sinews, ligaments, and joints, as well as the muscles. The neck and loins are the parts most frequently attacked, either separately or combined. The former affection causes the head to be carried in a bent position, and the latter produces considerable stiffness and weakness of the loins. The treatment should consist in removing the animal to a comfortable place, giving an active purgative, such as two ounces of Epsom salts dissolved in warm water, with a drachm of ginger and $\frac{1}{2}$ an ounce of spirits of nitrous ether. A stimulant, such as hartshorn and oil, or opodeldoc, should be well rubbed over the affected part; and if the disease assumes a chronic form, a seton should be inserted near the part.

SHEEP, Directions for Shearing.—The shearer may place the sheep on that part of the floor assigned to him resting on its rump, and himself in a posture with his right knee on a cushion, and the back of the animal resting against his left thigh. He grasps the shears about half way from the point to the bow, resting his thumb along the blades, which gives him a better command of the points. He may then commence cutting the wool at the brisket, and, proceeding downward, all upon the sides of the belly to the extremity of the ribs, the external sides of both sides to the edges of the flanks, then back to the brisket, and thence upward, shearing the wool from the breast, front, and both sides of the neck, but not yet the back of it, and also the poll, or forepart, and top of the head. Then "the jacket is opened," and its position, as well as that of the shearer is then changed, by the animal's being turned flat upon its side, one knee of the shearer resting on the cushion, the other gently pressing the fore-quarter of the animal to prevent any struggling. He then resumes, cutting upon the flank and rump, and thence onward to the head. The sheep is then turned on the other side—in doing which great care is requisite to prevent the fleeces being torn; and the shearer proceeds as upon the other side. He must then take the sheep near to the door through which it is to pass out, and neatly trim the legs, leaving not a solitary lock anywhere as a lodging-place for

ticks. It is absolutely necessary for him to remove from his stand to trim, otherwise the useless stuff from the legs becomes intermingled with the fleece-wool. In the use of the shears, the blades must be laid as flat to the skin as possible, the points not lowered too much, nor should more than one or two inches be cut at a clip, and frequently not so much, but depending on the compactness of the wool.

SHEEP, How to Purchase.—The best sheep for a man to buy who is just starting a flock, are young two and three year old ewes. Next to such, we should prefer to buy yearling ewes, although having to wait a year longer for increase. We consider it poor policy, and do not practice breeding yearlings. It will do in small flocks, where yearlings are large of their age, but not in large flocks—or Merino sheep especially. Next to yearlings, we would take a flock of thrifty lambs. But there is a very wide difference in the lots of lambs raised by different owners in the West, owing much to the manner in which they have been treated. The sort we should not want are those which were dropped in May, June and July, which were not weaned early enough, or not given a good chance at weaning, or even in some cases which have not been weaned at all, any further than the ewes weaned them. Although four and five year old ewes are not objectionable, if right other ways, yet there is, in general, nothing like young sheep.

A man who is acquainted with sheep should, on proposing to himself to buy a flock which may have been driven in to sell, for instance, take with him some man who is posted on sheep. A sheep man, on coming up to such a flock, will take a general look over it to note condition, thrift, quality of wool, etc. He will then wish to have them up in a yard, where he can catch them, to make more particular examination. He catches a lot of the oldest appearing ones and looks in their mouths; he watches sharply for any indications of scab (small patches of wool gone), and makes a rigid examination with his knife of the hoofs of such as limp the least bit or show any tenderness in their feet. If any of the hoofs have been treated for foot rot at any time within six months, he is sure to see it; it shows either in the growth of the edge

of the hoof from its former paring with the knife, or in the rough and unnatural hardness of the hoof which the application of all foot rot medicines (caustics) leave. A new man should never buy a flock which indicates that it has been treated for scab or foot rot. They may be cured, but he is not the man to risk it. Nothing sickens new men like having to go through a siege of doctoring a diseased flock.

Buy only good sheep, if you can't buy so many of them. Of all the profitless stock, a hard lot of sheep is the most so. One thing we forgot to mention above, and that is, in buying sheep in the summer or fall, to try and learn whether they

have had bucks running with them. One of my neighbors bought a flock in such condition last fall, and has had two hundred or more lambs dropped this winter, not one of which is alive at this time. In addition to the loss of the lambs, many of the ewes have died from weakness in lambing, and of those which live through many of them will shed their wool, and all shear but light fleeces. Don't buy ewes out of a flock driven in from a distance which have had bucks driven with them, even if they have been aproned. Aprons will slip sometimes, and, as we have heard, "accidents will happen in the best of families."

SHEEP, Fits.—See SHEEP, EPILEPSY.



SWINE:

DISEASES AND MANAGEMENT OF.

SWINE, Treatment of.—Pigs should always have access to fresh water. No matter how sloppy the food is, or how much dish-water is furnished, they should always be supplied with pure water. We are satisfied that pigs often suffer for want of it.

Salt, sulphur, charcoal, ashes, bone-dust, or superphosphate, should occasionally be placed where the pigs can eat what they wish of them.

Pigs will eat beans, if thoroughly boiled, though they are not fond of them. Peas they eat with avidity, and when as cheap as corn, should be fed in preference, as they afford much the richer manure. Half peas and half corn are probably better than either alone. Peas make very firm pork.

Oil-cake, when fed in large quantities, injures the flavor and quality of the pork, but we have fed small quantities of it with decided advantage to the health and rapid growth of the pigs, without any apparent injury to the lard or pork. It is quite useful for breeding sows. It keeps the bowels loose, and increases the quantity and quality of the milk.

Bran, except in small quantities, is not a valuable food for fattening pigs. It is too bulky. But when the rich, concentrated food is given, such as corn, barley, peas or oil-cake, pigs should be allowed all the bran they can eat, placed in a separate trough. In this way it becomes a very useful and almost indispensable article to the pig feeder. It is also very useful for breeding sows. The best roots to raise for pigs are parsnips and mangel-wurzel.

The period of gestation in a sow is almost invariably sixteen weeks. In three or four days after pigging, a sow in good condition will generally take the boar. But, as a rule, it is not well to allow it. If she passes this period she will not take

the boar until the pigs are weaned. If she fails the first time, she will "come round again" in from two to three weeks.

In mild cases of diarrhoea, nothing is better than fresh skimmed milk, thickened with wheat flour.

Pigs should be castrated a week or two before they are weaned.

Nothing in the management of pigs is more important than to provide a trough for the sucking pigs separate from the sow, and to commence feeding them when two or three weeks old.

Many of the diseases of pigs are contagious, and the instant a pig is observed to be sick it should be removed to a separate pen; and it would be well to regard this single case of sickness as an indication that something is wrong in the general management of the pigs. Clean out the pens, scald the troughs, scrape out all decaying matter from under and around them, sprinkle chloride of lime about the pen, or, what is probably better, carbolic acid. Dry earth is a cheap and excellent disinfectant. Use outside wood-work, troughs, plank floors, etc., with crude petroleum. It is the cheapest and best antiseptic yet discovered.

To destroy lice, wash the pig all over with crude petroleum, and the next day give him a thorough washing with warm water and soap, with the free use of the scrubbing-brush.

Pigs should be provided with scratching posts, having auger holes bored for pegs at different heights, to accommodate pigs of different sizes.

The following description may be considered the perfection of form in a fat pig: The back should be nearly straight, though being arched a little from head to tail is no objection; the back uniformly broad and rounded across along the whole body; the touch along the back

should be firm, but springy, the thinnest skin springing most; the shoulders, sides and hams should be deep perpendicularly, and in a straight line from shoulder to ham; the closing behind filled up; the legs short and bones small; the neck short, thick and deep; the cheeks round and filled out; the face straight, nose fine, eyes bright, ears pricked, and the head small in proportion to the body; a curled tail is indicative of a strong back.

SWINE, Breeds and Breeding.—There are several good breeds which lay claim to public favor—none of which are free from defects, or which embody all the points of a good hog—the Berkshire has retained the good opinion of the public longer than any other breed, and the improved Berkshire is probably our best breed. The Berkshire was first obtained by crossing the Neapolitan with one of the large English breeds. The Neapolitan is a descendant of the improved Roman hog, probably from their best, a proof of the skill of that ancient people in that direction.

Most of the improved English breeds were obtained by a cross of the large and rather coarse English hog with the fine and delicate Chinese. The Suffolk is the result of one of those crosses, and is esteemed the best breed in England. It is of fair size, and retains in a remarkable degree the fine fattening qualities of its China parent.

The pure Suffolk is almost destitute of hair, a very serious defect under our scorching sun and dry and hot climate; it is rather tender for our western treatment, but in fattening, gives a good return for all the food consumed,

There are several American breeds that have attracted attention, as the Maggee hog in Ohio and the Chester White from Pennsylvania, both good hogs, but as yet hardly entitled to be called distinct breeds. It requires a long continued breeding in one direction, with careful and judicious selection, to form a distinct breed, so that all the pigs will be of uniform character, size and form; till fully established, there is a tendency to breed back generally to the most defective progenitor, and till that tendency is overcome, the certainty of reproduction in its perfection cannot be relied on.

The Chester White, when distinctly established, will be as most of the breeds are now, valuable hogs, the square and deep form, stout and erect legs, broad and short head, quiet disposition, good fattening qualities, and heavy weight, form a combination of good qualities that can hardly be surpassed.

Although our best breeds of hogs were obtained by judicious crossing, and our future successful efforts will be perfected in the same way, yet the indiscriminate crossing practiced by our farmers cannot be too strongly condemned. There seems to be a mania for mixing all breeds, while the aim should be to preserve each breed distinct and pure. We often see litters of pigs with no two alike, but each is a representation of some one of the eight or ten breeds whose blood is mingled in the genealogical compound. We once made a cross of the Irish Grazier, a large, slow, maturing hog, with the Berkshire, and then crossed that sow with the Suffolk—and the product were three distinct breeds from the same litter—first, a fine delicate pig that would fatten at any age; second, a medium-sized hog that would fatten at twelve to eighteen months; and third, a Grazier hog, that would weigh from five to seven hundred, but must be two or two and a half years old before they would lay on fat. Preserve the breed pure and distinct, should be the rule.

Both parents should be at least one year old before being allowed to breed, and if the female should be kept till five or six years for that purpose it would materially improve the size and vigor of the pigs; while breeding from young sows deteriorates both size and vigor. The period of gestation with the sow is about sixteen weeks, or 112 days; during this period the sow should never be closely confined, but should have ample room for exercise, with free access to water; the food should be generous, but not too heavy and heating—such as will insure the most perfect health.

The best season for sows to farrow is April, or early in May; an April pig is worth one-third more than a July pig, and more than double a September pig. Some breeds can be fattened at any age, but none will fatten as well at one year or much as at 15 to 18 months; any hog

must arrive fully at maturity before it can be easily fattened. And an April pig can be kept till a year from the following January at less expense and trouble than a September pig. While suckling the sow should have free access to grass, and should have a generous supply of tolerably rich slop, and if fed in a trough easy of access, the young porkers will soon learn to feed with her with decided benefit to themselves and the mother. At eight weeks old they should be weaned—and if they have learned to eat with the mother and are fed milk or dairy slop with a generous supply of fine bran or coarse meal they will not fall off, but will continue growing without interruption.

A growing pig should never be fed corn to any amount, it contains too much oil and does not contain elements of growth; light grain, bran and shorts, with a good supply of grass and succulent vegetables, should constitute their food. After weaning, a pig should never be made extremely fat, it checks the growth and injures their thrift afterwards; nor should they be permitted to become poor—a poor pig can never be made to attain the size or form it would have done had it never been stopped in its growth—like a hill of corn, if it once becomes feeble and sickly, no after culture can atone for the injury done. A mangy pig is worthless and should be consigned to the golgotha where the dead animals of the farm are deposited.

Neat, cleanly and well sheltered accommodation should be provided for swine, especially during the season of growth—the hog has been much slandered in relation to his uncleanly habits—in some respect the hog is more cleanly than the cow or the horse or most domestic animals. It is true, like the elephant and other pachyderms, he is fond of bathing, a cleanly habit, and it is more the fault of his keeper than his own that he wallows in mud when better accommodations are not accessible. But if young pigs have to lie in a damp and dirty bed, their skin soon becomes encrusted with scurf, the ears and tail frequently drop off, and the growth is at once arrested. During the entire rearing to the term of fattening, the animal should be kept in a sleek, healthy and growing condition.

The natural instincts of every animal

must be consulted and followed to produce the best results when domesticated.

The hog is impatient of both heat and cold; any unusual exertion during the heat of summer, especially if in full flesh, will frequently cost him his life; comfortable shade should always be provided, convenient of access, such as will protect them from the noonday heats of the summer sun; neglect of this is inexcusable cruelty, and will be a serious drawback from the credit side of the pork account.

Equally important is ample protection from the opposite extreme of the winter cold. Pigs dropped in the fall are unfit, with all the care that can or will be given by our common farm accommodations, to pass uninjured the severity of the winter season. Early spring pigs will do much better, but a well covered, well protected and well littered sty where the pigs will not lie more than one deep, and when the owner will not have the nightmare from listening to their unearthly screams from suffering from the biting cold, is essential to successful pork raising. And we do not believe that any good Christian can say his prayers and sleep easily and quietly while the whole neighborhood is made vocal by the cries of his freezing pigs.

During the cold season, a proportion of corn as food is not objectionable. It is well calculated to keep up the animal heat, and from the care and convenience of feeding, it is now, and doubtless will continue to be, the principal food at that season. Yet the best results will not follow when most of the coarser grains with bran made into slop, and refuse apples, potatoes, or other roots or green food, constitute the diet.

Dry grain of any kind is not the best feed, and for this reason the hogs that follow beef cattle highly fed with corn do better than when they receive the corn directly from the crib.

During the summer, before fattening, a clover or timothy pasture is indispensable to successful fattening, and to economical production of pork—and the next best course is soiling with clover, timothy, or other succulent grasses or vegetables. Confinement in small pens, and heavy feeding with corn, is the most expensive, as well as the least successful preparation for fattening in the fall that can well be

adopted. If fed through the hot weather exclusively on corn, the teeth become sore, and the animal is generally diseased. At killing time the livers will generally be found diseased, and it will be found impracticable to make them put on fat.

One autumn, when corn was worth twenty cents, a neighbor inquired of us if we could tell why his hogs would not fatten, and also saying that most of his neighbors made the like complaint. We replied that the reason was obvious—cheap corn was the trouble; not that ten cent corn is less nutritious than when the price is one dollar, but it is fed too liberally, and neither a hog or any other animal can stand full feeding with corn alone but a few months and continue in health. The proper course is to so feed during the summer as to preserve the animals in the most perfect health, keep them thriftily growing, and slightly gaining in flesh, so as to prepare them best for the fattening process, which is always more or less a health-destroying process. With good clover or timothy pasture, a little corn or other grain is not objectionable, but they will do well on the pasture alone—they will grow but not fatten—and if kept through the summer on grass alone, will be in admirable condition to take on flesh; they will account promptly for every kernel of corn judiciously given them.

Their teeth and digestive organs are all fresh and in good condition, and with strong appetites and vigorous health, their advance to the condition of respectable porkers is easy and rapid. Sudden changes from solid to succulent food should be carefully avoided, and *vice versa*, the change from grass to heavy feeding with corn should be very gradual, especially as the fattening season commences.

There is one primary rule in fattening that should never be violated: the change of feed should always be from lighter to heavier, and never from heavier to lighter. Consequently, when taken from grass and vegetables, a little soft corn or meal should be gradually introduced. Corn cut while the kernel is in the milk is good food to follow the grass. The gradual hardening of the grain will be a proper increase of the nutrient quality of the food. When fairly established on a diet

of sound corn, it should be fed on a clean floor, and in amount about what will be eaten, but not so as to have a kernel left. The practice of leaving a quantity of corn more than will be eaten on the feeding floor is a very wasteful and bad practice. The nice point to ascertain is to find, by measurement, the amount that will be consumed without any waste, and then to always measure the feed, by that standard, varying the amount as their appetites require. There are no animals that will retain their appetite and thrive as well when fed to a surfeit, with the unused food blown and dirty constantly before them as they will with just enough to give healthy and full action to the digestive organs, and to preserve the appetite unimpaired. To effect this the last of each feed should be consumed with avidity. Thus the old adage, that the lazy farmer who leaned upon the fence while his hogs finished their meal, always had the leanest pork, has much significance.

Plenty of water, with occasionally a little salt, coal and ashes to correct the acidity of the stomach of the gourmand porkers, completes the required dietary. This system of feeding is adapted to corn fattening as practiced at the West.

Our Eastern friends have a somewhat different system. First, having secured the necessary buildings, kettles, troughs, etc., they commence the fattening process by boiling vegetables, such as apples, potatoes, pumpkins, or any other that hogs will eat, and when thoroughly cooked, these constitute the food for the first few days, they then commence adding a very little meal, mixing it with the hot, boiled or steamed vegetables, so as to cook it thoroughly. When the mess has undergone a slight fomentation it is ready for use. The amount of meal is very gradually increased, till toward the close of the fattening season, when meal alone is given; the meal is of corn, oats, buckwheat, and barley, ground, either mixed or separately.

Hogs kept in a close pen and fed corn through the whole period of their existence will figure up the profits on the wrong side of the balance sheet; and much depends on the breed; there will be a wide difference between results from a good and inferior breed with the same

keeping. There is much point in the reply of the man when his neighbor wanted to get some of his breed of hogs, that he would want his swill tub too. Yet, both a good breed and a well-filled trough are essential to successful pork raising.

SWINE, Debility, General, or Emaciation.—The falling off in flesh or wasting away, of swine is in most cases owing to derangement in the digestive organs. The cure consists in restoring the tone of these organs. We commence the treatment by putting the animal on a boiled diet, consisting of bran, meal, or any wholesome vegetable production. The following tonic and diffusible stimulant will complete the cure: powdered golden seal, powdered ginger, equal parts. Dose, a teaspoonful, repeated night and morning.

When loss in condition is accompanied with cough and difficulty of breathing, mix, in addition to the above, a few kernels of garlic with the food. The drink should consist of pure water. Should the cough prove troublesome, take a teaspoonful of fir balsam, and the same quantity of honey; to be given night and morning, either in the usual manner, or it may be stirred into the food while hot.

SWINE, Epilepsy.—The symptoms are too well known to need any description. It is generally caused by plethora, yet it may exist in an hereditary form.

Feed with due care, and put the animal in a well-ventilated and clean situation; give a bountiful supply of valerian tea, and sprinkle a small quantity of scraped horse radish in the food; or give powdered assafoetida, 1 ounce; powdered capsicum, 1 teaspoonful; table salt, 1 tablespoonful. Mix. Give half a teaspoonful daily.

Dr. Dun states with reference to epilepsy with which pigs are often suddenly attacked, that the inherited tendency may be mitigated by keeping the animals clean, warm, and comfortable, and supplied with a sufficiency of good, digestible, and somewhat laxative food.

"To eradicate it the stock must receive an infusion of new blood; and this is especially necessary, as epilepsy in pigs depends in most cases on continued breeding in-and-in."

SWINE, Fits. See SWINE, EPILEPSY.

SWINE, Rheumatism in.—Exposure, wallowing in filth, etc.

It is recognized by a muscular rigidity of the whole system. The appetite is impaired, and the animal does not leave its sty willingly.

Keep the animal on a boiled diet, which should be given to him warm. Remove the cause by avoiding exposure and filth, and give a dose of the following, equal parts: Powdered sulphur, powdered sassafras, powdered cinnamon.

Dose, half a teaspoonful, to be given in warm gruel. If this does not give immediate relief, dip an old cloth in hot water (of a proper temperature), and fold it round the animal's body. This may be repeated, if necessary, until the muscular system is relaxed. The animal should be wiped dry, and placed in a warm situation, with a good bed of straw.

SWINE, Ophthalmia.—Sudden changes in temperature, unclean sties, want of pure air, and imperfect light.

Keep the animal on thin gruel, and allow two teaspoonfuls of cream of tartar per day. Wash the eyes with an infusion of marshmallows, until a cure is effected.

SWINE, Vermin.—Some animals are covered with vermin, which even pierce the skin, and sometimes come out by the mouth, nose, and eyes.

The animal is continually rubbing and scratching itself, or burrowing in the dirt and mire.

First wash the body with a strong lye of wood ashes or weak saleratus water, then with an infusion of lobelia. Mix a teaspoonful of sulphur, and the same quantity of powdered charcoal, in the food daily.

Or, procure some leat tobacco, and boil it to a strong amber in water sufficient to float it. Mix in, while hot, sufficient amount of lard or refuse grease, to make a thin salve, rub on the pigs or hogs troubled, and in less than 24 hours, if the ointment is thoroughly applied, they will not have a single louse on them.

SWINE, Colic in.—Spasmodic and flatulent colic requires anti-spasmodics and carminatives, in the following form: Powdered caraway seeds, one teaspoonful; powdered assafoetida, one-third of a teaspoonful. To be given at a dose in warm water, and repeated at the expiration of an hour, provided relief is not obtained.

SWINE, Trichinæ.—To prevent the Trichinæ from getting into our hogs, it is necessary to remember that the most likely sources of the parasite are the animal offal and garbage which they eat when allowed to run at large, and the rats they are apt to devour when they can get at them; in illustration of which fact it may be mentioned that the pigs in Ireland, which are allowed much more liberty of wandering, and are less regularly fed than their congeners in England and Prussia, are more apt than these others to present the Trichinæ upon microscopic investigation. It is therefore advisable to keep pigs intended for human consumption in clean sties, containing only one or two each, and impervious to rats. The animals should be plentifully fed with sound grain, buttermilk, etc., well watered, and allowed some salt occasionally; in other words, placed in good hygienic conditions, and excluded from diseased food. It may perhaps seem necessary to dwell upon the value and necessity of measures which commend themselves at once as affording not only the best safeguard against the special disease under notice, but as going far toward the prevention of other diseases to which the hog is subject. Yet in view of the neglect and even positive abuse with which pigs are treated throughout the land, it is well that breeders should understand the fearful consequences liable to result from carelessness, which, in matters of such vital importance, is closely allied to criminality.

SWINE, Cholera.—Give one pint of turpentine each week to fifteen hogs, or in the same proportion to a lesser number, mixing it with slops.

SWINE, Choking.—Choking is often produced by feeding on roots, particularly round and uncut roots, like the potato. The animal slavers at the mouth, tries to raise the obstruction from the throat, often groans, and appears to be in great pain. Then the belly begins to swell, from the amount of gases in the paunch.

The obstruction, if not too large, can sometimes be thrust forward by introducing a flexible rod, or tube, into the throat. This method, if adopted, should be attended with great care and patience, or the tender parts will be injured. If the obstruction is low down, and a tube

is to be inserted, a pint of olive or linseed oil first turned down the throat will so lubricate the parts as to aid the operation, and the power applied must be steady. If the gullet is torn by the carelessness of the operator, or the roughness of the instrument, a rupture generally results in serious consequences. A hollow tube is best, and if the object is passed on into the paunch, the tube should remain a short time, to permit the gas to escape. In case the animal is very badly swelled, the dose of chloride of lime, or ammonia, should be given, as for the hoove, after the obstruction is removed.

Care should be taken, after the obstruction is removed, to allow no solid food for some days.

SWINE, Black Teeth in.—Sickness in hogs from indigestion, deranged biliary or urinary secretion, is sometimes attributed to an imaginary disease called the black tooth. The treatment usually adopted is to examine the teeth of the animal, and if one is found blacker than the rest, it is supposed to be the cause of the disease, and is hammered off even with the jaw, leaving the broken roots and lacerated nerves of the tooth to increase the suffering of the animal. Notwithstanding all this cruel treatment the hog sometimes recovers, and would probably have done so much sooner if he had been let alone. The tooth in these cases is not diseased, but only stained by food or otherwise. The cruel treatment of breaking off the tooth down to the nerve would certainly cause disease, and might, in connection with the true one, cause the death of the animal. A proper treatment would be to wash the hog thoroughly with soap and water, and give it three or four ounces of castor oil.

SWINE, Rot, Tails of Young Pigs.—The tails of young pigs frequently drop or rot off, which is attended with no further disadvantage to the animal than the loss of the member. The remedies are, to give a little brimstone or sulphur in the food of the dam; or rub oil or grease daily on the affected parts. It may be detected by a roughness or scabbiness at the point where separation is likely to occur.

SWINE, Bleeding.—The most convenient mode is from an artery just above

the knee, on the inside of the forearm. It may be drawn more copiously from the roof of the mouth. The flow of blood may usually be stopped by applying a sponge or cloth with cold water.

The diseases of swine, though not numerous, are formidable, and many of them soon become fatal. They have not been the subject of particular scientific study, and most of the remedies applied are rather the result of casual or haphazard suggestion than of well-digested inference from long-continued and accurate observation.

The cardinal principles of successful pig raising are, to breed only from sound and healthy parents of remote relationship, to keep the animal in dry, warm, and cleanly quarters, to feed regularly and with varying food, and to remove as early as possible any diseased or weakly animal from the herd.

SWINE, Apoplexy and Inflammation of the Brain.—In distilleries, and where many hogs are kept, and too well kept, this is a very destructive and not unfrequent malady. If the swine had been carefully observed it would have been seen that they were making a more than usually rapid progress, but there was at the same time a laziness, or heaviness, or stupidity about them. A dose or two of physic would have removed this, and not have interfered with the fattening; indeed they would have thriven the better after it. If this, however, has been neglected, the apoplexy will probably be established. The swine, in the act of feeding, or when moving across the sty, will fall suddenly, as if struck with lightning. He will be motionless for a little while, and then convulsions will come on, strong and dreadful; the eyes will seem protruded, the head and neck will swell, and the veins of the neck will be brought into sight, notwithstanding the mass of fat with which they may be covered. In the midst of his struggles the animal will be perfectly unconscious. He will often die in a few minutes, or should he recover, he will be strangely exhausted, and some internal injury will be evidently done, so that he will afterwards be very subject to returns of these attacks, either of apoplexy or of fits.

The course here is plain enough. He should be bled, and bled copiously. In-

deed, the blood should be suffered to flow as long as it will. Two or three ounces of Epsom salts should then be given; the quantity and the heating character of the food should be diminished, and a couple of drachms of sulphur given daily in the first meal.

When apoplexy or fits have once appeared in a sty they spread like wild-fire. There is nothing contagious in them, but there is the power of sympathy acting upon animals become too disposed to inflammation and fever. The most forward of them should be disposed of as soon as possible.

The habit of fits once established cannot easily be broken, and the only way to prevent the continuance of much annoyance is, to separate those that are oftenest affected from the rest, and to fatten them as soon as possible.

SWINE, Measles.—This is an inflammatory disease, not always indeed discovered during the life of the animal, but plain enough after death, and very considerably diminishing the value of the carcass. The red and pimpled appearance of the skin, or of the cellular substance between the flesh and the skin, sufficiently marks the disease. It shows that there has been general inflammation, either resulting from the fattening process being carried too far, or, much oftener, from the animal having too suddenly been taken from poor keep, and suffered to have as much as it will eat of highly nutritious and stimulating food. The measles are very seldom or never fatal, but the disease may generally be recognized by the pink blush of the skin, or of some parts of it, and by the hog rubbing himself more than usual, while the skin is free from pimples and scurf. The remedy would be a less quantity of food, or of not so stimulating a character, and occasional doses of Epsom salts or sulphur.

SWINE, Mange.—Few domesticated animals are so subject to this loathsome disease as the hog if he is neglected and filthily kept; but in a well cleaned and well managed piggery it is rarely or never seen, unless some, whose blood from generation to generation has been tainted with it, should be incautiously admitted. A mangy hog cannot possibly thrive well. His foul and scurfy hide will never loosen

so as to suffer the accumulation of flesh and fat under it.

Except it is hereditary, it may, although with some trouble, be perfectly eradicated. The first thing to be done is to clean the hog well; without this all external application and internal medicines will be thrown away. The animal must be scrubbed all over with a good strong soap lather, and when he is well dried with wisps of straw he will be ready for the ointment, and no better one can be used than the Mild Ointment for Scab in Sheep. (See No. 85, DOMESTIC ANIMALS, MEDICINES FOR.) A little of this should be well rubbed all over him every second or third day; but at the same time internal medicine, such as the Alterative Powder, (See No. 89, DOMESTIC ANIMALS, MEDICINES FOR,) should not be omitted. There is no animal in which it is more necessary to attack this and similar diseases constitutionally.

This, like the scab in sheep, is a very infectious disease, and care should be taken to scour the sty well with soap, and afterwards to wash it with a solution of chloride of lime, as recommended elsewhere. The rubbing-post, that useful but too often neglected article of furniture in every sty, should particularly be attended to.

SWINE, FEET, Soreness of the.—This often occurs to pigs that have traveled any distance; the feet often becomes tender and sore. In such cases, they should be examined, and all extraneous matter removed from the foot. Then wash with weak lye. If the feet discharge fetid matter, wash with the following mixture: Pyroligneous acid, two ounces; water, four ounces.

In the treatment of diseased swine, the "issues," as they are called, ought to be examined, and be kept free. They may be found on the inside of the legs, just above the pastern joint. They seem to serve as a drain or outlet for the morbid fluids of the body, and whenever they are obstructed, local or general disturbance is sure to supervene.

SWINE, Pigging.—The sow usually goes with pig four months, but there is more irregularity in her time than in that of any other of our domesticated quadrupeds. A week or ten days before her pigging she should be separated from the

rest, otherwise the young ones would probably be devoured as soon as they are dropped; and if she shows any disposition to destroy them, or if she has ever done so, she should be carefully watched, a muzzle should be put upon her, and her little ones should be smeared with train oil and aloes as soon as possible.

The teats of the sow will sometimes swell, and hard knots may be felt in them, as in the garget of cattle. The treatment should be nearly the same except that bleeding is scarcely requisite. A dose of physic, however, is indispensable. The Garget Ointment for Cattle (See No. 24, DOMESTIC ANIMALS, MEDICINES FOR,) may be rubbed with advantage into the teats, which should be carefully wiped or washed before the young ones are permitted to suck again; indeed they will not suck while any unusual smell remains about the teats. The milk should also be gently, but well pressed out of the diseased teats.

When it is wished to spay a breeding sow, in order that she may be put up for fattening, it may be done while she is suckling. The young pigs may be cut at three or four weeks old; they should never be suffered to suck longer than two months; and they may be rung as soon as convenient after weaning. No hog should escape ringing, even if he is destined to live in the sty. It is the only way to keep him quiet, and will contribute materially to his thriving.

SWINE, Quinsy.—This disease in the hog is compounded of sore throat and enlargement of the glands of the throat, and is something like strangles in the horse—inflammation and enlargement of the cellular substance between the skin and muscles under the lower jaw. The progress of the malady is rapid, and the swelling is sometimes so great as to prevent the breathing, and consequently to suffocate the animal. To a skin so thick as that of the hog it is useless to make any external application. The patient should be bled; two ounces of salts should be given, and half-ounce doses repeated every six hours, until the bowels are well opened; while warm weak wash, or milk and water, should be occasionally poured into the trough. It is not often a dangerous disease if remedies are early adopted.

SWINE, Inflammation of the Lungs.—

This complaint is known among the breeders and fatteners of swine by the term of rising of the lights. There seems to be a peculiar tendency in every malady of this animal to take on a highly inflammatory character. It is the consequence of the forcing system that is adopted in the fattening of the hog. It resembles the blood or inflammatory fever of oxen and sheep—a general and high degree of fever, produced on a system already strongly disposed to take on intense inflammatory action from the slightest causes. Every little cold is apt to degenerate into inflammation of the lungs in the fatted or fattening hog; and so many cases of this sometimes occur in the same establishment, or the same neighborhood—in fact, among those who are exposed to the same exciting cause, that the disease is mistaken for an epidemic. There is no doubt that when this heaving of the lights begins to appear in a herd of swine, a great many of them are sooner or later affected by it, and die. It is the cough or cold that is epidemic, but it is the plethora and inflammatory state of the animals that cause it to be so general as well as fatal.

The early symptom is cough. A cough in a hog is always a suspicious circumstance, and should be early and promptly attended to. The disease is rapid in its progress. The animal heaves dreadfully at the flanks; he has a most distressing cough, which sometimes almost suffocates him, and he refuses to eat. The principal guiding symptom will be the cough getting worse and worse, and becoming evidently connected with a great deal of fever.

In many cases congestion takes place in the lungs, and the animal dies in three or four days; in others he appears for a while to be getting better; but there is a sudden relapse, a frequent dry, husky cough comes on, there is a little appetite, rapid wasting, and the hog dies in a few weeks, evidently consumptive.

The first thing that is to be done is to bleed, and the most convenient place to bleed the hog is from the palate. If an imaginary line is drawn from between the first and second front middle teeth, and extending backward an inch along the palate, and the palate is there cut deeply,

with a lancet or fleam, plenty of blood will be obtained. A larger quantity of blood, however, can be abstracted from the vein on the inside of the fore-arm, about an inch above the knee. The application of cold water with a sponge will generally stop the bleeding without difficulty, or at least so far arrest it that no harm will be done if it should continue a little while longer. An assistant may easily open the mouth sufficiently for all this by means of a halter or stout stick, but beyond this the swine is an awkward patient to manage. He will struggle obstinately against every attempt to drench him, and the inflammation may be aggravated by the contest. It will, therefore, be necessary in the majority of cases: to endeavor to cheat him by mixing his medicine with his food.

Here we must recollect the nature of his stomach; it is not of that insensible character and difficult to be acted upon or nauseated as in the cow and the sheep, but it approaches as nearly as possible to the structure of that of the human being; and we must adapt our medicine accordingly. The emetic tartar must be omitted from our Fever Medicine, or it would sadly vomit the patient. The Fever Medicine for swine (see No. 88, DOMESTIC ANIMALS, MEDICINES FOR,) may be given.

In the greater number of cases the animal will readily take this; but if he is so ill that nutriment of every kind is refused, he must be drenched.

This should be repeated morning, noon, and night, until the inflammation is abated. A purgative should quickly follow, and we have those for the hog which are mild as well as effectual, and from which no danger can result. The Epsom salts may be given in doses of from one to three ounces, and they will communicate a not unpleasant or unusual flavor to his broth or swill.

If this inflammation of the lungs in the hog rivals in the speed with which it runs its course, and in its intensity and fatality, the blood, or inflammatory fever of oxen and sheep, no time should be lost in adopting the proper measures, and the bleeding should be copious, and the medicine given in doses sufficiently powerful. When the disease lingers on, and the dry, husky cough remains, and the animal is

evidently wasting, medicine will be in a manner useless, and warmth and cleanliness, and food that has no heating quality, afford the only chance of cure.

SWINE, Sore Ears.—There are often troublesome cracks and sores at the back of the large lop-ears of some breeds. If there is any disposition to mange, it is most evident about the ears of these animals, and the mischief is sadly aggravated when brutes in human shape set every ferocious dog at the stray pig, the favorite hold of which is the ear. The Healing Cleaning Ointment for Cattle (See No. 10, DOMESTIC ANIMALS, MEDICINES FOR,) will most readily heal the sores.

SWINE, Costiveness.—This is not an uncommon complaint of the confined and fattening hog, and is easily removed by the Epsom salts, or by five grains of calomel being given in a little of the animal's favorite food. It will be dangerous, however, to push the calomel beyond the second or third dose, for the hog is very easily salivated. The bowels having been well opened, a dose of the Alterative Powder (See No. 89, DOMESTIC ANIMALS, MEDICINES FOR,) given every fourth day will be very beneficial, and will hasten the fattening of the styed hog that exhibits any disposition to costiveness.

Sometimes, however, this costiveness is produced by inflammation of the bowels, which is attended by considerable pain, heat and tenderness of the abdomen, with a quick pulse, and other symptoms of fever, and sometimes by fits and insensibility. The treatment should consist of copious bleeding, oily laxatives, clysters, warm fomentations to the abdomen, and, if the animal is not too large, warm baths.

SWINE, Red Eruption in.—This disease is somewhat analogous to scarlet fever. It makes its appearance in the form of red pustules on the back and belly, which gradually extend to the whole body.

The external remedy is: Powdered bloodroot, half an ounce; boiling vinegar, one pint. When cool, it should be rubbed on the external surface. The diet should consist of boiled vegetables, coarse meal, etc., with a small dose of sulphur every night.

SWINE, Dropsy in.—The animal is sad and depressed, the appetite fails, re-

spiration is performed with difficulty, and the belly swells.

Keep the animal on a light, nutritive diet, and give a handful of juniper berries, or cedar buds, daily. If these fail, give a table-spoonful of fir balsam daily.

SWINE, Catarrh in.—Occasional fits of coughing, accompanied with a mucous discharge from the nose and mouth caused by exposure to cold and damp weather.

Give a liberal allowance of gruel made with powdered elm or marshmallows, and give a teaspoonful of balsam copaiba, or fir balsam, every night. The animal must be kept comfortably warm.

SWINE, Diarrhoea in.—For the treatment of this malady, see division SHEEP, SCOURS.

SWINE, Frenzy in.—This makes its appearance suddenly. The animal, having remained in a passive and stupid state, suddenly appears much disturbed, to such a degree that it makes irregular movements, strikes its head against everything it meets, scrapes with its feet, places itself quite erect alongside of the sty, bites anything in its way, and frequently whirls itself round, after which it suddenly becomes more tranquil.

SWINE, Itch in.—Itch may be cured by anointing with equal parts of lard and brimstone. Rubbing posts, and a running stream to wallow in, are preventives.

SWINE, Kidney Worms in.—The kidney worm is frequently fatal; and always produces weakness of the loins and hind legs, usually followed by entire prostration. A pig thus far gone is hardly worth the trouble of recovering, even where practicable.

SWINE, Preventives.—Preventives are general thrift, a range in a good pasture, and a dose of half a pint of wood ashes every week or fortnight in their food. A small quantity of saltpetre, spirits of turpentine, or tar, will effect the same object. When attacked, apply spirits of turpentine to the loins, and administer calomel carefully; or give half a tablespoonful of copperas daily for one or two weeks.

SWINE, Blind Stagers.—Blind staggers is generally confined to pigs, and manifests itself in foaming at the mouth, rearing on their hind legs, champing and grinding their teeth, and apparent blindness. The proper remedies are bleeding

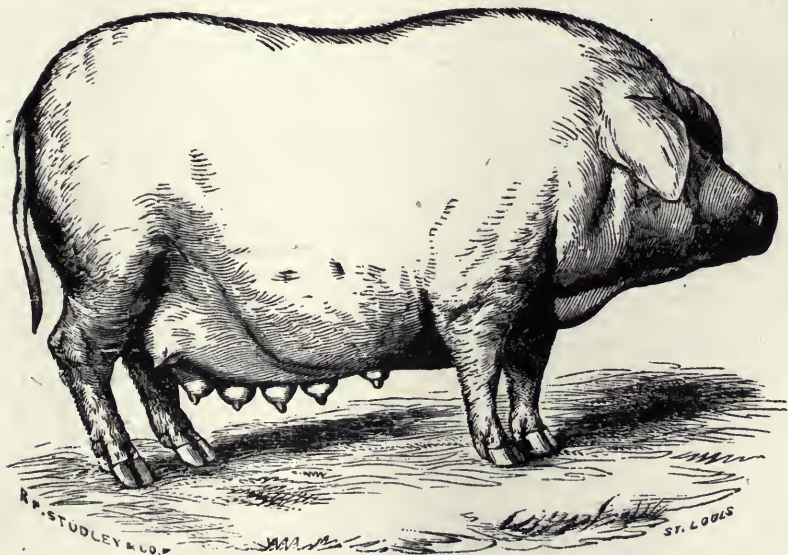
and purging freely, and these frequently fail. Many nostrums have been suggested, but few are of any utility. It is important to keep the issues on the inside of the fore legs, just below the knee, thoroughly cleansed.

Give half an ounce of Rochelle salts, in a pint of thoroughwort tea. If the bowels are not moved in the course of twelve hours, repeat the dose. A light diet for a few days will generally complete the cure.

SWINE, Jaundice in.—This disease is recognized by the yellow tint of the *conjunctiva* (white of the eye), loss of appetite, etc. The remedy is: Powdered golden seal, half an ounce; powdered sulphur, one-fourth of an ounce; powdered blue-flag, half an ounce; flaxseed, one pound; mix, and divide into four parts, and give one every night. The food must be boiled, and a small quantity of salt added to it.

SOWS, Near Farrowing, Treatment of.—During the whole period of pregnancy sows should be moderately well fed, but not so much as to produce much fatness, as this would be the means of reducing the number of the litter, or risk them being smothered by their unwieldy dam lying down on them. As farrowing approaches, the food must be semi-liquid or gently laxative, since costiveness at this

period generally fosters fever, and hence sows devour their offspring. Gentle exercise is beneficial to all pregnant healthy animals, and for this the pen should be roomy. It is best to protect the sow against injury from other pigs. The pen should be airy and clean, and, until the last day or two of pregnancy, comfortably littered. As the time approaches, or when uneasiness, or the piling of litter for a bed, shows its near advent, clear out the pen, and cover it with a thin litter of chaff only. This is necessary to prevent smothering the pigs, particularly if the sow be large or fat. Soon remove the pigs when they are brought forth, helping them away until after the after-birth. In all circumstances the after-birth should be removed at once. However natural it may be for the wild animal to devour this, the practice, if allowed among domesticated swine, develops the propensity to devour their offspring, a drink of milk gruel, or Indian or oatmeal and hot water will be at once grateful and supporting to the sow during and after parturition; and as soon as the secretion of milk is freely established, the diet should be abundant, soft and laxative. The pen should be kept clean. The litter of chaff should be of a limited amount for a week, until the pigs can be better able to protect themselves.



DOMESTIC ANIMALS: MEDICINES FOR.

HORSE, Alteratives.—This term is not very scientific, but it is very general use, and easily explains its own meaning, though the *modus operandi* of the drugs employed to carry it out is not so clear. The object is to replace unhealthy action by a healthy one, without resorting to any of the distinctly defined remedies, such as tonics, stomachics, etc. As a general rule, this class of remedies produce their effect by acting slowly but steadily on the depuratory organs, as the liver, kidneys and skin. The following may be found useful:

1. DISORDERED STATES OF THE SKIN—
 Emetic Tartar 5 ounces.
 Powdered Ginger 3 “
 Opium 1 “

Syrup enough to form sixteen balls: one to be given every night.

2. SIMPLY COOLING—
 Barbadoes Aloes 1 ounce.
 Castile Soap 1½ “
 Ginger ½ “

Syrup enough to form six balls: one to be given every morning.

3. Barbadoes Aloes 1½ drachm.
 Emetic Tartar 2 “
 Castile Soap 2 “

Mix.

4. ALTERNATIVE BALL FOR GENERAL USE—
 Black Sulphuret of Antimony 2 to 4 drachms
 Sulphur 2 “
 Nitre 2 “

Linseed meal and water enough to form a ball.

5. FOR GENERALLY DEFECTIVE SECRETIONS—
 Flowers of Sulphur 6 ounces.
 Emetic Tartar 5 to 8 drachms.
 Corrosive Sublimate 10 grains.

Linseed meal mixed with hot water, enough to form six balls, one of which may be given two or three times a week.

6. IN DEBILITY OF STOMACH—
 Calomel 1 scruple.
 Aloes 1 drachm.
 Cascarilla Bark, in powder 1 “
 Gentian Root, “ 1 “
 Ginger, “ 1 “
 Castile Soap 3 “

Syrup enough to make a ball, which may be given twice a week, or every other night.

HORSE, Anæsthetics. — Anæsthetics produce insensibility to all external im-

pressions, and therefore to pain. They resemble narcotics in their action, and, when taken into the stomach, may be considered purely as such. The most certain and safe way of administering them is by inhalation, and chloroform is the drug now universally employed. The *modus operandi* of the various kinds has never yet been satisfactorily explained; and when the comparison is made, as it often is, to the action of intoxicating fluids, we are no nearer to it than before. With alcoholic fluids, however, the disorder of the mental functions is greater in proportion to the insensibility to pain; and if they are taken in sufficient quantities to produce the latter effect, they are dangerous to life itself. The action of anæsthetics on the horse is very similar to that on man.

HORSE, Anodynes—Sometimes called narcotics, when taken into the stomach, pass at once into the blood, and there act in a special manner on the nervous centres. At first they exalt the nervous force; but they soon depress it, the second stage coming on sooner according to the increase of the dose. They are given either to soothe the general nervous system, or to stop diarrhoea; or sometimes to relieve spasm, as in colic or tetanus. Opium is the chief anodyne used in veterinary medicine, and it may be employed in very large doses:

1. ANODYNE DRENCH FOR COLIC—
 Linseed oil 1 pint.
 Oil of Turpentine 1 to 2 ounces.
 Laudanum 1 to 2 ounces.
 Mix, and give every hour till relief is afforded.
2. ANODYNE BALL FOR COLIC—(Only Useful in Mild Cases.)
 Powdered Opium ½ to 2 drachms.
 Castile Soap 2 “
 Camphor 2 “
 Ginger 1½ “

Make into a ball with Liquorice powder and Treacle, and give every hour while the pain lasts. It should be kept in a bottle or bladder.

3. ANODYNE BALL (ordinary)—
 Opium..... $\frac{1}{2}$ to 1 drachm.
 Castile Soap.....2 to 4 "
 Ginger.....1 to 2 "
 Powdered Aniseed..... $\frac{1}{2}$ to 1 ounce.
 Oil of Caraway Seeds..... $\frac{1}{2}$ drachm.
 Syrup enough to form a ball, to be dissolved in half pint of warm ale, and given as a drench.
4. ANODYNE DRENCH IN SUPERPURATION, OR ORDINARY DIARRHŒA—
 Gum Arabic.....2 ounces.
 Boiling Water.....1 pint.
 Dissolve, and then add—
 Oil of Peppermint.....25 drops.
 Laudanum..... $\frac{1}{2}$ to 1 ounce.
 Mix and give night and morning, if necessary.
5. IN CHRONIC DIARRHŒA—
 Powdered Chalk and Gum Arabic of each.....1 ounce.
 Laudanum..... $\frac{1}{2}$ "
 Peppermint Water.....10 "
 Mix, and give night and morning.

HORSE, Antacids.—As the term implies, these remedies are used to neutralize acids, whether taken into the stomach to an improper extent, or formed therein as products of diseases. They are often classed as alteratives, when used for the latter purpose. They include the alkalies and alkaline earths, but are not much used in veterinary medicine.

HORSE, Anthelmintics.—Drugs which are used to destroy worms receive this name in medical literature, when the author is wedded to the Greek language. The admirers of Latin call them vermifuges, and in English they receive the humble name of worm medicines. Their action is partly by producing a disagreeable or fatal impression on the worm itself, and partly by irritating the mucous lining of the bowels, and thus causing them to expel their contents. Failing, the following may be useful:

1. WORM BALL (recommended by Mr. GAMGEE)
 Asafetida.....2 drachms
 Calomel..... $1\frac{1}{2}$ "
 Powdered Savin..... $1\frac{1}{2}$ "
 Oil of Male Fern.....30 drops.
 Treacle enough to make a ball, which should be given at night, and followed by a purge next morning.
2. MILD DRENCH FOR WORMS—
 Linseed Oil.....1 pint.
 Spirit of Turpentine.....2 drachms.
 Mix and give every morning.

HORSE, Antispasmodics.—Are medicines which are intended to counteract excessive muscular action, called spasm or, in the limbs, cramp. This deranged condition depends upon a variety of

causes, which are generally of an irritating nature; and its successful treatment will often depend upon the employment of remedies calculated to remove the cause, rather than directly to relieve the effect. It therefore follows that, in many cases, the medicines most successful in removing spasm, will be derived from widely separated divisions of the *materia medica*, such as aperients, anodynes, alteratives, stimulants and tonics. It is useless to attempt to give many formulas for their exhibition; but there are one or two medicines which exercise a peculiar control over spasm, and we shall give them without attempting to analyze their mode of operation.

1. IN COLIC—
 Spirit of Turpentine..... $3\frac{1}{2}$ ounces.
 Laudanum..... $1\frac{1}{2}$ "
 Barbadoes Aloes.....1 "
 Powder the Aloes, and dissolve in warm water; then add the other ingredients, and give as a drench.
2. CLYSTER IN COLIC—
 Spirit of Turpentine.....6 ounces.
 Aloes.....2 drachms.
 Dissolve in three quarts of warm water, and stir the turpentine well into it.
3. ANTISPASMODIC DRENCH—
 Gin.....4 to 6 ounces.
 Tincture of Capsicum.....2 drachms.
 Laudanum.....3 "
 Warm Water..... $1\frac{1}{2}$ pint.
 Mix and give as a drench, when here is no inflammation.

HORSE, Aperients.—Aperients, or purges, are those medicines which quicken or increase the evacuations from the bowels, varying, however, a good deal in their mode of operation. Some act merely by exciting the muscular coat of the bowels to contract; others cause an immense watery discharge, which, as it were, washes out the bowels; whilst a third set combine the action of the two. The various purges also act upon different parts of the canal, some stimulating the small intestines, whilst others pass through them without affecting them, and only act upon the large bowels; and others, again, act upon the whole canal. There is a third point of difference in purges, depending upon their influencing the liver in addition, which mercurial purgatives certainly do, as well as rhubarb and some others, and which effect is partly due to their absorption into the circulation, so that they may be made to act, by injecting into the veins, as strong-

ly as by actual swallowing, and their subsequent passage into the bowels. Purgatives are likewise classed, according to the degree of their effect, into laxatives acting mildly, and drastic purges, or cathartics, acting very severely.

1. ORDINARY PHYSIC BALLS—

- Barbadoes Aloes.....3 to 8 drachms.
- Hard Soap.....4 drachms.
- Ginger.....1 “

Dissolve in as small a quantity of boiling water as will suffice; then slowly evaporate to the proper consistence, by which means griping is avoided.

2. A WARMER PHYSIC BALL—

- Barbadoes Aloes.....3 to 8 drachms.
- Carbonate of Soda.....½ drachm.
- Aromatic Powder.....1 “
- Oil of Caraway.....12 drops.

Dissolve as above, and then add the oil.

3. GENTLY LAXATIVE BALL—

- Barbadoes Aloes.....3 to 5 drachms.
- Rhubarb Powder.....1 to 2 “
- Ginger.....2 “
- Oil of Caraway.....15 drops.

Mix and form into a ball, as in No. 1.

4. STOMACHIC LAXATIVE BALLS, FOR WASHY HORSES—

- Barbadoes Aloes.....3 drachms.
- Rhubarb.....2 “
- Ginger.....1 “
- Cascarilla Powder.....1 “
- Oil of Caraway.....15 drops.
- Carbonate of Soda.....1½ drachms.

Dissolve the Aloes as in No. 1, and then add the other ingredients.

5. PURGING BALLS, WITH CALOMEL—

- Barbadoes Aloes.....3 to 6 drachms.
- Calomel.....½ to 1 “
- Rhubarb.....1 to 2 “
- Ginger.....½ to 1 “
- Castile Soap.....2 “

Mix as in No. 1.

6. LAXATIVE DRENCH—

- Barbadoes Aloes.....3 to 4 drachms.
- Canella Alba.....1 to 2 “
- Salt of Tartar.....1 “
- Mint Water.....8 ounces.

Mix.

7. ANOTHER LAXATIVE DRENCH—

- Castor Oil.....3 to 6 ounces.
- Barbadoes Aloes.....3 to 5 drachms.
- Carbonate of Soda.....2 “
- Mint Water.....8 ounces.

Mix, by dissolving the Aloes in the Mint Water by the aid of heat, and then adding the other ingredients.

8. A MILD OPENING DRENCH—

- Castor Oil.....4 ounces.
- Epsom Salts.....3 to 5 ounces.
- Gruel.....2 pints.

Mix.

9. A VERY MILD LAXATIVE—

- Castor Oil.....4 ounces.
- Linseed Oil.....4 “
- Warm Water or Gruel.....1 pint.

Mix.

10. USED IN THE STAGGERS—

- Barbadoes Aloes.....4 to 6 drachms.
- Common Salt.....6 ounces.
- Flour of Mustard.....1 ounce.
- Water.....2 pints.

Mix.

11. A GENTLY COOLING DRENCH IN SLIGHT ATTACKS OF COLD—

- Epsom Salts.....6 to 8 ounces.
- Whey.....2 pints.

Mix.

12. PURGATIVE CLYSTER—

- Common Salt.....4 to 8 ounces.
- Warm Water.....8 to 16 pints.

HORSE, Astringents—Appear to produce contraction on all living animal tissues with which they come in contact, whether in the interior or on the exterior of the body; and whether immediately applied or by absorption into the circulation. But great doubt exists as to the exact mode in which they act; and, as in many other cases, we are obliged to content ourselves with their effects, and to prescribe them empirically. They are divided into astringents administered by the mouth, and those applied locally to external ulcerated or wounded surfaces.

1. FOR BLOODY URINE—

- Powdered Catechu.....½ ounce.
 - Alum.....½ “
 - Cascarilla Bark in Powder.....1 to 2 drachms.
- Liquorice Powder and Treacle enough to form a ball, to be given twice a day.

2. FOR DIABETES—

- Opium.....½ drachm.
- Ginger powdered.....2 “
- Oak Bark powdered.....1 ounce.
- Alum.....As much as the Tea will dissolve.
- Camomile Tea.....1 pint.

Mix for a drench.

3. EXTERNAL ASTRINGENT POWDERS FOR ULCERATED SURFACES—

- Powdered Alum.....4 ounces.
- Armenian Bole.....1 “

Another—

- White Vitriol.....4 ounces.
- Oxide of Zinc.....1 “

Mix.

4. ASTRINGENT LOTION—

- Goulard Extract.....2 to 3 drachms.
- Water.....½ pint.

Another—

- Sulphate of Copper.....1 to 2 drachms.
- Water.....½ pint.

Mix.

5. ASTRINGENT OINTMENT FOR SORE HEELS—

- Acetate of Lead.....1 drachm.
- Lard.....1 ounce.

Mix.

6. ANOTHER FOR THE SAME—

- Nitrate of Silver-powdered.....½ drachm.
- Goulard Extract.....1 “
- Lard.....1 ounce.

Mix, and use a very small portion every night.

HORSE, Blisters, or Vesicants.—Blisters are applications which inflame the skin, and produce a secretion of serum between the cutis and cuticle, by which the latter is raised in the form of small bladders; but in consequence of the presence of the hair, these are very imperfectly seen in the horse. They consist of two kinds—one used for the sake of counter-irritation, by which the original disease is lessened, in consequence of the establishment of this irritation at a short distance from it; the other, commonly called “sweating” in veterinary surgery, by which a discharge is obtained from the vessels of the part itself, which are in that way relieved and unloaded; there is also a subsequent process of absorption in consequence of the peculiar stimulus applied.

1. **MILD BLISTER OINTMENT** (Counter-Irritant)—

Hog's Lard.....	4 ounces.
Venice Turpentine.....	1 “
Powdered Cantharides.....	6 drachms.

 Mix and spread.
2. **STRONGER BLISTER OINTMENT** (Counter-Irritant.)

Spirit of Turpentine.....	1 ounce.
Sulphuric Acid, by measure.....	2 drachms.

 Mix carefully in an open place, and add—

Hog's Lard.....	4 ounces.
Powdered Cantharides.....	1 “

 Mix and spread.
3. **VERY STRONG BLISTER OINTMENT**, (Counter-Irritant)—

Strong Mercurial Ointment.....	4 ounces.
Oil of Origanum.....	$\frac{1}{2}$ “
Finely-powdered Euphorbium.....	3 drachms.
Powdered Cantharides.....	$\frac{1}{2}$ ounce.

 Mix and spread.
4. **RAPIDLY ACTING BLISTER OINTMENT** (Counter-Irritant)—

Best Flour of Mustard.....	8 ounces.
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 Made into a paste with water. Add—

Oil of Turpentine.....	2 ounces.
Strong Liquor of Ammonia.....	1 “

 This is to be well rubbed into the chest, belly or back, in cases of acute inflammation.
5. **SWEATING BLISTER**—

Strong Mercurial Ointment.....	2 ounces.
Oil of Origanum.....	2 drachms.
Corrosive Sublimate.....	2 “
Cantharides, powdered.....	3 “

 Mix, and rub in with the hand.
6. **STRONG SWEATING BLISTER, FOR SPLINTS, RING-BONES, SPAVINS, ETC.**—

Binoidide of Mercury.....	1 to 1½ drachm.
Lard.....	1 ounce.

 To be well rubbed into the legs after cutting the hair short; and followed by the daily use of Arnica, in the shape of a wash, as follows, which is to be painted on with a brush:

Tincture of Arnica.....	1 ounce.
Water.....	12 to 15 ounces.

 Mix.

7. LIQUID SWEATING BLISTERS—

- | | |
|--------------------------------|----------|
| Cantharides..... | 1 ounce. |
| Spirit of Turpentine..... | 2 “ |
| Methylated Spirit of Wine..... | 1 pint. |
- Mix and digest for a fortnight. Then strain.
- Another—
- | | |
|-----------------------------------|----------|
| Powdered Cantharides..... | 1 ounce. |
| Commercial Pyrologneous Acid..... | 1 pint. |
- Mix and digest for a fortnight. Then strain.

HORSE, Caustics or Cantheries.—Caustics are substances which burn away the living tissues of the body, by the decomposition of their elements. They are of two kinds—first, the actual cautery, consisting in the application of the burning iron, and called firing; and secondly, the potential cautery, by means of the powers of mineral caustics, such as potassa fusa, lunar-caustic, corrosive sublimate, etc.

Firing is described in the chapter on operations.

The following are the ordinary chemical applications used as potential caustics:

1. **FUSED POTASS**, difficult to manage, because it runs about in all directions, and little used in veterinary medicine.
 2. **LUNAR CAUSTIC**, or Nitrate of Silver, very valuable to the veterinary surgeon, and constantly used to apply to profuse granulations.
 3. **SULPHATE OF COPPER**, almost equally useful, but not so strong as Lunar Caustic; it may be well rubbed in to all high granulations, as in broken knees, and similar growths.
 4. **CORROSIVE SUBLIMATE** in powder, which acts most energetically upon warty growths, but should be used with great care and discretion. It may safely be applied to small surfaces, but not without a regular practitioner, to large ones. It should be washed off after remaining on a few minutes. For the mode of applying it in castration, see HORSE, CASTRATION.
 5. **YELLOW ORPIMENT** is not so strong as Corrosive Sublimate, and may be used with more freedom. It will generally remove warty growths, by picking off their heads and rubbing it in.
 6. **MURIATE OF ANTIMONY**, called Butter of Antimony; a strong but rather unmanageable caustic, and used either by itself or mixed with more or less water.
 7. **CHLORIDE OF ZINC** is a most powerful caustic. It may be used in old sinuses in solution, 7 drachms in a pint of water.
- MILDER CAUSTICS**—
8. Verdigris, either in powder or mixed with Lard as an ointment, in the proportion of 1 to 3.
 9. Red Precipitate, ditto, ditto.
 10. Burnt Alum, used dry.
 11. Powdered White Sugar.
- MILD LIQUID CAUSTICS**—
12. Solution of Nitrate of Silver, 5 to 15 grains to the ounce of distilled water.

13. Solution of Blue Vitriol, of about double the above strength.

14. Chloride of Zinc, 1 to 3 grains to the ounce of water

HORSE, Charges—Are adhesive plasters which are spread while hot on the legs, and at once covered with short tow, so as to form a strong and unyielding support while the horse is at grass.

1. ORDINARY CHARGES—

Burgundy Pitch.....	4 ounces.
Barbadoes Tar.....	6 "
Beeswax.....	2 "
Red Lead.....	4 "

The three first are to be melted together, and afterwards the Lead is to be added. The mixture is to be kept constantly stirred until sufficiently cold to be applied. If too stiff (which will depend upon the weather), it may be softened by the addition of a little Lard or Oil.

2. ARNICA CHARGE—

Canada Balsam.....	2 ounces.
Powdered Arnica Leaves.....	1 ounce.

The Balsam to be melted and worked up with the leaves, adding Spirits of Turpentine, if necessary. When thoroughly mixed, to be well rubbed into the whole leg, in a thin layer, and to be covered over with the Charge No. 1, which will set on its outside and act as a bandage, while the Arnica is a restorative to the weakened vessels. This is an excellent application.

HORSE, Clysters, or Enemata.—Clysters are intended either to relieve obstruction or spasm of the bowels, and are of great service when properly applied. They may be made of warm water or gruel, of which some quarts will be required in colic. They should be thrown up with the proper syringe, provided with valves and flexible tube.

For the turpentine clyster in colic, see ANTISPASMODICS.

Aperient clysters, see APERIENTS.

1. ANODYNE CLYSTER IN DIARRHŒA—

Starch, made as for washing.....	1 quart.
Powdered Opium.....	2 drachms.

The Opium is to be boiled in water, and added to the starch.

HORSE, Cordials—Are medicines which act as temporary stimulants to the whole system, and especially to the stomach. They augment the strength and spirits when depressed, as after over-exertion in work.

1. CORDIAL BALLS—

Powdered Caraway Seeds.....	6 drachms.
Ginger.....	2 "
Oil of Cloves.....	20 drops.

Treacle enough to make into a ball.

Another—

Powdered Aniseed.....	6 drachms.
Powdered Cardamoms.....	2 "
Powdered Cassia.....	1 "
Oil of Caraway.....	20 drops.

Mix with treacle into a ball.

2. CORDIAL DRENCH—

A quart of good ale warmed, and with plenty of grated ginger.

3. CORDIAL AND EXPECTORANT—

Powdered Aniseed.....	½ ounce.
Powdered Squill.....	1 drachm.
Powdered Myrrh.....	1½ drachm.
Balsam of Peru, enough to form a ball.	

ANOTHER—

Liquorice Powder.....	½ ounce.
Gum Ammoniacum.....	3 drachms.
Balsam of Tolu.....	1½ drachms.
Powdered Squill.....	1 drachm.

Linseed meal and boiling water, enough to form into a mass.

HORSE, Demulcents—Are used for the purpose of soothing irritations of the bowels, kidneys, or bladder, in the two last cases by their effect upon the secretion of urine.

1. DEMULCENT DRENCH—

Gum Arabic.....	½ ounce.
Water.....	1 pint.

Dissolve and give as a drench night and morning, or mixed with a mash.

ANOTHER—

Linseed.....	4 ounces.
Water.....	1 quart.

Simmer till a strong and thick decoction is obtained, and give as above.

2. MARSHMALLOW DRENCH—

Marshmallows.....	A double handful.
Water.....	1 quart.

Simmer, as in the second part of No. 1, and use in the same way.

HORSE, Diaphoretics—Have a special action on the skin, increasing the perspiration sometimes to an enormous extent.

1. ORDINARY DIAPHORETIC DRENCH—

Solution of Acetate of Ammonia.....	3 to 4 ounces.
Laudanum.....	1 ounce.

Mix, and give at night. Or,

ANOTHER—

Solution of Acetate of Ammonia.....	2 ounces.
Spirits of Nitric Ether.....	2 ounces.
Mix, and give as above.	

2. IN HIDE-BOUND—

Emetic Tartar.....	1½ drachm.
Camphor.....	½ drachm.
Ginger.....	2 drachms.
Opium.....	½ drachm.
Oil of Caraway.....	15 drops.

Linseed meal and boiling water, to form a ball, which is to be given twice or thrice a week.

3. IN HIDE-BOUND (but not so efficacious)—

Antimonial Powder.....	2 drachms.
Ginger.....	1 drachm.
Powdered Caraways.....	6 drachms.
Oil of Aniseed.....	20 drops.

Mix as above.

These remedies require moderate exercise in clothing to bring out their effects, after which the horse should be wiped till quite dry.

HORSE, Digestives.—Digestives are applications which promote suppuration, and the healing of wounds or ulcers.

1. DIGESTIVE OINTMENT—

Red Precipitate.....	2 ounces.
Venice Turpentine.....	3 ounces.
Beeswax.....	1 ounce.
Hog's Lard.....	4 ounces.

Melt the three last ingredients over a slow fire, and when nearly cold stir in the powder.

HORSE, Diuretics.—Diuretics are medicines which promote the secretion and discharge of urine, the effect being produced in a different manner by different medicines; some acting directly upon the kidneys by sympathy with the stomach, while others are taken up by the blood-vessels, and in their elimination from the blood, cause an extra secretion of the urine. In either case their effect is to diminish the watery part of the blood, and thus promote the absorption of fluid effused into any of the cavities, or into the cellular membrane in the various forms of dropsy.

1. STIMULATING DIURETIC BALL—

Powdered Resin.....	3 drachms.
Sal Prunelle.....	3 drachms.
Castile Soap.....	3 drachms.
Oil of Juniper.....	1 drachm.

Mix.

2. A MORE COOLING DIURETIC BALL—

Powdered Nitre.....	$\frac{1}{2}$ to 1 ounce.
Camphor.....	1 drachm.
Juniper berries.....	1 drachm.
Soap.....	3 drachms.

Mix, adding linseed meal enough to form a ball.

3. DIURETIC POWDER FOR A MASH—

Nitre.....	$\frac{1}{2}$ to $\frac{3}{4}$ ounce.
Resin.....	$\frac{1}{2}$ to $\frac{3}{4}$ ounce.

Mix.

4. ANOTHER MORE ACTIVE POWDER—

Nitre.....	6 drachms.
Camphor.....	1 $\frac{1}{2}$ drachm.

Mix.

HORSE, Embrocations.—Embrocations or liniments are stimulating or sedative external applications, intended to reduce the pain and inflammation of internal parts, when rubbed into the skin with the hand.

1. MUSTARD EMBROCATION—

Best Flour of Mustard.....	6 ounces.
Liquor of Ammonia.....	1 $\frac{1}{2}$ ounces.
Oil of Turpentine.....	1 $\frac{1}{2}$ ounce.

Mix with sufficient water to form a thin paste.

2. STIMULATING EMBROCATION—

Camphor.....	$\frac{1}{2}$ ounce.
Oil of Turpentine.....	1 $\frac{1}{2}$ ounce.
Spirit of Wine.....	1 $\frac{1}{2}$ ounce.

Mix.

3. SWEATING EMBROCATION FOR WINGALLS, ETC.—

Strong Mercurial Ointment.....	2 ounces.
Camphor.....	$\frac{1}{2}$ ounce.
Oil of Rosemary.....	2 drachms.
Oil of Turpentine.....	1 ounce.

Mix.

4. ANOTHER, BUT STRONGER—

Strong Mercurial Ointment.....	2 ounces.
Oil of Bay.....	1 ounce.
Oil of Origanum.....	$\frac{1}{2}$ ounce.
Powdered Cantharides.....	$\frac{1}{2}$ ounce.

Mix.

5. A MOST ACTIVE SWEATING EMBROCATION—

Biniodide of Mercury.....	$\frac{1}{2}$ to 1 drachm.
Powdered Arnica Leaves.....	1 drachm.
Soap Liniment.....	2 ounces.

Mix.

HORSE, Emulsions.—When oily matters have their globules broken down by friction with mucilaginous substances, such as gum arabic or yolk of egg, they are called emulsions, and are specially useful in soothing irritation of the mucous membrane, of the trachea, and bronchi.

1. SIMPLE EMULSION—

Linseed Oil.....	2 ounces.
Honey.....	3 ounces.
Soft Water.....	1 pint.
Subcarbonate of Potass.....	1 drachm.

Dissolve the honey and potass in the water; then add the linseed oil by degrees in a large mortar, when it should assume a milky appearance. It may be given night and morning.

2. ANOTHER MORE ACTIVE EMULSION—

Simple Emulsion, No. 1.....	7 ounces.
Camphor.....	1 drachm.
Opium in Powder.....	$\frac{1}{2}$ drachm.
Oil of Aniseed.....	30 drops.

Rub the last three ingredients together in a mortar with some white sugar; then add the emulsion by degrees.

HORSE, Expectorants.—Expectorants excite or promote a discharge of mucus from the lining membrane of the bronchial tubes, thereby relieving inflammation and allaying cough.

1. EXPECTORANT BALL IN ORDINARY COUGH WITHOUT INFLAMMATION—

Gum Ammoniacum.....	$\frac{1}{2}$ ounce.
Powdered Squill.....	1 drachm.
Castile Soap.....	2 drachm.

Honey enough to form a ball.

2. IN OLD STANDING COUGH (STOMACH)—

Asafoetida.....	3 drachms.
Galbanum.....	1 drachm.
Carbonate of Ammonia.....	$\frac{1}{2}$ drachm.
Ginger.....	1 $\frac{1}{2}$ drachms.

Honey enough to form a ball.

3. A STRONG EXPECTORANT BALL—

Emetic Tartar.....	$\frac{1}{2}$ drachm.
Calomel.....	15 grains.
Digitalis.....	$\frac{1}{2}$ drachm.
Powdered Squills.....	$\frac{1}{2}$ drachm.

Linseed meal and water enough to form a ball which is not to be repeated without great care.

HORSE, Febrifuges—Generally called fever medicines, are given to allay the arterial and nervous excitements which accompany febrile action. They do this partly by their agency on the heart and arteries through the nervous system, and partly by increasing the secretions of the skin and kidneys.

1. FEVER BALL—

Nitre.....4 drachms.
Camphor.....1½ drachm.
Calomel and Opium, of each....1 scruple.
Linseed meal as above. Or,

ANOTHER—

Emetic Tartar.....1½ to 2 drachms.
Compound Powder of Trag-
acanth.....2 drachms.
Linseed meal and water enough to form a ball.

Or,

ANOTHER—

Nitre.....3 drachms.
Camphor.....2 drachms.
Mix as above.

2. COOLING POWDER FOR MASH—

Nitre.....6 drachms to 1 ounce.
May be given in a bran mash.

3. COOLING DRENCH—

Nitre.....1 ounce.
Sweet Spirit of Nitre.....2 ounces.
Tincture of Digitalis.....2 drachms.
Whey.....1 pint.

HORSE, Lotions or Washes—Consist in liquids applied to the external parts, either to cool them or to produce a healthy action in the vessels.

1. COOLING SOLUTION FOR EXTERNAL INFLAMMATION—

Goulard Extract.....1 ounce.
Vinegar.....2 ounces.
Spirits of Wine, or Gin.....3 ounces.
Water.....1½ pint.

Mix, and apply with a calico bandage.

2. ANOTHER, USEFUL FOR INFLAMED LEGS, OR FOR GALLED SHOULDERS OR BACK—

Sal Ammoniac.....1 ounce.
Vinegar.....4 ounces.
Spirits of Wine.....2 ounces.
Tincture of Arnica.....2 drachms.
Water.....½ pint.

Mix.

3. LOTION FOR FOUL ULCERS—

Sulphate of Copper.....1 ounce.
Nitric Acid.....¼ ounce.
Water.....8 to 12 ounces.

Mix.

4. LOTION FOR THE EYES—

Sulphate of Zinc.....20 to 25 grains.
Water.....6 ounces.

Mix.

5. VERY STRONG ONE, AND ONLY TO BE DROPPED IN—

Nitrate of Silver.....5 to 8 grains.
Distilled Water.....1 ounce.

Mix, and use with a camel-hair brush.

HORSE, Narcotics—A distinction is sometimes made between anodynes and

narcotics, but in veterinary medicine there is no necessity for separating them. (See ANODYNES.)

HORSE, Refrigerants—Lower the animal heat by contact with the skin, the ordinary ones being cold air, cold water, ice, and evaporative lotions. (See LOTIONS.)

HORSE, Sedatives—Depress the action of the circulatory and nervous systems; without affecting the mental functions. They are very powerful in their effects; and digitalis, which is the drug commonly used for this purpose, has a special quality known by the name of cumulative; that is to say, if repeated, small doses are given at intervals for a certain time, an effect is produced almost equal to that which would follow the exhibition of the whole quantity at once. Besides digitalis, aconite is also sometimes used to lower the action of the heart, and by many it is supposed to be equal in potency to that drug, without the danger which always attends its use.

HORSE, Stimulants—By this term is understood those substances which excite the action of the whole nervous and vascular systems; almost all medicines are stimulants to some part or other, as, for instance, aperients, which stimulate the lining of the bowels, but to the general system are lowering. On the other hand, stimulants, so called *par excellence*, excite and raise the action of the brain and heart.

Old Ale.....1 quart.

Carbonate of Ammonia.....½ to 2 drachms.

Tincture of Ginger.....4 drachms.

Mix and give as a drench.

For other stimulants, see CORDIALS.

HORSE, Stomachics—Stomachics are medicines given to improve the tone of the stomach, when impaired by bad management or disease.

STOMACHIC BALL—

Powdered Gentian.....½ ounce.

Powdered Ginger.....1½ drachms.

Carbonate of Soda.....1 drachm.

Treacle to form a ball; or

Another—

Cascarilla, powdered.....1 ounce.

Myrrh.....1½ drachm.

Castile Soap.....1 drachm.

Mix with syrup or treacle, into a ball; or

Another—

Powdered Colombo.....½ to 1 ounce.

Powdered Cassia.....1 drachm.

Powdered Rhubarb.....2 drachms.

Mix as in second part of No. 1.

HORSE, Styptics.—Styptics are remedies which have a tendency to stop the flow of blood either from internal or external surfaces. They are used either by the mouth, or to the part itself in the shape of lotions, etc.; or the actual cautery, which is always the best in external bleeding, may be employed. Sometimes, however, the part cannot be reached with the heated iron, and is yet within the influence of an injection, as in bleeding from the nostrils, for which the following may be employed:

Matico Leaves.....½ ounce.
Boiling Water.....1 pint.
Infuse, and when cold strain and inject into the nostrils.

For internal styptics, see **ASTRINGENTS**.

HORSE, Tonics—Augment the vigor of the whole body permanently, whilst stimulants only act for a short time. They are chiefly useful after low fever.

TONIC BALL—

Sulphate of Iron.....½ ounce.
Extract of Camomile.....1 ounce.

Mix and form into a ball, or

Another—

Arsenic.....10 grains.
Ginger.....1 drachm.
Powdered Aniseed.....1 ounce.
Compound Powder of Tragacanth...2 drachms.

Syrup enough to form a ball It is a very powerful tonic.

HORSE, Vermifuges, or Worm Medicines, are described under the head of **ANTHELMINTICS**, which see.

1. CATTLE, Drink, Cough and Fever—

Take Emetic Tartar.....1 drachm.
Powdered Digitalis.....½ drachm.
Nitre.....3 drachms.

Mix and give in a quart of tolerably thick gruel.

2. CATTLE, Drink, Purging—

Take Epsom Salts.....1 pound.
Powdered Caraway Seeds.....½ ounce.
Dissolve in a quart of warm gruel and give.

3. CATTLE, Drink, Purging—

Take Emetic Tartar.....½ drachm.
Nitre.....2 drachms.
Powdered Gentian Root.....1 drachm.
Powdered camomile flowers.....1 drachm.
Powdered ginger.....½ drachm.

Pour upon them a pint of boiling ale, and give the infusion when nearly cold.

4. CATTLE, Drink, Expectorant—

Take Liquorice Root.....2 ounces.
Bruise and boil in a quart of water until the fluid is reduced to a pint, then gradually and carefully add

Powdered Squills.....2 drachms.
Powdered Gum Guaiacum.....1 drachm.
Tincture of Balsam of Lolu.....½ ounce.
Honey.....2 ounces.

Give it morning and night.

5. CATTLE, Drink, Turpentine for Worms—

Take Oil of Turpentine.....2 ounces.
Sweet Spirit of Nitre.....1 ounce.
Laudanum.....½ ounce.
Linseed Oil.....4 ounces.

Mix and give in a pint of gruel.

6. CATTLE, Drink, Stimulating—

Take Digitalis.....1 scruple.
Emetic Tartar.....½ drachm.
Nitre.....3 drachms.
Powdered Squills.....1 drachm.
Opium.....1 scruple.

Mix, and give with a pint of gruel.

7. CATTLE, Drink, Sulphur Purging—

Take Sulphur.....8 ounces.
Ginger.....½ ounce.

Mix with a quart of warm gruel.

The drink should be repeated every third day, if the bowels appear to require it.

8. CATTLE, Drink, Rheumatic—

Take Nitre.....2 drachms.
Tartarized Antimony.....1 drachm.
Spirit of Nitrous Ether.....1 ounce.
Aniseed Powder.....1 ounce.

Mix with a pint of very thick gruel, and repeat the dose morning and night, except when it is necessary to give the Sulphur Purging Drink, No. 7.

9. CATTLE, Embrocation, Rheumatic—

Take Neatsfoot Oil.....4 ounces.
Camphorated Oil, Spirit of Turpentine and Laudanum, each...1 ounce.
Oil of Origanum.....1 drachm.

Mix.

10. CATTLE, Ointment, Healing, Cleansing—

Take Lard.....2 pounds.
Resin.....½ pound.

Melt them together, and when nearly cold, stir in calamine, very finely powdered, half a pound.

11. CATTLE, Camphorated Oil—

Take Camphor 2 ounces, and break into small pieces; put it into a pint of spermaceti, or common olive oil, and let the bottle, being closely corked, and shaken every day, stand in a warm place until the camphor is dissolved.

12. CATTLE, Drink, Cordial, Rheumatic—

Take rhododendron leaves, 4 drachms, boil it in a quart of water until it is diminished to a pint; strain the decoction, and to half of the liquid, warm, add

Gum Guaiacum, finely powdered...2 drachms.
Powdered Caraway Seeds.....2 drachms.
Powdered Aniseed.....2 drachms.

Mixed with half a pint of warm ale.

13. CATTLE, Drink, Tonic—

Take Gentian Root, Powdered.....½ ounce.
Ginger, Powdered.....1 drachm.
Epsom Salts.....2 ounces.

Mix the whole with a pint of warm gruel, and give it morning and night.

14. CATTLE, Drink for the Yellows—

Take of calomel and opium, a scruple; mix and suspend in a little thick gruel.

15. **CATTLE, Drink, Physic, a Strong—**
 Take Epsom or Glauber Salts. $\frac{1}{2}$ pound.
 Kernel of Croton Nut. 10 grains.
 Take off the shell of the Croton nut, and weigh the proper quantity of the kernel, rub it down to a fine powder, gradually mix it with half a pint of thick gruel, and give it, and immediately afterwards give the salts, dissolved in a pint and a half of thinner gruel.
16. **CATTLE, Ointment, Blister—**
 Take lard, 12 ounces; resin, 4 ounces; melt them together, and when they are getting cold add oil of turpentine, four ounces, powdered cautharides, five ounces; stirring the whole together.
17. **CATTLE, Drink, Astringent—**
 Take Prepared Chalk. 2 ounces.
 Oak Bark, Powdered. 1 ounce.
 Catechu, Powdered. $\frac{1}{2}$ ounce.
 Opium, Powdered. 2 scruples.
 Ginger, Powdered. 2 drachms.
 Mix, and give in a quart of warm gruel.
18. **CATTLE, Drink, Astringent, with Mutton Suet—**
 Take Mutton Suet. 1 pound.
 New Milk. 2 quarts.
 Boil them together until the suet is dissolved; then add—
 Opium, powdered. $\frac{1}{2}$ drachm.
 Ginger. 1 “
 Having previously well mixed them with a spoonful or two of fluid.
19. **CATTLE, Whey, Alum—**
 Take Alum. $\frac{1}{2}$ ounce.
 Water. 2 quarts.
 Boil them together for 10 minutes and strain.
20. **CATTLE, Astringent, Stimulating—**
 Take Oil of Juniper. 2 to 4 drachms.
 Tincture of Opium. 1 ounce.
 Oil of Turpentine. 1 “
 Mix and give in a pint of Linseed Tea once or twice a day.
21. **CATTLE, Drink, Stimulating—**
 Take Epsom or Glauber Salts. 1 pound.
 Ginger. $\frac{1}{2}$ ounce.
 Carbonate of Ammonia. $\frac{1}{2}$ “
 Pour 1 quart of boiling water upon the ingredients; stir them well and give when milk-warm.
22. **CATTLE, Stimulating Drink, Mild—**
 Take Ginger. 1 drachm.
 Gentian. 1 “
 Spirit of nitrous Ether. 1 ounce.
 Mix and give in a pint of gruel.
23. **CATTLE, Astringent, Mild—**
 Take Oak Bark, powdered. $\frac{1}{2}$ ounce.
 Catechu, powdered. 2 drachms.
 Opium, powdered. $\frac{1}{2}$ scruple.
 Mix together in a pint of gruel or warm water.
24. **CATTLE, Ointment, Mercurial Garget—**
 Take Soft Soap. 1 pound.
 Mercurial Ointment. 2 ounces.
 Camphor, rubbed down with a little Spirit of Wine. 1 ounce.
 Rub them well together.
25. **CATTLE, Ointment, Iodine—**
 Take Hydrate of Potash. 1 drachm.
 Lard. 7 drachms.
 Rub them well together.
26. **CATTLE, Drink, Diuretic—**
 Take Powdered Nitre. 1 ounce.
 Powdered Resin. 2 ounces.
 Ginger. 2 drachms.
 Mix them well together in a little treacle, and give them in a warm gruel.
27. **CATTLE, Ointment for Sore Teats—**
 Take Elder Ointment. 6 ounces.
 Beeswax. 2 “
 Mix them together, and add an ounce each of sugar of lead and alum, in fine powder; stir them well together until cold.
28. **CATTLE, Drink, Stimulant, warm—**
 Take Ginger, powdered. $\frac{1}{2}$ ounce.
 Caraway Seeds. 6 drachms.
 Allspice. $\frac{1}{2}$ ounce.
 Mix in a quart of warm water or mild ale.
29. **CATTLE, Drink, Anodyne—**
 Take Powdered Opium. $\frac{1}{2}$ drachm.
 Sweet Spirit of Nitre. 2 ounces.
 Rub them together, adding the fluid by small quantities at a time, and give the mixture in a pint of warm gruel.
30. **CATTLE Drink, Purgative, strong—**
 Take Epsom or Glauber Salts. 12 ounces.
 Flour of Sulphur. 4 “
 Powdered Ginger. 4 drachms.
 Spirit of Nitrous Ether. 1 ounce.
 To be dissolved in warm water.
31. **CATTLE, Drink, Cordial—**
 Take Caraway Powder. 1 ounce.
 Gentian, powdered. $\frac{1}{2}$ “
 Essence of Peppermint. 20 drops.
 Mix.
32. **CATTLE, Drink, Tonic—**
 Take Gentian. 2 drachms.
 Tartrate of Iron. 1 drachm.
 Ginger. 1 “
 Mix and give in a pint of gruel.
33. **CATTLE, Drink, Tonic, Mildest—**
 Take Gentian. 2 drachms.
 Emetic Tartar. $\frac{1}{2}$ drachm.
 Nitre. $\frac{1}{2}$ ounce.
 Spirit of Nitrous Ether. $\frac{1}{2}$ “
 Give in gruel.
34. **CATTLE, Lotion, Disinfectant—**
 Take Solution of Chloride of Lime, in powder. $\frac{1}{4}$ ounce.
 Water. 1 pint.
 Mix.
45. **CATTLE, Murrain, Drink for—**
 Take Sweet Spirit of Nitre. $\frac{1}{2}$ ounce.
 Laudanum. $\frac{1}{2}$ “
 Chloride of Lime, in powder. 2 ounces.
 Prepared Chalk. 1 ounce.
 Rub them well together, and give them with a pint of warm gruel.

**36. CATTLE, Drink, Tonic, for Mur-
rain—**

Take Columbia Root.....2 drachms.
 Canella Bark.....2 "
 Ginger.....1 drachm.
 Sweet Spirit of Nitre.....½ ounce.
 Rub them together, and give in a pint of thick
 gruel.

37. CATTLE, Fumigation—

Take Common Salt.....2 pounds.
 Oil of Vitrol.....1 pound.

38. CATTLE, Drink, Laxative—

Take Epsom Salts.....½ pound.
 Sulphur.....2 to 4 ounces.
 Nitre.....½ ounce.
 Ginger.....2 drachms.
 Spirit of Nitrous Ether.....1 ounce.
 Dissolve in warm water or gruel, and repeat
 once a day for several days.

39. CATTLE, Liniment—

Take Alum and White Vitriol, of each..½ ounce.
 Treacle.....1 gill.
 Dissolve in a pint of warm water.

40. CATTLE, Astringent Powder—

Take Blue Vitriol, powdered.....½ ounce.
 Powdered Alum.....½ "
 Prepared Chalk.....2 "
 Armenian Bole.....1 "
 Mix.

41. CATTLE, Tonic, Strong—

Take Powdered Ginger.....1 drachm.
 Powdered Caraway Seeds.....1 "
 Gentian, powdered.....4 "
 Spirit of Nitrous Ether.....1 ounce.
 To be mixed slowly with gruel.

**42. CATTLE, Drink for Inflammation of
the Bladder—**

Take Antimonial Powder.....2 drachms.
 Powdered Opium.....1 scruple.
 Rub well together with a small portion of very
 thick gruel, and repeat the dose morning and
 night.

43. CATTLE, Eye Lotion, Sedative (1)—

Take dried leaves of Fox Glove, powdered, 1½
 ounce; infuse them in a pint of Cape or Dry
 Raisin Wine for a fortnight, and keep the infusion
 for use.

44. CATTLE, Eye Lotion, Sedative (2)—

Take Extract of Goulard.....2 drachms.
 Spirituous Tincture of Digitalis,
 (made in the same manner as
 the Vinous in Receipt 43,
 No. 1).....2 drachms.
 Tincture of Opium.....2 "
 Water.....1 pint.
 This should also be introduced into the eye.
 Two or three drops at a time will suffice.

**45. CATTLE, Lotion for the Eye,
Strengthening—**

Take White Vitriol.....1 scruple.
 Spirit of Wine.....1 drachm.
 Water.....1 pint.
 Mix them together, and use the lotion in the
 same manner as Nos. 43 and 44.

46. CATTLE, Drink, Cordial—

Take Caraway Seed in powder.....½ ounce.
 Aniseed, in powder.....½ "
 Ginger.....½ "
 Mix with a pint of good ale, made hot.

**47. CATTLE, Physic Drink, for Locked
Jaw, Strong—**

Take Barbadoes Aloes.....1½ ounces
 Kernel of Croton Nut, powder'd. 10 grains.
 Dissolve in as small quantity of boiling water
 as possible, and give them when the liquid is suf-
 ficiently cool.

**48. CATTLE, Anodyne Drink for Lock-
ed Jaw—**

Take Camphor.....1 drachm.
 Rub it down in an ounce of Spirits of Wine;
 to this add—
 Powdered Opium.....1 drachm.
 And give the mixture in a small quantity of
 thick gruel.

**49. CATTLE, Embrocation for Bite of
Serpents—**

Take Hartshorn and Olive Oil equal quantities.
 Shake them well together, and rub the wound
 and the neighboring parts well with the liniment
 morning and night.

50. CATTLE, Lotion, Discutient—

Take Bay Salt.....4 ounces.
 Vinegar.....1 pint.
 Water.....1 quart.
 Oil of Origanum.....1 drachm.
 Add the oil of salt first; rub them well down
 with a little water; then gradually add the bal-
 ance of the water and vinegar.

51. CATTLE, Embrocation for Strains—

Take Bay Salt.....4 ounces.
 Oil of Origanum.....1 drachm.
 Rub them well together, until the salt is reduced
 to a powder; then add—

Vinegar.....½ pint.
 Spirits of Wine.....2 ounces.
 Water.....1 quart.

**52. CATTLE, Embrocation for Strains,
Strongest—**

Take Spirit of Turpentine.....½ pint.
 Oil of Origanum.....½ ounce.
 Olive Oil.....1½ pint.
 Cantharides.....1 ounce.
 Mix them together; shake them often and keep
 in a bottle for use.

**53. CATTLE, Charge for Old Strains
and Lameness—**

Take Burgundy Pitch.....4 ounces.
 Common Pitch.....4 "
 Yellow Wax.....2 "
 Barbadoes Tar.....6 "

Melt them together in a ladle, and apply the
 mixture to the parts when thoroughly warm and
 liquid.

54. CATTLE, Mange Ointment—

Take Flour of Sulphur.....1 pound.
 Strong Mercurial Ointment.....2 ounces.
 Common Turpentine.....½ pound.
 Lard.....1½ pounds.
 Melt the Turpentine and Lard together; stir
 well in the Sulphur when these begin to cool; and
 afterwards rub down the mercurial ointment on a
 marble slab with the other ingredients.

55. CATTLE, Drink, Alterative—

Take Flour of Sulphur.....2 ounces.
 Black Sulphuret of Antimony.....1 "
 Æthiop's Mineral.....½ "
 Nitre.....2 "

Mix and divide into four powders; give one every second morning in a little thick gruel. Turning into a salt marsh will be an excellent auxillary.

56. CATTLE, Vermin, Mercurial Ointment for—

Take Strong Mercurial Ointment.....1 ounce.
 Lard.....7 ounces.
 Mix them well together, and rub the ointment well on wherever the lice appear.

57. CATTLE, Vermin, Lotion for—

Take Corrosive Sublimate, 2 drachms; rub it down in 2 ounces of Spirits of Wine, and add a pint of water.

58. CATTLE, Tonic Powders, Alterative—

Take Flower of Sulphur.....4 ounces.
 Black Sulphuret of Antimony.....1 ounce.
 Æthiop's Mineral.....½ ounce.
 Nitre.....2 ounces.
 Powdered Gentian.....2 ounces.
 Powdered Ginger.....1 ounce.

Mix, and divide into six powders, and give one daily.

59. CATTLE, Bull Burnt, Lotion for—

Take Goulard's Extract.....1 ounce.
 Spirit of Wine.....2 ounces.
 Water.....½ pint.
 Mix.

60. CATTLE, Cow-pox, Lotion for—

Take Sal Ammoniac.....¼ ounce.
 White Wine Vinegar.....½ pint.
 Camphorated Spirit of Wine.....2 ounces.
 Goulard's Extract.....1 ounce.

Mix, and keep it in a bottle for use.

61. CALVES, Drink Aperient for—

Take Epsom salts, from 1 to 2 ounces, according to the size and age of the calf, and dissolve in half a pint of gruel; then add ginger, 1 scruple; essence of peppermint, 3 drops. Mix.

62. CALVES, Diarrhoea in—

Take Prepared Chalk.....2 drachms.
 Powdered Opium.....10 grains.
 Powdered Catechu.....½ drachm.
 Ginger.....½ drachm.
 Essence of Peppermint.....5 drops.

Mix, and give twice a day in half pint of gruel,

63. CALVES, Purging, to Stop—

Take Dover's Powder.....2 scruples.
 Starch or Arrow-root, in powder.....1 ounce.
 Compound Cinnamon Powder.....1 drachm.
 Powdered Kino.....½ drachm.

Boil the starch or arrow-root in a pint of water until it becomes well thickened, and then gradually stir in the other ingredients.

64. CALVES, Hoove in—

Take Oil of Turpentine.....1 ounce.
 Linseed Oil.....3 or 4 ounces.
 Ginger, Powdered.....1 drachm.

Mix. To be repeated at the interval of a week, as often as may be required.

65. SHEEP, Tonic Drink—

Take Gentian Root, powdered.....1 drachm.
 Caraway Powder.....½ drachm.
 Tincture of Caraway.....10 drops.

Give in a quarter of a pint of thick gruel.

66. SHEEP, Purging Drink for—

Take Epsom Salts.....2 ounces.
 Powdered Caraway.....¼ ounce.
 Warm thin gruel sufficient to dissolve the salts.

67. LAMBS, Astringent Drink for—

Take Compound Chalk Powder with
 Opium.....1 drachm.
 Gentian.....1 scruple.
 Essence of Peppermint.....3 drops.

Mix with a little thin starch, and give morning and night.

68. SHEEP, Cooling Fever Drink—

Take Powdered Digitalis.....1 scruple.
 Emetic Tartar.....10 grains.
 Nitre.....2 drachms.

Mix with thick gruel, and let it be given twice each day.

69. SHEEP, Laxative Medicine—

Take Epsom Salts.....1 ounce.
 Ginger.....1 scruple.
 Gentian.....1 drachm.
 Warm Water.....2 ounces.
 Linseed Oil.....1 ounce.

The above may be given either alone or with gruel, to a full-grown sheep; and from one-fourth to one-half to a lamb, according to its age.

70. SHEEP, Strengthening Drink—

Take Prepared Chalk.....1 ounce.
 Catechu.....½ drachm.
 Opium.....20 grains.
 Spirit of Nitrous Ether.....2 drachms.
 Gentian.....1 drachm.

To be dissolved in gruel, and given twice a day till the purging ceases; after which the last two ingredients, with a drachm of nitre and ten grains of tartarized antimony, should be given in gruel once a day.

71. SHEEP, Physic for Blown—

Take Glauber salts, 1 ounce, and dissolve in peppermint water, 4 ounces; to this add tincture of ginger, 1 drachm; tincture of gentian, 1 drachm; boiling water, 1 ounce. This should be given every six hours until the bowels are opened, and half the quantity on each of the four next mornings.

72. SHEEP, General Tonic Drink—

Take Gentian.....2 drachms.
 Colombo.....1 drachm.
 Ginger.....½ drachm.

Give in four ounces of warm gruel.

73. SHEEP, Mixture for the Rot—

Take Common Salt.....8 ounces.
 Powdered Gentian.....2 ounces.
 Ginger.....1 ounce.
 Tincture of Colombo.....4 ounces.

Put the whole into a quart bottle so as to fill the bottle.

74. SHEEP, Second Mixture for the Rot—

Take of the Receipt, MIXTURE FOR THE ROT (which see), one quart. To this add, spirits of turpentine, 3 ounces. Shake them well together when first mixed, and whenever the medicine is given, two table-spoonfuls are the usual dose.

75. SHEEP, Caustic Astringent Powder for Foot-Rot—

Take Verdigris, Bole, Armenian, and Sugar of Lead, equal parts. Rub them well together, until they are reduced to a fine powder.

76. SHEEP, Arsenical Wash for Lice—

Take Arsenic.....2 pounds.

Soft Soap.....4 pounds.

Dissolve in 30 gallons of water.

77. SHEEP, Mercurial Wash for Lice—

Take Corrosive Sublimate, 1 ounce; Spirits of Wine, 2 ounces. Rub the Corrosive Sublimate in the spirit until it is dissolved, and then add Cream of Tartar, 1 ounce; Bay Salt, 4 ounces. Dissolve the whole in two quarts of water, and apply a little of it with a small piece of sponge wherever the lice appear.

78. SHEEP, Fly Powder for—

Take White Lead, two pounds; Red Lead, one pound, and mix them together.

79. SHEEP, Ointment for Sore Heads—

Take Black Pitch.....2 pounds.

Tar.....1 pound.

Flower of Sulphur.....1 pound.

Melt them in an iron pot over a very slow fire, stirring together the ingredients as they begin to melt, but carefully watching the compound, and removing the pot from the fire the moment the ingredients are well mixed, and before they begin to boil, for they would then rapidly swell to an extraordinary extent, and the whole mass would run over into the fire.

80. SHEEP, Astringent Powder for—

Take Prepared Chalk..... $\frac{1}{4}$ ounce.

Ginger..... $\frac{1}{2}$ drachm.

Catechu, Powdered..... $\frac{1}{2}$ drachm.

Powdered Opium.....2 grains.

Give this in a little gruel, twice daily until the purging abates.

81. SHEEP, Mild Laxative—

Take Linseed Oil.....2 ounces.

Powdered Opium.....2 grains.

To be mixed with linseed tea. Linseed and oatmeal gruel should be given several times a day, and the second day the ASTRINGENT POWDER for sheep should be given.

82. SHEEP, Tonic Drink for Debility—

Take Gentian and Powdered Caraway Seeds, of each an ounce; Columbo and Ginger, of each, half an ounce. Pour a quart of boiling water upon them, and let the infusion stand three days, stirring it well every day. Then pour off the clear liquid, and bottle it for use. Give a table-spoonful daily, in a little gruel, mixed with an equal quantity of good ale.

83. SHEEP, Lotion for Cloudiness on the Eyes—

Take Corrosive Sublimate, 4 grains; rub it down with Spirits of Wine, $\frac{1}{4}$ ounce; and add 1 pint of water.

84. SHEEP, Mercurial Ointment for Scab—

Take Crude Quicksilver.....1 pound.

Venice Turpentine..... $\frac{1}{2}$ pound.

Spirits of Turpentine.....2 ounces.

Mix.

85. SHEEP, Mild Ointment for Scab—

Take Flower of Sulphur.....1 pound.

Venice Turpentine.....4 ounces.

Rancid Lard.....2 pounds.

Strong Mercurial Ointment.....4 ounces.

Rub them well together.

86. SHEEP, Powerful Ointment for Scab—

Take White Hellebore.....3 ounces.

Bichloride of Mercury.....2 ounces.

Fish Oil.....12 pounds.

Resin.....6 ounces.

Tallow..... $\frac{1}{2}$ pound.

The two first ingredients to be mixed with a portion of the oil, and then melt the other ingredients and add.

87. SHEEP, Smearing Mixture for Scab

Take a gallon of Common Tar and 12 pounds of any sweet grease. Melt them together, stirring them well while they are cooling.

88. SWINE, Fever Medicines for—

Take Digitalis.....3 grains.

Antimonial Powder.....6 grains.

Nitre..... $\frac{1}{2}$ drachm.

Mix and give in a little warm swill, or milk, or mash.

89. SWINE, Alterative Powder for—

Take Flower of Sulphur..... $\frac{1}{4}$ ounce.

Æthiop's Mineral.....3 grains.

Nitre and Cream of Tartar..... $\frac{1}{4}$ drachm.

Mix and give daily in a little thickened gruel or wash.

POULTRY-KEEPERS' GUIDE.

POULTRY, Management and Profit of.

—Except among professional poultry-breeders, and amateurs who can afford to gratify their fancy without regard to pecuniary remuneration, poultry has usually been left to care for itself to a great extent. The real profit of poultry-keeping is becoming better understood, however, and the care of fowls, in regard to both food and shelter, is increasing.

In the milder seasons of the year, domestic fowls, left to their own free ways, are almost invariably healthy. They secure exercise, pure air, pure water, variety of food, and access to fine, dry soil in which to bathe. As health is the first condition of success in poultry-keeping, this fact presents the key to the whole matter, of profitable management of poultry on farms and in large numbers as a specialty. If fifty hens, kept in health, can be made to produce a clear annual profit of \$50, a thousand in like condition may be made to yield a proportionate profit. The chief difficulty experienced is that of keeping large numbers in good condition, and this difficulty arises from failure to observe to the extent required the conditions which promote success with a few fowls. The proportion of range necessary, of sheltered space, of food, water, care, etc., must be extended mathematically in proportion to the number of fowls kept; and then, other things being equal, the profit is as certain with many hens as with a few.

Upon the farm, where a few fowls are kept for the benefit of the family, and have during much of the year free range, most of the conditions of moderate success are attained. With a little care and expense, however, absolutely necessary at some seasons of the year, better results may always be secured; and regular care is necessary from those who in cities or villages engage in poultry-keeping for pleasure or profit, hoping for success.

It is obvious that poultry must have room for exercise, and a place for rest, laying, and brooding, and such places should be fruitful, convenient, and healthfully located. The best soil upon which to keep poultry is a sandy one, resting upon gravel, as it retains the least moisture; stagnant moisture being a fruitful source of disease. Any soil upon which an inclosure for fowls is erected should be well drained. The place should have a southern or southeastern slope, preferably the former, and be sheltered from the north and east, thus securing warmth of the sun and of location, and security from cold winds. The hen-house should afford proper shelter and warmth; perches and nests should be kept clean and the air pure, without permitting any perceptible draught. The floor should be hard and perfectly dry, concrete or solidly packed earth being the best material. Whether composed of stone, brick, or wood, the house must be suited to the nature of its occupants. Success will be diminished in proportion to the neglect of any of these conditions.

A room eight to ten feet square is large enough for a roosting and laying house for twenty-five hens. If the walls are plastered, the protection against vermin and cold will be greater than when otherwise. The sunny side, except of the nest-room, should be composed of glass, commencing one foot above the ground or floor; and if the glass is small there will be less liability of breakage by the fowls. The perches should be low, especially for the heavier breeds, unless there is convenient access to them by means of steps, so that the fowls may not injure themselves in jumping to the floor. A good arrangement is one in which one perch is elevated above the other and behind it, the perches being about two feet apart and the lower one two feet from the floor. Some prefer, however,

not to furnish perches for Cochins and Brahmas, but to litter the floor with straw each night for them to rest upon. Perches for heavy fowls should be broad enough to give good support to the breast, or deformity of the breast-bone will ensue. The ground beneath should in all cases be strewed with sand or ashes, and removed often enough to prevent taint. Boxes for nests for sitting should be movable, for convenience of cleansing, secluded, and placed low. Many place the nests upon the ground. Chopped straw is a good material with which to fill nest-boxes, and should be clean. Where the fowls cannot have perfect freedom, it is necessary for their health that an inclosed yard should join the hen-house, to which they may have access. An eighth of an acre in grass is the proper proportion of land for twenty-five hens, but a smaller yard will answer if kept perfectly clean, and if a sufficient amount of vegetable food is supplied. Feed and water troughs or boxes of sufficient capacity should be provided, and so arranged for cleanliness and economy as to prevent the fowls from having access to them in any unnecessary way. If more than one breed of fowls are to be kept, the arrangements for their accommodation, above suggested, should be duplicated. If a smaller number, the proportions of house and yard may be diminished. These arrangements are such as are suggested and approved by the most experienced keepers, both in England and America.

Large numbers of fowls may be profitably kept by observing in due proportion the conditions of success with a few. They may be kept in large flocks, with extended conveniences, or divided into small flocks of fifty or less. It is reasonable to suppose that want of success with large numbers of birds is most frequently caused by neglect in the matter of cleanliness and food, causing disease, or low condition, destructive of profit, since it has been demonstrated by years of experience, that thousands of fowls may be kept together with large and certain remuneration. The editor of the Massachusetts Ploughman remarks that he has "frequently expressed the conviction that with proper management a large number of fowls will prove proportionately as

profitable as a small number," and recommends in substance as follows: That an acre of land, at least, should be given to every two hundred fowls; wild, rocky land covered with bushes being as good as any; and that a flock of a thousand should have six acres. It should be fenced with boards or pickets, and houses should be erected, according to plans approved for smaller numbers, large enough to accommodate a hundred fowls with shelter, roosts and nests. They should face the south, and the fronts should be partially or entirely glazed, the sashes opening on hinges at the top, so as to be opened in summer for free circulation of air. There should also be provided a number of low sheds about the grounds, beneath which the fowls may take shelter from the sun and storms. There should be abundance of pure water, easily accessible. Fowls selected for breeding should be kept separate from the others, in flocks of twenty, with the proper complement of male birds. This writer further says:

With a large flock properly kept on such a tract as we have described, there is no question as to its profits. The poulterer embarking in an enterprise of this kind should keep in view:

1. That the cheapest and most accessible land is the most desirable, always provided that a near and sure market is at command.
2. That the utmost economy consistent with the safety, comfort, and health of the poultry, should be exercised in the erection of the buildings and fences.
3. That an abundance of pure water is accessible or attainable.
4. That fowls over three years old are not profitable, and a stock should be thoroughly renewed every two years.
5. That only the largest, hardiest, and best fowls should be used as breeders.
6. That a careful supervision of the flock is necessary, and that it enjoy the most perfect health and greatest comfort in summer and winter.

These suggestions accord with the conditions under which Mr. Warren Leland, of New York, has successfully raised, for many years, large numbers of fowls, securing abundance of eggs and poultry, principally for use in the Metropolitan Hotel, in the city of New York. Mr.

Leland's method with fowls is reported in the Transactions of the American Institute and from that work, and his letters to the Farmers' Club of that Institute and the Department of Agriculture, we condense the following statement:

He devotes eighteen acres in one yard of his "Highland Farm," at Rye, New York, to his poultry, consisting of hens, ducks, turkeys and geese. The broods have another large lot, and the turkeys have a half mile range. The eighteen-acre lot is rough land, unsuited for tillage, having in it rocks, bushes, grass, weeds, and sandy places, and also a pond. It is supplied with heaps of ashes, bones, lime, and a portion is occasionally plowed to furnish worms. The fowls have woods and bushes to range in, the turkeys trees to roost in, and the ducks and geese enjoy the privileges of the pond. There are natural and artificial shelters for all, consisting of sheds, hillsides, bushes, nooks and hiding places of all sorts for hens with broods, and trees are cut and bent down into the grounds for shelter and roosts. The wings of none are clipped, and the hens may scratch and turkeys fly at pleasure, within the limits of the grounds. After a trial of some years, Mr. Leland has discarded coops, finding that the greater freedom he allows, the more healthful and profitable are his fowls. The principal features of his system are freedom, cleanliness, proper and sufficient food during the year, and change of cocks every spring. In summer, with the range they have, his fowls secure a good supply of animal food from the fields, in worms, grubs, bugs, grasshoppers, etc. They are also supplied at all seasons with the refuse scraps from the Metropolitan Hotel. Mr. Leland says: "Egg-making is no easy work, and hens will not do much of it without high feed. They need just what a man who works requires—wheat bread and meat." He feeds wheat, even when it costs \$2 per bushel. No old nests are allowed. After each brood is hatched the boxes are taken out and whitewashed inside and out, and after lying in the sun and rain a few days, they are half filled with clean straw and returned for use. The old straw is burned. Each of the 250 to 300 hens on hand in the spring is permitted to have one brood during the year. Four

or five will have broods the same day, and to the hen which appears to be the best mother, all the chickens are given. The others are given a cold bath and placed in confinement a few days, after which they return to the flock and their nests. Mr. Leland produces a great many eggs, which pay for food and attendance, and makes sales of poultry, amounting to several thousand dollars annually. If a hen comes off about the 1st of April with ten chickens, by the middle of June they will weigh twenty pounds and be worth five dollars. He asserts that he can produce a thousand pounds of poultry cheaper than he can produce the same weight of mutton, beef, or pork. He finds as great profit from turkeys as from hens, and greater with more attention. One-year-old turkeys are found to be the best mothers, and gobblers of that age are also preferred. Three hatchings are put with one turkey in a large coop, half hidden in tall grass, as bare ground is fatal to the young. The chicks do not require food until the third day, when cracked wheat is given them. They require great care during the first two weeks, and must not be left out in the rain or wet, but after that age they grow without much care. After the season of grasshoppers, they are fed on corn, and late in September they are ready for market. In the fall of 1875 Mr. Leland sold 450 turkeys, grown that year, for \$1,752—nearly \$4 each. He also sold 320 ducks for \$352, and over 80 geese at \$1 80 each. No food is given the geese after they are feathered; yet Mr. L. says other poultry is better and more profitable. He holds ducks—a cross between pure-bred Muscovy and English, which are hardy, honest for meat and best for eggs—in high esteem. The latter are fed on corn. His young chickens in 1875 numbered about 3,000, and his stock of all kinds of poultry about 4,000. It was estimated to be worth \$4,000 in November of that year, when poultry was higher than it has since been. Mr. Leland prefers the large bronze turkeys, Poland geese, which lay earliest, and light Brahma hens. His cocks are of all kinds, as he finds excellent results from the crosses secured, and no old cocks are allowed on the place. When nine months old his early spring pullets begin to lay,

and he gets 200 to 250 eggs daily during the cold season. He prefers the Brahmas because they mature early for spring chickens, are handsome, hardy good-layers, look well when dressed, and are of large size. No other hens are kept. The Black Spanish and White Leghorn have been found better for eggs, but they are undesirable for the table. He feeds corn, wheat, chopped turnips, refuse cabbage, and the waste bread and meat scraps from his hotel, and sour milk from his farm; also burat bones, lime, etc., for shell-making. During the past ten years Mr. L. has annually raised about 3,000 chickens, 450 turkeys, and 500 ducks and geese, and he thinks that the business might be made generally profitable, especially in rocky neighborhoods, and on a scale more extensive than his own. He says:

The great secret of my success is in keeping near the conditions of nature. At the outset I became convinced that, above all things, fowls must have space and cleanliness; that they cannot be expected to do well if confined in cramped and offensive quarters. With space and cleanliness, I cannot understand why the number need be limited.

He has never kept an account of his poultry business, being satisfied with its continuous success. He pays \$250 per year and board to one man to attend his fowls, and buys about 200 bushels of grain each year, which, with the vegetables and refuse from his hotel, interest on land, and cost of buildings, make up the regular expenses.

The committee of the American Institute Farmers' Club, appointed to visit poultry yards and ascertain the best mode of wintering poultry, reported through its chairman, that Mr. Leland had the best winter quarters for his hens, ducks, and geese, they had ever seen. The following description of his winter management of poultry is taken partly from the report of the committee, and in part from statements given by Mr. Leland. For the winter quarters of his flock—which at that season is reduced to 300 early spring pullets, 30 cocks, 30 turkeys, (sometimes many more), and a few geese and ducks—he has a stone buildings 75 feet long and 25 feet wide, which faces the South. The openings on the north

side are small and filled with window-glass, and in some cases with double sashes. Those on the south are much larger, consisting of double doors, which are opened on sunny days. In the middle of the north side is a wide, old-fashioned fire-place. Nearly every day in winter a fire is kept up with chunks, knots, and logs that would otherwise be useless. The walls being of stone and the floor of earth or rock, the fire can be left without danger. The chimney can easily be closed, or the logs rolled out into the middle of the building, and feathers or sulphur be used for fumigation, which is done whenever hen lice appear. Smoke is found to be better than carbolic acid, or kerosene, or white-wash, to drive away vermin. On cold and wet days the fowls gather before the fire, warm themselves and trim their feathers; and when the fire dies out they wallow in the warm ashes. Lime and plaster are freely used in the building to absorb odors and compost droppings. Roosts are made of oak slats an inch thick and two and one-half inches wide, fastened to the rafters near the ridge. About two feet below the perches is a scaffold of boards that fit closely. This is covered with plaster and ashes from time to time, which, with the accumulated droppings of the hens, are frequently swept off, put into barrels with all refuse filth, and used upon corn land. The manure is valued at one dollar per year from each hen, as the same amount of fertilizing salts in bone-dust, which would cost fifty dollars, is annually saved from fifty hens. The wide perches used enable the hens to cover their feet entirely with their warm feathers, and prevent freezing in the coldest nights. The offal of the farm and refuse from the kitchen are thrown into this hen-house to be picked over; and besides this the poultry is fed about a bushel of corn per day in winter, and half a bushel in summer. Mr. Leland raises excellent crops of corn, having the best manure, and he feeds the product of four acres in keeping and fattening his poultry.

The use of fumigation for driving away vermin may be successful in a building such as we have described, but cannot be relied on as the best means under all circumstances. Whitewash for walls,

perches, nests, etc., will always be found useful; and probably the best for protection against insects is that in which an ounce of carbolic acid is used with each four quarts of lime water. This recipe, it is claimed, is certain death to parasites. A solution of one part of acid to sixty parts of warm water may be used then thoroughly wet with it on all parts of the body, and afterwards as a wash for fowls, the mixture being cooled before use, and the fowls placed on dry, clean straw and dried in the sun. A soap for washing fowls, also, may be made by dissolving four pounds of common bar-soap in hot water, and adding one to two ounces of carbolic acid, according to the desired strength, and then letting it cool and become hard again.

POULTRY, Breeds, the Most Popular—

The profits of poultry-keeping being derived principally from two sources—the sale of eggs and of poultry, mostly chickens, in market, the question of breed is an important one. For eggs, it would seem that, with proper attention and care, the non-sitters are preferable; but some of the varieties of non-sitters are not hardy, and the extra attention such fowls require may be greater in cost than the enhanced value of their production. Fowls have been classified, not only in respect to their qualities of flesh and as layers, but also with a view to other characteristics. The following classification, based on the statement of an experienced poultry firm in New York, is approved by Tegetmeier:

1. **HARDINESS.**—*Hardy*: Brahmas, Houdans, Hamburgs, Creve Cœurs, Spanish, and Leghorns. *Delicate*: La Fleche, Polands, and Bantams.

2. **QUIETUDE.**—*Domestic and quiet*: Brahmas and Cochins. *More vivacious*: Spanish, Leghorns, and Dorkings. *Active*: Hamburgs and Games.

3. **SIZE OF BIRDS.**—*Large*: Brahmas, Cochins, La Fleche, Houdans, Creve Cœurs, and Dorkings. *Medium*: Polands, Spanish, Leghorns, and Games. *Small*: Hamburgs and Sultans. *Diminutive*: Bantams and Silkies.

4. **SIZE OF EGGS.**—*Layers of large eggs*, averaging about 7 to a pound: La Fleche, Houdans, Creve Cœurs, and Black Spanish. *Layers of medium eggs*, averaging 8 to 9 to a pound: Leghorns, Cochins,

Brahmas, Polands, Dorkings, Games, and Sultans. *Layers of small eggs*, averaging 9 to 10 to a pound: Hamburgs.

5. **NUMBER OF EGGS.**—*Great layers*: Hamburgs, Spanish, Leghorns, and Polands.

6. **INCUBATION.**—*Good sitters*: Cochins, Brahmas, Dorkings, and Games. *Non-sitters*: Houdans, Creve Cœurs, La Fleche, Spanish, Polands, Hamburgs, and Leghorns.

7. **VALUABLE FOR FLESH.**—*True table-birds*: La Fleche, Houdans, Creve Cœurs, and Dorkings. *Flesh less juicy*: Cochins and Brahmas.

8. **FOR EGGS AND CHICKENS**, which are generally equally desired, from fowls usually kept on farms, the testimony preponderates greatly in favor of the Brahmas; for, in addition to being good flesh fowls, both as to weight and quality, they are good winter, and may be considered at least fair summer, layers; they are quiet, hardy, and come early to maturity. Other breeds, considered superior in quality of flesh, or as egg producers, may be found more desirable, being raised with equal success in many localities. Generally, however, the Brahman is considered the most profitable fowl for the farmer.

POULTRY, Diseases of.—In this climate the diseases of our poultry are few in number, and are generally controlled by proper treatment. On this point, it is said, with truth too, that “prevention is better than cure;” and when the former cannot be altogether secured, the latter must be attended to immediately, or all attempts at a cure will prove fruitless. Although poultry are no less liable to disorders than cattle or other tame animals, but very little attention has been paid to them, owing, no doubt, to the small value of individual fowls compared with sheep or horses; and it is frequently most economical to kill them at once. These disorders, however, though few in number, are far from being devoid of interest, not only as sometimes leading to correct views of the diseases of other animals, but so far as the saving of even a few shillings, by curing them when that is possible, or of rendering their eggs or flesh more wholesome and palatable, as well as the humane motive of adding

comfort to the creatures intrusted to our care.

POULTRY, Apoplexy.—This disease is very frequent among fowls, and makes its attack, in most instances, without the slightest warning. M. Flourens, of Paris, says there are two degrees of apoplexy among fowls—one deep-seated and the other superficial—each having different symptoms. Deep-seated apoplexy is characterized by complete disorder of movement, while superficial apoplexy is manifested only by deficient muscular energy and inability in walking. Deep-seated apoplexy is accompanied by superficial apoplexy; but as the latter is the precursor of the former, it ought to be carefully attended to, in order to prevent its passing to what may be termed the second stage, though both stages are capable of being cured by a natural process, as an individual case proves.

M. Flourens had brought to him in the month of April a young fowl, whose gait indicated that of a tipsy animal so much that the peasants called it the "tipsy hen." Whether standing, or walking, or running, it reeled and staggered, advancing always in a zigzag manner, frequently turning to the right when it wished to turn to the left, and to the left when it wished to turn to the right, and instead of going forward it went backward. Its legs also often bent under it, so that it fell down; above all, when it flew high up to perch, it could not govern nor regulate its movements, but fell and rolled about on the ground a long while without being able to get upon its legs or recover its balance. These movements so nearly resemble those which had been produced by experiment, that M. Flourens was impatient to examine the brain. He found the bone of the skull to be covered with black carious points. On penetrating the dura mater, a quantity of clear water ran out, while the cerebellum was yellowish, rust-colored streaks on the surface, and in the centre was a mass of purulent coagulated matter as large as a horse-bean, contained in a cavity perfectly isolated, and having its sides very thin and smooth.

SYMPTOMS.—The symptoms of apoplexy are plain and decisive. A fowl, apparently in the most robust health, falls down suddenly, and is found either dead, or without sensation or the power of

motion. These symptoms are occasioned by the rupture of a small vessel (usually at the base of the brain), and the consequent effusion of blood, which, by its pressure, produces the evil.

CAUSES.—Apoplexy is almost invariably caused by a full habit of body; it is therefore frequent in overfed birds, and is most common among laying hens, which are sometimes found dead on the nest—the expulsive efforts required in laying being the immediate cause of the attack. Unnatural and overstimulating food, as greaves, hemp-seed, and a large proportion of pea or corn meal, greatly predisposes to the disease.

This disorder is termed by some epilepsy, megrims, or giddiness. Many promising chickens are lost by this complaint. Without any kind of warning, they fall, roll on their backs, and struggle for a minute or two, when they rise, stupid and giddy, and slowly return to their food. One fit having occurred, is quickly followed by others, each more violent than the preceding, until at length the little animal staggers about, half unconscious, refusing to eat, rapidly wasting, and soon dies convulsed. In some cases it occurs when the fowl is poor and half-starved; but then the food has been improper; it has been watery or disposed to fermentation; diarrhoea has followed, and the fits are the consequence of intestinal irritation. Other young fowls will have occasional fits, from which, however, they in most cases rapidly recover, and appear to be little or nothing the worse for them.

TREATMENT.—In this disease much may be done in the way of prevention—little toward a cure in an actual attack; the only hope consists in an instant and copious bleeding. It has been said that bleeding is out of the question; for how is a bird to be bled, and where? We would reply, it is not out of the question; for we have saved the lives of several birds by its prompt employment. And as to the mode of operating, it is the same as in other animals—simply opening a vein with a sharp-pointed pen-knife, or, still better, a lancet. The largest of the veins seen on the under side of the wing should be selected, and opened in a longitudinal direction, not cut across; and so long as the thumb is pressed on the vein, at any point between the opening and the

body, the blood will be found to flow freely. If the bird recovers after the operation, it should be kept quiet, and on light and scanty food, and the affected fowl should be confined in a rather dark coop, and kept warm.

POULTRY, The Pip.—This may be regarded as a token of derangement of the mucous membrane of the alimentary canal generally, and not as a local disease.

CAUSE.—This disease is generally attributed to the want of water, or to bad water, such as the drainings of dung-hills, sinks, etc., which fowls will drink when they can get no other.

SYMPTOMS.—The occurrence of a dry, horny scale upon the tongue is generally regarded as characteristic of this disease, which, however, is by some confounded with gapes. We are quite assured that the dry, scaly tongue is only a symptom caused by some other disease, which forces the fowl (which habitually breathes through the nostrils), to respire through the mouth; in this case the constant current of air dries the tongue, which becomes hard at the point, and assumes a very horny character. Thus, in any inflammatory affection of the wind-pipe, in gapes, catarrh, or roup, when the nostrils are closed by the discharge, the pip, as it is termed, makes its appearance. It should be regarded, however, as a symptom only, and not as the disease itself. The beak becomes yellow at the base, the plumage becomes ruffled, the bird mopes and pines, the appetite gradually declines to extinction, and at last it dies, completely worn out by fever and starvation.

TREATMENT.—The treatment varies with the cause. In all cases the mouth should be frequently moistened; and if the scale of hardened membrane is loose, it should be removed. The absurd plan of nipping off the end of the tongue in chickens is still practiced in some parts of the country; it is almost needless to say, that it is alike useless and barbarous.

A cure may be effected by a low diet; that is, in the case of common fowls, by an allowance of fresh vegetable food, as onions or parsley chopped and mixed with potatoes and a little Indian or oat-meal, granting at the same time a plenti-

ful supply of pure water. Give, also, a teaspoonful of castor-oil or thereabouts, according to the age or strength of the fowl. Do not scrape the tongue, nor use rough modes of cleaning it; but apply a little borax, dissolved in pure water, and tincture of myrrh, by means of a camel-hair brush, two or three times a day.

The following has been recommended. Give three times a day, for two or three days, a piece of garlic, the size of a pea; if garlic cannot be obtained, onion, shallot, or chive will answer; and if neither of these be convenient, two grains of black pepper, to be given in fresh butter, may be substituted.

POULTRY, To Preserve in Winter.—“About the 15th of November,” said the late Judge Buel, “I purchased a quantity of poultry for winter use. The insides were carefully drawn, their place partially filled with charcoal, and the poultry hung in an airy loft. It was used through the winter, till about the first of February, and although some were kept seventy days, none of it was the least affected with must or taint, the charcoal having kept it sweet.”

POULTRY, Vertigo.—**SYMPTOMS.**—Fowls affected with this disease may be observed to run round in a circle, or to flutter about with but partial control over their muscular actions.

CAUSE.—The affection is one evidently caused by an undue determination of blood to the head, and is dependent on a full-blooded state of the system.

TREATMENT.—We have always found that holding the head under a stream of cold water for a short time immediately arrested the disease; and a dose of any aperient, such as calomel, jalap, or castor-oil, removes the tendency to the complaint.

POULTRY, Giddiness.—See **POULTRY, EPILEPSY.**

POULTRY, Paralysis.—**SYMPTOMS.**—An inability to move some of the limbs. In fowls the legs are usually affected, and are totally destitute of the power of motion.

CAUSES.—Paralysis usually depends on some affection of the spinal cord, and is another result of overstimulating diet.

TREATMENT.—Nothing can be done by way of cure; the case may be regarded as hopeless, or nearly so.

POULTRY, Catarrh.—**SYMPTOMS.**—The symptoms of catarrh in fowls are identical with those so familiar in the human subject—namely, a watery or sticky discharge from the nostrils, and a slight swelling of the eyelids; in worse cases the face is swollen at the sides, and the disease has the appearance, or seems to run on to true roup.

CAUSES.—Exposure to cold and dampness, such as a long continuance of cold wet weather, or roosting in places which are open to the north or west.

TREATMENT.—In simple cases, removal to a dry, warm situation, and a supply of food rather more nutritious and stimulating than usual, soon effect a cure. We have found a little mashed boiled potatoes, well dusted with black pepper, very advantageous. In severe cases, the disease so closely resembles roup, that it may be treated in the same manner.

POULTRY, Gapes.—Of all diseases, real or presumed, to which our domestic fowls are subjected, the most frequent is the gapes, sometimes called pip. It is a very common and troublesome disorder, and often proves fatal. All domestic birds, particularly young fowls, are peculiarly liable to it, and generally in the hot weather of July and August. By some it is considered a catarrhal disease, similar to the influenza in human beings, producing a thickened state of the membrane lining the nostrils, mouth and tongue.

CAUSES.—This disease is supposed to be produced from filthy, sour diet, and drinking from dirty puddle water, infected with putrid, decaying substances, ill-ventilated fowl-house confinement, or a spot of ground tenanted year after year by fowls, without attention to cleanliness, to renovation of the soil, etc. At the same time, let it be borne in mind that the "gapes" is an epidemic disease.

The gapes is supposed by some to be caused by a sort of internal worm infesting the wind-pipe; but though this may have, in some instances, been observed, it is by no means uniformly met with in all the disorders accompanied with gaping.

SYMPTOMS.—The name is sufficiently expressive as to the symptoms of this disease; gaping, coughing, and sneezing, dullness, and inactivity, ruffled feathers, and loss of appetite.

On the dissection of chickens dying

with this disease, it will be found that the wind-pipe contains numerous small red worms about the size of a small cambric needle; on the first glance they would likely be mistaken for blood-vessels. It is supposed that these worms continue to increase in size until the wind-pipe becomes completely filled up, and the chicken suffocated. The disease first shows itself when the chicken is between three and four months old, and not generally after, by causing a sneezing or snuffing through the nostrils, and a frequent scratching of itself at the roots of the bill.

TREATMENT.—The plan formerly adopted, of giving remedies internally to remove the worms, is not a good one, as the medicine has to be absorbed, pass into the blood, and act powerfully upon the body of the fowl, before its purpose can be accomplished; its direct application to the worms is therefore preferable. This is readily secured by stripping the vane from a small quill feather, except half an inch from its extremity; this should then be dipped in spirits of turpentine; and, the chicken being securely held by an assistant, the feather so prepared is passed neatly down through the small opening of the wind-pipe, which is readily seen at the base of the tongue, and giving it one or two turns will generally bring up and destroy the worms. The turpentine at once kills the worms, and its application excites a fit of coughing, during which those that were left by the feather are expelled. This mode of application requires some dexterity, and at times the irritation proves fatal. We therefore suggest the shutting up of the chicken in a box, with some shavings dipped in spirits of turpentine, when the vapor arising from the extended surface produces, in most cases, an equally beneficial result. Creosote, used in the same manner, has been found most extraordinarily efficacious.

PREVENTION.—We know a person, a very large breeder of fowls, who always gives his chickens, at six weeks old, wheat steeped in turpentine. This is given them once in the morning, when fasting, and as a preventive against, instead of waiting for the arrival of, the gapes. Let their first food be coarse corn meal, almost dry; then give cracked corn. As soon as they can swallow whole grains, let them have them unbroken. All poultry-yards, of

course, should be supplied with lime, and the chickens should have free access to pure water. After the gapes appear, the cure is always doubtful; but crushed corn, soaked in very strong alum-water, is also a good remedy.

Or, pills of sulphur, turpentine, and wheat flour.

Or, oil of turpentine, two drachms; linseed oil, one ounce; or oil of turpentine, two drachms, with flour enough to make it into twenty pills. For twenty doses, give every other day three or four pills, allowing three hours to elapse between each dose.

Or, tobacco smoke.

Or, gapes are not caused by lice, but by parasitic worms, which exist in the windpipe. They may be removed by inserting a loop of horse-hair in the throat, and withdrawing it with a twisting motion, which detaches the worms and brings them out. Gapes may be prevented by changing the location of the yards and ranges, and especially by securing a supply of pure water.

POULTRY, Roup.—There are no diseases to which poultry are subject from which we have suffered more than from roup, catarrh, or swelled head, which we consider one and the same disease. The term roup is very indefinite, being applied to very dissimilar disorders of poultry, such as the obstruction of the rump gland, the pip, and gapes, already described, and to almost every sort of catarrh, to which gallinaceous fowls are much subject. But the chief disease to which chickens and fowls are liable, originates in changes of weather and variations of temperature; and when the malady becomes confirmed, with running at the nostrils and other well-known symptoms, they are termed roup.

The word roup is supposed to be a corruption of croup, to which children are subject, and which often proves fatal. It affects fowls of all ages, and is either acute or chronic, beginning sometimes suddenly and sometimes gradually, as the result of neglected cords, stormy weather, or damp lodgings.

SYMPTOMS.—The most prominent symptoms of roup are at first identical with those of severe catarrh; as difficult and noisy breathing, a cough, a kind of rattling in the throat, beginning with what

is termed gapes. There is considerable discharge from the nostril of fetid matter, like the glanders in horses; at first thin and limpid, but soon loses its transparent character, becoming more or less opaque, and of a very peculiar and offensive odor; froth appears in the inner corner of the eye; the lids swell, and in severe cases the eyeball is entirely concealed; the nostrils are closed by the discharge drying around them, and the eyelids are agglutinated together; the diseased secretion accumulating within the sides of the face, frequently swell to an extreme degree, and the bird, unable to see or feed, suffers from great depression, and sinks rapidly.

As secondary symptoms, the appetite is all but gone, except for drink; the crop feels hard to the touch, and the feathers are staring, ruffled, and without a healthy gloss. The fowl sits moping and wasting in corners, always apparently in great pain. In this stage of the disease, it is supposed to be infectious; and whether so or not, it is certainly proper, for cleanliness' sake, if nothing else, to separate the diseased from the healthy ones, to prevent the disorder from spreading through the yard.

As fowls habitually breathe through the nose, the mouth being kept closed, it follows that there is, even in the early stages, some difficulty of breathing, and a distension of the loose skin below the under jaw may be often noticed. The frothy matter appearing at the corner of the eye, results from the same cause; the air, stopped in its passage through the nose, passes up the tear-duct, and produces the appearance of bubbles.

With respect to the communication of this disease, our experiments prove that it is exceedingly contagious. It is, we are inclined to think, frequently communicated by fowls drinking out of the same vessels, as the discharge from the nostrils of the sick bird contaminates the water as it drinks.

TREATMENT.—In general, we should say, kill a roup-y fowl at once, unless it is valuable, as the risk of its contaminating the whole yard is great. At all events, let it be removed from the yard at once. Combined with every remedy, cleanliness is indispensable, as the first, the last, and the best, without which all others are:

vain, and worse than vain, as they may be pernicious by feeding, instead of starving the disease.

Warm, dry lodging, and nutritious food, are the first essentials to recovery; in addition, the frequent removal of the dried discharge from around the eyes and nose, by warm bathing the nostrils with Castile soap-suds as often as necessary, and the swollen eyes with warm milk and water. In the way of internal medicine, we find that nearly equal numbers recover under various modes of treatment. We have tried the following remedies, viz: A pepper-corn in a pill of dough the three following days, the patient being much chilled. Afterward, bathe the swollen parts with camphorated spirits, or brandy and water.

"But facts are better than words," says Boswell, and we have the following case from a Middlesex farmer: A cock, about four or five months old, apparently turned out by some one to die, came astray, and was in the last stage of roup. The discharge from his mouth and nostrils was very considerable, and extremely pungent and fetid, while his eyes appeared to be affected with inflammation, as bad as what surgeons term Egyptian ophthalmia. The roup, it may be stated, was somewhat prevalent at the time, and a very fine cock had perished in a corner hard by, of cold and hunger, from not being able to eat. The roup cock was placed by the fireside, his mouth and nostrils washed with warm water and soap, which made him expectorate and sneeze off a quantity of the offensive obstructing matter. His eyes were washed with warm milk and water, and the head gently rubbed with a dry cloth. As he could not see to eat, he was put into a rabbit-hutch, with a warm bed of hay to squat on. Some hours afterward, his head was again washed, and as there was much intermittent fever, though the cold stage prevailed, a stimulant plan was adopted. Long pellets were formed of barley meal, flour, mustard, and grated ginger, with which he was crammed several times a day, his head bathed, and warmth attended to. He had milk-warm water, sweetened with molasses, to drink, for the purpose of counteracting the too heating qualities of the stimulants. The fireside always seemed to invigorate him; yet he

still breathed with difficulty, and gaped, and had a rattle in his throat. In three days, the stimulants, warmth, and cleanliness, improved him so much, that he began to see a little, and in a week his sight was nearly perfect. A little mustard was still given him in his water, and then some flour of sulphur. He had also a pinch of calomel in some dough. He was gradually brought so as to season him to the cold, and, in a month, was in high health and spirits. Having moulted late, he caught a cold on the first frost, and suffered a relapse, having cough, gaping, ruffled feathers, and aguish shaking; warm lodging, and occasionally a lounge by the fireside, proved a speedy remedy without medicine."

Dr. Bennett, in his "Poultry Book," remarks, "But for roup and all putrid affections, I confidently prescribe the following, and consider it the only true treatment: Take finely pulverized, fresh-burnt charcoal, and new yeast, of each three parts; pulverized sulphur, two parts; flour, one part; water, quantity sufficient; mix well, and make into boluses of the size of a hazel-nut, and give one three times a day. Cleanliness is no less necessary than warmth, and it will sometimes be desirable to bathe the eyes and nostrils with warm milk and water, or suds, as convenient."

Mr. Giles, who is excellent authority, having had more than thirty years' experience with fowls, and being the owner of an extensive collection of fowls, says, "As soon as discovered, if in warm weather, remove the infected ones to some well ventilated apartment, or yard; then give a dessert-spoonful of castor oil; wash their heads with warm Castile soap-suds, and let them remain until the next morning, fasting. Scald for them Indian meal, adding two and a half ounces of Epsom salts for ten hens, or in proportion for a less or larger number; give it warm, and repeat the dose in a day or two, if they do not recover."

POULTRY, Consumption.—Notwithstanding their warm covering of feathers, from their peculiar structure, fowls are exceedingly liable to cold and other catarrhal diseases, exhibiting themselves in the symptoms of hoarseness, snorting and sneezing. It must be considered, also, that fowls are originally natives of a trop-

ical climate; and, though long naturalized, they still retain so much of their original habits as to influence them in this respect. Very wet or very dry weather, or extremes of cold or of heat, are equally fatal; whereas, when the weather is genial and equal, fowls always thrive best. The old poultry, in the meanwhile, frequently bear all changes of weather, without showing any symptoms of roup.

SYMPTOMS.—Consumption, which is caused by the presence of scrofulous tubercles in the lungs, may almost always be induced in chickens by confining them in cold, dark, unhealthy places; we have also found tubercles in other organs of the body. The symptoms of consumption are not strongly marked in the early stages; in the more advanced state there is wasting, cough, and expectoration of matter. They are also affected, more or less, by the circumstances in which they are placed, spending a large portion of their existence in coops and under shelter, so that they are more liable to be affected by exposure.

TREATMENT.—It is fortunate that consumption can always be prevented by wholesome, abundant diet, and good housing, for in advanced stages it is quite incurable; when it is suspected to be commencing, cod-liver oil may be given, mixed with barley meal; but as the disease is hereditary, a fowl so preserved would be worse than useless as a stock-bird. Temperature is the dominant principle, to which attention ought to be paid.

POULTRY, Crop-Bound.—**SYMPTOMS.**

The crop, or membranous dilatation of the gullet, whose office it is to receive food as it is swallowed, and to retain it until sufficiently softened by maceration, is sometimes so overcharged, that it is unable to expel its contents into the stomach. From the emptiness of the latter organ, the bird feels hungry, and by continuing to eat, adds to the mischief, until at last, by the contraction of the crop and the swelling of the grain, a hardened mass is formed, weighing, in some cases, nearly a pound, and by the enormous protuberance it causes, giving evident indications of its presence. Sometimes the disease is occasioned by a single object being swallowed, whose size is too large to permit it to pass into the stomach. In this case

it serves as a nucleus for other matters, and a mass is formed around it. "I have," says Mr. Tegetmeier, "now lying before me a piece of bone, one inch and a half long by three-quarters of an inch broad, which was imbedded in a mass of horse-hair, oat-husk, and other vegetable fibres, the whole forming an egg-shaped solid, two and a half inches in the long and one and a quarter in the short diameter. This caused the death of the Dorking in whose crop it was found."

TREATMENT.—The treatment of this disorder is very simple. With a sharp pen-knife an incision must be made through the skin and upper part of the crop; the impacted mass loosened by some blunt-pointed instrument, and removed. If it has remained many days, and is very offensive, the crop may then be washed out by pouring in some warm water. The incision, if small, may be left; but if large, a stitch or two is advisable. The bird should be fed on soft food a day or two, and will rapidly recover. Sometimes a dessert-spoonful of gin will stimulate the crop sufficiently to overcome the mass, and render the use of the knife unnecessary.

POULTRY, Diarrhœa. — "There are times when fowls dung more loosely than at others, especially when they have been fed on green or soft food; but this may occur without the presence of disease. But should this state deteriorate into a confirmed and continued laxity, immediate attention is required to guard against fatal effects."—*Dr. Bennett.*

SYMPTOMS.—The symptoms of diarrhœa, or looseness, are so evident as to render description hardly necessary. Lassitude, emaciation, and, in very severe cases, voiding of calcareous matter, white, streaked with yellow, resembling the yolk of a stale egg, and sticking to the feathers near the vent. It becomes acrid, from the presence of ammonia, and causes inflammation, which extends speedily through the intestines.

CAUSES.—Diarrhœa is generally produced by a too scanty supply of grain—which necessitates an excess of green food—dampness, undue acidity in the bowels, and unwholesome diet of any description.

TREATMENT.—The treatment is simple, and of course depends upon the cause.

When the disease is brought on by a diet of green or soft food, the diet must be changed, and water given sparingly. Five grains of powdered chalk, the same quantity of rhubarb, and three of cayenne pepper, may be administered; and if the relaxation is not speedily checked, a grain of opium and one of powdered ipecacuanha may be given every four or six hours.

Dr. Bennett recommends, when it arises from undue acidity, chalk mixed with meal; but rice-flour boluses are most to be depended upon."

POULTRY, Feathers, Loss of.—This disease, which is common to confined fowls, is by no means to be confounded with the natural process of moulting. In the annual healthy moult, the fall of the feathers is occasioned by the protrusion of new feathers from the skin. In the diseased state which we now consider, where the feathers fall, no new ones come to replace them, but the fowl is left bald and naked. A sort of roughness appears also on the skin.

The loss of feathers and the wants of poultry in confinement, are clearly shown by a correspondent of the Boston Medical Journal, in the following amusing sketch: "A most pleasing illustration," says he, "was the want of lime, and the effects of its presence, which came under my notice on my voyage from South America to France. We had omitted to procure gravel for our poultry, and in a few days after we were at sea, the poultry began to droop, and wound up their afflictions with the pip, or, as the sailors term it, the scurvy. Their feathers fell from their bodies, and it was perfectly ludicrous to see the numerous unfeathered tribe in the most profound misery, moping away their time in an utter state of nudity. Amusing myself one day by fishing up gulf-weed, which floated in immense fields upon the surface of the ocean, I took from it numerous small crabs, about the size of a pea. The poultry, with one accord, aroused themselves from their torpor, and seemingly, as if by instinct, aware of the therapeutic qualities of these interesting animals, partook of them with greater avidity than any invalid ever swallowed the 'waters of the springs.' After a few hours, the excellence of the remedy was apparent; the cocks began to crow, the

hens to strut and look saucy, and in a few days all appeared in quite a holiday suit of feathers, derived from the lime, the constituent part of the crab-shells."

SYMPTOMS.—A falling off in appetite, moping, and inactivity; the feathers staring and falling off till the naked skin appears.

REMEDY.—This affection is supposed by some to be constitutional rather than local. External remedies, therefore, may not always be sufficient. Stimulants, applied externally, may serve to assist the operation of what medicine may be given. Sulphur may be thus applied, mixed with lard. Cayenne and sulphur, in the proportion of one quarter each, mixed with fresh butter, is good to be given internally, and will act as a powerful alterative. The diet should be changed, and cleanliness and fresh air are indispensable.

POULTRY, Feathers, Eating their.—Eating each other's feathers is a habit which fowls often contract, when confined in yards, but is not, perhaps, fully understood. "It is a morbid appetite," says a writer in the Cultivator, "apparently induced in the outset by the impatience of the fowls under confinement." It is well known that fowls are very fond of blood: and when moulting, the new feathers are what is generally called blood-shot; that is, the ends of the quills, when quite young, have a drop or so of blood, which induces the fowls to pluck for the blood contained in them; and we knew it to be kept up till some individuals of the flock, who were made special victims, were almost entirely denuded of their feathers, and sometimes have even had their entrails torn out.

The best preventives are animal food, such as bones (not burnt), oyster-shells, charcoal, and fresh meat, with clean water and clean apartments. Sometimes a particular fowl shows a more inveterate disposition to eat feathers than the rest of the flock. It is best to kill or remove such.

In a letter read before the British Association, from M. Sace, of Neufchatel, Switzerland, giving an account of some experiments in the feeding of domestic fowls, he informs us that some hens, fed upon barley alone, would not lay well, and that they tore off each other's feathers. He then mixed with the barley some feath-

ers, chopped up, which they ate eagerly, and digested freely. By adding milk to the food, they began to lay, and ceased plucking out each other's feathers. He concludes, that this proceeding arose from the desire of the hens for azote food.

POULTRY, White Comb.—"This disease," say the authors of the "Poultry Book," "makes its first appearance in the form of small white spots on one or both sides of the comb of the cock, which are so thickly clustered together as to be sometimes mistaken for a sprinkling of meal or other white powder. It seems to be of a scorbutic, or leprous nature—a form of disease to which all animals of eastern origin are particularly liable. It is a disease to which the Shanghai is constitutionally subject; although we have heard of its existence in birds exposed to irregular diet and want of cleanliness. The disease should be attacked as soon as it makes its appearance. The consequences of neglect are related in the following communication, with the appropriate remedy:

"The disease is not confined to the combs only, but spreads itself down the neck, both in front and back, and takes off all the feathers as far as it goes, leaving the stumps. I saw a bird very lately, with his neck and breast entirely stripped of feathers, but the stumps all left, so that no hope of their return can be entertained until the time of moulting.

"Now to the remaining question, 'How can it be cured?' By applying cocoa nut oil and turmeric. This simple remedy has been tried with perfect success. No other oil but that of the cocoa nut seems to answer the purpose. The proportions are about a quarter of an ounce of turmeric powder to one ounce of cocoa nut oil. The latter, at an ordinary temperature, is solid, and very much resembles spermaceti; but it easily blends with the turmeric, and forms a yellow ointment. Three or four applications, with a day's interval between each, will usually be found effectual."

M. Tegetmeier suggests the separation of the sick bird, a plain, unstimulating, wholesome diet—say of oatmeal and water, with a supply of green vegetables—and the administration of some alterative medicine: as flour of sulphur ten grains, and calomel one grain, given ev-

ery other night; or a three-grain Plummer's pill might be given instead. The plumage will not often reappear until next moulting time.

POULTRY, Vermin, Lice.—The whole feathered tribe seem to be peculiarly liable to be infected with lice; and there have been instances where fowls have been so covered in this loathsome manner, that the natural color of the feathers has been undistinguishable.

Mascall says, "They get them in scraping abroad among foul straw, or on dung-hills, or when they sit in nests not made clean, or in the hen-house, by their dung lying long there, which corrupts their bodies and breeds lice and fleas."

The presence of vermin is not only annoying to poultry, but materially interferes with their growth, and prevents their fattening. In trifling cases, no particular attention is requisite; but when the cases are bad, the fowls should be removed from the rest.

A writer in the *Cultivator* recommends mixing sulphur with Indian-meal and water, and feed in the proportion of one pound of sulphur to twenty-four fowls, in two parcels, a few days apart. It is said this will completely exterminate the lice, and produce a remarkably healthy and glossy appearance in the fowls. Strew oil-meal about the floor, in the nests, and against the rafters and sides of the buildings. Lining the nests infected with lice with tobacco stems will expel them not only from the nests but from the body of the fowl. Another writer in the same paper says, "Lice may be destroyed by placing lard beneath the wing and on the back of the chicken." Sulphur, thoroughly dusted into the roots of the feathers, and spread over the entire skin, if used twice or thrice at intervals of a few days, is a certain cure. But the best remedy we have ever found is cleanliness in their roosting places and nests, which should be often whitewashed with hot lime-water, and to place plenty of slack-lime, dry ashes and sand, well mixed, where they can roll and bathe, by which means they will soon free themselves of the pests.

Hens, while hatching, are very apt to become infested with lice; so much so that they are often driven from the nest. We have known the eggs covered, and

the nest alive with them. In such cases we would recommend removing the litter and eggs, and cleansing the nest with scalding water. Then line the nest with tobacco stems.

A friend of the author was complaining last spring of the difficulty of keeping his hens on the nest in consequence of the vermin infesting them. We recommended the above, which was adopted with perfect success, and he raised a greater number of chickens than ever before. This year he raised 250, while last year he raised not more than 20 or 30 from the same number of hens.

POULTRY, Rheumatism and Cramp.—

These diseases, though differing in their nature, arise so constantly from the same cause, and are so readily removed by the same treatment, that we have placed them together. A disinclination and inability to move the limbs, evidently not arising from mere weakness or a permanently cramped condition of the toes, are sufficiently characteristic.

CAUSES.—Both disorders are caused by exposure to cold and wet, and the tendency to them may be much counteracted by preventing the fowls, during their chickenhood, from running among wet grass early in the morning.

TREATMENT.—Local applications are perfectly useless. Good food, and a warm, dry habitation, are generally effectual. When chickens are hatched at such times as February and March, it must not be expected that any treatment can counteract perfectly the unnatural circumstances under which they are placed. If exposed, they suffer from cold; and if confined in close rooms, the want of fresh air, natural green and insect food, produce equally unfortunate results.

POULTRY, Eggs, Eating their.—It is well known that hens when kept shut up, are very apt to eat their eggs. The best preventive is to keep them well supplied with lime and gravel, and with fresh meat, in some form.

Another way is to break an egg and dust the contents nicely with fine Cayenne pepper, afterwards turning the egg round so as to get the pepper below the yolk, if possible, and leave the egg in the offender's nest; or, if he catches her in the act of eating an egg, let him drive her away quietly, and place pepper in

the remainder of the egg, endeavoring, as stated before, to get the pepper underneath. He will very soon see her running furiously about with distended beak. If one dose is not sufficient, administer another a little stronger. If fowls are well supplied with lime and gravel rubbish and animal food (fresh meat) in some form, hens will not eat their eggs. Artificial or china eggs should be used as nest eggs.

POULTRY, Stomach, Inflammation of the.—**SYMPTOMS.**—When a fowl mopes and refuses to eat, without any apparent cause, or selects only soft food, rejecting corn or grain, and, gradually pining, becomes excessively thin, inflammation of the stomach may be suspected.

CAUSES.—Overstimulating food, especially peas, hemp-seed, etc., necessarily make a greater call upon the digestive organs than more simple and wholesome diet. The amount of gastric juice must be in proportion to the digestibility of the food; and hence, under the use of peas, corn, hemp-seed, etc., the organ is overworked and stimulated to such an extent as to become inflamed. The secretion of gastric juice then ceases, the food is not digested, and consequently distends the stomach to an enormous degree; so that, although not naturally larger than the finger, we have seen it four or five times the size of the gizzard.

TREATMENT.—The prevention of this disease, by the use of wholesome and natural diet, is easy; the cure in advanced cases very uncertain. The only treatment to be relied on would be the immediate employment of a plain dietary, consisting of cooked soft food, so as to make the least possible call on the digestive organs; and if to this regimen an occasional grain of calomel, at intervals of several days, be added, all is done that can be likely to benefit the patient.

POULTRY, Swelled Head.—See **POULTRY, ROUP.**

POULTRY, Eggs, Color of.—Fowls to which a portion of chalk is given with their food, lay eggs, the shells of which are remarkable for their whiteness. By substituting for chalk a calcareous earth, rich oxide of iron, the shells become of a light cinnamon color.

POULTRY, Megrim.—See **POULTRY, APOPLEXY.**

POULTRY, Bones to Pulverize for.—

Put the bones in a stove and allow them to burn white, when they can be easily pulverized; then mix with corn meal, and feed twice a day.

POULTRY, Wounds of.—

Wounds caused by fighting, or by accidents, should be kept clean, and the parts washed with Venice turpentine.

POULTRY, Ulcers in.—(See **POULTRY, WOUNDS OF.**)**POULTRY, For Market, Killing and**

Preparing.—If you wish to prepare your poultry in the nicest manner for the market, so that it will invariably secure the best price, observe the following rules, viz.: First, fat them well, and allow them to remain in the pens twenty-four hours without food previous to being killed. Then, when you kill them, instead of wringing their necks, cut their heads off at a single blow with a sharp axe or cleaver, and then hang them up by their legs and allow them to bleed freely, and pick them immediately, while warm. Some, however, prefer to run a small pen-knife into the jugular-vein by the side of the neck, just under the joles. In this case, let the heads remain on. In picking, great care should be taken not to tear the skin; the wings should not be cut off, but picked to the end. If the head should be cut off, the skin of the neck should be neatly tied over the end. Most persons like to see the heads of fowls left on; it makes a better show. The heads of ducks and geese should always be cut off. No cut should be made in the breast; all the offal should be taken out behind, and the opening should be made as small as possible.

Some persons send their poultry to market with their intestines in. This, to say the least, is a dirty, slovenly practice, doing great injury to the flesh, as it partakes of the flavor of the excrements when suffered long to remain undressed, and is otherwise impaired from the stagnant blood. After removing the intestines, wipe out the blood with a dry cloth, but no water should be used to cleanse them. With a moist cloth take off the blood that may be found upon the carcass, and hang them in a cool, dry room until ready to carry to market, or otherwise to be used. Do not remove the gizzard from its place; but, if the fowl be

very fat, make a larger hole, turn the leaves out, and fasten them with a small skewer. When prepared in this way, your poultry will be much nicer, and entitled to a better price than when butchered and dressed in the ordinary way.

We have often noticed the careless, slovenly manner, and little attention paid to external appearance of poultry offered for sale in our markets; and we have noticed the quick sale and higher price when due regard was paid to have the skin all sound and clean; the breast not mutilated by a long cut, the shrinking skin exposing the drying meat covered with hay-seed or chaff, but well covered all over with fat, of a rich, golden yellow. Much of the poultry exposed for sale has been through the process of scalding to facilitate picking; this practice should never be resorted to. It turns the rich yellow of the fat into a tallowy hue, and oftentimes starts the skin, so that it peels off unless very carefully handled.

Much care and attention is required after the poultry is dressed and cool. It should be carefully packed in baskets or boxes, and, above all, it should be kept from the frost. A friend who was very nice in these matters, used to bring his turkeys to market in the finest order possible, and always obtained a ready sale and the highest price. His method was to pick them dry, while warm, and dress them in the neatest manner; then take a long, deep, narrow, tight box, with a stick running from end to end of the box, and hang the turkeys by the legs over the stick, which prevents bruising or disfiguring them in the least.

Too much should not be exposed at a time for sale, nor should they be hauled over too often. Appearance is everything with poultry, as well as other articles, and has great influence on the purchaser.

POULTRY, Age of.—Farmers usually sell poultry alive. Poulterers in towns, on the other hand, kill and pluck every sort of fowl for sale, so that the purchaser has it in his power to judge of the carcass; and if he buys an inferior article at a high price it must be his own fault. It is easy to judge of a plucked fowl, whether old or young, by the state of the legs. If a hen's spur is hard, and the scales on the legs rough, she is old, whether you see

her head or not; but the head will corroborate your observation, if the under bill is so stiff that you cannot bend it down, and the comb thick and rough. A young hen has only the rudiments of spurs, the scales on the legs smooth, glossy, and fresh colored, whatever the color may be, the claws tender and short, the under bill soft, and the comb thin and smooth. An old hen turkey has rough scales on the legs, callosities on the soles of the feet, and long, strong claws; a young one, the reverse of all these marks. A young goose or duck is distinguished by the tenderness of the skin under the wings, the strength of the joints of the legs, and the coarseness of the skin.

POULTRY, Canker in.—This disease is indicated by the mouth and throat becoming filled up with a cheesy substance of very offensive odor, which causes in some cases a stoppage of the windpipe, and death by suffocation. It is to be treated successfully as follows: 1. If the fowl is not worth a good deal cut its head off. 2. If worth saving, with a small spoon and pincers, take out all the cheesy matter, and wipe out all the slimy mucus from the mouth, nostrils, and eyes. 3. Prepare a solution of chlorinated soda or chloride of lime. If the chlorinated soda (Labarague's solution) is used, dilute it with one or two parts of water. Wash the head, eyes, nostrils, mouth and throat out thoroughly, using a soft swab with one of these solutions, and in twenty minutes, give the fowl a good feed of chopped meat, mixed with bread soaked in ale or spirits and water, and well sprinkled with Cayenne pepper. Give some solution of iron in the water, and keep up the diet indicated until well. Put the whole flock on a similar diet for a few days, especially those having colds.

POULTRY, Croup.—Try and remove the croup membranes from the mouth with a feather, and then touch the parts with a feather dipped in a solution of nitrate of silver, 10 grains to 1 ounce of rain water. Feed no raw grain, but well boiled oat meal or corn meal will be excellent. Put half an ounce of carbonate of soda in every quart of the water drunk by the chickens, and, if possible, change their roosting-place to a new building. If this last cannot be done, clean the

place thoroughly, and wash it over with a solution at the rate of an ounce of carbolic acid to a quart of water.

POULTRY, Drooping Wings.—This, in either turkeys or chickens, is caused by vermin. To cure it, grease their heads, the under sides of their wings, and their bodies under their wings, with lard or fried meat fat, or any other grease. In a few days their wings will be natural, and their appetite and comfort will return.

POULTRY, Fattening.—The fowls designed for being fattened should be well and liberally fed from the time they are hatched. It is a mistake to suppose that they can be kept low when young, and got up to a great size by liberal feeding when put up to fatten. The fowls so treated are stunted in their growth, the bony frame-work becomes set, and they never afterward attain a large size; whereas with liberal feeding they become fit for the fattening-coop at the age of about four months in summer, and from five to six in winter. It cannot be too strongly impressed upon those who are desirous of obtaining poultry of first-rate quality, that fowls are only in perfection for the table before they have attained their complete development. The cockerels should be put up when "their tails begin to turn"—namely, just when the two long sickle feathers or streamers begin to top the straight feathers of the tail; and the pullets before they have laid. They may be either confined within a small space or placed in a coop, in a warm and rather dark situation, and, of course, under cover. The fowls should be separated from each other by partitions in the coop, and no more space ought to be allowed them than is necessary to make them comfortable, without allowing room for exercise.

The fattening-coops should stand on legs, in order to raise them to a convenient height from the ground, so that the dung may be removed daily; or each may have a shallow drawer underneath, being daily filled with fresh earth—an admirable plan—the fowls being very fond of nestling in dry earth, and earth being a deodorizer and disinfectant, it is most conducive to their health. The most scrupulous cleanliness must be observed in the case of fattening fowls; the troughs.

in front of the coop must be removed when the fowls have ceased eating, the remains of food taken out, and the troughs scalded and laid in the sun to dry daily. Not a particle of food that has become sour should be given to them; indeed, they will eat better if fresh food, and of a different kind, be given to them at each meal. When first put into the coop they should not have any thing placed before them for some hours, till they have recovered from their fright at being caught, and have become accustomed to their new residence. Afterwards they should be fed with much regularity three times each day, giving them at each meal as much as they can eat, but not leaving anything for them to pick up in the intervals.

When first placed in the coop they may be fed twice a day on boiled potatoes, mashed up with coarse oat meal, and moistened with a little new milk. The third meal may be Patna rice, well boiled, with a little milk added. When the fowls are nearly fat, the rice may be given twice a day and the potatoes only once; the rice makes the flesh white and clear. A little vegetable, chopped fine, may occasionally be given to vary the character of the food; the earth in the coop will supply the small stones necessary for their digestion. The first meal should be given early in the morning, the second about mid-day, and the last at dusk, when the other fowls are going to roost.

On this system of feeding a fowl will become perfectly fatted in from two to three or four weeks at the outside. When fat it should be immediately killed; for not only is it unprofitable to keep it any longer, but it deteriorates very rapidly, losing weight and becoming hard and coarse in the flesh. Before being killed the fowls should be kept for fifteen or sixteen hours without food or water. If this precaution is not taken, (and it is unfortunately often neglected,) the food in the crop and intestines ferments. When this is the case in summer, the fowl in a few hours turns green, and is entirely unfit for the table.

POULTRY, Costiveness.—"The existence of this disease," says Dr. Bennett, "will become apparent by observing the unsuccessful attempts of the fowl to

relieve itself. It frequently proceeds from continued feeding of dry diet, without access to green vegetables. Indeed, without the use of these, or some such substitute, as boiled potatoes, costiveness is sure to ensue. The want of a sufficient supply of good water will also produce the disease, on account of that peculiar structure which has already been explained, by which fowls are unable to void their urine except in connection with the feces of solid food, and through the same channel."

REMEDY.—Soaked bread, with warm skim-milk, is a mild remedial agent, and will usually suffice. Boiled carrots, or cabbage, is more efficient. A meal of earth-worms is sometimes advisable, and hot potatoes, mixed with lard, are said to be excellent.

POULTRY, Houses, to Fumigate.—Fumigating poultry houses with sulphur, thrown on glowing coals in an earthen vessel, and keeping the house closed for several hours, is said to be a perfect remedy for insects of all kinds. The poultry must of course be removed before the experiment, and the person using it must guard against being suffocated, and the building from being fired.

POULTRY, Vermin, to Destroy in.—Tobacco smoke, with good food and cleanliness. If infested with lice, damp the skin under the feathers with water, then sprinkle a little sulphur on the skin. If the bird be covered with insects or parasites, they will all disappear in the course of twelve hours.

POTLTRY, Blindness, Remedy for.—Foment with warm water, then drop a few drops of the following solution into the eyes: Laudanum, one teaspoonful; Water, a teaspoonful.

POULTRY, Dry Picking.—The practice of scalding poultry before plucking has very properly been vetoed by the market dealers. Fowls may be plucked with equal facility and with better effect in preserving the flesh immediately after death, and before they have had time to cool. The action of the market men is to be commended, and those sending dressed poultry to market will do well to act in accordance with it.

POULTRY, Rump-Root or Inflammation of the Oil Vessel in.—Open the tumor and squeeze out the oil.

POULTRY, Caponizing.—Caponizing has been practiced but little in this country, the practice being now confined mostly to Pennsylvania and New Jersey. Mr. G. H. Leavitt, an experienced poultry breeder of New York, says that 95 per cent. of the capons raised, are raised in Pennsylvania, and that the same proportion of experiments is successful. In most parts of this country the practice is unknown, even among those who breed fowls for market. Both cockerels and pullets may be caponized, the latter being called in France *poulardes*. The effect of depriving them of reproductive powers is to cause them to fatten more easily, with less food; it increases their size beyond what would otherwise be attained, and makes them more tender and more desirable for the table. So much superior are capons esteemed to be, that it is singular the practice is so limited. The weight is increased one-third, and the meat is much finer and commands one-third more price than other market fowls. Mr. Robert B. Engle, of Masonville, New Jersey, who is qualified to speak from experience, says: "The operation is simple and easily performed. An expert in the business can castrate two hundred in a day, for which we pay four cents each. The capons fatten more readily than cocks, attain greater weight, and their flesh is much more tender and juicy, and is better flavored, and consequently commands a higher price, which in Philadelphia and New York, as compared with other prime chickens, is as 35 cents per pound are to 25 cents in the Philadelphia market. The difference in price ranges from six to ten cents per pound, as to quality. . . . I believe that if all roosters that are to be kept until full grown for market were properly castrated it would enhance their value from 30 to 40 per cent."

Instruments for making capons may be purchased for \$5 per set, and consist of a spring, with which the incision, made by a sharp knife, is kept open during the operation; nippers and hook, with which to remove the covering of the testicles; a tube containing a silk-worm gut, with which the connection of the testicle with the bird is severed, and a spoon for removing the severed parts. The operation may be performed with more simple implements, however; as a sharp pocket-

knife, a pair of forceps, a sharp-pointed hook, a horse-hair, and a teaspoon. The operation is performed in the following manner, as described by those familiar with it: Confine the fowl to a table or board, left side downward, by weights or by straps which will securely fasten the legs and wings, the latter being drawn well over the back, and the legs extended backward, the upper one drawn farthest out. The head and neck should be left free.



FIG. 283.

The position of the confined fowl is denoted in the accompanying cut. Pluck the feathers from a spot an inch and a half in diameter, near the hip joint, and on a line from the hip to the shoulder joint. Draw the skin back, so that when left to itself again it will cover the wound in the flesh and make an incision between the last two ribs, commencing an inch from the back-bone and extending obliquely downward. The incision should be about an inch long, and only deep enough to separate the ribs, not wounding the intestines. The proper location for the incision is indicated by the line through the circle in the cut. The wound is kept open by a spring or otherwise for convenience of subsequent operations. Cut open the membrane covering the intestines, with care, pushing them with the spoon forward toward the breast-bone first, if they are not sufficiently drawn up. The testicles will then be exposed to view. They are connected with the back and sides by cords and covered with a thin

seized with the forceps or nippers, and torn open with the hook, commencing with the lower or left testicle, which is generally nearer the rump than the right one. Then introduce the tube containing the silkworm gut, or the horse-hair, with which to sever the connection of the testicle, using the bowl of the spoon when horse-hair is employed to facilitate the operation, and with a sawing motion sever the chords. A similar process is repeated with the right testicle, and then both, with the blood around the wounds, are to be removed with the bowl of the spoon. The left testicle should first be removed to prevent the blood which may issue from it from covering the right one and rendering the operation more difficult. After the operation the skin must be drawn over the wound and a few stitches taken in it with fine linen thread, after which the fowl may be released.

Caponizing should be performed during a warm spell, and as soon as the sex of the fowls can be discerned, and should be preceded by fasting them twenty-four hours and followed by feeding immediately after the operation, and during twenty-four hours, at least, on soft food. The caponized fowls will eagerly partake of food, and will be restored to health in a few days if the operation has been carefully performed. In making *poulardes* it is sufficient merely to cut across the egg-tube with a sharp knife.

HENS, To Make Lay.—The best food for this purpose, fed each alternate day, is the following: to 3 gallons of boiling water, add $\frac{1}{4}$ ounce of common salt, a teaspoonful of Cayenne pepper, and 4 ounces of lard. Stir the mixture until the pepper has imparted considerable of its strength to the water. Meantime the salt will have dissolved and the lard melted. Then, while yet boiling, stir in meal made of oats and corn, ground together in equal parts, until a stiff mush is formed. Set away to cool down to a milk warmth. Before feeding, taste to see that you have neither an overdose of salt or pepper. In winter, on the days that the above mixture is omitted, give the hens fresh meat, chopped fine, and at all times plenty of pure water, grain, gravel and lime.

HENS, Feeding Nettles to Laying.—The Vienna Agricultural and Forest

Journal states that hens fed in the winter with chopped and boiled nettle leaves, or with the seeds, and kept in a warm place, will continue to lay during the entire winter. The experiment was first suggested by noticing the eagerness with which both domestic and wild fowl devour the nettle leaves and seeds whenever the opportunity is afforded. This proclivity is believed to be the reason why, with the enormous yield of seeds by the nettle, comparatively so few plants are produced. It is stated also that in Denmark the seeds and leaves of the nettle are fed very carefully to horses, after having been collected, dried and ground; three times a week, morning and evening, a handful of this nettle dust is mixed with the oats, in consequence of which the horses are said to become fleshy and sleek, and their hair to grow unusually long, and to assume a silky lustre, remarkably beautiful.

HENS, Setting, How to Prevent.—Put in a trough sufficient water to make a depth of one inch; place the hen therein, and cover the top for about a day. The trough should be deep enough to allow the hen to stand up.

HEN, How to Choose a Good.—A hen should have bright eyes, a pendant comb, yellow or bluish legs, be of middling size, and not over three or four years of age.

HENS' NESTS, Treatment of.—These should be partly filled with wood-ashes, pulverized charcoal, or soot. These being slow conductors of heat, retain the warmth longer than many substances, and thus prevent the eggs from getting chilled during the absence of the hen. They are also an antidote to vermin, and keep the hen otherwise in good health.

HEN HOUSES.—If you wish a hen house that will keep your fowls safe from their foes, winged or four-footed, elevate it on posts two and a half or three feet above the ground, with a hole underneath through the floor, for them to enter. No animal will jump up into it, or owl or hawk find the way into it.

HEN ROOSTS, To Destroy Vermin in. Sprinkle kerosene on the roosts, and the vermin will suddenly disappear. Fumigate the building with sulphur, using four or five pounds, and the next day the premises will be clear.

HENS, How to Make Lay in Winter.

Give a portion of minced meat, mixed with their other food, every day, or as often as convenient, and see that they have a plenty of gravel, old plastering, or powdered egg-shells. The latter may be mixed with their food. Without some substance of this kind, which cannot be obtained when the ground is frozen or covered with snow, there will be nothing to form the shell.

TURKEYS, To Rear.—Choose a quiet hen for a sitter, and give her a quiet place for her nest while sitting. This is important. The usual number of eggs that a hen will cover is from 15 to 18; while sitting the hen should not be disturbed, and should not be taken from the nest after hatching for at least 24 hours, and if she appears contented, allow her to stay longer. The young chicks gain strength very fast by being kept quiet for a day or two at first. It is best to watch the hatching process, and if a chick is not likely to come out strong, the shell may sometimes be broken, and the chick saved. After the hen and her brood is taken from the nest, give her a large, airy coop, where the grass is closely mown off, where the chicks can bask in the sun at pleasure, and a chance to run at pleasure, and the picking up of bugs and insects.

The feed should be mostly curd, made from sour milk heated, and the whey drained off and seasoned with pepper. After a few days, if they are strong enough, they should have the range of the farm for a few hours a day. They should be housed at night, and not let out in the morning till the dew is off the grass. Then by liberal feeding, whenever they come near their roosting quarters, they will be healthy and grow very fast, especially if grasshoppers are plenty, as they are some years in most sections of the country. When it is the time for the fattening seasons, they should then have all the good food they can eat, of a variety such as corn, buckwheat, boiled potatoes, chopped cabbage, etc., and if kept where they can get what they will eat when they want it, they will fatten very fast.

An experienced farmer gives his experience as follows: Let the mother of the new-born brood choose her own time

to leave the nest. Taking off is always bad policy. As soon as the nest is left, make a yard, twelve feet square, by setting boards edgewise. Remove the turkey and her brood into this little pen, wherein they should be kept for at least six days, after which they may be let out in the middle of the day, and permitted the range of an acre; but they must always be gathered at least an hour before sundown into the pens to remain until the dew is off the next morning, and all the day, if there is the least appearance of a storm. The time the mother leaves the nest, wash the naked parts of her body thoroughly with tobacco juice, to kill the inevitable lice; and at the same time dust thoroughly the young with some vermin-destroying powder. No one thing kills as many young turkeys as these parasites. As a preventive, sulphur and snuff, mixed in equal quantities, and dusted on the nest after the turkey has been sitting two weeks, is recommended; but nothing should prevent the washing of the mother, or the dusting of the young, the day the mother leaves the nest, and two days after the young have left the shell. Young turkeys require but little food, but they need to be fed as often as once an hour for the first week. Coarse-ground Indian meal, mixed with sour milk curds, and fine-chopped hard boiled eggs, is the best feed for the first month. After that, the eggs may be left out, the meal ground a little coarser, and the curds, if you have them, used in larger measure than at the first. As soon as they can swallow whole grain, give them that, and then all trouble in this direction is at an end. Until they are two months old, they must be driven to some shelter every night, and never be allowed to remain in the fields through a long and heavy rain. Even when one-quarter grown, they will die from exhaustion, trying to follow the vigorous and unreasoning mother, if wet with but a very heavy dew. Three rules, then, must be observed, if those who attempt to raise turkeys would secure success: First—Be sure to free both old and young from lice immediately upon the old ones leaving the nest. Second—Feed frequently at the beginning with strengthening food. Third—Never let the young turkeys get wet, either with dew or rain, until their feathers afford

their bodies, if not complete, at least partial protection.

TURKEYS, Charcoal for.—A recent experiment has been tried in feeding charcoal for fattening turkeys. Two lots of four each were treated alike, except for one lot finely pulverized coal was mixed with mashed potatoes and meal, on which they were fed, and broken pieces of coal also plentifully supplied. The difference in weight was one and a half pounds each in favor of the fowls supplied with coal, and the flesh was superior in tenderness and flavor. This suggestion is well worth a fair trial from those engaged in turkey-raising.

TURKEY CHICKS, Paste for Weak.—Eggs boiled hard, nettles, and parsley, all chopped up, and moistened with wine and water.

TURKEY CHICKS, Chill in.—Give ground malt and barley meal in equal quantities, adding a little powdered caraway or coriander seed.

CHICKENS, Management of.—After emerging from the shell, the young chicken should not be removed from under the hen. They are at first weakly and wet, but in a few hours they become perfectly dry, and they should be allowed to remain under the hen until their little quaint heads peep from under the feathers. Many persons imagine that the chickens require feeding as soon as hatched, which is an error. At the time of hatching, the remains of the yolk are drawn into the digestive canal of the chick, and this is its first food. This will last them from twenty-four to thirty-six hours, and then the chicks are strong and active on the legs, and ready to eat with avidity. As regards the first food for the chicks, nothing approaches in value to a mixture of equal parts of grated bread, yolk of hard boiled eggs, and oatmeal slightly moistened with water. This is the best food for the first two weeks, then gradually add groats, hemp seed and green food, such as cress, lettuce, cabbage, and leeks chopped fine. If the weather is cold and wet, add a little powdered pimento to the food occasionally, also a little finely-cut mince meat, as a substitute for worms and insects, fresh curd and hard-boiled eggs, mashed up with the shells. Feed the chickens early in the morning, and often during the day, giving but a small

quantity at a time; the water vessels should be shallow, and frequently refilled, and so arranged that the chickens cannot get into them. Throw the food on the ground to the chickens, they will then pick up gravel with it, which is necessary for the digestion of their food. Both hen and chickens must be carefully and warmly housed at night, and never allowed out until the dew is quite off the grass.

Chickens, Mites, Remedy for.—Take common leaf tobacco, as much as the user may think necessary, and make a strong tea, letting it boil some time so as to get all the strength from the tobacco; then sprinkle the tea all over and about the place where the mites are, and if the first application is not sufficient, use in the same manner a second time; but the first time is almost always effectual.

CHICKEN CHOLERA, Remedy for.—Good rules for success in the management of fowls:

1. Good dry houses, well ventilated, but avoiding drafts.
2. Keep your hen houses clean and the floor covered with ashes.
3. Whitewash inside monthly from March 1 to October 1.
4. Feed regularly, but never over-feed; cease feeding when the fowls cease to run for it.
5. Scatter the food on the ground when the weather will permit.
6. Feed mixed grain, or alternate, as corn one day, oats next, wheat next, etc.
7. Allow adult fowls freedom as early in the morning as they desire.
8. Keep hens with chicks in small coops (well covered and dry), until the chicks are three weeks old.
9. Feed chicks morning, noon and late afternoon; cooked food morning, and grain, as broken corn, wheat, etc., noon and afternoon.
10. Mix ground black pepper with the morning food for chicks twice a week, one tablespoonful of pepper for every 20 chicks.
11. Grease the hen well under the wings, breast, and fluff feathers as soon as the chicks are taken off, with ointment made of lard and carbolic acid; ten drops of acid to two tablespoonsful of lard.

CHICKENS, Cats Catching.—When a cat is caught in the act of catching chickens you can cure her effectually by tying one around her neck, and making her wear it for two or three days. She will never again touch a chicken.

CHICKEN CHOLERA, to Cure.—The following is a good cure:

Take of Alum	2 ounces.
Resin	2 "
Copperas	2 "
Lac Sulphur	2 "
Cayenne Pepper	2 "

Pulverize, then mix three table-spoonfulls of the powder with one quart corn meal, and dampen for use.

This quantity is sufficient for twelve fowls, and may be used either as a preventive or cure. For the first it should be given once or twice a week.

DUCKS, Convulsions.—Give to grown-up ducks four grains of pepper, mixed with fresh butter.

DUCKS, to Fatten.—Give them oats, meal and barley. This feed puts on flesh rapidly. Shut your ducks up in a good coop, with no run-way. They must have no exercise, for that gives health, not fat. Feed them with bran, oats, oat-meal or barley-meal, cooked; put in a shallow vessel; give gravel water, cabbage leaves or a sod of grass. Some feed Indian meal, and proceed with the cramming process; but this is unnecessary, as young ducks will eat all the food put before them, and in that way cram themselves without assistance. Let whatever food you give them be cooked and fed warm.

EGGS, Soft-Shell.—This is caused from deficient supply of lime and an excess of soft and animal food. Give with the feed more plaster, pounded oyster shells, gravel, rubbish, etc.

EGGS, Brooded, Cooling off.—An inquiry is made of the German *Poultry Journal* whether eggs brooded upon and allowed to become cold can be hatched; in reply to which it is stated that, from extensive observation, it has been shown that eggs which have remained cold for two days or more may even then be successfully brooded, and that the nearer to the period of the escape of the young, the longer may this cooling last. It is, however, necessary that at least half of the brooding period be passed, as, if eggs are left too long in the first half of the period, especially if this is repeated many

times, the embryo will, in almost every instance, die. In the second half of the period the chick is already so far formed that a prolonged cooling is not especially injurious to it. It is also established that eggs thus cooled require a longer time than usual to come to maturity.

EGGS, to Choose for Hatching.—In our experience we have found that we had the best success by using eggs of a fair average size, any unusually large or small ones being rejected. Some hens lay very large eggs and others very small ones. A fat hen will in nearly all cases be found to lay small eggs, which will produce small and weakly chickens.

Absolute size in eggs is, therefore, of but little importance. Round short eggs are usually the best to select. It is said that very large eggs, especially if much pointed at the small end, are sure to breed birds with awkwardness in style of carriage. Rough-shelled eggs should not be chosen, as they usually show some derangement of the organs, and are often sterile. Smooth-shelled eggs alone are proper for hatching. Those who have been close observers of the fact claim that it is a farce to suppose that the sex of the bird can be determined by the shape of the egg.

EGGS, Sex of.—We have heard some parties say that eggs containing the germs of males can be told by having wrinkles on the points or smaller ends, while female eggs are perfectly smooth at both ends.

GUINEA FOWLS.—The best way to raise and keep this fowl is to procure some eggs of a good stock, hatch them under a small variety of fowl, such as game fowl or bantams; when the chick appears, keep them under cover where they can have plenty of air and dry gravel; feed them frequently—at least once in every three hours. Begin by giving them eggs and milk made into rather a dry custard; toward the end of the first month add to the food a little oat-meal mixed with milk, and as they grow older give them boiled vegetables, small wheat and potatoes.

GEESE, to Manage.—The goose lays from ten to twenty eggs before sitting, and when she is well fed and attended to she will lay and hatch three times in a year. She begins to lay early in March,

and even toward the end of February. The period of laying may be perceived in the circumstance that the goose at that time carries about straws in its bill, prompted by the development of the maternal instinct to prepare a nest. When this practice is observed it will be found prudent to confine the bird, providing her with a nest for laying and hatching in, which should be made of straw lined with hay, and so formed that the eggs will not readily fall out, especially when the bird turns them. Fifteen eggs will be sufficient to place under even a large bird. The period of incubation is a month, but some of the goslings may be hatched a day or two before this time; it is desirable, however, that all the young birds be hatched about the same time, and to this end as much care as is practicable should be taken to have all the eggs equally fresh. When the brood are hatched they ought to be turned out into a sunny place, sheltered alike from cold winds and bad weather; but it is not only unnecessary, but prejudicial, to feed them for twelve hours or so. Their earliest food ought to be bread soaked in milk, curds, porridge, boiled greens, boiled potatoes mixed with bran; and such food ought to be given them at a moderate temperature, so as to avoid the entrance of heat or cold, and for a couple of days at least after being hatched the goslings ought not to be allowed access to cold water, which often gives them cramp.

As a general rule, geese ought to be confined as little as possible. If they are allowed to run about the fields, ditches and streams of water, they will forage for themselves very successfully. Grass and water are essential to their comfort and well-being, such grass especially as may be found on damp and swampy soil, and which, however rank or coarse it may be, is well adapted to them. In harvest time the stubble fields are an excellent pasturage for them; they can there pick up no small supply of corn, and which would otherwise be lost, and they obtain abundance of young grass and other herbage. The advantages of a stubble field, however, are not always to be had, but where this occurs the kitchen garden may be made available. In autumn the geese

may be turned into it without the danger of their doing any serious damage; but they ought to be fed occasionally on boiled potatoes, bruised up with bran, or the result of their foraging for themselves will not be productive of any advantage.

Goslings in June and July will fatten without any food beyond what they can gather for themselves in the stubble fields; but if it be necessary to hasten the process they must be supplied with additional nutriment for that purpose, such as potatoes and turnips bruised with meal, and they should thus be fed once a day. There are various methods of fattening geese, but the simplest and best is nutritive food, and in abundance.

GEESE, Diseases of.—"Prevention is better than cure;" so says the proverb. Colds and fogs are extremely against geese; therefore, when young, care should be taken not to let them out but in fair weather, when they can go to their food without a leader.

They are particularly subject to two diseases; the first a looseness, or diarrhoea, for which Main recommends hot wine, in which the parings of quinces, acorns, or juniper berries are boiled. The second is like a giddiness, which makes them turn round for some time; they then fall down and die, if they are not relieved in time. The remedy recommended by Main, is to bleed the bird with a pin or needle, piercing a very prominent vein situated under the skin which separates the claws.

Another scourge to goslings are little insects which get into their ears and nostrils, which fatigue and exhaust them; they then walk with their wings hanging down, and shaking their head. The relief proposed is to give them, on their return from the fields, some corn at the bottom of a vessel filled with clear water; in order to eat it, they are obliged to plunge their heads in the water, which compels the insects to fly and leave their prey.

GEESE, Glanders, Roup and Gargle in.—A saturated solution of common salt; medium dose, half a teaspoonful. Antimonial powder, one grain, with sopped bread, twice a day.

DOGS AND THEIR DISEASES.

DOGS, Distemper in.—If the animal is a watch dog (such are usually confined in the daytime), the person who is in the daily habit of feeding him will first observe a loss of appetite; the animal will appear dull and lazy; shortly after, there is a watery discharge from the eyes and nose, resembling that which accompanies catarrh. As the disease advances, general debility supervenes, accompanied with a weakness of the hind extremities. The secretions are morbid; for example, some are constipated, and pass high-colored urine; others are suddenly attacked with diarrhoea, scanty urine, and vomiting. Fits are not uncommon during the progress of the disease.

If the animal is supposed to have eaten any improper food, we commence the treatment by giving an emetic:

Powdered Lobelia, (herb,).....1 teaspoonful.
Warm Water.....1 wine-glass.
Mix, and administer at a dose.

(A tablespoonful of common salt and water will generally vomit a dog.)

If this dose does not provoke emesis, it should not be repeated, for it may act as a relaxant, and carry the morbid accumulations off by the alimentary canal. If the bowels are constipated, use injections of soap-suds. If the symptoms are complicated, the following medicines must be prepared:

Powdered Mandrake.....1 tablespoonful.
Powdered Sulphur.....1 teaspoonful.
Powdered Charcoal.....2 teaspoonfuls.
Powdered Marshmallows.....1 tablespoonful.
Mix.

Divide the mass into six parts, and administer one in honey, night and morning, for the first day; after which, a single powder, daily, will suffice. The diet to consist of mush, together with a drink of thin arrowroot. If, however, the animal be in a state of plethora, very little food should be given him.

If the strength fails, support it with beef tea. Should a diarrhoea attend the

malady, give an occasional drink of hard-hack tea.

DOGS, Fits.—Dogs are subject to epileptic fits, which are often attended with convulsions. They attack dogs of all ages, and under every variety of management. Dogs that are apparently healthy are often suddenly attacked. The nervous system of the dog is very susceptible to external agents; hence whatever raises any strong passion in them often produces fits. Pointers and setters have often been known to suffer an attack during the excitement of the chase. Fear will also produce fits; and bitches, while suckling, if burdened with a number of pups, and not having a sufficiency of nutriment to support the lacteal secretion, often die in convulsive fits. Young puppies, while teething, are subject to fits: simply scarifying their gums will generally give temporary relief. Lastly, fits may be hereditary, or they may be caused by derangement of the stomach. In all cases of fits, it is very necessary, in order to treat them with success, that we endeavor, as far as possible, to ascertain the causes, and remove them as far as lies in our power: this accomplished, the cure is much easier.

Whenever the attack is sudden and violent, and the animal is in good flesh, plunge him into a tub of warm water, and give an injection of the same, to which a teaspoonful of salt may be added. It is very difficult, in fact improper, to give medicine during the fit; but as soon as it is over give

Manna.....1 teaspoonful.
Common Salt.....half a teaspoonful.
Add a small quantity of water, and give it at a dose.

ANOTHER.—Make an infusion of mullein leaves, and give to the amount of a wine-glass every four hours. With a view of preventing a recurrence of fits, keep the animal on a vegetable diet. If the bowels are constipated, give thirty grains of extract of butternut, or, if that

cannot be readily procured, substitute an infusion of senna and manna, to which a few caraways may be added.

If the nervous system is deranged, which may be known by the irritability attending it, then give a teaspoonful of the powdered nervine (lady's slipper). The diet must consist of boiled articles, and the animal must be allowed to take exercise.

DOGS, Worms.—Worms may proceed from various causes; but they are seldom found in healthy dogs. One of the principal causes is debility in the digestive organs.

INDICATIONS OF CURE.—To tone up the stomach and other organs—by which means the food is prevented from running into fermentation—and administer vermifuges. The following are good examples:

Oil of Wormseed.....1 teaspoonful.
Powdered Assatoetida.....30 grains.

To be given every morning, fasting. Two doses will generally suffice.

Another—
Powdered Mandrake.....½ tablespoonful.
“ Virginia Snakeroot ...1 teaspoonful.

Divide into four doses, and give one every night in honey.

Another—
Make an infusion of the sweet fern, *camptocoma splenifolia*,) and give an occasional drink, followed by an injection of the same.

Another—
Powdered Golden Seal.... ½ tablespoonful.
Common Brown Soap.....1 ounce.

Rub them well together in a mortar, and form the mass into pills about the size of a hazle-nut, and give one every night.

DOGS, Mange.—This disease is too well known to need any description. The following are deemed the best cures:

EXTERNAL APPLICATION FOR MANGE.
Powdered Charcoal.....½ tablespoonful.
“ Sulphur.....1 ounce.

Soft Soap sufficient to form an ointment.

To be applied externally for three successive days; at the end of which time, the animal is to be washed with castile soap and warm water, and afterwards wiped dry.

The internal remedies consist of equal parts of sulphur and cream of tartar, half a teaspoonful of which may be given daily, in honey.

When the disease becomes obstinate, and large, scabby eruptions appear on various parts of the body, take

Pyroligneous Acid.....2 ounces.
Water.....1 pint.

Wash the parts daily, and keep the animal on a light diet.

DOGS, Ear, Internal Abscess of the.

In this complaint, the affected side is generally turned downwards, and the dog is continually shaking his head.

In the early stages, foment the part twice a day with an infusion of marsh-mallows. As soon as the abscess breaks, wash with an infusion of raspberry leaves, and if a watery discharge continues, wash with an infusion of white-oak bark.

DOGS, Ear, Ulceration of the.—External ulcerations should be washed twice a day with

Pyroligneous Acid.....2 ounces.
Water.....8 “

Mix. As soon as the ulcerations assume a healthy appearance touch them with Turlington's balsam or tincture of gum catechu.

DOGS, Bowels, Inflammation of the.

Whenever inflammation of the bowels makes its appearance it is a sure sign that there is a loss of equilibrium in the circulation; and this disturbance may arise from a collapse of the external surface, or from irritation produced by hardened excrement on the mucous membrane of the intestines. An attack is recognized by acute pain in the abdominal region. The dog gives signs of suffering when moved, and the bowels are generally constipated.

Endeavor to equalize the circulation by putting the animal into a warm bath, where he should remain about five minutes. When taken out, the surface must be rubbed dry. Then give the following injection:

Linseed Oil.....4 ounces.
Warm Water.....1 gill.
Mix.

To allay the irritation or the bowels, give the following:

Powdered Pleurisy Root.....1 teaspoonful.
“ Marshmallow Root...1 tablespoonful.

Mix and divide into three parts; one to be given every four hours.

Should vomiting be a predominant symptom, a small quantity of saleratus, dissolved in spearmint tea, may be given.

Should not this treatment give relief, make a fomentation of hops and apply it to the belly; and give half an ounce of manna. The only articles of food and drink should consist of barley gruel and mush. If, however, the dog betrays great heat, thirst, panting and restlessness, a small quantity of cream tartar may be added to the barley gruel. The bath and clysters may be repeated, if necessary.

DOGS, Asthma in.—Dogs that are shut up in damp cellars, and deprived of pure air and exercise, are frequently attacked with asthma. Old dogs are more liable to asthma than young ones.

TREATMENT.—Endeavor to ascertain the cause, and remove it. Let the animal take exercise in the open air. The diet to consist of cooked vegetables; a small quantity of boiled meat may be allowed; raw meat should not be given.

Powdered bloodroot.....1 teaspoonful.
 “ lobelia.....“
 “ marshmallows.....1 “
 “ licorice.....1 “

Mix. Divide into twelve parts, and give one night and morning. If they produce retching, reduce the quantity of lobelia. The object is not to vomit, but to induce a state of nausea or relaxation.

DOGS, Piles in.—Piles are generally brought on by confinement, over-feeding, etc., and show themselves by a red, sore, and protruded rectum. Dogs subject to constipation are most likely to be attacked.

TREATMENT.—Give the animal half a teaspoonful of sulphur for two or three mornings, and wash the parts with an infusion of white oak bark. If they are very painful, wash two or three times a day with an infusion of hops, and keep the animal on a light diet.

DOGS, Dropsy in.—Dropsy is generally preceded by loss of appetite, cough, diminution of natural discharge of urine, and costiveness. The abdomen shortly afterward begins to enlarge.

TREATMENT.—It is sometimes necessary to evacuate the fluid by puncturing the abdomen; but this will seldom avail much, unless the general health is improved, and the suppressed secretions restored. The following is the best remedy we know of:

Powdered flagroot..... $\frac{1}{4}$ ounce.
 “ male fern..... $\frac{1}{4}$ “
 Scraped horseradish.....1 teaspoonful.

Mix. Divide into eight parts, and give one night and morning. Good nutritious diet must be allowed.

DOGS, Sore Throat in.—A strong decoction of mullein leaves applied to a sore throat will seldom fail in curing it.

DOGS, Sore Ears in.—A dog's ears may become sore and scabby from being torn or otherwise injured. In such cases they should be anointed with marshmallow ointment.

DOGS, Sore Feet in.—If the feet be-

come sore from any disease between the claws, apply a poultice composed of equal parts of marshmallows and charcoal; after which the following wash will complete the cure:

Pyroligneous acid.....1 ounce.
 Water.....6 “

Mix, and wash with a sponge twice a day.

DOGS, Wounds in.—Turlington's Balsam is the best application for wounds. Should a dog be bitten by one that is mad, give him a teaspoonful of lobelia in warm water, and bind some of the same article on the wound.

DOGS, Sprains in.—For sprains of any part of the muscular structure, use one of the following prescriptions:

Oil of wormwood.....1 ounce.
 Tincture of lobelia.....2 “
 Infusion of hops.....1 quart.
Mix. Bathe the part twice a day.

Another—
 Wormwood.....1 handful.
 Thoroughwort.....1 “
 New England rum.....1 quart.

Set them in a warm place for a few hours, then bathe the part with the liquid, and bind some of the herb on the part if practicable.

DOGS, Scalds in.—If a dog be accidentally scalded, apply, with as little delay as possible,

Lime water.....equal parts.
 Linseed oil.....“

DOGS, Ophthalmia in.—Ophthalmia is supposed to be contagious; yet a mild form may result from external injury, as blows, bruises, or extraneous bodies introduced under the eyelid. The eye is such a delicate and tender organ that the smallest particle of any foreign body lodging on its surface will cause great pain and swelling.

TREATMENT.—Take a teaspoonful of finely-pulverized marshmallow root, add sufficient hot water to make a thin mucilage, and with this wash the eye frequently. Keep the animal in a dark place on a light diet; and if the eyes are very red and tender, give a pill composed of twenty-nine grains extract of butternut and ten grains cream of tartar.

If a purulent discharge sets in, bathe the eye with infusion of camomile or red rose leaves, and give the following:

Powdered pleurisy root.....equal parts.
 “ bloodroot.....“
 “ sulphur.....“

Dose, half a tablespoonful daily. To be given in honey. When the eyelids adhere together, wash with warm milk.

DOGS, Weak Eyes in. — It often happens that after an acute attack the eyes are left in a weak state, when there is a copious secretion of fluid continually running from them. In such cases the eyes may be washed, night and morning, with pure cold water, and the general health must be improved. For the latter purpose, the following preparation is recommended:

Manna 1 ounce.
Powdered gentian 1 teaspoonful.
“ mandrake ½ “

Rub them together in a mortar, and give a pill, about the size of a hazel-nut, every night. If the manna is dry, a little honey will be necessary to amalgamate the mass.

DOGS, Fleas and Vermin in. — Fleas and vermin are very troublesome to dogs; yet they may easily be got rid of by bathing the dog with an infusion of lobelia for two successive mornings, and afterward washing with water and castile soap.

DOGS, Hydrophobia in. — Whenever one is bitten by another, and the latter is supposed to labor under this dreadful malady, immediate steps should be taken to arrest it; for a dog once bitten by another, whatever may be the stage or intensity of the disease, is never safe. The disease may appear in a few days; in some instances it is prolonged for eight months.

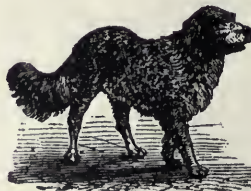
SYMPTOMS. — Mr. Lawson tells us that “the first symptom appears to be a slight failure of the appetite, and a disposition to quarrel with other dogs. A total loss of appetite generally succeeds. A mad dog will not cry out on being struck, or show any sign of fear on being threatened. In the height of the disorder, he will bite all other dogs, animals or men. When

not provoked, he usually attacks only such as come in his way; but, having no fear, it is very dangerous to strike or provoke him. The eyes of mad dogs do not look red or fierce, but dull, and have a peculiar appearance not easy to describe. Mad dogs seldom bark, but occasionally utter a most dismal and plaintive howl, expressive of extreme distress, and which they who have once heard can never forget. They do not froth at the mouth, but their lips and tongue appear dry and foul, or slimy. They cannot swallow water.” Mr. Lawson, and, indeed, many veterinary practitioners, have come to the conclusion that all remedies are fallacious.

TREATMENT. — Let the suspected dog be confined by himself, so that he cannot do injury. Then take two ounces of lobelia, and once ounce of sulphur, place them in a common wash tub, and add several gallons of boiling water. As soon as it is sufficiently cool, plunge the dog into it, and let him remain in it several minutes. Then give an infusion of either of the following articles: Yellow broom, plantain, or Greek valerian, one ounce of herb to a pint of water. An occasional teaspoonful of the powdered plantain may be allowed with the food, which must be entirely vegetable. If the dog has been bitten, wash the part with a strong infusion of lobelia, and bind some of the herb on the part. The treatment should be continued for several days, or until the animal recovers, and all danger is past.

DOGS, Bladder, Inflammation of the.
— See DOGS INFLAMMATION OF THE BOWELS.

DOGS, Mad. — See DOGS, HYDROPHOBIA IN.



Curing, Storing and Preserving.

APPLES, to Keep.—The following is a good plan: The apples should be placed in glazed earthen vessels, each containing about a gallon, and surrounding the fruit with paper. The vessels being perfect cylinders, about a foot each in height, stand very conveniently upon each other, and thus present the means of preserving a large quantity of fruit in a very small room. If the space between the top of one vessel and the base of another be filled with cement, composed of two parts of the curd of skimmed milk and one of lime, by which the air will be excluded, the latter kind of apples will be preserved with little change in their appearance from October to March. A dry and cold place in which there is little change of temperature is the best.

APPLES, to Dry.—The most general method adopted in drying apples is, after they are pared, to cut them in slices, and spread them on cloths, tables or boards, and then dry them out-doors. In clear and dry weather this is, perhaps, the most expeditious and best way; but in cloudy and stormy weather this way is attended with much inconvenience, and sometimes loss, in consequence of the apples rotting before they dry. To some extent they may be dried in this way in the house, though this is attended with much inconvenience. The best method that we have ever used to dry apples is to use frames. These combine the most advantages with the least inconvenience of any way, and can be used with equal advantage either in drying in the house or out in the sun. In pleasant weather, the frames can be set out-doors against the side of the building, or any other support, and at night, or in cloudy and stormy days, they can be brought into the house, and set against the side of the room near the stove or fire-place. Frames are made in the fol-

lowing manner: Two strips of board, 7 feet long, 2 or $2\frac{1}{2}$ inches wide—two strips 3 feet long, $1\frac{1}{2}$ inches wide, the whole $\frac{3}{4}$ of an inch thick—nail the short strips across the ends of the long ones, and it makes a frame 7 by 3 feet, which is a convenient size for all purposes. On one of the long strips nails are driven 3 inches apart, extending from the top to the bottom. After the apples are pared they are quartered and cored, and with a needle and twine, or stout thread strung into lengths long enough to reach twice across the frame; the ends of the twine are then tied together, and the strings hung on the nails across the frame. The apples will soon dry so that the strings can be doubled on the nails, and fresh ones put on or the whole of them removed, and others put in their place. As fast as the apples become sufficiently dry, they can be taken from the strings, and the same strings used to dry more on. If large apples are used to dry, they can be cut in smaller pieces. Pears and quinces, and other fruits that can be strung, may be dried in this way.

APPLES, to Pack in Barrels.—When the farmers find out that the manner of packing apples in barrels greatly influences the price of the same, they will take more care than they usually do. A neatly packed barrel will bring from one to two dollars more than one that the apples are thrown in without any effort to make a good show. When you begin to pack the barrel turn it upside down, the head resting on the ground or floor, then take the bottom out, leaving the head in. Then choose about a peck of your prettiest and finest apples: wipe them clean, being certain that there are no spots on them, or in any other manner disfigured; then place them in the barrel with their stems down, first placing them around the

rim of the barrel, entirely round the same, after which make another ring, until the whole is covered. Then throw in your apples, and when your barrel is full, press them down and put in the bottom, after which turn them head upwards. When the barrel is opened from the top, your apples will be found in good condition, even and nicely packed.

APPLE BUTTER.—Select two bushels of sour apples, and peel, core and quarter them. Take a barrel of good, sweet apple cider, and boil it in a copper kettle until all the impurities have risen to the surface. After this is done, and the impurities skimmed off, take out two-thirds of the cider. Then put in the apples, and as the quantity boils down put in the rest of the cider. After putting in the apples the butter must be stirred without interruption until it is taken off. It will take about five hours boiling after the apples are put into the cider. It should be boiled until the whole mass becomes smooth and of the same consistency, and of a dark brown color. Spice with ground cloves and cinnamon to taste. The butter can then be taken off and put into vessels for use. Earthen crocks are best for this purpose. Tie the vessels over with heavy paper and set them away in a dry place. The butter will keep a year if wanted.

BEANS, To Keep Fresh for Winter.—Procure a wide-mouthed stone jar, lay on the bottom of it some freshly-pulled French beans, and over them put a layer of salt; fill the jar up in this manner with alternate layers of beans and salt. The beans need not all be put in at the same time, but they are better if the salt be put on while they are quite fresh. They will keep good all through the winter. When going to use them, steep for some hours in fresh cold water.

BEANS, String, Dried.—Dried string beans are very excellent in winter. Cut the beans up in the usual lengths, dry them, put them in a bag. In winter, soak them and cook them in the usual way.

BEEF, Pickled.—Rub each piece of beef very lightly with salt; let them lie singly on a tray or board for twenty-four hours, then wipe them very dry. Pack them closely in a tub, taking care that it is perfectly sweet and clean. Have the

pickle ready, made thus: Boil four gallons of soft water with ten pounds of coarse salt, four ounces of saltpetre, and two pounds of coarse brown sugar; let it boil fifteen minutes, and skim it while boiling very clean. When perfectly cold pour it on the beef, laying a weight on the top to keep the meat under the pickle. This quantity is sufficient for 100 pounds of beef if closely packed.

BUTTER, To Preserve.—1. The best method to preserve butter from the air is to fill the pot to within an inch of the top, and to lay on it common coarse-grained salt, to the depth of one-half an inch or three-quarters of an inch, then to cover the pot up with any flat article that may be convenient. The salt by long keeping will run to brine, and form a layer on the top of the butter, which will effectually keep out the air, and may at any time be very easily removed by turning the pot on one side.

2. Fresh butter, sixteen pounds; salt, one pound.

3. Fresh butter, eighteen pounds; salt, one pound; saltpetre, one and one-fourth ounces; honey or fine brown sugar, two ounces.

APPLE BUTTER, Pennsylvania, to Make.—Let three bushels of fair sweet apples be pared, quartered, and the cores removed. Meanwhile let two barrels of new cider be boiled down to one-half. When this is done, commit the prepared apples to the cider, and let the boiling go on briskly and systematically, stirring the contents without cessation, that they do not become attached to the side of the kettle and be burned. Let the stirring go on till the amalgamated cider and apples become as thick as hasty-pudding, then throw in pulverized allspice, when it may be considered as finished, and committed to pots for future use.

BUTTER, Packing and Preserving.—Packing butter that is gathered up at country stores is a nice operation, and needs to be carefully performed. As it is of all shades of color, from white to pale yellow generally, a coloring may be prepared by melting some of the butter and dissolving in it the prepared annatto, which may be procured at any drug store. This should be kept for use as it is wanted. To use it, take a quantity of the butter to be colored in the

mixing-bowl, cut it into gashes with the butter ladle (don't touch it with the hands), place a small portion of the coloring preparation in each of these gashes, and mix until the color is evenly spread and no streaks are to be seen. Then gash it once more with the ladle, sprinkle one ounce of salt to the pound of butter, and leave it twenty-four hours. Then pour off any water collected on it, and pack it in a new oak tub that has been soaked with brine for a day and night. Water should never be used for working butter at any time.

BIRDS, To Preserve.—Birds may be preserved in a fresh state for some time by removing the intestines, wiping the inside out quite dry with a towel, and then flouring them. A piece of blotting paper, on which one or two drops of creosote have been placed, is now to be put inside them, and a similarly prepared piece of paper tied around them. They should then be hung up in a cool dry place, and will be found to keep much longer than without undergoing this process.

CABBAGE, To Keep.—Gather them before the severe fall frosts. Let the coarse outside leaves remain on them. Fix a strong string around the stalk, and suspend the cabbage from the timbers of the ceiling, heads downward. The cellar should be cool and dry. This will preserve them with a certainty.

Another good method is to cut the cabbage from the stump, pack close in a cask, taking care to fill up all the vacancies with dry chaff, or bran, and keep in a dry cellar.

CAULIFLOWER, To Keep.—They can be kept in a cellar by covering the roots and stalks with earth, till February. Or they may be placed in a trench in the garden, roots down, and covered with earth, up close to the heads; and then cover with hay, or straw, four or five inches thick, placing just enough soil on the straw to keep it in its position. This method does well in the latitude of New York; but in colder climates a thicker covering would be required.

CELERY, To Keep.—This may be kept in good condition through the winter in a cool, dry cellar, by having it set in earth. When a small quantity only is wanted, take a box and stand the celery up

in it, placing a little earth about the roots. The farmers who raise quantities of it often keep it in their old hot-beds, standing it up, and protecting it from frost. There is no vegetable more relished than this, and every person who has a garden should raise enough for his own use, if no more.

CIDER, How to Keep Sweet.—Use only sound apples. Make the cider when the weather is almost cold enough to freeze the apples. Expose the cider during freezing weather, and stir it till the whole of it is reduced as near the freezing point as possible without freezing. Then barrel it, bung up tight, and place it in a cellar kept nearly down to the freezing point. As long as you can keep it cold enough it will not ferment, and as long as it does not ferment it will remain sweet.

CHERRIES, Dried.—Take the stems and stones from ripe cherries; spread them on flat dishes, and dry them in the hot sun or warm oven; pour whatever juice may have run from them, a little at a time, over them; stir them about, that they may dry evenly. When they are perfectly dry, line boxes or jars with white paper, and pack them close in layers; strew a little brown sugar, and fold the paper over, and keep them in a dry place; or put them in muslin bags, and hang them in an airy place.

EGGS, Storing.—Wright's illustrated Book of Poultry says that a systematic trial for two seasons has shown that, for purposes of long keeping for eating or breeding, eggs should be packed with the large end downward, instead of placing them on the small end, as is commonly done. The longer the eggs are kept the greater difference will be found in the results of the two methods. Experiment has proved that eggs placed as recommended may be set and successfully hatched, with remarkable uniformity, at ages which with the usual method of storing would render success almost hopeless. The practical philosophy of the case is alleged to consist in delaying the spread of the air-bubble and its detachment from the membranous lining of the egg, thus retarding alterations destructive to vitality.

EGGS, to Dry.—The eggs are beaten to uniform consistency, and spread out in

thin cakes on batter plates. This dries them into a paste, which is to be packed in close cans and sealed. When required for use, the paste can be dissolved in water and beaten to a foam like fresh eggs. It is said that eggs can be preserved for years in this way, and retain their flavor.

EGGS, Pickled.—The jar to be of moderate size—wide-mouthed earthen jar, sufficient to hold one dozen eggs; let the latter be boiled quite hard; when fully done, place the same, after taking them up, into a pan of cold water. Remove the shells from them and deposit them carefully in the jar. Have on the fire a quart or more of good white vinegar, into which put one ounce of raw ginger, two or three blades of sweet mace, one ounce of allspice, half an ounce of whole black pepper and salt, half an ounce of mustard seed, with four cloves of garlic. When it has simmered down, take it up and pour the contents into the jar, taking care to observe that the eggs are wholly covered. When quite cold, stopper it down for use. It will be ready after a month. When cut into quarters, they serve as a garnish, and afford a nice relish to cold meat of any kind.

EGGS, to Keep.—1. Parties in the egg business in a large way build brick vats made water-tight, in which is lime-water, which is made by putting lime in water, and when it is slacked and settled to the bottom, drawing off the liquor. Into this liquor the eggs are placed and kept beneath the surface. They are kept as cool as possible. These are the limed eggs with which the markets are supplied during winter.

2. Another mode of keeping eggs, tested by the Agricultural Department, is as follows: Rub the eggs with flaxseed (linseed) oil, and place them, small end downwards, in sand. Eggs so prepared were found at the end of six months to have the same taste and smell of perfectly fresh eggs, and to have lost in weight only three per cent. Greasing eggs with lard or tallow has not been successful in preserving them, except for short periods.

3. Take a thin board of any convenient length and width and pierce it full of holes (each one and a half inches in diameter) as you can. A board two feet

and six inches in length and one foot wide, has five dozen holes in it, say twelve rows of five each. Then take four strips two inches broad, and nail them together edgewise into a rectangular frame of the same size as your other board. Nail this board upon a frame, and the work is done, unless you choose to nail a heading around the top. Put your eggs in this board as they come from the poultry house, the small ends down, and they will keep good for six months, if you take the following precautions: Take care that the eggs do not get wet, either in the nest or afterwards. Keep them in a cool room in summer, and out of the reach of frost in winter. If two boards be kept, one can be filling while the other is emptying.

4. Eggs can easily be kept from October to March in the following manner: A piece of lime, as large as a quart dipper, is put in five gallons of water, and salt added until an egg will float. This is strained and put into a clean keg, into which a loose head is made to fit easily; a knob is fitted to the head for a handle. The eggs are put, as they are gathered, into the liquid, and the loose head placed on them to keep them below the surface. The keg should be kept in a cool place in the cellar. The liquor will not freeze except at a lower temperature than freezing point. Eggs thus preserved will sell readily as limed eggs until fresh eggs come, and are almost as good as fresh ones.

5. Take one quart of unslacked lime, pour to it water enough to make it the consistency of whitewash, add one teaspoon of cream tartar: let this be in a wooden or stone vessel, and put the eggs into it.

6. Hang them by hooks in strong cabbage-nets, and every day hook them on a fresh mesh, so as thereby to turn the eggs.

7. Apply with a brush a solution of gum arabic to the shells, or immerse the eggs therein, let them dry, and afterwards pack them in dry charcoal dust. This prevents their being affected by alterations of temperature.

8. Mix together in a tub, or vessel, one bushel Winchester measure of quick-lime, thirty-two ounces of salt, eight ounces of cream of tartar; with as much water as

will reduce the composition to a sufficient consistence to float an egg. Then put and keep the eggs therein, which will preserve them perfectly sound for two years at least.

9. Eggs can be preserved by keeping them at a temperature of forty degrees or less in a refrigerator. Eggs have been tested when kept in this manner for two years, and found to be perfectly good.

10. Dissolve three or four ounces of beeswax in seven ounces of warm olive oil; put in this the tip of your finger and anoint the egg all over. Keep the eggs in a cool place, and they will keep fresh for five years.

FRUIT, Canning.—The principle should be understood, in order to work intelligently. The fruit is preserved by placing it in a vessel from which the external air is entirely excluded. This is effected by surrounding the fruit by liquid, and by the use of heat to rarefy and expel the air that may be entangled in the fruit or lodged in its pores. The preservation does not depend upon sugar, though enough of this is used in the liquid which covers the fruit to make it palatable. The heat answers another purpose; it destroys the ferment which fruits naturally contain, and as long as they are kept from contact with the external air they do not decompose.

The vessels in which fruits are preserved are tin, glass and earthenware. Tin is used at the factories where large quantities are put up for commerce, but is seldom used in families, as more skill in soldering is required than most persons possess. Besides, the tins are not generally safe to use more than once. Glass is the preferable material, as it is readily cleaned and allows the interior to be frequently inspected. Any kind of bottle or jar that has a mouth wide enough to admit the fruit and that can be securely stopped, positively air-tight—which is much closer than water-tight—will answer. Jars of various patterns and patents are made for the purpose, and are sold at the crockery and grocery stores. These have wide mouths, and a glass or metallic cap which is made to fit very tightly by an India-rubber ring between the metal and the glass. The devices for these caps are numerous, and much ingenuity is displayed in inventing

them. We have used several patterns without much difference in success, but have found there was some difference in the facility with which the jars could be opened and closed. The best are those in which atmospheric pressure helps the sealing, and where the sole dependence is not upon screws or clamps. To test a jar, light a slip of paper and hold it within it. The heat of the flame will expand the air and drive out a portion of it. Now put on the cap; when the jar becomes cool the air within will contract, and the pressure of the external air should hold the cover on so firmly that it cannot be pulled off without first letting in air by pressing aside the rubber or by such other means as is provided in the construction of the jar. When regular fruit jars are not used, good corks and cement must be provided.

Cement is made by melting $1\frac{1}{4}$ ounce of tallow with 1 pound of rosin. The stiffness of the cement may be governed by the use of more or less tallow. After the jar is corked, tie a piece of stout drilling over the mouth. Dip the cloth on the mouth of the jar into the melted cement, rub the cement on the cloth with a stick to break up the bubbles, and leave a close covering.

THE PROCESS. Everything should be in readiness, the jars clean, the covers well fitted, the fruit picked over or otherwise prepared, and cement and corks, if these are used, at hand. The bottles or jars are to receive a very hot liquid, and they must be gradually warmed beforehand, by placing warm water in them, to which boiling water is gradually added. Commence by making a syrup in the proportion of a pound of white sugar to a pint of water, using less sugar if this quantity will make the fruit too sweet. When the syrup boils, add as much fruit as it will cover, let the fruit heat in the syrup gradually, and when it comes to a boil ladle it into the jars or bottles which have been warmed as above directed. Put in as much fruit as possible, and then add the syrup to fill up the interstices among the fruit; then put on the cover or insert the stopper as soon as possible. Have a cloth at hand dampened in hot water to wipe the necks of the jars. When one lot has been bottled, proceed with more, adding more sugar and water

if more syrup is required. Juicy fruits will diminish the syrup much less than others. When the bottles are cold, put them away in a cool, dry, and dark place. Do not tamper with the covers in any way. The bottles should be inspected every day for a week or so, in order to discover if any are imperfect. If fermentation has commenced, bubbles will be seen in the syrup, and the covers will be loosened. If taken at once, the contents may be saved by thoroughly reheating. Another way is to prepare a syrup and allow it to cool. Place the fruit in the bottles, cover with the syrup and then set the bottles nearly up to their rims in a boiler of cold water. Some wooden slats should be placed at the bottom of the boiler to keep the bottles from contact with it. The water in the boiler is then heated and kept boiling until the fruit in the bottles is thoroughly heated through, when the covers are put on, and the bottles allowed to cool. It is claimed that the flavor of the fruit is better preserved in this way than by the other.

WHAT MAY BE PRESERVED.—All the fruits that are used in their fresh state or for pies, etc., and Rhubarb, or Pie-plant, and tomatoes. Green peas, and corn, cannot be readily preserved in families, as they require special apparatus. Strawberries—hard-fleshed sour varieties, such as the Wilson, are better than the more delicate kinds.

Currants need more sugar than the foregoing. Blackberries and huckleberries are both very satisfactorily preserved, and make capital pies. Cherries and plums need only picking over. Peaches need peeling and quartering. The skin may be removed from ripe peaches by scalding them in water or weak lye for a few seconds, and then transferring them to cold water. Some obtain a strong peach flavor by boiling a few peach meats in the syrup. We have had peaches keep three years, and were then better than those sold at the stores. Pears are pared and halved, or quartered, and the core removed. The best, high-flavored and melting varieties only should be used. Coarse baking pears are unsatisfactory. Apples—very few put up these. Try some high-flavored ones, and you will be pleased with them. Quinces—there is a great contrast between quinces pre-

served in this way and those done up in the old way of pound for pound. They do not become hard, and they remain of a fine light color. Tomatoes require cooking longer than the fruits proper. Any intelligent person who understands the principle upon which fruit is preserved in this way, will soon find the mechanical part easy of execution and the results satisfactory.

FRUIT, Dried, to Protect from Worms.

It is said that dried fruit put away with a little bark sassafras (say a large handful to the bushel) will save for years, unmolested by those troublesome little insects, which so often destroy hundreds of bushels in a single season. The remedy is cheap and simple, but we venture to say a good one.

FRUIT, Canned, Keeping.—The preservation of canned fruits depends very much on the place where they are stored. If put in a cellar, unless it is exceptionally dry, they will gather mold and lose all the fine, fresh flavor it is so desirable to retain. If kept in too warm a spot, they will ferment and burst the cans, and in that case, even if the fruit has not been spilled over the shelves, it will have been made so sour that no re-scalding, etc., can make it good. Severe cold does not injure it unless the weather is below zero.

One stinging cold morning we entered our milk-room to find long rows of grenadiers in red coats, standing triumphantly amid the fragments of numerous defeated bottles. The tomatoes being preserved entirely without sugar or spice, were frozen to a solid red ice, but the fruits put up with a small quantity of sugar were only slightly frozen, and as we immediately immersed the jars in cold water until the frost was extracted, they did not burst. The tomatoes were saved by an immediate re-bottling.

A doubled-walled closet in a fireless room on the second floor is one of the best places for storing canned fruits in the winter; and in summer a cool milk-room will be found safe.

GOOSEBERRIES, Dried.—To seven pounds of red gooseberries add a pound and a half of powdered sugar, which must be stewed over them in the preserving-pan; let them remain at a good heat over a slow fire till they begin to break;

then remove them. Repeat this process for two or three days; then take the gooseberries from the syrup, and spread them out on sieves near the fire to dry. This syrup may be used for other preserves. When the gooseberries are quite dry, store them in tin boxes or layers of paper.

GOOSEBERRIES, Red, to Keep.—Pick gooseberries when fully ripe, and for each quart take a quarter of a pound of sugar and a gill of water; boil together until quite a syrup; then put in the fruit, and continue to boil gently for fifteen minutes; then put them into small stone jars; when cold, cover them close; keep them for making tarts or pies.

GRAPES, To Keep.—1. They must not be too ripe. Take off any imperfect grapes from the bunches. On the bottom of a keg put a layer of bran that has been well dried in an oven, or in the sun. On the bran put a layer of grapes, with bran between the bunches so that they may not be in contact. Proceed in the same way with alternate layers of grapes and bran, till the keg is full; then close the keg so that no air can enter. 2. In a box first lay a paper, then a layer of grapes, selecting the best bunches and removing all imperfect grapes, then another paper, then more grapes, and so until the box is full; then cover all with several folds of paper or cloth. Nail on the lid, and set in a cool room where it will not freeze. We use small boxes, so as not to disturb more than we want to use in a week or so. Give each bunch plenty of room so they will not crowd, and do not use newspapers. Some seal the stems with sealing wax and wrap each bunch by itself, but we get along without that trouble. The grapes should be looked to several times during the winter. Should any mold or decay, they should be removed and the good ones again repacked. By this means we have had, with our pitcher of cider and basket of apples, our plate of grapes daily, besides distributing some among our friends and the sick of the neighborhood. 3. (*Chinese Method.*) It consists in cutting a circular piece out of a ripe pumpkin or gourd, making an aperture large enough to admit the hand. The interior is then completely cleaned out, the ripe grapes are placed inside, and the cover replaced

and pressed in firmly. The pumpkins are then kept in a cool place—and the grapes will be found to retain their freshness for a very long time. We are told that a very careful selection must be made of the pumpkin, the common field pumpkin, however, being well adapted for the purpose in question.

HAMS, to Cure.—The committee on bacon hams of the Second Annual Exhibition of the Frederick (Maryland) County Agricultural Society awarded the first premium to Mrs. George M. Potts, and the second to W. H. Lease, Esq., and observed "that the hams were remarkable for their excellent flavor, and were at the same time juicy and tender." The following are the recipes:

MRS. POTTS' RECIPE.—To each green ham of eighteen pounds, one dessert-spoonful of saltpetre; one-fourth pound of brown sugar applied to the fleshy side of the ham and about the hock; cover the fleshy side with fine salt half an inch thick, and pack away in tubs; to remain from three to six weeks, according to size. Before smoking rub off any salt that may remain on the ham, and cover well with ground pepper, particularly about the bone and hock. Hang up and drain for two days; smoke with green wood for eight weeks, or until the rind assumes a light chestnut color. The pepper is an effectual preventive of the fly. I never bag hams. This recipe took the first premium.

MR. LEASE'S RECIPE.—When the hams were cool he salted them down in a tight cask, putting a bushel of salt, well mixed with six ounces of saltpetre, to about one thousand pounds of pork; after it had been salted down four or five days, he made a strong brine, sufficient to float an egg, and cured the meat with it, and then let it remain five weeks longer; then hung it up, dusting the fresh sides with black pepper; then smoked with green wood.

ANOTHER.—After cutting out the pork, rub the skin-side with about half a tea-spoonful of saltpetre, well rubbed in. Rub the pieces all over with salt, leaving them well covered on the fleshy side. Then lay the hams in large, tight troughs, skin-side down. Continue this process until it is all salted down. Let them remain in the troughs without touching or troubling them for four or five weeks, accord-

ing to the size of the hog, no matter how warm or changeable the weather is. Then take them out of the trough, and string them on white-oak splits; wash all the salt off with the brine, if sufficient; if not, with water; then rub them well and thoroughly with wood ashes. Let them hang up and remain twenty-four hours or two or three days before you make the smoke under them, which must be made of green chips, and not chunks. Make the smoke under them every day, and smoke them five or six weeks. After the smoke stops, let the hams remain hanging all the time. Shoulders cure in the same manner. Always kill your hogs in the morning, and let them remain from twenty-four to thirty-six hours before cutting them up.

HAMS (Smoked), to Keep.—Make sacks of coarse cotton cloth, large enough to hold one ham, and fill in with chopped hay all around about two inches thick. The hay prevents the grease from coming in contact with the cloth, and keeps all insects from the meat. Hang in the smokehouse, or other dry, cool place, and they will keep a long time.

HERBS, to Dry.—They should be gathered in a dry season, cleansed from discolored and rotten leaves, screened from earth or dust, placed on handles covered with blotting paper, and exposed to the sun or the heat of a stove, in a dry, airy place. The quicker they are dried the better, as they have less time to ferment or grow mouldy; hence they should be spread thin, and frequently turned; when dried they should be shaken in a large meshed sieve to get rid of the eggs of any insects. Aromatic herbs ought to be dried quickly with a moderate heat that their odor may not be lost. Cruciferous plants should not be dried, as in that case they lose much of their antiscorbutic qualities. Some persons have proposed to dry herbs in a water bath, but this occasions them, as it were, to be half boiled in their own water.

HONEY, to Keep.—After the honey is passed from the comb, strain it through a sieve, so as to get out all the wax; gently boil it, and skim off the whitish foam which rises to the surface, and then the honey will become perfectly clear. The vessel for boiling should be earthen, brass,

or tin. The honey should be put in jars when cool, and tightly covered.

To keep honey in the comb, select combs free from pollen, pack them edge-wise in jars or cans, and pour in a sufficient quantity of the boiled and strained honey (as above) to cover the combs. The jars or cans should be tightly tied over with thick cloth or leather. These processes have been in use for twenty years with unvarying success.

HONEY, Artificial, to Make.—To ten pounds of good brown sugar add four pounds of water, gradually bring it to a boil, skimming it well. When it has become cooled, add two pounds of bees' honey and eight drops of peppermint. A better article can be made with white sugar instead of common, with one pound less of water and one pound more of honey. To twenty pounds of coffee-sugar add six pounds of water, four ounces cream of tartar, four tablespoonfuls of vinegar (strong), the white of two eggs, well beaten, and one pound of bees' honey, Lubin's extract of honeysuckle, twenty drops. Place the water and sugar in a kettle, and put it over a fire; when lukewarm add the cream of tartar, stirring it at the time; then add the egg, and when the sugar is melted, put in the honey and stir it well until it comes to a boil; then take it off, let it stand five minutes, then strain, adding the extract last. Let it stand over night, and it is ready for use.

HORSE-RADISH, to Keep.—Grate a sufficient quantity during the season, while it is green, put it in bottles, fill up with strong vinegar, cork them tight, and set them in a cool place.

LARD, to Keep from Molding.—It is not likely to mold if properly tried and kept in a cool, dry place; earthen crocks or pans well tinned are good to put lard in for keeping. Lard made from intestinal fat will not keep so long as leaf fat. It should be soaked two or three days in salted water, changed each day.

LARD, to Keep Sweet.—Even during the warmest weather lard can be kept sweet by the following plan: When rendering (melting) it, throw into each kettle a handful of fresh slippery elm bark. No salt must be added to it at any time. The jars in which the lard is to be kept must be thoroughly cleansed.

LARD, to Bleach.—Lard may be bleached by applying a mixture of bichromate of potassa and muriatic acid, in minute proportions, to the fat.

LARD, to Try Out.—This should be done in the open air. Set a large kettle over the fire, in some sheltered place, on a still day. It will cook much quicker in large quantities. Put into the kettle, while the lard is cold, a little saleratus, say one tablespoonful to every twenty pounds; stir almost constantly when nearly done till the scraps are brown and crisp, or until the steam ceases to rise; then there is no danger of its moulding; strain out into pans, and the first will be ready to empty into crocks when the last is strained.

LARD, Making.—Cut the fat up into pieces about two inches square; fill a vessel holding about three gallons with the pieces; put in a pint of boiled lye, made from oak and hickory ashes, and strained before using; boil gently over a slow fire, until the cracklings have turned brown; strain and set aside to cool. By the above process you will get more lard, a better article, and whiter than by any other process.

MEAT, to Keep Fresh in Winter.—In Minnesota, where winter thaws are not much to be feared, it is quite common to hang up a porker or a leg of venison or beef, and cut from it as it hangs, week after week. It seems to us that meat so kept must greatly deteriorate in flavor. We like best to cut the beef or venison into good pieces for cooking in various ways, and pack them down in snow. Of course they freeze, but thawing a piece brought in to cook is a simple matter. Put frozen poultry or meat in cold water, and all the frost will shortly leave it. A coating of ice will be found on the outside, which will easily cleave off.

MEAT, to Protect from Fly.—An effectual way of excluding the fly is by using a wire meat-safe, or by covering the joints with a long loose gauze, or some thin cloth, and hanging them from the ceiling of a dry room. Pepper and ginger should be sprinkled on the parts likely to be attacked by the fly, but should be washed off before the joint is put to the fire.

MEAT, to Cure.—To one gallon of water add one and a half pounds of salt,

half a pound of sugar, half an ounce of saltpetre, half an ounce of potash. In this ratio the pickle to be increased to any quantity desired. Let these be boiled together until all the dirt from the sugar rises to top and is skimmed off. Then throw it into a tub to cool, and when cold pour it over your beef or pork, to remain the usual time, say four or five weeks. The meat must be well covered with pickle, and should not be put down for at least two days after killing, during which time it should be slightly sprinkled with powdered saltpetre, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well; though the operation of boiling purifies the pickle by throwing off the dirt always to be found in salt and sugar. If this recipe is properly tried it will never be abandoned. There is none that surpasses it, if so good.

MEAT, Preserving in Cans.—A new method of preserving meat in tin cans, which is favorably commented upon, is that of Mr. R. Jones, of London. In this process the meat is first packed in its raw state into tins of any desired size. The lids are then soldered down, the top of each lid having a small tin tube inserted into it, which communicates with the interior of the tin. These tubes are next inserted into the exhauster, which is a receptacle connected with a machine designated a "Torricellian vacuum," an apparatus in which the air is exhausted by the action of water. The tins are then placed in the cooking-bath, and at the proper juncture the vacuum is created and the meat most thoroughly cooked, at a temperature varying from 180 to 228 degrees. At this stage another feature of the invention comes into play. The vacuum having been created, a supply of gravy is turned on from a receptacle, and the tins filled with a nutritious fluid. The feed-pipes of the tins are then nipped and the cases hermetically sealed. By thus filling the tins with the gravy the difficulty of collapse, which has always hitherto prevented large tins from being used, is obviated, while the whole space of the package is utilized. Testimonials, from captains of ships and others who have used it, are furnished by the inventor, certifying to the excellent quality of the

meat. By this improved processs overcooking the meat is prevented, and as now prepared, it would seem to merit general approbation.

MEAT, Pickle.—Moist sugar, 2 pounds; bay or common salt, 4 pounds; saltpetre, $\frac{1}{2}$ pound; fresh ground allspice, 2 ounces; water, 6 to 8 quarts. Dissolve. Used to pickle meat, to which it imparts a fine red color and a superior flavor.

MILK, to Keep.—Milk may be preserved in stout, well-corked and wired bottles by heating them to the boiling point in a water-bath, by which the small quantity of inclosed air becomes decomposed. Milk, or green gooseberries, or peas, thus treated, will keep for two years. Some persons add a few grains of calcined magnesia to each bottle of milk before corking it.

MEATS, Mince.—Three pounds of raisins, stoned; three pounds of currants; three pounds of beef suet, chopped fine; one pound of bread crumbs; three-quarters of a pound of mixed candied peel; one and a half pounds of fillet of beef, previously cooked. Salt, sugar, spices and ginger to taste. Each ingredient to be chopped up separately, and very fine. Mix all well together, and take especial care that the beef is well mixed with the other ingredients. Moisten with a bottle of brandy and stir occasionally.

ANOTHER.—Half a pound of candied peel, cut in delicate slices, then chopped; two wineglassfuls of brandy. Mix well together with a wooden spoon, and put the mince meat, well pressed down, into a covered jar, tied over very well. The mince meat should be made some days before it is wanted, and when about to be used a little more brandy should be stirred into it.

ANOTHER.—Quarter of an ounce of fine salt; half an ounce of mixed spice; three pounds of moist sugar; three pounds of well cleaned currants; two pounds of stoned raisins, chopped; two and a half pounds of beef suet, finely chopped; the thinnest peel of two lemons and their juice; two pounds of apples, baked to a pulp, and weighed when cold.

ONIONS, to Keep.—Gather in fall and remove the tops; then spread upon a barn floor or in any open shed, and allow them to remain there until thoroughly dry. Put into barrels or small bins or

boxes, and place in a cool place, and at the approach of cold weather cover with straw or chaff, if there is danger of very severe freezing.

Onions are often injured in winter by keeping them in too warm a place. They will seldom be injured by frost if kept in the dark, and in tight barrels or boxes, where not subjected to frequent changes of temperature. It is the alternate freezings and thawings that destroy them, and if placed in a position where they will remain frozen all winter, and then thawed out slowly and in a dark place, no considerable injury would result from this apparently harsh treatment. Onions should always be stored in the coolest part of the cellar, or put in chaff and set in the barn or some out-house.

PARSNIPS, To Keep.—The almost universal practice among farmers is to allow their parsnips to remain in the ground through winter, just where they were grown. We believe the quality of this root is improved by being frozen, or at least kept cool, but it is not necessary to leave them in the open garden during winter, where, if the ground remain frozen, they cannot be got at until it thaws in spring, and then used in a very few weeks or not at all. If the roots are dug up late in the fall, leaving all the tops on, then carefully heeled in thickly together in rows, after which cover with a little coarse litter, they can be reached whenever wanted during winter.

PEACHES, To Dry.—Never pare peaches to dry. Let them get mellow enough to be in good eating condition, put them in boiling water for a moment or two, and the skins will come off like a charm. Let them be in the water long enough, but no longer. The gain is at least sixfold—saving of time in removing the skin, great saving of the peach, the part of the peach saved is the best part, less time to stone the peaches, less time to dry them, and better when dried. A whole bushel can be done in a boiler at once, and the water turned off.

PEACHES, To Can.—Pare and halve your peaches. Pack them as closely as possible in the can without any sugar. When the can is full, pour in sufficient pure cold water to fill all the interstices between the peaches, and reach the brim of the can. Let stand long enough for

the water to soak into all the crevices—say six hours—then pour in water to replace what has sunk away. Seal up the can, and all is done. Canned in this way, peaches retain all their freshness and flavor.

There will not be enough water in them to render them insipid. If preferred, a cold syrup could be used instead of pure water, but the peaches taste more natural without any sweet.

PEAS, Green, to Preserve.—When full grown, but not old, pick and shell the peas. Lay them on dishes or tins in a cool oven, or before a bright fire; do not heap the peas on the dishes, but merely cover them with peas, stir them frequently, and let them dry very gradually. When hard, let them cool, then pack them in stone jars, cover close, and keep them in a very dry place. When required for use, soak them for some hours in cold water, till they look plump before boiling; they are excellent for soup.

PICCALILLI, Indian Method.—This consists of all kinds of pickles mixed and put into one large jar—sliced cucumbers, button onions, cauliflowers, broken in pieces. Salt them, or put them in a large hair sieve in the sun to dry for three days, then scald them in vinegar a few minutes; when cold put them together. Cut a large white cabbage in quarters, with the outside leaves taken off and cut fine; salt it, and put in the sun to dry three or four days; then scald it in vinegar, the same as cauliflower; carrots, three parts, boiled in vinegar and a little bay salt. French beans, radish, pods, and nasturtiums, all go through the same process as capsicums, etc. To 1 gallon of vinegar put 4 ounces of ginger bruised, 2 ounces of whole white pepper, 2 ounces of allspice, $\frac{1}{2}$ ounce chillies bruised, 4 ounces of turmeric, 1 pound of the best mustard, $\frac{1}{2}$ pound of shallots, 1 ounce of garlic, and $\frac{1}{2}$ pound of bay salt. The vinegar, spice, and other ingredients, except the mustard, must boil half an hour; then strain it into a pan, put the mustard into a large basin, with a little vinegar; mix it quite fine and free from lumps, then add more. When well mixed put it into the vinegar just strained off, and when quite cold put the pickles into a large pan, and the liquor over them; stir them repeatedly, so as to mix them all. Finally, put them into

a jar, and tie them over first with a bladder, and afterwards with leather. The capsicums want no preparation.

POTATOES, Storing.—Potatoes should not be exposed to the sun and light any more than is necessary to dry them after digging them from the hill. Every ten minutes of such exposure, especially in the sun, injures their edible qualities. The flesh is thus rendered soft, yellowish or greenish, and injured in flavor. Dig them when dry, and put them in a dark cellar immediately and keep them there till wanted for use, and there would not be so much fault found about bad quality. This is also a hint to those grocers and market-men who keep their potatoes in barrels in the sun—that is, if they wish to furnish their customers with a good article.

POTATOES, To keep from sprouting.—To keep potatoes intended for the use of the table from sprouting until new potatoes grow, take boiling water, pour into a tub, turn in as many potatoes as the water will cover, then pour off all the water, handle the potatoes carefully, laying up in a dry place on boards, only one layer deep, and see if you do not have good potatoes the year round, without hard strings and watery ends caused by growing.

PUMPKINS, Drying.—Take the ripe pumpkins, pare, cut into small pieces, stew soft, mash and strain through a colander, as if for making pies. Spread this pulp on plates in layers not quite an inch thick; dry it down in the stove oven, kept at so low a temperature as not to scorch it. In about a day it will become dry and crisp. The sheets thus made can be stowed away in a dry place, and they are always ready for use for pies or sauce. Soak the pieces over night in a little milk, and they will return to nice pulp, as delicious as the fresh pumpkin. The quick drying after cooking prevents any portion from slightly souring, as is always the case when the uncooked pieces are dried; the flavor is much better preserved, and the after cooking is saved.

RAIN-WATER, To Keep Sweet.—The best way to keep rain-water sweet in a cistern, is to first collect it in a tank, and filter it into the cistern below the surface. This will remove the organic matters, and prevent fermentation. Care should also be taken to prevent surface drainage into it.

ROSEBUDS, To Preserve.—A method employed in Germany to keep rosebuds fresh into the winter, consists in first covering the end of the recently cut stem with wax, and then placing each one in a closed paper cap or cone, so that the leaves do not touch the paper. The cap is then coated with glue, to exclude air, dust, and moisture, and when dry it is stood up in a cool place. When wanted for use, the bud is taken out of the cap and placed in water, after cutting of the end, when the rose will bloom in a few hours.

SWEET POTATOES, To Keep.—Sweet potatoes can be kept by placing them in bulk in a bin or box (the more the better) without drying, and maintaining for them a uniform temperature of 45° to 50°. Putting something between, among, or around them may serve to keep them at the proper temperature, but it is of no value whatever aside from this; and if it should retain dampness, it will be a positive injury. After the sweat takes place, say in three or four weeks, scatter over them a light covering of dry loam or sand. In this way it is easy to keep sweet potatoes for table use or for seed, as well as "the inferior and less nourishing Irish potato." Another way is to pack in barrels, and pour in kiln-dried sand until the intervals are full; or boxes of uniform size, piled up on the side of a room where the temperature never falls to the freezing point, which is a condition of first importance. This wall of boxes may be papered over, and left undisturbed till spring, when the potatoes will command the highest prices.

SWEET POTATOES, In Bulk.—A sweet potato grower in Southern Illinois states that sweet potatoes will keep in bulk. He has kept seven hundred bushels in one pile. The potatoes should be dug before the vines are injured by frost, sunned until dry, and then placed in a cellar on a clay floor, putting fine hay or flax straw between the potatoes and the wall, and covering with the same material. The deeper and larger the pile the better. The hay or straw should be covered with clay, a thickness of one or two inches being sufficient for the climate of that region. At the top should be left one or more air-holes, according to the size of the pile, for the escape of steam.

In damp warm weather open a window or door in the day-time.

SOAP, HARD, To Make.—After the raw soda or barilla is ground or pounded, it is placed in a vat in alternate layers with unslacked lime, the bottom layer being lime. Water is allowed to infiltrate through those layers, and the lye is secured as it trickles through a hole in the bottom of the vat. The lime absorbs the carbonic acid of the soda, making the lye caustic or fit for the soap-kettle; and the quantity of lime applied must be in proportion to the quantity of carbonic acid in the soda. To every twenty pounds of tallow add one gallon of weak lye, and boil until the lye is spent. The mass must then cool for one hour, the spent lye drawn off, and another gallon of strong lye added; the mixture again boiled until the second dose of lye is spent, and the same process must be repeated for several days, until the mixture, if properly managed, is converted into white tallow soap, which should be allowed to cool gradually and settle, when it is poured into molds, and when solid it is cut into the bars which are found in our markets. Twenty pounds of tallow ought to make 30 pounds of first-quality hard soap, allowing three pounds of soda-ash for every 20 pounds of tallow. The balance of the weight is made up by the large quantity of water which enters into combination with the grease and alkali in the course of saponification.

When yellow or resin soap is required, the hard soap has to be made in the usual manner, and at the last charge of lye, or when the soapy mass ceases to absorb any more lye, one-third the weight of pounded resin is introduced, the mixture constantly stirred, and the boil kept up vigorously until the resin has become incorporated with the soap. The whole must stand until it settles, and the soap then dipped out. Resin soap, when well made, should be a fine, bright color.

SOAP, SOFT, To Make.—The principal difference between hard and soft soaps is, that three parts of fat afford, in general, fully five parts of hard soda-soap; but three parts of fat or oil will afford six or seven parts of potash-soap of a moderate consistence. From its cheapness, strength, and superior solubility, potash-soap is pre-

ferred for many purposes, particularly for the scouring of woollens.

The lyes prepared for making soft soaps should be made very strong, and of two densities, as the process of making potash or soft soap differs materially from that of making soda or hard soap. A portion of the oil or fat being placed in the boiling-pan and heated to near the boiling-point of water, a certain portion of the weaker lye is introduced and the fire kept up so as to bring the mixture to the boiling-point; then some more oil and lye are introduced alternately, until the pan is filled. The boiling is continued gently, strong lye being added until the saponification is complete. The fire should then be removed, and some good soap, previously made, added while cooling down, to prevent any change by evaporation. One pound of oil requires about one-third of a pound of American potash, and will make one and three-quarters to two pounds of well-boiled soap, containing about 40 per cent. of water. Sixty pounds of lard will make 100 pounds of first-class soft-soap by using one and a half cans of concentrated lye, which is made from salt, and is really a soda-lye.

ROOTS, To Keep.—These are preserved in different ways, according to the object in view. Tuberous roots, as those of the dahlia, pæonia, tuberose, etc., intended to be planted in the succeeding spring, are preserved through the winter in dry earth, in a temperature rather under than above what is natural to them. So may the bulbous roots of commerce, as hyacinths, tulips, onions, etc., but for convenience, these are kept either loose, in cool dry shelves or lofts, or the finer sorts in papers, till the season of planting.

Roots of all kinds may be preserved in an ice house till the return of the natural crop.

After stuffing the vacuities with straw, and covering the surface of the ice with the same material, place on it case boxes, casks, baskets, etc., and fill them with turnips, carrots, beet-roots, and in particular potatoes. By the cold of the place vegetation is so much suspended that all these articles may be thus kept fresh and uninjured till they give place to another crop in its natural season.

SAUERKRAUT, To Make.—In the first place, let your "stand," holding from

half a barrel to a barrel, be thoroughly scalded out; the cutter, the tub and the stamper also well scalded. Take off all the outer leaves of the cabbages, halve them, remove the heart and proceed with the cutting. Lay some clean leaves at the bottom of the stand, sprinkle with a handful of salt, fill in half a bushel of cut cabbage, stamp gently until the juice just makes its appearance, then add another handful of salt, and so on until the stand is full. Cover over with cabbage leaves, place on top a clean board fitting the space pretty well, and on top of that a stone weighing twelve or fifteen pounds. Stand away in a cool place, and when hard freezing comes on remove to the cellar. It will be ready for use in from four to six weeks. The cabbage should be cut tolerably coarse. The Savoy variety makes the best article, but it is only half as productive as the Drumhead and Flat Dutch.

SAUSAGE, Making and Keeping.—1.

To make family sausage, the trimmings and other lean and fat portions of pork are used, taking care that there is about twice as much lean as fat; some consider it an improvement to add about one-sixth of the weight of lean beef. As to seasoning, that is a matter of taste. The majority of people use salt, pepper, and sage only, some use only salt and pepper, while others, in addition to the above, put in thyme, mace, cloves and other spices. There is something repulsive about the intestines or "skins" used for stuffing sausage, and the majority preserve the meat in bulk. In cold weather it will keep for a long time, but if it is desired to preserve it beyond cold weather it needs some care. We have found that muslin bags, made of a size to hold a roll two and one-half or three inches in diameter, keep the meat very satisfactorily. These bags, when filled with sausage meat, are dipped into melted lard, and hung up in a dry, cool place. For seasoning, we use to one hundred pounds of meat forty ounces salt, and from eight to ten ounces each pepper and salt.

2. Take two-thirds ham and one-third fat pork; season well with nine teaspoonfuls of pepper, and the same of salt, three of powdered sage, and one of thyme or summer savory to every pound of meat—not heaping teaspoonfuls, remember;

warm the meat enough so that you can mix it well with the hands; then pack in jars. When needed make up in small cakes and fry with a little butter, or simply alone. But they must not be covered alone, or they will fall to pieces. Some like a little cinnamon added. Keep where it is cool but not damp.

SUET, To Keep.—Suet may be kept a year, thus: Choose the firmest and most free from skin or veins, remove all traces of these, put the suet in the saucepan at some distance from the fire, and let it melt gradually; when melted, pour it into a pan of cold spring water; when hard, wipe it dry, fold it in white paper, put it in a linen bag, and keep it in a cool, dry place; when used, it must be scraped, and it will make an excellent crust with or without butter.

TOMATOES, Canning.—The most thorough and reliable mode of canning tomatoes is as follows: They are just sufficiently steamed, not cooked, to scald or loosen the skin, and are then poured upon tables and the skin removed, care being taken to preserve the tomato in as solid a state as possible. After being peeled, they are placed in large pans, with false bottoms perforated with holes, so as to strain off the liquid that emanates from them. From these pans they are carefully placed by hand into the cans, which are filled as solidly as possible—in other words, all are put in that the cans will hold. They are then put through the usual process and hermetically sealed. The cans, when opened for use, present the tomato not only like the natural vegetable in taste and color, but also in appearance; and moreover, when thus sealed, they are warranted to keep in any climate, and when opened, will taste as naturally as when just plucked from the vine.

TALLOW, To Clarify.—Dissolve one pound of alum in one quart of water, add to this 100 pounds of tallow in a jacket kettle (a kettle set in a larger one, and the intervening space filled with water; this prevents burning the tallow.) Boil three-quarters of an hour and skim. Then add one pound of salt dissolved in a quart of water. Boil and skim. When well clarified the tallow should be nearly the color of water.

TALLOW, To Harden.—We have used

the following mixture with success: To one pound of tallow take one-fourth of a pound common rosin; melt them together, and mold them the usual way. This will give a candle of superior lighting power, and as hard as a wax candle; a vast improvement upon the common tallow candle, in all respects except color.

TOMATO CATSUP.—Take perfectly ripe tomatoes $\frac{1}{2}$ bushel; wash them clean and break to pieces; then put over the fire and let them come to a boil, and remove from the fire; when they are sufficiently cool to allow your hands in them, rub through a wire sieve; and to what goes through, add salt 2 tea-cups; allspice and cloves, of each, ground, 1 tea-cup; best vinegar 1 quart. Put on to the fire again and cook one hour, stirring with great care to avoid burning. Bottle and seal for use. If too thick when used, put in a little vinegar. If they were very juicy they may need boiling over an hour.

VEGETABLES, Keeping.—Sink a barrel two-thirds of its depth into the ground (a box or cask will answer a better purpose); heap the earth around the part projecting out of the ground, with a slope on all sides; place the vegetables that you desire to keep in the vessel; cover the top with a water tight cover; and when winter sets in, throw an armful of straw, hay, or something of that sort, on the barrel. If the bottom is out of the cask or barrel, it will be better. Cabbages, celery, and other vegetables, will keep in this way as fresh as when taken from the ground. The celery should stand nearly perpendicular, celery and earth alternating. Freedom from frost, ease of access, and especially freshness, and freedom from rot, are the advantages claimed.

YEAST, To Keep.—Ordinary beer yeast may be kept fresh and fit for use for several months; by placing it in a close canvas bag, and gently squeezing out the moisture in a screw press, the remaining matter becomes as stiff as clay, in which state it must be preserved in close vessels.

YEAST CAKES, or Preserved Yeast.—Put a large handful of hops into two quarts of boiling water. Boil three large potatoes until they are tender. Mash them and add them to two pounds of

flour. Pour the boiling hot water over the flour through a sieve or colander, and beat it until it is quite smooth. While it is warm, add two tablespoonfuls of salt, and half a teacupful of sugar. Before it is quite cold, stir in a pint or more of good yeast. After the yeast has become quite light, stir in as much Indian meal as it will take, roll it out in cakes, and place them on a cloth in a dry place, taking care to turn them every day. At the end of a week or ten days they may be put into a bag, and should be kept in a dry place. When used, take one of these cakes, soak it in some milk-warm water, mash it smooth, and use it as any other kind of yeast.

VINEGAR, Cider.—1. The most profitable return from such apples as are made into cider is the further transformation of the juice into vinegar. To do this, the barrels should be completely filled, so that all impurities that "working"—fermenting—throws off will be ejected through the bung-hole. This process should be completed before the barrel is put in the cellar, and when this is done, the purified juice should be drawn out of the original cask and put into others where there is a small amount of old vinegar, which will amazingly hasten the desired result. If no vinegar can be obtained to "start" the cider, it must remain in a dry cellar six months, and perhaps, a year (the longer the better), before it will be fit for the table.

2. Save all your apple parings and slice in with them all waste apples and other fruits; keep them in a cool place till you get a pailful, then turn a large plate over them, on which a light weight should be placed, and pour on boiling water till it comes to the top. After they have stood two or three days pour off the liquid, which will be as good cider as much that is offered for sale; strain and pour it into a cask or some other convenient vessel (anything that can be closely covered will do), and drop in a piece of "mother," or vinegar plant, procured of some one that has good vinegar. If set in a warm place, the vinegar will be fit for use in three or four weeks, when it can be drawn off for use, and the cask filled with cider made from time to time by this process. The parings should be pressed compactly into a tub or pail, and only water enough

poured over to come to their surface, otherwise the cider would be so weak as to require the addition of molasses. By having two casks, one to contain the vinegar already made, and the other to fill into from time to time, one never need be without good vinegar. The rinsings of preserve kettles, sweetmeat jars, and from honey, also stale beer and old cider, should all be saved for the vinegar cask; only caution should be used that there be sufficient sweetness or body to whatever is poured in, or the vinegar may die from lack of strength.

3. A barrel or a cask of new sweet cider, buried so as to be well covered with fresh earth, will turn to sharp, clear, delicious vinegar in three or four weeks, as good as ever sought affinity with cabbage, pickles, or table sauce, and better than is possible to make by any other process.

PICKLES, Observations on.—The strongest vinegar must be used for pickling; it must not be boiled, or the strength of the vinegar and spices will be evaporated. By parboiling the pickles in brine they will be ready in much less time than they are when done in the usual manner, of soaking them in cold salt water for six or eight days. When taken out of the hot brine, let them get cold and quite dry before you put them into the pickle.

To assist the preservation of pickles, a portion of salt is added, and for the same purpose, and to give flavor, long pepper, black pepper, allspice, ginger, cloves, mace, eschalots, mustard, horse-radish and capsicum.

The following is the best method of preparing the pickle, as cheap as any, and requires less care than any other way: Bruise in a mortar four ounces of the above spices, put them into a stone jar with a quart of the strongest vinegar, stop the jar closely with a bung, cover that with a bladder soaked with pickle, set it on a trivet by the side of the fire for three days, well shaking it up at least three times in the day; the pickle should be at least three inches above the pickles. The jar being well closed, and the infusion being made with a mild heat, there is no loss by evaporation.

To enable the articles pickled more easily and speedily to imbibe the flavor of the pickle they are immersed in, previ-

ously to pouring it on them, run a larding-pin through them in several places.

Pickles should be kept in a dry place in unglazed earthenware or glass jars, which are preferable, as you can, without opening them, observe whether they want filling up; they must be carefully stopped with well-fitted bungs, and tied over as closely as possible with a bladder wetted with the pickle; and if to be preserved a long time after that is dry, it must be dipped in bottle cement.

When the pickles are well used, boil up the liquor with a little fresh spice.

To walnut liquor may be added a few anchovies and eschalots; let it stand till it is quite clear, and bottle it; thus you may furnish your table with an excellent savory-keeping sauce for hashes, made dishes, fish, etc., at very small cost.

Jars should not be more than three parts filled with the articles pickled, which should be covered with pickle at least two inches above their surface; the liquor wastes, and all of the articles pickled that are not covered are soon spoiled.

When they have been done about a week, open the jars and fill them up with pickle.

Tie a wooden spoon, full of holes, round each jar, to take them out with.

If you wish to have gherkins, etc., very green, this may be easily accomplished by keeping them in vinegar, sufficiently hot, till they become so.

If you wish cauliflowers, onions, etc., to be white, use distilled vinegar for them.

To entirely prevent the mischief arising from the action of the acid upon the metallic utensils usually employed to prepare pickles, the whole of the process is directed to be performed in unglazed stone jars.

BEETS, Pickled. — Boil your beets till tender, but not quite soft. To four large beets, boil three eggs hard and remove the shells; when the beets are done, take off the skin by laying them for a few minutes in cold water, and then stripping it off; slice them a quarter of an inch thick, put the eggs at the bottom, and then put in the beets with a little salt. Pour on cold vinegar enough to cover them. The eggs imbibe the color of the beets and look beautiful on the table.

BEET-ROOT, Pickled. — Simmer the roots till three parts done (from one and

a half to two and a half hours); then take them out, peel, and cut them in thin slices. Put them into a jar, and pour on sufficient cold spiced vinegar to cover them.

CABBAGE, Pickled. — Choose a fine, close cabbage for the purpose of pickling, cut it as thin as possible, and throw some salt upon it. Let it remain for three days, when it will have turned a rich purple; drain from it the salt, and put it into a pan with some strong vinegar, a few blades of mace, and some white pepper-corns. Give it a scald, and when cold, put it into the jars, and tie it up close.

CUCUMBERS, Pickled. — Make a brine by putting one pint of rock salt into a pail of boiling water, and pour it over the cucumbers; cover tight to keep in the steam, and let them remain all night and part of a day; make a second brine as above, and let them remain in it the same length of time; then scald and skim the brine, as it will answer for the third time, and let them remain in it as above; then rinse and wipe them dry, and add boiling hot vinegar; throw in a lump of alum as large as an oil-nut to every pail of pickles, and you will have a fine, hard and green pickle; add spices if you like, and keep the pickles under the vinegar. A brick on the top of the cover, which keeps the pickles under, has a tendency to collect the scum to itself, which may arise.

CHERRIES, Pickled. — Take the largest and ripest red cherries, remove the stems, have ready a large glass jar, fill it two-thirds full with cherries, and fill up to the top with the best vinegar; keep it well covered, and no boiling or spice is necessary, as the cherry flavor will be retained, and the cherries will not shrivel.

CHOPPED PICKLES. — What we call chopped pickle goes also under the name of chow-chow, picklette, higdum, etc. It is liked by most persons, is readily made, and admits of the use of a number of articles. There is no particular rule for making it, and the basis may be of whatever pickle-making material is most abundant. We have just put up our winter stock, and this time made it as follows: Green tomatoes furnished the largest share; then there were nearly ripe cucumbers with the seeds removed, cabbage, onions, and green peppers. These were chopped in a chopping-machine, and

mixed, sprinkled freely with salt, and allowed to stand until the next day. The abundant juice was then thoroughly drained off, and enough spiced vinegar prepared to cover the material. No rule can be given for the spice, which may be according to taste. Whole pepper, cloves, mustard-seed, broken cinnamon, or whatever spice is fancied, may be boiled in the vinegar. We prefer it with the addition of sugar. Some mix up mustard and add to the pickle when cold, and others boil turmeric in the vinegar to give it a uniform yellow color. It is a pickle that can be made according to fancy rather than according to rule. In winter, cabbage, celery, and onions, treated in the same way make a very fine pickle. As with other pickles, the vinegar should be poured off and boiled, at intervals of a few days, two or three times before it is put away for the winter.

CAULIFLOWER AND BROCCOLI.—These should be sliced, and salted for two or three days, then drained, and spread upon a dry cloth before the fire for twenty-four hours; then put into a jar and covered with spiced vinegar. Dr. Kitchener says, that if vegetables are put into cold salt and water (a quarter of a pound of salt to a quart of water), and gradually heated to boiling, it answers the same purpose as letting them lie some days in salt.

CRAB-APPLE, Sweet, Pickled.—Boil the fruit in clear water until it becomes a little soft; then drain them on a large dish; then to every pound of fruit add one of sugar, and boil hard until they are preserved.

To make the pickles, take one-half syrup and one-half vinegar; fill the jar with the preserves, and pour on the syrup and vinegar; add spices to suit the taste.

GHERKINS, Pickled.—Steep them in strong brine for a week, then pour it off, heat it to a boiling point, and again pour it on the gherkins; in twenty-four hours drain the fruit on a sieve, put it into wide-mouthed bottles or jars, fill them up with strong pickling vinegar, boiling hot, bung down immediately, and tie over with a bladder. When cold, dip the corks into melted bottle wax. Spice is usually added to the bottles, or else steeped in the vinegar.

In a similar way are pickled: onions,

mushrooms, cucumbers, walnuts, samphires, green gooseberries, cauliflowers, melons, barberries, peaches, lemons, tomatoes, beans, radish pods, codlins, red cabbage (without salt and with cold vinegar), beet-root (without salt), garlic, peas, etc., etc.; observing that the softer and more delicate articles do not require so long soaking in brine as the harder and coarser kinds, and may be often advantageously pickled by simply pouring very strong pickling vinegar over them, without applying heat.

GREEN-GINGER, Pickled.—Clean and slice the ginger; sprinkle with salt; let it remain a few hours; then put it into a jar or bottle, and pour boiling vinegar over it; cork it up when cool.

LIMES, Pickled.—They should be small, and with thin rinds. Rub them with pieces of flannel, then slit them half down in four quarters, but not through to the pulp; fill the slits with salt, hard pressed in; set them upright in a pan for four or five days until the salt melts; turn them three times a day in their own liquor until tender; make a sufficient quantity of pickle to cover them, of vinegar, the brine of the lemons, pepper and ginger; boil and skim it, and when cold put it to the lemons, with two ounces of mustard-seed, and two cloves of garlic to every six lemons. In boiling the brine care should be taken to use a well-tinned copper saucepan only, otherwise it will be discolored.

MIXED PICCALILLI, Pickled.—To each gallon of strong vinegar put four ounces of curry powder, four ounces of good flour mustard, three ounces of bruised ginger, two ounces of turmeric, eight ounces of skinned shallots, and two ounces of garlic (the last two slightly baked in a Dutch oven), one-fourth pound of salt and two drachms of cayenne pepper. Digest these near the fire, as directed above for spiced vinegar. Put into a jar, gherkins, sliced cucumbers, sliced onions, button onions, cauliflower, celery, broccoli, French beans, nasturtiums, capsicums, large cucumbers, and small lemons. All, except the capsicums, to be parboiled in salt water, drained, and dried on a cloth before the fire. Pour on them the above pickle.

MUSHROOMS, Pickled.—To preserve the flavor, buttons must be rubbed with a

piece of flannel and salt, and from the larger ones take out the red inside, for when they are black they will not do, being too old. Throw a little salt over, and put them into a stewpan with some mace and white pepper; as the liquor comes out, shake them well, and simmer them over a gentle fire till all of it is dried into them again; then put as much vinegar into the pan as will cover them; make it warm, and then put all into glass jars or bottles, and tie down with a bladder. They will keep two years, and are delicious.

MINCED PICKLES.—One large white cabbage, beans, green tomatoes, gherkins and green pepper (the veins to be cut out), without regard to quantity; chop them up finely, and place in separate vessels; salt them, and let them stand twenty-four hours; squeeze them through a sieve, mix all together, and flavor with mustard-seed, spice, cloves, black pepper and horse-radish; pour on scalding vinegar; cut up two large onions and throw in, and let them stand twenty-four hours; then pour off the vinegar, and fill up with cold.

ONIONS, Pickled.—Scald one gallon of small onions in salt water of the strength to bear an egg. Only just let them boil, strain them off, and peel them after they are scalded, place them in a jar, and cover them with the best cold vinegar. The next day pour the vinegar off, add two ounces of bruised ginger, one ounce of white pepper, two ounces of flour of mustard-seed, half an ounce chillies; boil them twenty minutes, turn all together, boiling hot, to the onions; let them remain ten days, turn the vinegar out again, boil as before, turn them hot on the onions again. They will be ready for use as soon as quite cold.

PEACH PICKLES.—Take any quantity of fine peaches just before they are ripe, stick into each five or six cloves; make a syrup of three pints of vinegar and three pounds of peaches; add cinnamon if you like. Bring the syrup to a boil, and pour hot over them; repeat the process for three days, or until they are shrunk on the pit. After the last scald they should be well covered and put away in a very cool cellar until cold weather sets in. They will be ready to use, however, in a few days after they are pickled.

PICKLES, to Color Green.—A beautiful green color, entirely destitute of any poisonous qualities, may be made by dissolving five grains saffron in one-fourth ounce distilled water, and in another vessel dissolving four grains indigo carmine in one-half ounce distilled water. After shaking each up thoroughly they are allowed to stand for twenty-four hours, and on being mixed together at the expiration of that time, a fine green solution is obtained, capable of coloring five pounds of sugar.

PEPPERS, Pickled.—Soak fresh, hard peppers in salt and water for nine days in a warm place, changing the brine every day; then put them into cold vinegar. If the pickles are not required very hot, take out the seeds from the greater portion of the peppers.

PLUMS, Sweet, Pickled.—Take seven pounds of fruit, put them in a jar with three and one-half pounds of sugar, one quart best vinegar, two ounces stick cinnamon, two ounces cloves; the whole boiled together and thrown over the fruit three days.

ROOTS, Pickled.—Roots, such as carrots, salsify and beet-root, may be pickled by being sliced, or cut into small pieces, and slightly boiled in vinegar without destroying their crispness, and adding the common spices; with beet-root, put button onions, or cut some Spanish onions in slices, lay them alternately in a jar; boil one quart of vinegar with one ounce of mixed pepper, half an ounce of ginger, and some salt, and pour it cold over the beet-root and onions.

PICKLES, Sweet.—For pickling all kinds of fruit to keep good the year round, the following rule is safe: To three pounds of sugar add one pint of good vinegar, spices to your taste; boil it together, then let it cool; fill the jars with clean and sound fruit, such as peaches, pears, plums, cherries and grapes (each kind in a separate jar); then, when the vinegar is cool, put it on the fruit; let it stand all night, then turn off the liquor, and boil it down a little; then let it cool, and pour it in the jars; cover them nicely, and put them in a cool place. If, in time, you discover a white scum on the top, skim it off, turn off the vinegar, add a little sugar, and boil it; when cool, pour it on the

fruit again, and you will have a delightful pickle.

For peach mangoes, these are excellent. Take sound, ripe, free-stone peaches; wipe off the fur; split them open; take out the pits; have ready some fine chopped tomatoes, cabbage, horse-radish, and mustard-seed; fill the vacancy in the peach; then place them together, and tie them with a string; fill your jars with prepared vinegar.

TOMATOES, Pickled.—Always use those which are thoroughly ripe. The small, round ones are decidedly the best. Do not prick them, as most recipe-books direct. Let them lie in strong brine three or four days, then put them down in layers in your jars, mixing with them small onions and pieces of horse-radish; then pour on the vinegar (cold), which should be first spiced as for peppers; let there be a spice bag to throw into every pot. Cover them carefully, and set them by in the cellar for a full month before using.

TOMATOES, Green, Pickled.—To one peck of tomatoes add a handful of salt, and enough water to cover them. Let them remain in this twenty-four hours. Put them in a kettle (porcelain lined is the best), fill up with vinegar, and set upon the stove until the vinegar begins to boil, and then set away to cool. When cold, set the kettle again upon the stove, and bring it to the boiling point. Then skim the tomatoes, and put them into a jar; fill up with some new, cold vinegar, and flavor with mustard-seed, allspice, cloves, etc.

The same vinegar first used will do to scald more tomatoes in.

PRESERVING, Hints on.—A very common discovery made by those who preserve fruits, etc., is, that the preserve either ferments, grows mouldy or becomes candied.

These three effects arise from three separate causes. The first from insufficient boiling; the second from being kept in a damp place, assisted in some degree by the first cause; and the third from being too quick and too long boiling.

Preserves of all kinds should be kept entirely secluded from the air, and in a dry place. In ranging them on the shelves of a store-closet, they should not be suffered to come in contact with the wall. Moisture in winter and spring ex-

udes from some of the driest walls, and preserves invariably imbibe it, both in dampness and taste. It is necessary occasionally to look at them, and if they have have been attacked by mould boil them up gently again. To prevent all risks it is always as well to lay a brandy paper over the fruit before tying down. This may be renewed in the spring.

Fruit jellies are made in the ratio of a quart of fruit to two pounds of sugar. They must not be boiled quick, nor very long. Practice, and a general discretion, will be found the best guide to regulate the exact time, which must necessarily be affected, more or less by local causes.

PRESERVE FRUITS, without Self-Sealing Cans.—Prepare a cement of one ounce resin, one ounce gum shellac, and a cubic inch of beeswax; put them in a tin cup and melt slowly; too high or too quick heat may cause it to scorch.

Place the jars where they will become warm while the fruit is cooking. If they are gradually heated there is no danger of breaking.

As soon as the fruit is thoroughly heated, and while boiling hot, fill the jars full, letting the juice cover the fruit entirely. Have ready some circular pieces of stout, thick cotton or linen cloth, and spread over with cement a piece sufficient to cover the mouth and rim of the jar. Wipe the rim perfectly dry, and apply the cloth while warm, putting the cement side down, bring the cover over the rim, and secure it firmly with a string; then spread a coating of cement over the upper surface. As the contents of the jar cool, the pressure of the air will depress the cover, and give positive proof that all is safe.

PRESERVE, Small Fruits without Cooking.—Strawberries, raspberries, blackberries, cherries and peaches can be preserved in this manner: Lay the ripe fruit in broad dishes, and sprinkle over it the same quantity of sugar used in cooking it. Set it in the sun, or a moderately heated oven, until the juice forms a thick syrup with the sugar. Pack the fruit in tumblers, and pour the syrup over it. Paste writing paper over the glasses, and set them in a cool, dry place. Peaches must be pared and split, and cherries stoned. Preserved in this manner, the fruit retains much more of its natural flavor and healthfulness than when cooked.

PRESERVE, Fruits without Sugar or Vinegar.—Pick the fruit from the stalks; put them into the bottles. Put one drachm of alum into four gallons of boiling water; let it stand till it is cold; then fill the bottles with this liquor, bung them tight, put them into a copper of cold water, and heat to 176°; and then tie them over with bladder and seal them.

FRUITS, Preserved, by Syrup without Heat.—Many fruits when preserved by boiling lose much of their peculiar and delicate flavor, as for instance pineapples; and this inconvenience may, in some instances, be remedied by preserving them without heat. Cut the fruit in slices, about one-fifth of an inch thick; strew powdered loaf-sugar an eighth of an inch thick in the bottom of a jar, and put the slices on it. Put more sugar on this, and then another layer of the slices, and so on, till the jar is full. Place the jar with the fruit up to the neck in boiling water, and keep it there till the sugar is completely dissolved, which may take half an hour, removing the scum as it rises. Lastly, tie a wet bladder over the mouth of the jar, or cork and wax it.

APPLES, Preserved.—Pare and core and cut them in halves or quarters; take as many pounds of the best brown sugar; put a tea-cup of water to each pound. When it is dissolved set it over the fire; and when boiling hot put in the fruit and let it boil gently until it is clear and the syrup thick; take the fruit with a skimmer on to flat dishes; spread it to cool; then put it in pots or jars and pour the jelly over. Lemons boiled tender in water and sliced thin may be boiled with the apples.

APPLES, Crab, Preserved.—Take off the stem and core them with a sharp knife without cutting them open; weigh a pound of white sugar for each pound of apples; put a tea-cup of water to each pound of sugar, and then put it over a slow fire. When the sugar is dissolved and hot, put the apples in; let them boil gently until they are clear, then skim them, cut and spread them on flat dishes. Boil the syrup until it is thick; put the syrup in whatever they are to be kept, and when the syrup is cold and settled, pour it carefully over the fruit. Slices of lemon boiled with the fruit is to some an improvement; one lemon is sufficient for

several pounds of fruit. Crab apples may be preserved whole with three-quarters of an inch of stem on; three-quarters of a pound of sugar for each pound of fruit.

APRICOTS, Preserved, Whole.—Take the largest and cleanest apricots to be got; pick out the stones with a silver skewer, or slit them down the sides with a silver knife; take nearly their weight in good lump sugar; dip each lump in water and put over the fire; let it just boil; skim, and put by till cold; then pour it over the fruit in the preserving-pan, warm very gently and only allow them to simmer; then put them by till next day, and warm them again, continuing this till they look clear; then take the fruit from the syrup. The latter must now be well boiled and skimmed, and when cold poured over the fruit.

CITRON MELON, Preserved.—Pare, core and cut into slices some fine citron melons. Weigh them. To six pounds of melon allow six pounds of refined sugar, the juice and grated rind of four large lemons, and a quarter pound of root ginger. Boil the slices of melon half an hour or more, till they look quite clear and are so tender that a broom straw will pierce them. Then drain them, lay them in a pan of cold water, cover them, and let them stand all night. In the morning tie the root ginger in a thin muslin cloth, and boil it in three pints of clear water till the water is highly flavored; take out the bag of ginger and pour the water over the pieces of sugar, which is previously broken and put in a preserving kettle. When the sugar is melted, set it over the fire, put in the grated peel of the lemons and boil and skim it till no more scum rises. Then put in the sliced citrons and the juice of the lemons; boil them in the syrup till all the slices are quite transparent, and so soft that a straw will go through them, but do not break them. When done put the slices, still warm, into jars, and gently pour over the syrup. This will be found delicious.

CUCUMBERS, Preserved, To Imitate Ginger.—Take small cucumbers, with the flowers and stalks on them, and some large ones gathered dry; put them in a stone jar with salt and water enough to cover them; then put cabbage leaves on the top to cover them close, and set them

in the chimney corner for a fortnight, until they are turned yellow; then drain the water away and throw away the cabbage leaves, which will smell very strong, almost to putrefaction; split the large ones, take out the seed, put them in an earthen pipkin over the fire with weak salt and water; cover them close, and let them green gently for ten hours, when they will look a little green, and are very clean; take them off the fire and drain them, and put them into cold water, shifting them twice a day for two days; then drain them and dry them in a fine cloth. Have ready a thin syrup with a good deal of whole ginger boiled in it, and some lemon peel; when it is cold put it on the cucumber. Boil up the syrup every day for a fortnight, and when it is cold pour it on as before. Tie them down with a bladder, and a leather and paper under it, and keep them in a cool, dry place. A pint of water to a pound of sugar is a good proportion for the syrup.

ORANGES, Seville, Preserve Whole.—

Cut a hole at the stem end of the oranges the size of a half dime, take out all the pulp, put the oranges into cold water for two days, changing it twice a day; boil them rather more than an hour, but do not cover them, as it will spoil the color; have ready a good syrup, into which put the oranges, and boil them till they look clear; then take out the seeds, skins, etc., from the pulp first taken out of the oranges, and add to it one of the whole oranges previously boiled, with an equal weight of sugar to it and the pulp; boil this together till it looks clear over a slow fire, and, when cold, fill the oranges with this marmalade, and put on the tops; cover them with syrup, and put brandy paper on the top of the jar. It is better to take out the inside at first, to preserve the fine flavor of the juice and pulp, which would be injured by boiling in the water.

GRAPES, Preserved in Bunches.—Take out the stones from the grapes with a pin, breaking them as little as possible; boil some clarified sugar nearly to candy height; then put in sufficient grapes to cover the bottom of the preserving-pan, without laying them on each other, and boil for five minutes, merely to extract all the juice; lay them in an earthen pan,

and pour the syrup over them; cover with paper, and the next day boil the syrup, skimming it well for five minutes; put in the grapes, let them boil a minute or two; put them in pots, and pour the syrup over them, after which tie down.

GINGER, Preserved, Imitation of.—

Boil, as if for the table, small, tender, white carrots; scrape them until free from all spots, and take out the hearts. Steep them in spring water, changing it every day, until all vegetable flavor has left them. To every pound of carrots so prepared add one quart of water, two pounds of loaf sugar, two ounces of whole ginger, and a rind of lemon shred fine. Boil for a quarter of an hour every day, until the carrots clear, and when nearly done, add red pepper to taste. This will be found a good imitation of West Indian preserved ginger.

MELON, Preserved Like Ginger.—

When the melon is nearly ripe, pare it thin, and cut it into pieces about the size of ginger; cover it with salt water, changing every day for three days; then put in clear spring water, changing it twice a day for three days. Then make a thin syrup, and boil it together with the melon once every day for three days; next make a thick syrup, adding the rind of one or more lemons, according to the quantity of melon, cut into narrow strips, and the juice squeezed in; then add some best white ginger, with the outside cut off, so as to make the syrup strong of the ginger. This should be boiled, and when cold put to the melon.

CURRANTS, Preserved.—Take ripe currants, free from stems; weigh them, and take the same weight of sugar; put a tea-cup of sugar to each pound of it; boil the syrup until it is hot and clear; then turn it over the fruit; let it remain one night; then set it over the fire and boil gently, until they are cooked and clear; take them into the jars or pots with a skimmer; boil the syrup until rich and thick; then pour it over the fruit. Currants may be preserved with ten pounds of fruit to seven of sugar. Take the stems from seven pounds of the currants, and crush and press the juice from the remaining three pounds; put them into the hot syrup and boil until thick and rich; put it in pots or jars, and the next day secure as directed.

CHERRIES, Preserved.—Take fine large cherries, not very ripe; take off the stems and take out the stones; save whatever juice runs from them; take an equal weight of white sugar; make the syrup of a tea-cup of water for each pound; set it over the fire until it is dissolved and boiling hot; then put in the juice and cherries; boil them gently until clear throughout; take them from the syrup with a skimmer and spread them on flat dishes to cool; let the syrup boil until it is rich and quite thick; set it to cool and settle; take the fruit into jars or pots and pour the syrup carefully over; let them remain open until the next day; then cover as directed. Sweet cherries are improved by the addition of a pint of red currant juice and a half pound of sugar to it, for four or five pounds of cherries.

DAMSONS, Preserved.—Put a quart of damsons into a jar with a pound of sugar strained between them; set the jar in a warm oven, or put it into a kettle of cold water and set it over the fire for an hour, then take it out; set to become cold, drain the juice off, boil it until it is thick, then pour it over the plums; when cold, cover as directed for preserves.

DEWBERRIES, Preserved.—Pick your berries early in the morning, weigh them, then spread them on dishes, sprinkle them with sugar in the due proportion assigned them (pound for pound). When the juice settles from them in the dishes, pour it off, and with it moisten the remainder of the sugar; simmer this over a slow fire, and, while simmering, drop in a portion of the berries; let them become clear, and return them to the dishes to cool while the remainder takes their place in the kettle. When all are clear, and the syrup boiled down to a rich consistency, pour it over them, and when cool enough, transfer them to glass jars.

GREENGAGES, Preserved.—Select well-grown greengages, but not the least ripe; prick them with a fork to the stone, and as soon as pricked, put them in water in a preserving-pan. When they are all done, put them over a slow fire to simmer very gently, so as to make them tender without breaking; try them with a fork, and when tender to the stone, put them in cold water, and as some will get soft before others they must be watched carefully;

let them lie in water a day and a night; strain then, and when well drained put them in an earthen pan and pour over them some boiling hot clarified sugar sufficient to cover them; put a paper over them; the next day pour off the syrup and boil it; if three quarts or thereabouts, boil for ten minutes, then pour it over the fruit and again lay the paper over them. Boil the syrup every other day in the same manner, until it is about the consistence of cream (in five or six boilings). If the syrup shrinks, so as not to keep the fruit well covered, add a fresh supply. While boiling the syrup the third time, put the greengages in, and let them simmer gently for a short time, which will bring them green; and the last time of boiling the syrup, let them simmer a little in it.

GOOSEBERRIES, Preserved.—Take full grown gooseberries before they are ripe, pick them and put them in wide-mouthed bottles; cork them gently with new, soft corks, and put them in an oven from which the bread has been drawn; let them stand till they have shrunk nearly a quarter, then take them out and beat the corks in tight; cut them off level with the bottle and resin them down close. Keep in a dry place.

GRAPES, Preserved, in Vinegar.—Grapes are preserved in vinegar by the Persians after the following fashion: The grapes are gathered when half ripe, and put into bottles half filled with vinegar, which so macerates them that they lose their hardness, and yet do not become too soft. The grapes have a sweet acid taste, which is not unpalatable, and especially refreshing during the great heats.

HUCKLEBERRIES, Preserved.—The huckleberries may be easily kept for winter use by putting them in bottles or cans, without adding anything to them and without cooking. The mouths of the cans should be tightly closed, and the cans should be buried mouth downward, in a box of sand. When taken out of the sand for use in the winter the color of the berries is slightly changed, but the shape and flavor are preserved in perfection. They make excellent pies.

GREEN GINGER, Preserved.—Scrape and clean your green ginger well; to each pound of green ginger put a pint and a

half of water; boil it down one-third; skim carefully while boiling, then strain off the liquid; add a pound of sugar-candy, and boil the ginger in it until quite tender.

MUSHROOMS, To Preserve.—The small open mushrooms suit best. Trim and rub them clean, and put into a stew pan a quart of the mushrooms, three ounces of butter, two teaspoonfuls of salt, and half a teaspoonful of Cayenne pepper and mace mixed; stew until the mushrooms are tender; take them carefully out and drain them on a sloping dish. When cold, press into small pots, and pour clarified butter over them. Put writing paper over the butter, and on that pour melted suet, which will exclude the air and preserve them for many weeks, if kept in a dry, cool place.

MOCK GINGER, Preserved.—Cut off the stalks of lettuce just going to seed, and peel off the strings, cut them in pieces two or three inches long, and throw them into water; after washing them, put them into sugar and water, mixed in the proportion of one pound of sugar to five pints of water, add to this quantity two large spoonfuls of pounded ginger. Boil the whole together for twenty minutes, and set it by for two days. Then boil it again for half an hour, and renew this five or six times in the same syrup. Then drain the stalks upon a sieve, and wipe them dry; have ready a thick syrup boiled, and make strong with whole ginger. Pour it upon the stalks boiling hot, boil them in it twice or thrice, or until they look clear, and taste like the West India ginger.

ORANGE-PEEL, Preserved.—Clean carefully; cut in thin strips; stew in water until the bitterness is extracted; drain off the water, and stew again for half an hour in a syrup of sugar and water, allowing a half-pint of water and a pound of sugar to each pound of peel. Put it aside in jars, and keep it in a cool place. If desired, a little cinnamon and ginger may be stewed with the peel, but it is more delicate cooked simply with sugar. Lemon-peel may be prepared in the same manner, either alone or mixed with orange-peel. These form pleasant "relishes" eaten with cake or bread, or if chopped finely when prepared, they form excellent flavoring for puddings and pies.

PEARS, Preserved.—Take six pounds of pears to four pounds of sugar, boil the parings in as much water as will cover them, strain it through the colander, lay some pears in the bottom of your kettle, put in some sugar, and so on, alternately; then pour the liquor off the pear-skins over, boil them until they begin to look transparent, then take them out, let the juice cool, and clarify it; put the pears in again, and add some ginger, prepared as in the above recipe; boil till done; let the liquor boil after taking them out, until it is reduced to a syrup.

PINE-APPLE, Preserved.—Choose ripe but sound ones, and cut them in slices about an inch in thickness, and cut off the rind. Weigh the slices, and to every two pounds of fruit put one pound and three-quarters of sifted white sugar. Boil them together in a preserving-pan for thirty minutes, and if the slices are tender, take them out carefully with a wooden spoon, and place them on a wooden dish; boil the syrup for a short time longer, and then pour it over the slices of pine-apple. This process must be repeated for three successive days, after which the preserves may be put into jars and covered.

PURPLE-PLUMS, Preserved.—Make a syrup of clean brown sugar; clarify it as directed in these recipes; when perfectly clear and boiling hot, pour it over the plums, having picked out all unsound ones and stems; let them remain in the syrup two days, then drain it off; make it boiling hot, skim it, and pour it over again; let them remain another day or two, then put them in a preserving-kettle over the fire, and simmer gently until the syrup is reduced, and thick or rich. One pound of sugar for each pound of plums. Small damsons are very fine, preserved as cherries or any other ripe fruit; clarify the syrup, and when boiling hot put in the plums; let them boil very gently until they are cooked, and the syrup rich. Put them in pots or jars; the next day secure as directed.

PEACHES, Preserved.—Take the peaches when ripe, pare them, and if you desire to preserve them whole, throw them into cold water as you pare them, so as to prevent them losing color. When you have everything ready, place the peaches in a can, adding as much sugar to each layer as will make them palatable. Then

set the can in a vessel containing hot water, and allow it to remain in boiling water until the fruit becomes heated through. This will require, if a quart can be used, from twenty to thirty minutes. When heated sufficiently, seal at once by heating the cover and pressing it at once firmly into place, and allowing a weight sufficient to keep down the cover to remain upon it until the cement hardens. The proper temperature of the lid is easily and conveniently ascertained by putting a piece of resin, about the size of a small pea, on the cover when it is put on the stove; as soon as the resin melts, the cover is ready to put in place. This precaution is necessary, as the solder with which the parts of the lid are joined together easily melts. It is not absolutely necessary to use sugar in this process, but as it assists in the preservation of the fruit, they can be sealed at a lower temperature than if not used. As sugar is used to render the fruits palatable, there can be no objection to using it when preparing the fruit for family use, as it will, in any case, be necessary, and there is no reason why the sugar should not be used before the can is sealed.

If soft peaches are preferred, they should be cut up as if intended to be eaten with cream, and must not be placed in water. When ready, they should be put in cans and heated as described above. It is not necessary to heat them in the can, but a larger quantity may be more conveniently heated together and put into the cans or jars while hot and sealed. A flat stewpan, lined with porcelain, will be found well adapted to this purpose. It must not, of course, be placed directly over the fire, but in a vessel of water which is set directly on the fire. By this means soft peaches may readily and certainly be preserved for winter use in such condition as scarcely to differ at all from the fresh peach. A most delicious dessert may thus be secured much more readily and at less expense, and much more palatable than the ordinary preserve. This method of preserving fresh peaches has been fully tested and may be relied upon.

QUINCES, Preserved, Whole or Half.—

Into two quarts of boiling water, put a quantity of the fairest golden pippins, in slices not very thin, and not pared,

but wiped clean. Boil them very quickly, close covered, till the water becomes a thick jelly; then scald the quinces. To every pint of pippin jelly, put one pound of the finest sugar; boil it and skim it clear. Put those quinces that are to be done whole into the syrup at once, and let it boil very fast; and those that are to be in halves by themselves; skim it, and when the fruit is clear, put some of the syrup into a glass to try whether it jellies before taking it off the fire. The quantity of quinces is to be one pound of sugar and one pound of jelly, already boiled with the sugar.

RHUBARB, Preserved.—Cut without peeling or splitting, six pounds of ordinary-sized rhubarb into pieces about an inch long; put it in with the rind of a lemon, into the stewpan, in which must be about a tablespoonful of water to keep it from burning; let it boil till tender, then, with a strainer, take out the fruit, and add to the juice five pounds of sugar; boil this forty minutes, then again put in the fruit and boil ten minutes. This is a delicious preserve.

RASPBERRIES, Preserved.—These may be preserved wet, bottled, or made jam or marmalade of, the same as strawberries. Raspberries are very good dried in the sun or in a warm oven. They are very delicious stewed for table or tarts.

STRAWBERRIES, Preserved.—Use ripe strawberries, but not soft. Make a syrup of one pound of sugar to a pound of berries. Sugar should be double-refined (though refined sugar will answer), as it makes the preserves have a more brilliant color than simply refined sugar. To each pound of sugar put a tea-cup of water; set it over a gentle fire and stir it until totally dissolved. When boiling hot put in the fruit, having picked off every hull and imperfect berry; then boil very gently in a covered kettle, until by cutting one open, you find it cooked through; that will be known by it having the same color throughout. Take them from the syrup with a skimmer and spread them on flat dishes, and let them remain till cold; boil the syrup until quite thick; then let it cool and settle; put the fruit into jars or pots, and strain or pour the syrup carefully over, leaving the sediment which will be at the bottom of the pitcher. The next day cover with several

papers wet with sugar boiled to candy; set them in a cool, airy place. Strawberries keep perfectly well made with seven pounds of sugar to ten of fruit. They should be done as directed above, and the syrup cooked quite thick. A pint of red currant juice and a pound of sugar for it to three pounds of strawberries, make the syrup very beautiful.

TOMATOES, Preserved.—Scald the tomatoes, take off the skins. Weigh the tomatoes, which must be full grown and ripe. Allow to every two pounds of the best brown sugar, a large spoonful of ground ginger and the juice and rind of one large lemon. Mix the tomatoes and sugar and white of one egg together, and put in a porcelain kettle. Boil slowly till the scum ceases to appear; then add gradually the juice and grated rind of the lemons and boil slowly for an hour or more. The tomatoes must all have burst by this time. When done take them off, and when cool put them in jars.

WALNUTS, Preserved.—Pierce your nuts several times with a fork and boil them in water until they begin to be tender; take them out of the water, and when cold make a hole through every one with a pretty large bodkin, and introduce a piece of candied lemon or citron. Make a syrup of brown sugar and a little water (the sugar to the weight of your nuts) and boil your nuts well until the sugar has penetrated to the centre; then put them into preserving pots, filling them with a thick syrup, and tie them up like jellies.

PEACHES, Canned, by the Cold Process.—Pare and halve the peaches. Pack them as closely as possible in a can without any sugar. When the can is full, pour in sufficient cold water to fill all the crevices between the peaches, and reach the top of the can. Let it stand long enough for the water to soak into all the crevices—say five hours—then pour in water to replace what has sunk away. Seal up the can, and all is done. Peaches preserved in this way retain all their freshness and flavor. There will not be enough water in them to render them insipid. If preferred, a cold syrup could be used instead of pure water, but the peaches taste most natural without any sweetening.

FRUIT, in Brandy.—Gather your fruit before it is quite ripe; prick them with a pin on each side; put them into a stew-pan of fresh spring water, and stew them gently until you can pass a pin with facility to the stone of the fruit, when take them from the pan and put them to drain on a sieve. Whilst draining, prepare a syrup, which, when the fruit is nicely arranged in a tureen, should be thrown on it boiling hot, and so left for twenty-four hours, when the fruit is again put to a drain, and the syrup boiled for one hour, and poured boiling hot over the fruit once more. On the third day arrange the fruit in the preserving pots, and boil the syrup to a proper consistency; when cool, mix it with brandy, in the proportion of two-thirds syrup to one-third brandy, and pour it over the fruit.

FRUIT, Bottled.—Cherries, strawberries, sliced pine apples, plums, apricots, gooseberries, etc., may be preserved in the following manner, to be used as fresh fruit: Gather the fruit before it is very ripe; put it in wide-mouthed bottles made for the purpose; fill them as full as they will hold, and cork them tight; seal the corks; put some hay in a large sauce-pan; set in the bottles with hay between them to prevent their touching; then fill the sauce-pan with water to the necks of the bottles, and set it on the fire until the water is nearly boiling, then take it off; let it stand until the bottles are cold; then keep them in a cool place until wanted, when the fruit will be found equal to fresh.

FRUIT, To Keep Fresh in Jars.—

We advise the use of self-sealing glass jars. Put the fruit in a porcelain-lined preserving kettle, sufficient to fill four quart jars; sprinkle on sugar, one-half pound; place over a slow fire and heat through, not boiled. While the fruit is being heated, keep the jars filled with moderately hot water. As soon as the fruit is ready, empty the water from the jars, fill to the brim with fruit, and seal immediately. As it cools a vacuum is formed, which prevents bursting. In this way every kind of fruit will retain its flavor. Sometimes a thick, leathery mold forms on the top—if so, all the better. The plan of keeping the jars full of hot water is merely to prevent the danger of cracking when the hot fruit is insert-

ed. Some prefer to set the bottles full of cool water in a boiler of water, and heating all together gradually; but the other way is much simpler and equally effective.

JAM.—Let the jam be drawn on a dry day; wipe the fruit clean, but do not wash it; peel off the skin and coarse fibres, and slice the fruit thin. To each pound thus prepared allow a pound of fine sugar in fine powder; put the fruit in a pan, and stew a quarter of the sugar amongst it and over it; let it stand until the sugar is dissolved, when boil it slowly to a smooth pulp; take it from the fire, and stir in the remainder of the sugar by degrees; when it is dissolved, boil the preserve quickly until it becomes very thick, and leaves the bottom of the pan visible when stirred. The time required for preserving this preserve will depend on the kind of fruit used, and the time of year it is made. It will vary from an hour to two hours and a quarter. The juice should be slowly drawn from it first.

JAM, To be Put up while Hot.—It is said that ordinary jam—fruit and sugar which have been boiled together some time—keeps better if the pots into which it is poured are tied up while hot. If the paper can act as a strainer, in the same way as cotton wool, it must be as people suppose. If one pot of jam be allowed to cool before it is tied down, little germs will fall upon it from the air, and they will retain their vitality, because they fall upon a cool substance; they will be shut in by the paper, and will soon fall to work decomposing the fruit. If another pot, perfectly similar, be filled with a boiling-hot mixture, and immediately covered over, though, of course, some of the outside air must be shut in, and germs which are floating in it will be scalded, and in all probability destroyed, so that no decomposition can take place.

JELLY.—To make a quart, soak one ounce of gelatine in a pint of cold water for twenty minutes, then add the same quantity of boiling water, stir until dissolved; add the juice and peel of two lemons, with enough sugar to sweeten; have ready, well beaten, the white and shell of one egg, stir these briskly into the jelly, then boil for two minutes without stirring it; remove it from the fire,

and allow it to stand twenty minutes, then strain through a coarse flannel bag; this jelly may be flavored or colored according to taste.

JELLY, Custard.—To one cupful of any sort of jelly, add one egg, and beat well together with three teaspoonfuls of cream or milk. After mixing thoroughly, bake in a good crust.

JELLY, Fruit in.—Put in a basin a half pint of calf's-foot jelly; and when it has become stiff, lay in a bunch of grapes, with the stalks upwards, or fruit of any kind; over this put a few vine leaves, and fill up the bowl with warm jelly; let it stand till next day, and then set the bowl in water up to the brim for a moment; then turn out carefully. It is an elegant looking dish.

JELLY, with Gelatine.—Take two ounces and three-quarters of gelatine, dissolved in about a quart of water, four lemons, one pound of loaf sugar, nearly half a bottle of raisin wine, or a little brandy, and less of the wine, a little white of egg is necessary to clear it, as the egg takes from the stiffness of the jelly. Boil together, strain through a jelly-bag, and put into a mold.

JELLY, Isinglass.—Two ounces of isinglass to a quart of water; boil till it is dissolved; strain it into a basin upon a slice of lemon-peel pared very thin, six cloves and three or four lumps of sugar; let this stand by the fire for an hour; take out the lemon and cloves, and then add four table spoonfuls of brandy.

JELLY, To Color.—To color jelly red, boil fifteen grains of cochineal, in the finest powder, with a drachm and a half of cream of tartar, in half a pint of water, very slowly half an hour. Add, in boiling, a bit of alum the size of a pea.

JELLIES, To Preserve from Mold.—Cover the surface one-fourth of an inch deep with fine pulverized loaf sugar. When thus protected, the jellies will keep for years in good condition, and free from moldiness.

MARMALADE.—Pare and cut up the fruit in small pieces, and to a pound of fruit add a pound of sugar. When the sugar is dissolved, set it over the fire, and let it boil till it is a smooth paste. Stir it all the time it is boiling. If you wish to flavor, add any essence you de-

sire. Put it in the jars while warm, and paste them over the next day.

WINE, Apple.—Take pure cider made from sound ripe apples as it runs from the press; put sixty pounds of common brown sugar into fifteen gallons of the cider, and let it dissolve; then put the mixture into a clean barrel, and fill the barrel up to within two gallons of being full, with clean cider; put the cask in a cool place, leaving the bung out for forty-eight hours; then put in the bung, with a small vent, until fermentation wholly ceases, and bung up tight; and in one year the wine will be fit for use. This wine requires no racking; the longer it stands upon the lees, the better.

WINE, Apricot.—Wipe clean and cut twelve pounds of apricots; boil them in two gallons of water till the water has imbibed the flavor of the fruit, then strain the liquor through a hair sieve, and to each quart of it put six ounces of loaf sugar; then boil it and add six pounds sugar and one pound of sliced beet-root. When fermented, put into the cask a quart or more of brandy or flavorless whisky.

WINE, Blackberry.—Gather the berries when perfectly ripe, and in such a manner as to avoid bruising. Empty them, as fast as gathered, into a tub until you have a quantity sufficient to fill, with juice, the cask in which you propose to make the wine.

Have the utensils, etc., required in the process, all ready before you pick—or at least before you mash your berries. Everything must be scrupulously clean. You want a keg, a beater of seasoned hard wood, a pail, a large bowl, tureen or other vessel into which to strain your juice, a good thick strainer—two or three folds of fine white flannel is the best material—a couple of yards of Osnaburgs, a spare tub or a bucket or two, and a tub of soft spring water. Everything must be perfectly clean and free from dirt or odor of any kind.

Crush the berries thoroughly with the beater, and then after straining the liquor, which runs freely from the pulp through the folded flannel, empty it into the cask, measuring it as you put it in. When the juice has been all drained from the pulp, you proceed to press the pulp dry. If the quantity is large, this had best be done by a regular press, but if only

a few gallons are wanted, the Osnaburg answers very well. Stretch out the Osnaburg, put a gallon or a gallon and a half of the pulp into the center, fold the cloth over it on each side, and let a strong hand at either end twist the cloth with all their strength; when the juice is well pressed out, remove and lay aside the cake of pomace, and put in more pulp. This process is apparently rough, but is both rapid and effectual. The juice so extracted is strained and measured into the cask as before mentioned. The flannel strainer and the Osnaburg may need rinsing occasionally during the work.

When all the pulp is pressed, put the hard cakes of pomace taken from the cloth into a tub, and pour upon them a little more soft spring water than you have clear juice; break up the balls and wash them thoroughly in the water, so as to obtain all the juice left in the mass, and then strain it clear; measure out as many gallons of this water as you have of clear juice, say five gallons of the water to five gallons of the juice, dissolve in each gallon of the water six pounds of sugar (brown or white, as you want a common or first-rate wine,) and when thoroughly dissolved, add the juice (first passing it again through the strainer), and mix them. Then rinse out your cask, put it where it can stand undisturbed in a cellar; fill it perfectly full of the mixture, and lay a cloth loosely over the bung-hole. In two or three days fermentation will commence, and the impurities run over at the bung; look at it every day, and if it does not run over, with some of the mixture which you have reserved in another vessel, fill it up to the bung. In about three weeks fermentation will have ceased, and the wine be still; fill it again, drive in the bung tight, nail a tin over it, and let it remain undisturbed until the following November, or what is better, March. Then draw it off, without shaking the cask, put it into bottles or demijohns, cork tightly and seal over.

For a ten-gallon cask, you will need about $4\frac{2}{3}$ gallons of juice, $4\frac{2}{3}$ gallons of water, and 26 pounds of sugar, and in the same proportion for larger or smaller quantities. Some persons add spirit to the wine, but instead of doing good, it is only an injury.

Another process is, after pouring in the mixture for a ten-gallon cask, to beat up the whites of two or three eggs into a froth, put them into the cask, and with a long stick mix them thoroughly with the wine. In five or six days, draw the now clarified wine off by a spigot, and without shaking the cask at all, into a clean cask, bung up and tin, to be drawn off into glass in November or March.

The more carefully your juice is strained, the better the quality of sugar, and the more scrupulously clean your utensils, particularly your kegs, are, the purer and better will be your wine.

The best quality, when you gather your own fruit, and make it yourself, costs you only the price of the white sugar, and when bottled will cost you in money about twelve and a half cents a bottle.

WINE, Currant. — The currants should be fully ripe when picked; put them into a large tub, in which they should remain a day or two; then crush with the hands, unless you have a small patent wine press, in which they should not be pressed too much, or the stems will be bruised, and impart a disagreeable taste to the juice. If the hands are used, put the crushed fruit, after the juice is poured off, in a cloth or sack and press out the remaining juice. Put the juice back into the tub after cleansing it, where it should remain about three days, until the first stages of fermentation are over, and removing once or twice a day the scum copiously arising to the top. Then put the juice in a vessel—a demijohn, keg, or barrel—of a size to suit the quantity made, and to each quart add 3 lbs. of the best yellow sugar, and soft water sufficient to make a gallon.

Thus, ten quarts of juice and 30 lbs. of sugar will give you 10 gals. of wine, and so on in proportion. Those who do not like sweet wine can reduce the quantity of sugar to two and a half, or who wish it very sweet, raise to three and a half pounds per gallon.

The vessel must be full, and the bung or stopper left off until fermentation ceases, which will be in 12 or 15 days. Meanwhile, the cask must be filled up daily with currant juice left over, as fermentation throws out the impure matter. When fermentation ceases, rack the wine off carefully, either from the spigot or

by a syphon, and keep running all the time. Cleanse the cask thoroughly with boiling water, then return the wine, bung up tightly, and let it stand 4 or 5 months, when it will be fit to drink, and can be bottled if desired.

All the vessels, casks, etc., should be perfectly sweet, and the whole operation should be done with an eye to cleanliness. In such event, every drop of brandy or other spirituous liquors added will detract from the flavor of the wine, and will not, in the least degree, increase its keeping qualities. Currant wine made in this way will keep for an age.

WINE, Gooseberry. — Pick and bruise the gooseberries, and to every pound, put a quart of cold spring water, and let it stand three days, stirring it twice or thrice a day. Add to every gallon of juice three pounds of loaf sugar; fill the barrel, and when it is done working, add to every twenty quarts of liquor, one quart of brandy, and a little isinglass. The gooseberries must be picked when they are just changing color. The liquor ought to stand in the barrel six months. Taste it occasionally, and bottle when the sweetness has gone off.

WINE, Grape. — Take two quarts of grape juice, two quarts of water, four pounds of sugar. Extract the juice of the grape in any simple way; if only a few quarts are desired, we do it with a strainer and a pair of squeezers, if a larger quantity is desired, put the grapes into a cheese press made particularly clean, putting on sufficient weight to extract the juice of a full hoop of grapes; being careful that none but perfect grapes are used, perfectly ripe and free from blemish. After the first pressing put a little water with the pulp and press a second time, using the juice of the second pressing with the water to be mixed with the clear grape juice. If only a few quarts are made place the wine as soon as mixed into bottles, filling them even full and allow to stand in a warm place until it ferments, which will take about thirty-six hours usually; then remove all the scum, cool and put into a dark, cool place. If a few gallons are desired place in a keg, but the keg must be even full, and after fermentation has taken place and the scum removed, draw off and bottle, and cork tight.

BEE-KEEPERS' GUIDE.

APIARY, Establishment of an.—The proper time for this purpose is about February, or the beginning of March, as the stocks have then passed through the winter in safety; the combs are then empty of broods, and light of honey, and may be removed with safety and ease. Stocks should be selected by a competent judge, as the weight alone cannot always be relied on; such as weigh 12 lbs. and upwards, the number of Bees being also observed, and that they are well combed to near the bottom, may be safely chosen. As soon as they are brought home they should be set in the Bee-house, care being taken to keep them dry and free from the attacks of vermin. The best time for removing stocks is in the evening. Swarms should be brought home the same evening they are purchased, for if delayed a day or two, the combs will be worked, and subject to be broken in removing.

BEE-KEEPING, Success in.—Success in bee-keeping, as well as success in everything else, depends so much upon taking hold of it the right way and sticking to it with a determination to succeed, that we will offer a few suggestions, which may be of use to the new beginner.

A person commencing bee-keeping, as well as anything else, had better begin moderately. Two or three, or perhaps four hives, are as many as it would be safe in a majority of cases to commence operations with. These may be purchased of any bee-keeper who has them to spare; or what may be better, have hives made such as you want, and engage some neighbor who keeps bees to put his earliest swarms in them. If the former plan is adopted, March or April is a good time to select and take them home. Choose hives under five years old, and that are strong in bees; by rapping smartly on a hive early in the morning, or any time in a cold day, you can judge pretty well of its strength; if there is a vigorous buzzing in answer to the raps, it is probably well

supplied with bees; if the rap is but feebly responded to, better try another. They can be taken home any cool day, by shutting them in the hive. If the most approved system is to be adopted, the movable comb hive will have to be procured. If common hives are to be used, twelve inches square by fourteen high, inside measurement, is a good size. No one should commence bee-keeping without profiting as much as possible by the experience of others, as found in books and agricultural papers. Lanstroth's work on "The Hive and Honey Bee" should be owned and read by every bee-keeper. Many are afraid to commence bee-keeping on account of the moth. After learning its habits, any intelligent, industrious person can keep as free from it as he can keep his cornfield free from weeds.

BEE, Pasturage.—The first of March brings the blossoms of the white and sugar maple, quaking asp, elm and some varieties of the willow. April brings with it the perfumed blossoms of the wild plum, cherry and peach, followed by the rose-scented apple blossoms of our tame orchards, and the no less perfumed and honey-yielding crab apple blossoms of our groves and forests. With the floral month of May come flowers innumerable, that yield an enormous quantity of finely flavored honey. Besides the flowers, there is the honey-yielding blossoms of the black and honey locusts, white haw, wild black cherry, raspberry, blackberry and box elder. In June we have, added to the large number of wild flowers, the honey-laden blossoms of our meadows and pastures. The white and red clover blossoms that grow not only in our meadows and pastures, but which are found covering all waysides and outlands, yield an abundant harvest. During the latter part of the month of July, all sources of honey measurably fail, until the fore part of August, which brings,

among other sources, the snow-white blossoms of buckwheat. This is raised to a considerable extent here, and is the richest harvest of the year. It usually lasts till frost.

The meagre supply of honey from flowers and blossoms during the latter part of July might, to the casual observer, be considered an injury to the honey bee and its business of making honey; but a little further observation shows that it is not the case. About this time the comb is filled, and the honey that has already been gathered is to be sealed over and secured; the brood of young ones is to be nurtured and matured to supply the place of those which have gone forth in swarms; pollen, or bee bread—that is furnished principally, at this time, by corn tassels—is to be laid up for the next spring's brood, then to be reared, and the industrious bee takes this opportunity to gather and store it up. After the early frosts there is not much honey to be collected, except from the yellow blossoms fall which now appear amid the faded verdure of decaying nature. But now the weather is too cold for gathering honey, and the bee only struggles for a time with the chilling winds of autumn, then ends the campaign and returns to winter quarters.

The following list comprises some of the plants from which bees gather honey and pollen during the feeding seasons:

SPRING.—Willow, alder, aspen or poplar, elm, maple, marsh-marigold, hepatica, anemone, dandelion, erythronium, service berry, currant, gooseberry, strawberry, peach, cherry, apple, pear, China tree, black gum, whortleberry, cottonwood, cornel or dogwood, narcissus, honey-suckle, oak, red bud, hazle, yellow jasmine, sweet myrtle, magnolia, hawthorn, box-elder, locust, azalea.

SUMMER.—Red clover, white clover, raspberry, blackberry, cockspur, thorn, whortleberry, black-haw, self-heal, azalea, sour-wood, cinquefoil, cucumber, narrow-leaved plantain, horse chestnut, strawberry, pea, honey-kew, (on live oak,) chincapin, persimmon, linden, bee-balm, maize, sorghum, heliotrope, iron weed, smart weed, butterfly weed, viper's bugloss, cotton plant, buckwheat, sumac, catnip, Spanish needles, beggar's lice, boneset, starwort, silk weed, thistle, sage,

cardinal flower, balsam, mountain mint, sweet marjoram, lavender, spearmint, peppermint, thyme, dandelion, chickweed, pennyroyal, sweet clover, speedwell, poppy, turnip, hollyhock, sunflower, dahlia, phlox.

AUTUMN.—Aster, golden rod, dandelion, white clover, red clover, cinquefoil, chickweed, pennyroyal, artichoke, phlox, chrysanthemum.

BEES, Common or Black, vs. Italian.—

We are satisfied that the Italian bees are superior to the common or black bees, first, in the prolificness of their queens; this is marked. Italian hives will be strong in spring, and throw off swarms from one to two weeks before the common bees. The great preventive of the ravages of the moth is to keep your hives strong; this very prolificness of the Italian queen keeps the hives strong. Seldom do we find moth worms in an Italian hive. Second, in vigor and energy. They commence work earlier in the morning; this is easily tested. Let a box with comb be exposed to the bees, the first bees that visit it in the morning, though there may not be more than one hive of Italians in twenty, will be the Italians, and they will be the last to leave it at night. This superior energy and vigor enables them to store more honey than the common bee. Third, in keenness of scent. This is also marked. Few who have kept the Italians have failed to notice this peculiarity. Let a dish of honey be exposed in a room with an open door or window, during the scarcity of honey, and the first bee that approaches it is sure to be an Italian. And fourth, in amiability of disposition. This has been questioned, and we will acknowledge that they are not always the quiet, gentle creatures that some have represented them to be. Excite their anger, and the same vigor and energy that leads them to work earlier and later than the common bee will make them more furious and less easily quieted, but my own experience is that they are rather more peaceable than the common bee. That they work on red clover any more readily than the common bee, we have not been able to see yet. But to conclude, the Italianizing of an apiary of common bees adds, in our humble opinion, fully one-third to its working powers.

BEES, Supplying with a Queen.—Three weeks are required for supplying a colony with a queen when lost. The queen is very frequently lost when she goes out for the purpose of being impregnated, and as she has destroyed all the unhatched queens, and there is no worker brood, the loss must be repaired by the owner. The loss is made sufficiently plain, and when the young queens are a week old, the hives should have attention paid to them morning and evening. The bees run about on the hive, fly away a short distance and return, and for the time being, all is confusion both within and without the hive. The swarm should now be given some worker brood from some other hive, or, better still, a fertile queen. The best way to introduce the queen to a new colony is, to cover her with honey water. If a queen survives her second year, it is best to remove her, to give place to a younger and more vigorous one. The keeper who allows his stock to remain without queens, is too careless to succeed.

BEES, Swarms Going to the Woods.—They may be prevented from doing so by keeping the hive shaded and cool, and close to the bottom board, except about an inch in front. If a difficult case, set in the cellar from forty-eight to seventy-two hours, and give them, perhaps, from a pound to two pounds of honey.

BEES, Swarming to Prevent.—Immediately after the issue of the first swarm, open the hives, (you must have movable frames for this,) destroy every royal cell but one. If at the end of five days this has not hatched, look over the combs again, and destroy every royal cell that may now appear, excepting the one saved at first. But if the oldest of the young queens is allowed to hatch and begin piping before anything is done, the fever of swarming will rise to such a pitch, that you cannot allay it, and the old hive may even be left destitute. The best way is to make the first swarm an artificial one, before or soon after queen cells are started. Then at the end of nine days, destroy all cells but one, as above. To prevent first swarms, clip the wings of the queen, and put a "queen yard" in front of the hive—a shallow box some two feet square, with edges of tin projecting inward, so that no bee can get out and away from the hive

without flying. This will, of course, prevent the escape of the queen, and swarms will return.

BEES, Enemies of the.—Domestic fowls are destroyers of bees, and also some birds, from whose attacks as they range the fields at a distance from the hive they cannot be protected. Among these is the titmouse, or blue tom-tit, which devours the bees, and feeds his young with them; and in winter is said to endeavor to force his way into the hive itself. Mice are often very troublesome, and even rats sometimes make their way into the hive. Slugs and snails often occasion much trouble; and especially in warm summer evenings, the attacks of wasps and hornets are a great annoyance to the bees. In all these cases, care and vigilance can do much. Wasps' nests ought to be destroyed wherever met with; insects of all kinds, such as earwigs, woodlice, ants, etc., should be cleared away. In a word, the hives and stands for them ought to be kept as clean and neat as possible.

BEE MOTH or WAX WORM.—Large hawk-moths sometimes enter a bee hive for what honey they can get, and even mice have been known to enter a hive; while several parasites live upon the bees themselves. But by far the worst enemy the bee-keeper has to contend with, is the bee-moth. This insect is so well known to bee men generally that it scarcely needs a description. It suffices to say, that the color of the moth is dusky gray, the fore wings which are scalloped at the end, being more or less sprinkled and dotted with purple-brown. The female is generally a good deal larger than the male, though there is not so much difference between the sexes as some writers have supposed. The worms which produce these moths are of an ash-gray color above, and yellowish-white beneath.

The bee moth was first introduced into this country from Europe about the commencement of the present century, and it was in all probability imported with the common bee hive. There are two broods of the moth each year, the first brood appearing in May and June, and the second, which is the most numerous, in August. During the day time these moths remain quietly ensconced in some angle of the hive, but as night approaches they become active, and the female uses her best

endeavors to get into the hive, her object being to deposit her eggs in as favorable place as possible. Wire-gauze contrivances are of no avail to keep her out, as she frequently commences flying before all the bees have ceased their work. But even if she were entirely prevented from entering the hive, she could yet deposit her eggs on the outside, or by means of her extensile ovipositor, thrust them in between the slightest joint or crack, and the young worms hatching from them would readily make their way into the hive. The moment the worm is hatched it commences spinning a silken tube for its protection, and this tube is enlarged as it increases in size. This worm cuts its channels right through the comb, feeding on the wax, and destroying the young bees on its way. When full-grown, it creeps into a corner of the hive or under some ledge at the bottom, and forms a tough white cocoon, of silk intermingled with its own black excrement. In due time the mouth emerges from this cocoon.

A worm-infested hive may generally be known by the discouraged aspect which the bees present, and by the bottom-board being covered with pieces of bee-bread mixed with the black gunpowder-like excrement of the worm. It must not be forgotten, however, that in the spring of the year pieces of bee-bread at the bottom of a hive, when not mixed with the black excrement, is not necessarily a sign of the presence of the worm, but, on the contrary, may indicate industry and thrift. If a hive is very badly infested with the worm, it is better to drive out the bees and secure what honey and wax there may be left, than to preserve it as a moth breeder to infest the apiary. If put into a new hive, the bees may do something, and if they do not, there is no loss, as they would have perished, finally, from the ravages of the worm.

It should invariably be borne in mind that a strong stock of bees is ever capable of resisting, to a great extent, the attacks of the worm; while a starved or queenless swarm is quite indifferent to its attacks. In a common box hive, a good way to entrap the worms after they are once in the hive, is to raise the front upon two small wooden blocks, and to put a

piece of woollen rag between the bottom board and the back of the hive. The worms find a cozy place under the rag, in which they form their cocoons, and may there may be found and killed, from time to time. Much can be done in the way of prevention, by killing every morning the moths which may be found on the outside of the hives. At this time of the day they allow themselves to be crushed, with very good grace; and if two or three be killed each morning, they would form an important item at the end of the year, especially when we recollect that each female is capable of furnishing a hive with at least 300 eggs. In conclusion, we give it as our conviction that immunity from the ravages of this bee-worm can only be guaranteed where a thorough control is had of both hive and bees; hence the importance of the movable frame hive.

BEES, Swarming, Artificial vs. Natural.

—Which is the best? It is probably well known to all who have heard of the movable comb hive that one of the advantages claimed for it is that of being able with it to divide your bees, or, in other words, to swarm them artificially. Those who are using the old box hives, nail kegs, hollow logs, etc., sometimes question whether an artificial swarm is as good as a natural one. Actual trial of the two modes, under equal circumstances, will alone decide. Last year the writer tried both thoroughly, and could see difference in results. There are several things in favor of artificial swarming. 1st. All swarms can be made early, and it is well known that an early swarm is worth far more than a late one. 2d. Swarms can be made at will—in other words, a person does not have to watch his bees all spring, and then have some of his best hives fail of swarming, or lose their swarms. This feature of the moveable comb hive renders bee keeping more pleasant and safe to the business man who wishes to keep bee hives enough to supply his family with honey. How many have been deterred from keeping bees by the trouble of watching them during swarming time, and then of being taken from their business to hive them after they are swarmed? 3d. Artificial swarms when made properly are more apt to remain than natural swarms. 4th.

They are more easily made, as a general thing, than natural swarms are hived. How often has the bee-keeper, while getting ready to hive a swarm, been troubled with having swarm after swarm issue and persist in clustering together? We have had as many as four clusters together in one monstrous swarm. Then the question is what to do with them? To hunt up even two queens and put them in two hives is tedious business—to run them into three or four hives at a venture runs the risk of getting all the queens in one hive, when the other bees will either leave or join the hive with the queens. There is considerable loss in hiving two or three prime swarms together, unless the honey season is short or the swarms very small. Artificial swarming saves all of this, makes a certainty of increase of stocks, and having few, if any, late swarms. We say few, if any, because with a large number of hives, occasionally a hive that has been divided will throw off a swarm, but the two cases are so few that they are hardly worth mentioning.

BEES, Swarming, Artificial.—This should be undertaken only when honey is abundant in the fields and the nights warm. To divide them, have a hive at hand of the same size and pattern as your others. Then from four hives take each two frames and place them in the new hive, supplying them in the old with empty frames. Then move a hive which you have not disturbed, a rod or more away to a new place, and place the new hive where that one stood. This should be done in the fields. These will come in loaded to their old place, and find it strange; and as it contains stores and young bees hatching, and eggs from which to rear another queen, they will at once proceed to rear one, and remain and work as contended as ever. This process may be repeated every two weeks until you have secured sufficient increase. The hives from which you take the combs, and the ones which you move to a new place, will lose so many bees that they will not think of swarming, but will energetically make up their loss, and be better than if nothing had been taken from them. This is the safest of all ways to divide bees, and can be safely practiced by beginners.

BEES, Swarming of.—It is generally

supposed that a hive will not swarm until most, if not all, of the cells are so filled that the queen has no place to lay her eggs, and as this is not apt to happen unless bees are gathering honey freely, it is useless to look for swarms, particularly in the spring, until warm, dry weather, as either cold or wet weather is unfavorable for the secretion of honey. Swarms seldom or never issue until at least one queen cell is capped over.

Those using the movable comb hive can by examining the frames every few days tell almost to a certainty when to expect a swarm, though occasionally bees will change their mind and permit the queen to destroy the royal cells.

No rattling of pans or any other noise is needed to make a swarm settle; in fact, I never was able to satisfy myself that throwing dirt or water among the bees ever had any tendency to make them settle, though others think it will.

The sooner bees are hived after clustering, the better the chances are of their remaining with you.

Hives need no rubbing with leaves or salt to induce bees to go into them; be sure they are clean, and free from cobwebs.

There is another thing very necessary, the lack of which has caused the loss of many a swarm of bees, and that is a cool hive.

After hiving a swarm, put the hive on a ventilating bottom board; it should not be raised, as bees are more inclined to remain in the hive if the ventilation is from below, and the entrance the only place they can get out. The hive should be well shaded, and in very warm weather sprinkling or syringing with water frequently will help keep the hive cool, and, of course, have a tendency to make the bees satisfied with their new home.

Occasionally a swarm will leave a hive when it seems as if all had been done that could be to keep them. If a swarm appears determined to "secede," put a box of honey on it, shut it up on its ventilating bottom board, and take it into the cellar, keeping it there, four or five days; it might be well to give water by putting a dish full under the bottom board and pressing it up to the wire screen, then the bees can help themselves.

We never knew a swarm desert a hive

after remaining in it four days (unless an accident happened, such as melting down the comb,) by that time there is brood which bees will seldom leave.

It may be necessary to explain what a bottom board is: it is simply a bottom board with a six or eight inch square cut out of the centre and a wire cloth tacked over it.

BEE QUEEN, Fertilization of the.—The idea is just this—a young queen will be fertilized in confinement if shut up about the time she would have flown, providing, of course, that a drone of the right sort is confined with her.

It is necessary to make a fertilizer of some kind large enough to allow the queen and drones to fly around in. It is best to make them of fine wire cloth, say twelve inches long by seven inches in diameter—size immaterial.

If coarse wire cloth is used in making them, the queen will be apt to be caught and held by the workers until she starves; workers sometimes pull the wings and legs from their own queen. We mention this so that the necessity for using fine wire cloth may be seen.

A wire cloth dish cover, ten inches in diameter, is just the thing for the purpose; they cost but little and can be easily fixed by fitting a piece of thin board in the bottom, in which a door large enough to put in one's hand should be made. Fasten on the inside of the fertilizer a piece of empty comb (drone comb is best) three or four inches square, which, when required for use, fill with honey and water—taking pains not to drop any honey in the fertilizer, or the queen and the drones will become daubed up so as to prevent them from flying.

From close observations it has been discovered that in the spring and summer young queens leave the hive to meet the drones for impregnation, usually on the fifth day; in the fall months they very seldom leave until seven or eight days old.

On the morning of the day that a queen is to leave the hive put her with four or five drones into the fertilizer.

In selecting the drones to be put with young queens, great care should be taken to choose only those that are strong, vigorous and well marked, and they should be caught as they are about to leave the

hive—those returning from a trip are generally too tired to be serviceable.

Having got the queen and the drones in the fertilizer and everything fixed, lay it over the frames of the hive to which the queen belongs, so that the heat from the hive can get into it. If a dish cover fertilizer is used, put the round side downward.

Put on the cap, which should have an opening in the side or top, covered with glass to admit light.

Leave her there thirty-six or forty-eight hours—a shorter time usually answers; when a dead drone is found, examine it, and if the generative organ is gone, the queen can be released, when she will go down into the hive and begin to lay in a few days, or she can be introduced to a nuclei hive, which can be done in a minute by giving the bees in the nuclei a dose of smoke, where she can be kept until wanted.

Fertilizers can be put on any hive, and two or three can be put on at a time if the space is large enough.

If any are in doubt about their queens becoming fertile, they can easily prove the matter by clipping the wings of the queen; or, better still, confining her with all the bees until she begins to lay.

We had over one hundred queens mated this season, in complying with the above directions, twenty of which were mated before our eyes.

Those that go to work and raise a large batch of queens in nurseries, and expect to have them fertilized by the wholesale, need not be surprised to find out that they have got a large sized elephant on their shoulders, and that instead of accomplishing their object, they lose the whole lot.

In our opinion, it is best to allow young queens to run with the workers until four days old, when the queen bees and all can be confined until the queen is ready to be put into a fertilizer, or she could be caught and put into a queen cage until six or seven days old, when there could be some prospect of success.

We have endeavored to describe the methods as minutely as possible, and in as "come-at-able" way as we know how.

Those having an accurate and thorough knowledge of the nature and habits of the bee, will not only succeed with it,



APIARY.



WORKING BEE.



QUEEN BEE.



DRONE BEE.

but should try all the experiments within their power to perfect the method for the benefit of apiarians generally.

BEE MILLER, to Destroy.—To a quart of water, sweetened with honey or sugar, add a gill of vinegar, and set in an open vessel on the top or by the side of the hive. When the miller comes in the night he will fly into the mixture and be drowned.

BEES, Different Kinds of.—There are three kinds of bees in every hive—viz., the queen, the drones, and the workers.

The queen bee is the mother of all the bees in the hive, and is the only perfect female, and is readily distinguished from all the others by her long body, short wings, and yellow abdomen. There is but one queen bee in a hive, and in case she is lost, the industry of the hive is stopped until preparations are completed for hatching another. The queen leaves the hive when she is seven or eight days old, for the purpose of meeting the male bee, is impregnated, and then never leaves the hive again, except with a swarm. Queens are the only bees that live more than one season, and they sometimes live three years, and they have been known to exist for five years. They are, if supplied with good cells, capable of laying over one hundred thousand eggs in a season. The queen always goes out with a swarm, and if by accident she becomes lost, the bees immediately return to the hive which they left.

Drones are male bees. Large numbers are reared in each hive, but are destroyed after the honey season is over, and the young queens have been impregnated. They are the consumers, not the producers—they do not labor, but are drones. They are somewhat larger and more clumsy than the workers, and sometimes number as high as several thousand to a hive.

The workers are the bees who do the work of the colony. For two weeks after they are hatched they work inside the hive; after that they go out to gather honey. During the working season, a bee of this class seldom lives over two months, so that during a season a colony is several times, with the exception of the queen, changed. A good swarm should number from twenty-five to thirty thousand bees, and previous to swarming they often num-

ber from forty to fifty thousand. This bee has a poisonous sting, which in self-defence they will use, but if carefully handled they will not sting. The workers, when absent from their hives, will not use their sting unless they cannot escape without it, and especially when swarming, they can be even brushed, handled, shaken, and, unless likely to be crushed, is this the case. When filled with honey at any time they will not sting, even in defence of their hives and treasures. They are smaller than the drone, and have a little sac for storing honey, and little baskets on their legs for pollen.

BEES, Wintering.—Bees require so little care and attention at the very time other stock require the most, that they are very apt to be entirely neglected; but we know of no stock so much benefited by a little labor rightly directed as bees. It is generally supposed that twenty-five pounds of honey, after the first of November, is sufficient to winter a hive of bees in this latitude in the open air; if the spring is late and wet, thirty pounds is barely enough. But our most successful apiarians find that it pays to build a house for wintering bees, or to partition off a room in the cellar. We have a room eight by ten feet, ceiled perfectly tight, with floor cemented. Two ventilating tubes, one from the bottom at one corner, the other from the opposite corner at the top; both opening out doors with slides to regulate ventilation. A thermometer hung to a slide running through the door so as to be drawn out and examined without opening the door, gives us the temperature without disturbing the bees; we have four tiers of shelves. The hives are taken from their bottom boards, caps or boxes taken off, and placed upon strips of laths to raise them from the shelves so as to give ventilation; the holes in the top for honey boxes are left open. The shelves are movable so as to be taken down or put up to facilitate operations. We wintered ninety-two hives in this room last winter without the loss of one.

BEE, Hat.—This hat, which is very useful to keepers of bees, is made by sewing a strip of cloth to the edge of a common stiff brim hat, sufficiently long to button under the coat. Over the face sew in the cloth a piece of wire gauze.

Let the gauze be coarse enough to keep the bees from entering, and it will not obstruct the sight.

BEE, Drones, in Swarming.—Mr. Quimby, one of the best bee men in the country, speaks thus in regard to drones: "A strong colony of bees, with a fertile queen, and abundance of honey on hand, will rear drones at the commencement of warm weather, usually in May. Yet but few swarm then in this latitude. If honey should become scarce between fruit blossoms and clover—it does sometimes—the mature drones are destroyed, and even the chrysalis is often dragged out and sacrificed. When honey is again abundant in the flowers, more eggs are deposited in the drone-cells. The swarm may issue before the drone appears. When a stock has too little honey to afford to rear drones until the flowers yield it, they will occasionally swarm before drones appear. The appearance of drones is not a certain indication of swarming. But when they are destroyed, it indicates that honey is scarce, and no swarms need be expected at such time. If it occurs late in the season, they may not swarm, although they may rear drones. A hive that has not reared any drones until the flowers yield honey, is much more likely to swarm than one that has destroyed them once. The queen does not lay drone eggs exclusively at any time, but a number of both drone and worker eggs daily for months in some seasons. Drones do not appear to control the swarming. We consider so many of them a useless horde of consumers, and take measures to prevent the bees from rearing so many. We find that if the queen lays her eggs in drone-cells they hatch out drones; if in worker cells, they are workers. Acting on this hint, we cut out all the combs from a box-hive, transferring them to movable frames, rejecting drone-combs, and without them they can raise no drones."

BEES, Feed for.—Should the weather be favorable, every stock should be examined about the first of February. Should any one be in want of food, it should be supplied. If in a box or gum hive, thin pieces of white sugar candy can be slightly pushed between the combs through an opening in the top. Honey or good sugar syrup can be given by

means of a saturated sponge or comb, filled with honey, placed at the opening on top, being careful to cover with a box, to keep out outside bees. In movable frame-hives, frames of honey from other hives having it to spare, is most convenient, and any required quantity can be given to the various feeders through the honey board. This feeding should be kept up, or food enough should be given for the bees and their brood until honey can be gathered from forage outside. As soon as bees begin to fly freely, stimulating should begin, which may be accomplished as in feeding for stores, except the feed should be given every day about sundown, and not more than three table-spoonsful of honey or four of syrup should be given at any one time. This should be done, whether the bees have an abundance of honey in their hives or not. The bees getting a little every day, it produces much the same effect as honey gathered from the field, which stimulates and promotes early brood.

Another important feed for bees is unbolted flour, or, what is better, rye-meal, which supplies the want of pollen (bee bread) for the larvæ brood of the hive.

This meal is given to the bees on a waiter, or wide plank having strips nailed on the edges to prevent waste, and should be placed in or near the apiary, out of the wind, and in the sun as much as possible.

Should the bees be tardy in finding the meal, put a piece of empty comb on the meal, or a few drops of honey on the plank, and when found the bees will pack it on their legs and take it to their hives every warm day with great avidity, until they can get pollen from the blossoms.

The effect is to produce large and early broods, strengthening weak stock, and making all strong with young bees in good time for the honey harvest, giving earlier and larger swarms, and greatly increasing the amount of surplus honey.

White clover, buckwheat, the linden-tree, golden-rod, and aster furnish good food. White clover and the linden-tree yield the best honey. Alsike clover is sown extensively for this purpose, and not only supplies honey for the bees, but hay and forage for the farm stock. It produces a great abundance of honey of fine quality, yields two crops of hay a year,

and continues to bloom till the frost comes. The Italian bee is said to prefer it to white clover.

BEE HIVES, the Best.—Mr. M. Quinby, the noted bee culturist, prefers the movable-comb bee-hive on account of its special fitness for removing the honey, feeding the bees, and for artificial swarming. Bees generally store much more honey than their necessities require. With this hive each sheet of comb may be taken out when it is filled, and the bees will restore it; or the comb may be emptied of its honey by means of a machine for that purpose, and the empty combs replaced. In this case the bees will need only to fill the old comb-cells. This makes a great saving of labor for the bees, as they will collect thirty pounds of honey in the time it would take to make one pound of comb. It is estimated that a swarm of bees, when supplied with the comb, as may be done with the movable comb-hive, will store more than two hundred pounds of honey in a favorable season.

How to MAKE.—The shape of a box-hive should be long from front to rear, fifteen inches deep, twelve inches wide, and the same in height. Inch boards unplanned are the best, and the boards should be well seasoned and carefully put together. The hive should set in a groove in the bottom board and not be fastened to it. Place two or three half-inch sticks, crossing each way in the middle of the hive, aids to support the combs. One-quarter inch from the top of the hive, fasten slats four to six inches in width of one-half inch stuff, leaving cracks from one-fourth to one-third inch in width between them. Over the top of the hive place a cover projecting on every side, and fasten the same to the hives by means of small hooks, which not only gives you a movable top and bottom board, but also a honey board. This is as near a movable comb hive as we can mention.

BEE HIVES, Position of.—So far as our experience goes, it is better that the hive should be near the ground. All of our hives are on the ground, or separated from it only by a board. The comb does not mold. The weary and heavy laden bee returning late at evening not seldom misses the entrance, and falls to the ground. Though chilled, they can still

crawl into the hive, whereas, if it were high they would never reach it. Weeds must not be allowed in front, nor high grass. Neither is it very important in what direction the hive faces. If it fronts the south in the summer the heat of the entrance is too great, and in winter the bees are invited forth by the sun in unsuitable times. If the west, the high winds of summer and winter dash them to the ground, and the setting sun invites them forth when they should remain at home. If the north, they get to work too late of a morning, and quit too soon at night, besides other objections. If the east, some think they get to work too soon, and many are lost, chilled by the morning dews. I think the east or southeast less objectionable than any other. It is the early bird that catches the worm. Many plants, such as buckwheat, and our yellow prairie flowers, are rich in honey in the morning only; whereas after ten o'clock, unless the day is cloudy or moist, the fount of honey is dry. Neither would this aspect tempt them forth too late in the evening. Many bees foraging after sundown are lost and never return. My Italians have been found watering three miles from home as a regular thing. A neighbor found them at that distance, and lined them home, supposing he had found a wild Italian hive; and yet there was plenty of water at all times within a stone's throw of their home.

BEE HIVES, Common.—The common box hive is the one most generally used. It is usually made of one and a half inch pine boards, though other materials are used, according to the taste of the maker or the cost of the material. The size of the hive varies much, but generally contains two hundred cubic inches, with cross-bars placed in the center to aid in supporting the combs. In general, they are simple boxes. This form is varied at times, however, by placing on the top of the hive drawers or boxes for surplus honey. In these hives the bees are left to take care of themselves, as very little can be done to aid them. The old-fashioned basket or straw hive is seldom used, and it will soon be wholly discarded, save by a few bee-keepers, who may retain it rather as a curiosity than for any practical use.

In the Southern States the favorite form

of hive is the "gum." This consists of a hollow log, generally a portion of a cypress stump, about two feet in length and a foot in diameter; upon the top of the hollow is placed a board, and at the bottom is cut a small notch for the entrance of the bees, and the hive is complete. Three-fourths of the hives in these States are of this description. This form of hive served the purpose before the appearance of the moth or foul-brood, but no reliance can now be placed upon it. If the moth is gaining the upper hand, foul-brood raging, honey supply low, or queen lost, there is no remedy—the bees must perish. The do-nothing system in bee-keeping, as in other branches of agriculture, will lead to the ruin of the bee-keeper. Those apiarians who use the movable-comb hive and a scientific method of bee-keeping have been the most successful.

HONEY.—The color of the honey shows whether it is fine or inferior. If it be wanted to press some in the comb, choose the fairest and those that have not been broken; wrap each comb in white paper, such as lines the blue cover of loaf-sugar. Set it edgewise as it stood in the hive, and it may be preserved many months. The combs meant to be drained must be cut in slices. Lay them on a hair-search, supported by a rack over the jar, in which the honey is to remain; for the less it is stirred after drainage the better it keeps.

Fill the jar to the brim, as a little scum must be taken off when it has settled. A bladder well washed in lukewarm water ought to be laid over the double fold of white paper with which it is covered.

HONEY, to Take, without Destroying the Bees.—In the dusk of the evening, when the bees are quietly lodged, approach the hive and turn it gently over. Having steadily placed in it a small pit, previously dug to receive it, with its bottom upward, cover it with a clean, new hive, which has been properly prepared, with a few sticks across the inside of it, and rubbed with aromatic herbs. Having carefully adjusted the mouth of each hive to the other, so that no aperture remains between them, take a small stick and beat gently around the sides of the lower hive for about ten minutes or a quarter of an hour, in which time the bees will leave

their cells in the lower hive, ascend and adhere to the upper one. Then gently lift the new hive, with all its little tenants, and place it on the stand from which the other was taken. This should be done some time in the week preceding mid-summer-day, that the bees may have time before the summer flowers have faded to lay in a new stock of honey, which they will not fail to do for their subsistence through winter.

BEES, Queen, Rearing of.—Premising that you use movable frames, make a number of small frames, as near 4 or 5 inches square as may be, to just fit inside one of your large ones. Fill with clean worker comb—that which has been frozen is the best, because the eggs of the moth will have been thus destroyed—and put the large frame containing these small ones in the middle of some stock with a fertile queen from which you wish to breed. Provide also some small boxes on the plan of a simple movable frame hive, with loose top and rabbeting for the frames, and just the size to accommodate three or four of them. When eggs have been deposited in the combs, set up one of your small boxes with them as a hive in miniature, and confine in it between a pint and quart of bees. They will immediately construct queen cells, and may then be opened. In this way any number of queens may be provided.

BEES, Foul-Brood.—Putrid foul-brood is a disease which attacks the young brood of the hive, showing itself fully after the larvæ have been sealed up. It may be known by the viscous, gelatinous and yeast-like appearance of the decomposing brood, the unpleasant odor arising from the hive, and by the sunken covers of the cells. The cause of foul-brood has been, until recently, involved in doubt, but late discoveries in Germany have thrown much light upon its origin. Mr. Lamprecht alleges that he has discovered the cause of the disease. His theory is this: "The chyme, which the workers prepare from honey and pollen by partial digestion, and with which the larvæ are fed, contains a nitrogenous, plastic, formative substance, from which all the organs and tissues of the larvæ are derived and composed; . . . and precisely because of this its complicated composition it is peculiarly susceptible of rapid

decomposition when exposed to air and moisture; that is, to undergo fermentation and putrefaction. It is hence obvious that pollen, even though having undergone only partial decomposition, must affect the bodies of bees and larvæ differently from what it did or would do in its natural condition; and there is no longer a doubt that it is from pollen, thus partially decomposed, that the foul-brood originates. That it can readily undergo decomposition is manifest. Moisture, emanating in part from unsealed honey, and in part from the perspiration of the bees, becomes condensed in the hive from external cold, and in the fall and toward spring it is frequently found hanging in drops on the combs, just as we find it condensed on the windows of our dwelling-houses. If one of these drops falls into a cell containing pollen, decomposition of the latter speedily commences, and is then communicated by the bees to the pollen in the other cells; and the cause of foul-brood is hence abundantly present in a hive thus circumstanced."

There is no cure for this disease when it has once obtained headway. Destruction of the bees and honey and thorough purification of the hive is the only remedy to prevent the spread of the disease. As a means of preventing the disease, Dr. Preuss gives the following directions: Feed no fermenting honey; feed no meal, especially when the hive is threatened with disease; destroy carefully every particle of dead and moldering matter: and avoid weakening bees during the brooding seasons, so that they will not be able properly to maintain the heat necessary for the development of the brood.

With the light now thrown upon the

nature of this disease by these recent discoveries, bee-keepers may be able to conquer the contagious malady whenever it makes its appearance.

BEEES, Ages of.—The queen passes the period of about three days in the egg and five as a worm; the workers then close her cell, and she immediately begins to spin her cocoon, which takes her from twenty to twenty-four hours. On the tenth and eleventh days, and perhaps a part of the twelfth day, she seems to be exhausted by her hard labor. She now remains in almost complete repose; she then passes four or five days as a nymph, and on the fifteenth to the sixteenth day a perfect queen is attained. Much depends upon the strength of the colony and the heat of the season, which will vary it from one to two days.

The drone passes three days in the egg, and about six in the worm, and changes into a perfect insect on the twenty-fourth day after the egg is laid. Much depends upon the strength and heat of the colony, which should be about 70° Fahrenheit for their speedy development. They lie in rather a dilatory state for several days after they hatch before taking wing.

The working bee spins its cocoon in about thirty-six hours. After passing three days in the egg in this state of preparation for a new life, it gradually undergoes a great change, and becomes armed with a firmer body, with scales of a brownish color, and somewhat fringed with light hairs. On its belly it has six rings or scales. After it has reached the twenty-first day of existence—reckoning from the egg—it comes forth from the cell on the twenty-first to the twenty-second day a perfect insect, and is termed an imago.

ACCIDENTS AND INJURIES,

AND

HOW TO MEET THEM.

As ACCIDENTS are constantly liable to occur, the importance of knowing how best to meet the various emergencies that may arise can hardly be over-estimated. In all cases, and under all circumstances, the best help to assist a party in this trying moment is *presence of mind*.

BITES.—See WOUNDS.

BITES, Harvest Bug.—The best remedy is the use of benzine, which immediately kills the insect. A small drop of tincture of iodine has the same effect.

BITES and Stings of Insects.—Such as bees, wasps, hornets, etc., although generally painful, and oftentimes causing much disturbance, yet are rarely attended with fatal results. The pain and swelling may generally be promptly arrested by bathing freely with a strong solution of equal parts of common salt and baking soda, in warm water; or by the application of spirits of hartshorn; or of volatile liniment (one part of spirits of hartshorn and two of olive oil). In the absence of the other articles, warm oil may be used; or, if this is not at hand, apply a paste made from fresh clay-earth. If the sting of the insect is left in the wound, as is frequent—the case, it should always be extracted. If there is faintness, give some stimulant; as, a table-spoonful or two of brandy and water, or brandy and ammonia.

BITES, Mad Dog.—1. Take immediately warm vinegar or tepid water; wash the wound clean therewith and then dry it; pour upon the wound, then, ten or twelve drops of muriatic acid. Mineral acids destroy the poison of the saliva, by which means the evil effects of the latter are neutralized. 2. Many think that the only sure preventive of evil following the bite of a rabid dog is to suck the wound

immediately, before the poison has had time to circulate with the blood. If the person bit cannot get to the wound to suck it, he must persuade or pay another to do it for him. There is no fear of any harm following this, for the poison entering by the stomach cannot hurt a person. A spoonful of the poison might be swallowed with impunity, but the person who sucks the place should have no wound on the lip or tongue, or it might be dangerous. The precaution alluded to is a most important one, and should never be omitted prior to an excision and the application of lunar caustic in every part, especially the interior and deep-seated portions. No injury need be anticipated if this treatment is adopted promptly and effectively. The poison of hydrophobia remains latent on an average six weeks; the part heals over, but there is a pimple or wound, more or less irritable; it then becomes painful, and the germ, whatever it is, ripe for dissemination into the system, and then all hope is gone. Nevertheless, between the time of the bite and the activity of the wound previous to dissemination, the caustic of nitrate of silver is a sure preventive; after that it is as useless as all the other means. The best mode of application of the nitrate of silver is by introducing it solidly into the wound.

BITES, Serpents.—The poison inserted by the stings and bites of many venomous reptiles is so rapidly absorbed, and of so fatal a description, as frequently to occasion death before any remedy or antidote can be applied; and they are rendered yet more dangerous from the fact that these wounds are inflicted in parts of the country and world where precautionary

measures are seldom thought of, and generally at times when people are least prepared to meet them. 1. In absence of any remedies, the first best plan to adopt on being bitten by any of the poisonous snakes is to do as recommended above in Mad Dog Bites—viz., to wash off the place immediately; if possible, get the mouth to the spot, and forcibly suck out all the poison, first applying a ligature above the wound as tightly as can be borne. 2. A remedy promulgated by the Smithsonian Institute is to take 30 grs. iodide potassium, 30 grs. iodine, 1 oz. water, to be applied externally to the wound by saturating lint or batting—the same to be kept moist with the antidote until the cure be effected, which will be in one hour, and sometimes instantly. 3. An Australian physician has tried and recommends carbolic acid, diluted and administered internally every few minutes until recovery is certain. 4. Another Australian physician, Professor Halford, of Melbourne University, has discovered that if a proper amount of dilute ammonia be injected into the circulation of a patient suffering from snake-bite, the curative effect is usually sudden and startling, so that, in many cases men have thus been brought back, as it were, by magic, from the very shadow of death.

BLEEDING OF WOUNDS. See Cuts.

BLEEDING AT THE NOSE.—1. Roll up a piece of paper, and press it under the upper lip. 2. In obstinate cases blow a little gum Arabic up the nostrils through a quill, which will immediately stop the discharge; powdered alum is also good. 3. Pressure by the finger over the small artery near the ala (wing) of the nose, on the side where the blood is flowing, is said to arrest the hemorrhage immediately.

BLEEDING FROM THE LUNGS.—A New York physician has related a case in which inhalation of very dry persulphate of iron, reduced to a palpable powder, entirely arrested bleeding from the lungs, after all the usual remedies, lead, opium, etc., had failed. A small quantity was administered by drawing into the lungs every hour during part of the night and following day.

BLEEDING FROM THE BOWELS.—The most common cause of this, when not a complication of some disease, is

hemorrhoids or piles. Should serious hemorrhage occur, rest and quiet, and cold water poured slowly over the lower portion of the belly, or cloths wet with cold water, or better, with ice water applied over the belly and thighs, and to the lower end of the bowels, will ordinarily arrest it. In some cases it may be necessary to use injections of cold water, or even put small pieces of ice in the rectum.

BLEEDING FROM THE MOUTH.—

This is generally caused by some injury to the cheeks, gums or tongue, but it sometimes occurs without any direct cause of this kind, and no small alarm may be caused by mistaking it for bleeding from the lungs. Except when an artery of some size is injured, bleeding from the mouth can generally be controlled by gargling, and washing the mouth with cold water, salt and water, or alum and water, or some persulphate of iron may be applied to the bleeding surface. Sometimes obstinate or even alarming bleeding may follow the pulling of a tooth. The best remedy for this is to plug the cavity with lint or cotton wet with the solution of persulphate of iron, and apply a compress which may be kept in place by closing the teeth on it.

BLEEDING FROM THE STOMACH.—

Vomiting blood.—Hemorrhage from the stomach is seldom so serious as to endanger life; but as it may be a symptom of some dangerous affection it is always best to consult a physician concerning it. In the meantime, as in all other varieties of hemorrhage, perfect quiet should be preserved. A little salt, or vinegar, or lemon juice, should be taken at intervals, in a small glass of fresh cool water, or ice-water, as ice may be swallowed in small pieces, and cloths wet with ice-water, or pounded ice applied over the stomach.

BLEEDING FROM VARICOSE VEINS.—Serious and even fatal hemorrhage may occur from the bursting of a large varicose or “broken” vein. Should such an accident occur, the bleeding may be best controlled, until proper medical aid can be procured, by a tight bandage, or a “stick tourniquet,” remembering that the blood comes toward the heart in the veins, and from it in the arteries. The best thing to prevent the rupture of vari-

cose or broken veins is to support the limb by wearing elastic stockings, or a carefully applied bandage.

BURNS and SCALDS.—There is no class of accidents that cause such an amount of agony, and none which are followed with more disastrous results.

1. By putting the burned part under cold water, milk, or other bland fluid, instantaneous and perfect relief from all pain will be experienced. On withdrawal, the burn should be perfectly covered with half an inch or more of common wheaten flour, put on with a dredging-box, or in any other way, and allowed to remain until a cure is effected, when the dry, caked flour will fall off, or can be softened with water, disclosing a beautiful, new and healthy skin, in all cases where the burns have been superficial.

2. Dissolve white lead in flaxseed oil to the consistency of milk, and apply over the entire burn or scald every five minutes. It can be applied with a soft feather. This is said to give relief sooner, and to be more permanent in its effects, than any other application. 3. Make a saturated solution of alum (four ounces to a quart of hot water). Dip a cotton cloth in this solution and apply immediately on the burn. As soon as it becomes hot or dry, replace it by another, and continue doing so as often as the cloth dries, which at first will be every few minutes. The pain will immediately cease, and after twenty-four hours of this treatment the burn will be healed, especially if commenced before blisters are formed. The astringent and drying qualities of the alum will entirely prevent their formation.

4. Glycerine, five ounces; white of egg, four ounces; tincture of arnica, three ounces. Mix the glycerine and white of egg thoroughly in a mortar, and gradually add the arnica. Apply freely on linen rags night and morning, washing previously with warm castile soap-suds. 5. Take one drachm of finely powdered alum, and mix thoroughly with the white of two eggs and one teacup of fresh lard; spread on a cloth, and apply to the parts burnt. It gives almost instant relief from pain, and, by excluding the air, prevents excessive inflammatory action. The application should be changed at least once a day. 6. M. Joel, of the Children's Hospital, Lausanne, finds that

a tepid bath, containing a couple of pinches of sulphate of iron, gives immediate relief to young children who have been extensively burned. In a case of a child four years old, a bath repeated twice a day—twenty minutes each bath—the suppuration decreased, lost its odor, and the little sufferer was soon convalescent. 7. For severe scalding, carbolic acid has recently been used with marked benefit. It is to be mixed with thirty parts of the ordinary oil of lime water to one part of the acid. Linen rags saturated in the carbolic emulsion are to be spread on the scalded parts, and kept moist by frequently smearing with a feather dipped in the liquid. Two advantages of this mode of treatment are, the exclusion of air, and the rapid healing by a natural restorative action without the formation of pus, thus preserving unmarred the personal appearance of the patient—a matter of no small importance to some people.

CHOKING.—In case of choking, a violent slap with the open hand between the shoulders of the sufferer will often effect a dislodgment. In case the accident occurs with a child, and the slapping process does not afford instant relief, it should be grasped by the feet, and placed head downwards, and the slapping between the shoulders renewed; but in case this induces violent suffocative paroxysms it must not be repeated. If the substance, whatever it may be, has entered the wind-pipe, and the coughing and inverting the body fails to dislodge it, it is probable that nothing but cutting open the wind-pipe will be of any avail; and for this the services of a surgeon should always be procured. If food has stuck in the throat or gullet, the forefinger should be immediately introduced; and if lodged at the entrance of the gullet, the substance may be reached and extracted, possibly, with the forefinger alone, or may be seized with a pair of pincers, if at hand, or a curling tongs, or anything of the kind. This procedure may be facilitated by directing the person to put the tongue well out, in which position it may be retained by the individual himself, or a bystander by grasping it, covered with a handkerchief or towel. Should this fail, an effort should be made to excite retching or vomiting by passing the fin-

ger to the root of the tongue, in hopes that the offending substance may in this way be dislodged; or it may possibly be effected by suddenly and unexpectedly dashing in the face a basin of cold water, the shock suddenly relaxing the muscular spasm present, and the involuntary gasp at the same time may move it up or down. If this cannot be done, as each instant's delay is of vital importance to a choking man, seize a fork, a spoon, a pen-holder, pencil, quill, or anything suitable at hand, and endeavor to push the article down the throat. If it be low down in the gullet, and other means fail, its dislodgment may sometimes be effected by dashing cold water on the spine, or vomiting may be induced by an emetic of sulphate of zinc (twenty grains in a couple of table-spoonfuls of warm water), or of common salt and mustard in like manner, or it may be pushed into the stomach by extemporizing a probang, by fastening a small sponge to the end of a stiff slip of whale-bone. If this cannot be done, a surgical operation will be necessary. Fish bones or other sharp substances, when they cannot be removed by the finger or forceps, may sometimes be dislodged by swallowing some pulpy mass, as masticated bread, etc. Irregular-shaped substances, a plate with artificial teeth for instance, can ordinarily only be removed by surgical interference.

COLIC.—Use a hot fomentation over the abdomen, and a small quantity of ginger, peppermint or common tea. If not relieved in a few minutes, then give an injection of a quart of warm water with twenty or thirty drops of laudanum, and repeat it if necessary. A half teaspoonful of chloroform, in a table-spoonful of sweetened water, with or without a few drops of spirits of lavender or essence of peppermint, will often give prompt relief.

CONVULSIONS.—In small children convulsions frequently happen from teething, sometimes from worms or from some irritating substance within the stomach or bowels, and sometimes from some affection of the brain.

When a child has convulsions place it immediately in a warm or hot bath, and sponge its head with cold water. Then apply a hot mustard plaster to the wrists, ankles and soles of the feet, or, in case a plaster cannot be obtained, apply a cloth

wrung out of hot mustard water. Allow these to remain until the skin reddens, and use care that the same do not blister. After the fit has subsided, use great care against its return by attention to the cause which gave rise to it.

Convulsions in adults must be treated in accordance with the manner which gave rise to them. During the attack, great care should be given that the party does not injure himself, and the best preventive is a cork or a soft piece of wood, or other suitable substance, should be placed between the teeth to prevent biting the tongue and cheeks; tight clothing must be removed or loosened; mustard poultices should be applied to the extremities and over the abdomen; abundance of fresh air should be secured by opening windows and doors, and preventing unnecessary crowding of persons around; cold water may be dashed on the face and chest; and if there be plethora, with full bounding pulse, with evidence of cerebral or other internal congestion, the abstraction of a few ounces of blood may be beneficial.

CRAMP.—Spasmodic or involuntary contractions of the muscles, generally of the extremities, accompanied with great pain. The muscles of the legs and feet are those most commonly affected with cramp, especially after great exertion. The best treatment is immediately to stand upright, and to well rub the part with the hand. The application of strong stimulants, as spirits of ammonia, or of anodynes, as opiate liniments, has been recommended. When cramp occurs in the stomach, a teaspoonful of sal volatile in water, or a dram glassful of good brandy, should be swallowed immediately. When cramp comes on during cold bathing, the limb should be thrown out as suddenly and violently as possible, which will generally remove it, care being also taken not to become flurried nor frightened, as presence of mind is very essential to personal safety on such an occasion. A common cause of cramp is indigestion, and the use of acedent liquors; these should be avoided.

CUTS.—In case the flow of blood is trifling, stop the bleeding by bringing the edges of the wound together. If the flow of blood is great, of a bright vermilion color, and flows in spurts or with a

jerk, an artery is severed, and at once should pressure be made on the parts by the finger (between the cut and the heart), until a compress is arranged by a tight ligature above the wounded part. Then the finger may be taken off, and if the blood still flows, tighten the handkerchief, or other article that forms the ligature, until it ceases. If at this point the attendance of a physician or surgeon cannot be secured, take strong silk thread, or wax together three or four threads, and cut them into lengths of about a foot long. Wash the parts with warm water, and then with a sharp hook or small pair of pincers in your hand, fix your eye steadfastly upon the wound, and directing the ligature to be slightly released, you will see the mouth of the artery from which the blood springs. At once seize it, draw it out a little, while an assistant passes a ligature round it, and ties it up tight with a double knot. In this way take up in succession every bleeding vessel you can see or get hold of. If the wound is too high up in a limb to apply the ligature, do not lose your presence of mind. If it is the thigh, press firmly on the groin; if in the arm, with the hand-end or ring of a common door-key make pressure above the collar-bone, and about its middle, against its first rib, which lies under it. The pressure should be continued until assistance is procured and the vessel tied up. If the wound is on the face, or other place where pressure cannot effectually be made, place a piece of ice directly over the wound, allowing it to remain there until the blood coagulates, when it may be removed, and a compress and bandage be applied.

After the bleeding is arrested the surrounding blood should be cleared away, as well as any extraneous matter; then bring the sides of the wound into contact throughout the whole depth, in order that they may grow together as quickly as possible, retaining them in their position by strips of adhesive plaster. If the wound be deep and extensive, the wound itself and the adjacent parts must be supported by proper bandages. The position of the patient should be such as will relax the skin and muscles of the wounded part. Rest, low and unstimulating diet, will complete the requirements necessary to a speedy recovery.

DEATH, How to Distinguish.—As many instances occur of parties being buried alive, they being to all appearance dead, the great importance of knowing how to distinguish real from imaginary death need not be explained. The appearances which mostly accompany death, are an entire stoppage of breathing, of the heart's action; the eye-lids are partly closed, the eyes glassy, and the pupils usually dilated; the jaws are clenched, the fingers partially contracted, and the lips and nostrils more or less covered with frothy mucus, with increasing pallor and coldness of surface, and the muscles soon become rigid and the limbs fixed in their positions. But as these same conditions may also exist in certain other cases of suspended animation, great care should be observed, whenever there is the least doubt concerning it, to prevent the unnecessary crowding of the room in which the corpse is in, or of parties crowding around the body; nor should the body be allowed to remain lying on the back without the tongue being so secured as to prevent the glottis or orifice of the windpipe being closed by it; nor should the face be closely covered; nor rough usage of any kind be allowed. In case there is great doubt, the body should not be allowed to be inclosed in the coffin, and under no circumstances should burial be allowed until there are unmistakable signs of decomposition.

Of the numerous methods proposed as signs for real death, we select the following: 1. So long as breathing continues, the surface of a mirror held to the mouth and nostrils will become dimmed with moisture. 2. If a strong thread or small cord be tied tightly around the finger of a living person, the portion beyond the cord or thread will become red and swollen—if dead, no change is produced. 3. If the hand of a living person is held before a strong light a portion of the margin or edges of the fingers is translucent—if dead, every part of it is opaque. 4. A coal of fire, a piece of hot iron, or the flame of a candle, applied to the skin, if life remains, will blister—if dead, it will merely sear. 5. A bright steel needle introduced and allowed to remain for half an hour in living flesh will be still bright—if dead, it will be tarnished by oxidation. 6. A few drops of a solution of

atropia (two grains to one-half ounce of water) introduced into the eye, if the person is alive, will cause the pupils to dilate—if dead, no effect will be produced. 7. If the pupil is already dilated, and the person is alive, a few drops of tincture of the calabar bean will cause it to contract—if dead, no effect will be produced.

DISLOCATIONS.—These injuries can mostly be easily recognized: 1. By the deformity that the dislocation gives rise to by comparing the alteration in shape with the other side of the body. 2. Loss of some of the regular movements of the joints. 3. In case of dislocation, surgical aid should be procured at once. While waiting the arrival of a physician the injured portion should be placed in the position most comfortable to the patient, and frequent cold bathing, or cloths wrung out of cold water, applied to the parts affected, so as to relieve suffering and prevent inflammation.

DROWNED, to Restore Persons, Apparently.—In the treatment of cases of apparent death, either from drowning or suffocation, no time is to be lost. Every moment is precious, and what is done must be done promptly and energetically.

Send for blankets and dry clothing, and instantly and on the spot proceed to treat the patient, keeping off the crowd which frequently surrounds in such cases, and give the patient all the fresh air possible, exposing the face, neck and chest to the wind, except in severe weather, removing all clothing from the neck and chest, and also the suspenders, if a man. Remember the points to be aimed at are, first and immediately, the restoration of breathing, and secondly, when breathing is restored, the promotion of warmth and circulation. If you promote warmth and circulation beyond drying the skin and removing the wet clothing before you restore the natural breathing, restoration of life will be engendered.

To restore breathing, cleanse the mouth and nostrils, place the patient gently on the ground or floor with the face downward for a moment, putting one of the arms under his forehead, by which position all fluids will more readily escape from the mouth, and the tongue will fall forward, leaving the entrance into the wind-pipe free; draw forth the patient's tongue and keep it forward by passing an

elastic band over the tongue and under the chin, or a piece of string or tape may be used for the same purpose; assist this operation by wiping and cleansing the mouth. If satisfactory breathing should now commence, use the treatment described below to promote warmth and circulation; but if there should be only slight breathing, or no breathing, or if the breathing fail, then excite breathing by turning the patient on one side, supporting the head and exciting the nostrils with snuff or hartshorn, if at hand, or tickling the throat with a feather, etc. Rub the face and chest warm, and dash cold water, or better still, alternately warm and cold water, on the face and chest. If still no success follows, lose not a moment, but instantly proceed to imitate breathing. Replace the patient on the face, raising and supporting the chest well on a folded coat or other firm pillow, letting one person attend solely to the movements of the head, keeping a hand under it; then turn the body gently on the side and a little beyond, and then on the face again, repeating these movements cautiously, efficiently and perseveringly, every four or five seconds, occasionally varying the side. By placing the body on the face, the weight of it forces the air out, and when turned on the side and the pressure removed, the air is enabled to enter the chest. On each occasion that the body is replaced on the face, make uniform but efficient pressure on the back, between and below the shoulder blades, but taking away the pressure immediately the body is turned on the side again. The result of this treatment will be, if not too late, to produce natural breathing, and consequently life. Whilst the above operations are being carried on, let the patient's hands and feet be dried, and as soon as blankets or dry clothing can be procured, strip the body and cover with the blankets and continue the operation as described, which must continue steadily and uninterruptedly.

If, however, these efforts should not prove successful in from three to four minutes, proceed to produce breathing in the method recommended by Dr. Sylvester, as follows: Place the patient on the back on a flat surface, inclined a little upward from the feet, supporting the head

and shoulders on a small firm cushion, as a folded coat, placed under the shoulder blades. Keep the tongue still projecting as before directed; then let an operator stand at the patient's head, grasp the arms just above the elbows, and draw the arms gently and steadily upwards until they meet above the patient's head (this is for the purpose of drawing air into the lungs), and keep the arms in this position for two seconds. Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest; repeat these measures alternately, deliberately and perseveringly, about fifteen times a minute, until a natural effort to breathe is perceived, when you may immediately cease and proceed at once to induce warmth and circulation. Commence rubbing the limbs upwards, with a firm, grasping pressure and energy, using handkerchiefs, flannels, etc. Continue the friction under the blankets, or even over the dry clothing, if that has been put on. Promote the warmth of the body with hot flannels or hot bricks, or bottles filled with hot water and placed under the arm-pits, between the thighs, and at the soles of the feet. Be careful not to expose the patient to any draught, but let the room be well ventilated. On restoration to life, a teaspoonful of warm water should be given, and when power of swallowing has returned, small quantities of wine, warm spirits and water, or coffee should be administered. Keep the patient in bed, and any disposition to sleep should be encouraged. In carrying out the above treatment, avoid rough usage, be careful to keep the tongue out, and do not desist in your treatment until all hope and chance are gone, for persons have been restored by the above treatment after many hours' perseverance.

The following are the rules for the restoration of persons apparently dead from drowning, given by Dr. Benjamin Howard, of New York city, and sanctioned by the Metropolitan Board of Health, of the city of New York:

1. Unless in danger of freezing, never move the patient from the spot where first rescued, nor allow bystanders to screen off the fresh air, but instantly wipe clean the mouth and nostrils, rip and remove all clothing to a little below the waist, rapidly rub and dry the exposed

part, and give two quick, smarting slaps on the stomach with your open hand. If this does not succeed immediately, proceed according to the following rules to perform artificial breathing:

2. Turn the patient on his face, a large bundle of tightly-rolled clothing being placed beneath his stomach, and press heavily over it upon the spine for half a minute.

3. Turn the patient quickly again on his back; the roll of clothing being so placed beneath it as to make the short-ribs bulge prominently forward, and raise them a little higher than the level of the mouth. Let some bystanders hold the tip of the tongue out of one corner of the mouth with a dry handkerchief, and hold both hands of the patient together, the arms being stretched forcibly back above the head.

4. Kneel astride the patient's hips, and with your hands resting on his stomach, spread out your fingers so that you can grasp the waist about the short-ribs. Now throw all your weight steadily forward upon your hands, while you at the same time squeeze the ribs deeply, as if you wished to force everything in the chest upwards out of the mouth. Continue this while you can slowly count—one—two—three; then suddenly let go; with a final push, which springs you back to your first kneeling position. Remain erect upon your knees while you can count—one—two; then throw your weight forward again as before, repeating the entire motions—at first about four or five times a minutes, increasing the rate gradually to about fifteen times a minute, and continuing with the same regularity of time and motion as is observed in the natural breathing which you are imitating.

5. Continue this treatment, though apparently unsuccessful, for two hours, or until the patient begins to breathe; and for a while after this, help him by well-timed pressure to deepen his first gasps into full, deep breaths; while the friction of the limbs, which should, if possible, have been kept up during the entire process, is now further increased.

6. As soon as the breathing has become perfectly natural, strip the patient rapidly and completely. Wrap him in blankets only. Put him in bed in a

room comfortably warm, but with a free circulation of fresh air, and, except for the administration of internal treatment, let him have perfect rest. Give him a little hot brandy and water, or other stimulant at hand, every ten or fifteen minutes for the first hour, and as often thereafter as may seem expedient.

EARS, Foreign Bodies in.—Great care should be taken in removing foreign bodies from the ear, as serious injury may be inflicted. Most foreign bodies, especially those of small size, can be easily removed by the use of a syringe with warm water, and in most cases no other means should be used. Should the first efforts fail, repeat the operation. A syringe throwing a moderately small and continuous stream is best adapted for the purpose, and the removal may generally be facilitated by inclining the ear downward while using the syringe. Severe inflammation may be excited, and serious injury done, by rash attempts to seize a foreign body in the ear, with a forceps or tweezers, or trying to pick it out with a pin or needle, or with an ear-scoop. Should it be necessary from any cause to use instruments, great care should be observed, and but very little force exerted. It has lately been recommended, when foreign bodies cannot be removed by syringing the ear, to introduce a small brush or swab of frayed linen or muslin cloth, or a bit of sponge, moistened with a solution of glue, and keep it in contact with the foreign body until the glue adheres, when the body may be easily removed.

EAR, Insects in the.—Insects in the ear may be easily killed by pouring oil in the ear, after which remove by syringing. (See EAR, FOREIGN BODIES IN.)

EAR, Wax, Hardened, to Remove.—Hardened ear wax may be softened by dropping into the ear some oil or glycerine, and then syringing. (See EAR, FOREIGN BODIES IN.)

EYE, Foreign Bodies in.—To remove small particles from the eye, unless they have penetrated the globe, or become fixed in the conjunctiva, do as follows:

Grasp the upper lid between the thumb and forefinger, lift it from the eyeball, and having drawn it down as far as possible outside the lower lid, let it slide slowly back to its place, resting upon the lower

lid as it goes back; and then wipe the edges of the lids with a soft handkerchief to remove the foreign substance. This may be repeated a number of times, if necessary, without injury. Should this means fail, evert the lids and remove the foreign substance by touching it lightly with a fold of the handkerchief, or with the point of a roll of paper made like a candle-lighter; or, if necessary, with a small pair of forceps. A drop of sweet oil instilled in the eye, while perfectly harmless, provokes a flow of tears that will frequently wash away any light substance.

Bits of metal, sharp pieces of sand, etc., sometimes penetrate the globe of the eye, and, unless removed, may excite so much inflammation as to destroy the eye. They should be removed by a competent surgeon.

FAINTING.—Lay the person who has fainted in a current of air, or in such a position that the air from an open window or door will have full play upon the face. Do not allow parties to crowd closely around, but give the sufferer plenty of room. Recovery will take place in a few minutes. The clothes also may be opened, and cold water sprinkled upon the face, hands and chest; and some pungent substance, as smelling salts, camphor, aromatic vinegar, etc., may be applied to the nostrils; and as soon as able to swallow, a little fresh water, or spirits and water, may be given. Persons who faint easily should avoid crowded rooms and places where the air is close.

FITS.—See CONVULSIONS.

FIRE, Clothing on.—If a woman's clothes catch on fire, let her instantly roll herself over and over on the ground. In case any one be present, let them throw her down and do the like, and then wrap her up in a table-cloth, rug, coat, or the first woolen article that can be found.

FRACTURES.—As we can only give general rules for treating the various fractures, we would advise any one suffering from such, to immediately apply to the nearest surgeon, and not rely upon an inexperienced party.

FROST-BITE.—Place the party suffering in a room without fire, and rub the frozen or frosted parts with snow, or pour ice-water over them until sensation begins to return. As soon as a stinging

pain is felt, and a change of color appears, then cease the rubbing, and apply cloths wet with ice-water, and subsequently if active inflammation follow, and suppuration result, a solution of carbolic acid in water, one part to thirty, should be applied. If mortification set in, amputation is generally necessary.

Where persons suffer from the constitutional effects of cold, hot stimulants should be given internally, and the body rubbed briskly with the hands and warm flannel.

GUNSHOT WOUNDS.—See WOUNDS.

HANGING, Apparent Death from.—

Persons found hanging should be cut down immediately and the cord removed from the neck, and similar means employed to re-establish breathing, as in cases of drowning or suffocation from other causes, except that the head should be kept somewhat raised to assist in relieving the congestion of the brain and its membranes which always results. (See ASPHYXIA.)

INSECT BITES.—See BITES AND STINGS.

POISONS, and their Antidotes.—When a person has taken poison, the first thing to do is to compel the patient to vomit, and for that purpose give any emetic that can be most readily and quickly obtained, and which is prompt and energetic, but safe in its action. For this purpose, there is, perhaps, nothing better than a large teaspoonful of ground mustard in a tumblerful of warm water, and it has the advantage of being almost always at hand. If the dry mustard is not to be had, use mixed mustard from the mustard pot. Its operation may generally be facilitated by the addition of a like quantity of common table-salt. If the mustard is not at hand, give two or three teaspoonfuls of powdered alum in syrup or molasses, and give freely of warm water to drink; or give ten to twenty grains of sulphate of zinc (white vitriol), or twenty to thirty grains of ipecac., with one or two grains of tartar emetic, in a large cup of warm water, and repeat every ten minutes until three or four doses are given, unless free vomiting is sooner produced.

After vomiting has taken place, large draughts of warm water should be given the patient, so that the vomiting will continue until the poisonous substances have

been thoroughly evacuated, and then suitable antidotes should be given. If vomiting cannot be produced, the stomach-pump should be used.

When it is known what particular kind of poison has been swallowed, then the proper antidote for that poison should be given, but when this cannot be ascertained, as is often the case, give freely of equal parts of calcined magnesia, pulverized charcoal, and sesquioxide of iron, in sufficient quantity of water. This is a very harmless mixture, and is likely to be of great benefit, as the ingredients, though very simple, are antidotes for the most common and active poisons.

In case this mixture cannot be obtained, the stomach should be soothed and protected by the free administration of demulcent, mucilaginous, or oleaginous drinks, such as the whites of eggs, milk, mucilage of gum arabic, or slippery elm bark, flaxseed tea, starch, wheat flour, or arrow-root mixed in water, linseed or olive oil, or melted butter or lard. Subsequently the bowels should be moved by some gentle laxative, as a tablespoonful or two of castor oil, or a teaspoonful of calcined magnesia; and pain or other evidence of inflammation must be relieved by the administration of a few drops of laudanum, and the repeated application of hot poultices, fomentations and mustard plasters.

The following are the names of the articles that may give rise to poisoning, most commonly used, and their antidote:

ACIDS, MINERAL—Sulphuric Acid (Oil of Vitriol), Nitric Acid (Aqua fortis), Muriatic Acid (Spirits of Salts).

SYMPTOMS.—Acid burning taste in the mouth, acute pain in the throat, stomach, and bowels; frequent vomiting, generally bloody, mouth and lips excoriated, shrivelled, white or yellow; hiccup, copious stools, more or less bloody, with great tenderness in the abdomen; difficult breathing, irregular pulse, excessive thirst, while drink increases the pain and rarely remains in the stomach; frequent but vain efforts to urinate; cold sweats, altered countenance; convulsions generally preceding death. Nitric acid causes yellow stains; sulphuric acid, black ones.

TREATMENT.—Mix calcined magnesia in milk or water to the consistence of cream, and give freely to drink a glass

full every couple of minutes, if it can be swallowed. Common soap (hard or soft), chalk, whiting, or even mortar from the wall mixed in water, may be given, until magnesia can be obtained. Promote vomiting by tickling the throat, if necessary, and when the poison is got rid of, flaxseed or elm tea, gruel, or other mild drinks. The inflammation which always follows wants good treatment to save the patient's life.

ACIDS, VEGETABLE—Acetic, Citric, Oxalic, Tartaric.

SYMPTOMS.—Intense burning pain of mouth, throat and stomach; vomiting blood which is highly acid, violent purging, collapse, stupor, death.

Oxalic Acid is frequently taken in mistake for Epsom salts, to which in shops it often bears a strong resemblance.

TREATMENT.—Give chalk or magnesia in a large quantity of water, or large draughts of lime water. If these are not at hand, scrape the wall or ceiling, and give the scrapings, mixed with water.

ACID, PRUSSIC, or HYDROCYANIC—Laurel Water, Cyanide of Potassium, Bitter Almond Oil, etc.

SYMPTOMS.—In large doses almost invariably instantaneously fatal; when not immediately fatal, sudden loss of sense and control of the voluntary muscles; the odor of the poison generally susceptible on the breath.

TREATMENT.—Chlorine, in the form of chlorine water, in doses of from one to four fluid drachms, diluted. Weak solution of chloride lime or soda; water of ammonia (spirits of hartshorn) largely diluted may be given and the vapor of it cautiously inhaled. Cold affusion, and chloroform in half to teaspoonful doses in glycerine or mucilage, repeated every few minutes until the symptoms are ameliorated. Artificial respiration.

ACONITE—Monkshood, Wolfsbane.

SYMPTOMS.—Numbness and tingling in the mouth and throat, and afterwards in other portions of the body, with sore throat, pain over the stomach and vomiting; dimness of vision, dizziness, great prostration, loss of sensibility and delirium.

TREATMENT.—An emetic and then brandy in table-spoonful doses, in ice-water, every half hour; spirits of ammonia in half teaspoonful doses in like man-

ner; the cold douche over the head and chest, warmth to the extremities, etc.

ALKALIES and their SALTS—Concentrated Lye, Woodash Lye, Caustic Potash, Ammonia, Hartshorn.

SYMPTOMS.—Caustic, acrid taste, excessive heat in the throat, stomach, and intestines; vomiting of bloody matter, cold sweats, hiccough, purging of bloody stools.

TREATMENT.—The common vegetable acids. Common vinegar being always at hand, is most frequently used. The fixed oils, as castor, flaxseed, almond, and olive oils form soaps with the alkalies, and thus also destroy their caustic effect. They should be given in large quantity.

ALCOHOL, BRANDY, and other Spirituous Liquors.

SYMPTOMS.—Confusion of thought, inability to walk or stand, dizziness, stupor, highly flushed or pale face, noisy breathing.

TREATMENT.—After emptying the stomach, pour cold water on the head and back of the neck, rub or slap the wrists and palm, and the ankles and soles of the feet, and give strong, hot coffee, or aromatic spirits of hartshorn, in teaspoonful doses in water. The warmth of the body must be sustained.

ANTIMONY and its Preparations—Tartar Emetic, Antimonial Wine, Kerme's Mineral.

SYMPTOMS.—Faintness and nausea, soon followed by most painful and continued vomiting, severe diarrhea, constriction and burning sensation in the throat, cramps or spasmodic twitchings, with symptoms of nervous derangement, and great prostration of strength, often terminating in death.

TREATMENT.—If vomiting has not been produced, it should be effected by tickling the fauces, and administering copious draughts of warm water. Astringent infusions, such as of gall, oak bark, Peruvian bark, act as antidotes, and should be given promptly. Powdered yellow bark may be used until the infusion is prepared, or very strong green tea should be given. To stop the vomiting, should it continue, blister over the stomach by applying a cloth wet with strong spirits of hartshorn, and then sprinkle on the one-eighth to one-fourth of a grain of morphia.

ARSENIC and its Preparations—Ratsbane, Fowler's Solution, etc.

SYMPTOMS.—Generally within an hour pain and heat are felt in the stomach, soon followed by vomiting, with a burning dryness of the throat and great thirst; the matters vomited are generally colored, either green, yellow, or brownish, and sometimes bloody. Diarrhœa or dysentery ensues, while the pulse becomes small and rapid, yet irregular. Breathing much oppressed; difficulty in vomiting may occur, while cramps, convulsions, or even paralysis often precede death, which sometimes takes place within five or six hours after arsenic has been taken.

TREATMENT.—Give a prompt emetic, and then hydrate of peroxide of iron (recently prepared) in table-spoonful doses every ten or fifteen minutes until the urgent symptoms are relieved. In the absence of this, or while it is being prepared, give large draughts of new milk and raw eggs, limewater and oil, melted butter, magnesia in a large quantity of water, or even if nothing else is at hand, flour and water, always, however, giving an emetic the first thing, or causing vomiting by tickling the throat with a feather, etc. The inflammation of the stomach which follows must be treated by blisters, hot fomentations, mucilaginous drinks, etc., etc.

BELLADONNA or DEADLY NIGHT-SHADE.

SYMPTOMS.—Dryness of the mouth and throat, great thirst, difficulty of swallowing, nausea, dimness, confusion or loss of vision, great enlargement of the pupils, dizziness, delirium and coma.

TREATMENT.—There is no known antidote. Give a prompt emetic and then reliance must be placed on continual stimulation with brandy, whisky, etc., and to necessary artificial respiration. Opium and its preparations, as morphia, laudanum, etc., are thought by some, to counteract the effect of belladonna, and may be given in small and repeated doses, as also strong black coffee and green tea.

BLUE VITRIOL, or Blue Stone.—See COPPERAS.

CANTHARIDES (Spanish or Blistering Fly) and Modern Potato Bug.

SYMPTOMS.—Sickening odor of the breath, sour taste, with burning heat in the throat, stomach, and bowels; fre-

quent vomiting, often bloody; copious bloody stools, great pain in the stomach, with burning sensation in the bladder and difficulty to urinate, followed with terrible convulsions, delirium and death.

TREATMENT.—Excite vomiting by drinking plentifully of sweet oil or other wholesome oils, sugar and water, milk, or slippery elm tea; give injections of castor oil and starch, or warm milk. The inflammatory symptoms which generally follow must be treated by a medical man. Camphorated oil or camphorated spirits should be rubbed over the bowels, stomach, and thighs.

CAUSTIC POTASH.—See ALKALIES.

COBALT, or Fly Powder.

SYMPTOMS.—Heat and pain in the throat and stomach, violent retching and vomiting, cold and clammy skin, small and feeble pulse, hurried and difficult breathing, diarrhœa, etc.

TREATMENT.—An emetic, followed by the free administration of milk, eggs, wheat-flour and water, and mucilaginous drinks.

COPPER—Blue Vitriol, Verdigris, or Pickles or Food Cooked in Foul Copper Vessels.

SYMPTOMS.—General inflammation of the alimentary canal, suppression of urine, hiccough, a disagreeable metallic taste, vomiting, violent colic, excessive thirst, sense of tightness of the throat, anxiety, faintness, and giddiness, and cramps and convulsions generally precede death.

TREATMENT.—Large doses of simple syrup as warm as can be swallowed, until the stomach rejects the amount it contains. The whites of eggs and large quantities of milk. Hydrated peroxide of iron.

COPPERAS.—See IRON.

CREOSOTE—Carbolic Acid.

SYMPTOMS.—Burning pain, acrid, pungent taste, thirst, vomiting, purging, etc.

TREATMENT.—An emetic, and the free administration of albumen, as the whites of eggs, or in the absence of these, milk, or flour and water.

CORROSIVE SUBLIMATE.—See MERCURY.

DEADLY NIGHT-SHADE.—See BELLADONNA.

FOX-GLOVE, or Digitalis.

SYMPTOMS.—Loss of strength, feeble, fluttering pulse, faintness, nausea, and

vomiting and stupor; cold perspiration, dilated pupils, sighing, irregular breathing, and sometimes convulsions.

TREATMENT.—After vomiting, give brandy and ammonia in frequently repeated doses, apply warmth to the extremities, and if necessary resort to artificial respiration.

GASES—Carbonic Acid, Chlorine, Cyanogen, Hydrosulphuric Acid, etc.

SYMPTOMS.—Great drowsiness, difficult respiration, features swollen, face blue as in strangulation.

TREATMENT.—Artificial respirations, cold douche, frictions with stimulating substances to the surface of the body. Inhalation of steam containing preparations of ammonia. Cupping from nape of neck. Internal use of chloroform.

GREEN VITRIOL. See IRON.

HELLEBORE, or Indian Poke.

SYMPTOMS.—Violent vomiting and purging, bloody stools, great anxiety, tremors, vertigo, fainting, sinking of the pulse, cold sweats, and convulsions.

TREATMENT.—Excite speedy vomiting by large draughts of warm water, molasses and water, tickling the throat with the finger or a feather, and emetics; give oily and mucilaginous drinks, oily purgatives, and clysters, acids, strong coffee, camphor, and opium.

HEMLOCK (Conium).

SYMPTOMS.—Dryness of the throat, tremors, dizziness, difficulty of swallowing, prostration and faintness, limbs powerless or paralyzed, pupils dilated, pulse rapid and feeble; insensibility and convulsions sometimes precede death.

TREATMENT.—Empty the stomach and give brandy in tablespoonful doses, with half teaspoonful of spirits of ammonia, frequently repeated, and if much pain and vomiting, give bromide of ammonium in five-grain doses every half hour. Artificial respiration may be required.

HENBANE or HYOSCYAMUS.

SYMPTOMS.—Muscular twitching, inability to articulate plainly, dimness of vision and stupor; later, vomiting and purging, small, intermittent pulse, convulsive movement of the extremities, and coma.

TREATMENT.—Similar to OPIUM POISONING, which see.

IODINE.

SYMPTOMS.—Burning pain in throat,

lacerating pain in the stomach, fruitless effort to vomit, excessive tenderness of the epigastrium.

TREATMENT.—Free emesis, prompt administration of starch, wheat flour, or arrowroot, beat up in water.

LEAD—Acetate of Lead, Sugar of Lead, Dry White Lead, Red Lead, Litharge, or Pickles, Wine, or Vinegar, sweetened by Lead.

SYMPTOMS.—When taken in large doses, a sweet but astringent metallic taste exists, with constriction in the throat, pain in the region of the stomach, painful, obstinate, and frequently bloody vomitings, hiccough, convulsions or spasms, and death. When taken in small but long-continued doses, it produces colic, called painter's colic; great pain, obstinate constipation, and in extreme cases paralytic symptoms, especially wrist-drop, with a blue line along the edge of the gums.

TREATMENT.—To counteract the poison, give alum in water, one and a half ounce to a quart; or, better still, Epsom salts or Glauber salts, an ounce of either in a quart of water; or dilute sulphuric acid, a teaspoonful to a quart of water. If a large quantity of sugar of lead has been recently taken, empty the stomach by an emetic of sulphate of zinc (one drachm in a quart of water), giving one-fourth to commence, and repeating smaller doses until free vomiting is produced; castor oil should be given to clear the bowels, and injections of oil and starch freely administered. If the body is cold, use the warm bath.

MEADOW SAFFRON.—See BELLADONNA.

LAUDANUM.—See OPIUM.

LUNAR CAUSTIC.—See SILVER.

LOBELIA, Indian Poke.

SYMPTOMS.—Excessive vomiting and purging, pains in the bowels, contraction of the pupils, delirium, coma and convulsions.

TREATMENT.—Mustard over the stomach, and brandy and ammonia.

MERCURY.—Corrosive Sublimite (bug poisons frequently contain this poison), Red Precipitate, Chinese or English Vermillion.

SYMPTOMS.—Acrid, metallic taste in the mouth, immediate constriction and burning in the throat, with anxiety and

tearing pains in both stomach and bowels, sickness, and vomiting of various colored fluids, and sometimes bloody and profuse diarrhoea, with difficulty and pain in urinating; pulse quick, small and hard; faint sensations, great debility, difficult breathing, cramps, cold sweats, syncope and convulsions.

TREATMENT.—If vomiting does not already exist, emetics must be given immediately, albumen of eggs in continuous large doses, and infusion of catechu afterwards, sweet milk, mixtures of flour and water in successive cupfuls, and to check excessive salivation put a half ounce of chlorate of potash in a tumbler of water, and use freely as a gargle, and swallow a tablespoonful every hour or two.

MONKSHOOD.—See **ARNICA**.

MORPHINE.—See **OPIUM**.

NITRATE OF SILVER (Lunar Caustic.)

SYMPTOMS.—Intense pain and vomiting and purging of blood; mucus and sheds of mucous membranes; and if these stand they become dark.

TREATMENT.—Give freely of a solution of common salt in water, which decomposes the poison, and afterwards flaxseed or elm bark tea, and after a while a dose of castor oil.

NUX VOMICA.—See **STRYCHNINE**.

OPIUM and all its Preparations—**Morphine, Laudanum, Paregoric, etc.**

SYMPTOMS.—Giddiness, drowsiness, increasing to stupor, and insensibility; pulse usually, at first, quick and irregular, and breathing hurried, and afterwards pulse slow and feeble and respiration slow and noisy; the pupils are contracted, and the eyes and face congested, and later, as death approaches, the extremities become cold, the surface is covered with cold, clammy perspiration, and the sphincters relax. The effects of opium and its preparations, in poisonous doses, appear in from a half to two hours from its administration.

TREATMENT.—Empty the stomach immediately with an emetic or with the stomach pump. Then give very strong coffee without milk; put mustard plasters on the wrists and ankles; use the cold douche to the head and chest, and if the patient is cold and sinking give brandy, or whisky and ammonia. Belladonna is thought by many to counteract the poi-

sonous effects of opium, and may be given in doses of half to a tea-spoonful of the tincture, or two grains of the extract, every twenty minutes, until some effect is observed in causing the pupils to expand. Use warmth and friction, and if possible prevent sleep for some hours, for which purpose the patient should be walked about between two persons, and if necessary a bunch of switches may be freely used. Finally, as a last resort, use artificial respiration, and a persistence in it will sometimes be rewarded with success in apparently hopeless cases. Galvanism should also be tried.

OXALIC ACID.—See **ACIDS**.

PHOSPHORUS—Found in **Lucifer Matches** and some **Rat Poisons**.

SYMPTOMS.—Symptoms of irritant poisoning; pain in the stomach and bowels; vomiting; diarrhoea; tenderness and tension of the abdomen.

TREATMENT.—An emetic is to be promptly given; copious draughts containing magnesia in suspension; mucilaginous drinks. General treatment for inflammatory symptoms.

POISONOUS FISH.

SYMPTOMS.—In an hour or two—often in much shorter time—after the fish has been eaten, a weight at the stomach comes on, with slight vertigo and headache; sense of heat about the head and eyes; considerable thirst, and often an eruption of the skin.

TREATMENT.—After full vomiting, an active purgative should be given to remove any of the noxious matter from the intestines. Vinegar and water may be drunk after the above remedies have operated, and the body may be sponged with the same. Water made very sweet with sugar, with aromatic spirits of ammonia added, may be drunk freely as a corrective. A solution of chlorate of potash, or of alkali, the latter weak, may be given to obviate the effects of the poison. If spasms ensue after evacuation, laudanum in considerable doses is necessary. If inflammation should occur, combat in the usual way.

POISONOUS MUSHROOMS.

SYMPTOMS.—Nausea, heat and pains in the stomach and bowels; vomiting and purging; thirst; convulsions and faintings; pulse small and frequent; dilated pupil and stupor; cold sweats and death.

TREATMENT.—The stomach and bowels are to be cleared by an emetic of ground mustard or sulphate of zinc, followed by frequent doses of Glauber or Epsom salts, and large stimulating clysters. After the poison is evacuated, ether may be given with small quantities of brandy and water. But if inflammatory symptoms manifest themselves, such stimuli should be avoided, and these symptoms appropriately treated.

POTASH.—See Alkali.

PRUSSIC ACID, Hydrocyanic.—See ACIDS.

POISON IVY.

SYMPTOMS.—Contact with, and with many persons the near approach to the vine gives rise to violent erysipelatous inflammation, especially of the face and hands, attended with itching, redness, burning and swelling, with watery blisters.

TREATMENT.—Give saline laxatives, and apply weak lead water and laudanum, or limewater and sweet oil, or bathe the parts freely with spirits of nitre. Anointing with oil will prevent poisoning from it.

SALTPETRE, Nitrate of Potash.

SYMPTOMS.—Only poisonous in large quantities, and then causes nausea, painful vomiting, purging, convulsions, faintness, feeble pulse, cold feet and hands, with tearing pains in stomach and bowels.

TREATMENT.—Treat just as is directed for arsenic, for there is no antidote known; and emptying the stomach and bowels with mild drinks must be relied on.

SAVINE.

SYMPTOMS.—Sharp pains in the bowels, hot skin, rapid pulse, violent vomiting and sometimes purging, with great prostration.

TREATMENT.—Mustard and hot fomentations over the stomach and bowels, and ice only allowed in the stomach until the inflammation ceases. If prostration comes on, food and stimulants must be given by injection.

STRAMONIUM, Thorn-apple or Jamestown Weed.

SYMPTOMS.—Vertigo, headache, perversion of vision, slight delirium, sense of suffocation, disposition to sleep, bowels relaxed and all secretions augmented.

TREATMENT.—Same as Belladonna.

STRYCHNINE and NUX VOMICA.

SYMPTOMS.—Muscular twitchings, constriction of the throat, difficult breathing and oppression of the chest; violent muscular spasms then occur, continuous in character like lock-jaw, with the body bent backwards, sometimes like a bow.

TREATMENT.—Give, if obtainable, one ounce or more of bone charcoal mixed with water, and follow with an active emetic; then give chloroform in teaspoonful doses, in flour and water or glycerine, every few minutes while the spasms last, and afterwards brandy and stimulants, and warmth of the extremities if necessary. Recoveries have followed the free and prompt administration of oils or melted butter or lard. In all cases empty the stomach if possible.

SULPHATE of ZINC, White Vitrol.—See ZINC.

TIN, Chloride of Tin, Solution of Tin, (Used by Dyers), Oxide of Tin or Putty Powder.

SYMPTOMS.—Vomiting, pains in the stomach, anxiety, restlessness, frequent pulse, delirium, etc.

TREATMENT.—Empty the stomach, and give whites of eggs in water, milk in large quantities, or flour beaten up in water, with magnesia or chalk.

TARTAR EMETIC.—See ANTIMONY.

TOBACCO.

SYMPTOMS.—Vertigo, stupor, fainting, nausea, vomiting, sudden nervous debility, cold sweat, tremors, and at times fatal prostration.

TREATMENT.—After the stomach is empty apply mustard to the abdomen, and to the extremities, and give strong coffee with brandy and other stimulants, with warmth to the extremities.

ZINC, Oxide of Zinc, Sulphate of Zinc, White Vitrol, Acetate of Zinc.

SYMPTOMS.—Violent vomiting, astringent taste, burning pain in the stomach, pale countenance, cold extremities, dull eyes, fluttering pulse. Death seldom ensues, in consequence of the emetic effect.

TREATMENT.—The vomiting may be relieved by copious draughts of warm water. Carbonate of soda, administered in solution, will decompose the sulphate of zinc. Milk and albumen also act as antidotes. General principles to be observed in the subsequent treatment.

WOORARA.

SYMPTOMS.—When taken into the stomach it is inert; when absorbed through a wound, it causes sudden stupor and insensibility, frothing at the mouth and speedy death.

TREATMENT.—Suck the wound immediately, or cut it out and tie a cord around the limb between the wound and the heart. Apply iodine, or iodide of potassium, and give it internally, and try artificial respiration.

SCALDS.—See BURNS AND SCALDS.

SPRAINS.—The portions most frequently implicated are the wrist and ankle; no matter which portion it may be, however, rest and quietness is a very important part of the treatment, and, when possible, in an elevated position. If the wrist is sprained, it should be carried in a sling; if the ankle, it should be supported on a couch or stool. Cold lotions (See BRUISES) should be freely applied, and irrigation by pouring water from a pitcher or tea-kettle resorted to several times a day to prevent inflammation. Later, frictions with opodeldoc, or with some stimulating liniment, and supporting the parts by pressure made with a flannel roller, or laced stocking when the ankle is involved, will be useful to restore tone; or strips of adhesive plaster properly applied will be useful for the same purpose. Recovery from severe sprains is always tedious. It is an old saying "that a bad sprain is worse than a broken bone."

STINGS of BEES and WASPS.—See BITES AND STINGS.

SUFFOCATION, from Noxious Gases, Foul Air, Fire, Damp, Etc.—Remove to fresh air and dash cold water over the

head, neck and chest; carefully apply hartshorn, or smelling salts to the nostrils, and when the breathing is feeble or has ceased, resort immediately to artificial respiration (See ASPHYXIA and DROWNING). Keep up the warmth of the body, and as soon as the patient can swallow, give stimulants in small quantities.

SUNSTROKE, Heat Apoplexy.—This is caused by long exposure in great heat, especially when accompanied with great fatigue and exhaustion. Though generally happening from exposure to the sun's rays, yet precisely similar effects may be and are produced from any undue exposure to great and exhaustive heat, such as workmen are exposed to in foundries, gas factories, bakeries, and other similar employments. Its first symptom is pain in the head and dizziness, quickly followed by loss of consciousness, and resulting in complete prostration; sometimes, however, the attack is sudden, as in apoplexy. The head is generally burning hot, the face dark and swollen, the breathing labored and snoring, and the feet and hands cold. Remove the patient at once to a cool and shady place, and lay him down with his head a little raised; apply ice or iced water to the head and face; loosen all cloths around the neck or waist; bathe the chest with cold water, apply mustard plasters, or cloths wetted with turpentine, to the calves and soles of the feet, and as soon as the patient can swallow, give weak brandy or whisky and water.

THROAT, Foreign Bodies in.—See CHOKING.

HOME DOCTOR.

ASTHMA.—Take hyssop water and poppy water, of each ten ounces; oxymel of squills, six ounces; syrup of maiden hair, two ounces. Take one spoonful when you find any difficulty in breathing.

AGUE in the Breast.—Take one part of gum camphor, two parts yellow beeswax, three parts clean lard; let all melt slowly, in any vessel [earthen best], on stove. Use either cold or warm; spread very thinly on cotton or linen cloths, covering those with flannel. No matter if the breast is broken, it will cure if persevered in. Do not, no matter how painful, cease from drawing milk from the breast that is affected.

AGUE, Mixture.—Mix twenty grains quinine with one pint diluted gin or port wine, and add ten grains subcarbonate of iron. Dose, a wine-glass each hour until the ague is broken, and then two or three times a day until the whole has been used.

2. Take Peruvian bark, two ounces; wild cherry tree bark, one ounce; cinnamon, one drachm; powdered capsicum, one teaspoonful; sulphur, one ounce; port wine, two quarts. Let it stand a day or two. Dose, a wine glassful every two or three hours until the disease is broken, and then two or three times a day until all is taken.

ANKLE, Sprained.—Wash the ankle frequently with cold salt and water, which is far better than warm vinegar or decoctions of herbs. Keep your foot as cold as possible to prevent inflammation, and sit with it elevated on a cushion. Live on very low diet, and take every day some cooling medicine. By obeying these directions only, a sprained ankle has been cured in a few days.

APOPLEXY.—Occurs only in the corpulent or obese, and the gross or high livers. To treat, raise the head to a nearly upright position; unloose all tight clothes, strings, etc., and apply cold water to the head and warm water and warm

clothes to the feet. Have the apartment cool and well ventilated. Give nothing by the mouth until the breathing is relieved, and then only draughts of cold water.

BALDNESS, Preparation for the Cure of.—Rum, one pint; alcohol, one ounce; distilled water, one ounce; tincture of cantharides, a half drachm; carbonate of potash, a half drachm; carbonate of ammonia, one drachm. Mix the liquids after having dissolved the salts, and filter. After the skin of the head has been wetted with this preparation for several minutes, it should be washed with water.

BILIOUS, Colic.—Mix two tablespoonfuls of Indian meal, in half a pint of cold water; drink it at two draughts.

BILIOUS, Complaints.—Take the root and branch of dandelion, and steep it in soft water a sufficient length of time to extract all the essence; then strain the liquor and simmer until it becomes quite thick. Dose, from one to three glasses a day may be taken with good effect.

BLACKBERRY CORDIAL.—To one quart blackberry juice add one pound white sugar, one tablespoonful each cloves, allspice, cinnamon, and nutmeg. Boil together fifteen minutes, and add a wine-glass of whisky, brandy, or rum. Bottle while hot, cork tight, and seal. Used in diarrhea and dysentery. Dose, a wine-glassful for an adult, half that quantity for a child. It can be taken three or four times a day, if the case is severe.

BLISTERS.—On the feet occasioned by walking, are cured by drawing a needful of worsted thread through them: clip it off at both ends, and leave it till the skin peels off.

BLOOD, Raising.—Make a tea of white oak bark, and drink freely during the day; or take half a pound of yellow dock root, boil in new milk, say one quart; drink one gill three times a day; and take one pill of white pine pitch every day, to

BLOOD, How to Stop.—Take the fine dust of tea, or the scrapings of the inside of tanned leather. Bind it upon the wound closely, and blood will soon cease to flow.

BOILS.—Make a poultice of ginger and flour, and lay it on the boil. This will soon draw it to a head.

BOWELS, Swelled, in Children.—Bathe the stomach of the child with catnip steeped, mixed with fresh butter and sugar.

CHILBLAINS.—Mr. Fergus recommends sulphurous acid in this affection. It should be applied with a camel's hair brush, or by means of a spray producer. One application of this usually effects a cure. The acid should be used pure. A good wash for hands or feet affected with chilblains is sulphurous acid, three parts; glycerine, one part; and water, one part. The acid will be found particularly useful in the irritating, tormenting stage of chilblains.

CHILBLAINS AND CHAPPED HANDS.

—When chilblains manifest themselves, the best remedy not only for preventing their ulcerating, but overcoming the tingling, itching pain, and stimulating the circulation of the part to healthy action, is the liniment of belladonna, two drachms; the liniment of aconite, one drachm; carbolic acid, ten drops; collodion flexile, one ounce; painted with a camel's hair pencil over their surface. When the chilblains vesicate, ulcerate or slough, it is better to omit the aconite and apply the other components of the liniment without it. The collodion flexile forms a coating or protecting film, which excludes the air, whilst the sedative liniments allay the irritation, generally of no trivial nature. For chapped hands we advise the free use of glycerine and good olive oil, in the proportion of two parts of the former to four of the latter; after this has been well rubbed into the hands and allowed to remain for a little time, and the hands subsequently washed with Castile soap and water, we recommend the belladonna and collodion flexile to be painted on, and the protective film allowed to remain permanently. These complaints not unfrequently invade persons of languid circulation and relaxed habit, who should be put on a generous regimen, and treated with ferruginous tonics. Obstinate cases

are occasionally met with which no local application will remedy, unless some disordered state of the system is removed, or the general condition of the patient's health improved. Chapped lips are also benefited by the stimulating form of application we advocate, but the aconite must not be allowed to get on the lips, or a disagreeable tingling results.

CHILBLAIN BALM.—Boil together ten fluid ounces olive oil, two fluid ounces Venice turpentine, and one ounce yellow wax; strain, and while still warm add, constantly stirring, two and a half drachms balsam of Peru, and ten grains camphor.

CHILBLAIN, Cure for.—Make a strong lye by boiling wood ashes in water. Put your feet in a small tub and cover them with the lye as hot as you can bear it. Gradually add more lye hotter and hotter. Keep them in half an hour, bathing and rubbing them continually, and being very careful to keep the lye hot.

CHILBLAIN LOTION.—Dissolve one ounce muriate of ammonia in one-half pint cider vinegar, and apply frequently. One-half pint alcohol may be added to this lotion with good effects.

CHILBLAIN OINTMENT.—Take mutton tallow and lard, of each three-fourths of a pound avoirdupois; melt in an iron vessel, and add hydrated oxide of iron, two ounces, stirring continually with an iron spoon until the mass is of a uniform black color; when nearly cool add Venice turpentine, two ounces; Armenian bole, one ounce; oil of bergamot, one drachm; rub up the bole with a little olive oil before putting it in. Apply several times daily by putting it upon lint or linen. It heals the worst cases in a few days.

CHILBLAINS, Russian Remedy for.—Slices of the rind of fully ripe cucumbers, dried with the soft parts attached. Previous to use they are softened by soaking them in warm water, and are then bound on the sore parts with the inner side next them, and left on all night. This treatment is said to be adopted for both broken and unbroken chilblains.

CHILBLAINS, Itching, Lotion for.—Take hydrochloric acid, one part, and water, eight parts; mix. Apply on going to bed. This must not be used if the skin is broken.

Sal ammoniac, two ounces; rum, one pint; camphor, two drachms. The af-

fectured part is wetted night and morning, and when dry is touched with a little simple ointment of any kind—cold cream or pomatum.

Oil of turpentine, four ounces; camphor, six drachms; oil of cajeput, two drachms. Apply with friction.

CHILBLAINS, Broken, Remedy for.—Mix together four fluid ounces collodion, one and a half fluid ounces Venice turpentine, and one fluid ounce castor oil.

CORNS, Cure for.—Take equal parts of mercurial and galbanum ointments; mix them well together, spread on a piece of soft leather, and apply it to the corns morning and evening. In a few days benefit will be derived. Take two ounces of gum ammoniac, two ounces of yellow wax, and six ounces of verdigris; melt them together, and spread the composition on soft leather; cut away as much of the corn as you can, then apply the plaster, and renew it every fortnight till the corn is away. Get four ounces of white diachylon plaster, four ounces of shomaker's wax, and sixty drops of muriatic acid or spirits of salt. Boil them for a few minutes in an earthen pipkin, and when cold roll the mass between the hands, and apply it on a piece of white leather. Soak the feet well in warm water, then with a sharp instrument pare off as much of the corn as can be done without pain, and bind up the part with a piece of linen or muslin thoroughly saturated with sperm oil, or, which is better, the oil which floats upon the surface of the herring or mackerel. After three or four days the dressing may be removed by scraping, when the new skin will be found of a soft and healthy texture, and less liable to the formation of a new corn than before. Corns may be prevented by wearing easy shoes. Bathe the feet frequently in lukewarm water, with a little salt or potashes dissolved in it. The corn itself will be completely destroyed by rubbing it often with a little caustic solution of potash till the soft skin is formed. Scrape to a pulp sufficient Spanish garlic and bind on the corn over night, after first soaking it well in warm water, and scrape off as much as possible of the hardened portion in the morning. Repeat the application as required.

CORNS, Soft, a Cure for.—Scrape a piece of common chalk, and put a pinch

to the soft corn, and bind a piece of linen rag upon it.

CORNS, Tender.—A strong solution of tannic acid is said to be an excellent application to tender feet as well as a preventive of the offensive odor attendant upon their profuse perspiration. To those of our readers who live far away in the country, we would suggest a strong decoction of oak bark as a substitute.

CORNS, Caustic for.—Tincture of iodine, four drachms; iodide of iron, twelve grains; chloride of antimony, four drachms; mix, and apply with a camel's hair brush, after paring the corn. It is said to cure in three times.

CORNS, to Relieve.—Bind them up at night with a cloth wet with tincture of arnica, to relieve the pain, and during the day occasionally moisten the stocking over the corn with arnica if the shoe is not large enough to allow the corn being bound up with a piece of linen rag.

CORNS, Remedy for.—1. The pain occasioned by corns may be greatly alleviated by the following preparation: Into a one-ounce vial put two drachms of muriatic acid and six drachms of rose-water. With this mixture wet the corns night and morning for three days. Soak the feet every evening in warm water without soap. Put one-third of the acid into the water, and with a little picking the corn will be dissolved. 2. Take a lemon, cut off a small piece, then nick it so as let in the toe with the corn, tie this on at night so that it cannot move, and in the morning you will find that, with a blunt knife, you may remove a considerable portion of the corn. Make two or three applications, and great relief will be the result.

CORNS, Solvent.—Expose salt of tartar (pearlash) in a wide-mouth vial in a damp place until it forms an oil-like liquid, and apply to the corn.

CHOLERA, Remedy, Sure.—Take laudanum, tincture cayenne, compound tincture rhubarb, peppermint and camphor, of each equal parts. Dose, ten to thirty drops. In plain terms, take equal parts tincture of opium, red pepper, rhubarb, peppermint and camphor, and mix them for use. In case of diarrhoea, take a dose of ten to twenty drops in three or four teaspoonfuls of water. No one who has this by him, and takes it in time, will ever have the cholera.

CHILDREN, Disease in, Signs of.—In the case of a baby not yet able to talk, it must cry when it is ill. The colic makes a baby cry loud, long, and passionately, and shed tears—stopping for a moment and beginning again.

If the chest is affected, it gives one sharp cry, breaking off immediately, as if crying hurt it.

If the head is affected, it cries in sharp, piercing shrieks, with low moans and wails between. Or there may be quiet dozing, and startings between.

It is easy enough to perceive, where a child is attacked by disease, that there has some change taken place; for either its skin will be dry and hot, its appetite gone; it is stupidly sleepy, or fretful or crying; it is thirsty, or pale and languid, or in some way betrays that something is wrong. When a child vomits, or has a diarrhoea, or is costive and feverish, it is owing to some derangement, and needs attention. But these various symptoms may continue for a day or two before the nature of the disease can be determined. A warm bath, warm drinks, etc., can do no harm, and may help to determine the case. On coming out of the bath, and being well rubbed with the hand, the skin will show symptoms of rash, if it is a skin disease which has commenced. By the appearance of the rash, the nature of the disease can be learned. Measles are in patches, dark red, and come out first about the face. If scarlet fever is impending, the skin will look a deep pink all over the body, though most so about the neck and face. Chicken-pox shows fever, but not so much running at the nose, and appearances of cold, as in measles, nor is there as much of a cough. Besides, the spots are smaller, and do not run much together, and are more diffused over the whole surface of the skin; and enlarge into blisters in a day or two.

CONSUMPTION.—Take one tablespoonful of tar, and the yolks of three hen's eggs, beat them well together. Dose, one tablespoonful morning, noon and night.

CROUP, Remedy for in One Minute.—This remedy is simply alum. Take a knife or grater, and shave or grate off in small particles about a teaspoonful of alum; mix it with about twice its quantity

of sugar, to make it palatable, and administer as quick as possible. Its effects will be truly magical, as almost instantaneous relief will be afforded.

CHOLERA REMEDY, HARTS-

HORNE'S.—Take of chloroform, tincture of opium, spirits of camphor, and spirits of aromatic ammonia, each one and one-half fluid drachms; creosote, three drops; oil of cinnamon, eight drops; brandy, two fluid drachms. Dilute a teaspoonful with a wine-glass of water, and give two teaspoonfuls every five minutes, followed by a lump of ice.

DANDRUFF, Cure for.—Good mild soap is one of the safest remedies, and is sufficient in ordinary cases; carbonate of potash or soda is too alkaline for the skin. Every application removes a portion of the cuticle, as you may observe by the smoothness of the skin of your hands after washing them with it. Borax is recommended; but this is also soda combined with a weak acid, boracic acid, and may by protracted use also injuriously act on the scalp. Soap is also soda or potash combined with the weak, fatty acids; and when the soap contains an excess of the alkalies or is sharp, it is as injurious as the carbonate of potash. All that injures the scalp injures the growth of the hair. One of the best applications from the vegetable kingdom is the mucilaginous decoction of the root of the burdock, called bardane, in French (botanical name, *Lappa Minor*). In the mineral kingdom the best remedy is a solution of flowers of sulphur in water, which may be made by the addition of a very small portion of sulphide of potassium, say ten or twenty grains to the pint. This solution is shaken up with the sulphur, and the clear liquid remaining on the top is used. This recipe is founded on the fact that sulphur is a poison for inferior vegetable or animal growth, like dandruff, itch, etc., and is not all a poison for the superior animals like man.

DIPHTHERIA.—A French physician expresses his preference for lemon juice, as a local application in diphtheria, to chlorate of potash, nitrate of silver, perchloride of lime water. He uses it by dipping a little plug of cottonwood, twisted around a wire, in the juice, and pressing it against the diseased surface four or five times daily.

BREATH, Bad.—Bad or foul breath will be removed by taking a teaspoonful of the following mixture after each meal: One ounce liquor of potassa, one ounce chloride of soda, one and one-half ounces phosphate of soda, and three ounces of water.

2. Chlorate of potash, three drachms; rose-water, four ounces. Dose, a tablespoonful four or five times daily.

BUNION, Cure for.—A bunion is a swelling on the ball of the great toe, and is the result of pressure and irritation by friction. The treatment for corns applies also to bunions; but in consequence of the greater extension of the disease, the cure is more tedious. When a bunion is forming it may be stopped by poulticing and carefully opening it with a lancet.

BURNS, and Scalds, Cure for.—Take half a pound of powdered alum, dissolve it in a quart of water; bathe the burn or scald with a linen rag, wetted with this mixture, then bind the wet rag on it with a strip of linen, and moisten the bandage with the alum water frequently, without removing it, during two or three days.

BURNS, Tea Leaves for.—Dr. Searles, of Warsaw, Wis., reports the immediate relief from pain in severe burns and scalds by the application of a poultice of tea leaves.

CANCER.—Boil down the inner bark of red and white oak to the consistency of molasses; apply as a plaster, shifting it once a week; or, burn red-oak bark to ashes; sprinkle it on the sore till it is eaten out; then apply a plaster of tar; or, take garget berries and leaves of stramonium; simmer them together in equal parts of neatsfoot oil and the tops of hemlock; mix well together, and apply it to the parts affected; at the same time make a tea of winter-green (root and branch); put a handful into two quarts of water; add two ounces of sulphur and drink of this tea freely during the day.

CASTOR Oil Mixture.—Castor oil, one dessert spoonful; magnesia, one dessert spoonful. Rub together into a paste. By this combination, the taste of the oil is almost entirely concealed, and children take it without opposition.

CASTOR OIL, to Disguise.—Rub up two drops oil of cinnamon with an ounce of glycerine and add an ounce of castor

oil. Children will take it as a luxury and ask for more.

CASTOR OIL Emulsions.—Take castor oil and syrup, each one ounce; the yolk of an egg, and orange flower water, one-half ounce. Mix. This makes a very pleasant emulsion, which is readily taken by adults as well as children.

CATARRE.—Take the bark of sassafras root, dry and pound it, use it as a snuff, taking two or three pinches a day.

CHILBLAINS.—Wash the parts in strong alum water, apply as hot as can be borne.

COLD.—Take three cents' worth of liquorice, three of rock candy, three of gum arabic, and put them into a quart of water; simmer them till thoroughly dissolved, then add three cents' worth paregoric, and a like quantity of antimonial wine.

CORNS.—Boil tobacco down to an extract, then mix with it a quantity of white pine pitch, and apply it to the corn; renew it once a week until the corn disappears.

COUGH Mixture.—Two ounces ammonia mixture; five ounces camphor mixture; one drachm tincture of digitalis (foxglove); one-half ounce each of sweet spirits of nitre and syrup of poppies; two drachms solution of sulphate of morphia. A tablespoonful of this mixture is to be taken four times a day.

2. Tincture of blood-root, one ounce; sulphate of morphia, one and a half grains; tincture of digitalis, one-half ounce; wine of antimony, one-half ounce; oil of winter-green, ten drops. Mix. Dose: from twenty to forty drops twice or three times a day. Excellent for a hard, dry cough.

3. Common sweet cider, boiled down to one-half, makes a most excellent syrup for colds or coughs for children, is pleasant to the taste, and will keep for a year in a cool cellar. In recovering from an illness, the system has a craving for some pleasant drink. This is found in cider, which is placed on the fire as soon as made, and allowed to come to a boil, then cooled, put in casks, and kept in a cool cellar.

4. Roast a large lemon very carefully without burning; when it is thoroughly hot, cut and squeeze into a cup upon three ounces of sugar candy, finely pow-

dered; take a spoonful whenever your cough troubles you. It is as good as it is pleasant.

DEAFNESS.—Take ant's eggs and onion juice. Mix and drop them into the ear. Drop into the ear, at night, six or eight drops of hot sweet oil.

DIARRHŒA, Remedies for.—1. Take one teaspoonful of salt, the same of good vinegar, and a tablespoonful of water; mix and drink. It acts like a charm on the system, and even one dose will generally cure obstinate cases of diarrhœa or the first stages of cholera. If the first does not bring complete relief, repeat the dose, as it is quite harmless. 2. The best rhubarb root, pulverized, 1 ounce; peppermint leaf, 1 ounce; capsicum, $\frac{1}{8}$ ounce; cover with boiling water and steep thoroughly, strain, and add bi-carbonate of potash and essence of cinnamon, of each, $\frac{1}{2}$ ounce; with brandy (or good whisky), equal in amount to the whole, and loaf sugar, 4 ounces. Dose—For an adult, 1 or 2 tablespoons; for a child, 1 to 2 teaspoons, from 3 to 6 times per day, until relief is obtained. 3. To half a bushel of blackberries, well mashed, add a quarter of a pound of allspice, 2 ounces of cinnamon, 2 ounces of cloves; pulverize well, mix and boil slowly until properly done; then strain or squeeze the juice through home-spun or flannel, and add to each pint of the juice 1 pound of loaf sugar, boil again for some time, take it off, and, while cooling, add half a gallon of the best Cognac brandy.

DIARRHŒA, Chronic.—Rayer recommends the association of cinchona, charcoal and bismuth in the treatment of chronic diarrhœa, in the following proportions: Subnitrate of bismuth, one drachm; cinchona, yellow, powdered, one-half drachm; charcoal, vegetable, one drachm. Make twenty powders and take two or three a day during the intervals between meals.

DYSENTERY, Cures for.—Tincture of rhubarb, tincture of capsicum, tincture of camphor, essence of ginger and laudanum, equal parts. Mix; shake well and take from ten to twenty drops every thirty minutes until relief is obtained. This is a dose for an adult. Half the amount for a child under twelve years of age. 2. Take some butter off the churn, immediately after being churned, just as it is,

without being salted or washed; clarify it over the fire like honey. Skim off all the milky particles when melted over a clear fire. Let the patient (if an adult) take two tablespoonfuls of the clarified remainder, twice or thrice within the day. This has never failed to effect a cure, and in many cases it has been almost instantaneous. 3. In diseases of this kind the Indians use the roots and leaves of the blackberry bush—a decoction of which in hot water, well boiled down, is taken in doses of a gill before each meal, and before retiring to bed. It is an almost infallible cure. 4. Beat one egg in a teacup; add one tablespoonful of loaf sugar and half a teaspoonful of ground spice; fill the cup with sweet milk. Give the patient one tablespoonful once in ten minutes until relieved. 5. Take one tablespoonful of common salt, and mix it with two tablespoonfuls of vinegar and pour upon it a half-pint of water, either hot or cold (only let it be taken cool.) A wine-glass full of this mixture in the above proportions, taken every half-hour, will be found quite efficacious in curing dysentery. If the stomach be nauseated, a wine-glass full taken every hour will suffice. For a child, the quantity should be a teaspoonful of salt and one of vinegar in a teacupful of water.

DROPSY.—Take the leaves of a currant bush and make into a tea.

DRUNKENNESS, Cure for.—The following singular means of curing habitual drunkenness is employed by a Russian physician, Dr. Schreiber, of Brzesze Litewski: It consists in confining the drunkard in a room, and in furnishing him at discretion with his favorite spirit diluted with two-thirds of water; as much wine, beer and coffee as he desires, but containing one-third of spirit; all the food—the bread meat and the legumes are steeped in spirit and water. The poor devil is continually drunk and dort. On the fifth day of this regime he has an extreme disgust for spirit; he earnestly requests other diet; but his desire must not be yielded to, until the poor wretch no longer desires to eat or drink; he is then certainly cured of his penchant for drunkenness. He acquires such a disgust for brandy or other spirits that he is ready to vomit at the very sight of it.

DYSPEPSIA.—1. Take bark of white

poplar root, boil it thick and add a little spirit, and then lay it on the stomach.

2. Take wintergreen and black cherry-tree bark and yellow dock; put into two quarts of water; boil down to three pints; take two or three glasses a day.

Here are two remedies for dyspepsia, said by those who "have tried them" to be infallible. 1. Eat onions. 2. Take two parts of well-dried and pounded pods of red pepper, mixed with one part of ground mustard, and sift it over everything you eat or drink.

EARACHE, Cure for.—Take a small piece of cotton batting or cotton wool, make a depression in the center with the finger, and then fill it up with as much ground pepper as will rest on a five cent piece; gather it into a ball and tie it up; dip the ball into sweet oil and insert it in the ear, covering the latter with cotton wool, and use a bandage or cap to retain it in its place. Almost instant relief will be experienced; and the application is so gentle that an infant will not get injured by it, but experience relief as well as adults. Roast a piece of lean mutton, squeeze out the juice and drop it into the ear as hot as it can be borne. Roast an onion and put into the ear as hot as it can be borne.

ERYSIPELAS.—Dissolve five ounces of salt in one pint of good brandy and take two table-spoonfuls three times a day.

EYES, Inflamed.—Pour boiling water on alder flowers, and steep them like tea; when cold, put three or four drops of laudanum into a small glass of the alder-tea, and let the mixture run into the eyes two or three times a day, and the eyes will become perfectly strong in the course of a week.

EYES, Weeping.—Wash the eyes in chamomile tea night and morning.

EYES, Inflammation, Granular.—A prominent oculist says that the contagious Egyptian or granular inflammation of the eyes is spreading throughout the country, and that he has been able in many, and indeed in a majority of cases, to trace the disease to what are commonly called rolling towels. Towels of this kind are generally found in country hotels and the dwellings of the working classes, and, being thus used by nearly every one, are made the carriers of one of the most

troublesome diseases of the eye. This being the case, it is urgently recommended that the use of these rolling towels be discarded, and thus one of the special vehicles for the spread of a most dangerous disorder of the eyes—one by which thousands of workingmen are annually deprived of their means of support—will no longer exist.

EYE, Cure for Sty in.—Bathe frequently with warm water. When the sty bursts, use an ointment composed of one part of citron ointment, and four of spermaceti, well rubbed together, and smear along the edge of the eye-lid.

FELONS, to Cure.—1. Stir one-half teaspoonful of water into an ounce of Venice turpentine until the mixture appears like granulated honey. Wrap a good coating of it around the finger with a cloth. If the felon is only recent, the pain will be removed in six hours.

2. As soon as the part begins to swell wrap it with a cloth saturated thoroughly with the tincture of lobelia. An old physician says, that he has known this to cure scores of cases, and that it never fails if applied in season.

FEVER AND AGUE.—Take of cloves and cream of tartar each one-half ounce, and one ounce of Peruvian bark. Mix in a small quantity of tea, and take it on well days, in such quantities as the stomach will bear.

FEVER SORES.—Take of hoarhound, balm, sarsaparilla, loaf sugar, aloes, gum camphor, honey, spikenard, spirits of turpentine, each two ounces. Dose, one table-spoonful, three mornings, missing three; and for a wash, make a strong tea of sumach, washing the affected parts frequently, and keeping the bandage well wet.

FITS.—Take of tincture of fox-glove, ten drops at each time twice a day, and increase one drop at each time as long as the stomach will bear it, or it causes a nauseous feeling.

GLEETS.—Make of turpentine a four-grain pill, and take three a day.

GLYCERINE, CREAM.—Receipt for chapped lips: Take of spermaceti, four drachms; white wax, one drachm; oil of almonds, two troy ounces; glycerine, one troy ounce. Melt the spermaceti, wax, and oil together, and when cooling stir in the glycerine and perfume.

GLYCERINE LOTION.—For softening the skin of the face and hands, especially during the commencement of cold weather, and also for allaying the irritation caused by the razor: Triturate, four and a half grains of cochineal with one and a half fluid ounces of boiling water, added gradually; then add two and a half fluid ounces of alcohol. Also make an emulsion of eight drops of otter of roses with thirty grains of gum arabic and eight fluid ounces of water; then add three fluid ounces of glycerine, and ten fluid drachms of quince mucilage. Mix the two liquids.

GONORRHOEA, Treatment of.—Mr. McDonald recommends the following: Smear a bougie with ointment of the nitrate of silver (nitrate of silver, one drachm; to lard, one ounce;) introduce it into the urethra about three inches, and allow it to remain two or three minutes. Two or three applications have been found to cure the disease.

GONORRHOEA.—Use internally in the acute stage the following: Tincture veratrum, twenty drops; gelseminum, one ounce; water, four ounces. Dose, a teaspoonful every two hours. As an injection, use once or twice daily, as the acute stage is passing away, carbolic acid, ten grains; tannic acid, fifteen grains; water four ounces.

GONORRHOEA, Injection (Ricord's).—Mix fifteen grains each of sulphate of zinc and acetate of lead, with six and a half ounces rose water. Inject three times a day.

FLESHWORMS.—These specks, when they exist in any number, are a cause of much unsightliness. They are minute corks, if we may use the term, of coagulated lymph, which close the orifices of some of the pores or exhalent vessels of the skin. On the skin immediately adjacent to them being pressed with the finger nails, these bits of coagulated lymph will come from it in a vermicular form. They are vulgarly called "flesh-worms," many persons fancying them to be living creatures. These may be got rid of and prevented from returning, by washing with tepid water, by proper friction with a towel, and by the application of a little cold cream. The longer these little piles are permitted to remain in the skin the more firmly they become fixed;

and after a time, when they lose their moisture they are converted into long bony spines as dense as bristles, and having much of that character. They are known by the name of spotted achne. With regard to local treatment, the following lotions are calculated to be serviceable: 1. Distilled rose water, 1 pint; sulphate of zinc, 20 to 60 grains. Mix. 2. Sulphate of copper, 20 grains; rose-water, 4 ounces; water, 12 ounces. Mix. 3. Oil of sweet almonds, 1 ounce; fluid potash, 1 drachm. Shake well together, and then add rose-water, 1 ounce; pure water 6 ounces. Mix. The mode of using these remedies is to rub the pimples for some minutes with a rough towel, and then dab them with the lotion. 4. Wash the face twice a day with warm water, and rub dry with a coarse towel. Then with a soft towel rub in a lotion made of two ounces of white brandy, one ounce of cologne, and one half ounce of liquor potassa.

FRECKLES, Removal of.—Freckles, so persistently regular in their annual return, have annoyed the fair sex from time immemorial; and various means have been devised to eradicate them, although thus far with no decidedly satisfactory results. The innumerable remedies in use for the removal of these vexatious intruders, are either simple and harmless washes, such as parsley or horseradish water, solutions of borax, etc., or injurious nostrums, consisting principally of lead and mercury salts.

If the exact cause of freckles were known, a remedy for them might be found. A chemist in Moravia, observing the bleaching effect of mercurial preparations, inferred that the growth of a local parasitical fungus was the cause of the discoloration of the skin, which extended and ripened its spores in the warmer season. Knowing that sulpho-carbolate of zinc is a deadly enemy to all parasitic vegetation (itself not being otherwise injurious), he applied this salt for the purpose of removing the freckles. The compound consists of two parts of sulpho-carbolate of zinc, twenty-five parts of distilled glycerine, twenty-five parts of rose-water, and five parts of scented alcohol, and is to be applied twice daily for from half an hour to an hour, then washed off with cold water. Protection

against the sun by veiling and other means is recommended, and in addition, for persons of pale complexion, some mild preparation of iron.

GRAVEL.—1. Make a strong tea of the low herb called heart's-ease, and drink freely. 2. Make of Jacob's ladder a strong tea, and drink freely. 3. Make of bean leaves a strong tea, and drink freely.

HAIR, Wash for.—Castile soap, finely shaved, one teaspoonful; spirits of harts-horn, one drachm; alcohol, five ounces; cologne water and bay rum, in equal quantities enough to make eight ounces. This should be poured on the head, followed by warm water (soft water); the result will be, on washing, a copious lather and a smarting sensation to the person operated on. Rub this well into the hair. Finally, rinse with warm water, and afterwards with cold water. If the head is very much clogged with dirt, the hair will come out plentifully, but the scalp will become white and perfectly clean.

HAIR, Restorative.—Take of castor oil, six fluid ounces; alcohol, twenty-six fluid ounces. Dissolve. Then add tincture of cantharides (made with strong alcohol), one fluid ounce; essence of jasmine (or other perfume) one and a half fluid ounces.

HEARTBURN.—Sal volatile combined with camphor is a splendid remedy.

HEADACHE, Sick.—Take a teaspoonful of powdered charcoal in molasses every morning, and wash it down with a little tea, or drink half a glass of raw rum or gin, and drink freely of Mayweed tea.

HEADACHE.—Dr. Silvers, of Ohio, in the *Philadelphia Medical and Surgical Reporter*, recommends ergot in headache, especially the nervous or sick headache. He says it will cure a larger proportion of cases than any other remedy. His theory of its action is that it lessens the quantity of blood in the brain by contracting the muscular fibres of the arterial walls. He gives ten to twenty drops of the fluid extract, repeated every half hour till relief is obtained, or four or five doses used. In other forms of disease, where opium alone is contra-indicated, its bad effects are moderated, he says, by combining it with ergot.

HEADACHE DROPS.—For the cure of nervous, sun, and sick headache, take two quarts of alcohol, three ounces of Castile soap, one ounce camphor, and two ounces ammonia. Bathe forehead and temples.

HIVE SYRUP (Coxe's).—Put one ounce each of squills and seneca snake-root into one pint water; boil down to one-half and strain. Then add one-half pound of clarified honey containing twelve grains tartrate of antimony. Dose for a child, ten drops to one teaspoonful, according to age. An excellent remedy for croup.

HAIR, Cleaning the.—From the too frequent use of oils in the hair, many ladies destroy the tone and color of their tresses. The Hindoos have a way of remedying this. They take a hand basin filled with cold water, and have ready a small quantity of pea flour. The hair is in the first place submitted to the operation of being washed in cold water, a handful of the pea flour is then applied to the head and rubbed into the hair for ten minutes at least, the servant adding fresh water at short intervals, until it becomes a perfect lather. The whole head is then washed quite clean with copious supplies of the aqueous fluid, combed, and afterwards rubbed dry by means of coarse towels. The hard and soft brush is then resorted to, when the hair will be found to be wholly free from all encumbering oils and other impurities, and assume a glossy softness, equal to the most delicate silk. This process tends to preserve the tone and natural color of the hair, which is so frequently destroyed by the too constant use of caustic cosmetics.

HANDS, to Soften.—After cleansing the hands with soap, rub them well with oat-meal while wet.

HANDS, to Remove Stains from.—Damp the hands first in water, then rub them with tartaric acid, or salt of lemons, as you would with soap; rinse them and rub them dry. Tartaric acid, or salt of lemons, will quickly remove stains from white muslin or linens. Put less than half a teaspoonful of salt or acid into a table-spoonful of water; wet the stain with it, and lay it in the sun for an hour; wet it once or twice with cold water during the time; if this does not quite remove it, repeat the acid water, and lay it in the sun.

HANDS, to Whiten.—1. Stir $\frac{1}{4}$ of a pound of Castile soap, and place it in a jar near the fire, pour over it $\frac{1}{2}$ pint of alcohol; when the soap is dissolved and mixed with the spirit, add 1 ounce of glycerine, the same of oil of almonds, with a few drops of essence of violets, or otto of roses, then pour it into moulds to cool for use. 2. A wine glassful of eau-de-cologne, and one of lemon-juice, two cakes of brown Windsor soap, mixed well together, when hard, will form an excellent substance.

HEAD, Scurf in.—A simple and effectual remedy. Into a pint of water drop a lump of fresh quick lime, the size of a walnut; let it stand all night, then pour the water off clear from the sediment or deposit, add $\frac{1}{4}$ of a pint of the best vinegar, and wash the head with the mixture. Perfectly harmless; only wet the roots of the hair.

LIPS, Chapped.—Take 2 ounces of white wax, 1 ounce of spermaceti, 4 ounces of oil of almonds, 2 ounces of honey, $\frac{1}{4}$ of an ounce of essence of bergamot, or any other scent. Melt the wax and spermaceti; then add the honey, and melt all together, and when hot add the almond oil by degrees, stirring till cold. 2. Take oil of almonds 3 ounces; spermaceti, $\frac{1}{2}$ ounce; virgin rice, $\frac{1}{2}$ ounce. Melt these together over a slow fire, mixing with them a little powder of alkane root to color it. Keep stirring till cold, and then add a few drops of the oil of rhodium. 3. Take oil of almonds, spermaceti, white wax, and white sugar candy, equal parts. These form a good, white lip salve.

MOTH PATCHES, to Remove.—Wash the patches with solution of common bicarbonate of soda and water several times during the day for two days, or until the patches are removed, which will usually be in forty-eight hours. After the process wash with some nice toilet soap, and the skin will be left nice, smooth and clear of patches.

NAILS, the Care of.—The nails should be kept clean by the daily use of the nail brush and soap and water. After wiping the hands, but while they are still soft from the action of the water, gently push back the skin which is apt to grow over the nails, which will not only preserve them neatly rounded, but will prevent the skin

cracking around their roots (nail springs), and becoming sore. The points of the nails should be pared at least once a week; biting them should be avoided.

HICCUGH.—A convulsive motion of the diaphragm and parts adjacent. The common causes are flatulency, indigestion, acidity, and worms. It may usually be removed by the exhibition of warm carminatives, cordials, cold water, weak spirits, camphor julep, or spirits of sal volatile. A sudden fright or surprise will often produce the like effect. An instance is recorded of a delicate young lady that was troubled with hiccough for some months, and who was reduced to a state of extreme debility from the loss of sleep occasioned thereby, who was cured by a fright, after medicines and topical applications had failed. A pinch of snuff, a glass of cold soda-water, or an ice-cream, will also frequently remove this complaint.

HOARSENESS.—Make a strong tea of horse-radish and yellow dock roots, sweeten with honey and drink freely.

HOARSENESS, Remedies for.—Take one drachm of freshly scraped horse-radish root, to be infused with four ounces of water in a close vessel for three hours, and made into a syrup, with double its quantity of vinegar. A teaspoonful has often proved effectual.

HUMORS.—Take equal parts of saffron and seneca snake root, make a strong tea, drink one-half pint a day, and this will drive out all humors from the system.

HYSTERIC.—Take the leaves of motherwort and thoroughwort, and the bark of poplar root, equal parts. Mix them in molasses, and take four of them when the first symptoms of disorder are felt, and they will effectually check it.

ITCH, Barber's.—Moisten the parts affected with saliva (spittle) and rub it over thoroughly three times a day with the ashes of a good Havana cigar. This is a simple remedy, but yet it has cured the most obstinate cases.

ITCH, Ointment.—1. Take lard, one pound; suet, one pound; sugar of lead, eight ounces; vermilion, two ounces. Mix. Scent with a little bergamot. 2. Take bichloride of mercury, one ounce; lard, one pound; suet, one pound; hydrochloride acid, one and a half ounces. Melt and well mix, and when perfectly

cold, stir in essence of lemon, four drachms; essence of bergamot, one drachm. 3. Take powdered chloride of lime, one ounce; lard, one pound. Mix well, then add essence of lemon, two drachms. 4. Take bichloride of mercury, one part; lard, fifteen parts. Mix well together. 5. Take white precipitate, one part; lard, twelve parts. Mix. A portion of either of these ointments must be well rubbed on the parts affected, night and morning.

ITCH, Seven-year, to Cure.—1. Use plenty of Castile soap and water, and then apply freely iodide of sulphur ointment; or take any given quantity of simple sulphur ointment and color it to a light brown or chocolate color with the subcarbonate of iron, and then perfume it. Apply this freely, and if the case should be a severe one, administer mild alteratives in conjunction with the outward application. 2. The sulphur bath is a good remedy for itch or any other kind of skin diseases. Leprosy (the most obstinate of all) has been completely cured by it, and the common itch only requires two or three applications to completely eradicate it from the system. 3. Benzine, it is said, will effect a complete cure for scabies in the course of half to three-quarters of an hour, after which the patient should take a warm bath from twenty to thirty minutes.

JAUNDICE.—1. Take the whites of two hen's eggs, beat them up well in a gill of water; take of this a little every morning; it will soon do good. It also creates an appetite, and strengthens the stomach. 2. Take of black cherry-tree bark, two ounces; blood root and gold thread, each half an ounce; put in a pint of brandy. Dose, from a teaspoonful to a tablespoonful morning and night.

JOINTS, Stiffened.—Take of the bark of white oak and sweet apple trees, equal parts; boil them down to a thick substance, and then add the same quantity of goose-grease or oil, simmer all together, and then rub it on the parts warm.

KIDNEYS, Diseases of.—Equal parts of the oil of red cedar and the oil of spearmint.

LAME BACK.—Take the berries of red cedar and allow them to simmer in neatsfoot oil, and use as an ointment.

LICE, To Kill.—All kinds of lice and their nits may be got rid of by washing with a simple decoction of stavesacre (*Delphinium staphisagria*), or with a lotion made with the bruised seed in vinegar, or with the tincture, or by rubbing in a salve made with the seeds and four times their weight of lard very carefully beaten together. The acetic solution and the tincture are the cleanliest and most agreeable preparations, but all are equally efficacious in destroying both the creatures and their eggs, and even in relieving the intolerable itching which their casual presence leaves behind on many sensitive skins. The alkaloid delphinia may also be employed, but possesses no advantage except in the preparation of an ointment, when from any reason that form of application should be preferred.

LINIMENT, Rheumatic.—Olive oil, spirits of camphor and chloroform, of each two ounces; sassafras oil, 1 drachm. Add the oil of sassafras to the olive oil, then the spirits of camphor, and shake well before putting in the chloroform; shake when used, and keep it corked, as the chloroform evaporates very fast if it is left open. Apply three or four times daily, rubbing in well, and always toward the body.

LINIMENT, Sore Throat.—Gum camphor, two ounces; castile soap, shaved fine, one drachm; oil of turpentine and oil of origanum, each one-half ounce; opium, one-fourth of an ounce; alcohol, one pint. In a week or ten days they will be fit for use. Bathe the parts freely two or three times daily until relief is obtained.

LINIMENT, Wonderful.—Two ounces oil of spike, two ounces origanum, two ounces hemlock, two ounces wormwood, four ounces sweet oil, two ounces spirit of ammonia, two ounces gum camphor, two ounces spirits turpentine. Add one quart strong alcohol. Mix well together, and bottle tight. This is an unequaled horse liniment, and of the best ever made for human ailments such as rheumatism, sprains, etc.

LIPS, SORE.—Wash the lips with a strong tea, made from the bark of the white oak.

LIVER COMPLAINT.—Make a strong tea of syrup of burdock, wormwood and dandelion, equal parts, and drink freely.

LOCK-JAW.—It is said that the application of warm lie, made of ashes as strong as possible, to a wounded part, will prevent a locked jaw; if a foot or hand, immersed in it; if another part of the body, bathe with flannels wrung out of the warm lie.

MUMPS.—This disease, most common among children, begins with soreness and stiffness in the side of the neck. Soon a swelling of the parotid gland takes place, which is painful, and continues to increase for four or five days, sometimes making it difficult to swallow, or open the mouth. The swelling sometimes comes on one side at a time, but commonly upon both. There is often heat and sometimes fever, with a dry skin, quick pulse, furred tongue, constipated bowels, and scanty and high-colored urine. The disease is contagious. The treatment is very simple—a mild diet, gentle laxative, occasional hot fomentations, and wearing a piece of flannel round the throat.

NAILS, to Prevent Growing into the Toe.—If the nail of your toe be hard, and apt to grow round, and into the corners of your toe, take a piece of broken glass and scrape the top very thin; do this whenever you cut your nails, and by constant use, it makes the corners fly up and grow flat, so that it is impossible they should give you any pain.

NAILS, to Whiten.—The best wash for whitening the nails is two drachms of diluted sulphuric acid, one drachm of tincture of myrrh, added to four ounces of spring water; first cleanse the hands, and then apply the wash.

NEURALGIA, Cure for.—1. Fill a tight-top thimble with cotton wool, and drop on it a few drops of strong spirits of hartshorn. The open mouth of the thimble is then applied over the seat of pain for a minute or two, until the skin is blistered. The skin is then rubbed off, and upon the denuded surface a small quantity of morphia (one-fourth grain) is applied. This affords almost instant relief. A second application of the morphia, if required, is to be preceded by first rubbing off the new formation that has sprung up over the former blistered surface.

2. Dr. J. Knox Hodge recommends the following as an application which will relieve facial or any other neuralgia

almost instantaneously: Albumen of egg, one drachm; rhigolene, four ounces; oil of peppermint, two ounces; collodion and chloroform, each one ounce. Mix. Agitate occasionally for twenty-four hours, and by gelatinization a beautiful and semi-solidified, opodeldoc-looking compound results, which will retain its consistency and hold the ingredients intimately blended for months. Apply by smart friction with the hand, or gently with a soft brush or mop along the course of the nerve involved.

3. Mix one and one-half drachms iodide of potash, fifteen grains of quinine, one ounce ginger syrup, and two and a half ounces water. Dose, a tablespoonful every three hours.

4. **Of the Stomach.**—Take of distilled water of cherry laurel, five parts; muriate of morphia, one-tenth part. Mix and dissolve. One drop on a lump of sugar immediately before meals.

OINTMENT, for Sore Nipples.—Glycerine, rose-water and tannin, equal weights, rubbed together into an ointment, is very highly recommended for sore or cracked nipples.

OINTMENT, Glycerine.—Melt together spermaceti, two drachms; white wax, one-half drachm; oil of sweet almonds, two ounces, and then add glycerine one ounce and stir briskly until cool. An admirable application for chapped hands, etc.

OINTMENT, for Itch.—White precipitate, fifteen grains; saltpetre, one-half drachm; flour of sulphur, one drachm. Mix well with lard, two ounces. Long celebrated for the cure of itch.

OINTMENT, Sulphur.—Flour of sulphur, eight ounces; oil of bergamot, two drachms; lard, one pound. Rub freely three times a day, for itch.

OINTMENT, for Piles.—Tannin, two drachms; water, two fluid drachms; triturate together, and add lard, one and a half drachms. An excellent application for piles.

OINTMENT, for Hemorrhoids.—Sulphate of morphia, three grains; extract of stramonium, thirty grains; olive oil, one drachm; carbonate of lead, sixty grains; lard, three drachms.

PAINS.—1. Steep marigold in good cider vinegar and frequently wash the

affected parts. This will afford speedy relief.

2. Take half a pound of tar and the same quantity of tobacco, and boil them down separately to a thick substance; then simmer them together. Spread a plaster and apply it to the affected parts, and it will afford immediate relief.

PAINTERS' COLIC.—Make of tartaric acid a syrup similar to that of lemon syrup; add a sufficient quantity of water, and drink two or three glasses a day.

PAIN-KILLER, Instantaneous.—Another and even more instant cure of pain is made as follows: Take aqua-ammonia, sulphuric ether, and alcohol, equal parts, and apply over the pain.

PIMPLES.—Take a teaspoonful of the tincture of gum guaiacum, and one teaspoonful of vinegar; mix well and apply it to the affected parts.

PLASTER, Poor Man's.—Melt together beeswax, one ounce; tar, three ounces; resin, three ounces; and spread on paper or muslin.

PLASTER, Rheumatic.—One-fourth pound of resin, and one-fourth pound of sulphur; melt by a slow fire, and add one ounce of Cayenne pepper, and one-fourth of an ounce of camphor gum; stir well till mixed, and temper with neats-foot oil.

PLASTER, Strengthening.—Litharge plaster, twenty-four parts; white resin, six parts; yellow wax and olive oil, of each three parts; and red oxide of iron, eight parts. Let the oxide be rubbed with the oil, and the other ingredients added melted, and mix the whole well together. The plaster, after being spread over the leather, should be cut into strips two inches wide, and strapped firmly around the joint.

PLASTERS, Mustard.—It is stated that in making a mustard plaster, no water whatever should be used, but the mustard mixed with the white of an egg; the result will be a plaster that will "draw" perfectly, but will not produce a blister even upon the skin of an infant, no matter how long it is allowed to remain upon the part.

POULTICE, Bread and Milk.—Take stale bread in crumbs, pour boiling sweet milk, or milk and water over it, and simmer till soft, stirring it well; then take it from the fire, and gradually stir in a

little glycerine or sweet oil, so as to render the poultice pliable when applied.

POULTICE, Linseed.—Take of linseed, powdered, four ounces; hot water sufficient, mix and stir well with a spoon, until of suitable consistence. A little oil should be added, and some smeared over the surface as well, to prevent its getting hard. A very excellent poultice, suitable for many purposes.

POULTICE, Spice.—Powdered cinnamon, cloves and Cayenne pepper, of each two ounces; rye meal, or flour, spirits and honey, of each sufficient to make of suitable consistence.

QUINSY.—This is an inflammation of the tonsils, or common inflammatory sore throat; commences with a slight feverish attack, with considerable pain and swelling of the tonsils, causing some difficulty in swallowing; as the attack advances these symptoms become more intense, there is headache, thirst, a painful sense of tension, and acute darting pains in the ears. The attack is generally brought on by exposure to cold, and lasts from five to seven days, when it subsides naturally, or an abscess may form in tonsil and burst, or the tonsil may remain enlarged, the inflammation subsiding.

TREATMENT.—The patient should remain in a warm room, the diet chiefly milk and good broths, some cooling laxative and diaphoretic medicine may be given; but the greatest relief will be found in the frequent inhalation of the steam of hot water through an inhaler, or in the old-fashioned way through the spout of a tea-pot.

RHEUMATISM, Other Remedies for.—

1. Bathe the parts affected with water in which potatoes have been boiled, as hot as can be borne, just before going to bed; by the next morning it will be much relieved, if not removed. One application of this simple remedy has cured the most obstinate of rheumatic pains.
2. Half an ounce of pulverized saltpetre put in half a pint of sweet oil; bathe the parts affected, and a sound cure will be speedily effected.
3. Rheumatism has frequently been cured by a persistent use of lemon-juice, either undiluted or in the form of lemonade. Suck half a lemon every morning before breakfast, and occasionally during the day, and partake

of lemonade when thirsty in preference to any other drink. If severely afflicted, a physician should be consulted; but, in all cases, lemon-juice will hasten the cure. 4. By the valerian bath, made simply by taking one pound of valerian root, boiling it gently for about a quarter of an hour in one gallon of water, straining and adding the strained liquid to about twenty gallons of water in an ordinary bath. The temperature should be about ninety-eight degrees, and the time of immersion from twenty minutes to half an hour. Pains must be taken to dry the patient perfectly upon getting out of the bath. If the inflammation remain refractory in any of the joints, linseed meal poultices should be made with a strong decoction of valerian root, and applied.

RING-WORM, To Cure.—To one part sulphuric acid, add sixteen to twenty parts water. Use a brush and feather, and apply it to the parts night and morning. A few dressings will generally cure. If the solution is too strong and causes pain, dilute it with water, and if the irritation is excessive, rub on a little oil or other softening application, but always avoid the use of soap.

Or, wash the head with soft soap every morning, and apply the following lotion every night: One-half drachm of sub-carbonate of soda dissolved in one gill of vinegar.

SALVE, Healing.—Sweet oil, three quarts; resin, three ounces; beeswax, three ounces. Melt together; then add powdered red lead, two pounds; heat all these together and when nearly cold add a piece of camphor as large as a nutmeg. Good for burns, etc.

SALT RHEUM.—1. Make a strong tea of elm root bark; drink the tea freely, and wash the affected part in the same. 2. Take one ounce of blue flag root, steep it in half a pint of gin; take a teaspoonful three times a day, morning, noon and night, and wash with the same. 3. Take one ounce of oil of tar, one drachm of oil of checker berry; mix. Take from five to twenty drops morning and night, as the stomach will bear.

STOMACH, Bleeding of the.—Take a teaspoonful of camomile tea every ten minutes until the bleeding stops.

STOMACH, Sickness of.—Drink three

or four times a day of the steep made from the bark of white poplar roots.

SUNBURN AND TAN.—1. Take two drachms of borax, one drachm of Roman alum, one drachm of camphor, half an ounce of sugar candy, and a pound of ox-gall. Mix, and stir well for ten minutes or so, and repeat this stirring three or four times a day for a fortnight, till it appears clear and transparent. Strain through blotting paper, and bottle up for use. 2. Milk of almonds made thus: Take of blanched bitter almonds half an ounce, soft water half a pint; make an emulsion by beating the almonds and water together, strain through a muslin cloth, and it is made. 3. A preparation composed of equal parts of olive oil and lime water is also an excellent remedy for sunburn.

SWEAT, To Produce.—Take of nitre, one-half drachm; snake's head (herb), saffron, camphor, snake-root, seneca, bark of sassafras root, each one ounce; ipecac. and opium, each one-half ounce; put the above in three quarts of Holland gin, and take a tablespoonful in catnip tea every few minutes, till a sweat is produced.

TEETHING.—Young children whilst cutting their first set of teeth often suffer severe constitutional disturbance. At first there is restlessness and peevishness, with slight fever, but not unfrequently these are followed by convulsive fits, as they are commonly called, which depend on the brain becoming irritated; and sometimes under this condition the child is either cut off suddenly, or the foundation of serious mischief to the brain is laid. The remedy, or rather the safeguard, against these frightful consequences is trifling, safe, and almost certain, and consists merely in lancing the gum covering the tooth which is making its way through. When teething is about it may be known by the spittle constantly drivelling from the mouth and wetting the frock. The child has its fingers often in its mouth, and bites hard any substance it can get hold of. If the gums be carefully looked at, the part where the tooth is pressing up is swollen and redder than usual; and if the finger be pressed on it the child shrinks and cries, showing that the gum is tender. When these symptoms occur, the gum should be lanced, and

sometimes the tooth comes through the next day, if near the surface; but if not so far advanced the cut heals and a scar forms, which is thought by some objectionable, as rendering the passage of the tooth more difficult. This, however, is untrue, for the scar will give way much more easily than the uncut gum. If the tooth does not come through after two or three days, the lancing may be repeated; and this is more especially needed if the child be very fractious, and seem in much pain. Lancing the gums is further advantageous, because it empties the inflamed part of its blood, and so relieves the pain and inflammation. The relief children experience in the course of two or three hours from the operation is often very remarkable, as they almost immediately become lively and cheerful.

TEETH AND GUMS, Wash for.—The teeth should be washed night and morning, a moderately small and soft brush being used; after the morning ablution pour on a second tooth-brush, slightly damped, a little of the following lotion: Carbolic acid, 20 drops; spirit of wine, 2 drachms; distilled water, 6 ounces. After using this lotion for a short time the gums become firmer and less tender, and impurity of the breath (which is most commonly caused by bad teeth), will be removed. It is a great mistake to use hard tooth-brushes, or to brush the teeth until the gums bleed.

TETTER.—After a slight feverish attack, lasting two or three days, clusters of small, transparent pimples, filled sometimes with a colorless, sometimes with a brownish lymph, appear on the cheeks or forehead, or on the extremities, and at times on the body. The pimples are about the size of a pea, and break after a few days, when a brown or yellow crust is formed over them, which falls off about the tenth day, leaving the skin red and irritable. The eruption is attended with heat, itching, tingling, fever and restlessness, especially at night. Ringworm is a curious form of tetter, in which the inflamed patches assume the form of a ring.

TREATMENT—Should consist of light diet, and gentle laxatives. If the patient be advanced in life, and feeble, a tonic will be desirable. For a wash, white vitriol, one drachm; rose-water, three

ounces, mixed; or an ointment made of alder-flower ointment, one ounce; oxide of zinc, one drachm.

TAN, to Remove.—Tan may be removed from the face by mixing magnesia in soft water to the consistency of paste, which should then be spread on the face and allowed to remain a minute or two. Then wash off with Castile soap suds, and rinse with soft water.

TEETH, Care of.—The mouth has a temperature of 98°, warmer than is ever experienced in the shade in the latitude of New England. It is well known that if beef, for example, be exposed in the shade during the warmest of our summer days, it will very soon decompose. If we eat beef for dinner, the particles invariably find their way into the spaces between the teeth. Now, if these particles of beef are not removed, they will frequently remain till they are softened by decomposition. In most mouths this process of decomposition is in constant progress. Ought we to be surprised that the gums and teeth against which these decomposing or putrefying masses lie should become subjects of disease?

How shall our teeth be preserved? The answer is very simple—keep them clean! How shall they be kept clean? Answer—By a toothpick, rinsing with water, and the daily use of a brush.

The toothpick should be a quill, not because the metallic picks injure the enamel, but because the quill pick is so flexible it fits into all the irregularities between the teeth.

Always after using the toothpick the mouth should be thoroughly rinsed. If warm water be not at hand, cold may be used, although the warm is much better. Closing the lips, with a motion familiar to all, everything may be thoroughly rinsed from the mouth.

Every morning (on rising), and every evening (on going to bed), the tooth-brush should be used, and the teeth, both outside and inside, thoroughly brushed.

Much has been said, *pro* and *con.*, upon the use of soap with the tooth-brush. My own experience and the experience of members of my family is highly favorable to the regular morning and evening use of soap. Castile or other good soap will answer this purpose. (Whatever is good for the hands and face is good for the

teeth.) The slightly unpleasant taste which soap has when we begin to use it will soon be unnoticed.

TOOTH POWDERS.—Many persons, while laudably attentive to the preservation of their teeth, do them harm by too much officiousness. They daily apply to them some dentifrice powder, which they rub so hard as not only to injure the enamel by excessive friction, but to hurt the gums even more than by the abuse of the tooth-pick. The quality of some of the dentifrice powders advertised in newspapers is extremely suspicious, and there is reason to think that they are not altogether free from a corrosive ingredient. One of the safest and best compositions for the purpose is a mixture of two parts of prepared chalk, one of Peruvian bark, and one of hard soap, all finely powdered, which is calculated not only to clean the teeth without hurting them, but to preserve the firmness of the gums.

Besides the advantage of sound teeth for their use in mastication, a proper attention to their treatment conduces not a little to the sweetness of the breath. This is, indeed, often affected by other causes existing in the lungs, the stomach, and sometimes even in the bowels, but a rotten state of the teeth, both from the putrid smell emitted by carious bones and the impurities lodged in their cavities, never fails of aggravating an unpleasant breath wherever there is a tendency of that kind.

TOOTHACHE, Remedies for.—1. One drachm of alum reduced to an impalpable powder, three drachms of nitrous spirit of ether—mix, and apply them to the tooth on cotton. 2. Mix a little salt and alum, equal portions, grind it fine, wet a little lock of cotton, fill it with the powder and put it in your tooth. One or two applications seldom fail to cure. 3. To one drachm of collodion add two drachms of Calvert's carbolic acid. A gelatinous mass is precipitated, a small portion of which, inserted in the cavity of an aching tooth, invariably gives immediate relief. 4. Saturate a small bit of clean cotton wool with a strong solution of ammonia, and apply it immediately to the affected tooth. The pleasing contrast instantaneously produced in some cases causes a fit of laughter, although a moment previous extreme suffering and

anguish prevailed. 5. Sometimes a sound tooth aches from sympathy of the nerves of the face with other nerves. But when toothache proceeds from a decayed tooth either have it taken out, or put hot fomentations upon the face, and hot drinks into the mouth, such as tincture of cayenne.

WARTS, to Cure.—Warts are formed by the small arteries, veins and nerves united together, taking on a disposition to grow by extending themselves upward, carrying the scarf-skin along with them, which, thickening forms a wart. Corns are a similar growth, brought about by the friction of tight boots and shoes. 1. Take a piece of diachylon plaster, cut a hole in the centre the size of the wart, and stick it on, the wart protruding through. Then touch it daily with aquafortis, or nitrate of silver. They may be removed by tying a string tightly around them. 2. Take a blacksmith's punch, heat it red hot and burn the warts with the end of it. When the burn gets well the warts will be gone forever. 3. Scrape down enough dry cobwebs to make a ball large enough to a little more than cover the wart and not touch the flesh around the same; lay it on top of the wart, ignite it, and let it be until it is all burnt up. The wart will turn white, and in a few days come out. 4. Pass a pin through the wart; apply one end of the pin to the flame of a lamp; hold it there until the wart fries under the action of the heat. A wart so treated will leave. 5. Dissolve as much common washing soda as the water will take up; wash the warts with this for a minute or two, and let them dry without wiping. Keep the water in a bottle and repeat the washing often, and it will take away the largest warts. 6. They may be cured surely by paring them down until the blood comes slightly and then rubbing them with lunar caustic. It is needless to say this hurts a little, but is a sure cure. The hydrochlorate of lime applied in the same way will cure after several applications and some patience; so will strong wood vinegar, and so it is said will milk weed. The cures founded upon superstitious practices, such as muttering some phrases over the excrescence, stealing a piece of beef, rubbing the wart therewith and then burying it under the leaves to await its decay,

etc., etc., are all the remnants of a past state of ignorance and are of no use whatever. Warts are generally only temporary and disappear as their possessors grow up.

WHITE SWELLING.—Draw a blister on the inside of the leg below the knee; keep it running with ointment made of hen manure, by simmering it in hog's lard with onions; rub the knee with the following kind of ointment: Bits of peppermint, oil of sassafras, checkerberry, juniper, one drachm each; simmer in one-half pint neatsfoot oil, and rub on the knee three times a day.

WOUNDS.—Catnip steeped, mixed with fresh butter and sugar.

WHOOPIING-COUGH.—Take a quart of spring water, put it in a large handful of chin-cups that grow upon moss, a large handful of unset hyssop; boil it to a pint, strain it off, and sweeten it with sugar-candy. Let the child, as often as it coughs, take two spoonful at a time.

WORMS, in Children.—1. Take one ounce of powdered snake-head (herb), and one drachm each of aloes and prickly ash bark; powder these, and to one-half teaspoonful of this powder add a teaspoonful of boiling water, and a teaspoonful of molasses. Take this as a dose, night or morning, more or less, as the symptoms may require. 2. Take tobacco leaves, pound them up with honey, and lay them on the belly of the child or grown person, at the same time administering a dose of some good physic. 3. Take garden parsley, make it into a tea,

and let the patient drink freely of it. 4. Take the scales that will fall around the blacksmith's anvil, powder them fine, and put them in some sweetened rum. Shake when you take them, and give a teaspoonful three times a day.

URINE, Scalding of the.—Equal parts of the oil of red cedar, and the oil of spearmint.

URINARY OBSTRUCTIONS.—Steep pumpkin seeds in gin, and drink about three glasses a day; or, administer half a drachm uva ursi every morning, and a dose of spearmint.

URINE, Free Passage of.—The leaves of the currant bush made into a tea, and taken as a common drink.

VENEREAL COMPLAINTS.—Equal parts of the oil of red cedar, combined with sarsaparilla, yellow dock and burdock made into a syrup; add to a pint of this syrup an ounce of gum guaiacum. Dose, from a tablespoonful to a wine glass, as best you can bear.

THROAT, Sore, How to Cure.—"One who has tried it" communicates the following sensible item about curing sore throat: Let each one of your half million readers buy at any drug store one ounce of camphorated oil and five cents' worth of chloride of potash. Whenever any soreness appears in the throat, put the potash in half a tumbler of water, and with it gargle the throat thoroughly; then rub the neck thoroughly with the camphorated oil at night before going to bed, and also pin around the throat a small strip of woolen flannel. This is a simple, cheap and sure remedy.

HOUSEHOLD PESTS

ANTS, to Destroy.—Ants that frequent houses or gardens may be destroyed by taking flour of brimstone, half a pound, and potash four ounces; set them in an iron or earthen pan over the fire till dissolved and united; afterwards beat them to a powder, and infuse a little of this powder in water; and wherever you sprinkle it the ants will die or fly the place.

ANTS, Black, to Destroy.—A few leaves of green wormwood, scattered among the haunts of these troublesome insects, is said to be effectual in dislodging them.

ANTS, Red, to Destroy.—The best way to get rid of ants, is to set a quantity of cracked walnuts or shell-barks on plates, and put them in the closet and places where the ants congregate. They are very fond of these, and will collect on them in myriads. When they have collected on them make a general *auto-da-fe*, by turning nuts and ants together into the fire and then replenishing the plates with fresh nuts. After they have become so thinned off as to cease collecting on plates, powder some camphor and put in the holes and crevices, whereupon the remainder of them will speedily depart. It may help the process of getting them to assemble on the shell-barks, to remove all edibles out of their way for the time.

BEE, Black, to Destroy.—Place two or three shallow vessels—the larger kind of flower-pot saucers will do—half filled with water, on the floors where they assemble, with strips of card-board running from the edge of the vessel to the floor, at a gentle inclination; these the unwelcome guests will eagerly ascend, and so find a watery grave.

BED-BUGS, to Destroy.—1. When they have made a lodgement in the wall, fill all the apertures with a mixture of soft

soap and Scotch snuff. Take the bedstead to pieces, and treat that in the same way. 2. A strong decoction of red pepper applied to bedsteads will either kill the bugs or drive them away. 3. Put the bedstead into a close room and set fire to the following composition, placed in an iron pot upon the hearth, having previously closed up the chimney, then shut the door; let them remain a day: Sulphur nine parts; saltpetre, powdered, one part. Mix. Be sure to open the door of the room five or six hours before you venture to go into it a second time. 4. Rub the bedstead well with lamp-oil; this alone is good, but to make it more effectual, get a sixpence worth of quicksilver and add to it. Put it into all the cracks around the bed, and they will soon disappear. The bedsteads should first be scalded and wiped dry, then put on with a feather. 5. Corrosive sublimate, one ounce; muriatic acid, two ounces; water, four ounces; dissolve, then add turpentine, one pint; decoction of tobacco, one pint. Mix. For the decoction of tobacco boil one ounce of tobacco in a $\frac{1}{2}$ pint of water. The mixture must be applied with a paint brush. This wash is a deadly poison. 6. Rub the bedsteads in the joints with equal parts of spirits of turpentine and kerosene oil, and the cracks of the surbase in rooms where there are many. Filling up all the cracks with hard soap is an excellent remedy. March and April are the months when bedsteads should be examined to kill all the eggs. 7. Mix together two ounces of camphor, four ounces spirits of turpentine, one ounce corrosive sublimate, and one pint alcohol. 8. Distilled vinegar, or diluted wood vinegar, a pint; camphor, one-half ounce; dissolve. 9. White arsenic, two ounces; lard, thirteen ounces; corrosive sublimate, one-fourth ounce; venetian red, one-fourth ounce. (Deadly poison.)

ro. Strong mercurial ointment, one ounce; soft soap, one ounce; oil of turpentine, a pint. 11. Gasoline and coal oil are both excellent adjuncts, with cleanliness, in ridding a bed or house of these pests.

CATERPILLARS, To Destroy.—Boil together a quantity of rue, wormwood, and any cheap tobacco (equal parts), in common water. The liquid should be very strong. Sprinkle it on the leaves and young branches every morning and evening during the time the fruit is ripening.

COCKROACHES AND BEETLES, to Destroy.—1. Strew the roots of black hellebore, at night, in the places infested by these vermin, and they will be found in the morning dead, or dying. Black hellebore grows in marshy grounds, and may be had at the herb shops. 1. Put about a quart of water sweetened with molasses in a tin wash basin or smooth glazed china bowls. Set it at evening in a place frequented by the bugs. Around the basin put an old piece of carpet that the bugs can have easy access to the top. They will go down in the water, and stay till you come. 3. Take pulverized borax, 4 parts, flour 1 part, mix intimately and distribute the mixture in cupboards which are frequented by the roaches, or blow it, by means of a bellows, into the holes or cracks that are infested by them. 4. By scattering a handful of fresh cucumber parings about the house. 5. Take carbonic acid and powdered camphor in equal parts; put them in a bottle; they will become fluid. With a painter's brush of the size called a sash-tool, put the mixture on the cracks or places where the roaches hide; they will come out at once. Then kill. 6. Mix up a quantity of fresh burned plaster of paris (gypsum, such as is used for making molds and ornaments), with wheat flour and a little sugar, and distribute on shallow plates and box boards, and place in the corners of the kitchen and pantry, where they frequent. In the darkness they will feast themselves on it. Whether it interferes with their digestion or not, is difficult to ascertain, but after three or four nights renewal of the preparation, no cockroaches will be found on the premises.

CRICKETS, To Destroy.—Sprinkle a little quicklime near to the cracks through which they enter the room. The lime

may be laid down over night, and swept away in the morning. In a few days they will most likely all be destroyed. But care must be taken that the children do not meddle with the lime, as a very small portion of it, getting into the eye, would prove exceedingly hurtful. In case of such an accident the best thing to do would be to wash the eye with vinegar and water.

FLEAS, To Get Rid of.—Much of the largest number of fleas are brought into our family circles by pet dogs and cats. The oil of pennyroyal will drive these insects off; but a cheaper method, where the herb flourishes, is to throw your cats and dogs into a decoction of it once a week. When the herb cannot be got, the oil can be procured. In this case, saturate strings with it and tie them round the necks of dogs and cats. These applications should be repeated every twelve or fifteen days. Mint, freshly cut, and hung round a bedstead, or on the furniture, will prevent annoyance from bed insects; a few drops of essential oil of lavender will be more efficacious.

FLIES, To Destroy.—1. Take an infusion of quassia, one pint; brown sugar, four ounces; ground pepper, two ounces. To be well mixed together, and put in small shallow dishes where required. 2. Black pepper (powdered), one drachm; brown sugar, one drachm; milk or cream, two drachms. Mix, and place it on a plate or saucer where the flies are most troublesome. 3. Pour a little simple oxymel (an article to be obtained at the druggists), into a common tumbler glass, and place in the glass a piece of cap paper, made into the shape of the upper part of a funnel, with a hole at the bottom to admit the flies. Attracted by the smell, they readily enter the trap in swarms, and by the thousands soon collected prove that they have not the wit or the disposition to return. 4. Take some jars, mugs, or lumblers, fill them half full with soapy water; cover them as jam-pots are covered, with a piece of paper, either tied down or tucked under the rim. Let this paper be rubbed inside with wet sugar, molasses, honey, or jam, or any thing sweet; cut a small hole in the centre, large enough for a fly to enter. The flies settle on the top, attracted by the smell of the bait; they then crawl

through the hole, to feed upon the sweet beneath. Meanwhile the warmth of the weather causes the soapy water to ferment, and produces a gas which overpowers the flies, and they drop down into the vessel. Thousands may be destroyed this way, and the traps last a long time.

FLY PAPER.—Melt resin, and add thereto while soft sufficient sweet oil, lard, or lamp oil to make it, when cold, about the consistency of honey. Spread on writing paper, and place in a convenient spot. It will soon be filled with ants, flies, and other vermin.

INSECTS, Expelling Them.—All insects dread pennyroyal; the smell of it destroys some, and drives others away. At the time that fresh pennyroyal cannot be gathered, get oil of pennyroyal; pour some into a saucer, and steep in it small pieces of wadding or raw cotton, and place them in corners, closet-shelves, bureau drawers, boxes, etc., and the cockroaches, ants, or other insects will soon disappear. It is also well to place some between the mattresses, and around the bed. It is also a splendid thing for brushing off that terrible little insect, the seed tick.

MICE, To Destroy.—1. Use tartar emetic mingled with some favorite food. The mice will leave the premises.

2. Take one part calomel, five parts of wheat flour, one part sugar, and one-tenth of a part of ultramarine. Mix together in a fine powder and place it in a dish. This is a most efficient poison for mice.

3. Any one desirous of keeping seeds from the depredations of mice can do so by mixing pieces of camphor gum in with the seeds. Camphor placed in drawers or trunks will prevent mice from doing them injury. The little animal objects to the odor and keeps a good distance from it. He will seek food elsewhere.

4. Gather all kinds of mint and scatter about your shelves, and they will forsake the premises.

MOSQUITOES, To Drive Away.—1. A camphor bag hung up in an open case-ment will prove an effectual barrier to their entrance. Camphorated spirits applied as perfume to the face and hands will prove an effectual preventive; but when bitten by them, aromatic vinegar is the best antidote.

2. A small amount of oil of penny-

royal sprinkled around the room will drive away the mosquitoes. This is an excellent recipe.

3. Take of gum camphor a piece about half the size of an egg, and evaporate it by placing it in a tin vessel and holding it over a lamp or candle, taking care that it does not ignite. The smoke will soon fill the room and expel the mosquitoes.

MOTHS, To Preserve Clothing from.

1. Procure shavings of cedar wood and enclose in muslin bags, which should be distributed freely among clothes. 2. Procure shavings of camphor wood, and enclose in bags. 3. Sprinkle pimento (allspice) berries among the clothes. 4. Sprinkle the clothes with the seeds of the musk plant. 5. An ounce of gum camphor and one of the powdered shell of red pepper are macerated in 8 ounces of strong alcohol for several days, then strained. With this tincture the furs or cloths are sprinkled over, and rolled up in sheets. 6. Carefully shake and brush woollens early in the spring, so as to be certain that no eggs are in them; then sew them up in cotton or linen wrappers, putting a piece of camphor gum, tied up in a bit of muslin, into each bundle, or into the chests and closets where the articles are to lie. No moth will approach while the smell of the camphor continues. When the gum is evaporated, it must be renewed. Enclose them in a moth-proof box with camphor, no matter whether made of white paper or white pine, before any eggs are laid on them by early spring moths. The notion of having a trunk made of some particular kind of wood for this purpose, is nonsense. Furs or woollens, put away in spring time, before moth eggs are laid, into boxes, trunks, drawers, or closets even, where moths cannot enter, will be safe from the ravages of mothworms, provided none were in them that were laid late in the autumn, for they are not of spontaneous production.

MOTHS IN CARPETS, To Kill.

Wring a coarse crash towel out of clear water, spread it smoothly on the carpet, iron it dry with a good hot iron, repeating the operation on all parts of the carpet suspected of being infected with moths. No need to press hard, and neither the pile nor color of the carpet

will be injured, and the moths will be destroyed by the heat and steam.

RATS, To Destroy.—1. When a house is infested with rats which refuse to be caught by cheese and other baits, a few drops of the highly-scented oil of rhodium poured on the bottom of the cage will be an attraction which they cannot refuse, 2. Place on the floor near where their holes are supposed to be a thin layer of moist caustic potash. When the rats travel on this, it will cause their feet to become sore, which they lick, and their tongues become likewise sore. The consequence is, that they shun this locality, and seem to inform all the neighboring rats about it, and the result is that they soon abandon a house that has such mean floors. 3. Cut some corks as thin as wafers, and fry, roast, or stew them in grease, and place the same in their track; or a dried sponge fried or dipped in molasses or honey, with a small quantity of bird lime or oil of rhodium, will fasten to their fur and cause them to depart. 4. If a live rat be caught and smeared over with tar or 'train oil, and afterwards allowed to escape in the holes of other rats, he will cause all soon to take their departure. 5. If a live rat be caught, and a small bell be fastened around his neck, and allowed to escape, all of his brother rats as well as himself will very soon go to some other neighbor's house. 6. Take a pan, about twelve inches deep, and half fill it with water; then sprinkle some bran on the water and set the pan in a place where the rats most frequent. In the morning you will find several rats in the pan. 7. Flour, three parts; sugar, one-half part; sulphur, two parts, and phosphorus, two parts. Smear on meat, and place near where the rats are most troublesome. 8. Squills are an excellent poison for rats. The powder should be mixed with some fatty substance, and spread upon slices of bread. The pulp of onions is also very good. Rats are very fond of either. 9. Take two ounces of carbonate of barytes, and mix with one pound of suet or tallow, place a portion of this within their holes and about their haunts. It is greedily eaten, produces great thirst, and death ensues after drinking. This is a very effectual poison, because it is both tasteless and odorless. 10. Take one ounce of finely powdered

arsenic, one ounce of lard; mix these into a paste with meal, put it about the haunts of rats. They will eat of it greedily. 11. Make a paste of one ounce of flour, one-half gill of water, one drachm of phosphorus, and one ounce of flour. Or, one ounce of flour, two ounces of powdered cheese-crumbs, and one-half a drachm of phosphorus; add to each of these mixtures a few drops of the oil of rhodium, and spread this on thin pieces of bread like butter; the rats will eat of this greedily, and it is a sure poison. 12. Mix some ground plaster of paris with some sugar and Indian meal. Set it about on plates, and leave beside each plate a saucer of water. When the rats have eaten the mixture they will drink the water and die. To attract them toward it, you may sprinkle on the edges of the plates a little of oil of rhodium. Another method of getting rid of rats is, to strew pounded potash on their holes. The potash gets into their coats and irritates the skin, and the rats desert the place. 13. The Dutch method; this is said to be used successfully in Holland; we have, however, never tried it. A number of rats are left together to themselves in a very large trap or cage, with no food whatever; their craving hunger will, at last, cause them to fight and the weakest will be eaten by the others; after a short time the fight is renewed, and the next weakest is the victim, and so it goes on till one strong rat is left. When this one has eaten the last remains of any of the others, it is set loose; the animal has now acquired such a taste for rat-flesh that he is the terror of ratdom, going round seeking what rat he may devour. In an incredibly short time the premises are abandoned by all other rats, which will not come back before the cannibal rat has left or has died. 14. Catch a rat and smear him over with a mixture of phosphorus and lard, and then let him loose. The house will soon be emptied of these pests.

VERMIN, in Water.—Go to the nearest river or pond, and with a small net (a piece of old mosquito bar will do) collect a dozen or more of the small fishes known as minnows, and put them in your cistern, and in a short time you will have clear water, the wiggle-tails and reddish-colored bugs or lice being gobbled up by the fishes.

BUGS, AND OTHER INSECTS:

HOW TO KNOW THEM—HOW TO DESTROY THEM.

BARK-LICE OF THE APPLETREE.

—There are two species of bark-lice that attack the apple-tree in the United States.

The first, which is a native North American insect, is now known as Harris'



Fig 1.

Bark-louse. The color of the scale is dirty white, and its form is irregular, being usually egg-shaped; but, however variable in outline, is always quite flat and causes the infested tree to wear the appearance of Figure 1; while the minute eggs which are found under it in winter time are in variably blood-red or lake-red. This species has scarcely ever been known to increase sufficiently to do material damage, for the reason doubtless that there have, hitherto, always been natural enemies and parasites enough to keep it in due bounds.

The second species, which is known as the Oyster-shell Bark-louse, is by no means so harmless however, for it is one of the most pernicious and destructive insects which the apple-grower in the Northern States has to contend with. This species may always be distinguished from the former by having a very uniform muscle-shaped scale, of an ash-gray color (the identical color of the bark), and by these scales containing, in the winter time, not red, but pure white colored eggs.

There is scarcely an apple-orchard in Northern Illinois, in Iowa, or in Wisconsin, that has not suffered more or less from its attacks, and many an one has been slowly but surely bled to death by this tiny sap-sucker. Its extension southward is un-

doubtedly limited, for though so abundant in the northern half of Illinois, observation has clearly proved that it cannot exist in the southern half of the same State.

The oyster-shell bark-louse produces but one brood annually, and these eggs, therefore, remain under the scales for more than nine months of the year, subjected alike to the continuous warmth of the fall months, and to the severe frosts of winter; freezing and thawing again and again, without their vitality being in the least impaired.

REMEDIES.—These may be summed up in a very few words, and consist for the most part in prevention, and we again urge a strict examination of every young tree before it is planted. If an orchard is once attacked before its owner is aware of it, much could be done on young trees by scraping the scales off in winter, but on large trees, where it is difficult to reach all the terminal twigs, this method becomes altogether impracticable, and it will avail but little to cleanse the trunk alone, as most of the scales containing living eggs will be found on the terminal branches. Alkaline washes, and all other washes, except those of an oily nature, such as petroleum or kerosine, are of no avail when applied to the scales, for the simple reason that they do not penetrate and reach the eggs, which are so well protected by these scales; and it is very doubtful whether any solution can be used that is sufficiently oily to penetrate the scales and kill the eggs without injuring the tree, especially while the sap of the tree is inactive. Hence, the bark-louse can only be successfully fought at the time the eggs are hatching, and the young lice are crawling over the limbs. The time of year in which this occurs has already been indicated, and the trees should

be closely watched during the last days of May and the first days of June, for, without close scrutiny, they will not be observed, appearing simply like very minute, white, moving specks. While the young larvæ are thus crawling over the tree, they are so tender that they can be readily destroyed by simply scrubbing the limbs with a stiff brush. It is quite evident, however, that any remedy, to become practicable on a large scale, so as to rapidly and effectually reach every limb of the tree, both large and small, must be applied by a syringe or by means of fumigation, and that whatever be applied, it must kill the lice without injuring the foliage or fruit, as the young apples are generally as large as a good sized pea by the time the lice hatch. Fu-

migation has not yet been sufficiently tried to enable us to judge of its merits.

In short, we have abundant proof that neither tobacco-water nor strong alkaline washes have any effect on these young lice, though a strong solution of soap will kill them, and our experience the past season, with cresylic acid soap in other directions, leads us to strongly recommend it for this purpose. It will sometimes be necessary to repeat the wash, as the lice do not all hatch out the same day, though the period of hatching seldom extends over three days.

APPLE TREE BORER, Round Headed.

—It is a fact which has not been disputed by any one whom we have queried on the subject, that apples trees on our ridges are shorter lived than those grown



FIG. 2.

on our lower lands. Hitherto no particular reason has been given for this occurrence, but we think it is mainly attributable to the workings of the borer now under consideration. We have invariably found it more plentiful in tree growing on high land than in those growing on low land, and it has also been our experience that it is worse in plowed orchards than in those which are seeded down to grass.

It also attacks the quince, mountain ash, hawthorn, pear and the June-berry.

At figure 2 this borer is represented in its three stages of larva (a), pupa (b), and perfect beetle (c). The beetle may be known by the popular name of the Two-striped Saperda, while its larva is best known by the name of the Round-headed apple-tree borer, in contradistinction to the Flat-headed species.

The average length of the larva, when full grown, is about one inch, and the width of the first segment is not quite one-fourth of an inch. Its color is light yellow, with a tawny yellow spot of a more

horny consistency on the first segment which, under a lens, is found to be formed of a mass of light brown spots. The head is chestnut brown, polished and horny, and the jaws are deep black. The pupa is of rather lighter color than the larva, and has transverse rows of minute teeth on the back, and a few at the extremity of the body; and the perfect beetle has two longitudinal white stripes between three of a light cinnamon-brown color. The Two-striped Saperda makes its appearance in the beetle state during the months of May and June, and is seldom seen by any but the entomologist who makes a point of hunting for it—from the fact that it remains quietly hidden by day and flies and moves only by night. The female deposits her eggs during the month of June, mostly at the foot of the tree, and the young worms hatch and commence boring into the bark within a fortnight afterwards. These young worms differ in no essential from the full-grown specimens, except in their

very minute size; and they invariably live, for the first year of their lives, on the sap-wood and inner bark, excavating shallow, flat cavities which are found to be stuffed full of their sawdust-like castings. The hole by which the newly-hatched worm penetrated is so very minute that it frequently fills up, though not till a few grains of castings have fallen from it; but the presence of the worms may be generally detected, especially in young trees, from the bark, under which they lie, becoming darkened, and sufficiently dry and dead to contract and form cracks. Through these cracks some of the castings of the worm generally protrude, and fall to the ground in a little heap, and this occurs more especially in the spring of the year, when, with the rising sap and frequent rains, such castings become swollen and augment in bulk.

As winter approaches, the young borer descends as near the ground as its burrow will allow, and doubtless remains inactive till the following spring. On approach of the second winter it is about one-half grown, and still living on the sap-wood; and it is at this time that these borers do the most damage, for where there are four or five in a single tree, they almost completely girdle it. In the course of the next summer when it has become about three-fourths grown, it generally commences to cut a cylindrical passage upwards into the solid wood, and before having finished its larval growth, it invariably extends this passage right to the bark, sometimes cutting entirely through a tree to the opposite side from which it commenced; sometimes turning back at different angles. It then stuffs the upper end of the passage with sawdust-like powder, and the lower part with curly fibres of wood, after which it rests from its labors. It thus finishes its gnawing work during the commencement of the third winter, but remains motionless in the larval state till the following spring, when it casts off its skin once more and becomes a pupa. After resting three weeks in the pupa state it becomes a beetle, with all its members and parts at first soft and weak. These gradually harden and in a fortnight more it cuts its way through its sawdust-like castings, and issues from the tree through a perfectly smooth and round hole.

REMEDIES—From this brief sketch of our round-headed borer, it becomes apparent that plugging the hole to keep him in, is on a par with locking the stable door to keep the horse in, after he is stolen; even supposing there were any philosophy in the plugging system, which there is not. The round smooth holes are an infallible indication that the borer has left, while the plugging up of any other holes or cracks where the castings are seen, will not affect the intruder. This insect probably has some natural enemies belonging to its own great class, and some of our wood-peckers doubtless seek it out from its retreat and devour it; but its enemies are certainly not sufficiently under our control, and to grow healthy apple trees we have to fight it artificially. Here again prevention will be found better than cure, and a stitch in time will not only save nine, but fully ninety-nine.

Experiments have amply proved that alkaline washes are repulsive to this insect, and the female beetle will not lay her eggs on trees protected by such washes. Keep the base of every tree in the orchard free from weeds and trash, and apply soap to them during the month of May, and they will not likely be troubled with borers. For this purpose soft soap or common bar soap can be used. The last is perhaps the most convenient and the newer and softer it is, the better. This borer confines himself almost entirely to the butt of the tree, though very rarely it is found in the crotch. It is, therefore, only necessary in soaping, to rub over the lower part of the trunk and the crotch, but it is a very good plan to lay a chunk of the soap in the principal crotch, so that it may be washed down by the rains. In case these precautions have been unheeded, and the borer is already at work, many of them may be killed by cutting through the bark at the upper end of their burrows, and gradually pouring hot water into the cuts so that it will soak through the castings and penetrate to the insect. But even where the soap preventive is used in the month of May, it is always advisable to examine the trees in the fall, at which time the young worms that hatched through the summer may be generally detected and easily cut out without injury to the tree. Particular attention should also be paid to any tree

that has been injured or sun-scalded, as such trees are most liable to be attacked.

PEACH BORER.—The borer is the most troublesome enemy of the peach, but if looked after in time it is easily subdued, and need not seriously interfere with cultivation. The eggs from which this pest is produced are deposited by a four-winged wasp-shaped insect, during the summer, on the tender bark of the tree, at the surface of the ground. As the season advances the eggs hatch into small white grubs or borers, about an inch long and an eighth of an inch in diameter, which penetrate the bark and bore into the sap-wood, where they remain all winter. The next spring they emerge in their perfect winged form, and soon commence depositing eggs for another generation. While in the tree they devour voraciously the bark and sap-wood, and one or two are sufficient to destroy a young tree in a single season, and four or five will destroy an old one.

REMEDY.—A little experience will enable one to detect the borer. The most certain and obvious sign is the gum at the neck of the tree; that is, the tender part which extends about an inch above and two below the surface. When this is discovered, the earth should be scraped from the root, the gum and decayed wood cut away, and a stiff wire or whalebone thrust into the curving cavity, and the worm be thus destroyed. Care must be taken to kill all, as sometimes five or six will be found in the same tree. The dead and diseased wood should be carefully removed, so that the new growth may cover the old wood as soon as possible. After the operation the soil should be drawn up to the neck of the tree again, to prevent the evil effects of the sun or dry winds in summer, or the severe frosts in winter. The application of boiling water, the waste water from salt works, and oil diffused in water have all been proposed as remedies, but are all inferior to the punching operation with a wire or whalebone. Sheathing the tree with strips of thick paper, straw, or cloth, a foot wide, is a good preventive, if kept on from the middle of June till the middle of October. The paper should extend two inches below the surface, the dirt being scraped away for the purpose. After adjusting the pa-

per properly, the dirt should be drawn back and pressed down firmly.

REMEDIES.—We have had ample occasion to witness the effects of the mounding system during the summer in several orchards, and are fully convinced that it is the best practical method of preventing the attacks of this insect, and that it matters little whether ashes or simple earth be used for the mound.

CODLING MOTH OR APPLE-WORM.

—The apple-worm we find to be quite common in almost all parts of the civilized world where apples are grown. Dr. Trimble has devoted page after page to the consideration of this little pest, and yet its whole history and the means of preventing its insidious work may be given in a very few lines. The following figure represents it in all its states, and gives at a glance its natural history: *a* represents a section of an apple which has been attacked by the worm, showing the burrowings and channel of exit to the left; *b*, the point at which the egg was laid and at which the young worm entered; *c*, the full grown worm; *h*, its head

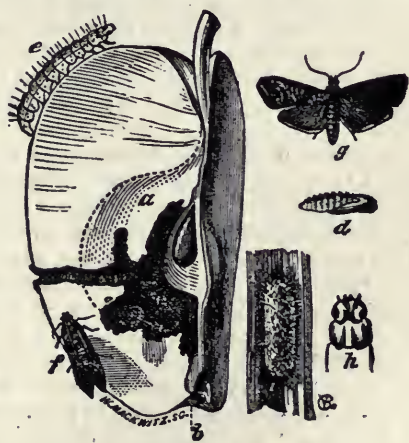


FIG. 3.

and first segment magnified; *i*, the cocoon which it spins; *d*, the chrysalis to which it changes; *f*, the moth which escapes from the chrysalis, as it appears when at rest; *g*, the same with wings expanded. The worm when young is whitish, with usually an entirely black head and a black shield on the top of the first segment. When full grown it acquires a flesh colored or pinkish tint, especially on the back, and the head and top of first

segment become more brown, being usually marked as at Figure 3. It is sparsely covered with very minute hairs, which take their rise from minute elevated points, of which there are eight on each segment.

The Codling moth is even more injurious than the Curculio.

In latitude thirty-eight degrees the moths make their appearance about the first of May, and the first worms begin to leave the apples from the 5th to the 10th of June and become moths again by the fore part of July. While some of the first worms are leaving the apples, others are but just hatched from later deposited eggs, and thus the two broods run into each other; but the second brood of worms (the progeny of the moths which hatch out after the 1st of July), invariably passes the winter in the worm or larval state, either within the apple after it is plucked, or within the cocoon. We have had them spin up as early as the latter part of August, and at different dates subsequently till the middle of November, and in every instance, whether they spun up early or late in the year, they remained in the larval state till the middle of April, when they all changed to chrysalids within a few days of each other.

Though the Codling moth prefers the apple to the pear, it nevertheless breeds freely in the latter fruit, for we have ourselves raised the moth from pear-boring larvæ, and the fact was recorded many years ago by the German entomologist, Kollar. It also inhabits the fruit of the crab-apple and quince.

REMEDIES.—Though with some varieties of the apple, the fruit remains on the tree till after the worm has left it, yet by far the greater portion of the infested fruit falls, prematurely with the worm, to the ground; hence much can be done toward diminishing the numbers of this little pest by picking up and destroying the fallen fruit as soon as it touches the ground. For this purpose, hogs will again be found quite valuable, when circumstances allow of their being turned into the orchard. Abundant testimony might be given to prove this.

There is, however, a more infallible remedy, and one which is always practicable. It is that of entrapping the

worms. This can be done by hanging an old cloth in the crotches of the tree, or by what is known as Dr. Trimble's hay-band system, which consists of twisting a hay-band twice or thrice around the trunk of the tree.

Many of the worms of the second brood yet remain in the apples even after they are gathered for the market. These wormy apples are barreled up with the sound ones, and stored away in the cellar or in the barn. From them the worms continue to issue, and they generally find plenty of convenient corners about the barrels in which to form their cocoons. Hundreds of these cocoons may sometimes be found around a single barrel, and it therefore becomes obvious that, no matter how thoroughly the hay-band system had been carried out during the summer, there would yet remain a sufficiency in such situations to abundantly continue the species another year. And when we consider that every female moth which escapes in the spring, lays from two to three hundred eggs, and thus spoils so many apples, the practical importance of thoroughly examining, in the spring of the year, all barrels or other vessels in which apples have been stored becomes at once apparent. It should, therefore, also be made a rule to destroy all the cocoons which are found on such barrels or vessels either by burning them up or by immersing them in scalding hot water.

The philosophy of the hay-band system is simply that the worms, in quitting the fruit, whether while it is on the tree or on the ground, in their search for a cozy nook, in which to spin up, find the shelter given by the hay-band just the thing, and in ninety-nine cases out of a hundred, they will accept of the lure, if no other more enticing be in their way. We have thoroughly tested this remedy the past summer, and have found it far more effectual than we had anticipated, wherever the above rules were recognized. Under two hay-bands which were kept around a single old isolated tree, through the months of June, July and August, we found every week of the last two months an average of fifty cocoons.

CUT-WORMS.—There are several different kinds of insects that are known by

the popular name of cut-worm. Thus, the White-grub, or larva of the common May beetle, and the different species of wire-worms, the larvæ of our Click beetles (Elatei family) are all called cut-worms in some part or other of the United States. But we shall confine the term to those caterpillars, which, for the most part, have the habit of hiding just under the surface of the earth during the day, and feeding either on the roots, stems or leaves of plants during the night.

Most of these caterpillars have the very destructive habit of cutting, or entirely severing the plant on which they feed just above or below the ground. On this account they have received the name of Cut-worms, and not because when cut in two, each end will reproduce itself as some people have supposed; for although some polyps and other animals belonging to the great class *Radiata* in the animal kingdom, have this curious power of multiplying by division, it is not possessed by any insect, and after having mutilated one of these cut-worms, the farmer need never fear that he has thereby increased, instead of having decreased their number. From this habit of cutting, they prove a far greater nuisance than if they were to satisfy their appetites in an honest manner. In the latter case we might feel like letting them go their own way in peace, but as with the Baltimore oriole, which abrades and ruins a hundred grapes where it would require one for food, we feel vexed at such wanton destruction of our products, and would gladly rid ourselves of such nuisances.

These caterpillars are called surface caterpillars in England, in which country, as well as on the continent of Europe, they have long been known to do great damage to vegetables, and especially to the cabbage, mangel-wurzel and turnip. There are many different species, and they vary in size and detail of markings; but all of them are smooth, naked and greasy-looking worms of some shade of green, gray, brown or black, with a polished, scaly head, and a shield of the same color on the top of the first and last segments; while most of them have several minute shiny spots on the other segments, each spot giving rise to a minute stiff hair. They also have the habit of

curling up in a ball when disturbed. They produce moths of sombre colors which are known as Owlet or Rustic moths, and the species that have so far been bred in this country, belong to one or other of the four genera, *Agrotis*, *Hadenæ*, *Mamestra* or *Celaena*. These moths fly, for the most part, by night, though some few of them may be seen flying by day, especially in cloudy weather. They frequently, even in large cities, rush into a room, attracted by the light of gas or candle, into which they heedlessly plunge and singe themselves. They rest with the wings closed more or less flatly over the body, the upper ones entirely covering the lower ones, and these upper wings always have two more or less distinctly marked spots, the one round, the other kidney-shaped.

The natural history of most of these cut-worms may be thus briefly given. The parent moth attaches her eggs to some substance near the ground, or deposits them on plants, mostly during the latter part of summer, though occasionally in the spring of the year. Those which are deposited during late summer, hatch early in the fall, and the young worms, crawling into the ground, feed upon the tender roots and shoots of herbacious plants. At this time of the year, the worms being small and their food plentiful, the damage they do is seldom noticed. On the approach of winter they are usually about two-thirds grown, when they descend deeper into the ground, and, curling themselves up, remain in a torpid state till the following spring. When spring returns, they are quite ravenous, and their cutting propensities having fully developed, they ascend to the surface and attack the first green succulent vegetation that comes in their way. When once full grown they descend deeper into the earth, and form for themselves oval chambers in which they change to chrysalids. In this state they remain from two to four weeks, and finally come forth as moths, during the months of June, July and August, the chrysalis skin being in most cases so thin that it is impossible to preserve it. These moths in time lay eggs, and their progeny goes through the same cycle of changes. Some species, however, as we shall presently show, are most likely two-brooded, while others

pass through the winter in the chrysalis state.

REMEDIES.—The climbing cut-worms are easily headed off by a little vigilance. From the orchard planted upon light, warm soils they can be driven away entirely by claying the ground about the trees; a wheelbarrow full is high enough for each tree when spread around its base and as far as the limbs extend. This is the most thorough and lasting. A small strip of tin, three inches wide, carefully secured around the body of the tree, will effectually prevent their ascension; if the tin is old and rusty it will require to be a little wider. Each night, after the swelling of the bud, an hour or two after midnight a slight jar of the tree will bring every one on it down, when they can be caught in a spread sheet and destroyed. This will have to be followed up till the bud has unfolded into the leaf, after which there is no longer anything to be apprehended from the worm. The reasons why the clay is so efficient are two-fold: 1. The worms seem to have an instinctive dislike to crawling over it. 2. In dropping from the tree on the hard surface they are frequently disabled, and whether disabled or not, they cannot immediately burrow into it as in sand, and they are all the more exposed to their numerous midnight enemies which are ever watching for them.

For the common field cut-worms we are convinced that there is no better remedy, as a rule, than hunting and killing them. It is generally believed that ashes and lime used about plants will keep off cut-worms, and we might fill pages with recorded experiments, going to prove the good effects of these substances. The experimenters generally forget, however, that there is a period in the life of these worms when they of themselves go down in the earth and disappear, and anything applied just before this happens is sure to be heralded forth as a perfect remedy. Experiments show, however, that when placed in a box with separate quantities of ashes, lime, salt and mold, they will burrow and hide in all of them, but especially in the ashes and mold. Soot seems to be more obnoxious to them, and, although we have not yet had an opportunity to give it a thorough test, we do not wish to discourage its trial. Fall plowing,

to be efficacious, must be done very late in the fall, when the worms are numbed with cold, and then we think it is of doubtful utility further than it exposes them to the attacks of enemies, including birds.

POTATO STALK-BORER.—This larva (Fig. 4,) is of a livid hue when young, with light stripes along the body, as shown in the figure. When full grown it generally becomes lighter, with the longitudi-



FIG. 4.—POTATO STALK-BORER.

nal lines broader, and at this time it more frequently resembles Figure 5.

It commonly burrows in large stalks of the potato; but it is not peculiar to that plant, as it occurs also in the

stalks of the tomato, and in those of the dahlia and aster and other garden flowers. We have likewise found it boring through the cob of growing Indian corn, and strangely confining itself to that portion of the ear: though it is likewise found occasionally in the stem of that plant. By way of compensation, it is particularly partial to the stem of the common cocklebur (*Xanthium strumarium*); and if it would only confine itself to such noxious weeds as this, it might be considered as a friend instead of any enemy.

REMEDY — Prevention.—The careful florist, by an occasional close inspection of his plants about the beginning of July, may detect the point at which the borer entered, which is generally quite a distance from the ground, and can then cut him out without injury to the plant. As this is not feasible in a large potato field, care should be taken to prevent his attacks another year as far as possible to do so, by hunting for him wherever a vine is seen to suddenly wilt.

POTATO STALK-WEEVIL.—This insect is more particularly a Southern species, occurring abundantly in the Middle States, but, according to Dr. Harris, be-

ing totally unknown in New England. The beetle (Fig. 7) is of a blueish or ash gray color, distinguished, as its name implies, by having three shiny black impressed spots at the lower edge of the thorax. The female deposits a single egg in an oblong slit about one-eighth inch long, which she has previously formed with her beak in the stalk of the potato. The larva subsequently hatches out, and bores into the heart of the stalk, always proceeding downward toward the root. When full grown, it is a little over one-fourth inch long (Fig. 6), and is a soft, whitish, legless grub, with a scaly head. Hence it can always be readily distinguished from the larva of the Stalk-



FIG. 6.—POTATO STALK-WEEVIL.

borer, which has invariably sixteen legs, no matter how small it may be. Unlike this last insect, it becomes a pupa (Fig. 6) within the potato stalk which it inhabits; and it comes out in the beetle state about the last of August or the beginning of September.

REMEDY.—Same as with the foregoing species. Burn all the vines which wilt from its attacks—roots and all, for it almost always works below ground. The stalk-borer must be searched for, if one will be sure of killing him as he leaves the stalk to transform; but as this stalk-weevil transforms within the vine, one may be pretty sure of destroying it by burning the vines when they first wilt.

POTATO or TOMATO WORM.—This well-known insect, the larva of which is usually called the potato worm, but it is far commoner on the closely allied tomato, the foliage of which it often clears off very completely in particular spots in a single night. Many persons are afraid to handle this worm, from an absurd idea that it has the power of stinging with the horn on its tail. But this is a vulgar error, and the worm is totally incapable of doing any direct harm to man, either with the conspicuous horn

on its tail, or with any hidden weapon that it may have concealed about its person. In fact, this dreadful looking horn is not peculiar to the potato worm, but is met with in almost all the larvæ of the large and beautiful group to which it belongs (*Sphinx* family.) It seems to have no special use, but, like the bunch of hair on the breast of the turkey cock, to be a mere ornamental appendage.

When full-fed, which is usually about the last of August, the Potato worm burrows under ground and shortly afterwards transforms into the pupa state. The pupa is often dug up in the spring from ground where tomatoes or potatoes were grown in the preceding season; and most persons that meet with it suppose that the singular, jug-handled appendage at one end of it is its tail. In reality, however, it is the tongue-case, and contains the long pliable tongue which the future moth will employ in lapping up the nectar of the flowers, before which, in the dusky gloom of some warm, balmy summer's evening, it hangs for a few moments suspended in the air, like the glorified ghost of some departed botanist.

The moth itself was formerly confounded with the Tobacco-worm moth (*Sphinx Carolina*, Linnæus), which indeed it very closely resembles, having the same series of orange-colored spots on each side of the abdomen. The gray and black markings, however, of the wings differ perceptibly in the two species; and in the Tobacco-worm moth there is always a more or less faint white spot or dot near the center of the front wing, which is never met with in the other species. In Connecticut and other northern States where tobacco is grown, the Potato-worm often feeds upon the leaves of the tobacco plant, the true Tobacco-worm being unknown in those latitudes. In the more southerly States, on the other hand, and in Mexico and in the West Indies, the true Potato-worm is unknown, and it is the Tobacco-worm that the tobacco growers have to fight. While in the intermediate country both species may frequently be captured on the wing in the same garden and upon the same evening. In other words, the Potato-worm is a northern species, the Tobacco-worm a southern species; but on the

confines of the two districts exclusively inhabited by each, they intermingle in varying proportions, according to the latitude.

REMEDIES.—This insect is so large and conspicuous that the most effectual mode of destroying it is by hand-picking. In destroying the worms in this manner care should be taken to leave alone all those specimens which one finds covered with little white oval cocoons, as these are the cocoons of little parasites which materially assist us in its subjugation.

STRIPED BLISTER BEETLE.—The Striped Blister Beetle is almost exclusively a southern species, occurring in particular years very abundantly on the potato vine in Central and Southern Illinois, and in Missouri, though, according to Dr. Harris, it is also occasionally found even in New England. In some specimens, the broad outer black stripe on the wing cases is divided lengthwise by a slender yellow line, so that instead of two there are three black stripes on each wing-case; and in the same field all the intermediate grades between the two varieties may be met with.

This species (Fig. 7) is the one commonly found in the more northerly parts of the Northern States, where it usually takes the place of the Striped Blister-beetle figured above. It is of a uniform ash-gray color; but this color is given it by the presence upon its body of minute ash-gray scales or short hairs, and whenever these are rubbed off, which happens almost as readily as on the wings of a butterfly, the original black color of its hide appears. It attacks not only potato vines, but also

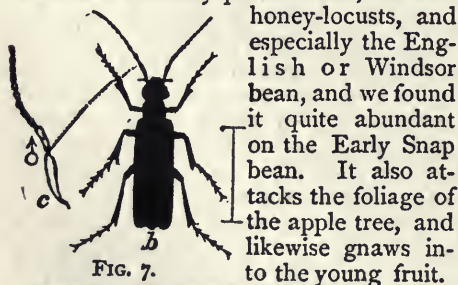


FIG. 7.

BLACK BLISTER-BEETLE.—This species is very similar in appearance to the Black-rat Blister-beetle; the latter being distinguishable from it only by having four raised lines placed lengthwise upon each wing-case and by the two first

joints of the antennæ being greatly dilated and lengthened in the males, as shown at Figure c. The Black Blister-beetle appears in August and September, and is very common on the flowers of the Golden-rod. As a general rule, it makes its appearance too late in the season to do great damage.

MARGINED BLISTER-BEETLE.—This species may be at once recognized by its general black color, and the narrow ash-gray edging to its wing-cases. It usually feeds on certain wild plants; but we found it quite abundant on potatoes last summer, both in Missouri and in Illinois. It appears not to attack the Peach Blow variety.

REMEDIES.—The same remedies will apply equally to all three of the blister-beetles that have just been described. Let it be remembered that during the heat of the day, these beetles are ready with their wings and may be driven from the vines. Thus the most practical and efficient mode of destroying them, is to drive them into a windrow of hay or straw, and kill them by setting fire to it. As they all appear rather late in the season, we should recommend the planting of early varieties, which will be more likely to escape their attacks; and especially of the Peach Blow variety, the leaves of which seem to be more distasteful to them than those of any other variety.

THREE-LINED LEAF-BEETLE.—The three first insects, described and figured above as infesting the potato-



FIG. 8. Three-Lined Leaf-Beetle.

plant, attack it only in the larva state. The five next, namely the three Blister-beetles, attack it exclusively in the perfect state. The three that remain to be considered attack it both in the larva and in the perfect state, but go underground to pass into the pupa state, in which state—

like all other beetles, without exception—they are quiescent, and eat nothing at all.

The larva of the Three-Lined Leaf-Beetle may be distinguished from all other insects that prey upon the potato by its habit of covering itself with its own excrement. In figure 8, this larva is shown in profile, both full and half grown, covered with the soft, greenish excrementitious matter which from time to time it discharges. Figure 7 gives a somewhat magnified view of the pupa; and Figure 8 shows the last few joints of the abdomen of the larva, magnified, and viewed, not in profile, but from above. The vent of the larva, as will be seen from this last figure, is situated on the upper surface of the last joint, so that its excrement naturally falls upon its back, and by successive discharges is pushed forward towards its head, till the whole upper surface of the insect is covered with it. In other insects, which do not indulge in this singular practice, the vent is situated either at the extreme tip of the abdomen or on its lower surface.

There are several other larvæ, feeding upon other plants, which commonly wear cloaks of this strange material, among which may be mentioned one which is very common upon the Sumach, and which produces a jumping, oval Leaf-beetle, about a quarter of an inch long, and of a yellow color, speckled with brick-red. The larvæ of certain Tortoise-beetles, some of which feed on the Morning Glory and the Sweet Potato vines, adopt the same practice, but in their case there is a forked process at the tail which curves over their backs and receives the requisite supply of excrement.

There are two broods of this species every year. The first brood of larvæ may be found on the potato vine toward the latter end of June, and the second in August. The first brood stays underground about a fortnight before it emerges in the perfect beetle state; and the second brood stays there all winter, and only emerges at the beginning of the following June. The perfect beetle is of a pale yellow color, with three black stripes on its back, and bears a general resemblance to the common Cucumber-

beetle. From this last species, however, it may be readily distinguished by the remarkable pinching in of the sides of its thorax, so as to make quite a lady-like waist there, or what naturalists call a "constriction." It is also on the average a somewhat larger insect, and differs in other less obvious respects. As in the case of the Colorado Potato-beetle, the female, after coupling in the usual manner, lays her yellow eggs (Fig. 8) on the under surface of the leaves of the potato plant. The larvæ hatching from these require about the same time to develop, and when full grown descend in the same manner into the ground, where they transform to pupæ (Fig. 8) within a small oval chamber, from which in time the perfect beetle comes forth.

The Three-lined Leaf-beetle, in certain seasons, is a great pest in the Eastern States; but, it has never yet occurred in the Valley of the Mississippi in such numbers as to be materially injurious.

APPLE-ROOT PLANT-LOUSE.—The roots of the apple tree are very often found to rot, and thus cause the death of the tree. Of these rots there appear to be three distinct kinds. One kind is that popularly known as "rotten root" in Southern Illinois, and seems to be a simple decomposition of the vegetable tissue, analogous to the rotting of the root of a cabbage, for instance. Its cause is not clearly understood, though it seems to be a consequence of certain conditions of the soil. The other rot was discovered during 1875, by Doctor Hull, of Alton, Illinois, and is a fungoid growth, which, after covering the root with a thin layer of white fibrous substance, causes a sort of dry rot of the root, and which is common to both the pear and the apple. Some of the symptoms of this rot are: a rather earlier development or maturity of the branches; an excess of fruit buds, and a shortening or thickening of some twigs.

Although this insect usually confines itself to the roots of the tree, yet a few may occasionally be found on the suckers that spring up round the butt of the trunk, and even on the trunk and limbs, especially in places where a branch has been formerly amputated, and nature is closing up the old wound by a circle of new bark. Where it works upon the

naked trunk, it often causes a mass of little granulations to sprout out, about the size of cabbage seeds, thus producing on a small scale, the same effects that it does upon the roots. Wherever the insect works, small as it is, it may be easily recognized by the peculiar blueish-white cottony matter which it secretes from its body, and which is never met with in the case of the common Apple-tree Plant louse that inhabits the leaves and the tips of the twigs.

Fig. *a*, as represented below, fully illustrates the Apple-root Plant louse. A

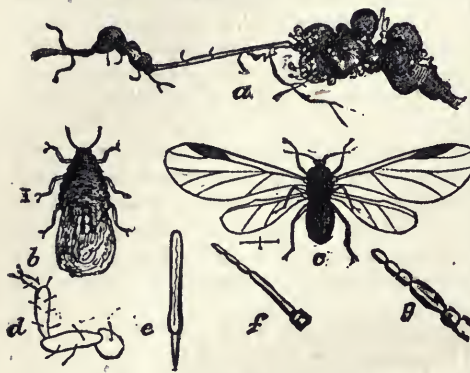


FIG. 9.

portion of a knotty root as it appears after the punctures of the lice is represented at *a*, the larva state at *b*, and the winged state at *c*; while *d* represents the leg, *e* the proboscis, *f* the antenna of the winged individual, and *g* that of the larva, all highly magnified. The young louse is of a deep flesh or pink color, and the proboscis extends the whole length of the body, while the older specimens have a deeper, purplish hue.

REMEDIES.—The best mode to get rid of the Apple-root Plant-louse is to drench the roots of the infested tree with hot water. But to render this process effectual, the water must be applied in quantities large enough to penetrate to every part of the infested roots. There need be no fear of any injurious result from such an application of hot water; for it is a very general rule that vegetable organisms can, for a short time, stand a much higher temperature than animal organisms, without any injury to their tissues. In laying bare the roots for the better application of the water, a sharp eye should be kept for the friends above

described, and when espied they should be tenderly laid aside till after the slaughter of the enemy. Mulching around the infested trees has been found, by Mr. E. A. Riehl and others, of Alton, Illinois, to have the effect of bringing the lice to the surface of the ground, where they can be more easily reached by the hot water.

ELM TREE BEETLE.—Many complaints have been made about the elms in cities being destroyed by a small worm, where the trees have been planted in the streets for shade and ornament, and have attained a considerable size. We will here give a condensed history of the beetle and its habits: This insect is generally known as the elm-tree beetle, (*Galeruca californiensis*), and is a small, striped beetle, somewhat resembling the three-lined leaf or striped cucumber beetle, but much smaller, and of a dull, yellowish-gray color, with only one dark line and spot on each wing case. This insect deposits its eggs in clusters upon the leaves, the worms or larvæ from which are hatched out in a few days, and immediately commence to feed upon the parenchyma, or soft pulpy substance of the leaf, at first making merely small blotches, but eventually, as they increase in size, destroying the whole leaf, leaving only the harder part, such as the mid-ribs and network of veins, untouched, thus causing the leaves to turn brown and wither, until the whole tree assumes the appearance of having been scorched by fire. These worms, when fully grown and ready to change into pupæ, not being able to descend by means of a silken thread, like the real caterpillars, crawl down the trunk to the ground, and, soon casting their larva skin, change into pupæ on or near the surface of the earth, at the foot of the tree they have despoiled. Some of the worms, however, conceal themselves in fissures of the bark, where they undergo their transformation into the perfect beetle. These last, however, are few, and bear no comparison with the multitudes of pupæ which will be found on the damp ground, motionless, helpless, and appearing like grains of wheat accidentally fallen near the tree. After becoming pupæ, in a few days the skin of the back splits open, and the perfect insect crawls

forth, furnished with wings, by means of which it is enabled to fly to other trees and deposit its eggs, thus spreading the nuisance to every elm in the neighborhood; or it may ascend the same tree and lay the eggs for a second generation, which destroys the second crop of leaves, frequently so enfeebling the already exhausted tree that it is unable to recover, and eventually perishes. If the trees are examined daily when the worms first appear on the foliage, which may be known by the leaves exhibiting a somewhat blotched appearance, it will be found that in the course of two or three weeks multitudes of worms have left the leaves, and are slowly descending the trunk for the purpose of undergoing their final transformation on earth, under stones or moss, near the collar of the tree, and in two or three days the pupæ may be killed by crushing under foot, when lying heaped up and incapable of locomotion. This is the best time to destroy them, as the worms are scattered over the whole tree,

and the perfect insect is much too nimble to allow itself to be caught. Were the base of each tree encased in a low, open box, about a foot or eighteen inches in height, placed at the same distance from the main trunk, having its lower part sunk four or five inches below the surface of the soil, the top capped with strips of bright tin, sloping inwards, and projecting on both sides like the eaves of a house, and the upper half of the inside boards painted every morning with coal tar or some other viscid substance, the larvæ could not crawl out over it, the helpless and motionless pupæ would be found collected in heaps within the enclosure, and could be killed by thousands without much trouble. It might be advisable to cover the ground inside with cement or mortar, so that the worms could not possibly burrow underneath the board fence and escape. The same box might also succeed in keeping the female of the canker worm from ascending the fruit trees to deposit her eggs, but in that case



FIG. 10.

coal tar should be put on the outside of the box, as these insects want to crawl inside in order to climb up the trunk, instead of descending and then scattering themselves over the surface of the ground, like the elm-tree beetle. Such temporary boxes might be made so as to be removed when not required, and put into some safe place to be used another season. If stationary, the same tin gutters now so extensively used in the Northern States to obstruct the canker worm, and usually placed around the tree itself, could be put around the box at some distance from the tree, and so prevent the oil, tar, or whatever is in them from being spilled and injuring the bark, and at the same time answer the purpose just as well in preventing the wingless female from ascending the trunk to deposit her eggs.

NEW GRAPE-ROOT BORER.—The larvæ of this insect, in general appear-

ance, resemble those of the peach-tree borer, and work in the same manner under ground, but destroy the roots by gnawing into them, and are sometimes said to be shielded from outward applications by a coating of the bark. It is evident that this pest is spreading, and may in a short time prove as disastrous to the vineyards as the peach-tree borer is to the peach orchards. This insect working underground, its ravages cannot be seen until the vine becomes sickly.

REMEDIES.—It is absolutely necessary for the grape-grower to examine the roots of all unhealthy-looking grape-vines in the vineyard, wherever the insect has effected a lodgment in the neighborhood, at least twice a year, and any larvæ or pupæ found should be cut out and destroyed at once. The Scuppernong grape alone is said to be exempt from the attacks of the grape-vine borer. The

pupæ are formed in rough oval cocoons of a gummy substance, covered outwardly with particles of wood and dirt, and the perfect insect makes its appearance from June to September.

Little can be done in the way of extirpating these underground borers, when, as in the present instance, their presence is only indicated by the approaching death of the vine. Still, every vineyardist should make it a rule to search for them wherever they find vines suddenly dying from any cause unknown to them, and upon finding such a borer should at once put an end to his existence. The beetle which may frequently be found during the summer months, should also be ruthlessly sacrificed where ever met with. We should also advise not to plant a vineyard on land covered with old oak stumps, and not to use oak stakes where those made of cedar can be had as conveniently.

GRAPE-CANE GALL-CURCULIO.—

The canes of the Concord vines are frequently found to have galls on the last year's growth, in the shape of an elongated knot or swelling which is generally situated above or below a joint. This gall was formed the previous fall while the tender cane was growing, and has almost invariably a longitudinal slit or depression on one side, dividing that side into two cheeks, which generally have a rosy tint. The gall is caused by a little footless, white cylindrical larva which measures 0.28 of an inch, and has a yellowish head, and somewhat darker tawny jaws. It is minutely wrinkled transversely, and sparsely covered with minute white bristles; the three segments next to the head being prominently swollen underneath and the bristles attached to them look very much like legs, and doubtless to some extent perform the functions of legs. This larva indeed bears a very close general resemblance to that of the Potato Stalk-weevil, and when taken out of its gall immediately curls up. It is of a uniform light yellowish brown without any markings whatever. It is closely allied to the Potato Stalk-weevil, but belongs to the genus *Madarus* which differs from *Baridius* in the peculiar undulating appearance of the wing-cases, and more especially in their being highly

polished, the word *Madarus* meaning glossy or polished.

REMEDY.—If these gall-bearing canes are cut off and burned during the winter there need be little fear of this insect's work, the more especially as it is not secure from parasites, even in its snug retreat, for we have bred a species of *Chalcis* fly from the galls, which had evidently destroyed the true gall-maker.

GRAPE-VINE FIDIA.—One of the worst foes to the grape-vine that we have is the Grape-vine Fidia, which is represented in the annexed Figure 11. It is of a chestnut-brown color, and is densely covered with short and dense whitish hairs which give it a



FIG. 11.—GRAPE VINE FIDIA. hoary appearance. We have found it very thick in most of the vineyards which we visited, and it is almost universally misnamed the "Rose-bug," which is, however, a very different insect. It is found in the woods on the wild grape-vine, and also on the leaves of the *Cercis Canadensis*; but of the tame vines it seems to prefer the Norton's Virginia and Concord. It makes its appearance during the month of June, and by the end of July has generally disappeared, from which fact we may infer that there is but one brood each year. The manner in which it injures the vine is by cutting straight elongated holes of about $\frac{3}{8}$ inch in diameter in the leaves, and when numerous it so riddles the leaves as to reduce them to mere shreds. The preparatory stages of this beetle are not yet known.

REMEDIES.—Luckily this beetle has the same precautionary habit of dropping to the ground, upon the slightest disturbance, as has the Plum curculio, and this habit enables us readily to keep it in check. The most efficient way of doing this is by the aid of chickens. Mr. Peschell, of Hermann, on whose vines this beetle had been exceedingly numerous, raised a large brood of chickens, and had them so well trained that all he had to do was to start them in the vineyard with a boy in front to shake the vines, and he himself behind the chicks. They picked up every beetle which fell to the ground, and in this manner he kept his

vines so clean that he could scarcely find a single beetle the following year.

GRAPE CODLING.—Although the preceding insect has been so scarce, yet the Grape has been worked upon in a somewhat similar manner, and even to a greater extent, by the insect now under consideration.

The larva of this Grape-codling may at once be distinguished from that of the Grape curculio, by its having six scaly legs near the head, eight fleshy legs in the middle, and two at the extremity of the body, and by spinning a fine web, by which it lets itself drop whenever handled. It is also larger, of a darker color, and bears a very close resemblance to that of the Strawberry leaf-roller, to be hereafter figured and described.

Its presence is soon indicated by a reddish-brown color on that side of the yet green grape which it enters. On opening the grape, a winding channel is seen in the pulp, and a minute white worm with a dark head is seen at the end of the channel. It continues to feed upon the pulp of the fruit, and when it reaches the seeds, eats out their interior. As it matures it becomes darker, being either of an olive-green or dark brown color, with a honey-yellow head; and if one grape is not sufficient it fastens the already ruined grape to an adjoining one by means of silken threads, and proceeds to burrow in it as it did in the first. When full grown it leaves the grape and forms its cocoon on the leaves of the vine. This operation is performed in a manner essentially characteristic: the worm cuts out a clean oval flap, leaving it hinged on one side, and, rolling this flap over, fastens it to the leaf, and thus forms for itself a cozy little house which it lines on the inside with silk.

REMEDIES.—This insect threatens to become a grievous pest unless checked by some unforeseen means, as was the case with the Grape curculio. Luckily, there is at least one parasite which attacks it, in the shape of a yellowish, footless maggot, with a green tint and fourteen segments. We obtained such maggots from two of the caterpillars, one having crawled out of its host before, and the other after he had spun up. Mr. Read says, the first brood of caterpillars feed on the leaves, appearing in May (in Ohio)

or as soon as the leaves are grown. The worms which appear in our grapes in July are, therefore, the second brood, and there is doubtless a third brood, for Mr. Rathvon received them in October, and we have taken the worm out of a grape as late as the 22d of September. The broods, in all probability, run into one another, and the last passes the winter within the cocoon, either in the larva or pupa state. They should, therefore, be searched for early in the season on the leaves. The second brood of worms, or those which infest grapes, can easily be espied and destroyed in a healthy vineyard; but where a vineyard is affected with what is designated as the "American Grape-rot," the grapes attacked by the Codling are not so easily distinguished, as they bear a close resemblance to the rotting ones. Care should be taken in gathering the infested grapes, for the worm being very active wriggles away and easily escapes.

GRAPE-VINE PLUME.—During the latter part of May and beginning of June, the leaves of the grape-vine may often be seen drawn together by silken threads, and in the retreat thus made will be found a small hairy caterpillar, which feeds on the tender leaves of the vine. This caterpillar grows to the length of about half an inch; the color of the body is very pale green and has four elevated white spots and two still smaller dots on every segment, from which spring stiff white hairs in all directions.

REMEDIES.—Whenever they become numerous, the only remedy is hand-picking.

TREE-CRICKET.—The general color is a delicate greenish, semi-transparent white, though some specimens have a blackish shade. From the fact that it is known to devour plant-lice, and likewise the eggs of some moths, we were formerly in doubt whether it should be considered friend or foe, but the experience during 1875 year settled the matter definitely, for it proved very destructive to the vine. The female deposits her eggs in grape canes, raspberry and blackberry canes, in the twigs of the peach, white willow, and a variety of other trees. In depositing, she makes a straight, longitudinal, contiguous row of punctures, each puncture about the size of that

which would be made by an ordinary pin. From each of these holes, a narrow, yellowish, elongate egg, runs slantingly across the pith. The twigs or canes thus punctured almost invariably die above the punctured part, and the injury thus caused to vines is sometimes considerable.

But by far the worst habit of the Tree-cricket is that of severing grapes from the bunches just as they are beginning to ripen, and it sometimes cuts off an entire bunch, or so thoroughly excoriates the stem that it fails to ripen its berries.

REMEDY.—The crickets themselves should be crushed whenever met with, while the vineyardist should make a business of searching in the winter time for all punctured twigs, and by burning them, prevent their increase in future.

STRAWBERRY LEAF-ROLLER, and Other Insects.—Insects are more injurious to the strawberry than any disease that has yet appeared.

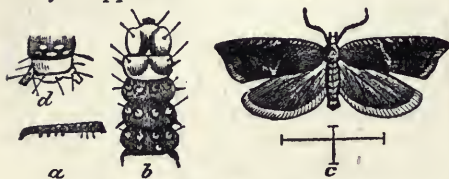


FIG. 12.—STRAWBERRY LEAF-ROLLER.

The most destructive of these is probably the larva of the common May Beetle, formerly called *Melolontha*, but now placed in the genus *Lachnosterna*. The grub (larva), when fully grown, is about an inch and a half long, and three-eighths thick, nearly white, with a brown head, and commonly called the White Grub.

These grubs are usually more numerous in old dry pastures and meadows than elsewhere, because their principal food is the roots of different kinds of grass. The old sods afford protection against the birds and worms which devour them; consequently they often become very abundant in such places. If these grass lands are plowed and planted with the strawberry, the grubs will attack the roots, and, if numerous, will destroy every plant almost as soon as it is put in the ground. In some sections of the country the white grub has materially checked the cultivation of the strawberry. The only remedy with which we are acquainted is, to occupy the ground with

some crop which requires considerable hoeing and cultivation, for two or three years before planting with the strawberry.

The grub is said to be three or four years in attaining its growth, and by continually manipulating the soil they are exposed to the attacks of birds, and many are destroyed by crushing; besides this, the beetles will seldom deposit their eggs in freshly disturbed soil.

Mr. Harris, in his "Insects Injurious to Vegetation," says "that this white grub is the larva of the May beetle, which is so often seen flying about in the evening. It is of a chestnut-brown color, smooth, but finely punctured—that is, covered with little impressed dots, as if pricked with the point of a needle, each wing-case has two or three slightly elevated, longitudinal lines; the breast is covered with yellowish down. The grubs are greedily devoured by birds; the crow being exceedingly fond of them.

Wire Worm.—

The wire worm (*Iulus*), which belongs to the Myriapods or many-footed worms, sometimes attacks the roots of the strawberry, but we have no accounts which show that they have as yet been very destructive. Frequent plowing and thorough cultivation are the most effective means of destroying them.

Snail or Slug.—

The snail or slug, which is so abundant and destructive to the strawberry and other garden products of Europe, has found its way to this country, and is now quite plentiful in some gardens near New York. These snails are great gourmands, and will destroy the strawberry fruit in quantities if they become very plentiful. Hand-picking, or destroying them with lime, is a pretty sure way of getting rid of this pest.

Plant Louse (Aphis).—

The Plant Louse (Aphis), or Green Fly, as it is usually called, sometimes becomes quite numerous upon the roots of the strawberry, particularly when the soil is quite loose and open, so as to admit them readily to the roots. Upon these they congregate in immense numbers, sucking the juices of the plant, and thereby effectually checking its growth. A liberal application of dry ashes or refuse

from a tobacco factory will usually destroy them. The Aphis also attacks the plants when grown under glass, but they are more readily destroyed than the Red Spider (*Tetranychus*), which insect is very destructive when numerous.

The best preventive to the ravages of the Red Spider is a moist atmosphere, but when this cannot be allowed, flour of sulphur should be freely scattered among the plants or upon the soil near them. The fumes of melted sulphur will make quick work with them, but it requires great care in its application, for should the sulphur take fire and burn, the fumes will destroy the plants as well.

WHITE-MARKED TUSSOCK MOTH.

—During the winter little bunches of dead leaves are sometimes found to be quite numerous on our apple trees. They are generally fastened to the twigs, and



FIG. 13.

upon examination are found to contain gray cocoons. The greater portion of these cocoons have an egg-mass glued to them, which is composed of numerous round, cream-colored eggs, of about 0.03 diameter, and partly covered with glistening white froth-like matter; while the other proportion of these cocoons have no such egg-mass.

This insect seems to occur more or less over the whole country, and we have repeatedly received its egg-masses during the past two winters. It is, however, as we might expect from its nature, often confined, like the Canker-worm, to particular orchards in a particular neighborhood. It feeds upon different kinds of trees, such as the elm, maple, horse-chestnut and oak, but it seems to prefer the apple, the plum, the rose and the pear.

REMEDIES.—Dr. Fitch has described two parasites, which attack this caterpillar, and we are acquainted with seven others, making in all nine distinct parasites, which prey upon this species.

In collecting the cocoons in the winter in order to destroy them, none but those which have the egg-masses on them should be taken, as all the others, either contain the empty male chrysalis or else some friendly parasite. From the fact that the female never travels beyond her cocoon, it becomes obvious that, since the insect can only travel in the caterpillar state, it would require over a century for it to spread even a hundred miles. Hence we may rightly conclude that it has been introduced into different parts of the country in the egg-state on young imported trees. How essential it is then to examine every tree in planting out a young orchard, and how easy it is, with the proper precautions, to forever keep an orchard free from its destructive work. As already stated, the young worms let themselves down upon slightly jarring the tree, and though after the third moult they lose this habit to a great extent, yet they may always be brought down by a good thorough shake, and where they have once invaded an orchard, this will be found the most feasible mode of killing them; though prevention, by destroying the egg-masses in the winter when they are easily discerned, is infinitely the best and surest remedy against its attacks.

BAG-WORM, alias BASKET-WORM, alias DROP-WORM.

—Our shade and ornamental trees are often defoliated by various insects, and we will give brief accounts of three which have attracted our attention during the past summer. Of these, the insect whose transformations are illustrated below, is by far the most common and injurious. It apparently flourishes better south of latitude 39° than north of that line. Year after year shade trees are planted, and year after year a great proportion of them dwindle and die, until at last the opinion very generally prevails among land-owners that it is of little use to try and grow them. Consequently they are not as generally planted as they should be.

Throughout the winter the weather-beaten bags may be seen hanging from almost every kind of tree. Upon plucking them many will be found empty, but the greater proportion of them will, on being cut open, present the appearance given at Figure 14; they are in fact full of soft

yellow eggs. Those which do not contain eggs are the male bags, and his empty chrysalis skin is generally found protruding from the lower end. About the middle of next May these eggs will hatch into active little worms, which, from the first moment of their lives, commence to

form for themselves little bags. They crawl on to a tender leaf, and, attached to their anterior feet with their tails hoisted in the air, they each spin around themselves a ring of silk, to which they soon fasten bits of leaf. They continue adding to the lower edge of the ring, pushing it up as it

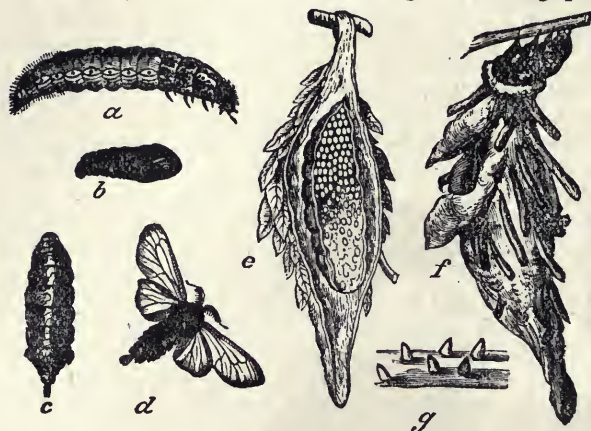


FIG. 14.—BAG-WORM, *alias* BASKET-WORM, *alias* DROP-WORM.

increases in width, till it reaches the tail and forms a sort of cone, as represented at Figure 14, *g*. As the worms grow, they continue to increase their bags from the bottom, until the latter become so large and heavy that the worms let them hang instead of holding them upright, as they did while they were young. By the end of July they have become full grown, when they present the appearance of Figure 14, *f*. The worm on being pulled out, appearing as at Figure 14, *a*. This full grown condition is not attained, however, without critical periods. At four different times during their growth these worms close up the mouths of their bags and retire for two days to cast their skins or moult, as is the nature of their kind, and they push their old skins through a passage which is always left open at the extremity of the bag, and which also allows the passage of the excrement.

REMEDIES.—From the natural history of this Bag-worm it becomes obvious, that by plucking the cases in the winter time, and burning them, you can effectually rid your trees of them, and we advise all who desire healthy trees to do this before the buds begin to burst in the spring. Where this is not done the worms will continue to increase, and

partly defoliating the tree each year slowly, but surely, sap its life.

SEED CORN WORM.—This maggot greatly resembles the Onion maggots, which are known to attack the onion in this country, and its work on corn is similar to that of this last-named maggot on the onion, for it excoriates and gnaws into the seed-corn, as shown at Figure 15, and finally causes such seed to rot.

After having become full fed, these maggots usually leave the kernels for the surrounding earth, where they contract into a smooth, hard, light-brown pupæ, and in about a week afterwards the perfect fly pushes open a little cap at the anterior end, and issues forth to the light of day. In this state it is a two-winged fly belonging to the order Diptera, and quite inconspicuous in its markings and appearance.



FIG. 15.—SEED CORN WORM.

REMEDIES.—It is difficult to suggest a remedy for this pest, as its presence is not observed till the mischief is done. Hot water has been found effectual in killing the Onion maggot, without injuring the onions, and would doubtless prove

an effectual for this Corn maggot, where a few hills of some choice variety are attacked, which it is very desirable to save. But its application in a large field, even if one knew where to apply it, would be impracticable, and we can only suggest soaking the seed, before planting, in gas-tar or copperas.

WHITE GRUB.—In its perfect state this larva is called the May-bug or May-beetle, and closely resembles the European cockchafer. In the latter part of July and in August the grubs are very

thus turned up to be killed by the frost late in the fall.

THE PLUM GOUGER.—This name was given by Mr. Walsh to another indigenous weevil. It is easily distinguished from either of the preceding weevils, by its ochre-yellow thorax and legs, and its darker wing-covers, which are dun-colored, or brown with a leaden-gray tint, and have no humps at all. Its snout is not much longer than the thorax, but as in the Apple Curculio, projects forwards, or downwards, but cannot be bent under as in the Plum Curculio.

The Plum Gouger seems to be unknown in the Eastern States, or at least is not common there; but it is very generally distributed throughout the Valley of the Mississippi. As a rule it is much less common and does much less injury than the little Turk, though in some few districts it is found equally abundant.

The Plum Gouger is often found on wild crab-trees, and may, like the Plum Curculio, occasionally deposit and breed in pip-fruit; but it is partial to smooth-skinned stone-fruit, such as prunes, plums and nectarines, and it does not even seem to relish the rough-skinned peach.

This beetle appears in the spring about the same time as the Plum Curculio, but as no eggs are deposited after the stone of the fruit becomes hard, and as its larva requires a longer period to mature than that of the latter, its time of depositing is shorter, and the old beetles generally die off and disappear before the new ones eat their way out of the fruit, which they do during August, September and October, according to the latitude.

REMEDIES.—This Plum Gouger is about as hard to deal with as the Apple Curculio. It drops almost as reluctantly, and we, therefore, cannot do much by the jarring process to diminish its numbers. Moreover, it takes wing much more readily than the other weevils we have mentioned; and though fruit that is badly punctured for food, often falls prematurely to the ground, yet, according to Mr. Walsh, that infested with the larva generally hangs on the tree, until the stone is hard and premature ripening sets in. In all probability the stunted and prematurely ripened fruit containing this insect will jar down much more readily than the healthy fruit.

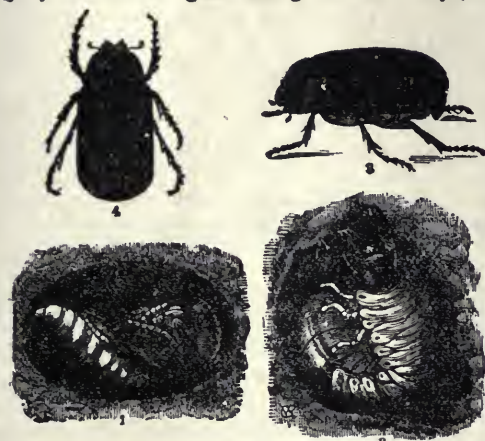


FIG. 16.—WHITE GRUB.

numerous in old meadows and pastures. Attention is drawn to them by spots of sward becoming dead, as if killed by drought. On turning up some of the dead turf the grass roots are found to be eaten off an inch or two below the surface, permitting the turf to be rolled up like a carpet. They carefully reject every root of clover. It is known, however, that they eat the roots of young fruit trees, and sometimes do great injury to strawberry plants, Indian corn, wheat, and potatoes.

REMEDY.—In all States they are preyed upon by various animals. No doubt an immense number might be destroyed by turning hogs into the fields where the grass has been killed. "Where the ground has been overrun by the grubs it is frequently advisable to plow it, and either sow it to winter wheat or rye, or reseed it to grass." As the larva of the insect, at the approach of winter, descends into the ground to a greater depth than can be easily reached by the plow, it cannot be

PLUM CURCULIO, or Plum-Weevil.

The plum-weevil, commonly known as the "curculio," was said by Dr. Walsh to be double-brooded, he stating that the first brood at Rock Island, Illinois, appears from July 19 to August 4, and the second brood from August 23 to September 28; but Mr. Riley states distinctly that it is single-brooded, and that it hibernates in the perfect or weevil state, and not in the larval or pupal, as was formerly imagined. The beetle also is more nocturnal than diurnal in habit, and is very active at night; but during the daytime, especially in bright sunny weather, rests among the leaves and branches, or under some shelter. It was formerly stated that the female first bored a crescent-shaped cut or incision with her beak, and then deposited an egg in the cut; but Dr. F. C. Hill, of Ohio, states that the female first bores a round hole with her snout, not straight in, but slanting backward, so that the cavity is just below the skin; she deposits her egg in the hole, and then cuts the usual crescent-shaped slit in front of it so as to undermine the egg, and leave it in a kind of flap formed by the little piece of flesh of the fruit which she has undermined, in order to meet the piece around the egg, and prevent the growing fruit from crushing it. The insect in the perfect state is

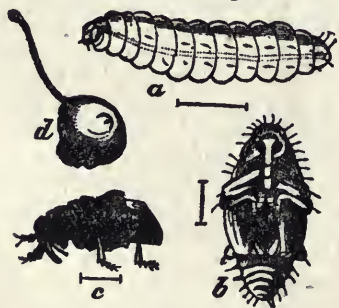


FIG. 28.—PLUM CURCULIO.

a, Larva; *b*, Pupa, into which the larva is transformed within a little cavity underground and of the perfect curculio (*a*).

said by Dr. Riley to gouge holes in peaches and apples, and also to feed on bark and tender twigs, and to gnaw holes in the leaves. In regard to the new remedy proposed during 1875 by Mr. Ransom, of St. Joseph, Michigan, in the *Prairie Farmer* and elsewhere, we quote from Mr. Ransom himself: Some experi-

ments were made by laying pieces of bark, etc., on the ground under the trees, as a shelter under which the curculio could hide. The first night, about sunset, he prepared two hundred and fifty trees, and in the morning went around, and in about three hours caught six hundred and forty-seven curculios; the next day having finished the orchard of four hundred trees, he killed four thousand one hundred and seventy-one curculios. The total number of curculios killed by him in one season was seventeen thousand nine hundred and forty-five. The *Michigan Farmer*, in commenting upon this article, says that the State entomologist of Illinois, and the horticultural editor of the *Prairie Farmer*, having been at St. Joseph, examining into the workings of the method proposed by Dr. Ransom to destroy the plum curculio, stated that the traps were pieces of bark three or four inches long, and about half as wide. Before putting them down, the ground was smoothed and the earth pressed close to the trunks, so as to leave no hiding place for the curculio to enter. The pieces of bark were then laid close around the trunks of the trees, three or four pieces to a tree, and pressed down in contact with the earth, so that only very small openings should be left under them. The pieces laid close to the ground, with one edge touching the tree, were generally selected by the insects, whose object was to shelter themselves, while at rest, from observation and possibly from the cold. On further inquiry, this method appears to have been only partially effective, and the fruit-growers near St. Joseph found that, though they destroyed many insects by this trapping method, more were destroyed by jarring the trees. When the weather became warm, the curculios were taken under the trees in diminished numbers, while in fact their numbers were rapidly augmented in the trees. The conclusions arrived at are briefly as follows: The trapping system will help to thin out the curculio before the season for stinging the fruit commences; that it will not do to dispense with jarring the trees; and, furthermore, that pieces of bark for a short time, early in the season, when the days are sometimes warm and the nights cold, and before the peach blossoms have

withered away, are useful for capturing curculios, but that after the fruit is as large as a hazel-nut this remedy is not successful. It is recommended to place the traps of bark under the trees as soon as the frost is fairly out of the ground.

In small orchards it will be found most profitable to drive a spike into the trunk of each tree and to use two sheets stretched on frames, which can both be dragged or carried and placed in position by one man, while a second person gently taps the iron spike with a mallet. To bring the Curculio down, it requires a light, sudden tap which jars, rather than a blow which shakes, and if the frames are each made so as to fold in the middle, it will facilitate disposing of those which fall upon it.

In conclusion, the intelligent fruit-grower can draw many a lesson from this account of the Curculio—already somewhat lengthy. Thus in planting a new orchard with timber surrounding, the less valuable varieties should be planted on the outside, and as the little rascals congregate on them from the neighboring woods in the early part of the season, they should be fought persistently. It will also pay to thin out all fruit that is known to contain grubs, and that is within easy reach; while wherever it is practicable all rubbish and underbrush should be burnt during the winter, whereby many, yes very many, of them will be destroyed in their winter quarters.

The old remedy of keeping hogs in a plum, peach or apple orchard, to eat the infested fruit as soon as it falls to the ground, appears to be very successful when practiced for two or three years, and where there are no other orchards in the vicinity.

THE CRANBERRY CURCULIO.—The perfect insect of another small curculio, *Anthonomus quadrigibbus* (Say), is accused of eating round holes in apples, plums, etc., both for food and as a place in which to deposit her eggs. In the American Entomologist, however, it is stated that it never attacks stone fruit, and goes into the ground to change into the pupa state, but transforms in the fruit itself. Another of this genus *Anthonomus suturalis*, (Lec.,) described by Mr. W. C. Fish, in a report to the Cape Cod Cranberry Grower's Asso-

ciation, is called the cranberry weevil. The female deposits its eggs, about the middle of May, in the buds of the cranberry. Selecting a bud not quite ready to open, and clinging to it, she works her snout deep into its center; an egg is then deposited in the hole thus made; the beetle climbs the stem, and cuts it off near where it joins the bud, and the shoot drops to the ground. The larva feeds inside the bud, and the weevil, when mature, eats its way out. The perfect insect is also said to eat into the fruit. The only remedy that could be suggested, should the insect become troublesome, is to flood the cranberry patch, if possible, for a short time, provided it does not occur at a period when the future crop might be injured by being under water.

AMERICAN MEROMYZA.—About the middle of the month of June, 1875, in all the wheat fields which we examined we noticed that a great many of the ears had prematurely ripened, had turned yellow and were stunted and shorter than the rest, and upon examination the kernels proved to be withered and shrunken. In most fields about one per cent. of the ears were thus affected, but in two fields, from three to four per cent were injured in this manner. This appearance was variously attributed to Hessian fly, Midge, etc., etc., no one seeming to know the true



cause. Upon examination we found that the last or ear-bearing joint could invariably be pulled out of its sheath with but a slight effort, and that it was perfectly yellow and dry, while the lower end bore an irregular and gnawed appearance. Upon splitting open the first joint of the stalk, a space of about a quarter of an inch was found to be completely corroded, so to speak, and filled with excrementitious matter, as shown in Fig. 17, *a*. In this space would generally be found a pale watery-green maggot of the form of Fig. 17, *b*, attenuated at one end and blunt at the other. We took a number of infested stalks home, and many of the maggots changed to green pupæ of the form and appearance of Fig. 17, *c*. Before changing to pupa

the maggot would sometimes crawl away from the joint and get nearer the head, between the stalk and the sheath. The pupa state lasted from twelve to fourteen days, and the first flies emerged during the first week in July.

REMEDIES.—Much can be done in an artificial way by cutting off and destroying all the infested stalks, which may readily be recognized by the signs already described; but even if this plan should faithfully be carried out, it is doubtful whether it would pay in a country where labor is so scarce and demands such high wages as in ours. We therefore have to fall back on the only practical means within our reach, viz.: that of varying the culture by alternate courses, and this style of cultivation will have to be more generally adopted, should this pigmy foe sufficiently increase as to greatly diminish the yield of the "staff of life." There is every reason to believe, however, that nature has her own means of keeping these flies within due bounds, for they are known to be preyed upon by parasitic Ichneumon flies in Europe, and we noticed many flies of this last description, of polished hues and active movements, deftly darting through, and resting upon the wheatplants of the fields infested with the *Meromyza*.

CURRENT WORM.—The imported currant worm, or saw-fly, was very destructive during 1875. The insect is stated to have been imported first in the neighborhood of Rochester, and to have traveled about twenty-five miles a year. The perfect fly comes out of the ground about April or May, and lays her eggs along the principal veins on the under side of the leaves. The larvæ have twenty legs, black heads, and are of a greenish color, spotted with black, but after the last molt they become entirely of a green color, with large, dark, eye-like spots on each side of the head. When fully grown the larvæ are about three-fourths of an inch in length. They then burrow into the earth, or hide under dead leaves, and spin a thin oval cocoon of brown silk, in which the pupa is formed. The perfect insect appears about June or July, and the second brood does not come out until the following spring. The native currant-worm, is said not to be as injurious as its foreign rela-

tive, and differs from it by being, in the larval state, always of a uniform green color, without the black dottings always found on the imported species, except after the last molt. The cocoon is also spun among the twigs and leaves of the bushes on which it feeds, and it does not go under ground to form its cocoon. The insects are only about three-fourths the size of the imported pest, and the sexes are alike in coloration, while the female of the imported species has the body mostly of a bright honey-yellow, the male being principally black; the venation of the wings also varies. The larvæ of both feed upon the currant and gooseberry, and some were said to have been found feeding on the leaves of the strawberry, planted around the currant bushes. The best remedy is dusting the bushes with pulverized white hellebore—the root of the *Veratrum album* of Europe—which may be found at any druggist's. The success of our native species, *Veratrum viride*, of Gray, the American white hellebore, or Indian poke, has not yet been reported on, but should be tried. Syringing the plants with a strong decoction of hellebore is said to kill the insect also, and although it is poisonous in large quantities, the American Entomologist states that in minute doses there is no reason to be afraid of it. Dr. Fitch states, as a proof of its innocuous properties, that it has long been in use as the basis of certain snuffs. It would be well, however, to wash the fruit before using it.

NEW YORK WEEVIL.—This large gray beetle often does considerable damage to fruit trees. It kills the twig by gnawing off the tender bark, in the early part of the season, before the buds have put out, and later in the year it destroys the tender shoots which start out from old wood, by entirely devouring them. It eats out the buds, and will also frequently gnaw off the leaves at the base of the stem, after they have expanded. It attacks, by preference, the tender growth of the apple, though it will also make free with that of peach, plum, pear and cherry, and probably of other fruit as well as forest trees.

REMEDY.—This insect is more active at night than day, and is often jarred down upon a sheet of curculio-catcher, for it falls about as readily as the Plum Curculio.

COTTON ARMY WORM.--The caterpillar, or cotton army worm, appear in countless myriads, destroying millions of dollars' worth of cotton, and in many instances totally ruining the planters who relied upon cotton alone as their main crop. It is also to be feared, if effectual means are not soon devised for their extermination, that the planting of cotton must be abandoned, for a time at least, in the most Southern States, where these insects particularly abound, and most probably originate. In the more northern cotton States the cotton army worm is only an occasional visitor, becoming rare as it approaches the north. In the extreme south they appear every season in greater or less numbers. As heavy frosts kill caterpillar, chrysalis, and perfect moth, its periodical appearance in certain districts is most probably owing to climatic influences, the insect being exterminated for the time whenever there has been cold weather, and not appearing in that neighborhood again until replaced by fresh migrations of moths from more southern localities, where the frost had not reached. An old cotton planter in South Carolina states that the moth made its appearance periodically every twenty-one years in his district, having been very destructive in the years 1804, 1825 and 1846. "Moreover, it had actually been foretold that in the year 1867 the caterpillars might be expected to destroy the crops."

As false alarms about the appearance of the cotton worm in certain districts are frequently inserted in the southern newspapers by persons interested in the sale of cotton when the worms seen in the field are merely boll worms, grass worms, or some other comparatively harmless caterpillar, we will mention some distinguishing marks by which the cotton moth may be recognized in either the egg, caterpillar, chrysalis, or perfect state. In the first place, the egg of the cotton worm is round and very much flattened in form, and of a green color, whereas the egg of the boll worm moth is round, somewhat bluntish, conical in shape, and of a yellow color. The egg of the cotton worm is mostly deposited on the leaf or branches, while the egg of the boll worm is usually placed in the so-called "ruffle" or envelope of the flower.

The caterpillar of the cotton worm has

six pectoral or front feet, two anal, and eight ventral, the two foremost of the



FIG. 19.

ventral feet being very small, apparently useless, and not employed for grasping, like the other six; while in the grass worm the legs are perfectly formed and all used when creeping from leaf to leaf. Owing to this imperfection in the formation in the first pair of ventral feet, the cotton caterpillar always moves like the span worm or looper, that is, by alternately contracting and expanding its body, holding fast by means of its hind feet to the object on which it rests, while the head and fore feet are extended as far as possible, the stalk or leaf being securely grasped by the pectoral feet, the hinder part and legs are suddenly brought up to them, so that at every step the body assumes the shape of an arch; whereas the grass worm glides along by moving its feet alternately and gradually without raising the middle of its body from the leaf. The cotton worm has also a habit of doubling itself up suddenly when disturbed, and springing to a distance, but the grass worm merely rolls itself up somewhat like a snake when coiled. The cotton worm, when about to change, spins a very loose web or cocoon among, or in the leaves or branches of the cotton plant or weeds infesting the field, at some distance from the ground. The grass worm, on the contrary, comes down from the plant it has fed on and retires under stones, loose earth, or buries itself in the ground before forming its cocoon. The perfect moth of the real cotton worm is much more angular and graceful in form, with the upper wings of a somewhat reddish or claret colored brown, and there is always a darker spot having a light centre, more or less defined in the middle of these wings, while the under wings are of a dark ash color. The grass worm moth is much more clumsy in form, its upper wings being clouded and barred with dark and light grayish brown, while the under wings are lighter colored.

Whether the cotton caterpillar feeds.

upon any other plants or not we are unable to say, never having found it eating anything but cotton, and even when seen on weeds in cotton fields the worm has merely wandered away to find some suitable locality in which to spin its cocoon. Several cotton worms, kept for the purpose of experiment, constantly refused to eat anything but cotton, although supplied daily with fresh leaves of all the weeds or plants in the neighborhood, and several actually starved to death rather than touch anything but cotton as a food.

As far as the habits of the cotton caterpillar are known, whenever they have appeared in Georgia or South Carolina they almost invariably came from the southward, and committed great ravages some twenty or thirty miles off, a fortnight or three weeks before making their appearance in the localities named. The second and third broods of moths still traveling further north, spread destruction and devastation wherever they deposited their eggs, until provisionally killed by the frost. If this theory of their northward migration is correct, it would be well for the planters to give a small reward to the discoverer of the first cotton caterpillars in their neighborhood, and then combine to turn their hands *en masse* on the infested plantation, to crush, burn, and destroy the insect in all its forms, as worm, chrysalis in cocoon, or fly, even if they have to burn the field to get rid of them, and to pay the proprietor for the damage done; for they may rest assured that if allowed to become moths, and multiply without any effort being made to destroy them, the flies will undoubtedly migrate to all the neighboring plantations, and their own crop will eventually be destroyed among the rest. Many remedies have been proposed for their extermination. Fires built at twilight in and near cotton fields would doubtless burn up a great many moths, yet it is very questionable if these fires will not also attract moths from other plantations, which escaping the fire will found new colonies, when they otherwise might have been content to remain where they were as long as there was any cotton foliage left for their progeny to devour. Large shallow plates or dishes filled with molasses or syrup with vinegar, or some strong aromatic substance, have been

used in dry weather on a small scale with success, especially when the moth makes its first appearance, as, being attracted by the sweet scent, they crowd into the plate and are drowned. Perhaps if a preparation of arsenic or some tasteless poison were mixed with the syrup it would answer better, as doubtless most of the moths visiting the plate, after satisfying their appetite, escape being caught by the viscid substance and fly off to the neighboring plants. Hard wood boards or shingles thickly coated on one side with the poisoned preparation might be used as a substitute for the plates, but in this case the boards should either be placed under temporary shelter, or in a slanting position with the prepared side underneath, so that heavy rains could not wash off the poisoned mixture. Syrup and rum painted or smeared on the trunks of trees are extensively used by continental entomologists to attract the night-fly moths.

If poison, however, in any shape is used for exterminating noxious insects, the hands working on the plantation should be warned of it, otherwise many of the young negroes might mysteriously disappear with the moths, and it should on no account whatever be used where there are bee-hives in the neighborhood. This poisoning process has nevertheless been found to answer very well in Maryland and Virginia, where tobacco is the staple crop. The sweetened poison being dropped into the flower of the Jamestown weed (*Stramonium*), or the tobacco blossoms themselves after having been cut from the plant, the moth is attracted by the flower and perfume in the early twilight, inserts its large flexible trunk, and after imbibing the poison dies before having time to deposit its eggs. This plan has been practiced with decided success in Florida by the planters of tobacco.

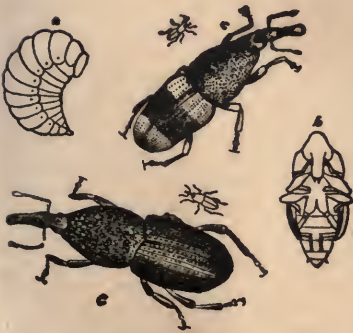
The eggs of the cotton moth are frequently destroyed by several species of small ants, which are said to bite the egg open when just deposited and to abstract the substance. Many caterpillars, especially if weak or somewhat disabled, fall victims to the voracity of the restless myriads of ants always abounding in the fields, and feeding upon the honey dew secreted by the cotton louse or aphid, and the bodies of such other insects as they



CABBAGE WORM, (Butterfly.)
See pages 377-503.



CABBAGE WORM LARVA.
See pages 377-503.



GRAIN WEEVIL.



HORNED BUG.



BEE MOTH.
See page 303



FLEA LION.



OAK PRUNER.
See page 407.

can overcome. The cotton caterpillar is also destroyed by a small yellow and black banded ichneumon fly, which deposits its eggs in the worm. This egg hatching produces a footless grub, which feeds in the body of the caterpillar, at first avoiding all the vital parts and devouring merely the fatty matter, leaving the larva with strength to spin its cocoon and change into the chrysalis, with its internal foe still in its body. The grub then, after devouring the remainder of interior, changes into a pupa, and finally emerges from the dried chrysalis' skin as a full-formed four-winged fly, somewhat resembling a very diminutive wasp.

PEAR SLUG.—The pear slug, a brownish-green, slimy slug, feeding upon the leaves of the pear tree, deposits its eggs singly in June, in incisions made by the piercer of the female under the skin of the leaf. The larvæ, hatching, eat the substance of the leaf, leaving the veins and under skin untouched. The pupa is formed in oblong oval cavities under ground. The insect appears in about fifteen days after the slug has gone into the ground, in June and August, and lays its eggs for the second crop, which go into the ground in September and October, and remain until the following spring, when the perfect flies come out to lay their eggs on the foliage. Mr. Saunders, of Canada, states that this insect is readily destroyed by dusting the tree with air-slacked lime. Coal oil will injure the trees, and road-dust is of little value when dusted over the trees. For another insect of the same genus, Harris recommends syringing with strong soap-suds. The Rose Slug and other injurious slug worms can be destroyed by dusting the plants with the powdered hellebore, or syringing with a strong decoction of the same root.

PLANT LICE.—To destroy common plant lice (*Amphides*) and other insects in the greenhouse and garden, the following remedy has been recommended by M. Cloetz, of the Jardin des Plantes, in Paris: Three and one-half ounces quassia chips, five drachms of stavesacre seeds, powdered and placed in seven pints of water, and boiled until reduced to five pints.

Dr. Hull recommends dusting slacked lime on the trees or bushes when the

foliage is wet; syringing with soap-suds or tobacco-water, or a strong decoction of quassia with soap-suds; also, a weak solution of chloride of lime is said by Mr. Andrews to preserve plants from insects if sprinkled over them. The following recipe is also highly recommended in an English horticultural journal as being almost infallible "for mildew, scale, mealy bug, red spider, and thrips:" Two ounces flour of sulphur worked into a paste with water, two ounces washing soda, one-half ounce common shag tobacco, and a piece of quicklime about the size of a duck's egg. Pour them all into a saucepan with one gallon of water, boil and stir for a quarter of an hour, and let the whole settle until it becomes cold and clear. It should then be poured off, leaving the sediment. In using it, add water according to the strength or substance of the foliage. It will keep good for a long time if kept closed.

CABBAGE BUG.—The harlequin cabbage-bug, which appeared in 1871, has been much complained of the past year. The perfect insect hibernates in sheltered places, and the female deposits her eggs in March and April, in two rows, cemented together, mostly on the under-side of the leaf, and generally ten to twelve in number. In about six days the first broods make their appearance, the young larvæ resembling the perfect insect, with the exception of being wingless. About sixteen to eighteen days elapse from the deposition of the eggs to the development of the perfect insect. A second brood appears in July, which probably hibernates (in North Carolina) in sheltered places. It is said that fowls and birds will not eat them, and the only remedy recommended is handpicking, and as they hibernate in the perfect state beneath bark, under brush heaps or stones, like the cotton red-bug, it would be well in winter to search for them in such situations, and in spring to destroy them on their first appearance upon the plants, before they have had time to deposit their eggs; or if little heaps of rotting vegetables were left as places of shelter, here and there during the winter, so that they might be induced to hibernate under them, they might readily be destroyed in spring by burning straw over the heaps.

ROCKY MOUNTAIN LOCUST.—These insects appear in vast armies, devouring every green thing, like the locusts mentioned in the Scriptures, and which may be reckoned yet among the plagues of the Eastern States.

The female locust, in the autumn, deposits her eggs in small holes or cells made in the earth by means of her ovipositor. Most of these eggs remain all winter uninjured by the frost, and hatch the following spring, earlier or later, according to the influences of climate. Cold rains in the spring, however, are

escape by a rapid and prolonged flight. When young they feed near the place where they were hatched, and upon whatever vegetation is growing in the vicinity. When fully grown, with perfect wings, they collect together, pair, and emigrate in countless myriads to other places in search of food and proper places in which to deposit their eggs for the next year's crop, after doing which they soon die and disappear. In the *Practical Entomologist*, Dr. Walsh states that he does not think the hateful grasshopper will ever cross the Mississippi to pass onward to the Eastern States, and recommends the authorities to offer a bounty for every bushel of eggs.

The western grasshopper differs from its eastern relative, the red-legged locust, merely by having the wings much more elongated, so as to be adapted for long flights. In habits they are much alike; the red-legged locust feeds on grass, leaves and vegetables, and is also migratory. The red-legged locust, in certain seasons, collects in great numbers, and some years ago, in certain parts of New York, did considerable damage, especially to garden vegetables, not sparing even unripe red peppers. A planter in Texas, as a remedy for the western locust or grasshopper, recommends that: "As soon as the grasshopper has laid its eggs the planters plow their fields and turn the

soil over so that the eggs will be buried under a layer of earth, which will crush them and thus destroy the spring crop of grasshoppers. This experiment has been made in small spots of ground where myriads of eggs were deposited, and not a grasshopper came from under the layer of soil that covered the eggs."

Besides the remedies already mentioned for destroying the eggs of the western locust or grasshopper, crushing and killing the young insects by means of a large roller, has been spoken of; the young grasshopper, however, being exceedingly agile, many doubtless would make their escape. It has been proposed not to burn the prairies in the autumn, as is usually the practice, but to defer it until spring, when the young grasshoppers are yet wingless and the grass dry, then to

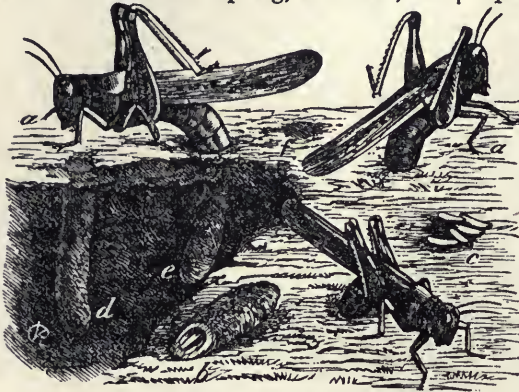


FIG. 000.—ROCKY MOUNTAIN LOCUST.

a, a, female in different positions, ovipositing; *b*, egg-pod extracted from ground, with the end broken open, showing how the eggs are arranged; *c*, a few eggs lying loose on the ground; *d, e*, shows the earth partially removed, to illustrate an egg-mass already in place, and one being placed; *f*, shows where such a mass has been covered up.

said to destroy the young insects. The grasshoppers when first hatched exactly resemble the old insects in form, with the exception that they have no wings or wing cases. Rudimentary wings and wing cases are developed when they cast their skins, but they are as yet perfectly incapable of flight, and can merely walk or jump from plant to plant; and it is only when they have shed their skins for the last time that they acquire fully developed wings and are capable of any flight whatsoever. This insect, from the egg to the perfect state, is injurious, devouring almost any vegetable substance, (sorghum and osage orange alone being excepted by some of our correspondents,) and is most easily destroyed by wholesale when young and unable to fly, as the perfect insect when disturbed can readily

set fire to it in circles as much as possible, so that the insects cannot escape from the ring of fire, but be driven by the heat and smoke into the centre, where they will eventually perish in the flames. In the Eastern States, where the red-legged grasshopper abounds, the nets already mentioned could be used with advantage, and if the insects have been killed by immersion in boiling water, they could be given as food to poultry, etc., kept in enclosures where they cannot find any insects. The only trouble yet found with this net is that it sometimes collects a great deal of rubbish, such as leaves, sticks, etc., and the centre opening is liable to become clogged with such substances if not examined and cleaned out every few minutes.

THE QUINCE CURCULIO.—This insect has been called the Quince Curculio by Dr. Trimble, and though it breeds in other fruits, the name is a good one, as it will enable us to distinguish it at once from our other fruit snout-beetles.

Though belonging to the same genus as our Plum Curculio, and having very much the same form, as may be seen by referring to the figure, (Figure 19 *a* side view; *b* back view), yet it differs remarkably in its habits from both of the preceding weevils. It is, like them, an indigenous species, and its original fruit was evidently the wild Haw, which in the West it yet seems to prefer to the cultivated fruits. But in the East it has become very injurious to the Quince, and, as we might naturally expect, also attacks the Pear, and especially the Lawrence and other late varieties.



FIG. 19.

REMEDIES.—Very fortunately this insect drops as readily when alarmed as does the Plum Curculio, and the jarring process will be found just as effectual in catching it, with the additional advantage that the jarring need only be carried on for about ten weeks of the year, namely, from about the first of June to the middle of August in this latitude. Moreover, in accordance with its late appearance, we

find that, according to Dr. Trimble, whenever it attacks pears, it prefers the late ripening varieties. Again, it is, like the Plum Curculio, nocturnal in its habits, and secretive during the day, so that the Ransom process will undoubtedly prove effectual with it, if used at the right season. All fruit that falls should be destroyed, and as we know that the larva hibernates in the ground, many of them will be injured and destroyed by late stirring of the soil.

GRASS, OR ARMY-WORM.—The grass or army-worm, though it appears every season, is not always troublesome. The eggs are probably deposited at the base of perennial grass-stalks, and the larvæ at times appear in immense multitudes in the Northern, Middle and Western States, where they destroy grass, grain and other crops. Leaving one field, after having eaten it out, they march or crawl to those in the neighborhood in search of food; hence the vulgar name of army worm. The insect by day hides in tufts of grass. When the larvæ are migratory, or on the march for food, their march is stated to be at the rate of two to six rods per hour. These pests are said to multiply much faster in dry seasons when the swamps are dry, and when they are thus multiplied a wet season and overflowing swamps drive the insects from their lurking places in flocks, and they alight here and there over the country. There is generally but one brood in the Northern States in one season, but in the South there are probably two, the last of which hibernates as pupæ. Several remedies have been proposed for their prevention and destruction, among which may be mentioned burning over the meadows in winter or very early in spring, or plowing late in the fall or early in spring, which will probably destroy all their eggs. Judicious ditching will prevent their migration from infested fields to those as yet unjured, and these ditches should be dug, if possible, with almost perpendicular sides, or sloping inward from the top on the side to be protected, so that the caterpillars cannot readily crawl out. When the ditches are filled with the struggling caterpillars, if dry straw is scattered over them and fire applied it will kill them and clear the ditch for another lot.

WESTERN POTATO BUG, Colorado bug, or ten-lined spearman, has been very injurious to the potato crops during the last few years in the Western States. It appears to be rapidly spreading towards the East, the rate of progress eastward assumed to be about fifty miles a

year. The habits of the western potato beetle are as follows: The eggs are deposited by the female, to the number of about seven hundred, at intervals during forty days, on the leaves of the potato, in somewhat regularly arranged loose clusters. After the lapse of about six



FIG. 21.—COLORADO POTATO-BEETLE.

Colorado Potato-Beetle: *a*, *a* eggs; *b*, *b*, *b*, larvæ of different sizes; *c*, pupa; *d*, *d*, beetle; *e*, left wing-cover magnified to show lines and punctures; *f*, leg, enlarged. Colors of egg, orange; of larvæ, Venetian-red; of beetle, black and yellow.

days they hatch into larvæ, which feed upon the foliage of the plant about seventeen days; they then descend to the ground, where they change into pupæ at the surface of the earth. The perfect beetle appears about ten to fourteen days after the pupæ is formed, begins to pair in about seven days, and on the fourteenth day commences to deposit her eggs, thus requiring about fifty days from egg to egg again. This period may, however, vary somewhat according to the state of the weather, and the abundance or paucity of food when in the larva state. There is another insect almost exactly similar in color, size, and form to this potato beetle, found in the Middle and Southern States, which is mentioned in Melsheimer's catalogue as a synonym under the name of *Doryphora*. This insect merely differs from the *decim lineata* by having the second and third stripes always united behind, and the edges of all the stripes with a single row of punctures; the legs also have a black spot in the middle of all the thighs. This insect (the *D. juncta*) we found in

South Carolina upon the horse nettle, and several specimens in Alabama, where they fed upon potatoes and egg plants, being reported as especially injurious to the latter.



FIG. 22.—BOGUS COLORADO POTATO-BEETLE.

a, eggs, *b*, *b*, larva, *c*, Beetle, *d*, left wing-cover enlarged, retaining marks and punctures; *e*, leg enlarged; colors of egg, pale yellow; of larva, cream yellow; of beetle, black, yellow and brown.

A remedy we propose is "a weak lime sprinkled over the plants between sundown and dark, three applications to be made at different times," and adds in a postscript, "this remedy was tried in the year 1867, and proved effectual." If brine is used, however, great care should

be taken not to have too strong or too much of it, else the remedy would be as bad as the disease, and both potato beetles and plants would be killed at the same time. Straw placed loosely over the plants will protect them somewhat from the insect, but would cost too much when spread over a large field. If the larvæ and perfect beetles are beaten off the plants into pans, as is frequently done, it would be advantageous to have the vessels, which are to receive them when they fall from the plants, made of smooth tin, shaped somewhat like a spittoon but much deeper, with the slope inwards to the central hole in the top, or a much greater inclination so that the insects would readily slide down and fall into the main case, where, once in, they could not possibly escape. This top might also be made much larger, and shallow, funnel-shaped, if desired, to cover more space, and be attached to a bag. The same vessels might be used for the rose beetle and other insects which fall to the ground when disturbed. When open mouth bags or sweeping nets are used to sweep them off the foliage, this plan might be modified by using a net or bag and somewhat like the fish-baskets in rivers and creeks—that is, with a double net or bag attached to a hoop, the outer one being very long, conical, and with an opening at the lower end, which can be closed by means of a string, and through which the insects captured can be shaken into hot water; the inner net to be also conical but shallower, with a smooth round hole in the centre, through which the beetles are swept when the net is forced over or under the plants. This orifice might be made of tin and closed with a cork when the net is nearly full, or when not in use. Such a net could be made of any size or shape, and would undoubtedly be of much utility, as the insects, once swept into the inner part, could not possibly escape, as is frequently the case when open-mouthed sweeping nets are used. The ring of the net by which the mouth is kept open can readily be made of common telegraph wire; any straight and strong stick will answer for a handle, and the bags may be made of canvas or strong muslin. The edges of the hoop to which the net is fastened ought to be protected by a covering of

leather or some such material, as the muslin is subject to be worn away by friction when beating the plants. Powdered hellebore is reported to have been used with effect as a means of destroying both the Colorado potato bug and the gooseberry or currant worms, if dusted over and under the foliage when the plants are wet with dew. Hellebore, however, is a somewhat dangerous remedy, on account of its poisonous qualities.

The true remedy consists in preventing them from becoming numerous so late in the season. Watch for the beetles in early spring, when the vines are just peeping out of the ground. Ensnare as many of them as you can before they get a chance to pair, by making a few small heaps of potatoes in the field planted; to these the beetles will be attracted for food, and you can easily kill them in the morning. Keep an eagle eye for the eggs which are first deposited. Cultivate well by frequently stirring the soil. Plant early varieties in preference to late ones, because the bugs are always more numerous late in the season than they are during the spring and early summer. Give the preference to the peach-blow, early rose and such other varieties as have been found most exempt from attack, and surround your fields on the outside by rows of such tender-leaved varieties as the Mercer, Shaker, Russet, Pinkeye and early Goodrich; but, above all, isolate your potato field as much as possible, either by using land surrounded with timber, or by planting in the centre of a cornfield. Carry out these suggestions thoroughly and you will not have much use for Paris green, and still less for the scorching remedy.

THE APPLE CUCULIO.—The Apple, or Four-Humped Curculio, (Fig. 23, *a* natural size; *b*, side view; *c*, back view,) is a smaller insect with a snout which sticks out more or less horizontally and cannot be folded under, and which in the male is about half as long, and in the female is fully as long as the whole body. This insect has narrow shoulders and broadens behind, where it is furnished with four very conspicuous humps, from which it takes its name. It has neither the polished black elevations nor the pale band of the Plum Curculio. In short, it differs generically, and never attacks stone fruit.

The size varies from 1-20th to nearly 1-10th of an inch, but the colors are quite uniform, the body being ferruginous or rusty-brown, often with the thorax and anterior third of the wing-covers ash-gray—the thorax having three more or less distinct pale lines.

REMEDIES AND PREVENTIVE MEASURES.—Notwithstanding we have had reports, published in the columns of our agricultural papers, of the relative number of Apple and Plum Curculios captured from peach trees by jarring with the Curculio-catcher, we are fully convinced that



FIG. 23.

such reports were not based on facts, and that we may never expect to subdue this insect by the jarring process. It is not as timid or as much inclined to drop as the Plum Curculio, and though it can occasionally be brought down, it generally remains defiantly on the fruit or on the bough, through the gentlest as well as the severest jarring of the tree. Indeed, its habit of transforming in the fruit places it in a great measure beyond our control, and we fear that this is one of the few insects with which we can do but little by artificial means. But we have only just commenced to understand this foe, and there is much yet to learn about it. We sincerely hope that the few facts which have been here given will increase the reader's interest in this insect and enable him to carry on future observations and experiments with a better understanding; so that they will at last result in making us masters of this rather difficult situation. Mr. H. Lewelling, of High Hill, Montgomery county, Missouri, who has had much of his fruit injured by this insect, informs me that Tallman's Sweet is preferred by it to all other varieties, and our observations should, as much as possible, tend in the direction of deciding which varieties are most subject to, and

which most exempt from its attacks; and which varieties fall most readily when infested by it.

THE PEA-WEEVIL.—The pea-weevil, or pea-bug, does not deposit its eggs in the flowers of the pea within the pod, as is sometimes taught, but on the surface of the young pods, without special reference to particular parts. They are attracted to the outside of the pod by a "viscid" fluid which dries white, and glistens like silk. As soon as the eggs are hatched, the larvæ bore directly through the pod, one entering each pea and making a puncture smaller than a pin-hole. As the pea and pod enlarge, the puncture closes up, and the larva excavates a small cavity in one side of the pea, leaving its outer coating whole. In this cavity it assumes the pupa state, and comes out a perfect beetle the next year, usually about the time the young peas are in bloom. If the weevils are in the peas when sown, they remain in the ground till the proper time to come out and deposit their eggs.

REMEDY.—Inclose the peas, after they are perfectly dry, in a tight cask, and keep them over to the second year before sowing, which will kill the weevils; to put them into water just before sowing, when the sound ones will mostly sink, and those containing the weevil will rise to the surface. Also immerse them in hot water for one or two minutes, by which most all the weevils will be killed and the sprouting of the peas not injured.

All peas intended for seed should be examined, and it can very soon be determined whether or not they are infested. The thin covering over the hole of the peas that contain weevils and which may be called the eye-spot, is generally somewhat discolored, and by this eye-spot those peas which ought not to be planted can soon be distinguished. Where this covering is off there is little danger, for in that case the weevil has either left, or, if still within the pea, is usually dead. It would, of course, be tedious to carefully examine a large lot of peas, one by one, in order to separate those that are buggy, and the most expeditious way of separating the sound from the unsound, is to throw them into water, when the sound ones will mostly sink and the unsound swim.

Choice lots of seed, if found to be infested when received from the seedsman, may be thrown into hot water for a minute or two, and the sprouting of the peas will be quickened, and most of the weevils, but not all, be killed. But whatever plan be adopted to obtain sound seed, it should be every man's aim, in duty to himself and to his neighbors, to plant none but bugless peas.

GRAPE LEAF-FOLDER.—The subject of this sketch has long been known to depredate on the leaves of the grape-vine in many widely separated parts of North

America. It is not uncommon in Canada West, and is found in the extreme southern parts of Georgia. It appears to be far more injurious, however, in the intermediate country, or between latitude thirty-five and forty degrees, than in any other sections, and in Southern Illinois and Central Missouri proves more or less injurious every year.

The moth of the Grape Leaf-folder is a very pretty little thing, expanding on an average almost an inch, with a length of body of about one-third of an inch. It is conspicuously marked, and the sexes



FIG. 25.

differ sufficiently to have given rise to two names, the female having been named *Botys bicolor*. The color is black with an opalescent reflection, and the under surface differs only from the upper in being less bright; all the wings are bordered with white. The front wings of both sexes are each furnished with two white spots; but while in the male (Fig. 25, 4), there is but one large spot on the hind wings, in the female (Fig. 25, 5) this spot is invariably more or less constricted in the middle, especially above, and is often entirely divided into two distinct spots. The body of the male has but one distinct transverse band, and a longitudinal white dash at its extremity superiorly, while that of the female has two white bands. The antennæ, as already stated, are still more characteristic, those of the male being elbowed and thickened near the middle, while those of the female are simple and thread-like.

There are two broods—and probably three—during the year; the first moths appearing in June, the second in August, and the worms produced from these last hibernating in the chrysalis state. The eggs are scattered in small patches over the vines, and the worms are found of all sizes at the same time. These last change

to chrysalids in twenty-four to thirty days from hatching, and give one-fourth the moths in about a week afterwards.

The worm (Fig. 25, 1) folds rather than rolls the leaf, by fastening two portions together by its silken threads; and for this reason, in contradistinction to the many leaf-rollers, may be popularly known as the "Grape Leaf-folder." It is of a glass-green color, and very active, wriggling, jumping and jerking either way at every touch. The head and thoracic segments are marked as at Figure 25, 2. If let alone, these worms will soon defoliate a vine, and the best method of destroying them is by crushing suddenly within the fold of the leaf, with both hands. To prevent their appearance, however, requires far less trouble. The chrysalis is formed within the fold of the leaf, and by going over the vineyard in October, or any time before the leaves fall, and carefully plucking and destroying all those that are folded and crumpled, the supply for the following year will be cut off. This should be done collectively to be positively effectual, for the utmost vigilance will avail but little if one is surrounded with slovenly neighbors.

COMMON YELLOW BEAR.—This is

one of the most common North American insects. The moth (Figure 26), which is very generally dubbed "The Miller," frequently flies into our rooms at night; and there are quite a number of our farmers who, somehow or other, have got the idea that this "Miller" is the insect

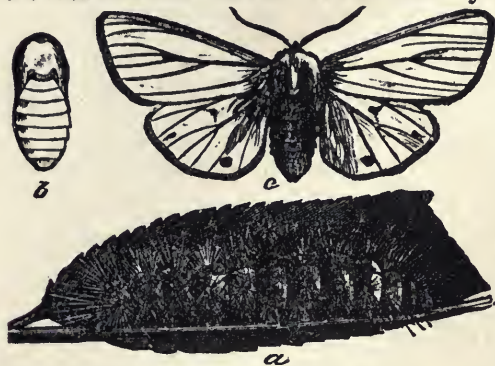


FIG. 26—COMMON YELLOW BEAR.

that infests their beehives—that it is, in short, the Bee-moth.

Though the moth is so common, how few persons ever think of it as the parent of that most troublesome of caterpillars, which Harris has so aptly termed the Yellow Bear (Figure 26.) These caterpillars are quite frequently found on the Grape-vine.

The Yellow Bear is found of all sizes from June to October; and though quite fond of the vine, is by no means confined to that plant. It is, in fact, a very general feeder, being found on a great variety of herbaceous plants, both wild and cultivated, as butternut, lilac, beans, peas, convolvulus, corn, currant, gooseberry, cotton, sunflower, plantain, smart-weed, verbenas, geraniums, and almost any plant with soft, tender leaves. These caterpillars are indeed so indifferent as to their diet, that we have actually known one to subsist entirely, from the time it cast its last skin till it spun up on dead bodies of the Camel Cricket.

The best time to destroy these worms is soon after they hatch from their little round yellow eggs, which are deposited in clusters; for, as already intimated, they then feed together.

SQUASH BUG.—The common squash bug has been extremely injurious to the squash family in many parts of the Middle States, injuring the plants in larva, pupa, and perfect states, by con-

gregating in great numbers around the stem near the ground, or on the leaves, and sucking out the sap by means of their strong beaks. The eggs of this insect are deposited in little patches fastened to the under side of the leaves in June and July. It is stated, however, that all the eggs are not deposited at the same time.

The young insects live in families, puncturing the leaves and stem, and draining the sap from the plant. The perfect insects hibernate in crevices of walls and fences, and have been found in Maryland in midwinter under the bark of rotting trees, from whence they come out in summer to deposit their eggs for the first generation. One of the remedies recommended is to remove all the earth from the roots as far as they will bear, and fill up with a mixture of dry ashes and salt, which will prevent the insects from burrowing near the root. Another

remedy is to trim off the under leaves early in the season, laying them in the evening under and close to the plant; the insects hiding under them can be found and destroyed in the morning. It has been suggested to lay pieces of boards along the rows, a little raised from the ground by small stones. During the night the insects will congregate under the trap; the boards and leaves, however, should be examined very early in the morning, for as soon as warmed by the sun the insects will disperse over the vines.

CUCUMBER MOTH.—The larva of cucumber moth was taken several years ago in Florida boring holes in the fruit of the squash and feeding on the flesh inside. Last year the larva of this insect was reported as very injurious to melons and cucumbers in Missouri, by eating holes in the fruit, from July to the end of September, as many as four being sometimes found in one cucumber. The pupæ are formed in slight cocoons of white silk on leaves near the ground, and the perfect moth appears in eight to ten days, and probably hibernates as a perfect insect. This larva is said also by Guene to feed on potatoes. To destroy this pest it has been recommended to examine the cucumbers and melons early in the season, and to destroy the first worms that appear and also all infested fruit. The upper wings of the moth are of a yellowish-



TOBACCO WORM.



TOBACCO WORM MOTH.
See page 337-338.



TOBACCO WORM
CURYSALIS.

brown color, with a semi-transparent, irregular, yellow spot, while the hind wings are of the same semi-transparent yellow color, with a broad dark border.

PYRAMIDAL GRAPE-VINE WORM.

Another worm, never hitherto mentioned



FIG. 27—PYRAMIDAL GRAPE-VINE WORM.

as injurious to the Grape-vine, is often found resting upon it in the posture shown in Figure 27, and may be at once distinguished from all others that are known to attack it, by having a pyramidal hump near the end of its body. This worm we have also found upon the Red Bud, Raspberry and the Poplar, but it is only as a vine-feeder that it can be considered injurious. It is of the form shown in the figure and of a delicate green color, marked with pale yellow or cream-colored lines and spots, as there indicated. It is found on the vines during the month of May with us, and during the forepart of June descends to the surface of the ground, where it spins a loose cocoon of whitish silk, generally constructed between some fallen leaves. Within this cocoon it remains some time in the larva state, but eventually becomes a shiny mahogany-brown chrysalis from which emerges a moth with the front wings bark brown and glossy and marked with dark brown and pale grayish-brown as in the cut; and with the hind wings of a lustrous copper color, from which character it may be called in popular language the American Copper Underwing.

REMEDIES.—The worm is easily kept in check by hand-picking, and though its moth is attracted by sweets, it has never been numerous enough in the past to warrant this mode of capturing it. We have no good description of this insect in the English language.

ONION FLY.—The larvæ of a small fly, or the Onion Fly, somewhat resembling a miniature house fly, are very destructive to the onion crop in the Eastern States. The eggs of this fly are laid on the leaves close to the earth, and the larvæ destroy the root, and cause the plant

to turn yellow, wither and die. The larva state lasts about two weeks, the pupa is formed in the bulb itself, or in the earth near it, and the fly appears in two or three weeks afterward, and it is stated that there are sometimes as many as three generations in one season. The insect was imported about forty years ago. A dressing of sand and spirits of tar is said to be effective in preventing the ravages of *Psila Rosae*, a small fly of somewhat similar habits, which attacks carrots, etc., in Europe, and might be used, perhaps, with advantage with our onion flies, or petroleum, coal tar, or oil might probably be used with sand in a similar manner. In order to create a bad smell to drive away this insect and similar flies injuring onions, carrots, turnips, radishes, etc., it has been recommended to water near the plants with a mixture of one gallon of soap suds to four quarts of gas water, or two quarts of tar. This is said to keep the flies away from the plants, so that they do not deposit their eggs on them; but it is doubtful, unless it is constantly renewed, especially after rains, and even then might injure the young plants if it came in contact with them. Dr. Harris suggests sowing the seed on ground where a quantity of straw has been burned. Tar and water, wood-ashes, lime, powdered charcoal, flour of sulphur, lime-water and soot, etc., etc., have all been highly spoken of as remedies. Mr. Sanborn recommends petroleum sprinkled along the rows, and watering with soap-suds, soot, or pyroligneous acid. Curtis recommends lime and salt to destroy the maggots; boiling hot water poured over the root is highly recommended by many, and is said to destroy the maggots without injuring the plants. The eggs of this fly are said to be destroyed by the larva of a *Chrysopa* (a neuropterous insect).

For another species of Onion fly, *Ortalis flexa*, found in the Western States, it is said that a pound of copperas dissolved in a pailful of soft soap, when thinned with water, and applied to the onions, is good to keep off the maggots, and also to promote the growth of the plant. A preventive is suggested in Mr. Packard's last report, which is to sow the seeds deeper than usual, so that the fly cannot so readily get at it to lay its eggs;

it is, however, especially recommended that all yellow or diseased onions (or other bulbs and roots) should be at once removed from the beds, with as much of the roots and fibres as possible, and burnt or otherwise destroyed immediately.

GRAPE-ROOT BORER.—The most

common root-borers of the Grape-vine in the West are those which we have termed Gigantic Root-borers, namely, the larvæ of two large beetles (*Prionus laticollis* and *P. imbricornis*). The insect now under consideration is a moth and not a beetle, and has for a number of years been



FIG. 28.—MALE GRAPE ROOT BORER.

known as THE Grape-root Borer. It bears a very close resemblance to the common Peach Borer, both in habit, and in the size and general appearance of the larva, but it is a somewhat larger insect and the moths differ materially.

Unlike the Peach Borer which makes its abode quite near the surface, this borer lives exclusively under ground, and unlike the Gigantic root-borers which hollow out and bore up along the heart of the roots, it confines itself almost entirely to bark and sap-wood, and the effects of its work are consequently more fatal to the vine. Roots attacked by it look "as if a drunken carpenter had been diligently scooping away the sap-wood with a quarter-inch gouge."

REMEDIES.—It has been ascertained by observation and experiment that the Scuppernong grape-vine—which, according to Gray, is a cultivated variety of the Southern Fox Grape (*vitis vulpina*)—is never attacked by this borer, and consequently that other varieties grafted on to the Scuppernong share its immunity from attack. This is a very easy mode of preventing its ravages in the more Southern States where the Scuppernong flourishes; and if this borer should ever become very numerous with us, it may be deemed advisable to introduce that stock here. At present we have no other preventive than mounding, and the insect is so comparatively scarce that we have not yet had an opportunity of testing whether such mounding would work as well as it does with the Peach Borer. When it is once



FIG. 29.—FEMALE GRAPE ROOT BORER.

ascertained that the borers are at work on a vine, they may be destroyed by clearing away the earth and applying hot water to the roots.

COTTON LOUSE.—The cotton louse and the rust are also prone to attack the plant in its infancy. Brisk cultivation and a top dressing of ashes and plaster of Paris are the best remedies for both. Rust is generally the worst in soils of moderate depth, which have been planted in cotton for a number of successive years. Rotation of crops, and a liberal application of manures, especially those that are rich in potash and phosphoric acid, will, in nine cases out of ten, relieve the cotton field of this malady. It is not until the plant has nearly reached its growth, and in many cases begun to whiten for the harvest, that cotton is liable to the onset of its three most destructive enemies. These are the boll-worm, the cotton-worm or caterpillar, and the army-worm.

BEAN WEEVIL.—A weevil which appeared about ten years ago in Rhode Island, and is now found in some parts of New York, Illinois, and Missouri. It infests beans in the same manner as the pea-weevil infests peas, except that several larvæ usually enter the same bean. It is about half as large as the pea-weevil, and of a tawny gray color. It is regarded as indigenous to this country, and as likely, if not checked, to extend itself through the country, and prove as destructive to beans as the pea-weevil has to peas. The same preventives may be used as for destroying the pea-weevil.

THE GRAPE-VINE FLEA-BEETLE.—

The Grape-Vine Flea-Beetle (Fig. 31, *d*) often goes by the cognomen of "Steel-Blue Beetle," and is even dubbed "Thrips" by some vineyardists. The latter term, however, is entirely inapplicable. The former name is not sufficiently characteristic, be-



FIG. 31.

cause the color varies from steel-blue to metallic green and purple, and because there are many other flea-beetles to which it would equally apply.

The Grape-Vine Flea-Beetle is found in all parts of the United States and in the Canadas, and it habitually feeds on the Alder as well as upon the wild and cultivated grape-vine.

They are generally found on the upper surface of the leaf, which they so riddle and devour as to give it the appearance represented in Figure 31, *a*.

REMEDY.—The larva can be more easily destroyed by an application of dry lime, used with a common sand-blower or bellows. This has been found to be more effectual than either lye or soap-suds, and is withal the safest, as lye, if used to strong, will injure the leaves.

TOBACCO WORM.—The tobacco hawk-moth, or "horn-blower" of Maryland, is a large moth, the caterpillar of which, commonly known as the tobacco worm in the Middle States, is very destructive to the leaf of the tobacco plant, when the worm is young, by eating holes in the leaves, thus spoiling them for use as wrappers for cigars, and when old by

devouring the whole of the leaf itself. These worms appear of all sizes, during late summer and autumn, in the tobacco fields in Maryland, the first brood of eggs hatching in May or June. The egg is deposited singly on the leaf of the tobacco or tomato plant, and the young worm, when first hatched out by the heat of the sun, commences to eat holes in the leaf of the plant, and sheds its skin several times before attaining its full size; it then goes into the earth, and the pupæ is formed in a subterranean cell, the late broods remaining as pupæ all winter, and coming out as the perfect fly the following spring. The insect appears from June and July until late fall. It hovers in the twilight like a humming bird over flowers, especially honeysuckle and Jamestown weed, sucking the nectar by means of its long, flexible tongue, which, when the insect is at rest, is coiled up like a watch-spring under the head. The tongue when unrolled measures four to six inches in length; and the caterpillar feeds also on the potato, red-pepper and tomato, as well as the tobacco. This insect is almost exactly like the northern so-called

potato-worm in all the states of larva, pupæ and insect, and can scarcely be distinguished from it by young entomologists; but in the "tobacco-worm" the anal horn on the tail of the caterpillar is reddish instead of bluish; it also has no longitudinal white stripe, the pectoral feet are ringed with black, the body is more hirsute, and the insect itself is more indistinctly marked, and always has a white mark at the base of its wings and partly on the thorax, which the moth of the potato-worm has not.

The potato-worm is also found feeding on the tobacco in Maryland, and frequently a black or nearly black variety of the worm is taken, especially towards the end of the season. The potato or tomato worm has also been accused of being poisonous, but this is entirely erroneous, as the horn on the tail of the caterpillar is incapable of inflicting any serious wound, and has no poisonous properties whatever. The potato-worm is the northern species, and in Maryland the two species meet, and are found indiscriminately together in the tobacco fields, yet never mixing, but remaining perfectly distinct, although so nearly allied in appearance, habits and food.

REMEDIES.—There are several parasites, and one in particular, that is very useful in destroying the potato and tobacco worm. It is a minute, four-winged fly, (*Microgaster congregata*), which deposits its eggs in the caterpillar, and eventually kills it. The eggs of this parasite, to the number of one hundred or more, are deposited in the back and sides of the caterpillar, in small punctures made by the ovipositor of the fly. The larvæ, when hatched, feed upon the fatty substance, and when fully grown eat a hole in the skin, and each maggot spins for itself a small white oval cocoon, one end of which is fastened to the skin of the worm, and the caterpillar appears as if covered with small oval white eggs. Eighty-four flies were obtained from one caterpillar by Say, and Fitch counted one hundred and twenty-four cocoons on another worm, so that these insects must destroy a great number of worms. The parasite, however, is said to be destroyed by another hymenopterous insect, (*Pteromalus tabacum*), which deposits its eggs in the cocoons of the microgaster. Another species, forming an immense mass of loose woolly cocoons, is also said to kill the caterpillar of the potato-sphinx, and most probably attacks also that of the tobacco-worm in a similar manner. It is, therefore, of great consequence when destroying the caterpillars by hand-picking, to avoid crushing or injuring any caterpillars which appear to have either white floss or egg-like cases on their backs or sides, as these are the cocoons of a very useful insect, which, if left undisturbed, would produce multitude of flies, which would destroy an immense number of these injurious worms.

The hornets, and an orange-colored wasp, devour the caterpillar when young and small. The best remedy against these insects, however, is to poison the fly which produces either the potato or tomato worm, by dropping a mixture of "blue stone" of the druggists, or crude black arsenic, into the flower of the Jamestown weed, or stramonium, in the evening, when the fly will come and insert its long proboscis into the flower, sip up the poisonous mixture, and die before depositing its eggs.

A tobacco planter in Tennessee finds it advantageous to cultivate a few plants

of the Jamestown weed among his tobacco, and then to poison the blossoms, as they appear, with the above mentioned liquid, every evening, and has thereby saved a great part of his crop uninjured. In Maryland some tobacco-growers utilize young turkeys by driving them into the tobacco-field, where they pick the worms from the leaves. Some planters also pay a small premium to children for the dead millers or flies, which are readily killed with a piece of shingle or board as they hover over the flowers in the evening twilight.

FLEAS.—Fleas, although not mentioned by Loew or Ostensacken among the diptera, by many other entomologists are classed with them, and Professor Verrill regards them as "degraded diptera in which the wings are represented only by two pairs of stiff scales, which have little or no power of motion." These insects are very abundant in the neighborhood of hog-sties, etc., and may be driven away by scattering quicklime about their haunts. The principal remedy against them is cleanliness, and should the house dogs be permitted to sleep on the door-mats or rugs, these should be scalded every week or two to destroy the living inmates as well as their eggs and larvæ, which are in the form of small footless white maggots, and live upon decaying vegetable and animal matter found in the dirt and rubbish. When dogs are kept in kennels, the straw or shavings upon which they sleep should be carefully burned every few weeks, as door-mats and old refuse straw are perfect nurseries for these insects. When the animals themselves are very much infested with fleas, a thorough washing in strong soap-suds or a decoction of tobacco will drive many of them away. Professor Verrill says, "to remove fleas from the animals themselves, a wash containing six to ten per cent. of petroleum, naphtha, or benzine, well shaken together, may be used; a weak solution of carbolic acid, about two or three parts to one hundred parts of water, will also be efficacious." A mixture of ten parts benzine, five parts soap, and eighty-five parts water has been recommended. Great care should, however, be taken not to make any of these mixtures too strong, as otherwise they are very apt to injure the animals to which they

are applied. Camomile flowers are said to be very obnoxious to fleas, and to drive them away. Persian insect powder, which is the powdered flowers of *Pyrethrum roseum*, or caucasicum, rubbed in among the hair, will drive off the fleas, but the animals, when operated upon with it, should be taken out of doors, as a small portion of this powder paralyzes the fleas only, and if they fall on the carpet they are apt to revive in a few hours. The animal, after an application of the Persian powder, should be well washed with soap and water. The flowers of feverfew, camomile, and even of ox-eye dairy have a somewhat similar effect, but much slighter, and when applied to common house-flies appear partially to paralyze them.

THE SPOTTED PELIDNOTA.—This is the largest and most conspicuous beetle that attacks the foliage of the grape-vine, and in the beetle state it seems to subsist entirely on the leaves of this plant, and of the closely allied Virginia Creeper. Though some years it becomes so abund-

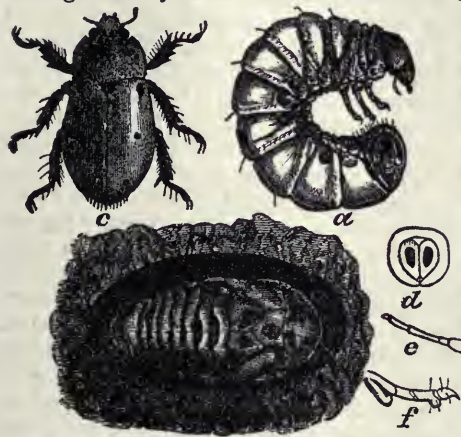


FIG. 31.—THE SPOTTED PELIDNOTA.

ant as to badly riddle the foliage of our vineyards, yet such instances are exceptional; and it usually occurs in such small numbers, and is so large and clumsy, that it can not be considered a very redoubtable enemy.

Its larva has, for a number of years, been known to feed on the decaying roots of different trees, and is a large, clumsy grub (Fig. 31 *a*) bearing a close resemblance to the common White Grub of our meadows, and it differs from that species principally in being less wrinkled, and in

having the chitinous covering (or skin, so called,) more polished and of a pure white color, and in the distinct heart-shaped swelling above the anus (Fig 31 *d*). Towards the latter part of June we have found this larva in abundance, in company with the pupa (Fig. 31 *e*), in rotten stumps and roots of the Pear. In preparing for the pupa state, the larva forms a rather unsubstantial cocoon of its own excrement, mixed with the surrounding wood. The pupa state lasts but from eight to ten days, and the beetle (Fig. 31 *c*) is found on our vines during the months of July, August and September. It is not yet known how long a time is required for the development of the larva, but from analogy we may infer that the insect lives in that state upwards of three years.

REMEDY.—It is easily kept in check by hand-picking.

HESSIAN FLY.—The eggs of the Hessian Fly are deposited in longitudinal creases in the blade of the plant of wheat, barley, rye, etc., in autumn and spring. These eggs hatch in from four to twenty days, according to the state of the weather. The larvæ or grubs crawl down, working their way between the leaf and main stalk till they come to a joint, where they remain and suck the sap. They attain their full growth in from four to six weeks. The pupa is formed in the same place, its outer covering or puparium resembling a flaxseed. The winged insects appear in April and May, and lay their eggs in wheat and other cereals. Curtis says that feeding the wheat off with sheep in winter might possibly save the crop from the Hessian Fly. Dr. Harris recommends the same as a partial remedy. Mr. Herrick states that the stouter varieties of wheat should be chosen, and the land kept in good condition. If fall wheat is sown late some eggs will be avoided, but the risk of winter-killing will be incurred. Great numbers of the pupæ may be destroyed by burning the stubble immediately after harvest, and then plowing and harrowing the land. Steeping the grain and rolling it in plaster or lime tends to promote a vigorous growth, and is, therefore, beneficial. Quicklime strewed over the field immediately after the grain is cut would doubtless destroy many of the pupæ.

CORN WORM, alias Boll Worm.—This is a worm which is every year more or less destructive to our corn in the ear, and whose ravages are increasing with every successive year.

This glutton is not even satisfied with ravaging these two great staples of the

garden flower known as Gladiolus, and in confinement to eat ripe tomatoes. Last summer it was also found by Miss M. E. Murtfeldt in common string beans, around Kirkwood, Mo., and in Europe it is recorded by M. Ch. Goureau as not only infesting the ears of Indian corn, but as devouring the heads of hemp, and leaves of tobacco, and of lucern. The fact of its attacking a kind of pea, namely, the chick pea or coffee-pea, has also been recorded by M. J. Fallou in certain parts of France, the young worms feeding on the leaves, but the larger individuals boring through the pods and devouring the peas.

But for the present we will consider this insect only in the two roles of Boll-worm and Corn-worm, because it is as such that it interests the practical man most deeply. The egg from which the worm hatches (Fig. 33, *a*, side view; *b*, top view magnified) is ribbed in a somewhat similar manner to that of the Cotton-worm, but may be readily distinguished by being less flattened, and of a pale straw color instead of green. It is usually deposited singly on the outside of the involucre

outer calyx of the flower or young boll, and each female moth is capable of thus consigning to their proper places, upwards of five hundred eggs. Mr. Glover, in his account of the Boll-worm, says: "Some eggs of the Boll-worm moth hatched in three or four days, after being brought in from the field, the enclosed worms gnawing a hole through the shell of the egg and then escaping. They soon commenced feeding upon the tender fleshy substance of the calyx, near the place where the egg had been deposited. When they had gained strength, some of the worms pierced through the calyx, and others through the petals of the closed flower-bud, or even penetrated into the young and tender boll itself. The pistils and stamens

of the open flower, are frequently found to be distorted and injured without any apparent cause. This has been done by the young Boll-worm; when hidden in the unopened bud, it has eaten one side only of the pistils and stamens, so that when the flower is open the parts injured

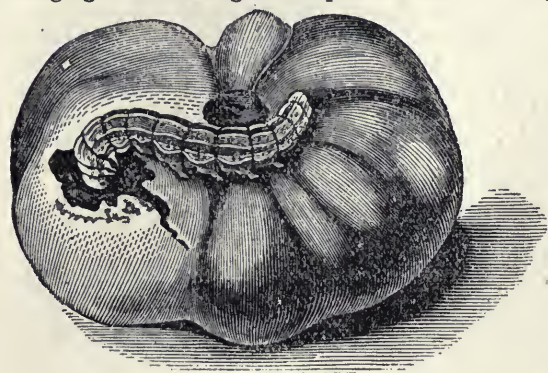


FIG. 32.

country—cotton and corn—but, as we discovered in 1875, it voraciously attacks the tomato, eating into the green fruit (Fig. 32), and thereby causing such fruit to rot. In this manner it often causes serious loss to the tomato-grower, and it may justly be considered the worst enemy to the tomato in that section of the country. Mr.

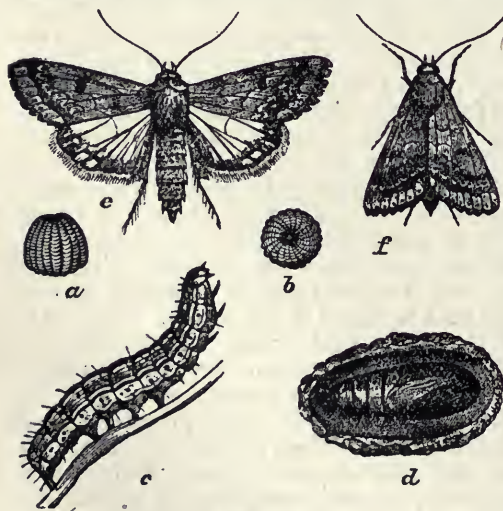


FIG. 33.

Glover also found it feeding in a young pumpkin, and it has been ascertained by Mrs. Mary Treat, of Vineland, New Jersey, not only to feed upon the undeveloped tassels of corn, and upon green peas, but to bore into the stems of the

are distorted and maimed, and very frequently the flower falls without forming any boll whatever. In many cases, however, the young worm bores through the bottom of the flower into the immature boll before the old flower falls, thus leaving the boll and involucre or envelope still adhering to the foot-stalk, with the worm safely lodged in the growing boll. The number of buds destroyed by this worm is very great, as they fall off when quite small, and are scarcely observed as they lie brown and withering on the ground beneath the plant. The instinct of the Boll-worm, however, teaches it to forsake a bud or boll about to fall, and either to seek another healthy boll, or to fasten itself to a leaf, on which it remains until at length it acquires size and strength sufficient to enable it to bore into the nearly matured bolls, the interior of which is nearly destroyed by its attacks, as, should it not be completely devoured, rain penetrates through the hole made by the worm, and the cotton soon becomes rotten and will not ripen. . . . One thing is worthy of observation, and that is, whenever a young boll or bud is seen with the involucre spread open, and of a sickly yellow color, it may be safely concluded that it has been attacked by the Boll-worm, and will soon perish and fall to the ground. . . . The buds injured by the worms may be readily distinguished by a minute hole where it has entered, and which, when cut open, will be found partially filled with small black grains, something like coarse gunpowder, which is nothing but the digested food after having passed through the body of the worm."

This insect is very variable in the larva state, the young worms varying in color from pale green to dark brown. When full grown there is more uniformity in this respect, though the difference is often sufficiently great to cause them to look like distinct insects. Yet the same pattern is observable, no matter what may be the general color; the body being marked as in the above figures with longitudinal light and dark lines, and covered with black spots which give rise to soft hairs. Those worms which Mrs. Treat found in green peas and upon corn tassels had these lines and dots so obscurely represented that they seemed to be

of a uniform green or brown color, and the specimens which we sometimes see in string beans are of a dark, glass-green color with the spots inconspicuous, but with the stripe below the breathing pores quite conspicuous and yellow. The head, however, remains quite constant and characteristic. Figure 32 may be taken as a specimen of the light variety, and Figure 33 as illustrating the dark variety. When full grown, the worm descends into the ground, and there forms an oval cocoon of earth interwoven with silk, wherein it changes to a bright chestnut-brown chrysalis (Figure 33), with four thorns at the extremity of its body, the two middle ones being stouter than the others. After remaining in the chrysalis state from three to four weeks, the moth makes its escape. In this last and perfect stage, the insect is also quite variable in depth of shading, but the more common color of the front wings is pale clay-yellow, with a faint greenish tint, and they are marked and variegated with pale olive and rufous, as in Figure 33, *e* showing the wings expanded, and *f* representing them closed, a dark spot near the middle of each wing being very conspicuous. The hind wings are paler than the front wings, and invariably have along the outer margin a dark brown band, interrupted about the middle by a large pale spot.

Mrs. Glover says that there are at least three broods each year in Georgia, the last brood issuing as moths as late as November. With us there are usually but two, though, as already hinted, there may be exceptionally three. Most of the moths issue in the fall, and hibernate as such, but some of them pass the winter in the chrysalis state and do not issue till the following spring. We have known them to issue, in this latitude, after the 1st of November, when no frost had previously occurred.

REMEDIES.—It is the general experience that this worm does more injury to very early and very late corn than to that which ripens intermediately, for though the broods connect by late individuals of the first and early individuals of the second, there is nevertheless a period about the time the bulk of our corn is ripening, when the worms are quite scarce. We have never yet observed

their work on the green tassel, as it has been observed in New Jersey, and do not believe that they do so work with us. Consequently it would avail nothing as a preventive measure, to break off and destroy the tassel, and the only remedy when they infest corn is to kill them by hand. By going over a field when the ears are in silk, the presence of the worms can be detected by the silk being prematurely dry or by its being partially eaten.

In the South various plans have been adopted to head off the Boll-worm, but we believe none have proved very successful. The following experiment with vinegar and molasses was made by B. A. Sorsby, of Columbus, Ga., as quoted by Mr. Glover:

"We procured eighteen common-sized dinner plates, into each of which we put a gill of vinegar and molasses, previously prepared in the proportion of four parts of the former to one of the latter. These plates were set on small stakes or poles driven into the ground in the cotton field, one to about each three acres, and reaching a little above the cotton plant, with a six-inch square board tacked on the top to receive the plate. These arrangements were made in the evening, soon after the flies had made their appearance; the next morning we found eighteen to thirty-five moths to each plate. The experiment was continued for five or six days, distributing the plates over the entire field; each day's success increasing until the numbers were reduced to two or three moths to each plate, when it was abandoned as being no longer worthy of the trouble. The crop that year was but very little injured by the Boll-worm. The flies were caught in their eagerness to feed upon the mixture by alighting in it and being unable to escape."

FALL WEBB WORM.—The Tent-caterpillar of the Forest and the common Orchard Tent-caterpillar are often confounded with another, which in reality has nothing in common with them, except that it spins a web. The insect we refer to is known by the appropriate name of Fall Web-worm, and whenever we hear accounts of the Tent-caterpillars taking possession of trees and doing great injury in the fall of the year (and we do hear such accounts quite often), we may

rest assured that the Fall Web-worm is the culprit, and has been mistaken for the Tent-caterpillars, which never appear at that season of the year.

We do not know how injurious this insect is in the more Southern States, but he who travels in the fall of the year, with an eye to the beauties of the landscape, through any of the Northern and Middle States, especially towards the Atlantic sea-board, will find the beauty fearfully marred by the innumerable webs or nests of this worm. The Web-worm is found

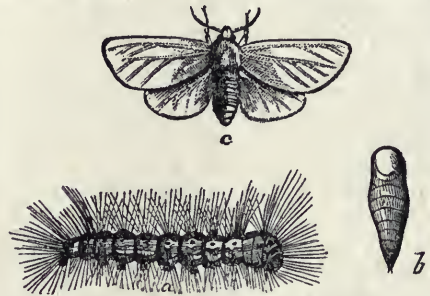


FIG. 34.—FALL WEBB WORM.

on a great many kinds of trees, though on some more abundantly than others; but with the exception of the different grape-vines, the evergreens, the sumachs and the Ailanthus, scarcely any tree or shrub seems to come amiss to its voracious appetite.

REMEDIES.—As, therefore, nothing can be done to materially affect this insect during the winter, we must do all the fighting when the worms first hatch. Their web soon betrays them, and the twig or branch containing it may be pruned off in the same manner described for the Tent-Caterpillars. As the worms are always under the tent, the operation in this case can be performed at any time of the day without the risk of missing any wanderers.

TENT-CATERPILLAR of the FOREST.—The Tent-caterpillar of the Forest differs from the common Orchard Tent-caterpillar principally in its egg-mass being docked off squarely, instead of being rounded at each end; in its larva having a row of spots along the back, instead of a continuous narrow line, and in its moth having the color between the oblique lines on the front wings as dark, or else darker, instead of lighter than the rest of the wing. It feeds on a variety of both

forest and orchard trees; makes a web which, from its being usually fastened close to the tree, is often overlooked; is often very destructive, and is most easily fought in the egg state.

REMEDIES.—From the time they are born till after the third moult these worms will drop and suspend themselves in mid air, if the branch upon which they are feeding be suddenly jarred. Therefore when they have been allowed to multiply in an orchard this habit will suggest various modes of destroying them. Again, as already stated, they can often be slaughtered *en masse* when collected on the trunks during the last moulting period. They will more generally be found on the leeward side of the tree if the wind has been blowing in the same direction for a few days. The cocoons may also be searched for, and many of the moths caught by attracting them towards the light. But pre-eminently the most effective artificial mode of preventing this insect's injuries is to search for and destroy the egg-masses in the winter time when the trees are leafless. Not only is this course the more efficient because it is more easily pursued, and nips the evil in the bud, but for the reason that, in destroying the eggs only, we in a great measure evade killing, and consequently co-operate with the natural parasites presently to be mentioned, which infest the worms themselves. A pair of pruning shears attached to the end of a pole, and operated by a cord, will be found very useful in clipping off the eggs; or, as recommended by Mr. Ferris, a more simple instrument may be made by fastening a piece of an old scythe to a pole. If the scythe is kept sharp, the twigs may very handily be clipped with this instrument. Tared bandages, or any of the many remedies used to prevent the female Canker worm from ascending trees, can only be useful with the Forest Tent-caterpillar when it is intended to temporarily protect an uninfested tree from the straggling worms which may travel from surrounding trees.

BLUE SPANGLED PEACH WORM.

In examining peach orchards about the first week of May a large number of the young twigs of the trees are observed to be killed at the extreme point or end for

a distance of one to two and a half inches, and the terminal buds entirely destroyed. On cutting open these dying twigs, the injury is found to be caused by a very minute caterpillar, which, entering the twig near a bud, entirely eats out the pith and interior, leaving only its "frass" and the exuded gum to mark the spot where it had entered. When confined in a glass case, after about a couple of weeks, several of the larvæ left the injured twigs and formed very loose cocoons on the sides of the box, or among the rubbish and old leaves lying scattered on the earth, and

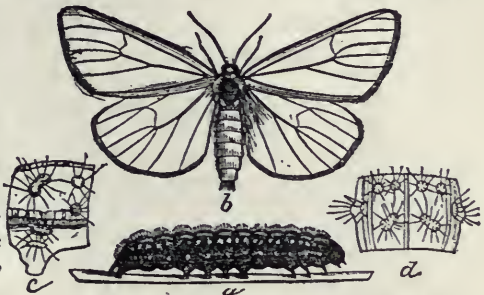


FIG. 35.—BLUE SPANGLED PEACH WORM.

in about six to ten days the perfect moth appeared. The tail of the pupa is attached to a little button of silk, in an exceedingly slight cocoon. There was scarcely a single young tree in the peach orchard examined that was not more or less injured by this little pest, and at least as many as twenty to fifty injured twigs were found on some very young trees. After the insect leaves the twig the injured part dries up and breaks off. This insect was also seen though in much smaller numbers, in Maryland and Virginia, and apple trees are also frequently observed injured in a similar manner in Maryland, and it is probable that the damage is done by the same worm.

REMEDY.—The only way to destroy them is to go around the peach orchard in May and June and cut off such terminal shoots as appear to be withering or drying up, and then burn them with the caterpillars inside. This at least would prevent their multiplying to such an extent as to be very injurious at present. When not so very numerous, they appear only to serve to somewhat prune the trees, as they take off merely the tips of the branches.

FALL ARMY WORM.—A new worm has for the past few years made its appearance in the West, somewhat resembling the Army Worm. Fig. 34 is the true Army Worm, while Fig. 35, is what is called the Fall Army Worm. By examining the two worms, many characteristic differences appear, as will be seen by comparing Fig. 34, which represents the true Army Worm, with Fig. 35, which represents



FIG. 34.

at *a* the Fall Army Worm, natural size, at *b* its head magnified, at *c* a magnified dorsal view of one of the joints, and at *d* a magnified view of the same.

It commences its depredations in August, and devours wheat, oats, corn, turnips, buckwheat, grass, tomatoes, etc. It travels in immense numbers, and destroys whole fields of grain or grass

in a very short time. A gentleman who bred the insects, found that they produced at least two broods in a year, sometimes three or four. As preventives of its ravages, he recommends to plow ground,

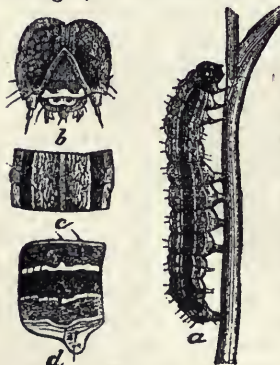


FIG. 35.

intended for fall wheat, early in the season, and to keep it clear from all vegetation till the wheat is sown; also to plow late in the season land on which worms have been numerous, in order to kill the pupæ and larvæ which have entered the ground to spend the winter. When they are infesting grain-fields and covering the ground in large numbers, to roll the land with a heavy roller, which will kill the worms but not injure the grain.

APPLE TREE TENT-CATERPILLAR, or AMERICAN LACKEY MOTH.—What orchardist in the older States of the Union is not familiar with the white web-nests of this caterpillar? As they glisten in the

sun, before the trees have put on their full summer dress, these nests, which are then small, speak volumes of the negligence and slovenliness of the owner of the orchard, and tell more truly than almost anything else why it is that he fails and has had luck with his apple crop. Where ever these nests abound one feels morally certain that the borers, the Codling-moth, and many other enemies of the good old apple tree, have full play to do as they please, unmolested and unnoticed by him whom they are ruining; and when we pass through an orchard with two, three or more "tents" on every tree, we never pity the owner, because there is no insect more easily kept in check.

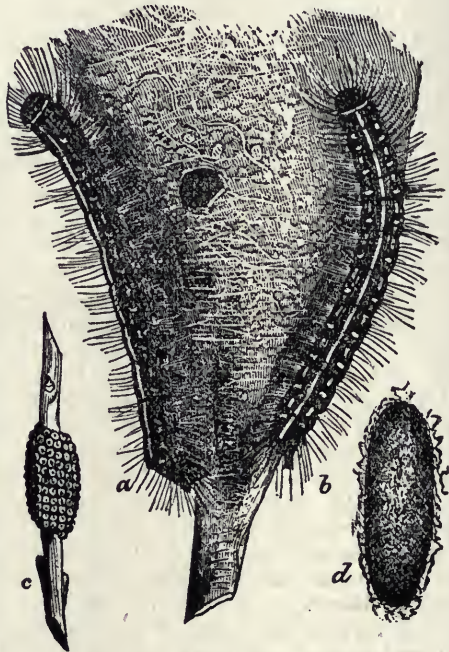


FIG. 36.

The small, bright and glistening web, if unmolested, is soon enlarged until it spreads over whole branches, and the caterpillars which were the architects, in time become moths, and lay their eggs for an increased supply of nests another year.

This insect, in all probability, extends wherever the wild blackberry (*Cerasus serotina*) is found, as it prefers this tree to all others; and this is probably the reason why the young so often hatch out before the apple buds burst, because, as is well known, the cherry leafs out much earlier.

Besides the Cherry and Apple, both wild and cultivated, the Apple-tree tent-caterpillar will feed upon Plum, Thorn, Rose, and perhaps on most plants belonging to the Rose family, though the Peach is not congenial to it, and it never attacks the Pear, upon which, according to Dr. Trimble, it will starve. It does well on Willow and Poplar, and even on White Oak, according to Fitch, who also found it on White Hazel and Beech.

REMEDIES.—Cut off and burn the egg-clusters during winter, and examine the trees carefully in the spring for the nests from such clusters that may have eluded the winter search. The eggs are best cut off in the manner presently to be described for the Tent-caterpillar of the Forest. Though to kill the caterpillars numerous methods have been resorted to, such as burning, and swabbing with oil, soap-suds, lye, etc., they are all unnecessary, for the nests should not be allowed to get large, and if taken when small are most easily and effectually destroyed by going over the orchard with the fruit-ladder, and by the use of gloved hands. As the caterpillars feed about twice each day, once in the forenoon and once in the afternoon, and as they are almost always in their nests till after nine A. M., and late in the evening, the early and late hours of the day are the best in which to perform the operation. As a means of facilitating this operation, it would be a good plan, as Dr. Fitch has suggested, to plant a few wild cherry trees in the vicinity of the orchard, and as the moths will mostly be attracted to such trees to deposit their eggs, and as a hundred clusters on a single tree are destroyed more easily than if they were scattered over a hundred trees, these trees will well repay the trouble wherever the Tent-caterpillar is known to be a grievous pest.

TURNIP FLEA BEETLE.—The turnip is exposed to numerous depredators, of which the turnip flea-beetle is the most inveterate. It attacks the plant as soon as the first leaves expand, and often destroys two or three successive sowings. The black caterpillar, slugs, wire-worms, and numerous other insects, grubs and aphides prey upon and greatly diminish the crop.

REMEDIES have been tried to an almost indefinite extent, but none hitherto, with more than very partial success. Liberal sowing and rapid growth best insure the plant from injury; and to effect this, the seed should be plentifully sown in a rich soil, and if possible, when the ground is moist. Before sowing the seed should be steeped in some preparation, which experience has shown will the most quickly develop the germ. Solutions of nitrates or sulphates, urine, soot-water, liquid guano, or currier's oil, impregnate the first leaves with substances distasteful to their early enemies, and thus a short respite from their attacks will be secured. Gypsum, ashes, bone-dust and poudrette drilled in with the seed, are excellent forcers for the young roots. Charcoal dust, applied in the same way, has been found to increase the early growth from four to tenfold. When the fly or bug is discovered, the application of lime, ashes or soot, or all combined, should be made upon the leaves, while the dew or a slight moisture is on them. This leads the young plant along, and kills such enemies as it reaches. Stale urine, diluted sulphuric acid (oil of vitrol), and other liquid manures will have the same effect. Ducks, chickens, young turkeys and birds will devour innumerable quantities, and their presence should always be encouraged, not only on this, but on most of the fields. Dragging the surface with fine, light brush, will lessen the slugs and insects. The ground should be plowed just before winter sets in, which exposes the worms and the larvæ of insects to the frost, when they are unable to work themselves into a place of safety. The seed should not be planted on ground recently occupied by any of the order of plants *crucifera*, (cabbage, radish, mustard, charlock and water-cress), as they all afford food for the enemies of turnips, and thereby tend to their multiplication.

LOCUST BORER, To Destroy.—To destroy the well-known locust borer, a beautiful variegated black and yellow beetle, it has been recommended to apply soft soap to the trunks of very young trees every summer, about the first of August, or earlier.

GOOSEBERRY WORMS.—See CURRANT WORM.

THE CHINCH BUG.—Few farmers in this section of the country need an introduction to this insect; but lest there be those who are so blessed as not to know the gentleman by sight, we annex his portrait.



I

FIG 39.—CHINCH BUG.

Hair line underneath pale, yellow six-legged showing natural size. atom, scarcely visible to the naked eye, and with a tinge of red near the middle of the body, it goes through four molts before acquiring wings. It is bright red, with a pale band across the middle of the body after the first; somewhat darker, with the merest rudiments of wing-pads after the second, and quite brown, with distinct wing-pads, but with the pale transverse band still visible, after the third, in which it assumes the pupa state, and from which, in the fourth molt, it escapes as a winged bug.

The chinch bug injures by suction, not by biting. It winters in the perfect winged state, mostly dormant, principally in the old rubbish, such as dead leaves, corn-shucks, corn-stalks, and under weeds and prostrate fence rails and boards that generally surround grain fields; also, in whatever other sheltered situation it can get in adjacent woods; hence the importance of fighting the pest in the winter time, either by trapping it under boards laid for the purpose, or by burning it with its aforementioned shelter. Such burning will not destroy all the dormant hosts, but will practically render the species harmless, especially where whole communities combine to practice it. It issues from its winter quarters during the first balmy days of spring, when those females which were impregnated the previous fall, and which are most apt to survive the winter, commence ovipositing at once, if suitable conditions are at hand. Others take readily to wing and scatter over our fields, attracted by preference to grain growing in

loose and dry soil, into which they penetrate to consign their eggs. The eggs are deposited on the roots, and the young bugs, which are red, remain under ground, sucking the roots during the early part of their lives, or until they are forced from necessity to travel from one plant to another. These spring-hatched bugs, constituting the first brood, do not, as a rule, acquire wings till after wheat is cut. It is, therefore, during and just after wheat harvest, that they congregate and travel in such immense swarms as to attract attention. In July, as these acquire wings, they scatter over grass, late grain and corn-fields, where they lay their eggs; but the second brood, hatching from these eggs, generally attracts less attention and does less injury than did the first, because of its more scattered nature and the greater maturity and resisting power of the plants. Anything that will prevent the mother bug from getting at the roots of the grain, will prevent the injury of her progeny. Hence the importance in this connection of fall plowing and using the roller upon land that is loose and friable; and hence, if old corn ground is sufficiently clean, it is a good plan to harrow in a crop of small grain upon it without plowing at all. The earlier also, that wheat gets well started and matures, the less it will suffer; because it may be harvested before the bugs acquire their greatest growth and power for harm. Hence, and from the greater compactness of the ground, winter wheat suffers less than spring wheat. Heavy rains are destructive to the chinch bug. Hence, if such occur in the fall, the farmer may plant with little fear of injury the following year, while if they occur in May, he need suffer no anxiety, so far as chinch bugs are concerned; hence, also, where irrigation is practicable, the pest may at all times be overcome. It injures no other plants than grasses and cereals. In its migrations from field to field it may be checked by a line of tar poured on the ground, or by deep furrows or trenches, but the tar must be kept soft and the surface of the furrows friable and pulverized.

THE FLAT-HEADED APPLE-TREE BORER.—This insect, owing to the enteebled condition of many fruit and shade trees—a condition superinduced in part by excessive drouth, in part by defoliation, in the country ravaged by locusts—

has been exceedingly injurious all over the country.

Considering the fatality of its work and the number of valuable fruit and shade trees which it attacks, few insects are more to be dreaded than this same Flat-headed Apple-tree Borer. The Oak, Mountain Ash, Linden, Box-elder, Beech, Plum, Pear, Cherry and Peach alike succumb to its attacks. We have reared the beetle from Oak, Apple, Mountain Ash, Box-elder, Peach and Pear, and found the larvæ, judged to be the same after critical comparison, in the other trees mentioned. While the Apple is so subject to its injuries that no man who does not understand this enemy and is not willing to give some little time to mastering it, can hope to succeed in growing apple trees; and in reality the time and money spent in planting young apple orchards, especially in the West, is generally wasted for the want of the necessary precautions against this insect.

REMEDIES.—In treating of the means to be employed against this Flat-headed borer, one important fact should be borne in mind. The natural breeding place of the insect is undoubtedly in the old decaying oaks of our woods, and we have know it to swarm in old post-oak stumps from which the tops had been felled for a number of years. In fact, it prefers partially dead or injured trees to those which are thrifty and vigorous, and partly for this reason, and partly because rough, cracked bark forms a better nidus for the female to lay her eggs, the species is more abundantly found on the southwest side of young apple trees where they are most apt to get injured by sunscald. Sickliness in the tree, injury from the whiffletree or other cause, therefore, predispose to its attacks. It is for this reason that transplanted trees, checked as they are in growth, usually fare badly. But there is yet one other predisposing cause which few people suspect, and that is reckless and careless pruning, especially of the larger branches. Many a fine orchard tree, and many more city shade trees receive their death shock from the reckless sawing off of limbs without effort being made to heal the wounds by coating with grafting wax, clay or other protecting substances. Around such an unprotected sawed limb, as around the frus-

tum of a felled tree, the rain and other atmospheric influences soon begin their work of causing decay between the bark and the solid wood; and this is but the forerunner of greater injury by insects, which are attracted to the spot, and which, though hidden meanwhile from view, soon carry the destruction from the injured to the non-injured parts. Among the insects thus attracted, *Chrysobothris* plays no mean part, where, had the wounded limb been properly protected, its presence would never have been known. It thus becomes of the first importance, in treating this insect, to keep the young trees vigorous and healthy, and the bark as smooth and as free from injury as possible. Thus in planting a young orchard in this part of the country, where the sun (whether indirectly or directly is for the vegetable pathologist to determine) is apt to injure the bark on the southwest side, it will prove labor well spent to protect them on that side by old paling or lath. Young trees are far more liable to be attacked than old ones, and consequently require greater care.

As a preventive against the insect's attacks there is nothing better than coating the trunks and larger branches with soap at least twice a year—once towards the end of May and again in July or August. The soap is not only obnoxious to the beetle, but it tends to keep the bark clean and smooth, so as to offer no attraction to the female, and is, withal, beneficial to the tree.

But whatever preventive measures be taken, trees should be carefully examined late in the Fall. At this season, or even in the Winter time, the young borers, which have just commenced work, are easily detected and destroyed by a knife before they have done much harm. Trees presenting those conditions which we have already stated to be attractive to the insect, should be especially watched, and any tree that is suddenly checked in growth should be attended to, as it will probably be found to contain the borer, though the outward signs of its presence may not at first be so manifest. There is a very general impression, also, among orchardists, that this insect is more injurious on low lands than on high lands, and orchards on low lands should be more particularly watched.

The presence of the young borer is usually indicated by a discolored spot, a cracking of the bark, or the presence of saw-dust like excrement. It will pay to look over the trees even before Fall, for as early as the latter part of June, the newly hatched worm may sometimes be found just entering, when its presence is frequently indicated by an exuding drop of moisture on the bark, and when it may be destroyed by cleanly cutting out a small slice of bark.

It is useless to spend time in trying to reach such borers as have already penetrated into the solid wood. They are with difficulty attained.

FLIES, House.—The common house-fly, and some other insects, are said sometimes to be dangerous to mankind by conveying infectious disease from house to house, and several cases have been reported where the bite of an apparently common fly had caused dangerous festering sores. In such cases, however, it was presumed that the fly had previously been feeding on decaying carrion, and had inoculated the wound with putrid virus. There is a small fly, resembling in general appearance the common house-fly, which stings mankind, horses, and cattle very severely. They are sometimes very abundant, especially before rain in dwelling houses, and more especially when in the vicinity of stables. Horses may be protected from their attacks by rubbing or washing the animals with a strong decoction of tobacco leaves, of smart-weed, or the leaves of the English walnut, and doubtless a weak solution of carbolic acid would answer the same purpose.

GRAPE-VINE HOPPER.—The grape-vine hopper is a very small insect, about 0.13 inch in length, of a pale yellow color, with two blood-red bands, and a third dusky band across the wing-covers. It is supposed by most entomologists that these insects pass the winter in the perfect state, hybernating under bark, dead leaves, and rubbish. It therefore appears probable that some of the early broods may be produced from eggs laid by the parent insect the previous autumn, either on the stem of the vine itself or on foliage. The first perfect grape-leaf hopper in 1875 was found in April, and had probably hybernated on the stem of the vine, under the bark, as before mentioned.

The insects, as soon as hatched, commence to suck the sap of the plant, and change their skin several times before attaining their full size; and these cast-off white skins may be seen in the autumn in multitudes, adhering to the under side of the leaves, each of them with a slit down the back, through which the perfect insect has escaped.

As larvæ, or when very young, they do not possess any wings, and it is only in the adult state that the perfect wings are acquired. The leaves injured by these insects appear at first flecked and spotted with whitish marks, showing where the sap has been drawn out by the leaf-hopper. They then assume a sickly appearance, and if the insects are very numerous the foliage will finally turn brown and fall to the ground. Some varieties of vines suffer more from this pest than others, and the Clinton, Delaware, and other thin-leaved grapes are said to suffer the most.

REMEDIES.—The remedies already proposed for the destruction of these insects are syringing the vines with strong tobacco-water or soap-suds. A very weak mixture of carbolic acid and water has also been recommended, but when made too strong the leaves are apt to be injured. Dusting the vines with lime, wood-ashes, lime and sulphur, is said to be beneficial, and fumigation with strong tobacco, when under glass, will destroy many of them. Mr. Saunders, of Canada, states that a lighted torch carried through a vineyard at night will destroy multitudes, as they fly to the light and are burnt. This should be repeated several times at short intervals. He also says that constant stirring the earth in the immediate vicinity of the vines in spring and autumn will probably operate to disturb the perfect insect and eggs by exposing them to the frost. As lights also attract these insects at night, if a lantern were placed immediately over a pail or tub nearly filled with water, on the surface of which a little oil had been poured, whenever the vines were disturbed the insects would immediately fly toward the light and fall into the vessel below and perish by hundreds. The same plan would also answer if lights were placed before or on boards painted with a thick syrup, or any adhesive substance like the celebrated fly-paper.

CANKER-WORMS.—In illustration of the remarks on the two species of Canker-Worm which have very generally been considered mere varieties of one species, and about which there has been no little confusion, we have prepared figures of each, which, in connection with a few explanatory remarks, will enable their ready distinction.

The Spring Canker-Worm.—This species, which, from the fact that the great bulk of the moths issue from the ground in early spring, may be distinguished from the other by the popular name here given,



FIG. 41.

SPRING CANKER-WORM.—*a*, full grown larva; *b*, egg, enlarged, the natural size shown in the small mass at side; *c*, an enlarged joint, side view; *d*, do., back view, showing the markings.

This Spring Canker-Worm is distinguished, in the light of recent careful discriminations, by the characters following, viz.: by each of the first seven joints of the abdomen in both sexes bearing two transverse rows of stiff, red, or reddish-brown, posteriorly directed spines; by the front wings in the male having three transverse, dusky lines, and a somewhat broader, jagged, pale submarginal line; and by the whole body in the female, as also the legs and antennæ, being pubescent with pale and dusky hairs—the color being rabbit-gray, or speckled black and white, the abdomen having a medio-dorsal black stripe. The dusky stripes on the front wings of the male, except at costa, and the black stripe on the abdomen, except at each end, are usually more or less obsolete, and indeed the ornamentation of the wings is extremely variable. In many specimens the middle portion of the front wings, within the three dusky lines, is quite pale and mottled with grayish-green, while the basal and terminal portions are marked with brown, thus making the contrast greater. Others again are absolutely without marks whatever, even when fresh from the chrysalis; while captured specimens always

have the marks more or less effaced on account of the looseness of the scales. The moths rise from the ground; for the most part, early in Spring, and only rarely the previous Fall. They are crepuscular in habit, and are most active soon after dark in the evening. The female, by means of a horny and extensile ovipositor, thrusts her eggs, to the number of from 50 to 150, under the loose scales of bark or in any crevice or sheltered place, and is very fond of availing herself for this purpose of the empty cases of the Rascal Leaf-crumpler. The eggs are but slightly glued together, and have the form of a rather elongate hen's egg, the shell being very delicate and smooth, though often appearing roughened by transverse and longitudinal, irregular depressions. The larva has but four prolegs, is variable in color, and one of its distinguishing characters, is the mottled head and two pale narrow lines along the middle of the back, the space between them usually dark and occupied on the anterior edge and middle of joints by black marks somewhat in form of X; these marks being represented by dots on the other joints. There are two rather prominent tubercles on top of the eleventh joint, preceded by two white spots. The chrysalis, so far as our comparisons have enabled us to judge, does not differ materially from that of the other species, so that the two species could hardly be distinguished in this state. This is the species which so injuriously affects our apple orchards.

The Fall Canker-Worm.—This insect is easily distinguished from the pre-

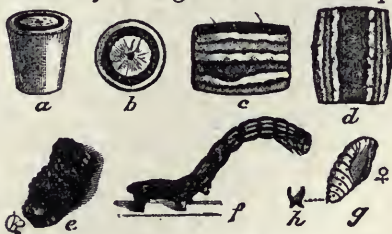


FIG. 42.—FALL CANKER-WORM.

a, *b*, egg, side and top views; *c*, *d*, joints of larva, side and top views, showing markings—enlarged; *e*, batch of eggs; *f*, full-grown larva; *g*, female chrysalis—natural size; *h*, top view of anal tubercle of chrysalis, enlarged.

ceding, when critically examined. It is, on the average, somewhat larger and

more glossy; the front wings of the male have a distinct white spot on the front edge, and are crossed by two pale, jagged bands, along the sides of which there are several blackish dots. The hind wings also have a pale, curved line, more or less distinct, across their middle. The female is uniformly dark ash-gray above, paler beneath, with the antennæ naked, and the legs and abdomen smooth and glistening, and with no extensive ovipositor. Thus it lacks the characteristic spines of *vernata*, the dusky marks across the front wings, and the pubescence in the female, together with many other minor differences.

The moths rise mostly late in the fall, but also during the warm weather of winter, even to spring. The eggs are tough, with a flattened crown of a purplish color, and having a dimple in the centre, and a brown ring near the edge; they are not secreted or hidden under scales, but are laid in regular and compact batches, of from 100 to upwards of 200, on the surface of twigs or of the trunk, being fastened by a strong glue, and covered with a slight coating of grayish varnish. The larva is distinguished from that of the Spring Canker-worm by having a dark brown back, and three conspicuous broad, pale yellow lines each side, as well as by having a third pair of prolegs, shorter than the others, on the eighth joint. It develops very rapidly, entering the ground, with favorable weather, within three weeks after hatching; and, singularly enough, suffers but two molts, exclusive of that which takes place under ground in transforming to the chrysalis. It is found principally, on the Elm. The female chrysalis is stout, and has a little, decurved, bifid thorn on the tip of the body superiorly. It has perfect wing-sheaths, though the moth is wingless. The color is light brown with darker wing-sheaths.

REMEDY.—In the case of the Spring species, the scraping of loose bark from the tree, and otherwise cleansing it of dead leaves, cocoons, larva-cases, etc., a short time before the hatching of the worms, or before the buds of the tree commenced to open, will prove an effectual preventive measure; as thereby many of the eggs will be destroyed. Moreover, a tree kept clean of loose bark will be less

subject to its attacks. The same argument will not apply to the fall species, which attaches its eggs in any exposed position. It would seem, also, that the mode of trapping the moths will have to be somewhat modified, according to the species to be dealt with; for while Dr. LeBarron found the tin and rope trap so effectual with the Spring Canker-worm, it does not appear to afford any barrier to the fall species.

CLOVER-HAY WORM.—This is a very widely distributed little insect, for it



FIG. 42.—ASOPIA COSTALIS.

1, 2, larva; 3, cocoon; 4, chrysalis; 5, 6, moth with wings expanded and closed; 7, worm, covered with silken web.

occurs in many parts of Europe and Canada, and is quite generally found throughout the Eastern and Middle States, and in the Mississippi Valley.

For many years grievous complaints were made in this country of a worm which infests clover, both in the stack and mow, and spoiled it for feeding purposes by interweaving and covering it with abundant white silken web and black excrement, much resembling coarse gunpowder. Frequently the silken matting is so dense that the hay looks moldy, and it is not improbable that much of the "clotting" and "burning" clover, so often referred to in our agricultural journals, may be, in reality, the work of this worm.

REMEDIES.—From what we now know of the habits of this insect (and there is much yet, in detail, to learn), the only way to defeat its attack is by adopting certain preventive measures: First, as the worms feed solely on dry clover, it follows

that during summer they must be confined to such unfed hay as remains over from the previous year's making. Therefore, new hay should never be stacked in contact with old. In confinement, the worms show a tendency to work their way to the bottom of whatever they are confined in, and we may conclude that this tendency is natural. It will account for their being found so generally at the bottom of a stack. Yet, aside from this tendency, it follows that wherever clover is stacked for successive years on the same foundation, the bottom, coming in contact as it does with the infested leavings of the previous year, will necessarily suffer most. Secondly, as the worms show a preference for the moister and more compact portions of a stack, it will be well to build on a good log or rail foundation. This gives an air passage underneath, and is, besides, a commendable practice. Thirdly, we should recommend salting the hay, especially the two or three feet near the bottom; for while it is a good practice as a preventive of moldiness, it may also prove an antidote to the worm nuisance.

LEGGED MAPLE BORER. — Vieing with the Flat-headed Borer, in destructiveness, but generally following in its trail and rendering more conspicuous the damage which that species does to our shade maples, the insect under consideration deserves notice. It may be called the Legged Maple Borer, because the possession of sixteen legs at once distinguishes it from the Flat-headed Borer. It is, indeed, in structure similar to, and belongs to the same family as the common Peach-tree Borer, and the more common Currant Borer.

The worm (Figure 43), burrows under the bark of our soft maples, feeding on the inner bark and sap-wood and never penetrating deeply into the more solid heart-wood. It is so numerous at times that it completely girdles, and thus kills outright, trees of considerable size; while smaller trees are weakened, and rendered liable to be broken by wind, even where the worms are less numerous.

REMEDY.—We have always found the worms in such trees as had been injured, either by the work of the Flat-headed Borer, the rubbing of the tree against a post or board, or in some other way. Where the bark is kept smooth, they

never seem to trouble it, the parent evidently preferring to consign her eggs to cracked or roughened parts. For this reason the worm is not found in the smoother branches, but solely in the main trunk. Whether the soap application will prevent the moth from depositing her eggs, is not known: judging from analogy, probably not. Yet it will tend



FIG. 43.—*ÆGERIA ACERNI*.

a, a, larva, dorsal and lateral views; *b, b, b*, cocoons exposed by detachment of bark; *c*, moth; *d*, chrysalis skin as it is often left remaining in the hole of exit.

to keep the bark smoother, and, in being used to shield the tree from the other borer, it will indirectly shield it from this one.

Mr. Grannadius recommends whitewashing the trunks, and filling up all holes and fissures with mortar, so as to render the bark as smooth as possible.

MICE, Field.—Field mice, which are sometimes so destructive to apple trees and the bulbs of herd grass, may be trapped and destroyed by digging a few holes in the form of a post-hole in the fields infested by them. Having occasion to build a post-fence on one side of an orchard not long since, about a dozen of the post-holes were left unfilled for a couple of days, and on going to set the posts from one to eight mice were found in each hole, having fallen in and being unable to climb the smooth sides of the hole.

GRAPE PHYLLOXERA.—Not the least interesting feature in the economy of our Phylloxera, are the different phases or forms under which it presents itself. Among these forms are two constant types, which have led many to suppose that we have to do with two species. The one type, which we have, for convenience, called *gallæcola*, lives in galls on the leaves; the other, which we have called *radicicola*, on swellings of the roots.

Type Gallæcola or Gall-inhabiting.—The gall or excrescence produced by this insect is simply a fleshy swelling of the under side of the leaf, more or less wrinkled and hairy, with a corresponding depression of the upper side, the margin of the cup being fuzzy, and drawn together so as to form a fimbriated mouth. It is usually cup-shaped, but sometimes greatly elongated or purse-shaped.

Soon after the first vine leaves that put out in the spring have fully expanded, a few scattering galls may be found, mostly on the lower leaves, nearest the ground. These vernal galls are usually large (of the size of an ordinary pea), and the normal green is often blushed with rose where exposed to the light of the sun. On carefully opening one of them (Fig. 43) we shall find the mother-louse dili-



FIG. 43.—UNDER SIDE OF LEAF COVERED WITH GALLS.

gently at work surrounding herself with pale-yellow eggs of an elongate oval form, scarcely .01 inch long, and not quite half as thick (Fig. 44). She is about .04 inch long, generally spherical in shape, of a dull orange color and looks not unlike an im-

mature seed of the common purslane. At times, by the elongation of the abdomen, the shape assumes, more or less perfectly, the pyriform. Her members are all dusky, and so short, compared to her swollen body, that she appears very clumsy, and undoubtedly would be outside of her gall, which she never has occasion to quit, and which serves her alike as dwelling-house and coffin. More carefully examined, her skin is seen to be shagreened or minutely granulated, and furnished with rows of minute hairs, which which more particularly described elsewhere. The eggs begin to hatch when six or eight days old, into active, little, oval, hexapod beings, which differ from their mother in their brighter yellow color and more perfect legs and antennæ, the tarsi being furnished with long, pliant hairs, terminating in a more or less distinct globule. These hairs were called *digituli* by Dr. Shimer, and they lose their globular tips and become more or less worn with age. In hatching, the egg splits longitudinally from the anterior end, and the young louse, whose pale yellow is in strong contrast with the more dusky color of the egg-shell, escapes in the course of two minutes. Issuing from the mouth of the gall, these young lice scatter over the vine, most of them finding their way to the tender terminal leaves, where they settle in the downy bed which the tomentose nature of these leaves affords, and commence pumping up and appropriating the sap. The tongue-sheath is blunt and heavy, but the tongue proper—consisting of three brown, elastic, and wiry filaments, which, united, make so fine a thread as scarcely to be visible with the strongest microscope—is sharp, and easily run under the parenchyma of the leaf. Its puncture causes a curious change in the tissues of the leaf, the growth being so stimulated that the under side bulges and thickens, while the down on the upper side increases in a circle around the louse, and finally hides and covers it as it recedes more and more within the deepening cavity. Sometimes the lice are so crowded that two occupy the same gall. If, from the premature death of the louse, or other cause, the gall becomes abortive before being completed, then the circle of thickened down or fuzz enlarges with the expansion of the leaf, and remains (Fig.

44, c) to tell the tale of the futile effort. Otherwise, in a few days the gall if formed, and the inheld louse, which while eating its way into house and home, was also growing apace, begins a parthenogenetic maternity by the deposition of fertile eggs, as her immediate parent had done before.

She increases in bulk with pregnancy, and one egg follows another in quick succession, until the gall is crowded. The mother dies and shrivels, and the young, as they hatch, issue and found new galls. This process continues during the summer until the fifth or sixth generation. Every egg brings forth a fertile female, which soon becomes wonderfully prolific. The number of eggs found in a single gall averages about 200; yet it will sometimes reach as many as 500, and, if Dr. Shimer's observations can be relied on, it may even reach 5,000. As summer advances, they do frequently become prodigiously multiplied, completely covering the leaves with their galls, and settling on the tendrils, leaf-stalks, and tender branches, where they also form knots and rounded excrescences (Fig. 44), much resembling those made on the roots.

In such a case, the vine loses its leaf prematurely. Usually, however, the natural enemies of the louse seriously reduce its numbers by the time the vine ceases its growth in the fall, and the few remaining lice, finding no more succulent and suitable leaves, seek the roots. Thus, by the end of September, the galls are mostly deserted, and those which are left are almost always infested with mildew (*Botrytis viticola*, Berkely), and eventually turn brown and decay. On the roots, the young lice attach themselves singly or in little groups, and thus hibernate. The male gall-louse has never been seen, and there is every reason to believe he has no existence. Nor does the female ever acquire wings. Indeed, we cannot lay too much stress on the fact that *gallecola* occurs only as an agamic and apterous female form. It is but a transient summer state, not at all essential to the perpetuation of the species, and does, compared with the other type, but trifling damage. We have found it occasionally on

all species of the grape-vine cultivated in the Eastern and Middle States, and on the wild *cordifolia*; but it flourishes only on the river-bank grape, and more especially on the Clinton and Taylor, with their close allies.

As already indicated, the autumnal in-

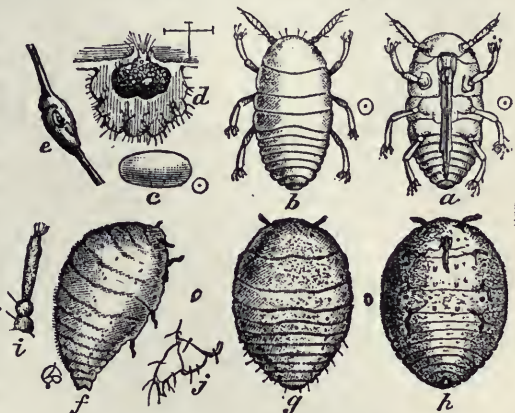


FIG. 44.—TYPE *GALLECOLA*.

a, b, newly-hatched larva, ventral and dorsal view; c, egg; d, section of gall; e, swelling of tendril; f, g, h, mother gall-louse—lateral, dorsal and ventral views; i, her antenna; j, her two-jointed tarsus. Natural sizes indicated at sides.

dividuals of *gallecola* descend to the roots, and there hibernate. There is every reason to believe also that, throughout the

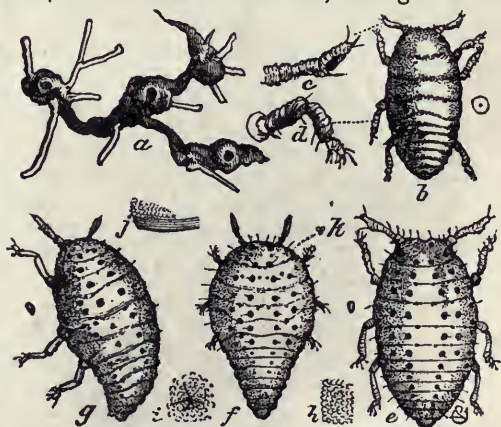


FIG. 45.—TYPE *RADICICOLA*.

a, roots of Clinton vine, showing relation of swellings to leaf-galls, and power of resisting decomposition; b, larva as it appears when hibernating; c, d, antenna and leg of same; e, f, g, forms of more mature lice; h, granulations of skin; i, tubercle; j, transverse folds at border of joints; k, simple eyes.

summer, some of the young lice hatched in the galls are passing on to the roots;

as, considering their size, they are great travelers, and show a strong predisposition to drop, their natural lightness, as in the case of the young *Cicada*, and of other insects which hatch above, but live under ground, enabling them thus to reach the earth with ease and safety. At all events, we know, from experiment, that the young *gallacola*, if confined to vines on which they do not normally, and perhaps can not, form galls, will, in the middle of summer, make themselves perfectly at home on the roots.

Type *Radiceicola*, or Root-inhabiting.—We have seen that, in all probability, *gallacola* exists only in the apterous, shagreened non-tubercled, fecund female form. *Radiceicola*, however, presents itself in two principal forms. The newly-hatched larvæ of this type are undistinguishable, in all essential characters, from those hatched in the galls; but in due time they shed the smooth larval skin, and acquire raised warts or tubercles which at once distinguish them from *gallacola*. In the development from this point the two forms are separable with sufficient ease: one (*a*) of a more dingy greenish yellow, with more swollen fore-body, and more tapering abdomen; the other, (*b*) of a brighter yellow, with the lateral outline more perfectly oval, and with the abdomen more truncated at tip.

The first, or mother form, (Fig. 45, *f*, *g*), is the analogue of *gallacola*, as it never acquires wings, and is occupied, from adolescence till death, with the laying of eggs, which are less numerous and somewhat larger than those found in the galls. We have counted in the spring as many as two hundred and sixty-five eggs in a cluster, and all evidently from one mother, who was yet very plump and still occupied in laying. As a rule, however, they are less numerous. With pregnancy this form becomes quite tumid and more or less pyriform, and is content to remain with scarcely any motion in the more secluded parts of the roots, such as the creases, sutures, and depressions which the knots afford. The skin is distinctly shagreened (Fig. 45, *h*) as in *gallacola*. The warts, though usually quite visible with a good lens, are at other times more or less obsolete, especially on the abdomen. The eyes, which were quite perfect in the larva, become more simple

with each molt, until they consist, as in *gallacola*, of but triple eyelets (Fig. 45, *k*), and in the general structure this form becomes more degraded with maturity, wherein it shows the affinity of the species to the *Coccidæ*, the females of which, as they mature, generally lose all trace of the members they possessed when born.

The second or more oval form (Fig. 45, *e*) is destined to become winged. Its tubercles, when once acquired, are always conspicuous; it is more active than the latter, and its eyes increase rather than diminish in complexity with age. From the time it is one-third grown, the little dusky wing-pads may be discovered, though less conspicuous than in the pupa state, which is soon after assumed. The pupæ (Fig. 48, *e*, *f*,) are still more active, and, after feeding a short time, they make their way to the light of day, crawl over the ground and over the vines, and finally shed their last skin and assume the winged state. In this last molt the tubercled skin splits on the back, and is soon worked off, the body in the winged insect having neither tubercles nor granulations.

In the great majority of insects the wings in the pupa are simply compressed and thickened without being folded, and in the imago they expand without material change in form. Those of our *Phylloxera* are rolled up both from the sides and the end, and, in expanding, they unroll; the whole operation requiring but about five minutes. At first, and for some time after the molt, the color of the body of the new-fledged *Phylloxera* is of a uniform bright, deep yellow, with the wings white and rather opaque, and the eyes brown. The dark thoracic band and more diaphanous and smoky nature of the wings are gradually acquired in the course of a day, and the insect finally presents the appearance of Fig. 48, *g*, *h*. The wings when highly magnified are seen to be thickly covered with minute hooks.

These winged insects are most abundant in August and September, but may be found as early as the first of July, and until the vines cease growing in the fall. The majority of them are females, with the abdomen large, and more or less elongate. The veins of the front wing are not connected, and, by virtue of the large abdomen, the body appears some-

what constricted behind the thorax. From two to five eggs may invariably be found in the abdomen of these, and are easily seen when the insect is held between the light, or mounted in balsam or glycerine. A certain proportion have an entirely different shaped and smaller body, the abdomen being short, con-

play such an important part in the disease as was at first supposed, may be controlled with sufficient ease by a little care in destroying the first galls which appear, and in pruning and destroying the terminal growth of infested vines later in the season. The root-lice are not so easily reached. As the effort will be according to the exigency, we may very naturally look to France for a direct remedy, if ever one be discovered. But of all the innumerable plans, patented or non-patented, that have been proposed—of all the many substances that have been experimented with under the stimulus of a large national reward, no remedy has yet been discovered which gives entire satisfaction or is applicable to all conditions of soil. Nor is it likely that such a remedy ever will be discovered. A large majority of the remedies proposed, such as the planting of *Madia sativa* among the vines to catch the insect by its viscous property, or inoculating the vines with the essence of *Eucalyptus globulus*, are, upon their face, unworthy of practical consideration, or absurd. These we will pass by, and briefly mention only those which have been more or less productive of good.

Submersion, where practicable, and where it is total and sufficiently prolonged, is a perfect remedy. This is what even the closest student might expect, as very finds that excessive moisture is very disastrous to the lice. M. Louis Faucon, of Graveson (Bouche du Rhone) France, has abundantly proved its efficacy, and has, by means of it, totally annihilated the

insect in his vineyard, which was suffering from it four years ago. From his experience we may draw the following conclusions:

1. The best season to submerge is in autumn (September and October), when the lice are yet active and the vines have ceased growing. Submergence for 25 to 30 days, at this season, will generally rout the lice. 2. A submergence of 40 to 50 days, in winter, is required. 3. A vineyard should never be inundated for a



FIG. 48.—TYPE RADICICOLA.

a, shows a healthy root; b, one on which the lice are working, representing the knots and swellings caused by their punctures; c, a root that has been deserted by them, and where the rootlets have commenced to decay; d, d, d, show how the lice are found on the larger roots; e, female pupa, dorsal view; f, same, ventral view; g, winged female, dorsal view; h, same, ventral view; i, magnified antenna of winged insect; j, side view of the wingless female, laying eggs on roots; k, shows how the punctures of the lice cause the larger roots to rot.

tracted, and terminating in a fleshy and dusky penis-like protuberance; the limbs stouter, and the wings proportionately larger and stouter, with their veins connecting. This shorter form never has eggs in the abdomen, but, instead, a number of vesicles containing granulations in sacs. These granulations have much the appearance of spermatozoa, and seem to have a Brownian movement, but are without tails.

REMEDIES.—The leaf-lice, which do not

longer period than two days in summer, or during growth; and though these brief inundations at that season affect only a few lice near the surface, and are by no means essential, they are nevertheless important auxiliaries to the more thorough fall or winter submersion, as they destroy the few lice which are always invading a vineyard in infested districts. These summer inundations will be necessary only after the winged insects begin to appear; and three or four, each lasting less than two days, made between the middle of July and the fall of the leaf, will effect the end desired. 4. An embankment should be made around the vineyard in order that the water may evaporate and permeate the earth, but not run off and carry away any nutritive properties of the soil.

On our best hilly vine land, thorough submersion is impracticable; but on our bottom lands some of the grapes which fail now may be made to succeed by its means.

Carbolic acid, added to water at the rate of about one per cent., applied by pouring into deep holes made by a crow-bar or auger, has given satisfactory results; and a thorough application of soot has also been strongly advocated by those who have tried it. In the experiments that we have been able to make in a small way, a thorough mixing with the soil of a cheap carbolic powder, has given good results.

The advantages of grafting are too well recognized to need enforcing. By its means, healthy, vigorous vines, which do not fruit well, may soon be made abundant bearers; new varieties and seedlings be quickly tested, and a less desirable variety replaced by one more desirable. Our knowledge of the Grape Phylloxera has of late pointed out other cogent advantages that may be derived from grafting.

BLACKBERRY BUSH BORER.—The Blackberry bush borer, is occasionally found eating out the pith of the young canes of the Raspberry and Blackberry, but it is not common. The beetle, which is the parent of the borer, is about a half inch long, black, rusty yellow on the breast, and on top of the thorax. It lays its eggs early in August on the stems of the Blackberry and Raspberry, generally

at the base of a leaf. The grub penetrates the stem, eating out the pith, causing the young canes to wither. A few of our Blackberry bushes were attacked by this insect the past season.

REMEDY.—The infested canes should be pruned off in the Fall and buried. In Europe there is a beetle which deposits its eggs in the flower of the Raspberry, which produce small white maggots by the time the fruit is ripe. A similar worm is quite common upon our Wild Red Raspberry, but whether it is the same as the European species, or one of the Ortalidians (some of which are known to deposit the eggs in the Raspberry), we are unable to say, as they are seldom seen upon the cultivated varieties.

GOOSEBERRY MIDGE.—The berries turning red prematurely and becoming putrid, having in them small, bright yellow maggots, of an oblong-oval form, and slightly divided into segments by fine impressed transverse lines; changing to pupæ in the berries, and in the latter part of July giving out a small, two-winged fly, resembling a musquito, of beeswax yellow color.

REMEDY.—The berries should be gathered so soon as they show signs of premature ripening, and fed to hogs, or otherwise destroyed.

QUINCE BORER.—"Should the borer by any means steal in, ferret them out carefully with a piece of wire. Should they, however, get the advantage of you, and your trees become honey-combed, set out again young trees, so that by the time the old ones are gone the young ones will be finely in bearing. We have raised these quinces in perfection, but not caring for the fruit, they were removed when they were about to die from the operations of the worm."

THE JUMPING SUMACH BEETLE.—As soon as vegetation starts in the Spring, the beetles, (Fig. 48 *f*), which had passed the winter, as such, in sheltered situations, may be seen upon their foot-plants, sometimes in great numbers, and generally coupled. Though not as shy and active as many of the smaller flea-beetles, they yet jump with alacrity by means of their thickened hind thighs—a fact which has been doubted by some entomologists, but certainly by none who have known the insect in life. The wing-

covers are of a bright mahogany-brown, marked, as in the illustration (*f*), with white, and the head and thorax are of a bright shining green. In cabinet specimens these colors fade, and the general tint is more yellowish or rust-colored. Very soon after the appearance of the beetle the stems and branches of the plants named, if carefully examined, will be found more or less covered with little elongate pellets of excrement, (*b*, *b*),

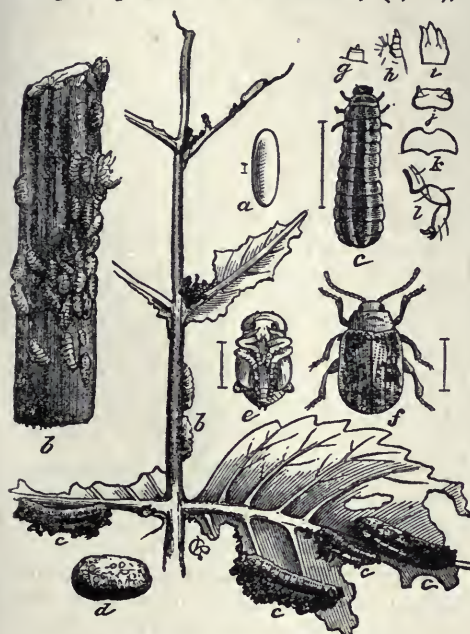


FIG. 48.—BLEPHARIDA RHOIS.

a, egg; *b*, *b*, egg masses covered with excrement; *c*, *c*, *c*, larvae; *d*, cocoon; *e*, pupa; *f*, beetle; *g*, *h*, *i*, *j*, *k*, *l*, mouth parts of larvae.

dark when fresh, but becoming paler and grayish-brown when dry. These pellets are sometimes so numerous as to form one large mass, completely covering the stem or branch; at other times, especially when on the leaf or leaf-stem, they are single. If more critically examined, they will each be found to contain five or six pale yellow eggs (*a*), mostly laid side by side, and separated from the excrement by a thin papery layer of a whitish, opaque substance. These eggs give birth, in a very few days, to little dark yellow worms with a conspicuous black head, and shiny plate on the first joint, six long, black, thoracic legs, and a pale anal proleg.

REMEDIES.—The Smoke-tree may be

protected from the injuries of this insect by jarring the beetles, in early spring, into pans of water, or by strewing the ground lightly with straw, then starting a ring of fire on the outside, and jarring the beetles into it. If the worms have been allowed to hatch, the Paris-green mixture will soon dispose of them.

OAK PRUNER.—This is a long-horned brownish beetle which cuts off the branches of oak, apple, peach, hickory, and chesnut. This beetle, which is known as the “oak-pruner,” does not make the incision from the outside of the branch, like the twig-girdler, but the larva cuts the twig from the inside. The egg is deposited in July, on a twig near the extremity of a branch. The larva when hatched penetrates into the wood, and forms a cylindrical burrow several inches in length in the interior of the branch, and, when full-grown, eats away parts of the wood of the branch in which it resides, from the inside, leaving only the bark untouched, so that these branches are broken off in autumn by the first strong wind, and fall to the earth with the larvæ yet in them. Professor Peck considered that this was done in order that the branch might retain sufficient moisture from lying on the damp ground to enable the pupa and insect to be perfectly developed.

REMEDY.—If this insect should increase so as to become very injurious, it may readily be destroyed by gathering up all fallen branches under the trees in winter or spring, before the perfect beetle is developed, and burning them immediately. If such fallen branches are examined in early spring, they will be found to contain either pupæ or perfect beetles, which if not destroyed, would, next season, deposit eggs on the neighboring trees.

APPLE TWIG BORER.—These insects measure from .25 to .35 of an inch in length, and are small, dark chesnut-colored beetles, of a cylindrical form, having the front part of the thorax roughened with elevated points, the male having two little horns, and the tip of the wing covers above provided with two prickle-like points curving inward. Attacks apple, pear, hickory, and cherry trees, and also grape vines, by boring into the twigs and young branches. It is

in the perfect beetle state that the insect does the injury to our fruit and forest trees, boring into the twig just above the bud, working down sometimes to the depth of two or more inches through the pith, thus finding in the branch both food and protection. Even in mid-winter both male and female beetles may sometimes be found hiding in the cylindrical burrows, and always with the head directed downward. The insects are plentiful in the Western States.

REMEDY.—The only remedy that can be suggested, when the insects attack twigs and branches, is to cut them off some distance below the place injured and to burn them immediately, with the beetles inside, as it is not likely that any preparation could be applied to the trees that would prevent their attacks.

TWIG-GIRDLER.—The beetle that thus girdles the twigs is the perfect insect of the so-called "twig-girdler," medium-sized, long-horned beetle, of a chestnut-brown color, and having a broad, lighter colored band across the wing-covers. The female beetle first makes a perforation in a branch, generally just below a bud; she then deposits an egg in this perforation, in one case even making as many as six perforations, in which eggs were deposited below the buds in a single branch, not more than a foot in length.

After the insect has deposited her eggs, she proceeds to gnaw all around the branch, thus forming a circular cut or incision, about one-eighth to one-tenth of an inch in width, below the place where the eggs are deposited, so that the exterior part or end dies; the larva, when hatched, feeds on the dead wood, which sort of food appears to be essential to its growth. The principal injury is said to be done in August and September. They have also been found to injure walnut and apple trees as well as those above mentioned.

REMEDY.—The best way to eradicate this insect is to cut off all such branches and twigs as have the least appearance of having been girdled, and to gather up all fallen branches and burn them immediately, as the eggs or larvæ of the next year's generation are contained in these twigs, and, if allowed to remain undisturbed, would produce a race of beetles

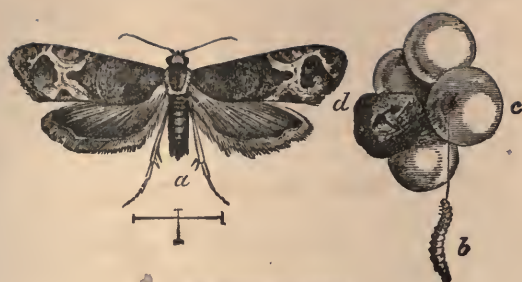
next season which would girdle all the trees in the neighborhood. The best time to prune off the infested branches is after the leaves have fallen from the trees, as the injury can be more plainly seen than when the tree is full of leaves.

PEACH - BORER, Remedy for.

Take a five pound can of carbolic soap, called "carbolic plant-protector," (costing two dollars,) dissolve it in ten or twelve gallons of hot water by stirring or letting stand over night, then add twenty gallons of cold water, and apply this liquid, with a paint-brush, to the base of each tree, for eight or ten inches in height first clearing away any weeds or loose dirt with a hoe, and taking pains to have the liquor enter the crevices of the bark where the insect deposits her eggs. An active man or lad will go over, in this way, five hundred trees in a day. If the orchard is in clean condition the above quantity of liquid will serve for a thousand trees, so that the expense is not over half a cent per tree. Apply from the first to the middle of July.

INSECT INJURIES, to Fruit Trees, and their Remedies.—Insects rarely attack the most healthy and vigorous trees; hence the importance of effort to keep fruit trees in the most thriving state. The black louse, imbedded in the bark, lays her eggs, and covers them till hatched, then removes them to another place and repeats the process. The grain lice are attended by ants which seem to milk them, living on the sweet substance exuding from them. They are often killed by another insect which breeds within them, and is their constant enemy and our friend and helper.

CURRANT BORERS.—To destroy these borers, the plants should be examined every fall or during winter, and every shoot that has a borer in it will usually be of a brown color, or slightly wilted; sometimes, when the shoots are very vigorous, no difference can be observed, but by close inspection the small hole where the worm entered can be found. All shoots containing worms should be cut out, and the worm destroyed. In this way they may be checked, if not entirely eradicated.



GRAPEBERRY MOTH.



GRAPEBERRY MOTH.



GOOSEBERRY OR CURRANT WORM LARVA.



OUTWORM MOTH.



OUTWORM PUPA.



GOOSEBERRY OR CURRANT MOTH.



OUTWORM LARVA.

M E C H A N I C A L .

BLADDERS, to Prepare. — Soak them for twenty-four hours in water, to which a little chloride of lime or potash has been added, then remove the extraneous membranes, wash them well in clean water and dry them.

BRICK OVENS, How to Make. — A brick oven built in the old style, out of doors, entirely separated from the dwelling-house, is more desirable and more safe, so far as danger from fire was concerned, than if built by the side of the fireplace in the house. A good brick oven for baking bread, pies and cakes is worth all the ranges and cook-stoves that one could store in his kitchen. In such an oven everything will be baked just right, above and below, through and through. After a foundation has been prepared, let two courses of hard bricks be laid for the bottom of the oven. Then build the mouth and part of the sides, until it is desirable to begin to draw the sides inward, when sand or mellow earth may be placed on the foundation, and the surface smoothed off and pressed down to the desired form of the oven. Now let the brick work be built over this form of sand. Let two courses of hard bricks be laid over the form with the best mortar. After the last bricks have been laid the sand may be removed. The bricks should be soaked for several hours previous to being laid, so that they will not absorb the moisture of the mortar until it has set. Such an oven will cost but a few dollars. Many people can collect a sufficient number of loose bricks and pieces around their dwellings to build a brick oven. Besides this, any intelligent man, though only half a mechanic, can build such an oven about as well as a mason.

CEMENT, for China, Glass, Crockery, Metals and Wood. — 1. An excellent cement for mending china may be made as follows: Take the white of an egg and a little flour, which make into a light paste;

clear the parts to be joined from all dust and dirt; spread some of the paste on each piece and press them together; while wet, wipe off the exuding portions, both inside and out; then let it remain until quite dry. 2. The following recipe we know from experience to be a good one, and, being nearly colorless, it possesses advantages which liquid glue and other cements do not: Dissolve $\frac{1}{2}$ an ounce of gum-acacia in a wine-glass of boiling water; add plaster of Paris sufficient to form a thick paste, and apply it with a brush to the parts to be cemented together. **FOR MENDING BROKEN CHINA, GLASS, ETC.** — 3. Take 1 pound white shellac, pulverized; 2 oz. clean gum mastic; put these into a bottle, and then add half a pound pure sulphuric ether. Let it stand for half an hour, and then add half a gallon 90 per cent. alcohol. Shake occasionally till it is dissolved. Heat the edges of the article to be mended, and apply the cement with a pencil brush; hold the article together until the cement cools. This makes a transparent cement. 4. **AN INDIAN CEMENT FOR GLASS AND METALS.** — Dissolve 5 or 6 pieces of gum mastic, each about the size of a large pea, in just as much spirit as will render it liquid. Soften some isinglass by steeping it in water; having dried it, dissolve as much of it in good brandy as will fill a two-ounce phial; add 2 small bits of gum ammoniacum, previously rubbing them until they are dissolved. Mix the two solutions; keep in a close phial, and when it is to be used set the phial in boiling water. 5. Take a thick mucilage of gum arabic and stir into it plaster of Paris—the broken images are best—made very fine, to form a thick paste, and apply to the edges with a brush, and press firmly together and confine there two or three days. I have pulled over 30 pounds with a wine-glass, the stem of which had been broken and mended with the cement.

6. Dissolve 1 ounce common salt in 1 quart of water; bring to a boil, and put in $1\frac{1}{4}$ pounds gum shellac. When it shall be dissolved, pour into cold water and work like wax. Make into small sticks. This will make crockery as good as new. 7. Steep Russian isinglass 24 hours in white brandy; gently boil and stir the mixture until it is well compounded, and a drop of it, cooled, will become a very thick jelly; then strain it through a linen cloth, and cork it up closely. A gentle heat will dissolve it into a colorless fluid. Broken dishes, united with it, will break elsewhere, rather than separate in the old fracture. To apply it, rub the edges, place them together, and hold them 2 or 3 minutes. 8. A desirable cement is made by burning oyster shells, and pulverizing the lime from them very fine; then mixing it with white of egg to a thick paste, and applying it to the china or glass, and securing the pieces together until dry. Take 4 pounds of white glue, $1\frac{1}{2}$ pounds of dry white lead, $\frac{1}{2}$ a pound of isinglass, 1 gallon of soft water, 1 quart of alcohol, and $\frac{1}{2}$ a pint of white varnish. Dissolve the glue and isinglass in the water by gentle heat, if preferred; stir in the lead, put the alcohol in the varnish, and mix the whole together. 10. A cement that will mend marble, china and ornamental ware is made by taking water 1 gallon, nice glue 3 pounds, white lead 4 ounces, alcohol 1 quart. Mix. Directions—If it is cold weather, warm the bottle until the cement is dissolved; then with the finger or a brush, rub it on the broken parts (both edges), put together, and retain in their places until dry. 11. A cement withstanding both heat and moisture is simply pure white lead or zinc white, ground in oil, and used very thick. It is excellent for mending broken crockeryware, but it takes a very long time to harden sufficiently. The best plan is to place the mended object in some store-room, and not to look after it for several weeks, or even months. After that time it will be found so firmly united that, if ever again broken, it will not part on the former fracture.

CEMENT, Egg.—White of egg, thickened with finely-powdered quick-lime. Used to mend earthenware, glass, china, marble, alabaster, spar ornaments, etc. It does not resist moisture.

CEMENT, for Leather.—To 10 parts bisulphide carbon and 1 part spirits turpentine add enough gutta-percha to make a tough, thickly-flowing liquid. The surfaces to be joined must be perfectly free from grease, which is accomplished by laying a cloth upon them and applying a hot iron for a time. The coat is applied to both surfaces, and pressure made till the joints are dry.

CORN CRIBS, Rat-Proof, to Make.—Let the four corner posts be eight inches square, frame the sills which support the floor of the corn cribs into posts, a distance of two feet from the lower end. Before putting the frame together, taper the lower ends of the posts for the distance of two feet, so that at the very base the posts shall only be four inches square. Now, when the frame is set up, let the posts also stand on tapered rocks. If the crib needs more than these four posts to bear up the corn that will be put in it, make the legs like the lower portion of these posts, and set these legs under the sills. Now lay the joists or sleepers on the sills, and put on the floor, making tight, and about three feet from the ground. Having the door made tight, keep it shut, and no rats will get into your crib.

DEER SKINS, to Dress.—Put the skin into the liquid while warm, viz.: eight quarts rain water, to one pint soft soap. Warm it. Then punch the hide, or work it with a soft stick and let it lie one day. It is then to be taken out and wrung—rolled between two logs—or even a wringing machine will be better. Then stretch it until it is dry, in the sun is best, or by a hot fire. Then oil it thoroughly with any oil convenient. It should then be treated to the same bath of suds (heated quite warm), and lie another day. Then pull it out and dry as before. Any oil will do, but good fresh butter is better than anything else. When the skin is dry rub it with ochre, which will give it a splendid yellow color.

FURNITURE, Varnished.—This may be finished so as to look equal to the best French polished wood, in the following manner: Take two ounces of tripoli, powdered; put it into an earthen pot, with just enough water to cover it; then take a piece of white flannel, lay it over a piece of cork or rubber, and proceed

to polish the varnish, always wetting it with the tripoli water. It will be known when the process is finished by wiping a part of the work with a sponge, and observing whether there is a fair, even gloss. When this is the case, take a bit of mutton suet and fine flour, and clean the work.

HIDES (Green) to Cure.—A great many butchers do not use proper care in this branch, and the consequence is that the hides will not pass city inspection, owing entirely to the ignorance and carelessness of persons preparing them for market. The proper way to salt hides is to lay them flat, flesh side up, and form a nearly square bed, say 12 by 15 feet, folding in the edges so as to make them as nearly solid as possible. Split the ear in the cords that run up the ear in each one, so as to make them lie out flat. Sprinkle the hide with two or three shovelfuls of coarse salt, as the size may require—say for a sixty or eighty pound hide, from ten to fifteen pounds of salt. At any rate cover the hide well, as it need not be wasted; then let them lie in this from 12 to 20 days, after which take them up, shake the salt out and use it again.

CISTERNS, How to Build.—The cistern that is designed to supply the family with water for drinking and cooking should be sixteen to twenty feet deep and eight to ten feet in diameter. It should be walled up with brick or stone; brick is the best—takes up less room and allows a good arch to be made at the top. If the earth is clay, sufficiently retentive to hold water, the cistern wall need not be plastered, but should be laid up in cement mortar. It is quite common to wall up cisterns in retentive clay without any mortar, but this makes them liable to the same objection we have stated against common wells—they will drain the surface to the distance of twenty or thirty feet, as we know from trial.

The cistern for family use should be provided with a filter. This may be made by building a four-inch brick wall across the cistern from bottom to top, laid in cement, curving to the side which is to receive the water, and which should be about two-thirds the entire capacity of the cistern. The water will filter through the bricks of the partition, and may be drawn pure from the small compartment.

Another good method, and probably the best, all things considered, is to dig a small cistern adjoining the main one, about five feet wide by six feet deep, connected about a foot above the bottom with the large one by a pipe. Fill this two-thirds full with sand and gravel, and let the water from the roof be discharged into it and filter through into the main cistern. The advantage of this method is that when the filtering materials become old or too impure, they may be taken out and renewed without disturbing or losing the water in the main reservoir. Very good cisterns of small capacity are frequently made in clay soil by cementing on the earth. A large, deep and substantial cistern with a good filter, for family use, is invaluable for its supply of pure water.

HOUSES, Choice of Color for.—The choice of color for country houses requires the exercise of taste, judgment, and an eye for harmonious combinations. It is laid down as a rule by Calvert Vaux, that every building requires four tints to make it a pleasant object in the way of color. "The main walls," he remarks, "should be of some agreeable shade of color, the roof-trimmings, verandas, and other wood work, being either of a different color, or of a different shade of the same color, so that a contrast, but not a sharp one, may be established—a third and fourth color, not widely different from the other wood work, should be applied to the windows, blinds, etc."

The greatest defect in the generality of country buildings is the too frequent use of white. Another most decidedly objectionable color is unmodified red, or those brown-stone tints, approaching to chocolate color, which are so frequently used in the construction of town dwellings.

The simplest practical rule in the painting of houses, is to choose paint of some neutral tint that is quiet and satisfactory, and let the facings of the windows, cornices, etc., be painted several shades, darker of the same color.

ICE-HOUSE, Extemporaneous.—An ice-house can be extemporized without making a tenon or sawing a board. Construct a pen near the pond or stream, where the ice is to be gathered, choosing if possible, a gravel bank where there

will be good drainage. The pen may be made of rails twelve feet long, or of any desired length. The larger the pen, the better the ice will keep. Lay up two rails upon each of the four sides. Make the bottom level, and cover it a foot or more with straw, sea-weed, or any convenient refuse vegetable matter. Sawdust is better than straw, if it can be had. Spent tan-bark is a good material for this foundation. Cut the cakes of ice in the usual manner, and pack them closely, filling the interstices with pounded ice, and if the weather is freezing pour on a little water to make it solid. Pack the outside with a foot of straw, sawdust, or other material, and put up the fence as the pile of ice rises. The pile can be conveniently made about eight feet high. Cover the top with at least eighteen inches of sawdust, or two feet of straw trodden down closely. Make a roof of boards or slabs slanting to the north, sufficiently steep to shed water, and fasten with a few nails. Such a pile of ice as this can be secured by a couple of men and a team in a day. A cheap ice-box made with double sides and packed with sawdust will be wanted. The inner chamber should be about two feet long, two feet deep, and eighteen inches wide. This will hold a single cake of ice weighing a hundred pounds or more, and leave room on top to keep milk, fresh meats, fruit, and other matters. It will last from four days to a week, according to the quantity that is used in the drinking-water. If the extemporaneous ice-house is not disturbed more than once a week, it will probably supply the family through the summer with abundance of ice.

LIGHTNING RODS, How to Erect.—

1. The rod should consist of round iron of about one inch in diameter; its parts, throughout its whole length, should be in perfect metallic continuity, by being secured together by coupling ferrules.
2. To secure it from rust the rod should be coated with black paint, itself a good conductor.
3. It should terminate in a single platinum point.
4. The shorter and more direct the course of the rod to the earth the better; bendings should be rounded, and not formed in acute angles.
3. It should be fastened to the building by iron eyes, and may be insulated from those by cylinders of glass (We do not,

however, consider the latter of much importance.) 6. The rod should be connected with the earth in the most perfect manner possible, and nothing is better for this purpose than to place it in metallic contact with the gas-pipes, or, better, the water-pipes of the city. This connection may be made by a ribbon of copper or iron soldered to the end of the rod at one of its extremities, and wrapped around the pipe at the other. If a connection of this kind is impracticable, the rod should be continued horizontally to the nearest well, and then turned vertically downward until the end enters the water as deep as its lowest level. The horizontal part of the rod may be buried in a stratum of powdered charcoal and ashes. The rod should be placed, in preference, on the west side of the building. A rod of this kind may be put up by an ordinary blacksmith. The rod in question is in accordance with our latest knowledge of all the facts of electricity. Attempted improvements on it are worthless, and, as a general thing, are proposed by those who are but slightly acquainted with the subject.

MEASUREMENT OF SLATERS' AND TILERS' WORK.—

In these articles, the contents of a roof are found by multiplying the length of the ridge by the girts over from eaves to eaves; making allowance in this girt for the double row of slates at the bottom, or, for how much one row of slates or tiles is laid over one another. When the roof is of a true pitch—that is, forming a right angle at the top, then the breadth of the building, with its half added, is the girt over both sides, nearly. In angles formed in a roof, running from the edge to the eaves, when the angle bends inward, it is called a valley; but when outward, it is called a hip. Deductions are made for chimney shafts or window holes.

MEASUREMENT, GLAZIERS' WORK.

—Glaziers take their dimensions either in feet, inches and parts, or feet, tenths and hundredths, and they complete their work in square feet. In taking the length and breadth of a window, the cross bars between the squares are included. Also windows of round or oval forms are measured as squares; measuring them their greatest length and breadth, on account of the waste in cutting the glass.

MEASURE, Board.—The unit of Board Measure is a square foot one inch thick. Hence, to measure boards, if one inch thick, multiply the length in feet by the breadth in inches, and divide by 12. If the board taper, multiply by half the width of both ends added. *Sawed lumber*, like *joists*, *plank* and *scantling*, are now bought and sold by board measure. Hence, to measure them, multiply the width in inches by the thickness in inches; multiply the product by the length in feet, and divide by 12. The number of feet, board measure, which can be sawn from a given log, can only be approximately determined from general tables. The following table is the standard commonly adopted for logs 10 feet in length, and of diameters indicated, measured under the bark at the smaller end.

Diam.	Ft.	Diam.	Ft.	Diam.	Ft.
10	23	23	225	36	640
11	31	24	250	37	681
12	40	25	275	38	723
13	50	26	302	39	765
14	62	27	330	40	810
15	75	28	360	41	850
16	90	29	391	42	993
17	105	30	422	43	952
18	122	31	456	44	1000
19	140	32	490	45	1051
20	160	33	526	46	1103
21	180	34	562	47	1156
22	202	35	601	48	1210

To find the contents in board measure of a log of any length, look for its diameter in the table, take the corresponding number of feet, point of one place, and multiply by the length of the log.

MEASURING, the Height of Trees.—

It is often desirable to determine the height of a tree, if not with mathematical correctness, with something approaching to accuracy. There are instruments made for the purpose of measuring with great precision, but there are several methods by which the height can be ascertained without expensive appliances. By measuring the shadow of a rod or other object of a known length and the shadow of the tree, a simple sum will give the height. Suppose that we measure the shadow of a perpendicular rod six feet long, or that of a man of the same height, and find it to measure eight feet, and then measure the shadow of the tree and find it to be one hundred and thirty-two feet; then

as 8 ft. : 6 feet. : 132 feet. : 99 ft.

The *Gardeners' Chronicle* figures a simple quadrant for tree-measuring, which we here explain. A quarter of a circle is made of some light wood, and a small plumb-bob is suspended from what would be the centre of the circle, and a mark made just half way of the curved side of the quadrant. Two small eyes for sights attached to one of the straight edges makes the implement complete. The quadrant is held by the operator, moving backward or forward until he can see the top of the tree through both sights, the plumb-line at the same time hanging over the mark. The distance of the observer from the tree, when he can see the top of it in this manner will be the height of the tree. Allowance must be made for the height of the eye from the ground, and for any difference in the lever of the ground between the tree and the observer.

ANOTHER MODE.—In his tale of *Monsieur Violet*, Captain Marryat tells us, as an instance of the great aptitude for applying simple rules possessed by the Shosnonnee Indians, that when they desired to measure the height of a tree at any time when its shadow is cast on the ground, they used to place a stick at a given length into the ground, and then, calculating the difference between the length of its shadow and its actual height, and applying the same to the shadow of the tree, they ascertained its correct height, thus unknowingly working out a sum in the rule of three. Any person, however ill-informed, might easily get at the exact height of a tree when the sun shines, or during bright moonlight, by marking two lines on the ground three feet apart, and then placing in the ground on the line nearest to the sun a stick that shall stand exactly three feet out of the soil. When the end of the shadow of the stick exactly touches the farther line, then also the shadow of the tree will be exactly in length the same measurement as its height. Of course in such a case the sun will be at an exact angle of 45°. Measurements of this character could be best effected in the summer when the sun is powerful, has reached to a good height in the heavens, and when the trees are clothed with living green, so as to cast a dense shadow. To many to whom this idea might not have occurred it might be

made annually a matter of interest thus on warm summer days to take the height of prominent trees, and so to compare notes of growth from year to year.

MEASURING TIMBER IN THE TREE.—A simple method, and one that can be put in practice at any time and place, when one has only a measuring rod, and has the experience of the writer, as follows: A stick of timber is desired, say fifty feet long. Select your tree, measure fifty feet in a direct line from the foot of the tree on as near level ground as possible; now cut a stick the exact height of the observer, and stick it in the ground exactly perpendicular; now let the observer lie flat on his back, his feet against the stick and head in line of tree and stick, and look directly over the top of the stick, and where the line of vision strikes the tree will be the length of stick (fifty feet) desired. If the ground is not level the measure will not be exact, but allowance must be made.

MEASURING, OR GAUGING.—Gauging is measuring the capacity of casks and other round vessels. When a round vessel has the same diameter throughout, it is said to be cylindrical, or like a cylinder. The area of a cylinder is equal the square of the diameter $\times .7854 \times$ height. Hence, if we take the dimensions of diameter and height in inches, to find the number of gallons, we must divide the product by 231, the number of inches in a gallon. But $\frac{.7854}{231} = .0034$. Hence, to find how many gallons a cylindrical vessel will contain, multiply by .0034 the product of the square of the diameter in inches by the height in inches. To find how many gallons a cask will contain, multiply by .0034 the product of the square of half the sum of the diameter, at head and bung, by the length. To find the capacity of a box or bin in bushels, multiply together the length, breadth and height in feet, and the product by $\frac{4}{5}$ or .8. To find the size of a bin necessary to hold a given number of bushels, increase the number of bushels by one-fourth, and resolve into three factors. These will be the length, breadth and height required.

MEASURE, Heaped, to Estimate.—Corn on the cob, apples, potatoes, etc., are sold by heaped measure. A heaped bushel contains 2509 inches;

hence a cubic foot is $\frac{1728}{2509}$ or about .63 of a heaped bushel. To estimate the number of bushels of corn, potatoes, apples, etc., therefore, it is only necessary to find the number of cubic feet and multiply by .63. Some convenient rules for ascertaining cubical contents are here given. *Boxes, or Rectangular Bins, etc.*, multiply together the length, the breadth and the height. *Cribs*, flared—that is, smaller at the bottom than at the top—add together the widths of the upper level of the corn, and at the bottom, and divide by two. Then multiply the quotient by the length of the crib, and the product by the depth of the corn. *Heaps*—If the bottom of the heap be square or rectangular, multiply the length by the breadth, and the product by one-third the height. If the bottom be circular, multiply the square of the diameter by .7854, and the product by one-third the height. For ordinary purposes .7854 may be considered $\frac{3}{4}$. Hence, to estimate the heaped bushels in a round heap, square the diameter, divide by 6 and multiply by the height. Thus, a heap of apples 2 feet in height and 6 feet in diameter would contain $\frac{3}{8} \times 4 = 24$ bushels.

MEASURING GRINDSTONES.—Which are sold by the stone, a cylinder, 24 inches in diameter and 4 inches thick, multiply together, in inches, half the diameter, once and a half the diameter, and the thickness. Then divide by 1728.

MEASUREMENT OF PLUMBERS' WORK.—Plumbers' work is rated at so much per pound. Sheet lead, used in roofing, guttering, etc., is from 6 to 10 pounds to the square foot, and a pipe of an inch bore is usually 12 to 13 to the yard in length, as seen below:

Thickness of Lead.	Pounds to a Square Ft.	Bore of Lead-pipe.	Pounds Per Yard.
$\frac{1}{10}$	5.899	$\frac{3}{4}$	10
$\frac{1}{9}$	6.545	1	12
$\frac{1}{8}$	7.373	$1\frac{1}{4}$	16
$\frac{1}{7}$	8.427	$1\frac{1}{2}$	18
$\frac{1}{6}$	9.831	$1\frac{3}{4}$	21
$\frac{1}{5}$	11.797	2	24

STOVES, To Mend Cracks in.—Take equal parts of wood ashes and common salt, and mix them to a proper consistence with water; with this fill the cracks.

MEASURE, HAY, Weight to be Estimated.—Hay is sold by the ton, but on account of its bulk it is often inconvenient to weigh it. As general estimates, these relations of weight to bulk are reliable.

Cubic Yds. to the ton.

New mown hay.....	25
Loaded and stored hay.....	20
Well settled hay.....	15
Baled hay.....	10

It remains to estimate the number of cubic yards. If the stack or mow be square or rectangular, multiply together the length, breadth, and half the height in yards. If the stack be long and triangular, multiply together the length and half the height in yards. If the stack be circular, multiply together the square of the circumference by .04 of the height in yards. To calculate the price of a given number of pounds of hay, multiply the number of pounds by one-half the number dollars per ton, and point off three places. Thus at \$30 per ton, 400 pounds are worth, $480 \times 15 = 7.20$. To estimate the number of acres in a certain field, remember that an acre equals 160 rods, or 4,840 yards, or 43,560 feet. Hence measure the length and breadth of the field in rods, divide by 16, and point off one place; or measure it in yards or paces, multiply length by breadth, and divide successively by 11, 11 and 4.

MEASURE, LIVE CATTLE, to Estimate Weight.—The superficial feet of animals are estimated by multiplying the feet of girth just behind the shoulder-blade by the feet of length of back from tail to fore part of the shoulder-blade. Thus an ox, whose girth is 8 feet 6 inches, and length 6 feet, would measure $8\frac{1}{2} \times 6 = 56$ superficial feet. This assumes the shape of the body to be cylindrical, and is, of course, only an approximation. For ordinary estimates, the following may be regarded as the weight per superficial foot:

	Pounds.
Girth less than 3 feet.....	11
“ from 3 to 5 feet.....	16
“ from 5 to 7 feet.....	23
“ from 7 to 9 feet.....	31

Thus, an ox alluded to would weigh about, $51 \times 31 = 1,581$ pounds.

MEASURING EXCAVATIONS.—This branch of work is measured by the cubic yard or 27 cubic feet.

If the ground is irregular, two, three or

more dimensions are to be taken to obtain the mean or average depth of digging, this multiplied by the length or breadth of the superficies will be the cubic contents in feet, the result divided by 27 will give the number of cubic yards.

In loose, loamy or sandy soil, where digging with the spade only is necessary, a man may throw up a cubic yard in an hour; but in clay or gravel, where picking is necessary, it will require two men; and in very strong gravel three men will be required to throw up the same quantity.

Where wheeling off on barrows is necessary, three men will remove 30 cubic yards in a day to the distance of 20 yards—that is, two filling and one wheeling.

When the stuff is to be carted away, a man with a horse and cart can, with the assistance of a man to fill, remove 12 loads per day to the distance of a mile.

When earth is left to protect an adjoining wall, the same is to be charged extra per cubic foot when required to be removed.

NOTE.—24 cubic feet of sand, or 18 cubic feet of earth, or 17 cubic feet of clay, make a ton.

Digging wells and cisterns is valued at so much per foot in depth.

MEASURING MASON'S WORK.—In preparing the foundation for any building, there are two sources of failure which must be carefully guarded against—viz., inequality of settlement, and lateral escape of the supporting material; and if these radical defects can be guarded against, there is scarcely any situation in which a good foundation may not be obtained.

The best foundations are rock, gravel and very stiff, dry clay. Where the ground in its natural state is too soft to bear the weight of the proposed structure, recourse must be had to artificial means of support; this is best obtained by a thick layer of *concrete*, which is composed of fresh burnt lime, brought directly from the kiln, slaked with all possible speed and immediately mixed up with clean, coarse gravel, or broken rock, and let fall into the bottom of the trenches to such depth as may be deemed necessary. This must be allowed to set (which may require two or three days) before the rubble masonry is commenced thereon. As this composition sets quickly, and, like

plaster of Paris, possesses the property of swelling as it sets, it acts with considerable force against the sides of the trenches—forming a solid, compact mass as hard as stone, and more firmly fixed in the trench than the foundation could be if built with any other material.

In the lower course of footings to walls, it is advantageous to have a great portion of the stones—all, indeed, if the stone will allow of it—running right through the thickness of the wall; at all events, if these cannot be procured, it will be proper to alternate the headers and stretches, on both faces of the wall, so that it may be well united in the direction of its thickness.

Joints down the centre of a wall should, as much as possible, be avoided.

Rubble masonry is measured according to custom, by the perch of 22 cubic feet.

Projections from the face of a wall of 12 inches, and under, are measured by taking the face, and one return, for the length. This multiplied by the height, and this last quotient multiplied by the thickness or projection will give the contents in cubic feet, which, divided by 22, will be the number of perches.

Projections exceeding 12 inches measure as follows: Take the solid contents of the blank space, and add the face, and the return, or one foot, and proceed as above to find the number of perches.

This measurement is given for the trouble of squaring and plumbing the angles.

Square isolated piers, 3 feet 6 inches by 3 feet 6 inches, and under, double measurement.

From 3 feet 6 inches up to 5 feet, one and a half.

From 5 feet up to 7 feet, one and one-fourth.

Over 7 feet, single or actual contents.

No deductions are made for openings; but, if such openings exceed 6 feet in width, the same to be deducted and the jambs measured.

For area steps, enclosed by walls, the steps built in and set by the stone-mason, measure the enclosing walls as walls, and girt the steps and risers for the length of sloping back, multiplied by the length of the steps in the clear, and by one foot 6 inches for the thickness, will be the con-

tents in cubic feet, and divide by 22 for the number of perches.

Circular work, double measurement.

Range work is measured by the foot superficial, and all openings deducted.

Arches are charged at so much each.

NOTE.—A perch of stone or masonry is 16½ feet long, 1½ feet wide, and 1 foot high, or 24¾ cubic feet.

MEASURING BRICK.—Brick may be used for nearly all the purposes to which stone is applicable—for when carefully made, its strength, hardness and durability are but little inferior to the more ordinary kinds of building stone. It remains unchanged under the extremes of temperature; resists the action of water; sets firmly and promptly with mortar; and being both cheaper and lighter than stone, is preferable to it for many kinds of structures—as arches, the walls of houses, etc.

Brick of good quality exhibits a fine compact, uniform texture when broken across, gives a clear ringing sound when struck, and is of a cherry red or brownish color. Three varieties are found in the kiln: Those which form the arches, called arch brick, are always vitrified in part and present a grayish, glassy appearance at one end; they are very hard, but brittle, and of inferior strength, and set badly with mortar. Those from the interior of the kiln, usually called red and hard brick, are of the best quality. Those from near the top and sides are generally under burnt, and are called salmon brick; they have neither sufficient strength nor durability for heavy work nor the outside courses of walls which are exposed to the weather.

The bricks in general use are Stock Red and Hard, and Merchantable brick—this latter being part salmon and part red brick.

Brick presents great diversity in its strength, arising principally from its greater or less density; the densest made of the same earth being uniformly the strongest.

It was found on experiment that good brick, having the specific gravity of 2,168 required 1,200 pounds on a square inch to crush it.

Machinery is now coming into use in this country for moulding brick; it is superior to manual labor, not only

from the labor saved, but from its yielding a better quality of brick, by giving it greater density, which adds to its strength.

Fire brick is used for the facing of ovens, furnaces, fire-places, etc., where a very high degree of temperature is to be sustained. It is composed of a very refractory species of clay, that will remain unimpaired by a degree of heat which would vitrify and completely destroy ordinary brick.

Bond, as it is technically called in brick walling, is the form of connection of the bricks with each other. There are two modes employed.

English bond, is that disposition of bricks in a wall in which (except at the quoins) the courses are alternately composed of headers and stretchers. This method gives the greatest strength that can be obtained with rectangular bricks.

Flemish bond, is that wherein the same course consists alternately of headers and stretchers, which, in appearance, is superior to English bond. It is defective, however, in strength, particularly at the angles; hence, good mortar is essential where this kind of bond is used.

If the surface of a brick be coated with loose sand or dust when it is laid, the mortar will not adhere to it; hence, all such dust or sand should be removed by washing; and it is further desirable to have the bricks well wetted before laying them in dry weather.

Measuring and estimating the value of brick work is generally done at per thousand of bricks laid, including labor, mortar and scaffolding.

In measuring walls faced with stock or pressed bricks, take the area of such facing as for common work, and add 8 inches in breadth and 4 inches in height on each opening, and 4 inches at each quoin, for the workmanship only, and deduct the openings. When the openings are without frames, and have the jambs faced through the full thickness of the wall, both jambs to be measured and 4 inches on each return on the inside to be allowed.

A superficial foot of facing to fronts will take 7 bricks.

In walls, take the whole length by the height and thickness and deduct the openings.

In measuring for the length of party

walls, take the dimensions clear of the front and rear walls.

No deductions to be made for plates, bond timbers, sills, lintels, etc.; but 2 inches in height to be allowed for bedding plates where no brick work is over them.

Chimneys are measured solid to allow for the trouble of forming and pargetting the flues.

In chimney breasts, take the width of the face on each floor, and multiply by the height and by the thickness projecting into the room. The fire-places not deducted.

In chimney tops, take the width and multiply by the height above the roof, and by the thickness or number of bricks thick; when projections on the top exceed two courses of brick, two courses to be added to the height.

All chimney stacks, whether with square, circular or octagon shafts, to measure solid.

In measuring isolated piers, take the face and one return for the width, and multiply by the height and thickness or number of bricks thick.

To measure brick cornices, take the height and length, and that portion which does not exceed $4\frac{1}{2}$ inches projection from face of wall, allow half brick thick; over $4\frac{1}{2}$ inches projection, and not exceeding 9 inches, allow one brick thick.

Fire-walls, when carried up for metallic or composition roofing of the usual flat pitch, add two courses of brick in height for cutting the brick and waste thereon.

Recesses in outside walls measured the same as other openings; but the jambs to be deducted from the opening.

Recesses in inside walls of 3 feet and over, to be deducted in toto.

Recesses at window backs not deducted.

Gauged arches are sometimes deducted and charged separately—sometimes not; but whether deducted or not does not signify, as the extra price must be allowed in the latter case, and the whole price in the former.

Rubbed and gauged arches, of whatever form, should be measured and charged by the superficial foot.

Semi-circular openings, when under 6 feet diameter, to measure solid; when

over 6 feet diameter, one-half the opening to be deducted.

For openings without frames, measure to the springing for the height by the width, deducting one jamb.

For arches of vaults, sewers, etc., take the outside circumference by the length and thickness.

Ovens, coppers, boilers, etc., are measured as solid work, deducting only the ash-holes; but all the fire-brick, tiles, etc., although measured alone, are not deducted out of the brick-work.

Paving is measured by the superficial yard, or 9 square feet, which will require 41 bricks when laid flat, and about twice that amount when laid on edge.

A 9 inch wall will require 14 bricks.

A 13 inch wall will require 21 bricks.

A cubic foot of brick-work weighs from 120 to 125 pounds, avoirdupois.

One bushel hydraulic cement will, where mixed with two bushels sharp sand, serve to lay 150 bricks.

Mortar when made up should not be disturbed for several days, and during the period of its consumption should be broken down and "tempered" in no larger quantities than may be required for use from day to day.

Pointing to fronts is measured by the foot superficial.

Stone sewer-pipes are measured and valued by the foot run, according to size of bore, from 3 to 18 inches diameter, and are made in 2 feet lengths.

NOTE.—All openings and irregulars, add 50 per cent. apiece more.

MEASURING TIMBER.—All rectangular and square lumber and timber, as plank, joists, beams, etc., are measured by what is called board measure. The board being considered 1 inch thick, and estimated by the square or superficial foot of 144 inches, or the cubic foot of 1728. The calculations are performed by duodecimals—that is, the foot or inch, etc., divided into 12 parts, thus:

12 fourths make.....1 third.
12 thirds make.....1 second.
12 seconds make.....1 inch.
12 inches make.....1 foot.

And the several values arising are:

Feet multiplied by feet give feet.
Feet multiplied by inches give inches.
Feet multiplied by seconds give seconds.
Inches multiplied by inches give seconds.
Inches multiplied by seconds give thirds, etc.

This rule is commonly called cross multiplication, on account of commencing with the left hand figure of the multiplier.

EXAMPLE 1.—Required the superficial contents of a board of 12 feet 6 inches long and 1 foot 3½ inches broad.

$$\begin{array}{r} \text{F. I.} \\ 12.6 \\ \text{Multiplied by } 1.3.6 \\ \hline 12.6 \\ 3.1.6 \\ 6.3 \\ \hline \end{array}$$

Feet, 16.1.9

When the two ends of a board are of different breadths, add the two breadths together, and multiply the length by half the same.

EXAMPLE 2.—A board that is 1 foot 3 inches broad at one end, 11½ inches broad at the other, and 18 feet 9 inches long, what is the superficial contents?

$$15 \times 11\frac{1}{2} = 26\frac{1}{2} = 13\frac{1}{4} \text{ inches.}$$

$$\begin{array}{r} 2. \\ \text{F. I.} \\ \text{Then } 18.9 \\ \text{Multiplied by } 13\frac{1}{4} = 1.1.3 \\ \hline \end{array}$$

$$\begin{array}{r} 18.9 \\ 1.6.9 \\ 4.8.3 \\ \hline \end{array}$$

Feet, 20.8.5.3

To find the contents of joists, beams, etc.:

RULE.—Multiply the depth, taken in inches, by the thickness, and this product by the length in feet, and the quotient is the contents in feet.

EXAMPLE.—Required the cubic contents of a joist 10 inches wide and 12 feet 6 inches long?

$$\begin{array}{r} \text{F. I.} \\ 12.6 \\ \text{Multiplied by } 1.8 \\ \hline 12.6 \\ 8.4.0 \\ \hline \end{array}$$

Feet, 20.10.0

To find the contents of solid timber:

The solid contents of timber (according to custom) is found by multiplying the length by the square of the ¼ girth.

EXAMPLE.—Required the contents of a round stick of timber in cubic feet whose girth in the middle is 84 inches and length 25 feet 6 inches:

$$84 \div 4 = 21 \text{ inches } \frac{1}{4} \text{ girth.}$$

$$\begin{array}{r} \text{F. I.} \\ \text{And } 21 \text{ inches} = 1.9 \\ \text{Multiplied by } 1.9 \\ \hline 1.9 \\ 1.3.9 \\ \hline = 3.0.9 \end{array}$$

$$\begin{array}{r} \text{F. I.} \\ \text{Then } 25.6 \\ \text{Multiplied by } 3.0.9 \\ \hline 76.6 \\ 1.7.1.6 \\ \hline \end{array}$$

Feet, 78.1.1.6

But a more expeditious method is obtained by means of the following table:

$\frac{1}{4}$ girth in inches.	Area in feet.	$\frac{1}{4}$ girth in inches.	Area in feet.	$\frac{1}{4}$ girth in inches.	Area in feet.
6	.250	12 $\frac{1}{4}$	1.042	19	2.506
6 $\frac{1}{4}$	.272	12 $\frac{1}{2}$	1.085	19 $\frac{1}{2}$	2.640
6 $\frac{1}{2}$	.294	12 $\frac{3}{4}$	1.129	20	2.777
6 $\frac{3}{4}$	.317	13	1.174	20 $\frac{1}{2}$	2.917
7	.340	13 $\frac{1}{4}$	1.219	21	3.062
7 $\frac{1}{4}$	.364	13 $\frac{1}{2}$	1.265	21 $\frac{1}{2}$	3.209
7 $\frac{1}{2}$	.390	13 $\frac{3}{4}$	1.313	22	3.362
7 $\frac{3}{4}$	.417	14	1.361	22 $\frac{1}{2}$	3.516
8	.444	14 $\frac{1}{4}$	1.410	23	3.673
8 $\frac{1}{4}$	.472	14 $\frac{1}{2}$	1.460	23 $\frac{1}{2}$	3.835
8 $\frac{1}{2}$	.501	14 $\frac{3}{4}$	1.511	24	4.000
8 $\frac{3}{4}$	.531	15	1.562	24 $\frac{1}{2}$	4.168
9	.562	15 $\frac{1}{4}$	1.615	25	4.340
9 $\frac{1}{4}$	.594	15 $\frac{1}{2}$	1.668	25 $\frac{1}{2}$	4.516
9 $\frac{1}{2}$	.626	15 $\frac{3}{4}$	1.722	26	4.694
9 $\frac{3}{4}$	.659	16	1.777	26 $\frac{1}{2}$	4.876
10	.694	16 $\frac{1}{4}$	1.833	27	5.062
10 $\frac{1}{4}$	.730	16 $\frac{1}{2}$	1.890	27 $\frac{1}{2}$	5.252
10 $\frac{1}{2}$	.766	16 $\frac{3}{4}$	1.948	28	5.444
10 $\frac{3}{4}$	.803	17	2.006	28 $\frac{1}{2}$	5.640
11	.840	17 $\frac{1}{4}$	2.066	29	5.840
11 $\frac{1}{4}$	.878	17 $\frac{1}{2}$	2.128	29 $\frac{1}{2}$	6.044
11 $\frac{1}{2}$	.918	17 $\frac{3}{4}$	2.187	30	6.250
11 $\frac{3}{4}$	.959	18	2.250		
12	1.000	18 $\frac{1}{4}$	2.376		

RULE.—Multiply the area corresponding to the $\frac{1}{4}$ girth in inches by the length of the timber in feet, and the product is the solid contents in feet and decimal parts.

EXAMPLE.—A piece of timber 18 feet long and 14 inches square, what are the cubic contents in feet?

$$1.361 \times 18 = 24.498 \text{ cubic feet.}$$

PLASTERERS' WORK, MEASURING.

—Plain plastering is measured by the superficial yard—that is, 3 feet multiplied by 3 feet=9 feet.

In measuring ceilings, take the dimensions from wall to wall.

In measuring walls and partitions, take the girt around the room for a length, and from floor to ceiling for the height, deducting one half of the openings, such as doors, windows, &c.

All cornices and mouldings, and all work where the running mould is used, are measured from the nose of the moulding to the wall; and we speak of a moulding as being so many inches according to girt; the length is taken on the wall line, and one foot lineal is allowed to each metre. Take all plain or moulded cornices under 12 inches girt by the running foot, and all above that girt by the superficial foot. The plain parts of ornamental cornices should first be taken as plain, and the several enrichments therein taken per foot run, at their separate values, which added to the price of the plain moulding, will give the correct value per foot run of the whole cornice complete.

Mouldings encircling centres, to be measured as mouldings.

All circular work, double measurement.

All inclined or raking ceilings under an angle of 22 degrees with the horizon, to be measured as level; over 22 degrees, one and a half measurement.

Closets and presses under 4 feet by 8 feet, double measurement.

Privies, double measurement.

Furring, regulating or striping on all lath work at per square.

Whitening and coloring are measured in the same manner as plastering.

Niches and arches are valued at so much each.

Cast and enriched centres to ceilings fixed, &c., complete, so much each, according to diameter.

All circular enrichments to be twice the price of straight of the same description.

When enrichments are modeled from original designs, the expense of modeling to be paid for extra.

Outside work done with cement or mastic, measured same as plastering; but no openings deducted.

CARPENTER'S WORK AND MEASURING. — What is called *Naked Flooring*

in carpentry are the joists which support the flooring boards and ceiling of a room. There are different kinds, but they may all be comprised in the three following—viz.: Single joisted floors, double floors, and framed floors.

A single joisted floor consists of only one series of joists, sometimes every third or fourth joist is made deeper, with ceiling joists nailed across at right angles. This is a good method, as the ceilings stand much better than when the laths are nailed to the joists alone.

A double floor consists of binding, bridging and ceiling joists; the binding joists are the chief support of the floor, and the bridging joists are nailed upon the upper side of them; the ceiling joists are either notched to the under side or framed between with chased mortices. The best method is to notch them.

Framed floors differ from double floors only in having the binding joists framed into large pieces of timber, called *girders*.

Single joisted floors, when the bearing exceeds 10 feet, should be cross-bridged between the joists, to prevent them from turning or twisting side ways, and also to stiffen the floor; when the bearing exceeds 15 feet, two rows will be necessary, and so on, adding another row for each increase of 5 feet bearing.

Single joisting may be used to any extent for which timber can be got deep enough; but where it is desirable to have a perfect ceiling, the bearing should not exceed 18 feet, nor the distance from centre to centre be more than 16 inches; otherwise the bearing for the laths become too long to produce good work.

To find the depth of a joist, the length of bearing and thickness being given—

RULE.—Divide the square of the length in feet by the thickness in inches, and the cube root of the quotient multiplied by 2.2 for pine, or 2.3 for oak, will be the depth in inches.

Example.—Suppose a joist whose bearing is 10 feet, and the thickness 2 inches, what will be the depth?

Here $10 \times 10 = 100$, divided by 2, the thickness, $= 50$, the cube root of which is 3.684 $\times 2.2 = 8.1048 = 8$ inches, the depth.

To find the scantlings of joists for different bearings from 5 to 20 feet, at sev-

eral thicknesses, refer to the following table:

Length of bearing in feet.	Thickn's 2 inches.	Thickn's 2½ inches.	Thickn's 3 inches.	Thickn's 3½ inches.	Thickn's 4 inches.
	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.	Depth in inches.
5	5¼	4¾	4¾	4½	4
6	5¾	5¾	5	4¾	4½
7	6½	6	5½	5¼	5
8	7	6½	6¼	5½	5¾
9	7½	6¾	6½	6	5¾
10	8	7½	7	6¾	6½
11	8¾	8	7½	7	6¾
12	9½	8½	8	7½	7¼
13	9¾	9	8½	8	7¾
14	10	9½	9	8½	8
15	10½	9¾	9¼	8¾	8½
16	11	10½	9¾	9¼	8¾
17	11½	10¾	10¼	9¾	9¼
18	12	11¼	10½	10	9½
19	12½	11½	10¾	10¼	10
20	13	12	11¼	10¾	10¼

Girders are the chief support of a framed floor, and their depth is often limited by the size of the timber; therefore, the method of finding the scantling may be divided in two cases—

CASE 1.—To find the depth of a girder when the length of bearing and thickness of the girder are given.

RULE.—Divide the square of the length in feet by the thickness in inches, and the cube root of the quotient multiplied by 4.2 for pine, or by 4.34 for oak, will give the depth required in inches.

CASE 2.—To find the thickness when the length of bearing and depth are given.

RULE.—Divide the square of the length in feet by the cube of the depth in inches, and the quotient multiplied by 74 for pine, or by 82 for oak, will give the thickness in inches.

In these rules the girders are supposed to be 10 feet apart, and this distance should never be exceeded; but should the distance apart be more or less than 10 feet, the thickness should be made proportionate thereto.

When the breadth of girders is considerable, it is an excellent method to saw them down the middle and bolt them together, with the sawn sides outward. This not only gives an opportunity of examining the centre of the log, but also reduces the timber to a smaller scantling

by which means it dries sooner and is less liable to rot. The slips put between the halves or fitches should be thick enough to allow the air to circulate freely between them.

Ceiling Joists.—If 2 inches be fixed upon for the thickness of ceiling joists, the rule for finding the depth becomes very easy; for half the length in feet gives the depth in inches—that is, if the length be 10 feet, the depth should be 5 inches; if 12 feet, the depth will be 6 inches, and so on for any other length.

Wall plates should be made stronger as the span becomes longer.

The following proportions may serve for general purposes:

For a 20 feet bearing	4½ by 3 inches.
“ 30 “	6 by 4 “
“ 40 “	7½ by 5 “

Construction of Roofs.—The height of roofs is seldom above one-third of the span, and should never be less than one-sixth, except for metal or composition.

The usual pitch is that when the height is one-fourth of the span, or at an angle of 26½ degrees with the horizon, this inclination is adapted to the covering with slates or shingles.

For roofs whose spans are between 20 and 50 feet, no more than a truss with a king-post and struts will be necessary, in which case the scantlings here-under given will be sufficient, viz.:

	In.	In.
For a span of 20 feet, the beams to be	-	9 by 4
The king-posts,	-	4 by 4
Principal rafters,	-	4 by 4
Struts,	-	4 by 3
For a span of 25 feet, the tie beams,	-	10 by 5
The king-posts,	-	5 by 5
Principal rafters,	-	5 by 4
Struts,	-	5 by 3
For a span of 30 feet, the tie beams,	-	11 by 6
The king-posts,	-	6 by 6
Principal rafters,	-	6 by 4
Struts,	-	6 by 3

For roofs whose spans are between 30 and 33 feet, a truss with two queen-posts and struts will be required, and a straining piece between the queen-posts. Thus:

For a span of 35 feet, the tie beams to be 11 inches by 5 inches; queen-posts, 4 inches by 4 inches; principals, 5 inches

by 4 inches; straining piece, 7 inches by 4 inches; struts, 4 inches by 2 inches.

For a span of 40 feet, the tie beams to be 12 inches by 5 inches; queen-posts, 5 inches by 5 inches; principals, 5 inches by 5 inches; straining piece, 7 inches by 5 inches; struts, 5 inches by 2½ inches.

For a span of 45 feet, the tie beams to be 13 inches by 6 inches; queen-posts, 6 inches by 6 inches; principals, 6 inches by 5 inches; straining piece, 7 inches by 6 inches; struts, 5 inches by 3 inches.

For roofs whose spans are between 45 and 60 feet, two sets of queen-posts are required, and a straining piece between them; struts from the larger to the smaller queen-posts, and struts again from the latter.

For a span of 50 feet, tie beams, 13 inches by 8 inches; queen-posts, 8 inches by 8 inches; small queens, 8 inches by 4 inches; principals, 8 inches by 6 inches; straining piece, 9 inches by 6 inches; struts, 5 inches by 3 inches.

For a span of 55 feet, tie beams, 14 inches by 9 inches; queen-posts, 9 inches by 8 inches; small queens, 9 inches by 4 inches; principals, 8 inches by 7 inches; straining piece, 10 inches by 6 inches; struts, 5½ inches by 3 inches.

For a span of 60 feet, tie beams, 15 inches by 10 inches; queen-posts, 10 inches by 8 inches; small queens, 10 inches by 4 inches; principals, 8 inches by 8 inches; straining piece, 11 inches by 6 inches; struts, 6 inches by 3 inches.

The scantlings of purlins are regulated principally by their bearing, which ought not to exceed 10 feet.

For a bearing of 6 ft., the scantling should be - - - 6 by 4

For a bearing of 8 ft., the scantling should be - - - 7 by 5

For a bearing of 10 ft., the scantling should be - - - 8 by 6

For common rafters the scantlings are as follows:

12 feet should be the maximum of bearing.

For a bearing of 8 ft., the scantling should be - - - 4 by 2

For a bearing of 10 ft., the scantling should be - - - 5 by 2

For a bearing of 12 ft., the scantling should be - - - 6 by 2

In measuring carpenters' work it would be impossible to specify all the methods

required to ascertain the value of each kind of work, within the limits of this volume. They must be learned by observation and experience. All that we have to do is with the principles on which measuring and estimating is conducted.

Before laying the floors, or lathing the work to receive the plastering, the timbers should be measured, so that the scantlings may be examined and proved correct according to the specification; and in this, as a general rule, it is to be remembered that all pieces having tenons are measured to their extremities, and that the ends of joists, girders, etc., lie in the walls at least $\frac{1}{3}$ of the wall's thickness. In large measures, where the quantity of materials and workmanship is uniform, the articles are usually measured by the square—that is, 10 feet by 10 feet = 100 feet.

Partitions are measured, if uniform in materials, etc., by the square; but if trussed, add a larger price than for the common studs, on account of the trouble of fitting the ends of the uprights to the bracings and forming the abutments.

Furring of walls, measured by the square.

In measuring bond timber and wall plates, the laps must be added to the net lengths.

All the timbers in the principals of a trussed roof to be reduced to board measure, and classed according to the difficulty of execution, or the waste that occurs in performing the work.

Common rafters, as respects labor, are rated much the same as joists or stud-ding.

Purlins, which require trouble in fitting, are worth more, because on them are notched down the common rafters, the joggles, including the tenons at the ends of struts; morticing tie beams and principal rafters, preparing king and queen-posts, and the strapping and bolting are all to be separately considered to arrive accurately at the true value.

Ribbed ceilings are taken by the quantity of timber they contain, making due allowance for the waste of stuff, which is often considerable.

Plain centering is measured by the square; but the ribs and boarding, being different qualities of work, should be

taken separately. The dimensions are obtained by girting round the arch and multiplying by the length. Where groins occur, besides the measurement as above the angles must be measured by the foot run—that is, the ribs and boards are measured separately, according to the exact superficial contents of each, and the angles by the lineal foot for the labor in fitting the ribs and boards, and waste of wood.

All circular timbers, of flat sweep, one and a half times; quick sweep, twice; elliptical, twice and a half; and circular, four times the price of straight of the same denomination.

Bracketing, including plugging, measured by the foot superficial.

For every angle bracket, add one foot of the cornice. If circular on plan, one and a half times the price of straight.

MEASURING JOINERS' WORK.—

This branch of work is measured and estimated by the foot superficial.

Floors are measured by the square of 100 feet.

Boarders to hearths, mitred, at per foot lineal.

The value of every kind of framing must depend on the thickness of the stuff, whether it is plain or molded, and upon the number of panels in a given height and breadth, and also on the form of the plan.

Wainscoting, window linings, as backs and elbows; door linings, such as jambs and soffits; back linings, partitions, doors, shutters, and the like, are all measured and valued by the foot superficial.

Sashes, frames, blinds, doors, etc., are made at the several planing mills, and may be obtained of any size.

Sashes, by the pair, according to thickness and size of glass.

Frames, whether solid or box frames, each. If with segment or circular heads, so much additional.

Blinds, with stationary slats, or rolling, according to thickness, at per pair.

Skylights, the prices whereof depend on their plans and elevations, are measured by the foot superficial.

Framed grounds, by the foot run.

In the measurement of stair-cases, the risers, treads, carriages, etc., are, after being classed together, measured by the foot superficial, and the string board is

sometimes included. The value varies, as the steps may be straight, or winders, or circular.

Stairs circular on the plan, measure double; stairs oval, and for the quick part, three times. Some kind of elliptical work should be valued at six times; and dome or globe work at nine times that of the straight.

The balusters, housings to steps and risers, common cut brackets, square and circular on the plan, together with the preparing and fixing, are all valued by the piece; returned nosings are sometimes valued by the piece, and if circular on the plan, double the price of the straight ones.

Handrails, by the foot run, measured in the centre on the top, and three inches beyond the springing of the sweep.

Mouldings are measured by the foot run, their value depending on the number of quirks.

All horizontal moldings on a circular plan are three or four times the value of those on a straight plan, the trouble being increased as the radius of the circle upon which they are formed diminishes.

Circular heads of shutters to store fronts, to be measured square from the springing three times that of the straight.

Among the articles which are to be measured by the lineal foot, are beads, fillets, bead or O. G. capping, astragals, reeds, etc.

Rule joints, cantilevers, trusses, and cut brackets for shelves, are charged by the piece.

Shingles.—White pine sawed, shaved and star shingles, average 16 inches long and 4 inches wide. A square will require 1000 laid $4\frac{1}{2}$ inches to the weather, allowing for waste.

Cedar shingles average 30 inches long by 7 inches wide.

A square will require 248 laid 8 in. to the weather.

A square will require 220 laid 9 in. to the weather.

Hardware, such as nails, screws, sash pulleys, bolts, hinges, locks, etc., are charged for with the work to which they are attached, the joiner being allowed a percentage on the prime cost.

MEASURING COMPOSITION ROOFING—Is measured by the square of 100

feet—that is, 10 feet multiplied by 10 feet.

It is denominated 2 ply, 3 ply or 4 ply.

The paper is generally 26 inches wide. With a two inch lap and 2 ply, 11 inches will be exposed to the weather; for 3 ply and 2 inch lap, 8 inches will be exposed; and for 4 ply, also 2 inch lap, 6 inches will be exposed to the weather.

The price, of course, regulated accordingly.

Plastic slate roofing is measured the same way, and deductions made in either case when the openings exceed one square.

PAINTERS' WORK, Measuring of, and Hints on.—There is no department in the art of building on which greater attention ought to be bestowed than house painting; not only for the protection it gives the material to which it is applied, but the superior elegance of which the plainest finished house may be made susceptible by its judicious and tasteful application.

In painting new work, the knots must, first, be properly *killed*, as the painters term it. The best way of effecting this is by laying upon those knots which retain any turpentine a considerable substance of lime immediately after it is slacked. This process dries and burns out the turpentine which the knots contain; or, by coating them over with size composed of pure shellac and alcohol. If any doubts exist of their still remaining un-killed and should appear after priming, they should be covered with silver or gold leaf.

When the knotting is completed the *priming color* is laid on. The priming color is composed of white and a little red lead, mixed thin with linseed oil. One pound of it will cover from 18 to 20 yards.

The second coat, if intended for white finish, half oil and half turpentine; if four coat work, the third coat should be about $\frac{1}{3}$ oil and $\frac{2}{3}$ turpentine; fourth coat, all turpentine.

Where the work is to be grained, the coats, after priming, should be composed of about half and half. Before laying on the third coat the work should be rubbed down with fine sand paper, and stopped with oil putty where necessary.

In respect to outside work, the use of turpentine is to be avoided, for turpentine is more susceptible to water than oil, and, hence, not so well calculated to preserve work exposed to the weather.

The process of *sanding* is frequently adopted for outside work. It is performed with fine sand thrown on the last coat of paint while wet.

The method of gilding is either through a medium of oil or water, the former being that most used in gilding the decorations of houses.

The gold of various thicknesses is furnished by the gold-beater in books of 26 leaves; each leaf being $3\frac{3}{8} \times 3$ inches or, in the book, 1 foot 6 inches and 6-8th of an inch superficial.

The art of imitating the grain of the more expensive woods is now brought to so great a degree of perfection that it is often almost impossible to determine, without feeling the surface, whether we are looking upon the wood or an imitation of it. Mahogany, satin wood, rosewood, maple and some others, are frequently imitated; and it is but seldom that a good house is finished without the introduction of some grain-ing. Delicate parti-colors are often preferred for parlors and other apartments.

Painting is measured wherever the brush goes; and all wainscoting, walls, doors, shutters, jamb-linings, architraves and all other places over 9 inches girth, is taken at per yard superficial. On all articles under 9 inches girth, at per foot run. On all frame work the net length is taken one way and the dimensions girted over the mouldings, panels, &c., the other way.

The following rules for measuring painters' work can be relied on:

Mouldings, one inch is to be allowed.

Beads, $\frac{1}{2}$ inch is to be allowed.

Cutting edges, 1 inch is to be allowed.

Brick work, measured solid and $\frac{1}{3}$ of openings deducted.

Frame houses, same as brick. Blinds, one and a half measurement. Lattice work, from one and a half to three times.

Old painted work, outside or inside, if 1 foot or under to girth; 1 foot, if over 1 foot to girth, according to measurement.

Plain cornices, to measure $1\frac{1}{2}$; but if

block and dentil, or otherwise ornamented, from $1\frac{1}{2}$ to 5 measurement.

Sashes to measure solid if of 1 color; but if 2 colors, $1\frac{1}{2}$ up to glass 24 inches by 30 inches, and all above. Muntins to be measured and 1 inch allowed for cutting edges.

Edges to shelves, three times.

Base, if of 1 color and under 1 foot to girth, 1 foot; if 2 colors girth, 1 foot six inches; if over 1 foot, 6 inches; if over 1 foot and one color to girth, 1 foot 6 inches; but if 2 colors to girth, 2 feet; if higher, to measure according to measurement.

Down spouts to girth, from 1 to 3 feet.

Balusters, $1\frac{1}{2}$ to 3 measurements.

Iron railing for porches, fences and verandahs, to measure from $1\frac{1}{2}$ to 4 measurements.

Door and window caps, if of 1 color to girth, from 1 to 3 feet; but if 2 colors, double measurement.

Fluted columns, $1\frac{1}{2}$ times the flutes to be measured.

Caps and bases to columns, from 2 to 5 measurements.

Quoins and corner stones, $1\frac{1}{2}$ to 2 measurements.

Paling fences, $1\frac{1}{2}$ to 3 measurements.

Mantles, measured solid, from 2 to 3 measurements.

Stair strings, 2 measurements when plain; but if bracketed or otherwise ornamented, 3 measurements.

For cleaning off new work, add 3 per cent. to whole bill.

A liberal deduction to be made on all work that is not done in a good and workman-like manner, to be assessed by arbitrators appointed by the parties or by the measurer.

PAINT, (Cheap), for Fences, etc.—1.

Take a bushel of well burnt lime, white and unslacked; 20 pounds of Spanish whiting, 17 pounds of rock salt, and 12 pounds of brown sugar. Slake the lime and sift out any coarse lumps and mix it into a good whitewash with about 40 gallons of water, and then add the other ingredients, and stir the whole together thoroughly, and put on two or three coats with a common brush. This is a cheap paint. Five dollars' worth ought to make the building look a hundred dollars' worth better. This makes a coat that

does not wash off, or easily rub off, and it looks well, while it will go far to preserve the wood. It is, therefore, especially adapted to the outside of buildings that are exposed to the weather. Three coats are needed on brick and two on wood. If you want to get a fine cream color, add three pounds of yellow ochre to the above. If you prefer a brown color, add four pounds of umber, one pound of Indian red, and one pound of lampblack. If you want a gray or stone color, add four pounds of raw umber and two pounds of lampblack. This will be more durable than common whitewash.

PAINTING.—The value of paints prepared from oxides of iron is very generally overlooked by architects. These paints some men of experience pronounce to be superior to those prepared from the oxides of lead; at any rate, they answer equally well, and the cost is considerably less. But we propose to allude to the value of these paints, especially for use upon iron. It has been acknowledged for years that the oxides of lead, or copper, if put upon iron, will eat into it, and promote corrosion, and yet how frequently do we meet with the requirement that iron work shall have a coat of red-lead before leaving the foundry: a worse provision could hardly be made, unless it be to specify verdigris, a preparation from copper; this also is sometimes used, though it eats holes into the iron in a very short time. Very shortly after iron-work is painted, the iron will be observed corroded, and the remark be upon every body's tongue, "This ought not to be going so soon; ought not to want painting so soon." The fact is, lead has been put upon it, and nothing else could be expected. The reason red or white lead causes metal to corrode so quickly is explained thus: directly the air gets to the metal, not only does natural corrosion take place, but a chemical action sets in between the lead and the iron, and increases the corrosion. No harm can result from painting iron with red or white lead, so long as the oxygen of the air, or water, does not get to the metal; but as it is almost sure to do so, it is best not to run the risk. The same quantity of paint, made from the oxide of iron, will cover a surface of twice the area as that of paint prepared from lead, though the price is

much less. Aqua fortis, one of the strongest acids, if poured upon red or white lead, will fuse it instantly, but has no effect upon paint prepared from the oxide of iron. With regard to the numerous anti-corrosive paints in existence, we may say, in one word, it is of no use trying to cheat nature; anti-corrosive paints will not answer the purpose their names imply: all paints must yield eventually to the action of the oxygen, and the work be repainted, and for many reasons it is well that all work should be repainted at proper intervals. All that can be done to attain the objects of such paints is to pick and form the stuff as to reduce the power of the elements to affect it to a minimum. This is found best secured when the composition forming the paint is granular, not so finely powdered as ordinarily. The finer the powder of the mixture, the greater the tendency for air-holes to form, as the paint is being laid on; paint that is more gritty, or granular, affords a better opportunity for the air to escape, and therefore reduces the liability of corrosion to the utmost limit. The coating of oil is the best preservative, and not the paint mixtures; and therefore those mixtures which, like lamp-black, go a long way in mixing with oil, answer better than those that require more of the mixture to form the paint. For covering urinals or other work exposed to the influence of strong acid, black varnish is the best article to use; it should be frequently applied, and is inexpensive. Woodwork before painting ought to be well soaked with good priming, principally turpentine; this keeps damp out of the wood; a coat of paint has not the same power, as it forms a skin on the wood, instead of soaking into it. The priming should pass over all the woodwork, where exposed; otherwise damp may come into contact with the portion not primed, and it will find its way down the wood, and cause blisters in the paint, where we have thought them unlikely; blistering is often a result of insufficient priming. Painters, as a rule, neglect to prime the tops of outside doors; damp gets down the wood, and blistering results. Knots will sometimes show through paint-work, and lead to the inference that no knotting has been used, whereas the effect may be merely the result of using inferior stuff.

It is of great importance that knotting of good quality be used; it may be purchased at half the cost of the well known patent knotting, but will answer no purpose. The best driers are prepared from sugar of lead; the lighter the driers the better their quality. The quantity of driers required depends upon the time of the year the paint is used, and the character of the oil. There is a great deal of bad oil in use now, distilled, or by other means prepared from resin; this will not dry properly, do what you will with it, and it should be condemned for paint-work at once. It does not cost half so much as linseed oil, and there is, therefore, at all times danger of it getting into our work. When fresh, and sometimes when of long standing, it may be killed by an application of petroleum spirit, or potash; but generally, when this oil proves to be in the paint, the best course is to scrape the whole off with salaman-cas, or hot irons, in the usual way. No oil will answer so well as linseed oil, well boiled or raw, when there is not the necessity for so much driers; raw oil may be used in summer weather, and should always be used for white paints, as the boiled oil discolors them; driers in this latter case must be added. Often when we specify the best copal varnish, we get nothing but common oak, though the difference in cost may be from seven shillings to twenty-one per gallon. The best proceeding for the architect is to price the varnish, and take special means for obtaining it. For ordinary purposes, where we usually specify common oak varnish, copal varnish diluted with oil answers better, and in practice is often adopted.

PAINT, Mixing Oil Colors.—In mixing different colored paints to produce any desired tint, it is best to have the principal ingredient thick, and add to it the other paints thinner. In the following list of the combinations of colors required to produce a required tint, the first named color is the principal ingredient, and the others follow in the order of their importance. Thus, in mixing a limestone tint, white is the principal ingredient, and red the color of which least is needed, etc. The exact proportions of each depending on the shade of color required.

List of compound colors, showing the simple colors which produce them.

Buff, white, yellow ochre, red.
Chestnut, red, black, yellow.
Chocolate, raw umber, red, black.
Claret, red, umber, black.
Copper, red, yellow, black.
Dove, white, vermillion, blue, yellow.
Drab, white, yellow ochre, red, black.
Fawn, white, yellow, red.
Flesh, white, yellow ochre, vermillion.
Freestone, red, black, yellow ochre, white.
French Gray, white, Prussian blue, lake.
Gray, white lead, black.
Gold, white, stone ochre, red.
Green Bronze, chrome, green, black, yellow.
Green Pea, white, chrome green.
Lemon, white, chrome yellow.
Limestone, white, yellow ochre, black, red.
Olive, yellow, blue, black, white.
Orange, yellow, red.
Peach, white, vermillion.
Pearl, white, black, blue.
Pink, white, vermillion, lake.
Purple, violet, with more red and white.
Rose, white, madder lake.
Sandstone, white, yellow ochre, black, red.
Snuff, yellow, Vandyke brown.
Violet, red, blue, white.

LAND, Measuring.—Land measuring is the art by which we ascertain the superficial contents of any tract of ground.

There are various methods of obtaining the measurement—some of them requiring familiar acquaintance with mathematical treatises more intricate and comprehensive than the present work; whilst others need nothing beyond a knowledge of the simplest principles of mensuration.

As the present work addresses itself entirely to practical men, we shall confine our remarks to the popular method ordinarily employed.

Land is commonly measured with what is called Gunter's chain. This chain is divided into 100 links, having at the end of every ten links a piece of brass fixed with notches denoting the number of tens, so that the number of links may be readily ascertained. The English chain is 22 yards or 66 feet in length, and each link 6.92 inches,

In taking measurements in the field, the various distances are set down in

links, which are afterward reduced to acres, roods, poles, etc.

The field requisites for a land-measurer are the chain just mentioned, a bundle of arrows, a cross-staff and a number of signals. The arrows are usually ten in number and two feet in length, each has a piece of red cloth affixed to the head, by which it is easily distinguishable at a considerable distance when stuck in the ground. The use of the [arrows is to indicate the number of chains in any line of the survey. The cross-staff is a pole 10 links long, shod at one end with iron and pointed, that it may be thrust into the earth as occasion requires. A small block of wood, about 6 inches square, having grooves cut round its margin at right angles to each other, is fitted on the pole, and slides up and down, according to the height of the eye; its use is for obtaining a perpendicular from the base line of any triangle to the angular point. The signals are more or less numerous, according to the extent of the field or tract to be surveyed; their use is to mark definitely the various points and bearings; they are usually slight poles, from six to eight feet in length, with a small, red flag attached to each.

Land measuring is divided into three distinct operations—first, the actual measurements in the field; second, the plotting or laying down on paper all the lines and angles of the field, according to a scale fixed on; third, the reducing the measurements of the various triangles, and thence obtaining the total superficial contents of the whole survey.

We shall take each division in order—

1. The land-measurer requires an assistant in the field, who is called the leader, as it is his business to lead or carry out the chain under the direction of the surveyor, who, for the sake of distinction, is named the follower. The leader is first directed to fix the signals at the angular points of the field; he then takes the end of the chain in one hand, and the ring of arrows and the cross-staff in the other, and proceeds in the measurement of the longest or base line, under the guidance of the follower, who holds the other end of the chain, and has his field-book ready to note down the various measurements taken. The leader fixes an arrow when he has extended the chain

to its full length, and proceeds onward till the follower reaches this arrow, when the chain is again drawn tight, the leader leaving another arrow, and the follower taking up the one first left. The entire line is thus passed over, the leader leaving his arrows as the chain runs out, and the follower gathering them up as the data of the measurement. The follower must be careful to observe that the leader keeps in the line between him and the signal toward which they are measuring; and he must also direct him to give information when he arrives at any point on the line whence a perpendicular may be raised to the angles on either side. When the leader intimates his arrival at any such point, both he and the follower stop, draw the chain tight and leave it extended on the ground. The follower does not remove the last arrow for the present, but leaves it standing and lays those he has gathered up beside it; he then proceeds to the place where the leader has stopped, and, taking the cross-staff, ascertains the precise point whence the perpendicular can be raised to the angle. This is done in a very simple manner—the cross-staff is planted close to the chain, and one of the grooves made to coincide with it; or, in other words, on looking through the groove in opposite directions, the measurer must see the point whence he set out, and the point to which he is tending; then looking along one of the grooves at right angles (without disturbing the position of the cross-staff), he must see whether it bears directly on the angular point; if it do not, the cross-staff must be moved backward or forward along the chain till the precise point is determined; its position on the line of measurement is then noted on the field-book, an arrow is planted at the spot, and the leader and follower, taking their respective places, proceed with the measurement of the remainder of the line; which having completed, the various perpendiculars are measured from the points indicated by the arrows.

If the subject of the survey be a triangular or quadrilateral field, with straight sides, the field work is completed when the longest line (that is, the base in the triangle and the diagonal in the quadrilateral) and the perpendiculars are measured. If the field is contained under a

We will begin by plotting the field, A B C, the measurement of which forms the first example in the preceding section.

Draw an indefinite line and set off from the plotting scale the base A B, = 900 links, marking with the point of a pencil the termination, A and B; set off on A B the distance, A F, = 300 links, from the point F raise an indefinite perpendicular and set off on it F C, = 480 links; draw lines connecting the points, A B, B C, A C, and the field is correctly plotted. The field, A B C D, it will be obvious, merely requires the erection of the perpendicular, D E, = 510 links, and drawing lines connecting the points, A D, D B, in addition to the foregoing operation.

In the third example, where the boundary, D d e f B, is irregular, on the line D B set off a , = 150 links, $a b$ = 270 links, $b c$ = 150 links and $c B$ = 180 links, and from the points, $a b c$, raise the perpendiculars, $a d$, = 150 links, $b e$ = 90 links, and $c f$ = 180 links, draw lines connecting the points, D d, d e, e f, f B, which finishes the plotting of the whole field, A C B f e d D.

It is usual to place the north side of the plan uppermost with a flower-de-luce to indicate the north point, and in a vacant place to insert a scale of equal parts or chains and the title of the plan.

3. The next thing to be done is the computing the contents of the various triangles and trapezoids, and bringing out the total area of the whole survey, which is equally simple with the preceding operations.

We cannot be expected in the limits of this work to give a comprehensive treatise on Mensuration and Superficies; we shall, therefore, confine ourselves to mentioning two or three things, a knowledge of which is indispensably necessary in the calculation of almost every survey:

1. The base and perpendicular of any triangle multiplied into each other gives twice the area of such triangle; or the base multiplied by half the perpendicular is equal to the area of the triangle.

2. The sum of the parallel sides of any trapezoid (that is, a four-sided figure having two of its sides parallel) multiplied by the perpendicular distance between

them, gives twice the area of such trapezoid; or, half the sum of the parallel sides multiplied by the perpendicular is equal to the trapezoid.

3. The number of square links in an acre, 100,000. Hence this rule—square links are reduced to acres by cutting off five figures to the right, as a remainder, which is to be multiplied successively by 4 for roods, 40 for poles, $30\frac{1}{4}$ for yards, and 9 for feet, at each multiplication, cutting off 5 figures to the right; the numbers on the left of the point being: acres, roods, poles, yards and feet.

The following calculation will sufficiently illustrate the computing of surveys.

Required the area of the field, A C B f e d D—

LINKS.

Triangle, A B C, = A B, 900,	
× C E, 480, =	- - 432000
Triangle, A B D, = A B, 900,	
× D E, 510, =	- - 459000.

OFFSETS.

Triangle, D a d, = D a, 150, ×	
a d, 150 =	- - - 22500.
Trapezoid, a d e b, = a d, 150 +	
b e, 90, × a b, 270, =	- 64800.
Trapezoid, b e f c, = b e, 90, +	
c f, 180, × b c, 150, =	- 40500.
Triangle, c f B, = c f, 180, × c	
B, 180, =	- - - 32400.

According to Rule, divide by 2)1051200

Square links, - - - -	5.25600
	4
	1.02400
	40
	.9608
	$30\frac{1}{4}$
	28.80000.
	24000
	29.04000
	9
	.36000

• Contents of the field, 5 acres, 1 rood, 29 yards and about $\frac{1}{3}$ of a foot.

BRICK-MAKING, Hints on.—The art of brick-making is a distinct branch of the useful arts, and does not properly belong to that of the-builder; but as he is frequently obliged to prepare this material, the following outline of the process may prove of service.

The best brick-earth is composed of a mixture of pure clay and sand, deprived of pebbles of every kind, but particularly of those that contain lime and pyritous, or other metallic substances; as these, when in large quantities, and in the form of pebbles, act as fluxes, destroy the shape of the brick, and weaken it, by causing cavities and cracks; but when present in small quantities and equally diffused throughout the earth, they assist the vitrification and give it a more uniform character.

Good brick-earth is frequently found in a natural state, and requires no other preparation for the purpose of the brick-maker.

When he is obliged to prepare the earth by mixing the pure clay and sand, direct experiments should be made in all cases to ascertain the proper proportions of the two. If the clay is in excess, the temperature required to semi-vitrify it will cause it to warp, shrink and crack; and if there is an excess of sand, complete vitrification will ensue under similar circumstances.

The quality of the brick depends as much on the care bestowed on its manufacture as on the quality of the earth.

The first stage of the process is to free the earth from pebbles, which is most effectually done by digging it out early in the fall, and exposing it in small heaps to the weather during the winter. In the spring the heaps are carefully riddled if necessary, and the earth is then in a proper state to be kneaded or tempered.

The quantity of water required in tempering will depend on the quality of the earth; no more should be used than will be sufficient to make the earth so plastic as to admit of its being easily moulded by the moulder.

About half a cubic foot of water to one of the earth is, in most cases, a good pro-

portion. If too much water be used, the brick will not only be very slow in drying, but it will, in most cases, crack, owing to the surface becoming completely dry before the moisture of the interior has had time to escape; the consequence of which will be that the brick when burnt will be entirely unfit for use, or very weak.

Great attention is requisite in drying the brick before it is burned. It should be placed for this purpose in a dry exposure, and be sheltered from the direct action of the wind and sun, in order that the moisture may be carried off slowly and uniformly from the entire surface. When this precaution is not taken, the brick will generally crack from the unequal shrinking, arising from one part drying more rapidly than the rest.

Too large a proportion of sand will render the brick brittle under this process; while too large a proportion of clayey matter will be indicated by the brick shrinking and cracking.

The burning and cooling should be done with equal care. A very moderate fire should be applied under the arches of the kiln for about 24 hours, to expel any remaining moisture from the raw brick. This is known to be completely effected when the smoke from the kiln is no longer white. The fire is then increased until the bricks of the arches attain a white heat; it is then allowed to abate in some degree, in order to prevent complete vitrification; and is alternately raised and lowered in this way until the burning is complete, which may be ascertained by examining the bricks at the top of the kiln.

The cooling should be slowly effected; otherwise the bricks will not withstand the effects of the weather. This is done by closing the mouths of the arches and the tops and sides of the kiln, in the most effectual manner with moist clay and burnt brick, and allowing the kiln to remain in this state until the warmth is perfectly subsided.

A kiln 13 feet long, 10 feet 6 inches wide and 12 feet high, the walls being perpendicular on the inside, and piled full, deducting the arch openings, will contain about 25,000 bricks.

WEIGHTS AND LINE Required for Common Sized Windows.

EACH WEIGHT.		Line for each weight.	
1¼ inch.	1½ inch.	weight.	
8 x 10 4 lbs.	5 lbs	2½ ft.	
8 x 12 4½ "	5 "	3 "	
9 x 11 4½ "	5¼ "	2¾ "	
9 x 12 5 "	5½ "	3 "	
9 x 13 5¼ "	5½ "	3¼ "	
9 x 14 5½ "	6 "	3½ "	
9 x 15 5½ "	6¼ "	3¾ "	
9 x 16 6 "	6½ "	4 "	
10 x 12 5¼ "	6 "	3 "	
10 x 13 5¾ "	6½ "	3¼ "	
10 x 14 5¾ "	6½ "	3½ "	
10 x 15 6 "	7 "	2¾ "	
10 x 16 6¼ "	7½ "	4 "	
10 x 17 "	7½ "	4¼ "	
10 x 18 "	8 "	4½ "	
11 x 15 "	7½ "	3¾ "	
11 x 16 "	7¾ "	4 "	
11 x 17 "	8 "	4¼ "	
11 x 18 "	8½ "	4½ "	
12 x 14 "	7½ "	3½ "	
12 x 15 "	8 "	3¾ "	
12 x 16 "	8½ "	4 "	
12 x 18 "	9½ "	4½ "	
12 x 20 "	10½ "	5 "	

Each Hank contains 75 feet of Line.

NAILS, Size of.—The following table will show at a glance the length of the various sizes and the number of nails in a pound. They are rated "3-penny" up to "20-penny." The first column gives the number, the second the length in inches, and the third the number per pound—that is:

2-penny	1 inch.	557 nails	per lb.
4- "	1¼ "	353 "	"
5- "	1¾ "	232 "	"
6- "	2 "	167 "	"
7- "	2¼ "	141 "	"
8- "	2½ "	101 "	"
10- "	2¾ "	68 "	"
12- "	3 "	54 "	"
20- "	3½ "	34 "	"
Spikes	4 "	15 "	"
	4½ "	12 "	"
	5 "	10 "	"
	6 "	7 "	"
	7 "	5 "	"

From this table an estimate of quantity and suitable sizes for any job of work can be made.

MEASURING, Paper-Hanging.—The various sorts of paper used for lining walls it would be useless to describe.

We have only to mention that English papers are printed in pieces of 12 yards in length, and 1 foot 8 inches wide; hence, 1 yard in length contains 5 feet superficial; therefore, any number of superficial feet divided by 60 (the length 36 feet X 1 foot 8 inches) will give the number of pieces wanted for the work.

American papers are 8 yards long, and 1 foot 6 inches wide; therefore, if the number of feet contained in a room be divided by 4.6, it will show the number of yards, or, by 36, it will show the number of pieces of paper required.

French papers are 1 foot 6 inches wide, and contain 9 yards; therefore, if the number of feet required to be covered be known, divide by 4.6 for the number of yards, and by 41.6 for the number of pieces.

ROOFING, A Cheap.—First cover the roof with ordinary tongued and grooved floor-boards, the same as you would lay a floor; then take roofing-paper, to be obtained in any large town or city, and cover the boards with that, to be laid on as shingles are laid, to lap over each sheet about an inch, and fastened down with large tacks. Over the paper spread raw tar. Raw tar is that which is not heated to render it thicker. It can be spread with a trowel made of a shingle, about the sixteenth of an inch deep. Next take a sieve, fill it with sand, and sprinkle as much over the tar as it will absorb, sifting on the sand as each course of tar is laid on, beginning on the upper side of the roof, about half an inch thick.

Such a roof should have a slight descent—say 1 foot in twelve, more or less; and the tar should be laid on when the heat of the sun will not cause it to run out of its place before the sand is put on it.

A mortar made of tar and sand, like a thick paste, will stop any leaks in roofs, especially around chimneys, that can be covered by it.

SAW, To Put in Order.—First, the saw should be set; this may be done by laying the blade flat upon a piece of heavy plank or scantling, and bending the teeth with a hammer and punch. The set, or punch, can be made of a three-cornered saw file, broken of at each end, and the smallest end ground square. Set the

punch square upon the tooth, but inclined from you, so that it rests mainly upon the point of the tooth, and hit it a light blow with the hammer. Every tooth should be bent in this manner, then the saw turned over, and the operation repeated. The set already in the saw will be the guide as to the direction the tooth is to be bent, if the saw, previous to setting, is inclined to catch and jump, one of three things is the matter: the set is uneven; a few teeth are longer than the rest, or the teeth have been filed hooking. Either of these troubles can be easily detected and remedied. If by looking along the teeth from end to end, an unevenness is seen, lay the blade upon the head of an axe, or something of that kind, and strike gently upon the sides of the teeth with a hammer until all of the set is removed; then set the saw as above directed. If after the saw is properly set, some of the teeth should be longer than others, put the blade between two thin boards, three or four inches wide, and as long as the saw, screw them firmly in a vise, the same as for filing, and run a flat saw-mill file lengthwise along the teeth until they are brought level. The saw is now ready for filing. The file should be placed between the teeth in a diagonal direction, but held level. Every other space should be filed from the small end to the handle; then the remaining spaces filed by holding the file at an opposite angle. After this operation is completed, then look across the teeth again, and if the channel between the rows of teeth terminates in the centre, the filing is good; if it terminates at one side of the centre, the full side needs more filing. If the saw catches and jumps after jointing up, it will be owing to the teeth having been filed too hooking, or, in other words, the points inclined too much toward 'the narrow end of the saw. This can be remedied by refiling and taking off from the lower side of the teeth enough to make them stand upright on the blade. Always file where there is sufficient light to enable you to see points distinctly. Be exceedingly careful to stop filing as soon as the tooth is filed to a perfect point. One thrust with a file after a tooth has been brought to a complete edge, will shorten it, and put the saw out

of order just in proportion as the point is filed off. Let the points be set uniformly, and only a little. Go over the teeth with an old file, and give them a more perfect cutting-edge. Then lay the blade flatly on a smooth board, and pass a fine-gritted whetstone along the sides of the points, to remove the wiry edge, and to give the teeth as fine a cutting-edge as practicable.

SHEEP-SKINS, To prepare for Mats.

—Make a strong lather with hot water, and let it stand till cold; wash the fresh skin in it, carefully squeezing out all the dirt from the wool; wash it in cold water till all the soap is taken out. Dissolve a pound each of salt and alum in two gallons of hot water, and put the skin into a tub sufficient to cover it; let it soak for twelve hours, and hang it over a pole to drain. When well drained, stretch it carefully on a board to dry, and stretch several times while drying. Before it is quite dry, sprinkle on the flesh side one ounce each of fine pulverized alum and saltpetre, rubbing it in well. Try if the wool be firm on the skin; if not, let it remain a day or two, then rub again with alum; fold the flesh sides together and hang in the shade for two or three days, turning them over each day till quite dry. Scrape the flesh side with a blunt knife, and rub it with pumice or rotten stone.

SKINS (Small), Stretching and Curing.

—The market value of a skin is greatly affected by the care taken in removing it from the animal, and in drying it. The common way is to tack the skin to the barn door and let it remain stretched until quite dry. The trapper in the woods, having no such convenience as the barn-door at hand, is obliged to resort to other methods. One plan is to dry the skin on a hoop. A skin to be dried in this manner must not be ripped down the belly, but it is cut from the lower jaw of the animal to just below its forelegs; the lips, eyes, and ears being cut around, the skin is stripped off, leaving the fur side inward. The hoop consists of a branch of hickory or other elastic wood, an inch through at the butt. This is bent and pushed into the skin, which is drawn tight, and fastened in place by notches in the bow, drawing the skin of the lip, into these notches. A much

neater way, and one generally preferred, is to use stretchers of thin wood. As these have to be carried by the trapper, they are made of light wood and very thin. They are three-sixteenths of an inch thick, 20 inches long, 6 inches wide at the larger end, and slightly tapering. They are rounded to a blunt point at the lower end, and the edges chamfered. The skin is drawn over the board, and secured with tacks. Skins stretched by these methods should not be dried in the sun nor by a fire, but in a cool place where they will be sheltered from the rain. No salt or other preservative is used upon skins intended for the market.

OX-YOKE, How to Make.—To make this yoke it is necessary to have a stick of light and strong timber, such as butternut, walnut, sycamore, basswood, soft maple, or wild cherry, each of which is excellent material. The size of the stick necessary is ten by sixteen inches, and five feet long. This should be sawed in two, cutting out two inches of the heart, making two pieces ten by seven. One side and edge of the piece should be dressed square; the center found, the first bow-hole is then bored twelve inches from this center; the second bow-hole twelve inches from the first. To make the holes accurate, they should be marked, and bored from each side, meeting in the center. The auger should be two inches diameter. After the holes are bored, they should be burned with a hot iron and made smooth. The yoke is then laid out three and a half inches thick in the center between the bow-holes, and six and a half inches thick in the center between the two bows, where the ring is placed; the ends are beveled off, and lines of proper curvature laid out between the points marked. The yoke may be fashioned either with a jig or band saw or foot adz, and should then be finished up square and true from the face-side with a drawing-knife. It should then be laid upon its back and four and one-half inches marked off at the center for the width, cutting off about one and one-fourth inch on each side. The ends are then tapered off, and where previously beveled, are now rounded.

The bottom or inside of the yoke is now to be rounded, by first taking off a

broad chamfer, and then rounding up smooth, the top to be left flat and square, except a broad chamfer around the edge of the yoke. The bows are twenty-eight to thirty inches in length and two inches in diameter. No staple is to be used, but a board strap, which goes round the yoke, having screws cut on the end, and a plate held down by nuts screwed over it, to clasp the yoke and strengthen it. In the bottom of the strap is placed two pieces of cast-iron, which have a flange upon the edge and four slight projections upon the top, for which small holes are bored in the yoke. The two pieces are so formed that when they are placed together they have a hole in the middle in which the ring is inserted; the strap is placed around them and put upon the yoke, and the nuts upon the top screwed tight. Such a yoke is much stronger and better than when a staple passes through it.

BUCKSKINS, To Tan.—Take a skin, either green or well soaked, and flesh it with a dull knife; spread the skin on a smooth log and grain it by scraping with a sharp instrument; rub nearly dry over the oval end of a board held upright. Take the brains of a deer or a calf, dry by the fire gently, put them into a cloth and boil until soft, cool off the liquid until blood-warm, with water sufficient to soak the skin in, and soak until quite soft and pliable, and then wring out as dry as possible; wash in strong soap-suds and rub dry, and smoke well with wood smoke. Instead of brains, oil or lard may be used, and the skin soaked therein six hours. This is called Indian tad.

FUR SKINS, Any Kind, to Tan.—After you have cut off the useless parts, and softened the skins by soaking in warm water, take away the fatty part from the inside, after which, soak the skins in tepid water for two hours. Next, mix equal parts of borax, saltpetre, and glauher salts (sulphate of soda), in the proportion of about one-third ounce of each for each skin, with sufficient water, to make a thin paste; spread this with a brush over the inside of the skin, applying more on the thicker parts than the thinner; double the skin together, flesh side inwards, and place it in a cool place. After standing twenty-four hours, wash the skin clean, and apply in the same.

manner as before, a mixture of one ounce sal soda, one-third ounce borax, and two ounces hard white soap, melted slowly together without being allowed to boil; fold together again and put away in a warm place for twenty-four hours. After this, dissolve three ounces alum, seven ounces salt, and one and one-half ounces saleratus, in sufficient hot rain-water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for twelve hours; then wring out and hang it up to dry. When dry repeat this soaking and drying two or three times, till the skin is sufficiently softly. Lastly, smooth the inside with fine sandpaper and pumice-stone.

LEATHER, Tanning.—It is often a matter of both convenience and economy in the household or on the farm to be able to do a little tanning; so we give here an approved recipe which may prove useful: Soak the skin or hide eight or nine days in water, then put it in lime; take it out, and remove the hair by rubbing it, and soak it in clear water until the lime is entirely out. Put one pound of alum to three of salt; dissolve in a vessel sufficiently large to hold the hide; soak the hide in it three or four days, then take it out, let it get half dry, and then beat or rub it until it becomes pliable. Leather prepared by this process will not do well for shoes, but answers for hamstrings, backbands, and various other purposes on the farm.

MUSKRAT SKINS, Tanning with the Fur on.—To do this successfully, first give the skins a good wash in warm water, after which remove all fatty and fleshy matter. Then place the skins in a liquor to soak, prepared as follows:

To five gallons of cold soft water add four quarts of wheat bran, one-fourth pint old soap, one-half ounce borax; by adding one ounce sulphuric acid the soaking may be done in one-half the time. If the hides have not been salted, add one-half pint salt. Green hides should not be soaked more than eight or ten hours. Dry ones should soak till very soft. For tan liquor, to five gallons warm soft water, add one-fourth bushel bran; stir well and let stand in a warm room till it ferments. Then add slowly one pound sulphuric acid; stir all the while. Muskrat hides should remain in

about four hours; then take out and rub with a fleshing knife—(an old chopping knife with the edge taken off will do). Then work it over a beam until entirely dry.

RABBIT SKINS, To Cure.—First lay the skin on a smooth board, placing the fur side under, and fasten the skin to the board with tinned tacks. Wash it over with a solution of salt; then dissolve one and one-fourth ounces alum in one-half pint of warm water, and with a sponge dipped in this solution, moisten the surface all over; repeat this every now and then for three days; when the skin is quite dry, take out the tacks, and rolling it loosely the wrong way, the hair inside, draw it quickly backwards and forwards through a large smooth ring, until it is quite soft, then roll it in the contrary way of the skin, and repeat the operation. Skins prepared thus are useful for many domestic purposes.

SHEEP-SKINS, To Cure with the Wool on.—Take a spoonful of alum and two of saltpetre; pulverize and mix well together, then sprinkle the powder on the flesh side of the skin, and lay the two flesh sides together, leaving the wool outside. Then fold up the skin as tight as you can, and hang it in a dry place. In two or three days, or as soon as it is dry, take it down and scrape it with a blunt knife, till clean and supple. This completes the process, and makes you a most excellent saddle cover. If, when you kill your mutton, you treat the skins this way, you can get more for them from the saddler than you can get for the wool and skin separately disposed otherwise.

Other skins which you desire to cure with the fur or hair on, may be treated in the same way.

SMALL SKINS, To Tan.—When taken from the animal, let the skins be nailed in the shape of an oblong square on a board to dry, fur side down. Before taking them from the board, clean off all the fat or oily matter with a dull knife. Be careful not to cut the skins. When you wish to tan them, soak thoroughly in cold water until soft; then squeeze out the water, and take of soft water three quarts, salt half a pint, and best oil of vitrol, one ounce. Stir well with a stick, and put in the skins quickly, and leave

them in thirty minutes. Then take them in your hand and squeeze (not wring) them out, and hang in the shade, fur side down, to dry. If you get the quantity of liquor proportioned to the skin, they will need no rubbing to make them soft; and, tanned in this way, the moths will never disturb them.

SKINS, To Tan with the Hair on.—Stretch the skin tightly and smoothly upon a board, hair side down, and tack it by the edges to its place. Scrape off the loose flesh and fat with a blunt knife, and work in chalk freely, with plenty of hard rubbing. When the chalk begins to powder and fall off, remove the skin from the board, rub in plenty of powdered alum, wrap up closely, and keep it in a dry place for a few days. By this means it will be made pliable, and will retain the hair.

Another.—Take of soft water, ten gallons; wheat bran, one-half bushel; salt, seven pounds; sulphuric acid, two and one-half pounds. Dissolve altogether and place the skins in the solution, and allow them to remain twelve hours; then remove and clean them well, and again immerse twelve hours, or longer if necessary. The skins may then be taken out, well washed, and dried. They can be beaten soft if desired.

Another.—Saltpetre, two parts; alum, one part. Mix. Sprinkle uniformly on the flesh side, roll up and lay in a cool place. Spread it out to dry. Scrape off the fat and rub till pliable.

VARNISH BRUSHES, Care of.—Brushes used for applying finishing varnishes should be cared for with the utmost pains, as good work depends much upon the good condition of the brushes. A good way to keep them is to suspend them by the handles in a covered can, keeping the points at least half an inch from the bottom, and apart from each other. The can should be filled with slow-drying varnish up to a line about a sixteenth of an inch above the bristles or hair. The can should then be kept in a close cupboard, or in a box fitted for the purpose. As wiping a brush on a sharp edge of tin will gradually split the bristles, cause them to turn backward, and eventually ruin the brush, the top of the can should have a wire soldered along the edge of the tin turned over, in order to prevent injury.

Finishing brushes should not be cleansed in turpentine, except in extreme cases. When taken from the can, prepare them for use by working them out in varnish, and before replacing them cleanse the handles and binding with turpentine.

VARNISHES, Cautions Respecting the Making of.—As heat in many cases is necessary to dissolve the gums used in making varnish, the best way, when practicable, is to use what the chemists call a sand bath, which is simply placing the vessel in which the varnish is in another filled with sand and placed on the fire. This will generally be sufficient to prevent the spirits catching fire; but to avoid such an accident (which not unfrequently happens), it will be best to take a vessel sufficiently large that there shall be little danger of spilling its contents; indeed, the vessel should never be more than two-thirds filled. However, a piece of board sufficiently large to cover the top of the vessel should always be at hand in case the spirits should take fire; as also a wet wrapper, in case it should be spilt, as water itself thrown on would only increase the mischief. The person who attends the varnish-pot should have his hands covered with gloves, and, if they are made of leather and rather damp, it will eventually prevent injury. These cautions should be well observed, or shocking personal injury may result from their neglect.

VARNISH, Amber.—*a.* Amber, one pound; pale boiled oil, ten ounces; turpentine, one pint. Render the amber, placed in an iron pot, semi-liquid by heat; then add the oil, mix, remove it from the fire, and when cooled a little stir in the turpentine. *b.* To the amber, melted as above, add two ounces of shellac, and proceed as before.

This varnish is rather dark, but remarkably tough. The first form is the best. It is used for the same purposes as copal varnish, and forms an excellent article for covering wood, or any other substance not of a white or pale color. It dries well, and is very hard and durable.

VARNISH, Amber Black.—Amber, one pound; boiled oil, one-half pint; powdered asphaltum, six ounces; oil of turpentine, one pint. Melt the amber, as before described, then add the asphal-

tum, previously mixed with the cold oil, and afterwards heated very hot; mix well, remove the vessel from the fire, and when cooled a little add the turpentine, also made warm.

Each of the above varnishes should be reduced to a proper consistence with more turpentine if required. The last form produces the beautiful black varnish used by the coach-makers. Some manufacturers omit the whole or part of the asphaltum, and use the same quantity of clear black resin instead, in which case the color is brought up by lampblack reduced to an impalpable powder, or previously ground very fine with a little boiled oil. The varnish made in this way, lacks, however, that richness, brilliancy, and depth of blackness imparted by asphaltum.

VARNISH, Amber, Pale.—*a.* Amber pale and transparent, six pounds; fuse, add hot clarified linseed oil, two gallons; boil till it strings strongly, cool a little, and add oil of turpentine four gallons. Pale as copal varnish; soon becomes very hard, and is the most durable of oil varnishes; but requires time before it is fit for polishing. When wanted to dry and harden quickly, drying oil may be substituted for linseed, or "driers" may be added during the boiling.

b. Amber, one pound; melt, add Scio turpentine, one-half pound; transparent white resin, two ounces; hot linseed oil, one pint, and afterwards oil of turpentine as much as sufficient, as above. Very tough.

c. Hard—Melted amber, four ounces; hot boiled oil, one quart, as before.

d. Pale—Very pale and transparent amber, four ounces; clarified linseed oil and oil of turpentine, of each one pint, as before.

Amber varnish is suited for all purposes, where a very hard and durable oil varnish is required. The paler kind is superior to copal varnish, and is often mixed with the latter to increase its hardness and durability.

VARNISH, Black, for Iron-Work.—Asphaltum, forty-eight pounds; fuse, add boiled oil, ten gallons; red lead and litharge, of each seven pounds; dried and powdered white copperas, three pounds; boil for two hours, then add dark-gum amber (fused), eight pounds; hot linseed

oil, two gallons; boil for two hours longer, or till a little of the mass, when cooled, may be rolled into pills, then withdraw the heat, and afterwards thin down with oil of turpentine, thirty gallons. Used for the iron work of carriages, and other nice purposes.

VARNISH, Black.—Heat to boiling linseed oil varnish, ten parts, with burnt umber, two parts, and powdered asphaltum, one part, and when cool dilute with spirits of turpentine to the required consistence.

VARNISH, Black, for Wood.—There are two kinds of black varnish:

a. The ordinary black varnish for different kinds of wood.

b. The black ebony varnish for certain woods which approach nearest to ebony in hardness and weight.

The ordinary black wood varnish is obtained by boiling together blue Brazil wood, powdered gall apples and alum, in rain or river water, until it becomes black. This liquid is then filtered through a fine organzine, and the objects painted with a new brush before the decoction has cooled, and this is repeated until the wood appears of a fine black color. It is then coated with the following varnish: a mixture of iron filings, vitriol and vinegar is heated (without boiling), and left a few days to settle. If the wood is black enough, yet for the sake of durability, it must be coated with a solution of alum and nitric acid, mixed with a little verdigris; then a decoction of gall apples and logwood dyes is used to give it a deep black. A decoction may be made of brown Brazil wood with alum in rain water, without gall apples; the wood is left standing in it for some days in a moderately warm place, and to it merely iron filings in strong vinegar are added, and both are boiled with the wood over a gentle fire. For this purpose soft pear wood is chosen, which is preferable to all others for black varnishing.

For the fine black ebony varnish, apple, pear, and hazlewood are recommended in preference for this; especially when these kinds of wood have no projecting veins, they may be successfully coated with black varnish, and are then most complete imitation of the natural ebony. For this varnish: fourteen ounces of gall apples, three and

a half ounces of rasped logwood, one and three-fourths ounces of vitriol, and one and three-fourths ounces of distilled verdigris are boiled together with water in a well-glazed pot, the decoction filtered while it is warm, and the wood coated with repeated hot layers of it.

For a second coating a mixture of three and a half ounces of pure iron filings, dissolved in three-fourths of liter of strong wine vinegar, is warmed, and when cool the wood already blackened is coated two or three times with it, allowing each coat to dry between.

For articles which are to be thoroughly saturated, a mixture of three-fourths ounce of sal ammoniac, with a sufficient quantity of steel-filings, is to be placed in a suitable vessel, strong vinegar poured upon it, and left for fourteen days in a gently heated oven. A strong lye is now put into a good pot, to which is added coarsely bruised gall apples and blue Brazil shavings, and exposed for the same time as the former, to a gentle heat of an oven, which will then yield a good varnish. The pear wood articles are now laid in the first-named varnish, boiled for a few hours, and left in for three days longer; they are then placed in the second varnish and treated as in the first. If the articles are not then thoroughly saturated they may be once more placed in the first bath and then in the second.

VARNISH, For Basket Ware.—The following varnish for basket work is said to dry rapidly, to possess sufficient elasticity, and to be applicable with or without admixture of color: Heat 375 grains of good linseed oil on a sand-bath until it becomes stringy, and a drop placed upon a cold, inclined surface does not run; then add gradually 7,500 grains of copal oil varnish, or any other oil varnish. As considerable effervescence takes place, a large vessel is necessary. The desired consistency is given to it, when cold, by addition of oil of turpentine.

VARNISH, Coachmakers'.—The fine black varnish of the coachmakers is said to be prepared by melting sixteen ounces of amber in an iron pot, adding to it half a pint of drying linseed oil, boiling hot, of powdered resin and asphaltum, three ounces each. When the materials are well united, by stirring over the fire, they are to be removed, and after cooling

for some time, a pint of warm oil of turpentine is to be introduced.

VARNISH, Colorless.—Dissolve two ounces and a half of shellac in a pint of rectified spirits of wine; boil for a few minutes with five ounces of well-burned and recently-heated animal charcoal. A small portion of the solution should then be filtered, and if not colorless, more charcoal must be added. When all color is removed, press the liquor through a piece of silk, and afterward filter through fine blotting paper. This kind of varnish should be used in a room of at least sixty degrees Fahr., perfectly free from dust. It dries in a few minutes, and is not liable afterward to chill or bloom. It is particularly applicable to drawings and prints that have been sized, and may be used for gilding.

VARNISH, Copal Blue.—Indigo, Prussian blue, blue verditer, or ultra-marine. All these substances must be powdered fine.

VARNISH, For Cardwork.—Before varnishing cardwork it must receive two or three coats of size to prevent the absorption of the varnish and any injury to the design. Size may be made by dissolving a little isinglass in hot water, or by boiling some parchment cuttings until dissolved. In either case the solution must be strained through a piece of thin muslin, and for very nice purposes should be clarified with a little white of egg. A small clean brush, called by painters a sash tool, is the best for applying the size as well as the varnish. Touch lightly, especially for first coat, lest the ink or colors be started or smothered.

VARNISH, Chinese.—Mastic, two ounces; sandarach, two ounces; rectified spirit, a pint. Close the matrass with bladder, with a pin-hole for the escape of vapor; heat to boiling in a sand or water bath, and when dissolved strain through linen.

VARNISH, Pale Carriage.—Take copal, thirty-two parts; pale oil, eighty parts; fuse and boil until stringy, then add dried white copperas, one part; litharge, one part. Boil again, then cool a little, and mix in spirits of turpentine, one hundred and fifty parts. Strain.

While making the above—Take gum anime, thirty-two parts; pale oil, eighty parts; dried sugar of lead, one part; li-

tharge, one part; spirits of turpentine, one hundred and seventy parts. Pursue the same treatment as before, and mix the two varnishes while hot.

VARNISH, Crystal.—Picked mastic, four ounces; rectified spirit, a pint; animal charcoal, one ounce. Digest and filter.

VARNISH FOR CHROMOS.—The best varnish for chromos is made of gum mastic dissolved in spirits of turpentine. It should be of such thickness as to spread easily and evenly with a common varnishing brush. If a chromo is not oil-colors, two coats of size (isinglass dissolved in water) should be first given to it. When the size is dry the varnish may be laid on. Two or three coats may be needed to get a good surface, which should be perfectly free from cracks. This varnish may be cleaned with a soft sponge and soap and water. It is equally serviceable for maps and drawings as for chromos or paintings.

VARNISH, Copal, to dissolve in Alcohol.—Copal, which is called gum copal, but which is not strictly either a gum or a resin, is the hardest and least changeable of all substances adapted to form varnishes, by their dissolution in spirit, or essentials, or fat oils. It therefore forms the most valuable varnishes; though we shall give several receipts where it is not employed, which form cheaper varnishes, sufficiently good for many purposes, adding only the general rule, that no varnish must be expected to be harder than the substance from which it is made.

To dissolve copal in alcohol, dissolve half an ounce of camphor in a pint of alcohol; put it into a circulating glass, and add four ounces of copal in small pieces; set it in a sand-heat, so regulated that the bubbles may be counted as they rise from the bottom, and continue the same heat till the solution is completed.

The process above mentioned will dissolve more copal than the menstruum will retain when cold. The most economical method will therefore be to set the vessel which contains the solution by for a few days, and when it is perfectly settled, pour off the clear varnish and leave the residue for future operation.

The solution of copal thus obtained is very bright. It is an excellent varnish

for pictures, and would doubtless be an improvement in japanning, where the stoves used for drying the varnished articles would drive off the camphor and leave the copal clear and colorless in the work.

VARNISH, Copal, to Dissolve in Spirits of Turpentine.—Reduce two ounces of copal to small pieces and put them into a proper vessel. Mix a pint of the best spirits of turpentine with one-eighth of spirits of sal ammoniac; shake them well together, put them to the copal, cork the glass and tie it over with a string of wire, making a small hole through the cork. Set the glass in a sand-heat so regulated as to make the contents boil as quickly as possible, but so gently that the bubbles may be counted as they rise from the bottom. The same heat must be kept up exactly till the solution is complete.

It requires the most accurate attention to succeed in this operation. After the spirits are mixed they should be put to the copal and the necessary degree of heat be given as soon as possible, and maintained with the utmost regularity. If the heat abates or the spirits boil quicker than is directed, the solution will immediately stop, and it will afterward be in vain to proceed with the same materials; but if properly managed, the spirit of sal ammoniac will be seen gradually to descend from the mixture and attack the copal, which swells and dissolves, excepting a very small quantity which remains undissolved.

It is of much consequence that the vessel should not be opened till some time after it has been perfectly cold, for if it contain the least warmth when opened the whole contents will be blown out of the vessel.

Whatever quantity is to be dissolved should be put into a glass vessel capable at least of containing four times as much, and it should be high in proportion to its width.

This varnish is of a deep rich color when viewed in the bottle, but seems to give no color to the pictures upon which it is laid. If it be left in the damp it remains racky, as it is called, a long time; but if kept in a warm room or placed in the sun it dries as well as and other turpentine varnish, and when dried, appears

to be as durable as any other solution of copal.

Copal may also be dissolved in spirits of turpentine by the assistance of camphor.

Turpentine varnishes dry more slowly than those made with alcohol, and are less hard; but they are not so liable to crack.

VARNISH, Copal.—*a.* Oil of turpentine one pint, set the bottle in a water bath and add in small portions at a time three ounces of powdered copal that has been previously melted by a gentle heat and dropped into water; in a few days decant the clear. Dries slowly, but is very pale and durable. Used for pictures, etc.

b. Pale hard copal two pounds; fuse, add hot drying oil one pint, boil as before directed, and thin with oil of turpentine, three pints, or as much as sufficient. Very pale. Dries hard in twelve to twenty-four hours.

c. Clearest and palest African copal eight pounds; fuse, add hot and pale drying oil two gallons, boil till it strings strongly, cool a little, and thin with hot rectified oil of turpentine, three gallons, and immediately strain into the store can. Very fine. Both the above are used for pictures.

d. Coarsely powdered copal and glass, of each four ounces; alcohol of ninety per cent., one pint; camphor, one-half ounce; heat it in a water bath so that the bubbles may be counted as they rise, observing frequently to stir the mixture; when cold, decant the clear. Used for pictures.

e. Copal melted and dropped into water, three ounces; gum sandarach, six ounces; mastic and Chio turpentine, of each two and one-half ounces; powdered glass, four ounces; alcohol of eighty-five per cent, one quart; dissolve by a gentle heat. Used for metal, chairs, etc.

All copal varnishes are hard and durable, though less so than those made of amber, but they have the advantage over the latter of being paler. They are applied on coaches, pictures, polished metal, wood, and other objects requiring good durable varnish.

f. Hard copal, three hundred parts; drying linseed or nut oil, from one hundred and twenty-five to two hundred

and fifty parts; oil of turpentine, five hundred parts; these three substances are to be put in three separate vessels; the copal is to be fused by a somewhat sudden application of heat; the drying oil is to be heated to a temperature a little under ebullition and is to be added by small portions at a time to the melted copal. When the combination is made and the heat a little abated, the essence of turpentine, likewise previously heated, is to be introduced by degrees; some of the volatile oil will be dissipated at first, but more being added, the union will take place. Great care must be taken to prevent the turpentine vapor from catching fire, which might occasion serious accident to the operator. When the varnish is made and cooled down to about 130° of Fahrenheit, it may be strained through a filter, to separate the impurities and undissolved copal. Almost all varnish makers think it indispensable to combine the drying oil with the copal before adding the oil of turpentine, but in this they are mistaken. Boiling oil of turpentine combines very readily with fused copal; and, in some cases, it will probable be preferable to commence the operation with it, adding it in successive small quantities. Indeed, the whitest copal varnish can be made only in this way; for if the drying oil has been heated to nearly its boiling point it becomes colored and darkens the varnish.

This varnish improves in clearness by keeping. Its consistence may be varied by varying the proportion of the ingredients within moderate limits. Good varnish, applied in summer, should become so dry in twenty-four hours that the dust would not stick to it or receive an impression from the fingers. To render it sufficiently dry and hard for polishing, it must be subjected for several days to the heat of a stove.

g. Melt in an iron pan at a slow heat copal gum powdered, eight parts, and add balsam copavia, previously warmed, two parts. Then remove from the fire and add spirits of turpentine, also warmed beforehand, ten parts, to give the necessary consistence.

h. Prepared gum copal, ten parts; gum mastic two parts, finely powdered, are mixed with white turpentine and boiled linseed oil, of each one part, at a

slow heat, and with spirits of turpentine, twenty parts.

i. Prepared gum copal, ten parts; white turpentine, two parts; dissolve in spirits of turpentine.

Gum copal is prepared and made more soluble in spirits of turpentine by melting the powdered crude gum, afterwards again powdering and allowing to stand for some time loosely covered.

VARNISH, Dammar.—Gum dammar, ten parts; gum sandarach, five parts; gum mastic, one part; digest at a low heat, occasionally shaking, with spirits of turpentine, twenty parts. Finally add more spirits of turpentine, to give the consistency of syrup.

VARNISH, for Engravings, Maps, etc.—Digest gum sandarach, twenty parts; gum mastic, eight parts; camphor, one part, with alcohol forty eight parts. The map or engraving must previously receive one or two coats of gelatine.

VARNISH, Engraver's Stopping-out.—Take lampblack and turpentine to make a paste.

VARNISH, for Engraving on Glass.—

a. Wax, one ounce; mastic one-half ounce; asphaltum, one-fourth ounce; turpentine, one-half drachm.

b. Mastic, fifteen parts; turpentine, seven parts; oil of spike, four parts.

VARNISH, Etching.—*a.* White wax, two ounces; black and Burgundy pitch, of each, one half ounce; melt together, add by degrees powdered asphaltum two ounces, and boil till a drop taken out on a plate will break when cold by being bent double two or three times between the fingers; it must then be poured into warm water and made into small balls for use.

b. Hard Varnish—Linseed oil and mastic, of each four ounces; melt together.

c. Soft Varnish—Soft linseed oil, four ounces; gum benzoin and white wax, of each one half ounce; boil to two-thirds.

VARNISH, Furniture.—White wax, fifteen ounces; yellow resin, one ounce, powdered; spirits of turpentine, one quart. Digest until dissolved. Lay it on with a brush or cloth, and well polish with clean pieces of woolen.

The simplest, and perhaps the best is the solution of shellac only, but may add gum sandarach, mastic, copal, arabic,

benjamin, etc., from the idea that they contribute to the effect. Gum arabic is certainly never required if the solvent be pure, because it is insoluble in either rectified spirit or rectified wood naphtha, the menstrua employed in dissolving the gums. As spirit is seldom used on account of its expense, most of the following are mentioned as solutions in naphtha, but spirits can be substituted when thought proper:

a. Shellac, one and one-half pounds; naphtha, one gallon; dissolve and it is ready without filtering.

b. Shellac, twelve ounces; copal, three ounces (or an equivalent of varnish); dissolve in one gallon of naphtha.

c. Shellac, one and a half pounds, seed-lac and sandarach, each four ounces; mastic two ounces; rectified spirit, one gallon, dissolve.

d. Shellac, two pounds, benzoin, four ounces; spirit, one gallon.

e. Shellac, ten ounces; seed-lac, sandarach, and copal varnish, of each six ounces; benzoin, three ounces; naphtha one gallon.

To darken polish, benzoin and dragon's blood are used; tumeric, and other coloring matters are also added; and to make it lighter it is necessary to use bleach lac, though some endeavor to give this effect by adding oxalic acid to the ingredients; it, like gum arabic, is insoluble in good spirit or naphtha. For all ordinary purposes the first form is best and least troublesome, while its appearance is equal to any other.

VARNISH, for Frames for Hot-Beds.

—Mix four ounces of pulverized white cheese, two ounces of slacked lime, and four ounces of boiled linseed oil. Mix, and add four ounces each of whites and yolks of eggs, and liquefy the mixture by heat. This curious mixture is said to produce a pliable and transparent varnish.

VARNISH, Gold.—*a.* Tumeric, one drachm; gamboge, one drachm; oil of turpentine, two pints; shellac, five ounces; sandarach, five ounces; dragon's blood, seven drachms; thin mastic varnish, eight ounces. Digest, with occasional agitation, for fourteen days in a warm place, then set it aside to fine, and pour off the clear.

b. Dutch leaf, one part; gamboge, four parts; gum dragoon, four parts; proof

spirit, eighteen parts. Macerate for twelve hours, then grind on a stone slab.

VARNISH, Glass.—This is a solution of soluble glass, and should be thus made: Fuse together fifteen parts of powdered quartz (or of fine sand), ten parts of potash and one of charcoal. Pulverize the mass, and expose it for some days to the air; treat the whole with cold water, which removes the foreign salts, etc. Boil the residue in five parts of water until it dissolves. It is permanent in the air, and not dissolved by cold water. Used to protect wood, etc., from fire.

VARNISH, Ground Glass, to Imitate.—To make a varnish to imitate ground glass, dissolve ninety grains of sandarach and twenty of mastic in two ounces of washed methylated ether; add, in small quantities, a sufficiency of benzine to make it dry with a suitable grain—too little making the varnish too transparent, and excess making it carpy. It is important to use washed ether, free from spirit.

VARNISH, Green Copal.—Verdigris, crystallized verdigris, compound green (a mixture of yellow and blue). The first two require a mixture of white in proper proportions, from a fourth to two-thirds, according to the tint to be given. The white used for this purpose is ceruse, or the white oxide of lead, or Spanish white. Proceed as before.

VARNISH, Pearl Grey Copal.—White and black; white and blue; for example, ceruse and lampblack, ceruse and indigo; mix them with the varnish, according to tint required.

VARNISH, Black, for Harness.—Digest shellac, twelve parts; white turpentine, five parts; gum sandarach, two parts; lampblack, one part; with spirits of turpentine, four parts; alcohol, ninety-six parts.

VARNISH, for Harness.—One-half pound India-rubber, one gallon of spirits of turpentine; dissolve by a little heat to make it into a jelly, then take equal quantities of hot linseed oil and above mixture, and incorporate them well on a slow fire.

VARNISHES, India-Rubber.—*a.* Cut up one pound of India-rubber into small pieces, and diffuse in half pound of sulphuric ether, which is done by digesting in a glass flask on a sand bath. Then add one pound pale linseed oil varnish,

previously heated, and, after settling, one pound of oil of turpentine, also heated beforehand. Filter, while yet warm, into bottles. Dries slowly.

b. Two ounces of India-rubber finely divided and digested in the same way with a quarter of a pound of camphene, and half an ounce of naphtha or benzole. When dissolved, add one ounce of copal varnish, which renders it more durable. Principally for gilding.

c. In a wide-mouthed glass bottle, digest two ounces of India-rubber in fine shavings, with one pound of oil of turpentine, during two days without shaking, then stir up with a wooden spatula. Add another pound of oil of turpentine, and digest, with frequent agitation, until all is dissolved. Then mix a pound and a half of this solution with two pounds of very white copal oil varnish, and a pound and a half of well boiled linseed oil, shake and digest in a sand bath, until they have united into a good varnish. For morocco leather.

d. Four ounces India-rubber in fine shavings are dissolved in a covered jar by means of a sand bath, in two pounds of crude benzole, and then mixed with four pounds of hot linseed oil varnish, and a half pound of oil of turpentine. Dries very well.

e. Flexible Varnish.—Melt one pound of rosin, and add gradually half a pound of India rubber in very fine shavings, and stir until cold. Then heat again, slowly, add one pound linseed oil varnish, heated, and filter.

f. Another.—Dissolve one pound of gum dammar, and half a pound of India rubber, in very small pieces, in one pound of oil of turpentine, by means of a water bath. Add one pound of hot oil varnish and filter.

g. India rubber in small pieces, washed and dried, are fused for three hours in a close vessel, on a gradually heated sand bath. On removing from the sand bath, open the vessel, and stir for ten minutes, then close again, and repeat the fusion on the following day, until some globules appear on the surface. Strain through a wire sieve.

h. Varnish for Water-proof Goods.—Let a quarter of a pound of India rubber, in small pieces, soften in a half pound of oil of turpentine, then add two pounds of

boiled oil, and let the whole boil for two hours over a slow coal fire. When dissolved, add again six pounds of boiled linseed oil, and one pound of litharge, and boil until an even liquid is obtained. It is applied warm.

i. Gutta-Percha Varnish.—Clean a quarter of a pound of gutta-percha in warm water from adhering impurities, dry well, dissolve in one pound of rectified resin oil, and add two pounds of linseed oil varnish, boiling hot. Very suitable to prevent metals from oxidation.

VARNISH, Hair.—Dissolve one part of clippings of pig's bristles, or of horse-hair, in ten parts of drying linseed oil by heat. Fibrous materials (cotton, flax, silk, etc.), imbued with the varnish and dried, are used as a substitute for hair-cloth.

VARNISH, for Iron.—Take oil of turpentine, add to it drop by drop, and while stirring, strong sulphuric acid, until a syrupy precipitate is quite formed, and no more of it is produced on further addition of a drop of acid. The liquid is now repeatedly washed with water, every time refreshed after a good stirring, until the water does not exhibit any more acid reaction on being tested with blue litmus paper. The precipitate is next brought upon a cloth filter, and, after all the water has run off, the syrupy mass is fit for use. This thickish magma is painted over the iron with a brush; if it happens to be too stiff, it is previously diluted with some oil of turpentine. Immediately after the iron has been so painted, the paint is burnt by a gentle heat, and, after cooling, the black surface is rubbed over with a piece of woollen stuff, dipped in and moistened with linseed oil.

According to the author, this varnish is not a simple covering of the surface, but it is chemically combined with the metal, and does not, therefore, wear off or peel off, as other paints or varnishes do from iron.

VARNISH, Japan, Black.—Bitumen, 2 ounces; lampblack, 1 ounce; Turkey umber, one-half ounce; acetate of lead, one-half ounce; Venice turpentine, one-half ounce; boiled oil, twelve ounces. Melt the turpentine and oil together, carefully stirring in the rest of the ingredients, previously powdered. Simmer all together for ten minutes.

VARNISH, Mahogany.—Sorted gum anime eight pounds, clarified oil three gallons, litharge and powdered dried sugar of lead, of each one-fourth of a pound; boil till it strings well, then cool a little, thin with oil of turpentine five and one half gallons, and strain.

VARNISH, for Oil Paintings.—Digest at a slow heat gum sandarach, two parts; gum mastic, four parts; balsam copaiva, two parts; white turpentine, three parts; with spirits of turpentine, four parts; alcohol (ninety-five per cent.) fifty-six parts.

VARNISH, for Paintings and Pictures.—Honey, one pint; the whites of two dozen fresh eggs; one ounce of good clean isinglass; twenty grains of hydrate of potassium; one-half-ounce of chloride of sodium; mix together over a gentle heat of eighty or ninety degrees Fah. Be careful not to let the mixture remain long enough to coagulate the albumen of the eggs; stir the mixture thoroughly, then bottle. It is to be applied as follows: one tablespoonful of varnish added to one-half-tablespoonful of good oil of turpentine, then spread on the pictures as soon as mixed.

VARNISH, Oak.—*a.* Clear pale resin, three and a half pounds; oil of turpentine, one gallon; dissolve.

b. Clear Venice turpentine, four pounds; oil of turpentine, five pounds; mix. Both are good common varnishes.

VARNISH, Red Copal.—*a.* Vermilion, red oxide of lead (minium), red ochre, or Prussian red, etc., and proceed as before.

b. Dragon's blood, brick red, or Venetian red, etc., and proceed as before.

VARNISH, for Straw Hats.—Take either red or black sealing wax; to every two ounces of sealing wax, add one ounce of rectified spirits of wine; pound the wax fine, then sift it through a fine lawn sieve, till you have made it extremely fine; put it into a large phial with the spirits of wine; shake it; let it stand near the fire forty-eight hours, shaking it often; then with a brush (a hog's bristle brush) lay it all over the hat (or basket). Let it dry and then repeat the operation.

VARNISH, for Stoves.—Melt half a pound of asphaltum, and add to it a quarter of a pint of linseed oil, and one pint of turpentine. This quantity will be

enough for four grates. If it be found too thick, as it gets towards the bottom of the bottle, add a little more turpentine. It is for the black stoves, which must be washed clean of dirt and black lead, and, when dry, apply the varnish with a brush.

VARNISH, for Shoes.—Put one-half pound gum shellac, broken up in small pieces, into a quart bottle or jug, cover it with alcohol, cork it tight, and put it on a shelf in a warm place; shake it well several times a day, then add a piece of camphor as large as an egg, shake it well, and in a few hours shake it again, and add one ounce of lamp-black. If the alcohol is good it will be dissolved in two days; then shake and use. If it gets too thick, add alcohol, pour out two or three teaspoonfuls in a saucer, and apply it with a small paint brush. If the materials are all good it will dry in about five minutes, giving a gloss equal to patent leather, and will be removed only by wearing it off. The advantage of this preparation over others is, it does not strike into the leather and make it hard, but remains on the surface, and yet excludes the water almost perfectly. The same preparation is admirable for harness, and does not soil when touched, as is usually the case with lamp-black preparations.

VARNISH, Purple Copal.—Prussian blue or vermillion, or any other blue and red, then proceed as before.

VARNISH, Tar.—Tar, two gallons; tallow, one pound. Melt, then add ground ochre, seven pounds; spirits of turpentine, six pounds. Mix well. By regulating the quantity of the ochre, a very excellent chocolate paint for rough outdoor work will be produced.

VARNISH, Turpentine.—Resin, one part; boiled oil, one part. Melt, then add turpentine, two parts. Mix well.

VARNISH, Transfer.—Mastic in tears, six and a half ounces; resin, twelve and a half ounces; pale Venice turpentine (genuine) and sandarach, of each twenty-five ounces; alcohol, five pints; dissolve as before. Used for fixing engravings or lithographs on wood, and for gilding, silvering, etc.

VARNISH, Violet Copal.—Vermillion, blue, white, in proportion as required to color the varnish.

VARNISH, for Water Color Drawings.

Take Canada balsam, one part; oil of turpentine, two parts; mix; size the drawing before you apply the varnish.

VARNISH, to Make White Copal.—

White oxide of lead, ceruse, Spanish white, white clay. Such of these substances as are preferred ought to be carefully dried. Ceruse and clay obstinately retain a great deal of humidity, which would oppose their adhesion to drying oil or varnish. The cement then crumbles under the fingers, and does not assume a body.

Another.—On sixteen ounces of melted copal, pour four, six or eight ounces of linseed oil boiled, and quite free from grease. When well mixed by repeated stirrings, and after they are pretty cool, pour in sixteen ounces of the essence of Venice turpentine. Pass the varnish through a cloth.

VARNISH, Yellow Copal.—Yellow oxide of lead of Naples and Montpellier, both reduced to impalpable powder. These yellows are hurt by the contact of iron and steel; in mixing them up, therefore, a horn spatula with a glass mortar and pestle must be employed. Gum guttæ, yellow ochre, or Dutch pink, according to the nature and tone of the color to be imitated.

VARNISH, Transparent Green.—A beautiful transparent green varnish is made by taking a small quantity of Chinese blue, with about twice the amount of finely powdered chromate of potash, and stirring these in copal varnish thinned with turpentine. A thorough grinding of this mixture must be made for the purpose of intimately incorporating the ingredients, as otherwise it will not be transparent. A preponderance of chromate of potash gives a yellowish shade to the green, and a deficiency increases the amount of blue. This varnish, thus colored, produces a very striking effect in japanned goods, paper-hangings, etc., and can be made very cheaply.

KALSOMINE.—Ten pounds whiting, dissolved in hot or boiling water, quarter of a pound of glue, should be put to soak over night in one pint of water; it may now be melted on a stove, stirring it frequently; two ounces of ultramarine blue; one ounce of venetian red; mix separately with cold or soft water, and strain through

a stocking or thin cloth—each in separate vessels. The whiting may now be stirred well; if too thick, add more hot water and strain through a sieve into a good sized pot. Add some of the blue and red alternately until you get the shade required. When your color is determined pour in the glue, and after mixing well apply the wash hot to the wall. Should the second coat not be put on until the next day, heat the mixture, as the glue will not mix with the other ingredients unless pretty warm.

WAX, for Canning Fruits.—Resin, one pound; lard, tallow, and beeswax, each one ounce. Melt, and stir well together.

MECHANICS, Farmers should be.—On every farm there should be a shop-room, with work-benches and a kit of tools, comprising all such as may be required for any ordinary repairs of buildings or wooden farm implements, and every farmer should have skill to use them. Having them, many repairs and necessary jobs can be done, in less time than would be required to carry the job to a regular mechanic, and often in a better manner; while no more time will be lost, and some money will be saved. With a soldering copper, rosin, and solder, with a few minutes' practice, much inconvenience and expense can be saved by repairing tin-ware, water-pipes, etc., in odd moments and on rainy days.

BUILDINGS and GROUNDS, Choosing a Location for.—In choosing a location, one of the first considerations is that of access to and egress from a city, and if daily intercourse is contemplated, it becomes a question of special interest. The time, trouble, and expense of travel on bad roads are a severe tax upon country pleasures. A drive of half an hour on a hard road, during a fine summer evening, is a recreative pleasure which may be not appreciated when an hour and a half are spent on the same distance during a stormy winter morning. A good road in dry weather may become very indifferent after rains, and be impassable for three-fourths of the year.

In these days of railroads and steam-boats it is difficult to indicate what might be considered a convenient distance from a city. Upon a well managed railroad a distance of twenty miles may be more

accessible than two miles upon a common road. Proximity to a railroad station will always secure a certainty of convenient transit, even allowing the distance to be within an easy carriage drive. This facility should not be overlooked when it can be secured.

Healthiness of locality is of paramount importance. Low, flat lands are generally damp and cold, and should never be selected for the habitation either of man or beast, if there is any choice in the matter. Valleys, or even slight depressions, are equally unsuitable. The air after sunset is always dense in such places, dews are heavier and more frequent; and, as a consequence, frosts are more prevalent than on elevations. Fogs are most frequent on low lands. The extremes of temperature are also greater, especially if surrounded by forests, which prevent the free circulation and equalizing influence of winds. Wide and long valleys between uniform hills are frequently subjected to sweeping blasts. Even the vicinity of such localities ought to be avoided. A person may drain, cultivate, plant, and otherwise improve his own property, and still be subjected to the injurious influences of unimproved lands over which he has no control.

An elevated situation is generally healthy. The extent of prospect it secures is also an advantage; yet it is not well to place too great a value on distant views. For permanent residence the exposure of elevations is a disadvantage. Though cool, airy, and agreeable in summer, they may be bleak, chilly, and exceedingly uncomfortable during winter. The tender and delicate varieties of flowers and shrubbery, as well as fruits and culinary products, are less likely to flourish when fully exposed to cold and unbroken winds.

BUILDING SITE, Selecting a.—This is too commonly settled by selecting the highest point of the ground, but not always wisely. A modern house set up on a sharp knoll has an isolated appearance which is not readily altered or improved by trees, and it is with difficulty approached by roads, if the grounds slope suddenly from it.

A somewhat level plateau, partially surrounded by higher ground, forms a good position for a dwelling house. The

ground should fall from it in all directions, more rapidly in front than back, where the descent may be merely sufficient for drainage. Back of the house, positions should be selected for the vegetable garden, stables, and other buildings, such as greenhouses and graperies, all of which will be sheltered and protected by the higher ground beyond.

The nature of the soil should receive attention in selecting a spot for a house. Clay soils are retentive of water; and, even when artificially drained, the surface is disagreeable after rains. Clay, in contact with foundation walls, keeps them damp and cold. The expansion of clay when wet, and shrinkage when dry, unfit it for a safe foundation. If every other condition is secured in a site, art can do much towards ameliorating the physical qualities of the soil; but, for all the purposes of human comfort and enjoyment, in the immediate vicinity of a house, a light, open, porous soil is decidedly the best.

It is always desirable to secure the beauty and utility of a natural plantation; but, to select a site for a mansion in the center of a grove of old trees, with the intention of making them a nucleus for future landscape effect, will generally prove unsatisfactory. In natural forests the trees grow closely together; their trunks are long, slender, and destitute of branches; and, if thinning is attempted, those that are left seldom flourish for any length of time. If the thinning out is gradual, and the best of the remaining trees are judiciously pruned, they may ultimately recover, and make a satisfactory appearance.

Where old trees abound, it is difficult to prepare or keep a good lawn, or to introduce new shrubs or flowers. The roots of the trees prevent thorough renovation of the soil, and the shade of the branches interferes with the growth of plants. There is a steady antagonism between the old and the new, both with regard to individual growth and landscape effect, until either the one or the other predominates. It is no matter of doubt or uncertainty, but a settled question with all who have any experience in remodeling or adapting old woods or groves to modern improvements, that it is immeasurably better to commence on a treeless, naked field; as

a judicious selection and intermixture of fast-growing trees, properly planted in good soil, will, in a very few years, serve all useful purposes, produce such effects as are contemplated, and give far more satisfaction than can be derived from the accidental position and growth of natural forests, at least so far as relates to improvements in the immediate vicinity of a rural residence.

OUTBUILDINGS, STABLES, ETC.,

Arrangement of.—The selection of sites for the various buildings required near a country or suburban residence is second in importance only to the selection of a site for the mansion. Convenience dictates that these buildings should be as near the house as is practically consistent with their objects and character. The dwelling-house will, of course, occupy the best and most advantageous position, and its superior size and style of architecture will always be such as to render all other necessary structures of secondary and subordinate appearance. Such buildings as stables and ice-houses are so obviously necessary to domestic comfort that their presence is not only expected, but their absence conveys an impression of poverty or incompleteness altogether inconsistent with our ideas of what a country home should be.

Instead, therefore, of endeavoring to entirely conceal these offices by plantations and by other expedients, as is frequently advised, they should be located on the most eligible sites, and display, in their architectural details and ornaments, an expression of the purposes for which they are intended, and be judiciously exposed to view without rendering conspicuous the operations necessarily connected with the structure.

The best location for these buildings will be governed, to some extent, by local circumstances; but, where there are no grades, views, or other exceptional features to interfere with the selection, a point in a northeast direction from the house will combine the greatest number of advantages.

When the stables and other farm buildings should not be entirely hidden from view at certain points, at the same time it will be obvious that a due amount of privacy in and about the buildings themselves, as well as in the line of view from

the dwelling-house, will be essential, and can readily be effected by the introduction of trees and shrubs at the points indicated.

ROADS AND WALKS, Laying Out.—

The guiding principle in designing the position of roads and walks is utility. Nature forms no road. They are the works of men and animals, and would undoubtedly always proceed in straight lines from point to point, if obstructions of various kinds did not interfere and cause deviations. Necessity will therefore suggest where and how they should be introduced. So far as regards approaches and walks to and from buildings, the object of their introduction is sufficiently apparent; but, in laying out pleasure grounds and lawn fronts, it is a common practice to introduce walks for the mere purpose of variety. This is a very questionable reason at the best, and not always successfully accomplished; but even in cases of this kind, they should appear to aim for some definite object, or lead to points of sufficient importance to suggest their utility.

Unnecessary roads and walks should be carefully avoided. They are expensive in their construction, if properly made, and require constant attention to keep them clean and in repair. Nothing looks so woe-begone and poverty-stricken as a weedy, neglected road to a house, or walks through pleasure grounds or garden. They detract much from the beauty of the surroundings, no matter how elaborate or intrinsically worthy they may be. An over-supply of roads and walks is always a serious infiction.

The beauty of curved lines sometimes prompts to a deviation from the more available direct course; and, where it can be done without too great sacrifice of utility, it is not objectionable. But no walk should be turned from its obvious direct course without an apparently sufficient reason. A change of level in the ground, a tree, or a group of plants, or other similar obstruction, will induce, and seemingly demand, a change of line.

There are many locations where the straight line should be preferred as a matter of taste in design. As a connecting link between the strictly horizontal and the perpendicular lines of a building, and the irregular surfaces surrounding it,

a perfectly straight walk is in the best taste and adds greatly to the effect of the architecture, while a frequently curving walk detracts from it. So also a walk along the side of a straight boundary fence should not curve if both lines are visible at the same time. Most persons are aware of the great beauty of straight walks and avenues of trees; and for public parks of lesser order, inclosed by formal outlines, they can always be introduced with great effect, as well as convenience, where curving walks would be the reverse. In this case beauty depends upon harmony rather than contrast, and more than either upon utility.

When roads or walks are carried over irregular surfaces, the natural turns and windings necessary to follow an easy or uniform grade, and keep as near the original surface of the ground as possible, will usually develop pleasing curves. A little studied attention in this matter of the course of a road will not only increase the beauty of curves by adding to them the grace of utility, but also deep and expensive cuttings, as well as heavy embankments, will be avoided, and easy grades and economical construction be more certainly secured.

When it is necessary to branch a secondary road from the main line, it should leave the latter at as nearly a right angle as convenient, and at the same time be somewhat narrower, so that its appearance may convey the proper idea of its being subordinate, and so avoid confusion and mistake; otherwise the roads leading to the stable, ice-house, or garden, may be mistaken for the road to the mansion. Under no circumstances should walks be made conspicuous in views of natural scenery. If it is essentially necessary that a walk should cross a lawn where it would interrupt a continuity of view, and destroy breadth of effect, it should be sunk beneath the line of vision, by placing it in a slight excavation, which may be further assisted by throwing up a small mound on the side nearest the point of view. These expedients, as also that of planting thick groups of low-growing shrubs, will be effective and satisfactory if properly executed.

In laying out curving roads it is not advisable to closely follow geometrical rules, or to set the curves out to any

regular radius. This plan may occasionally prove perfectly satisfactory on a strictly level surface, but it will have quite an opposite effect where the ground is greatly undulating. The curves, to be pleasing, must be "eye-sweet"—not too sudden or abrupt—and properly blended at their points of junctions.

ROADS AND WALKS, Construction of.—Very much of personal comfort and pleasure in rural residences depends upon good roads. A smooth, firm, dry road is one of the greatest conveniences and enjoyments; while a rough, soft, muddy road is one of the greatest drawbacks and annoyances of country life. Bad roads form the greatest obstacles to progress and permanent improvements in all the neighborhoods that are blasted with their presence; they have a demoralizing effect upon the inhabitants, and are a sure sign either of poverty or mismanagement, or both.

Water is the worst enemy to good roads. It is, therefore, a leading principle in road-making so to construct them that they may be kept dry. In absence of a timely recognition of this principle, many costly roads have proved to be failures; but where it has had prominent recognition and its value has been properly appreciated, good roads have been made at a trifling expense.

After locating the road and marking out its course, the sides should be brought to the proper grade and finished by a layer of sod as a guide to further operations. In crossing a sloping surface it is not necessary to have both sides perfectly level, but the nearer this can be secured, with due regard to getting rid of surface water, the better it will admit of a neat finish and the more easily will it be kept in repair.

The road bed is then formed by excavating and removing the soil to a depth of six inches at the sides, curving slightly higher in the centre, and made perfectly smooth by rolling, producing a uniform surface upon which the material of the road is to be placed.

The best stone for road metal is tough granite. Hard brittle stone is more readily reduced by pressure, but in a well-kept road this difference is not important. It is, however, all important that the stones should be broken small. The largest

should easily pass through a two-inch ring, and if one-half of them are small enough to pass through a ring of only one inch diameter, the road will ultimately become all the more compact.

The road bed should be filled with this broken stone to a level with the sides, increasing in depth toward the centre at the rate of one inch to the yard. Thus, a road sixteen feet in width would have a depth of about nine inches in the centre. The utmost care should be applied to regulating the surface, and the smaller stones should be used on top, in order to secure an even, compact, carefully-molded grade, which should be compressed by repeatedly passing a heavy roller over it, wedging every stone, and making the surface almost as smooth and solid as a pavement. A thin layer, not more than one inch in thickness, of fine clayey gravel should then be evenly distributed over the stones, and the roller again applied until the surface becomes homogeneous, firm, and close.

The surface of the road will thus be higher than the sodded edges, water will therefore pass readily from it, and one of the main points of keeping a good road will be secured. This will form a first-class road for ordinary carriage drives, or for all purposes required in public parks or private grounds; and, if kept in good surface by frequent rolling, so as to prevent the forming of ruts while it is settling; and, if a facing of gravel is applied when necessary, it will permanently fulfill all requirements of a good road.

The quality of gravel deserves notice. Wash gravel, consisting only of sand and rounded pebbles, should never be used. No amount of pressure will render it firm, and it is the most disagreeable material to walk upon. The best gravel is that to be found in banks composed of pebbles mixed with reddish clay; and the stones must be small. No detail in road-making is of so much importance as this. If a wagon wheel or the foot of a horse press on one extremity of a stone the other end of it will probably be slightly raised, allowing small particles of sand to fall into the crevice, when the stone is loosened, and will roll on the surface; hence the necessity of using only very finely divided stones on top, so that

they will be smaller than the pressing point, and not become disarranged from leverage or compound action.

Where stone cannot conveniently be obtained, the road bed may be filled with refuse matters of many kinds, such as coal ashes, clinkers from furnaces, and shells. Oyster shells are plentiful in many places near the seaboard, and form an admirable road; but the permanency, as well as efficiency of these materials in a road bed, will depend altogether upon the care of surfacing with proper gravel. Where it is impracticable to procure, or deemed inexpedient to use, any of the foregoing materials, an earth road may be rendered very serviceable by proper attention to the leading principle—that is, to keep it dry. In this case, instead of excavating a road bed, slight excavations should be made at the sides and the material spread over the center; and that surface water may pass to the sides more rapidly and thoroughly, a greater convexity may be given to the curve. In some sections of the country good roads are kept up in this manner, but they are carefully repaired whenever necessary, and all ruts and tracks are filled up as soon as they are formed. The same general principles apply to the formation of walks and foot-paths. The depth of material, however, need not exceed a few inches. It is certain that much unnecessary expense is frequently laid out upon mere foot-walks. A porous, gravelly, or sandy soil is in itself a good walk if properly shaped. Such walks admit of greater convexity than carriage roads, which is equivalent to a saving of material. Walks should be well filled up. There is no more disagreeable object, or one that conveys so meagre an expression, as deep, raw edgings to a walk, looking as if they had been trimmed with a plow. Walks in this condition may be serviceable as water courses, but they are not comfortable foot-paths.

LAWNS, Formation and Management of.—A fine lawn is the most beautiful of external ornaments. Soft, velvety, elastic turf, smoothly shorn and of fine color, is always pleasing, but not always attained. Formerly the emerald lawns of European pleasure grounds were considered to be unequalled; and it was thought that nothing approaching to their beauty

could be realized in this climate of scorching suns and summer droughts; but it has been demonstrated beyond any doubt that lawns may be produced and maintained here, as fine as those to be found in any country.

The primary requisite is thorough preparation of the soil. Without this, failure is probable, but if properly done at the outset, success is certain, with subsequent intelligent management. First of all, a good foundation must be laid by draining and subsoiling, trenching, manuring, or otherwise loosening or enriching the soil. With limited lawns, spade-trenching will be at once thorough and permanent; but, where a plow and other implements can be used, the work may be executed much more economically, and, by using the subsoil plow in connection with the common surface turning, a depth of eighteen inches will be reached, which, on ordinarily good corn-producing lands, will be ample preparation for a good lawn. Previous to the final plowing a heavy dressing of manure should be applied. This should be well decomposed, more especially if the soil is partially of a gravelly or sandy character.

The surface must be rendered smooth and regular. Careful plowing can accomplish much toward making a smooth surface; but whatever the expense may be, the finish should be made perfect before sowing the grasses. There are two seasons for sowing—autumn and spring, either of them appropriate; and the choice will depend upon circumstances, and is of secondary consideration, compared to the preparation of the land. To get rid of weeds and clean the ground before laying it down to grass, it is a commendable practice to plant it with early potatoes. These, if cultivated with ordinary care, will soon cover the surface with their leaves, and prevent the growth of weeds; and the operation of digging up and removing the crop tends to pulverize and loosen the soil. The potatoes can be removed and grass seed sown by the middle of August to the middle of September, and the grasses will vegetate and cover the surface before frosts. A top dressing of thinly sprinkled manure will protect the young plants during the winter, and a good thick set lawn will be secured early in the following summer.

In hard, clayey loams, where a sufficiently comminuted surface is not so easily obtained, the ground should be prepared in the latter portion of the year, and plowed over, so as to leave a rough surface to be acted upon by frosts during the winter. This will insure a friability not easily attainable by mechanical means on tenacious soils. The seeds should be sown as early as can be done in the spring, but not until the ground is dry. Working a clayey soil when it is wet is ruinous to the future crop.

In the immediate preparation of the ground before seeding, the surface should be pulverized by the harrow and roller if necessary. The seed will be sufficiently covered by passing a light harrow or roller over the ground. The former is best in clayey or baking soils, and the roller on light and sandy soil.

The best grasses for permanent lawns are red top (*Agrostis vulgaris*.) and June grass (*Poa pratensis*.) The following proportions have been used in the lawns of the Department, with great satisfaction: one bushel red top, two bushels June grass, one quart timothy, and two pounds white clover, to each acre of land. These should be thoroughly mixed before sowing. This is heavy seeding, but experiments demonstrate that a good lawn can be secured only by seeding heavily, when sown in the spring; autumn sowing may be thinner, but the thick seeding will be the most satisfactory. There is no grass equal to the June grass for fine lawns; this is also known as green grass, and Kentucky blue grass. The red top also forms a good sward where the soil is good, and the summers comparatively cool and moist; but during dry, warm weather it becomes hard and wiry. The timothy grass vegetates quickly, and greatly assists the growth of the others. The clover is also valuable, in rapidly producing a thick, close sod.

The practice of sowing oats, barley, or other grains with the grasses, under the impression that they will protect the young plants from sun and drought, is altogether wrong, as it practically does much more harm than good. The larger growing plants rob the soil of its moisture, to the destruction of the tender and more feebly rooting grass plants. No such protection is necessary, even were it pos-

sible to supply it without injury. With fair preparation of ground, and seed put in as soon as practicable in the spring, the lawn will be fit to mow in June at latest.

A very successful improver, especially in the making of lawns, sows down in August and adds about two pounds of turnip seed to the acre. The gradual growth of the turnip foliage forms a congenial damp shade for the vegetation and spread of the young grass plants. The larger leaves of the vegetable also protect the grass against injury from the early frosts. Their gradual decay and ultimate removal are effected before the grasses are so far advanced as to be hurt by continuous shade, and a thick sward is secured before winter. A slight covering of strawy manure will be of advantage to autumn-sown lawns, particularly so if the soil inclines to be wet, and therefore liable to have the young plants thrown to the surface by the alternate action of freezing and thawing. A heavy roller should be passed over it as early in the spring as the firmness of the soil will admit, in order to tighten the earth around the roots, and press down such plants as have been loosened during the winter.

While it is true that a fine lawn cannot be produced without good preparation, it is equally true that a fine lawn cannot be maintained without frequent mowing. The recent improvements in lawn mowers leave but little to be desired so far as mowing facilities are concerned. They also roll the lawn at the same time that it is cut, which is essential to the most perfect keeping. That which was formerly regarded as a formidable operation is now one of the easiest, and the lawn is kept in good order at less cost than any other portion of the pleasure grounds. One of the best points in the lawn mower is its incapacity for cutting long grass, thus compelling frequent mowing, which is the great secret in keeping a superior lawn. Mow early and often is the rule. Even on newly seeded lawns the mower should be at work as soon as the grass is high enough to cut; indeed much injury results from procrastination at this time; weeds will gain the ascendancy, and unequal growths follow. A lawn sown down in April was cut six

times before the first of August, and had the appearance of an old thickset sod.

Neither in the preparation and formation of a lawn, nor in its keeping in this climate, are there any half-way compromises. The work must be done thoroughly to begin with, and then timely attention to cutting all through the growing season will insure a satisfactory result. Neither soil nor climate can justly be blamed for poor lawns, although it is a convenient mode of shifting responsibility, and one frequently adopted.

As already remarked, lawn mowing machines will not operate to any good purpose where the grass is long; hence it has been recommended to leave the cut grass as a mulch. During the first year this course may be followed with advantage; but experience shows that a long continuance of the practice injures the lawn very materially, particularly during early spring, or late in the season. In the hottest portion of summer the cut grass dries up so thoroughly as to be but of slight influence either way.

The lawn will be benefited by a top dressing once in three or four years; not, however, by throwing over it an unsightly covering of rough, strawy litter, which, however beneficial, is not commendable in neatly kept grounds. A compost made up of fresh stable manure and any ordinarily good surface soil, thrown together in layers, and intermixed and pulverized by frequent turnings during the summer, will be in condition for application any time in early winter. This should be evenly distributed, broken up, and raked in among the roots, taking advantage of frost to assist in the work of disintegration, and removing the rougher portions altogether before rolling the lawn in the spring.

FENCES and HEDGES.—Some sort of fence is usually necessary to guard against intruders, or to designate ownership, and the kind of fence used will generally be governed by necessity.

Whatever materials may be used for outside fences, they should be strong and substantial. Inside fences for such purposes as that of separating the lawn from the vegetable garden may be of lighter construction; especially if a fence crosses a lawn, as seen from the house with an open view beyond, it should be as light

and elegant as is consistent with strength and durability. In such cases it is often desired to conceal the fence, as an intrusive object in the landscape, by adopting the sunken fence. This may be described as a ditch-like excavation four or five feet in depth, finished by a perpendicular wall on the lawn side, and the ground flatly sloped on the opposite.

The propriety of persistently concealing the fence in such positions may be questioned. Utility is a strong element of the beautiful, and if no visible barrier intervenes between the pleasure ground and a grazing field, we at once condemn the incongruity. We cannot distinguish where the flower garden ends or the grazing meadow begins, and must suppose that the cattle can perambulate the flower garden if they choose; we can imagine the result, and we feel that a fence becomes a necessity to separate objects that cannot well be united without injury to one or both. Wire fences are well adapted to this purpose, as they are so light as not materially to interrupt the view; and if properly constructed, are sufficiently strong and permanent.

Even in those happy communities where cattle are not permitted to run at large, some kind of fence will be necessary to designate boundary lines of property. It has been claimed that the highest degree of rural beauty is a village without fences, or any other distinctive marks to properties. As well might it be claimed that the best arrangement in a picture gallery will be produced by taking the paintings out of the frames and nailing the canvas to the walls. The love of exclusive possession is a mainstay of society. Well-defined boundary lines to property greatly enhance its enjoyment, especially when applied to lawns and gardens.

For this purpose the live fence is by far the most appropriate, and that formed of evergreen plants the most permanently beautiful. The Siberian arbor vitæ, Nootka cypress, and hemlock spruce are among the best for northern climates. In the South the Chinese arbor vitæ, Japan euonymus, and other evergreen shrubs may be added to the list. If deciduous plants are preferred, a selection may be made from the following list: Japan quince, buckthorn, *elæagnus*. Ia-

pan privet; and, if a somewhat formidable fence is desired, the Osage orange and honey locust will answer that purpose.

Hedges are also useful as shelter to gardens, rendering them earlier, more productive, and greatly exempt from casualties of climate and locality. In the growth of all kinds of small fruits, as well as those of larger orchard growth, shelter is always of the greatest benefit. Many of the diseases of our fruit trees and imperfections in the products can be effaced by sheltering hedges and plantations—facts that are now being fully appreciated by fruit-growers.

In grounds of very limited dimensions, where the boundary lines are at no great distance from the house, an evergreen hedge set inside the fence will afford great relief to the eye and form a background, as it were, to the shrubbery and flower borders. The stiff line of the hedge can be modified in appearance by planting small, diversified groups of shrubs, or low-growing evergreens along its front. A continuous border varying in width and of curving outline, running in a direction parallel with the hedge, and thickly planted with flowering shrubs of variety, interspersed with such flowering herbaceous perennials as hollyhocks, phloxes, chrysanthemums, delphiniums, etc., is one of the best modes of treating a small pleasure garden and lawn.

WATER, Lakes.—When appropriately introduced, the effect of water in pleasure grounds is always pleasing; frequently it is strikingly beautiful; and, of all the materials that enter into the composition of natural scenery, there are none that produce a greater amount of varied interest and beauty. It is, therefore, eagerly desired as an adjunct to the more artificial improvements of private residences, public institutions, and city parks, and is always a valuable acquisition where it can be secured.

To form an artificial lake, the first requisite is an ample supply of water at all seasons. There cannot well be a more unsatisfactory object in artificial grounds than a lake where the supply of water is insufficient to keep it properly filled, and where natural facilities for a constant supply do not exist its construction should

not be attempted. The surface water, or casual supply derived from rains and snows, may be sufficient during winter and spring, but entirely inadequate to meet the evaporation during summer; and lakes that are dependent upon this source, and become partially empty and stagnant during the warm season, are as injurious to health as they are opposed to all correct ideas of beauty.

Water for ponds is sometimes procured from the discharges of underground drains; and where the drained area is extensive enough to furnish all the water necessary, which can be ascertained by observations during summer, a pond may be excavated at the lowest point, allowing the surface of the water to be on a level with the discharge pipes of the drains. The excavated soil can be used in forming the banks of varied heights and configurations. The outline of the pond, like that of a belt of trees or shrubbery border skirting a lawn, should be varied and irregular, with bold points and deep indentations, and these should be a level lawn, surrounded by curved outlines of shrubbery, and that of a smooth sheet of water in a pond or small lake, with jutting banks and retiring bays, is very close, so far as relates to their artistic treatment in ornamental planting.

The most natural position for a sheet of water is in a hollow or low ground, occupied by a constantly running stream. It frequently occurs that small streams are so situated that by skillfully throwing a dam across the valley hollow through which the water runs a large surface may be flooded and the water permanently retained. The water level on the surrounding ground will probably show a beautifully varied outline which may be increased or rendered more definite by deepening bay-like recesses and adding to prominent or jutting points. This, together with the effects that may be produced by planting, will give variety to otherwise monotonous outlines.

In geometrically arranged flower gardens simple basins of water may be introduced with good effect, either with fountains or without them. In these situations the marginal finish or connection between the grass and water should be of an architectural description. Any attempt made toward a rugged, or what

is usually termed a natural looking finish, will certainly prove unsatisfactory.

GATES AND CARRIAGE TURNS.—

First impressions are strongly influencing, and oftentimes prove to be the foundation of lasting prejudices. A neatly designed and tastefully arranged gateway at the entrance of a property creates the favorable expectation of finding these characteristics pervading other improvements. An imposing entrance way, therefore, becomes an important feature; but it should always bear a close relation to the general style and scale of the situation; and, if it is architectural in design, should harmonize with the style of the mansion to which it is an adjunct; at the same time it may be more highly ornamented, keeping strictly in mind that no amount of mere decoration will compensate for any appearance of insufficient strength or utility.

Iron gates appear to greatest advantage when they are hung to stone posts or attached to pillars of masonry. A single block of granite, fashioned into a post, forms a very satisfactory support for an ordinary iron gate. Large, heavy, and elaborately constructed iron gates demand heavier and more massive supporting pillars, ornamented to correspond with the style and finish of the gate. The main or principal entrance gate to any place, even of the most humble description, should be placed on a line receding more or less from the line of the outside or public road, being connected with the latter by a curved line of fence. The extent of this recess will vary with the extent of the place, facilities of position, and size and style of the gate; but ten to thirty feet may be given as a range. Even in places of quite limited extent, the former distance will be sufficient to give a decided effect, without encroaching too severely on the grounds, and will establish a largeness of expression to the whole surroundings. In placing posts for gates the mistake is frequently made of setting them parallel to the public road instead of having them at a right angle to the road to which they properly belong. When the private road leaves the public one at right angles, and continues in a straight line for some distance, the gate will, of course, be properly placed in a line parallel to the public road: but

where the front lawn is small in extent and it becomes a necessity to branch the road suddenly to right or left, the importance of adhering strictly to the rule of placing the gate at a right angle to the carriage road will appear very conspicuous; for if the posts are set parallel with the public road, it will be found to be a matter of much nicety to drive a carriage through the gateway without either coming in contact with the post or allowing the horses to walk on the grass or road edging. Examples of this may be seen in most suburban districts.

The greater the inequality of the respective distances between the posts and the line of the outside or public road the more difference will there be in the length of the curved lines connecting them with the fence. One will be much shorter and have a different radius from the other; but this will not destroy the symmetry of composition which a gateway should possess, since the apparent utility of the arrangement will convey a strong reason for its adoption, which can be further increased by the judicious planting of trees; besides, it should be remembered that an expression of symmetry can be obtained without having a strict adherence to uniformity in details.

A space sufficiently large for allowing a carriage to turn is a necessary convenience to a house, and as near to the main entrance as practicable. In the front of very large buildings, a gravel space wide enough for this purpose is sometimes provided; but when the house is one of ordinary dimensions, and the grounds of only moderate extent, a large gravel space will very materially abridge the breadth of the front. The reflection of heat from gravel is not pleasant, neither is it so agreeable to the eye as the grassy lawn. Some of the objections to an open gravel space are removed by forming a circular carriage-way, directly in front of the house, inclosing a bed for shrubbery or a grass plot. The amount of roadway is, by this mode, somewhat reduced, but the evil of breaking up the front still exists; nor does it provide all the requirements of a carriage turn, as there is no alternative but to perambulate the circle when retiring; and the annoyance of having vehicles and animals obstructing the views from the principal windows of the

house is also a great objection to this arrangement. The best position for a carriage-turn is beyond the house, so that a vehicle, after approaching the main entrance, can proceed onward, turn, and approach the house again in the opposite direction. The turn in this case can be partially screened from the house by planting shrubbery; and arrangements for tying horses can be made in unobjectionable positions where they will not present annoying features as seen from the house. This allows the grass or lawn to be carried closer to the building, the roadway only intervening, and the side grouping of plants can be executed much more effectively. The curve of the road, entering into the grounds on one side, will be balanced by a similar curve on the other side, toward the turn. In this proximity to a building, the walks, as well as artificial plantings, should be symmetrical in their tendencies, and in keeping with the formal style of treatment which such a position demands. The central view from the building will be open, and impart an expression of freedom and apparent extent of lawn, which is always pleasing, particularly in limited areas.

ROADS and AVENUES, Planting.—

In the planting of straight roads and avenues it is essential to preserve regularity of line, as also uniformity in the color and shape of the trees. The nearest approach to the sublime in landscape gardening is in effects produced by extended uniform lines of trees. Continuity of line and uniformity of object, when combined with great extension, produce sublimity. Objects are sublime which possess quantity and simplicity in conjunction. It is not on a small rivulet, however transparent or beautifully winding it may be; it is not on a narrow valley, though variegated with flowers of a thousand hues; it is not on small elevations, though they are clothed with the most delightful verdure, that we bestow the epithet sublime; but it is upon Niagara, the Mississippi, the Andes, the ocean, the wide expanse of the firmament, or the immensity of space uniformly extended, without limit and without termination. To produce this effect it is, therefore, imperative that only one variety of tree should be used. Anything that

tends to break up the uniform continuity will at once destroy it. A straight avenue, planted with a variety of trees of varied forms, some broad and spreading, others tall, pointed, and spiry, is as much at variance with good taste as would be a Grecian facade, furnished with columns embracing all the different orders of architecture. Among the best trees for planting wide avenues are the tulip tree, the sugar and the silver maple, lindens, sycamores, walnuts, oaks, and chestnuts. For narrower roads, those from sixteen to twenty feet in width, the Norway maple, the black and the white ash, the horse chestnut, and those of kindred habit, will be more suitable.

On wide and long avenues, in positions where a side view of the lines is prominent, the wall-like effect may be very much softened and toned down, by setting a double or even a triple row of trees, and this will be still further increased by planting each opposite row, respectively, with a distinct kind. An avenue of tulip trees will, in this arrangement, be well supported by an outside line of red maples; their forms will blend pleasingly, and the contrast of their spring verdure, and autumn colorings will be agreeable. In a similar disposition the sugar maple, sweet gum, and ash-leaved maple may be used. Such combinations may be indefinitely varied and adapted to the embellishment of avenues, as their extent and importance may demand or require.

In planting curving roads, the disposition of the trees will obviously be determined by the general character of the grounds through which the road passes.

In places of six to ten acres in extent, and in form nearly of a square or parallelogram, with the mansion placed one hundred yards back of the front line, the entrance gate may be judiciously set near one of the corners, and the road gradually curve to the building. A single continuous row of trees on one side of this road would have a monotonous effect, and a row on each side would destroy and completely break up any attempt at breadth of view. The road should rather appear to curve round and pass through masses of trees and shrubbery plantations. While attention may be given to partially shading the road, by planting suitable

trees mainly on the south and west sides, yet these shade trees should form only a portion of groups, with an occasional isolated single specimen tree; or, what is still better, two trees of the same kind set six to ten feet apart, so that when they grow up they will give a distant appearance as of a single tree, with the additional variety of aspect when closely viewed. The plantings or groups should be more extensive and massive on the inner circle, around which the road will curve, with frequent open vistas, looking in upon the lawn. The width and length of the road and extent of lawn will designate the size of the groups, and also suggest the particular kinds of trees and shrubs of which they are to be composed. Shade trees may be thus introduced in sufficient quantities, even on winding roads, to answer the combined purposes of shade and garniture, without producing an appearance of strained effort to secure it.

Where the road is wholly on the southern side of the dwelling, deciduous trees should be used in front or near the building. If the entrance and road are north of the house, a straight avenue of evergreen trees will form an admirable feature, if ample space is allowed for both road and trees. The Norway spruce is, perhaps, the first choice of tree for such planting. The hemlock spruce is the more graceful, and the best adapted to short roads or narrow grounds. The Austrian, the Scotch, and the white pine may be used where the grounds are extensive. Even when the Norway spruce is used the parallel lines should be fifty feet apart, not only to admit of sun and winds to act directly on the roadway, but also to give ample room for the spread of the lower branches of the trees; and in no case should they be planted nearer than sixteen feet from the edge of the road; and when the larger and more widely spreading pines are used, a space of at least twenty feet should be given. A very meagre effect will result from planting close to roadways, narrowing them into mere strips, which for at least one-half of the year are seldom dry.

BUILDINGS, Planting near.—A mischievous error, and one too frequently perpetrated, is that of placing trees close to buildings. Although trees and shrubs

are the chief decorative ornaments of a place, they become not only disagreeable but positively injurious to animal life, when closely massed around a habitation, by shutting out light, and preventing the rays of the sun and drying action of winds from exerting their salutary influence on the walls, which, in consequence, are constantly damp and unhealthy. Where large trees are allowed to spread and overhang the roofs, choking gutters and water leaders, and causing a deposit of mold and other fungoid growths as far as their influence extends, it is impossible for the house to be dry, comfortable, or healthy for human beings. Many of the older houses throughout the country are rendered almost uninhabitable by the dense surroundings of trees and shrubbery, and the evil is greatly aggravated when the trees are of evergreen species. Ventilation is produced by heat, and a building shaded from the rays of the sun by lofty trees, and sheltered from currents of air by thickets of shrubbery, is deprived of the influences most conducive to health, and is a fitting subject for the attention of a sanitary commission.

Plantings of the finer species of dwarf flowering shrubs may be placed in moderately large masses on the lawn near the house, without any great injury, if not too frequently repeated; but even the smaller growing shrubbery, if planted in continuous thickets near the building, in any except a northerly direction, will sensibly exclude the genial cool breezes so grateful during summer. A house nestling on the sunny side of an evergreen plantation is suggestive of comfort, and presents a cheerful, sheltered appearance during winter. It is as economical as it is attractive, as many persons can testify who have had the foresight to plant sheltering borders of evergreens in bleak and treeless situations, and in consequence are realizing a higher thermometric temperature; but even these, to be of greatest benefit, should not approach within one hundred feet of the house, at least not in mass. Isolated specimens of rare, or otherwise specially interesting trees, may be planted nearer, but only on the northern sides of the house.

A certain amount of shade is very desirable in connection with a house, especially in climates where, during a

great portion of the time, it is more agreeable out doors than it is in rooms; yet it had better be secured by covered verandas than by trees. It is also more conducive to health to sit under a covered roof. Exposure to evening dews is a well-known fruitful source of sickness, and the partial protection afforded by the overhanging branches of trees is not sufficient when dew is falling.

Trees of the large-growing species should not be planted nearer than sixty feet to the walls of a dwelling-house. Such trees are the sugar and the silver maple, the sycamore, elm, linden, ash, chestnut, and poplar. Trees of medium growth, such as the Norway and the English maple, and others of this class, that do not attain a height of more than thirty feet, may be planted thirty to forty feet from the building.

Another disadvantage resulting from surrounding the building with a thicket of foliage is, that it shuts out the views of immediate and distant scenery, as seen from the house, at the same time the house, as an object of the local landscape, is completely hidden from view. If the architecture of the structure has received any study as a work of artistic design, it should in itself form a picture which, to be properly appreciated, must be seen and viewed as a whole, so that its proportions, outlines, elevations, and ornamental details may be taken in at one view. Even beds of low shrubbery, if abundantly introduced near the base of a building, will foreshorten the elevation, obstruct the view of the horizontal base line, and seemingly destroy architectural proportions. Many of the finest structures, both public and private, are ruinously shorn of their beauty by careless or ignorant planters, who, in their endeavors to beautify a building, succeed only in concealing those salient lines and projections that give it character and distinctive-ness.

A proper connection of the house with

its surroundings is the first point to which attention should be given in laying out grounds, as it is the most prominent and leading detail of improvements. A house should not appear to have risen out of the green lawn like a tree. It is necessary that some evidence should be apparent of suitable preparation having been made for the building; at least, a level platform of more or less width should project from the base line. The ground line should be level, and all walks should correspond with the lines of the ground plan. Zigzag and curving walks close to the straight lines of a large, or even the most humble building, are directly opposed to beauty or propriety; they are sure evidence of unskilled labor.

The principal front of a building should show a terrace, either architecturally treated, or at least with architectural appendages. The level line of terrace will furnish a uniform base to the building, and masses of low-growing plants may be introduced below the terrace where they will not interfere with the view of the structure. A few trees may be planted at the ends or in the rear, which will serve to connect the house with the grounds and their scenery, and this can be done without either hiding or overshadowing the building.

It has long been laid down as a general principle that round-headed trees contrast best with the prevailing perpendicular lines of Gothic architecture, and those of a pointed or conic shape with the horizontal of the Grecian. It may be questioned whether either of these rules is sufficiently accurate to be worthy of consideration; certain it is that there may be found compositions of expressive beauty, where the arrangements are the reverse of those proposed in the general principle. It is perhaps nearer the facts to state that, in the arrangement of forms, harmony will prove more pleasing than contrast; but when applied to colors, contrast will develop the most distinct and expressive compositions.

L A W;

OR,

EVERY MAN HIS OWN LAWYER.

ASSIGNMENT, General.—(INDORSED ON THE ASSIGNED INSTRUMENT.)—Know all men by these presents, that I, the within A. L., in consideration of \$25 to me paid by B. C., have assigned to the said B. C., and all assigns, all my interest in, and to the within instrument, and every part or parcel thereof, and all the rights and interests therein, and thereby conveyed, and I do hereby constitute the said B. C., my true and lawful attorney in my name, but at his own costs and charges, to take all legal measures, which may be necessary to enforce the stipulations and agreement herein contained, or to recover the moneys due or to grow due thereon.

Witness my hand and seal this—of—18—
A. L. [L. s.]

LEASE, Assignment of a.—Know all men by these presents, that I, B. C., the within named lessee, for and in consideration of \$50 to me in hand paid by A. L., of the town of _____ county of _____, at and before the sealing and delivery hereof, the receipt whereof I do hereby acknowledge, have granted, assigned, and set over, and by these presents, do grant, assign and set over, unto the said A. L., his executors, administrators and assigns, the within indenture of lease, and all that house and farm [or describe the property to be assigned] therein described, with the appurtenances; also all my estate, right, title, term of years yet to come, claim and demand whatsoever of, in, to, or out of the same. To have and to hold the said house and farm, and the appurtenances thereof, unto the said A. L., his executors, administrators, and assigns, for the residue of the term within mentioned, under the yearly rent and covenants within reserved and contained on my part and behalf to be done, kept and performed.

Witness my hand and seal this—of—18—
B. C. [L. s.]

PATENT RIGHT, Assignment of a.—Whereas, letters patent, bearing date

the—the day of—18—, were granted and issued by the Government of the United States, under the seal thereof, to Edwin Hough, of the town of Hornellsville, of the State of New York, for [here state the nature of the invention as in the patent] a more particular and full description whereof is annexed to the said letters patent in a schedule, by which letters patent the full and exclusive right and liberty of making and using the said invention, and of vending the same to others to be used, was granted to the said Edwin Hough, his heirs, executors, administrators or assigns, for the term of seventeen years, from the same date.

Now, know all men by these presents, that I, the said Edwin Hough, for and in consideration of the sum of \$1000, to me in hand paid, the receipt whereof is hereby acknowledged, have granted, assigned, and set over, and by these presents do grant, assign and set over unto William A. Dean, of the said town of Hornellsville, his executors, administrators, and assigns, forever, the said letters patent, and all my right, title and interest in and to the said invention, so granted unto me; to have and to hold the said letters patent and invention, with all benefit, profit and advantage thereof, unto the said William A. Dean, his executors, administrators and assigns, in as full, ample and beneficial manner, to all intents and purposes, as I, the said Edwin Hough, by virtue of the said letters patent, may or might have, or hold the same, for and during all the rest and residue of the said term of seventeen years.

In witness whereof, I have hereto affixed my hand and seal, this—day
of 18

EDWIN HOUGH, [L. s.]

In presence of }
BEN. WILEY, }
D. R. SHAFER. }

This assignment should be recorded in

the office of the Commissioner of Patents,
at Washington.

ASSIGNMENT OF A JUDGMENT.

—Court, County of—

A. B. }	Recovery	1,131 14
agt.		
C. D. }	Costs	30 25
		\$1,161 39

Roll filed May 10th, 1876, 3 h. P. M.

J. B. W., Plff's Att'y.

In consideration of \$1,162, to me paid, I do hereby assign and transfer to G. H., the judgment above mentioned, for his use and benefit, hereby authorizing him to collect and enforce judgment thereof in my name, or otherwise, but at his own costs and charges, and covenanting that the sum of \$1,161.39 with the interest from the 10th day of May, 1876, is due thereon.

Witness my hand and seal this 1st day of January, 1876. A. B. [L. S.]

Assignment of Bond and Mortgage.—

Mortgage dated the 3d day of January, 1876, executed by A. B. and wife to C. D.; recorded in the ——— County Clerk's office, in Book No. — of Mortgages, page — &c., bond bearing date the day aforesaid, executed by A. B. to C. D., aforesaid, in the penal sum of \$1,000, conditioned for the payment of \$500 in five years from the date thereof, with interest semi-annually.

In consideration of \$500 to me paid by E. F., I do hereby sell, assign, transfer and set over, unto the said E. F., the bond and mortgage above described, hereby authorizing him to collect and enforce payment thereof, in my name or otherwise, but at his own cost and charges; and I hereby covenant that the sum of \$500, with interest, from the 3d day of January, 1876, is now due and owing on the said bond and mortgage, and that I have a good right to sell the same. *

Witness my hand and seal this 10th day of January, 1876. C. D. [L. S.]

Have the assignment acknowledged before the proper officers and recorded.

Assignment of Bond and Mortgage as Collateral Security.—The same as in preceding form (see ASSIGNMENT OF BOND AND MORTGAGE); where the star is affixed add the following:

But this assignment is, nevertheless,

made on this express condition, that, if the said C. D., his heirs, executors or administrators, shall well and truly pay, or cause to be paid, unto the said E. F., his heirs, executors, administrators or assigns, the sum of \$500 and interest thereon, on or before the 3d day of January, 1881, this assignment shall be void and of no effect, this indenture being made for the purpose of securing the payment of the said sum of \$500, with interest as aforesaid, and for no other purpose whatever. And in case the said E. F., his heirs, executors, administrators or assigns, shall collect or receive the money due on the said mortgage hereby assigned, he shall, after retaining the sum of \$500 and interest thereon, and his reasonable costs and charges in that behalf expended, pay the surplus, if any, to the said C. D., his heirs, executors, administrators or assigns.

In witness whereof, the said parties have hereto respectively set their hands and seals, this 10th day of January, 1876.

C. D. [L. S.]

E. F. [L. S.]

Have the same acknowledged before a proper officer and recorded.

BOND, for Payment of Money at different times.—(The same as in last form to the * then let the Bond read as follows: The condition of this obligation is such, that if the above-bound A. B., his heirs, executors, and administrators, or any of them, shall well and truly pay, or cause to be paid, unto the above-named C. D., his executors, administrators, or assigns, the just and full sum of \$1000, lawful money as aforesaid, in manner following, to-wit, \$300, part thereof, on the ——— day of ——— next ensuing the date thereof; \$300 more thereof on the ——— day of ———, the next following; and \$400, the residue, and in full payment thereof, on the ——— day of ——— which will be in the year of our Lord, 18—; then this obligation to be void; but if default be made in payment of any or either of said sums on the days and times hereinbefore mentioned and appointed for payment thereof respectively, then this bond shall remain in full force and virtue.

A. B. [L. S.]

CONVEYANCES.—See DEEDS AND MORTGAGES.

CONTRACTS.—See AGREEMENTS.

Bill of Exchange.

\$500 New York,———18

Fifteen days after sight (or as many days as may be agreed upon), pay to the order of Mr. B. B. five hundred dollars, and charge the same to the account of
To L. M., St. Louis, Mo. C. D.

NOTE, Promissory.

\$200. Baltimore,———18

Thirty days after date I promise to pay B. B. or order (or bearer), two hundred dollars, for value received. B. F.

NOTE, Joint Promissory.

\$1,050. Memphis———18

Sixty days after date we jointly promise to pay C. D., or order, (or bearer), one thousand and fifty dollars, for value received.
A. C.
B. H.

NOTE, Payable on Demand.

\$100. Mobile,———18.

On demand, for value received, I promise to pay H. B., or order (or bearer), one hundred dollars (with interest).
C. C.

NOTE, Payable at Bank.

\$300. St. Louis,———18

Thirty days after date, for value received, I promise to pay C. D. A., or order (or bearer), three hundred dollars, at the Bremen Savings Bank.
D. R. S.

NOTE, not Negotiable,

\$100. Madison, Ga.,———18

Two months after date I promise to pay J. H., one hundred dollars, for value received. B. B.

DUE BILL.

\$50. Cincinnati,———18

Due A. W., fifty dollars, with interest from this date. M. A.

NOTE, with Surety,

\$75. Columbus, Miss.,———18

Six moths from date I promise to pay E. G., or order (or bearer), seventy-five dollars, for value received. B. B.
X. X.

Note Payable by Instalments.

\$500. Albany,———18

For value received, I promise to pay A. C., or order (or bearer), five hundred dollars, in the following manner: One hundred dollars in three months, two hundred dollars in nine months, one hundred dollars in twelve months, and one hundred dollars in fifteen months, from

date, with interest on the several sums as they may become due. W. Z.

DRAFT at Sight.

\$100. Chicago,———18

At sight, pay J. C., or order, one hundred dollars, and charge the same to my account. C. E. B.

To A. X.

BILL OF SALE.—Know all men by these presents, that I, E. D., of the town of——, county of——, State of——, of the first part, for, and in consideration of, the sum of one hundred dollars, lawful money of the United States, to me in hand paid, at or before the ensembling and delivery of these presents, by C. B., of the second part, the receipt whereof is hereby acknowledged, have bargained, sold, granted and conveyed, and by these presents do bargain, sell, grant and convey unto the said party of the second part, his executors, administrators and assigns [here set out the articles sold], to have and to hold the same unto the said party of the second part, his executors, administrators and assigns, forever. And I do for myself, my heirs, executors and administrators, covenant and agree to and with the said party of the second part, to warrant and defend the said described goods hereby sold unto the said party of the second part, his executors, administrators and assigns, against all and every person and persons whatsoever.

In Witness Whereof, I have hereunto set my hand and seal the——day of——18—
E. D. [L. S.]

Signed, sealed and delivered, }
in the presence of B. B. }

CHATTEL MORTGAGE to Secure a Money Demand.—To all to whom these presents shall come—greeting: Know ye, that I, A. C., of the town of——, county of——, State of——, party of the first part, for securing the payment of the sum of one dollar, to me in hand paid, at or before the ensembling and delivery of these presents, by B. H., of the same place, party of the second part, the receipt whereof is hereby acknowledged, have granted, bargained, and sold, and by these presents do grant, bargain, and sell unto the said party of the second part, all that [here mention the articles] and all other goods and chattels whatsoever, mentioned and expressed in the schedule hereunto annexed, now remaining and

being in the possession of the said A. C. To have and to hold all and singular the goods and chattels above bargained and sold, or intended so to be, unto the said party of the second part, his executors, administrators, and assigns forever. And the said party of the first part, for himself, his heirs, executors, and administrators, all and singular, the said goods and chattels above bargained and sold unto the said party of the second part, his executors, administrators and assigns, against the said party of the first part, and against all and every person and persons whomsoever, shall and will warrant, and by these presents forever defend.* Upon condition, that if the said party of the first part, shall well and truly pay, or cause to be paid, unto the said party of the second part, his executors, administrators or assigns, the sum of \$—, and interest thereon, on the — day of — next, then these presents and everything herein contained, shall cease and be void.† And the said party of the first part, for himself, his executors, administrators and assigns, does covenant and agree to and with the said party of the second part, his executors, administrators and assigns, to make punctual payment of the money hereby secured; and in case default shall be made in payment of the said sum above mentioned, it shall and may be lawful for, and the said party of the first part does hereby authorize and empower the said party of the second part, his executors, administrators and assigns, with the aid and assistance of any person or persons, to enter and come into and upon the dwelling-house or premises of the said party of the first part, and in such other place or places as the said goods and chattels are or may be held or placed, and take and carry away the said goods and chattels, to sell and dispose of the same for the best price they can obtain, and out of the money to retain the said sum above mentioned, with the interest and all expenses thereon, rendering the overplus (if any) unto the said party of the first part, his executors, administrators and assigns. And until default be made in the payment of the aforesaid sum of money, the said party of the first part to remain and continue in quiet and peaceable possession of the said goods and

chattels, and the full and free enjoyment of the same, unless the said party of the second part, his executors, administrators or assigns, shall sooner choose to demand the same; and until such demand be made, the possession of the said party of the first part shall be deemed the possession of an agent or servant, for the sole benefit and advantage of his principal, the said party of the second part.

In witness whereof, the said party of the first part has hereunto set his hand and seal, this—day of—18—.

A. C. [L. s.]

Sealed and delivered in }
the presence of } —

When the list of goods are not all embraced in the body of mortgage, they may be embraced in the schedule, which shall be signed by the mortgagor.

ASSIGNMENT OF BOND AND MORTGAGE—Indorsed on the Instrument.—

In consideration of \$500, to me paid by A. B., I hereby sell, assign, transfer and set over to A. B., the within mortgage and the bond accompanying the same, and authorize him to collect and discharge the same. L. M. [L. s.]

New York, January 10, 1876.

CHATTEL MORTGAGE, to Secure a Note.—(In the foregoing form where the * is inserted, in place of the sentence from the * to the † insert the following:)

Upon condition that the said party of the first part shall well and truly pay at maturity the full amount, principal and interest, of a certain promissory note executed by the said party of the first part for \$—, dated—day of—18—, payable to the order of said B. H., — months after date, then these presents, and everything herein contained, shall cease and be void.

BOND, Common.—Know all men by these presents, that I, A. B., of the town of—, county of—, and State of—, am held and firmly bound unto the said C. D., of the same place, in the sum of \$1000 [this amount is called the penal sum, and is usually double the amount of the real debt, in order to cover interest, costs and other contingencies], good and lawful money of the United States, to be paid the said C. D., his executors, administrators and assigns; to which payment, well and truly to be made, I do bind myself, my heirs, execu-

tors, administrators and assigns; to which payments, well and truly to be made, and I do bind myself, my heirs, executors and administrators, and every of them, firmly by these presents. Sealed with my seal, dated the——day of——, A. D., 18—.*

The condition of this obligation is such that if the above bound A. B., his executors, and administrators, or any of them, shall and do well and truly pay, or cause to be paid, unto the above-named C. D., his executors, administrators and assigns, the just and full sum of \$500 lawful money aforesaid, with legal interest for the same, on or before the——day of——, in the year of our Lord 18—, without fraud or further delay, then this obligation to be void and of no effect, or else to remain and be in full force and virtue.

In witness whereof I have hereunto affixed my hand and seal, the day and year first above written.

A. B. [L. s.]

BOND, to Execute a Conveyance.—

(The same as in Bond, Common, to the *, then let the Bond read as follows:) The condition of this bond is such, that if the said A. B., on or before the——day of——next ensuing the date hereof, or, in case of his death before that time, if the heirs of the said A. B., within——months next after his decease, if such heirs shall be then of full age, or, if within age, then within the months after such heirs shall be of full age, shall and do, upon the reasonable request of, and at the charges of C. D., his heirs or assigns, make, execute and acknowledge, or cause so to be, all and every such deed or deeds, conveyance or conveyances whatsoever, which shall be needful for conveying and confirming unto the said C. D., his heirs and assigns, a good, absolute and indefeasible estate of inheritance in fee simple, clear of all incumbrances, of and in a certain messuage (here describe) with the appurtenances; and if, in the meantime, and while and until the same deed or deeds shall be executed, the said A. B., his heirs and assigns, shall and do permit and suffer the said C. D., his heirs and assigns, peaceably and quietly to have, hold and enjoy the same messuage and tract of land; then the above obligation

to be void; otherwise it shall be and remain in full force and virtue. A. B. [L. s.]

AGREEMENT, for the Sale and Purchase of Land.—Articles of Agreement made and concluded this——day of——, A. D., 18—, by and between A. B. and C. D., of——, in the State of——

First.—The said A. B. in consideration of the sum of \$1,000 to him paid by the said C. D., the receipt whereof is hereby acknowledged; and in further consideration of the promise of the said C. D., hereinafter contained, doth hereby promise and agree, to and with the said C. D., that he will, on or before the——day of——next, make and deliver to the said C. D. a good a sufficient deed, with the usual covenants of warranty, release of dower, etc., of all that tract of land situate, lying, and being in the town of——, in the county of——, and State of——, known as the——, etc., [or bounded and described as follows:—]

Second.—In consideration whereof, the said C. D. doth hereby promise and agree, to and with the said A. B., that he will, on such a deed being tendered to him by the said A. B. on or before the——day of——next, pay to the said A. B. the further sum of——dollars, in addition to the payment already made, being the balance of the purchase money hereby agreed upon for the said tract of land.

And to the true and faithful performance of all the agreement, herein contained on the part of the said A. B. and C. D., each of them binds himself, his heirs, executors and administrators, to the other, and his heirs, executors and administrators.

In testimony whereof, we have hereunto set our hands, on the day and year first above written.

A. B.

C. D.

Executed and delivered } E. F.
in presence of } G. H.

AGREEMENT, to Build a House According to a Plan and Specifications Annexed.—Be it remembered, that on this——day of——A. D., 18—, it is agreed by and between A. B., of——, and C. D., of——, in manner and form following, viz.:

The said C. D., for the considerations hereinafter mentioned, both for himself, his executors and administrators, promise and agree to and with the said

A. B., his executors, administrators and assigns, that he, the said C. D., or his assigns, shall and will, within the space of of—months next after the date hereof, in good and workmanlike manner and according to the best of his art and skill, at—well and substantially erect, build, set up, and finish, one house or messuage, according to the draught or scheme and specifications hereunto annexed, of the dimensions as following, viz.: [here insert specifications, &c.,] and to compose the same with such stone, bricks, and other materials as the said A. B., or his assigns, shall find or provide for the same. In consideration whereof, the said A. B. doth, for himself, his executors and administrators, promise and agree to, and with the said C. D., his executors, administrators and assigns, well and truly to pay, or cause to be paid, unto the said C. D., or his assigns, the sum of—dollars, in manner following: that is to say, the sum of—dollars, part thereof, at the beginning of said work; the sum of—dollars more, another part thereof, when the same shall be completely finished; and, also, that he, the said A. B., his executors, administrators, or assigns, shall and will, at his and their own proper expense, find and provide all the stone, brick, tile, timber and other materials necessary for making and building the said house; and for the performance of all and every the articles and agreements above mentioned, the said A. B. and C. D. do hereby bind themselves, their executors, &c., each to the other, in the penal sum of \$500, firmly by these presents.

In witness whereof, we have hereunto set our hands and seals, this—day of—, A. D., 18—

A. B. [L. s.]

C. D. [L. s.]

CONTRACT OF COPARTNERSHIP.—

Articles of co-partnership made this—day of—, 18—, by and between A. A. and B. B., both of the town of—county of—witnesseth:

That the said parties hereby agree to form, and do, form a co-partnership, for the purpose of carrying on the general (kind of business here insert) business on the following terms and articles of agreement, to the faithful performance of which they mutually engage and bind themselves, each to the other.

The name and style of the co-partnership shall be (here insert whatever name the firm is to be known by), and shall commence on the—day of—, 18—, and continue for the period of—years. Each of the parties agree to contribute to the funds of the partnership the sum of \$— in cash, which shall be paid in, on or before the—day of—, 18—; and each of said parties shall devote and give all his time and attention to the business, and to the care and superintendence of the same.

All profits which may accrue to the said partnership shall be divided equally, and all losses happening to the said firm, from bad debts, depreciation of goods, or any other cause or accident, and all expenses of the business, shall be borne by the said parties equally.

All the purchases, sales, transactions and accounts of the said firm shall be kept in regular books, which shall always be opened to the inspection of both parties and their legal representatives respectively.

An account of stock shall be taken, and an account between the parties shall be settled as often as once a year, and as much oftener as either partner may desire and in writing request.

Neither of said parties shall subscribe any bond, sign or indorse any note of hand, accept, sign or indorse any draft or bill of exchange, or assume any other liability, verbal or written, either in his own name or the name of the firm, for the accommodation of any other person or persons whatsoever, without the consent in writing of the other party; nor shall either party lend any of the funds of the co-partnership without such consent of the other partner.

No large purchases shall be made, (if desired a limited amount can be named), nor any transactions out of the usual course of the business shall be undertaken by either of the partners, without previous consultation with and approbation of the other partner; neither shall withdraw from the joint stock, at any time, more than his share of the profits of the business then earned, (if desired, an amount can be named), nor shall either party be entitled to interest on his share of the capital; but if, at the expiration of the year, a balance of profits be found due to either

partner, he shall be at liberty to withdraw the said balance, or to leave it in the business, provided the other partner consent thereto, and in that case he shall be allowed interest on said balance.

At the expiration of the aforesaid term, or earlier, dissolution of this co-partnership, if the said parties, or their legal representatives cannot agree in the division of the stock then on hand, the whole co-partnership effects, except the debts due the firm, shall be sold at public auction, at which both parties shall be at liberty to bid and purchase like individuals, and the proceeds shall be divided, after payment of the debts of the firm, in the proportions aforesaid.

For the purpose of securing the performance of the foregoing agreements, it is agreed that either party, in case of any violation of them, or either of them, by the other, shall have the right to dissolve this co-partnership forthwith, on his becoming informed of such violation.

In witness whereof, we, the said A. A. and B. B., have hereto set our hands, the day and year first above written.

Executed and delivered in }
presence of }
C. C.
D. D.

A. A.
B. B.

AGREEMENT, to Continue a Partnership.—Endorse the following on the original articles: Whereas, the partnership evidenced by the within written articles, has this day expired by limitations contained herein (or will expire on the—day of—18—), it is hereby mutually agreed that the same shall be continued, on the same terms and with all the provisions and restrictions herein contained, for the further term of—years from this date (or from the—day of—18—).

In witness whereof, we have hereto set our hands this—day of—18—.

A. A.
B. B.

AGREEMENT, to Sell and Deliver Wood.—Memorandum of agreement made this—day of—18—, by and between A. A., of the town of— and B. B., of the village of—, witnesseth: That the said A. A., for the sum of \$— per cord, hereby agrees to sell and deliver to the said B. B.,—

cords of good sound (name kind) wood, and to securely and properly pile the same (name place) on the lot of the said B. B. Said wood is to be cut during the month (this can be left out) to be cut four feet long, and properly piled on said lot, on or before the—day of—next. Said wood when piled as aforesaid, is to be measured by D. F., and the said B. B. agrees to pay the said A. A. the sum of \$— for each and every cord so delivered; payment to be made by installments on each—cords as they are delivered, whenever, and as soon as the said A. A. shall furnish to the said B. B. the certificate of the said D. F., that such—cords or additional of wood have been delivered and properly piled on said lot.

Witness our hands, the day and year first above written.

A. A.
B. B.

QUIT CLAIM DEED.—Know all men by these presents, that I, A. B., of the town of—county of—, for divers good causes and considerations thereunto moving, especially for \$— received to my full satisfaction, having remised, released, and forever quit-claimed, and by these presents do for myself, my heirs, executors and administrators, justly and absolutely remise, release and forever quit-claim unto the said C. D., and to his heirs and assigns forever, all such right and title, as I, the said A. B., have or ought to have, in or to all that (insert here description of premises), to have and to hold the above released premises, unto the said C. D., his heirs and assigns, to his and their only proper use and behoof forever; so that neither I, {the said A. B., or any other person in my name and behalf, shall or will hereafter claim or demand any right or title to the premises, or any part thereof; but they, and every of them, shall by these presents be excluded and forever barred.

In witness whereof, I have hereunto set my hand and seal, the—day of— in the year of our Lord, 18—.

A. B. [L. S.]

Signed, sealed and delivered } S. M.
in the presence of } P. P.

WARRANTY DEED.—This indenture, made the—day of—, in the year of our Lord, 18—, between A. B., of the town of—, county of—, State

of—, and S. B., his wife, parties of the first part, and C. D., of the same place, party of the second part, witnesseth, that the said parties of the first part, for and in consideration of the sum of \$—, lawful money of the United States of America, to them in hand paid, by the said party of the second part, the receipt whereof is hereby confessed and acknowledged, have granted, aliened, remised, released, enfeoffed and confirmed, and by these presents do alien, remise, release, enfeoff and confirm unto the said party of the second part, and unto his heirs and assigns forever, all (insert description), together with all and singular, the hereditaments and appurtenances thereunto, belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues add profits thereof, and all the estate, right, title, interest, claim and demand whatsoever, of the said parties of the first part, either in law or equity, of, in and to the above granted premises, with the said hereditament and appurtenances; to have and to hold the above mentioned and described premises, with the appurtenances, and every part and parcel thereof, to the said party of the second part, his heirs and assigns forever; and the said A. B., for himself, his heirs, executors and administrators, does covenant, grant, bargain, promise and agree, to and with said party of the second part, his heirs and assigns, to warrant and forever to defend the above granted premises, and every part and parcel thereof, now being in the quiet and peaceable possession of the said party of the second part, against the said parties of the first part, their heirs, executors, administrators and assigns, and against all and every other person or persons claiming or to claim the said premises, or any part thereof.

In witness whereof, the said parties of the first part have hereunto set their hands and seals, the day and year first above written.

	A. B.	[L. s.]
	S. B.	[L. s.]
Sealed and delivered in		D. D.
the presence of		X. X.

MORTGAGE, with Covenant to Insure.

This indenture, made the—day of—, 18—, between A. B., of the town of—, and S. B., his wife, parties

of the first part, and C. D., of the town of—, party of the second part, witnesseth, that the said parties of the first part, in consideration of \$— to them duly paid, have sold, and by these presents do grant and convey to the said party of the second part, and to his heirs and assigns forever, all (insert description) with the appurtenances, and all the estate, title and interest of the said party of the first part therein. And the said A. B. covenants with the said party of the second part, and his assigns, to keep the building now standing, or hereafter to be erected on the above described premises, insured in some solvent insurance company in this State, to the amount of at least \$—, and keep the policy of such insurance assigned to the said party of the second part and his heirs and assigns; and in case of any failure in this covenant, the party of the second part, or his assigns, may effect an insurance to the amount aforesaid, and the premium and expense of such insurance may be added to, and may be deemed part of the money hereby secured.* This grant is intended as a security for the payment of \$—, and interest thereon, as follows: \$— in one year from the date hereof; and the balance in—years from the date hereof; interest being—per cent. per annum, payable semi-annually, on all sums unpaid, according to the condition of a certain bond or writing obligatory, bearing even date herewith, executed by the said A. B., to the said party of the second part, as a collateral security, which payments, together with all the premiums and expenses for policies of insurance, if duly made, will render this conveyance void. And if default shall be made in payment of the principal or interest above mentioned, or in keeping said premises insured, and the policy assigned as herein covenanted for, then the said party of the second part, and his assigns are hereby authorized, pursuant to statute, to sell the premises above granted, or so much thereof as will be necessary to satisfy the amount hereby secured, with the costs and expenses allowed by law; rendering the overplus, if any there may be, to the said parties of the first part, their heirs and executors, administrators or assigns.

In witness whereof, the said parties of

the first part, have hereunto set their hands and seals, the day and year first above written.

	A. B.	[L. s.]
	S. B.	[L. s.]
Sealed and delivered in the	S. D.	
presence of	B. D.	

MORTGAGE, for Purchase Money.—

Insert immediately after the description in the foregoing mortgage, the following:

Being the same premises this day conveyed by the said C. D. to the said A. B., and these presents are given to secure the the payment of (part of) the consideration money of the said premises.

[When the mortgage is given for the purchase money, or a part of the purchase, it is not necessary that the wife join in the mortgage.]

MORTGAGE to Secure Notes.—The same as MORTGAGE WITH COVENANT TO INSURE. At * insert the following, in place of the remaining portion:

This conveyance is intended to secure the payment of a certain promissory note, or any notes given in renewals thereof; said note was given by the said party of the first part to the said party of the second part, for the sum of \$—, bearing date—, 18—, and payable one year after date thereof, with interest; and if the amount of said note, principal and interest, and all notes given in renewal thereof, shall be paid at maturity, then these presents shall become void; but if default shall be made in the payment of the said note, or notes, given in renewal thereof, or any part thereof, (or in keeping said premises insured, and the policy assigned, as herein covenanted for), then the party of the second part, and his assigns, are hereby authorized, pursuant to statute, to sell the premises above granted, or so much thereof as will be necessary to satisfy the amount hereby secured, with costs, and expenses allowed by law; rendering the surplus, if any there be, to the said parties of the first part, their heirs and executors, administrators or assigns.

EXEMPTION, Waiver of.—Whereas, I have become indebted to C. D. in the sum of \$—, and have confessed judgment to him for that amount, to secure his indebtedness, (or he has obtained judgment against me for that amount); now, to secure and make safe the said C. D.,

and in consideration of \$1 to me paid, I do hereby release and waive any and all benefit or advantage by me obtained by virtue of my certificate recorded (or, the cause inserted in my deed,) under and in accordance with the provisions of an act entitled, "An Act to exempt from sale or execution the homestead of a householder having a family," (or whatever the act may be), passed—, 18—, so that said property, so held by me as exempt by said statute and said certificate (or clause in said deed), may be levied upon and sold on execution issued against me for a demand owing by me to the said C. D.

Witness my hand and seal, this—, 18— N. W. [L. s.]

County of—, State of—, s. s.: On this—day of—, 18—, before me came the above named N. W., to me known to be the person described in, and who executed the foregoing (or the within) instrument, and acknowledged the execution thereof.

M. O., Commissioner of Deeds.

LEASE OF A HOUSE.—This indenture, made this—day of—, 18—, between A. B., of the one part, and C. D., of the other part, witnesseth, that the said A. B., for and in consideration of the rent, covenants and agreements hereinafter in and by these presents mentioned, reserved and contained on the part and behalf of the said C. D., his executors, administrators and assigns, to be paid, observed, done, and performed, have granted, demised, leased and to farm let, and by these presents doth grant, lease, and to farm let unto the said C. D., his executors, administrators and assigns, all that brick (mention kind, if not a brick,) house, messuage, or tenement, with all and singular, its appurtenances, situate, standing, and being in a certain street or place, called (name place, or street,) together with all and singular its appurtenances whatsoever, to the said brick house, (or whatever kind it may be,) messuage, tenement, and premises belonging, or in any wise appertaining, *and therewith heretofore held, used, occupied and enjoyed by F. G., late occupier thereof.* (In case of a new house, the portion in italics to be left out.) To have and to hold said (name kind) house, messuage and tenement, and all and singular other the

premises therein, before granted and demised, or mentioned, or intended to be, with the appurtenances, unto the said C. D., his executors, administrators and assigns, from the — day of —, next ensuing, the day of the date of these presents, for and during, and until the full end of the term of — years from thence next ensuing, and fully to be complete and ended; yielding and paying therefor yearly, and every year during the said term, unto the said A. B., his heirs, or assigns, the yearly rent of \$ —, on the — day of —, 18—, in every year; the first payment thereof to begin, and to be made, &c., next ensuing the date of these presents. Provided, always, nevertheless, and it is the true intent and meaning of these presents, and of the said parties hereunto, that if it should happen that the said yearly rent of \$ —, hereby reserved, or any part thereof, be behind and unpaid by the space of — next over, or after any of the said days, whereon the same ought to be paid as aforesaid; that then, and from thenceforth, it shall, and may be lawful to, and for the said A. B., his executors, administrators and assigns, into and upon the said demised premises, and every or any part or parcel thereof, with their appurtenances, in the name of the whole, to re-enter, and the same to have again, repossess, and enjoy, as in his, or their first or former estate, or estates; and him, the said C. D., his executors, administrators, and assigns, and all and every other, the occupier or occupiers of the said demised premises, from thence utterly expel, remove and put out, anything in these presents contained to the contrary thereof in any wise notwithstanding. And the said C. D., for himself, his executors, administrators, and assigns, doth covenant and grant, to and with the said A. B., his heirs, and assigns, by these presents, in manner following; that is to say: that he, the said C. D., his executors, administrators and assigns, shall, and will, well and truly pay, or cause to be paid, unto the said A. B., his heirs or assigns, the above yearly rent, above reserved, according to the true intent of these presents, clear of, and over and above all taxes and reprises whatsoever. And the said C. D., his executors, administrators and assigns, shall and will,

from time to time, and at all times hereafter, during the said term hereinbefore granted, at his and their own proper costs and charges, well, and sufficiently keep in repair, the said demised premises, with their appurtenances, and all the glass, windows, pavements, privies, sinks and gutters (here name any other special objects) belonging to the same, in, by, and with all manner of needful and necessary reparations and amendments whatsoever, when, and as soon as the damage shall require (damages by fire only excepted); and the same premises, with all and singular their appurtenances, being in and by all things so well and sufficiently repaired and kept (except as before excepted,) at the end, expiration, or other sooner determination of the said terms hereby granted, shall and will quietly and peaceably leave and surrender, and yield up unto the said A. B., his executors, administrators and assigns, in good and sufficient repair and condition (reasonable use and wearing thereof, and damage by fire, as aforesaid, only excepted); that he, the said C. D., will, from time to time, and at all times hereafter, during the said time hereby granted, pay and discharge all taxes, charges, and impositions, which shall be taxed, charged, imposed, or assessed upon the said messuage or tenement, or premises, or any part thereof.

In witness whereof, the said parties have hereunto set their hands and seals, the day and year first above written.

A. B. [s. s.]

C. D. [s. s.]

RECEIPT, for Money Paid by Another Person.—Boston, — 18—. Received of M. B., at the hands of XX, seventeen dollars, in full payment for a horse, by me sold and delivered to the said M. B. \$17.

D. S.

STRAY, Notice of, for the Town Clerk.—To all persons whom it may concern: Take notice, that on the — day of —, 18—, one yoke of working oxen, of a red color, with a white spot in the forehead of each, and the left hind foot of each one white, and having on brass buttons, strayed upon my enclosed lands, in the town of Lenox, where I reside, (or give as near description as possible) and now remain there.

B. B.

Lenox, —, 18—.

LEASE, Farm.—This indenture, made this — day of —, in the year of our Lord 18—, between A. B., of the town of —, county of —, State of —, party of the first part, and C. D., of the same place, party of the second part, witnesseth: that the said party of the first part, in consideration of the rents, covenants and agreements hereinafter mentioned, reserved and contained on the part of said party of the second part, his executors, administrators and assigns, to be paid, kept and performed, has demised, and to farm let, unto the said party of the second part, his executors, administrators and assigns, all (here insert description) with the appurtenances; unto the said party of the second part, his executors, administrators and assigns, from the — day of —, 18—, for the full term of — years, then next ensuing, yielding and paying therefor, unto the said party of the first part, his heirs or assigns, yearly and every year during the said term hereby granted, the yearly rent or sum of \$— in equal half yearly payments, to-wit: on the — day of —, and — in each year and every year; provided that if the yearly rent above reserved or any part thereof, shall be unpaid on any day of payment whereon the same ought to be paid, as aforesaid; or if default shall be made in any of the covenants or agreements herein contained, on the part of the said party of the second part, then and from thenceforth it shall be lawful for the said party of the first part, his heirs or assigns, to re-enter upon said demised premises, and the same to have again, as in their first and former estate. And the said party of the second part does covenant and agree with the said party of the first part, his heirs and assigns, that he, the said party of the second part, his executors, administrators or assigns, will pay yearly, or every year during the said term, unto the said party of the first part, his heirs or assigns, the yearly rent above reserved, on the days and in the manner limited and prescribed as aforesaid, for the payment thereof, without any deduction or delay. And that the said party of the second part, his executors, administrators or assigns, will, at his own proper costs and charges, bear, pay and discharge all taxes, duties and assessments as may, during the

said term hereby granted, be charged, assessed or imposed upon the said demised premises. And that on the determination of the estate hereby granted, the said party of the second part, his executors, administrators or assigns, shall and will leave and surrender unto the said party of the second part, his executors, administrators or assigns, shall and will leave and surrender unto the said party of the first part, his heirs or assigns, the said demised premises in as good state and condition as they are now in, ordinary wear and damages by the elements excepted. And the said party of the first part does covenant and agree with the said party of the second part, his executors, administrators and assigns, paying the said yearly rent above reserved, and performing the covenants and agreements aforesaid on his part, the said party of the second part, his executors, administrators and assigns, shall, and may, at all times during the said term hereby granted, peaceably have, hold and enjoy the said demised premises without any manner of trouble or hindrance of, or from, the said party of the first part, his heirs or assigns, or any other person or persons whomsoever.

In Witness Whereof, the parties to these presents have hereunto set their hands and seals.

A. B. [L. s.]
C. D. [L. s.]

Sealed and delivered in }
the presence of }

E. F.
G. H.

LEASE, Assignment of, Indorsed—

Know all men by these presents, that I, A. B., in consideration of \$— to me in hand paid by C. D., the receipt whereof I do hereby acknowledge, have bargained, sold, assigned and set over, and by these presents do bargain, sell, assign and set over unto the said C. D., his executors, administrators and assigns [or, if a durable lease, say his heirs or assigns] as well the within written indenture, as also all the term and interest in all and singular the lands, tenements, hereditaments and premises within mentioned, yet remaining under and by virtue of the said indenture, and likewise all my estate, right, title, interest, claim, property and demand of, in, or to the same lands, tenements, hereditaments and premises,

within indenture, or likewise howsoever; subject, nevertheless, to the rents and covenants in the said indenture contained.

In Witness Whereof, I have hereunto set my hand and seal, this ____ day of ____, 18 ____.

A. B. [L. s.]

LIEN, Mechanics'—Contractors'.—To *Miles Hawley* [or insert the name of the officer, town and county,] Town Clerk, of the town of Hornellsville, in the county of Steuben.

Take notice, that I, a resident of said town, have, or claim to have, a lien upon the building herein described and the appurtenances, and the lot upon which the same stands, as security for the amount due me, in pursuance of the statute made and provided. The said building is known as No. ____, on ____ street, in Hornellsville, or stands on the lot bounded and described as follows: [insert description] and said house and lot is owned by ____*. That the claim against said lot, or the owner thereof, is for work, labor and services as carpenter and joiner [if any other trade, mention it in place of carpenter and joiner,] and for materials, furnished by me as the contractor with the said ____ for the building, altering or repairing said house, under and in pursuance of an agreement made with ____; that ____ days have not elapsed since the performance and completion of such labor [or the furnishing of the materials.] Yours, etc., D. R. S.

Hornellsville, ____ 18____.

LIEN, Mechanics'—Workman or Other Person.—(The same as foregoing to the* after which insert the following instead.) That the claim against said ____ is for work by me performed as a carpenter and joiner [or whatever trade it may be] for ____ months, labor performed by me on said building, in pursuance of an agreement with A. B., the contractor, amounting to \$____ [or is for a large quantity of lumber and building materials furnished for and used in the erection of said house, in pursuance of an agreement with said A. B., amounting to the sum of \$____), and that ____ days have not elapsed since the performance and completion of said labor [or since the said materials were furnished.] Yours truly,

D. R. S.

Hornellsville, N. Y., 18____.

PARTNERSHIP.—See AGREEMENTS.

ATTORNEY, Power of—COMMON LAW.

Know by all these presents, that I, M. B., of the town of ____, county of ____, State of ____, have made, constituted and appointed, and by these presents do make, constitute and appoint C. D., of ____, my true and lawful attorney for me, and in my name, place and stead [here insert the general power given, and if necessary the limit to same;] giving and granting unto my said attorney full power and authority to do and perform all and every act and thing whatsoever requisite and necessary to be done in and about the premises, as fully, to all intents and purposes, as I might or could do if personally present, with full power of substitution and revocation, hereby ratifying and confirming all that my said attorney or his substitute shall lawfully do or cause to be done by virtue thereof.

In Witness Whereof, I have hereunto set my hand and seal, the ____ day of ____, in the year of our Lord 18____.

M. B. [L. s.]

Sealed and delivered in the presence of H. H.

ATTORNEY, Power of.—REVOCATION.

Know all men by these presents: That whereas I, M. B., did, in and by my letter of attorney dated ____, 18____, constitute C. D. my true and lawful attorney, for me and in my name to [here insert the power given in the original letter of attorney,] as by the said letter of attorney appears: Now, therefore, the said M. B., by these presents, do hereby revoke, countermand, annul and make void the said letter of attorney, dated ____ 18____, and all power therein and thereby, or in any manner given or intended to be given the said C. D.

In Witness Whereof, I have hereunto set my hand and seal, this ____ day of ____, 18____.

M. B.

RECEIPT, a General.—Baltimore ____, 18____. Received of O. P. the sum of one thousand dollars, in full of all demands against him.

D. S.

\$1,000.

RECEIPT, for Rent.—New York ____, 18____. Received of M. P. one hundred dollars, being one month's rent, due this day for my dwelling house [if stores, insert it in place of dwelling house,] and

estate, No. — street, now occupied by
said M. P. D. S.
\$100.

RECEIPT, on Account.—Syracuse, —, 18—. Received of M. B., fifty dollars on account. D. S.
\$50.

RELEASE, of all Demands.—Know all men by these presents, that I., A. B., for and in consideration of the sum of thirty dollars and seventy-five cents, to me paid by the said C. D., (the receipt whereof I do hereby acknowledge) have remised, released and forever discharged, and I do hereby, for myself, my heirs, executors, administrators, and assigns, remise, release, and forever discharge, the said C. D., his heirs, executors, and administrators, of and from all debts, demands, actions, and causes of action, which I now have, or which may result from the existing state of things, from any and all contracts, liabilities, doings, and omissions, from the beginning of the world to this day.

In testimony whereof, I have hereunto set my hand and seal, this — day of —, 18—. A. B. [L. S.]

STRAY, Not Redeemed, Notice of Sale.—Take notice, that whereas, on the — day of — last, there strayed on to my enclosed land, in the town of Lenox, (here describe property) and the same not having been redeemed by the owner thereof, now, in pursuance of the statute in such cases made and provided, I shall expose the same for sale at public auction, to the highest bidder, on the — day of — next or instant, at — o'clock, (A. M. or P. M.) in front of the town house, in said town of Lenox.

B. B.

Dated the — day of — 18—.

WILLS, Common Form.—I, A. G., of —, county of —, State of —, widow of the late J. G., mindful of the uncertainties of human life, do make, publish and declare this my last will and testament, in manner following:

First.—After the payment of my just debts and funeral expenses, I give, devise and bequeath to my daughter, J. W., wife of A. W., the sum of \$1,000.

Second.—I give and devise and bequeath to my daughter L. P., wife of E. P., the sum of \$100.

Third.—I give, devise, and bequeath to

my daughter, E. D., wife of H. D., the sum of \$400.

Fourth.—All the rest, residue and remainder of all my estates, both real and personal, I give, devise and bequeath to my son, S. G., and to my daughters, J. W., L. P. and E. D., to be equally divided between them and their heirs, share and share alike, the child or children of a deceased child taking that which his, her or their parents would have taken if living.

Fifth.—In case there should not be sufficient of my property to fully comply with the first, second and third provisions of this, my will, then I direct that my estate be divided into fourteen equal shares or portions, and that five of the said shares or portions be given to my said daughter, J. W., and that six of the said shares or portions be given to my daughter, E. D., and the remaining three shares or portions be given to my daughter, L. P., the child or children of a deceased daughter to have the shares or portions which his, her or their parent would have taken if living.

Sixth.—I hereby nominate and appoint my son-in-law, H. D., the executor of this, my last will and testament, and hereby authorize and empower him, the said H. D., to compound, compromise and settle any claim or demand which may be against or in favor of my said estate. In witness whereof I have hereunto set my hand and seal, this — day of —, 18—. A. G. [L. S.]

Signed, published and declared by the said testatrix, to be her last will and testament in the presence of us, who have signed our names at her request, as witnesses in her presence and in the presence of each other.

B. B., of the village of —.

C. C., of the village of —.

WILL, Codicil to a.—I, A. G., of the town of —, county of —, State of —, do make this codicil to my last will, in words as follows:

Whereas, in and by my last will and testament, dated on or about —, 18—, by the first item thereof, give, devise and bequeath to my daughter, J. W., the wife of A. W., the sum of \$1,000, and whereas, I loaned to the said A. W., in his lifetime, the sum of \$1000, and for which sum he was indebted to me at the

time of his decease, and his estate is still indebted to me for that amount now, I hereby revoke said bequest of \$1,000, so given by said first item of my will, and in lieu and instead thereof, give to my said daughter, J. W., the claim which I have against the estate of the said A. W., and authorize my executor to assign the said claim to my said daughter, J. W., but should it happen that the said claim of \$1,000 should be paid to me previous to my decease, then I direct that the sum of \$1,000 to be paid my said daughter, J. W., in the same manner, as if this codicil to my will had not been executed.

In witness whereof I have hereunto set my hand and seal, this — day of —, 18—. A. G. [L. s.]

Published and declared by the said A. G. to be the codicil to her last will and testament, in the presence of us, who have signed the same as witnesses, in her presence, at her request, and in the presence of each other.

L. B., merchant of —.

J. R., of the village of —.

WILL, Devise of an Estate for Life, in Lieu of Dower, Remainder to His Children.—ITEM. I give and devise unto

my said wife, all that in said messuage or tenement, with the appurtenances, situate (here describe) with the lands and hereditaments thereunto belonging, and the rents, issues and profits thereof, for and during the term of her natural life; and from and after the decease of my said wife, I give and bequeath the said messuage or tenements, lands and hereditaments, unto such child or children as I shall leave or have living at the time of my decease, and to their heirs and assigns forever, and if I shall have no such child or children, then I give and devise the said legacy to my said wife aforesaid, and I hereby declare the said gift is intended to be, and is so given to her, in full satisfaction and recompense of, and for her dower and thirds, which she may, or can in any wise, claim or demand out of my estate.

WILL, Proviso that Sums Advanced to Children Shall be Taken as Part of Portion.—ITEM. Provided always, and I do hereby declare that in case I shall, in my lifetime, advance and pay to any of my children, either sons or daughters, any sum or sums of money, for his or their

benefit or advancement in the world or otherwise, and shall signify the same in writing under my hand, then if any such sum or sums shall be equal to the share or shares of such child or children respectively, of and in the premises (here described), by me hereby devised or bequeathed for their respective benefits, such sum or sums so paid or advanced shall in that case be accounted in full satisfaction of the share or shares of such child or children respectively in the said estate and premises, but if such advanced sum or sums shall be less than the share or shares of such child or children respectively, of and in the said premises (here describe), then such sum or sums shall be accounted as part only of the share or shares of such child or children therein, and in that case such child or children shall not receive, or be entitled to any share or interest of, or in such parts of the said premises, etc., which shall have been paid or advanced to him, her or them, for the purpose aforesaid, until the other or others of such child or children shall have received as much of the said premises (here describe) as shall make his, her or their share or shares thereof equal to what shall have been so paid or advanced to or for the benefit, advantage, or preferment of such child or children respectively, to the end and intent that the said premises may be equally divided among all such children, share and share alike.

WILL, Guardian, Appointment of.—And I hereby commit the guardianship of all my children, until they shall respectively attain the age of twenty-one years, unto my said wife, during her life, if she shall so long continue my widow; and from and after her decease or second marriage, unto my trusty and much esteemed friend A. B., his executors and assigns, (and do hereby declare that the expenses of the maintenance and education of my said children, until they shall attain the age aforesaid, or become entitled to the sum or sums of money hereby provided for their benefits respectively, shall be paid and borne by my said wife, by and out of the moneys and estate given and bequeathed to her in and by this, my will.

WILL, Power of Executors to Convey Real Estate.—I will and ordain that the

executor of this, my last will and testament, shall, with all convenient speed after my decease, bargain sell and alien, in fee simple, all my lands, for the doing, executing and perfect finishing whereof, I do by these presents give to my said executor full power and authority to grant, alien, bargain, sell, convey and assure all the same lands to any person or persons, and their heirs forever, in fee simple, by all and every such lawful ways and means in the law as to my said executor, or to his counsel learned in law, shall seem fit or necessary.

LAWS, FENCE, for Each State.—In the older States the laws regulating fences are substantially alike. As to height, a legal fence is generally four and a half feet, if constructed of rails or timber. Ditches, brook, ponds, creeks, rivers, &c., sufficient to turn stock, are deemed equivalents for a fence. In case a stream or other body of water is considered inadequate to the turning of stock, the facts are investigated by officers known as fence viewers, who will designate the side of the water upon which a fence shall be erected, if the fence be deemed necessary, the cost to be equally borne by the parties whose lands are divided. Occupants of adjoining lands which are being improved are required to maintain partition fences in equal shares. Neglect to build or to keep in repair such fences subjects the negligent party to damages, as well as double, and in some States treble, the cost of building or repairing, to the aggrieved party. A person ceasing to improve land cannot remove his fence unless others interested refuse to purchase within reasonable time. A provision in the laws of several of these States, which is well calculated to serve the interests of neighbors, saving the expense of fence building, is one permitting persons owning adjoining lots or lands to fence them in one common field, and for the greater advantage of all, allowing them to form an association, and to adopt binding rules and regulations for the management of their common concerns, and such equitable modes of improvement as are required by their common interest; but in all other respects each proprietor may, at his own expense, inclose, manage and improve his land as he thinks best, maintaining his proportion of the general inclosure.

Maine, Massachusetts, Vermont, New Hampshire, and Connecticut.—The laws regulating fences in the NEW ENGLAND STATES differ only in a few particulars. The required height of a fence in MAINE, MASSACHUSETTS, and NEW HAMPSHIRE, is four feet; in VERMONT, four and a half feet; in RHODE ISLAND, and CONNECTICUT, a hedge, with a ditch, is required to be three feet high upon the bank of the ditch, well staked, at the distance of two and a half feet, bound together at the top, and sufficiently filled to prevent small stock from creeping through, and the bank of the ditch not to be less than one foot above the surface of the ground. A hedge without a ditch to be four feet high, staked, bound, and filled; post-and-rail fence on the bank of a ditch to be four rails high, each well set in post, and not less than four and a half feet high. A stone wall fence is required to be four feet high, with a flat stone over the top, or surmounted by a good rail or pole; a stone wall without such flat stone, rail, or post on top to be four and a half feet high. In each of the NEW ENGLAND STATES there are plain provisions in regard to keeping up division fences on equal shares, and penalties for refusal to build them, and when built for neglect to keep them in repair. Fence-viewers in the respective towns settle all disputes as to division fences. Owners of adjoining fields are allowed to make their own rules and regulations concerning their management as commons. No one not choosing to enclose uncultivated land can be compelled to bear any of the expense of a division fence, but afterward electing to cultivate, he must pay for one-half the fence erected on his line.

New York and New Jersey.—Similar provisions for the maintenance of division fences exist in New York; whenever a division has been injured by a flood or other casualty, each party interested is required to replace or repair his proportion within ten days after notification. When electors in any town have made rules or regulations prescribing what shall be deemed a sufficient fence, persons neglecting to comply are precluded from recovering compensation for damages done by stock lawfully going at large on the highways, that may enter on their lands. The sufficiency of a fence

is presumed until the contrary is established; assessors and commissioners of highways perform the duties of fence-viewers.

Pennsylvania.—In PENNSYLVANIA towns and counties secure special legislation as to the running of stock or other cattle at large. Fences in New Jersey are required to be four feet and two inches in height, if of post and rails, timber, boards, brick or stone; other fences must be four and a half feet, and close and strong enough to prevent horses and neat cattle from going through or under. Partition fences must be proof against sheep. Ditches and drains made in or through salt marshes and meadows for fencing and draining the same, being five feet wide and three feet deep, and all ditches or drains made through other meadows being nine feet wide at the surface and four and a half feet wide at the bottom, three feet deep, and lying on mud or miry bottom, are considered lawful fences. Division fences must be equally maintained. If one party ceases improving he cannot take away his fence without first having given twelve months' notice. Hedge growing is encouraged by law.

Delaware.—In Newcastle and Kent Counties, DELAWARE, a good structure of wood or stone, or well-set thorn four and a half feet high, or four feet with a ditch within two feet is a lawful fence; in Sussex County four feet is the height required. Fence-viewers are appointed by the court of general sessions in each "hundred." Partition fences are provided for the same as in other States.

Maryland, Virginia, West Virginia, and North Carolina.—There is no general law in MARYLAND regulating fences, the law being local and applicable to particular counties. In VIRGINIA a lawful fence is five feet in height, including the mound to the bottom of the ditch, if the fence is built on a mound. Certain water courses are specified as equivalent to fences. Four feet is the height of a legal fence in WEST VIRGINIA, and five feet in NORTH CAROLINA. In the latter State persons neglecting to keep their fences in order during the season of crops are deemed guilty of misdemeanor, and are also liable to damages. Certain rivers are declared sufficient fences.

South Carolina.—In SOUTH CAROLINA

fences are required to be six feet high around "provisions." All fences strongly and closely made of rails, boards, post and rails, or an embankment of earth capped with rails or timber of any sort, or live hedges five feet in height, measured from the level or surface of the earth, are deemed lawful; and every planter is bound to keep up such lawful fence around his cultivated grounds, except where a navigable stream or deep water-course may be a boundary. No stakes or canes that might injure horses or cattle are allowed in an inclosure.

Georgia, Florida, Alabama, and Mississippi.—The laws of GEORGIA provide that all fences, or inclosures commonly called worm fences, shall be five feet high, and from the ground to the height of three feet the rails must not be more than four inches apart. All paling fences are required to be five feet from the ground, and the poles not more than two inches apart. Any inclosure made by means of a ditch or trench must be three feet wide and two feet deep, and if made of both fence and ditch, the latter must be four feet wide and the fence five feet high from the bottom of the ditch. All water-courses that are or have been navigable are deemed legal fences as far up the stream as navigation has ever extended, whenever, by reason of freshets or otherwise, fences cannot be kept, and are subject to the rules applicable to other fences. The fences in FLORIDA are required to be five feet in height, but where there is a ditch four feet wide the five feet may be measured from the bottom of the ditch. If the fence is not strictly according to law, no action for trespass or damages by stock will lie. In ALABAMA all inclosures or fences must be at least five feet high, and, if made of rails, be well staked and ridged; or otherwise sufficiently locked; and from the ground to the height of three feet the rails must not be more than four inches apart; if made of palings, the poles must be not more than three inches apart; or if made with a ditch, four feet wide at the top; the fence, of whatever materials composed, must be five feet high from the bottom of the ditch and three feet from the top of the bank, and close enough to prevent stock of any kind from getting through. No suit for damages can be maintained if the

fence is not a legal one. For placing in an inclosure any stakes, pits, poison, or anything which may kill or injure stock, a penalty of \$50 is provided. Partition fences must be equally maintained. Fences in MISSISSIPPI are required to be five feet high, substantially and closely built with plank, pickets, hedges, or other substantial materials, or by raising the ground into a ridge two and a half feet high and erecting thereon a fence of common rails or other materials two and a half feet in height. Owners of adjoining lands, or lessees thereof for more than two years, are required to contribute equally to the erection of fences, if the lands are in cultivation are used for pasturing. No owner is bound to contribute to the erection of a dividing fence when prepared to erect a fence of his own, and to leave a lane on his own land between himself and the adjoining owner; but the failure to erect such fence for sixty days is deemed an abandonment of the intention to do so, and determination to adopt the fence already built.

Texas, Arkansas, Tennessee, Kentucky, Missouri, Illinois, and Indiana.—In Texas every gardener, farmer, or planter is required to maintain a fence around his cultivated lands at least five feet high and sufficiently close to prevent hogs from passing through it, not leaving a space of more than six inches in any one place within three feet of the ground. Fences in ARKANSAS must be five feet high. In all disputed cases the sufficiency of a fence is to be determined by three disinterested householders, appointed by a justice of the peace. Division fences are provided for as in the majority of the other States. In TENNESSEE every planter is required to make a fence around his cultivated land at least five feet high. When any trespass occurs a justice of the peace will appoint two freeholders to view the fence as to its sufficiency, and to ascertain damages. If a person, whose fence is insufficient, should injure any animal which may have come upon his lands, he is responsible in damages. In case of dispute between the parties as to a division fence, a justice of the peace will appoint three disinterested freeholders to determine the proportion to be maintained by each. No owner,

whose fence is exclusively on his own land, can be compelled to allow his neighbor to join it. In KENTUCKY all sound and strong fences of rails, plank, or iron, five feet high, and so close that cattle and other stock cannot creep through, or made of stone or brick four and a half feet high, are deemed legal fences. Division fences cannot be removed without consent of the party on adjoining land, except between November 1 and March 1 in any year, six months' notice having been given. In MISSOURI all fields must be inclosed by hedge or fence. Hedges must be five feet high; fences of posts and rails, posts and palings posts and plank, or palisades, four and a half feet; turf, four feet, with trenches on either side three feet wide at top and three feet deep; worm fence at least five feet high to top of rider, or, if not ridered, five feet to top rail, and corner locked with strong poles rails or stakes. Double damage may be recovered from any person maiming or killing animals within his inclosure if adjudged insufficient. In ILLINOIS fences must be five feet high. The laws regulating division fences are similar to those of the New England States. In cases of dispute three disinterested householders decide as to the sufficiency of any fence. Proprietors of commons may make their own regulations. Line fences are protected on public highways. In INDIANA any structure or hedge, or ditch, in the nature of a fence, used for purposes of inclosure, which shall, on the testimony of skillful men, appear to be sufficient, is a lawful fence.

Ohio and Wisconsin.—The laws of OHIO provide that whenever a fence is erected by any person on the line of his land, and the person owning the land adjoining shall make an enclosure on the opposite side, the latter shall pay one-half the value of the fence as far as it answers the purpose of a division fence, to be adjudged by the township trustees. A legal fence in Wisconsin is four and a half feet high if of rails, timber, boards, or stone walls or their combinations, or other things which shall be deemed equivalent thereto in the judgment of the fence-viewers. While adjoining parties cultivate lands they must keep up fences in equal shares; double value of building or

repairing may be recovered from delinquents. The law regulating division fences is similar in most particulars to those of the New England States and Illinois. Overseers of highways perform the duties of fence-viewers.

Michigan.—Fences in MICHIGAN must be four and a half feet high, and in good repair; consisting of rails, timber, boards, or stone walls, or any combination of these materials. Rivers, brooks, ponds, ditches, hedges, etc., deemed by the fence-viewers equivalent to a fence, are held to be legal inclosures. No damages for trespass are recoverable if the fence is not of the required height. Partition fences must be equally maintained as long as parties improve their lands. When lands owned in severalty have been occupied in common, any occupants may have lands divided. Fences extending into the water must be made in equal shares, unless otherwise agreed by parties interested. If any person determines not to improve any portion of his lands adjoining a partition fence, he must give six months' notice to all the adjoining occupants, after which he will not be required to keep up any part of the fence. Overseers of highways act as fence-viewers.

Minnesota.—In MINNESOTA four and a half feet is the legal height. Partition fences are to be kept in good repair in equal shares. In case of neglect, complaint may be made by the aggrieved party to the town supervisors, who will proceed to examine the matter, and if they determine that the fence is insufficient, notice will be given to delinquent occupant of land; and if he fails to build or repair within a reasonable time, the complainant may build or repair, and may recover double the expense, with interest at the rate of one per cent. per month, in a civil action. No part of a division fence can be removed if the owner or occupant of adjoining land will, within two months, pay the appraised value. When any uninclosed grounds are afterward inclosed, the owner or occupant is required to pay for one-half of each partition fence; the value thereof to be determined by a majority of the town supervisors. If a party to a division fence discontinues the improvement of his land, and gives six months' notice thereof to the occu-

pants of adjoining lands, he is not required to keep up any part of such fence during the time his lands are unimproved, and he may remove his portion if the adjoining owner or occupant will not pay therefor. County commissioners are the fence-viewers in counties not divided into towns.

Iowa.—A legal fence in IOWA is four and half feet high, constructed of strong materials, put up in a good, substantial manner. In all counties where, by a vote of the legal voters, or by an act of the general assembly, it is determined that hogs and sheep shall not run at large, a fence made of three rails of good, substantial material, or three boards not less than six inches wide and three-fourths of an inch thick, such rails or boards to be fastened in or to good, substantial posts, not more than ten feet apart where rails are used; or any other fence which, in the opinion of the fence viewers, shall be equivalent thereto, is deemed a lawful fence, provided that the lowest or bottom rail shall not be more than twenty nor less than sixteen inches from the ground, and that the fence shall be fifty-four inches in height. The respective owners of enclosed lands must keep up fences equally as long as they improve. In case of neglect to repair or rebuild, the adjoining owner may do so, and the work being adjudged sufficient by the fence-viewers, and the value determined, the complainant may recover the amount, with interest at the rate of one per cent. per month. If an owner desires to throw his field open, he shall give the adjoining parties six months' notice, or such shorter notice as may be directed by the fence-viewers.

Kansas and Nebraska.—In KANSAS and NEBRASKA fences may be of posts and rails, posts and palings, or posts and planks, at least four and a half feet high; of turf, four feet, and staked and ridered, with a ditch on either side at least three feet wide at top and three feet deep; a worm fence must be at least four and a half feet high to top of rider, or if not ridered, four and a half feet to top rail, the corners to be locked with strong rails, posts, or stakes. The bottom rail, board or plank in any fence must not be more than two feet from the ground in any township, and in those town

ships where hogs are not prohibited from running at large it must not be more than six inches from the ground. All such fences must be substantially built and sufficiently close to prevent stock from going through. Stone fences are required to be four feet high, eighteen inches wide at the bottom, and twelve at top. All hedges must be of sufficient height and thickness to protect the field or enclosure. A wire fence must consist of posts of ordinary size for fencing purposes, set in the ground at least two feet deep, and not more than twelve feet apart, with holes through posts, or staples on the side, not more than fifteen inches apart, and four separate lines of fence wire, not smaller than No. 9, to be provided with rollers and levers at suitable distances, to strain and hold the wires straight and firm. Owners of adjoining lands must maintain fences equally. In case of neglect of one party to build or repair, another party may do so and recover the amount expended, with interest at the rate of one per cent. per month. A person not improving his land is not required to keep up any portion of a division fence. The trustee, clerk, and treasurer of each township act as fence-viewers, to adjust all disputes concerning fences. A legal fence in Nebraska is described as any structure, or hedge, or ditch in the nature of a fence, used for the purposes of enclosure, which is such as good husbandmen generally keep. Division fences must be equally maintained. A party may remove his portion of a division fence by giving sixty days' notice. If removed without such notice the party so doing is liable for full damages. Where a fence is injured or destroyed by fire or flood it must be repaired within ten days after notice by interested persons. Justices of the peace are *ex officio* fence-viewers.

California.—Legal fences in CALIFORNIA are described with great particularity. Wire fences must consist of posts not less than twelve inches in circumference, set in the ground not less than eighteen inches, and not less than eight feet apart, with not less than three horizontal wires, each one-fourth of an inch in diameter, the first to be eighteen inches from the ground, the other two above at intervals of one foot, all well stretched

and securely fastened from post to post, with one rail, slat, pole, or plank, of suitable size and strength, securely fastened to the post, not less than four and a half feet from the ground. Post and rail fence must be made with posts of the same size and at the same distances apart and the same depth in the ground, as above required, with three rails, slats, or planks of suitable size and strength, the top one to be four and a half feet from the ground, the other two at equal distances between the first and the ground, all securely fastened to the post. Picket fences must be of the same height as above, made of pickets not less than six inches in circumference, placed not more than six inches apart, driven in the ground not less than ten inches, all well secured at the top by slats or caps. Ditch and pole fence: the ditch must not be less than four feet wide on the top and three feet deep, with embankment thrown on inside of ditch, with substantial posts set in the embankment not more than eight feet apart, and a plank, pole, rail, or slat securely fastened to posts at least five feet high from the bottom of the ditch. Pole fence must be four and a half feet high, with stakes not less than three inches in diameter, set in the ground not less than eighteen inches, and when the stakes are placed seven feet apart there must not be less than six horizontal poles well secured to the stakes; if the stakes are six feet apart, five poles; if three or four feet, four poles; if two feet apart three poles, and the stakes need not be less than two inches in diameter; if one foot apart, one pole, and the stakes need not be more than two inches in diameter. The above is a lawful fence so long as the stakes and poles are securely fastened and in a fair state of preservation. Hedge fence is considered lawful when by reliable evidence it shall be proved equal in strength and as well suited to the protection of inclosed lands as the other fences described. Brush fence must be four and a half feet high and at least twelve inches wide, with stakes not less than two inches in diameter, set in the ground not less than eighteen inches, and on each side, every eight feet, tied together at the top, with horizontal pole tied to the outside stake five feet from the ground. In the case of partition fences, if one party re-

fuse or neglect to build or maintain his share the other may do so and recover the value. Three days' notice to repair is sufficient. The sufficiency of a fence is to be determined by three disinterested householders.

LAWS, STOCK, for Each State.—In a majority of the States there are general laws prohibiting cattle and other stock from running at large; in some instances, however, authority is delegated to counties or towns to make by-laws upon the subject, or there is special legislation for particular counties or districts. The law of estrays differs in the various States in no essential particulars. If a beast is found running at large, in violation of law, it may be taken up and impounded, where public pounds have been provided; or it may be held by the person so taking up on his own premises. If the owner is known, notice must be given to him at once; if unknown, the animal must be advertised for a specified time; and no owner claiming it, must be sold to the highest bidder. The person taking up the stray is entitled to a reasonable compensation for maintaining the beast. In some States, after a certain time, the stray becomes the property of the person taking it up, the prescribed legal notice having been given. When an animal is found doing damage on the land of another, the fences being constructed according to law, it may be held as security for damages. In all cases where the owner is known, he must be notified of the facts, and a reasonable time allowed him to reclaim and to inspect damages. In the majority of the States, also, owners of stock are required to adopt certain earmarks, marks, or brands, and to make a record of them.

Maine, New Hampshire and Vermont.

—In MAINE and NEW HAMPSHIRE, towns may make by-laws concerning the running of animals at large. The laws of MAINE provide that persons injured by beasts may sue for damages, and distrain the animal. NEW HAMPSHIRE allows the owners of stock impounded for doing damage four days to respond to notice of the fact; and if he fails to answer, the animals may be sold and the amount of the damages deducted from the proceeds. In VERMONT, twenty days are allowed for redemption. Ungelded animals are

not allowed to run at large. Rams must be restrained from August 1 to December 1, and be marked with the initials of the owner's name; and if found at large, a forfeit of \$5 is due for each one taken up to the person so taking up. The owner of such animals is responsible for all damages done by them. Sheep infected with foot rot or scab must be diligently restrained, and for all damages resulting from neglect of this provision the owner is responsible, and is also subject to a fine of \$10. Any person finding such diseased animals at large, may take them as forfeit, and no action at law or in equity will lie for their recovery. Any person who shall drive, or in any manner bring, into the State any neat cattle, knowing them, or any of them, to have the pleuro-pneumonia, or of having been exposed to that disease, is liable to a forfeit of a sum not over \$500, or to imprisonment in a county jail for not more than twelve months, nor less than one month. Towns may establish regulations, appoint officers or agents, and raise and appropriate money for the purpose of preventing and arresting the spread of pleuro-pneumonia.

Massachusetts.—The laws of MASSACHUSETTS provide that when a person is injured in his crops or other property by sheep, swine, horses, mules, or neat cattle, he may recover damages in an action of tort against the owner of the beasts, or by distraining the beasts doing the damage; but if the beasts were lawfully on the adjoining lands, and escaped therefrom in consequence of the neglect of the person who suffered the damage to maintain his part of the division fence, the owner of the beasts shall not be liable for such damages. The selectmen of towns and the mayor and aldermen of cities, in case of the existence of pleuro-pneumonia or any other contagious disease among cattle, shall cause the infected animals or those exposed to infection to be secured in some suitable place or places, and kept isolated, the expense of keeping to be paid, one-fifth by city or town, and four-fifths by the State. They may prohibit the departure of cattle from any inclosure, or exclude them therefrom; may make rules in writing to regulate or prohibit the passage of any neat cattle to or through their respective cities or towns,

or from place to place, and arrest and detain them at the cost of the owners. They are authorized to brand infected animals, or those exposed to infection, with the letter "P" on the rump. For selling an animal so branded, there is liability to fine not exceeding \$500, or imprisonment not exceeding one year. Notice of any suspicion of the existence of contagious disease must be given, with a penalty for neglect or refusal. A board of commissioners is appointed for the State, with authority to use any measure to control the introduction of diseased cattle into the State, or the spread of disease. The rules and regulations made by this board supersede those of the selectmen of towns, and mayor and aldermen of cities. The moving of cattle into other States without permission is prohibited. The law of 1867 provides that no cattle diseased, or suspected of being diseased, shall be killed, except by order of the governor. The owners of cattle ordered to be killed are indemnified.

Rhode Island.—In RHODE ISLAND, animals trespassing on lands are held a year and a day; and, if a horse, must have a withe kept about his neck during that time. Each town is required to erect and maintain at its own charge one or more public pounds, and it is lawful for any freeholder or qualified elector or field driver, and it is made the duty of every surveyor of highways, to take up and impound any horse, neat cattle, sheep, or hog found at large in any highway or common. Provisions of the act extend also to goats and geese. In 1860, in view of the dangerous disease which had become prevalent in other States, the general assembly enacted that neat cattle might only be brought into the State from places west of the Connecticut River, upon thoroughfares leading into the western and southern portions of the State, under regulations established by a board of commissioners, until they should prohibit importations from any of said places. For a violation of the provisions of the act, a penalty was provided, not exceeding \$300 for each offence, and liability to indictment, and, on conviction, imprisonment not exceeding one year. In case of the introduction of a number of diseased cattle at the same time, the introduction of each animal is to be

deemed a separate and distinct offense. Town councils are empowered to take all necessary measures to prevent the breaking out or spreading of any infectious diseases among the neat cattle in their respective towns, and to prescribe penalties in money, not exceeding \$500. A board of commissioners is provided for, to be appointed by the governor, consisting of one person from each county, to see that the law is faithfully executed. It is made the especial duty of the board to endeavor to obtain full information in relation to the disease known as pleuro-pneumonia, and to publish and circulate the same, at their discretion; and in case the disease should break out, or there should be a reasonable suspicion of its existence in any town, they are required to examine the several cases and publish the result of their examination, in order that the public may have correct information. If satisfied of its existence in any town, they must give public notice of the fact in printed handbills, posted up; and, thereafter, any incorporated company or person who may drive, carry, or transport any neat cattle out of the town into any other town in the State, is liable to the penalties above stated. Any person who sells or offers to sell any cattle known to be infected with pleuro-pneumonia, or with any disease dangerous to public health, is liable to indictment, and, on conviction, to punishment by fine not exceeding \$1,000, or imprisonment not exceeding two years. The act of March 26, 1864, provides that any person knowingly bringing into the State any neat cattle or other animals suffering from any infectious disease, or who knowingly exposes such cattle or other animals to other cattle and animals not infected with such disease, shall, upon conviction, pay a fine of not less than \$100, and not exceeding \$500.

Connecticut.—The laws of CONNECTICUT allow owners of sheep to keep flocks in common, and to make their own rules and regulations concerning their care and safety. No horses, asses, mules, neat cattle, sheep, swine, or geese are allowed to go at large in any highway or common, or to roam at large for the purpose of being kept or pastured on the highway or common, either with or without a keeper. Any person may seize and take

into his custody and possession any animal which may be trespassing upon his premises, provided the animal enter from the highway, or through a fence belonging to the owner of the animal, or through a lawful fence belonging to any other person. He must give immediate notice to the owner, if known, and may demand for every horse, mule, ass, ox, cow, or calf, 25 cents; and for every sheep, goat, goose, or swine, 10 cents; together with just damages for injuries occasioned by such animals, if applied for within twenty-four hours after such notice shall have been given. If the owner is not known, the animal shall be sold by the town clerk, after due public notice.

New York.—The cattle laws of NEW YORK allow any person to seize and take into his custody any animal which may be in any public highway, and opposite to land owned or occupied by him, or which may be trespassing upon his premises. Notice must be given to a justice of the peace, or a commissioner of highways of the town in which the seizure has been made, who shall post up notices in six public places that the animal will be sold in not less than fifteen nor more than thirty days. The surplus money, after payment of all charges, is subject to the order of the owner for one year. The owner, before sale, may pay all charges and take the animal. If the animal has been trespassing by the willful act of another than the owner to effect that object, the owner is entitled to the animal upon making demand, after paying the compensation fixed by the justice or commissioner, but no other costs; and the person committing such willful act will be held liable to a penalty of \$20.

New Jersey.—In NEW JERSEY town committees, upon notice of the existence of any disease supposed to be contagious, are required personally to examine the cause, and if the symptoms which characterize contagious diseases are exhibited, shall cause such animals to be removed and kept separate and apart from other cattle and stock, five hundred feet distant from any highway, and the same distance from any and all neighbors. If any die of the disease, or are killed, they must be buried immediately, five hundred feet distant, etc., as above. No cattle that

have been sick, and have recovered from any supposed contagious or infectious disease, shall mix with other cattle, or be removed, unless permission has been given by the town committee. Any person knowingly storing a hide, or any other portion of a diseased animal, is subject to a fine. The town committee are authorized to prohibit the importation or passage of cattle from other places into or through their respective towns. After notice of prohibition, owners are liable to a fine of \$100 for every animal driven into a township. A fine of \$100 is imposed for every animal sold and known to be diseased. The act of 1866 authorizes the Agricultural Society of the State to take measures for preventing the introduction or increase of rinderpest, and any other disease among cattle, at their discretion. In this State, animals affected with glanders are authorized to be killed. Cattle must not be marked by chopping both ears; nor must either ear be cropped more than one inch.

Pennsylvania.—The running of cattle at large is controlled in PENNSYLVANIA by towns and counties, through special legislation. The sale of cattle or sheep affected with pleuro-pneumonia, or any other contagious disease, is punished by fine not exceeding \$500, or imprisonment not exceeding six months. Animals must not be sold alive from, or slaughtered on, premises where disease is known to exist, nor for a period of two months after disease shall have disappeared from the premises. Cattle and sheep are not allowed to run at large where any contagious disease prevails. Constables of townships are required to take up and confine any animals so found, until all costs are paid.

Delaware.—In DELAWARE, by act of general assembly, cattle are forbidden to run at large in certain districts. Stallions over eighteen months old are not permitted to be at large.

Maryland.—The laws of MARYLAND provide that any person aggrieved by trespass upon his premises of any cattle, hogs, or sheep in the possession or care of a non-resident, may impound them, and have the damages sustained by the trespass valued on oath by two disinterested citizens of his county, and the

animals may be sold for the damages and costs.

Virginia.—The laws of VIRGINIA provide that if any horses, cattle, hogs, sheep, or goats enter into any grounds inclosed by a lawful fence, the owner or manager shall be liable to the owner of the ground for all damages; and for every succeeding trespass by such animals, the owner shall be liable for double damages; and, after having given at least five days' notice to the owner of the animals of the fact of two previous trespasses, the aggrieved party shall be entitled to the animals if again found trespassing on the same lands. Horses diseased and unaltered, are not allowed to be at large. Every person shall so restrain his distempered cattle, or such as are under his care, that they may not go at large off the land to which they belong; and no person shall drive any distempered cattle into or through the State, or from one part of it to another, unless it be to remove them from one piece of ground to another of the same owner; and when any such cattle die, the owner thereof, or person having them in charge, shall cause them to be buried (with their hides on) four feet deep. Any justice, upon proof before him that any cattle are going at large, or are driven in or through his county or corporation, in violation of law, may direct the owner to impound them; and if he fail to do so, or suffer them to escape before obtaining a certificate that they may be removed with safety, they shall, by order of the justice, be killed and buried four feet deep, with their hides on, but so cut that no one may be tempted to dig them up. For the protection of sheep special laws have been passed taxing dogs in certain counties, and for their restraint in those counties.

North Carolina.—In NORTH CAROLINA, if cattle are driven from one part of the State to another, they must be certified to be healthy, sound, and free from any infectious distemper; the granting of such certificate by any justice, without affidavit, is a misdemeanor in office. Stallions and mules over two years old are not allowed to go at large, under a penalty of \$10. Damages for injury done by trespassing animals are recoverable as in other States,

South Carolina.—In SOUTH CAROLINA horses, cattle, hogs, sheep, or goats breaking into any field having a crop of any kind growing or ungathered, with a lawful fence, may be seized and kept confined until notice is given to the owner, within twenty-four hours of the seizure, who shall be bound to pay the owner of such field 50 cents a head for each horse or mule, and 25 cents for every head of cattle, hogs, etc., before he is entitled to have the animal delivered up to him. For the second breaking, within one month after the first, the owner is liable to the person injured for all damages sustained, in addition to the fine. Full satisfaction lies for injuring any animal found in any field where the fence is not a lawful one.

Georgia.—In the State of GEORGIA, if any trespass or damage is committed by stock on any lands not protected by lawful fences, the owner of the animal is not liable to answer for trespass; and if the owner of the premises should kill or injure the animal in any manner he is liable in three times the damages. When fences are made pursuant to law, and any animal breaks in, the owner of the inclosure shall not kill or injure him for the first breaking, and not until after notice is given to the agent or owner, if possible, but the owner shall be liable for double the damage done by his stock.

Florida.—In FLORIDA there can be no trespass or damage if the fence is not a lawful one; nor in such case can stakes, canes, or other devices to maim or kill cattle, sheep, swine, etc., be used, under a penalty of \$10 for each offence and damages. Marks upon stock are required.

Alabama.—Any person is allowed in ALABAMA to take up any horse, mare, jack, neat cattle, hog, or sheep found running at large, if the owner is unknown. If any stallion or jackass over two years of age is found at large it must be taken before a justice who shall cause it to be advertised. The taker up is entitled to \$5 from the owner, and reasonable compensation for keeping. If such stallion or jackass is not claimed within three months it may be gelded.

Mississippi.—The laws of MISSISSIPPI provide that every owner of cattle, horses, mules, hogs, sheep, or goats shall be liable for all injuries and trespasses committed

by breaking into grounds inclosed by legal fence. If any person whose fence is not a lawful one, shall hurt, wound, lame, or kill, by shooting, or hunting with dogs, or otherwise, any cattle, etc., that may have broken into his inclosure, he shall pay the owner double damages. A ranger is elected in each county to attend specially to estrays, of which he is required to keep a record. When any person finds horses, mules, jacks, cattle, sheep, or hogs straying upon his land he may take them up and forthwith send them to the owner, if known; if unknown, he must give notice to the ranger, or some justice of the peace. The owner of all estrays appraised at \$10 and not exceeding \$20 is allowed six months, and if less than \$10, three months, from the date of certificate of appraisement to claim and prove his property. It is not lawful for any drover or other person to drive any horses, mules, cattle, hogs, or sheep of another from the range to which they belong; but it is made his duty if any such stock join his, to halt immediately at the nearest pen, or some other convenient place, and separate such stock as does not belong to him, or to the person by whom he may be employed. For neglect a forfeit of \$20 for every offence is provided, and liability to all damages. Any person may confine and geld any stallion above the age of two years found running at large, at the risk of the owner, but this will not apply to stallions usually kept up, but to those which accidentally escape. Any animal addicted to fence breaking may be taken up by owner of land, who may recover 75 cents a day for keeping, provided owner has been notified, if known; but condition of fence may be shown in mitigation of damages. Double damages may be recovered for injury to animals where fence is not a lawful one. Defacing or altering marks of animals subjects to a penalty of imprisonment in the penitentiary for not more than three years, or fine of not more than \$500, and imprisonment in county jail for not more than one year, or both.

Texas.—No neat cattle belonging to non-residents are allowed to be taken into TEXAS for grazing or herding purposes, under pain of forfeiture to the county into which they shall have been so taken.

Severe penalties for altering the brands are provided in this State.

Arkansas.—In ARKANSAS, if any horse, cattle, or other stock break into any inclosure, the fence being of the required height and sufficiency, the owner of the animal shall, for the first offence, make reparation for true damages; for the second offence, double damages; and for the third the party injured may kill the trespassing beasts, without being answerable. If any stallion or jack over two years old is found running at large, the owner may be fined \$2 for the first offence, and \$10 for each subsequent offence, and is liable for all damages that may be sustained. Any person may take up such animal, and, if not claimed within two days, may castrate, and recover \$3 for doing so; but the life of the animal must not be endangered. If any such animal cannot be taken up, he may be killed, if notice be first put up at the court-house, and at three other of the most public places in the county for ten days, accurately describing the animal.

Tennessee.—In TENNESSEE stallions and jackasses over fifteen days old are not allowed to run at large under a penalty to the owner of not less than \$5 or more than \$25. The animal may be taken before the nearest justice of the peace who shall give public notice. If not claimed within three months the animal may be gelded at the risk and expense of the owner. The party taking him up is entitled to \$5 and reasonable expenses for keeping.

West Virginia.—There is no law in force in WEST VIRGINIA to prevent cattle from running at large; but if they break into an inclosure and destroy any grain or crops, the owner is liable, provided the fence is a lawful one. A law exists to prevent diseased sheep from traveling on the highway.

Kentucky.—In KENTUCKY breechy and mischievous bulls may be taken up and altered; a jack or stallion may be gelded if found at large, allowing the owner, if known, at the rate of twenty-five miles a day to reach the place where the animal is held, and recover the animal; when the owner is not known, the animal is dealt with as an estray, and may be ordered by a justice to be gelded. If the owner of any distempered cattle permits

them to run at large, or drives them through any part of the State, he is liable to a fine of \$10 for each head; and if any die the owner must cause them to be buried, subject to a penalty of \$5 for neglect in each case.

Missouri.—The State of MISSOURI has created a board of cattle inspectors to prevent the spread of the Texas or Spanish fever. The county court of each county is authorized to appoint three competent persons to act as a board for the inspection of cattle supposed to be distempered or affected with the disease known as the Texas or Spanish fever. They may stop any drove of cattle. If they adjudge cattle to be diseased or distempered, and in a condition to communicate any contagious or infectious disease, they are required to order the cattle to be removed from the county without delay, upon the same route upon which they came in, if practicable. If the owners comply with the order they will not be further liable; but if they, or the persons having the cattle in charge, wilfully delay or neglect to do so, the president of the board will direct the sheriff to drive the cattle out by the route they came in, or to kill them, if the board think it necessary in order to prevent the spread of the disease. The parties owning or in charge of the cattle ordered to be removed or killed are liable for all the costs that may accrue in case of examination, removal, or killing. The act to prevent the introduction of diseased cattle into the State provides that no Texas, Mexican, or Indian cattle shall be driven or otherwise conveyed into any county in the State between the first day of March and the first day of December in each year, but this does not apply to any cattle which have been kept the entire previous winter in the State. Cattle may be carried through the State by railroad or steamboat, provided they are not unloaded, but the railroad company or owners of the steamboat are responsible for all damages which may result from the Spanish or Texas fever, should the same occur along the line of transportation; and the existence of such disease along the route shall be *prima facie* evidence that the disease has been communicated by such transportation. For every head of cattle brought into the State contrary to law a fine of \$20 may be recovered, or

the party may be imprisoned in the county jail not less than three nor more than twelve months, or may be subjected to both fine and imprisonment. It is lawful for any three or more householders to stop any cattle which they may have good reason to believe are passing through any county in violation of the act.

Illinois.—In ILLINOIS the owner of animals breaking through a legal fence is liable to full damages for the first trespass, and to double damages for any subsequent trespass. Where the fence is insufficient, and the landowner injures or destroys animals, he is answerable in damages. Stallions over one year old are not permitted to run at large; but if so found may be gelded, if the owner does not reclaim them, one day for every fifteen miles' distance of the animal from home being allowed, after notice. Diseased horses, mules, and asses must be kept within the owner's inclosure, under penalty of \$20 damages. Estray hogs must be sold between Nov. 1 and March 1. To convey any Texas or Cherokee cattle into the State between the first day of October and the first day of March renders the party so doing liable to a fine not exceeding \$2,000 nor less than \$500, and imprisonment at the discretion of the court. Any and all fines are paid into the county treasury, subject to the order of the board of supervisors or county court, for the purpose of being divided *pro rata* among persons who may have suffered damage or loss on account of any such Texas or Cherokee cattle. All persons or corporations are liable to injured parties for any damage arising from the introduction, by any of them, of any diseased cattle. It is made the duty of any circuit or county judge, or justice of the peace, upon oath of any householder, setting forth that Texas or Cherokee cattle are spreading disease among the native cattle, to forthwith issue a warrant to any sheriff or constable of the county, commanding him to arrest and impound such cattle, and keep them by themselves until the first day of October following. "Texas and Cherokee cattle" are defined to mean a class or kind of cattle, without reference to the place from which they may have come.

Indiana.—In INDIANA the laws regu-

lating the running at large of cattle and other stock are local in their application, county boards designating what animals may or may not run at large. However, when any animal is found at large contrary to the local law, and has been taken up, the owner may reclaim it within ten days, after which time the animal may be sold.

Ohio.—It is unlawful in the State of OHIO for any one to sell, barter, or dispose of, or permit to run at large, any horse, cattle, sheep, or other domestic animal, knowing them to be infected with contagious or infectious disease, or to have been recently exposed thereto, unless he first duly informs the party to whom he may sell as to the facts. The fine for so doing is not less than \$20 nor more than \$200, with costs, or confinement in the county jail not more than thirty days. For allowing infected animals to come in contact with animals belonging to another, a fine is provided of not less than \$50 nor more than \$500, with costs of prosecution, or confinement in the county jail not less than ten nor more than fifty days. If any horse, mule, ass, or any neat cattle, hogs, sheep, or goats, running at large, break into or enter any inclosure other than inclosures of railroads, the owner is liable for all damages, and an animal so breaking into or entering an inclosure is not exempted from execution issued on any judgment or decree rendered by any court. For allowing any such animal to run at large in any public highway or upon any uninclosed land, or for herding any of them for the purpose of grazing on premises other than those owned or occupied by the owner or keeper of the animals, the party offending is liable, for every violation, to a fine of not less than \$1 nor more than \$5. But a general permission may be granted by the commissioners of any county for certain animals to run at large, and in any counties where there is no such general permission, township trustees may grant special permits, such general and special permits terminating on the first Monday of March of each year; and special permits are revokable at the discretion of the trustees, upon three days' notice in writing to the owner of the animals. Special permits must be directed to in-

dividuals, and for particular animals described therein. The owner of trespassing animals is liable for all damages upon premises of another without reference to the fence which may inclose the premises. Any person may take up and confine an animal found at large contrary to law, and the owner may reclaim the same within ten days. The fees are as follows: For taking up and advertising each horse or mule, \$1; neat cattle, 75 cents each; swine, 50 cents each; sheep or geese, 25 cents each; and reasonable pay for keeping the same. It is unlawful for the owner or keepers of any animals knowingly to permit them to enter the enclosure of any railroad, or, having entered, to remain therein; or to lead or drive any such animals within the inclosure, or along or upon the track of any railroad, at any other place than the regular street or road crossing, farm crossing, or way.

Michigan.—In MICHIGAN it is not lawful for any cattle, horses, sheep, or swine to run at large on the highways, except in those counties or parts of counties where it shall be otherwise determined by the board of supervisors in such county. Where the law is in force, any person may seize and hold in his possession any animal found running at large, and give notice to a justice of the peace or a commissioner of highways, who is required to post up notices describing the animal. The animal must be sold at public outcry in not less than thirty days nor more than sixty days after date of notice; but the owner may redeem the animal by paying costs and compensation for keeping—redemption to be made within one year. Any animal found trespassing by the willful act of another, may be taken by the owner on demand, after paying reasonable compensation, but the person committing the act is liable to a fine of \$20. Any person taking up a beast going at large contrary to law, or contrary to any by-law of a township, is entitled to fifty cents per head for all horses, mules, asses, and neat cattle, and 10 cents per head for all sheep, goats and swine. When any person is injured in his land by animals, he may recover damages in action for trespass against the owner of the beasts, or by distraining the beasts doing damage, unless the animals

shall have been lawfully on adjoining lands, and shall have escaped therefrom in consequence of the neglect of the person who has suffered the damage, to maintain his part of the division fence.

Wisconsin.—The laws of WISCONSIN permit towns to make regulations concerning the running of animals at large. The owner or occupant of lands may distrain all beasts doing damage within his inclosure, and when any distress shall be made the person distraining is required to keep such beast in some place or other than in the public pound until his damages are appraised; and within twenty-four hours he shall apply to a justice of the peace, who shall appoint three disinterested free-holders to appraise the damages sustained. If within twenty-four hours after the appraisement the damages are not paid, the animals may be placed in the public pound, to be there maintained until the amount of damages and costs is recovered by due process of law. If the owner of any sheep infected with contagious disease permits any of them to go at large out of his own inclosure at and season of the year, he shall forfeit the sum of \$5 for each and every such sheep, to the person who may enter complaint, for each time they are so found running at large. If the owner neglect to restrain such sheep, any person is authorized to take them up and put them in some safe place other than the public pound. Rams are not permitted to go at large between July 15 and December 1, and the owner forfeits \$10 to the person taking up the animal for each time so found abroad.

Minnesota.—The electors of each town in the State of MINNESOTA have power at their annual meetings to determine the number of pound masters, and the location of pounds, and regulations for impounding animals, and to fix the time and manner in which cattle, mules, asses, and sheep may be permitted to go at large, provided that no cattle, horses, mules, nor asses be allowed to go at large between the 15th of October and the 1st of April. The owner or occupant of lands may distrain all beasts doing damage upon his lands during the nighttime, from 8 o'clock in the evening until sunrise; and when any distress is made the distrainer shall keep such beasts in

some secure place other than the public pound, until his damages are appraised, unless the same is made on Sunday, in which case, before the next Tuesday morning thereafter he shall apply to a justice of the peace of the town, who shall appoint three disinterested persons to appraise damages. No damage can be recovered by the owner of any lands for damage committed by any beasts during the daytime, until it is first proved that the lands were inclosed by a lawful fence. Distress may be made at any time before the beasts doing damage escape from the lands, and without regard to the sufficiency of fences. The owner of any horse or other animal, having the disease known as the glanders, who knowingly permits such animal to run at large, or be driven upon any of the highways of the State, or any hotel keeper, or keeper of any public barn, who permits any animal having such disease to be stabled, such person shall be deemed guilty of a misdemeanor, and upon conviction before any justice of the peace, shall be punished by a fine of not more than \$100 nor less than \$25.

Iowa.—In IOWA no stallion, jack, bull, boar, or buck is permitted to run at large. Persons aggrieved are allowed to distrain any such animals, and compel the owner to pay damages. If the animal is not redeemed within seven days, seven days' notice of its sale at public auction must be given, the proceeds to apply on damages after deducting costs. If any domestic animal, lawfully on adjoining land, escapes therefrom in consequence of the neglect of the person suffering damage to maintain his part of the division fence, the owner of the animal is not liable for any damages. If beasts are not lawfully upon the adjoining land, and came upon it, or of they escaped therefrom into the injured inclosure, in consequence of the neglect of the adjoining owner to maintain a partition fence or any part of one, which it was his duty to maintain, then the owner of the adjoining land shall be liable as well as the owner of beasts. Fence-viewers appraise all damages. An act of April 8, 1868, forbids any one to bring into the State, or to have in possession, any Texas, Cherokee, or Indian cattle. Transportation on railroads through the State is not forbidden, nor the

driving through any part of the State of such Texas or southern cattle as have been wintered at least one winter north of the southern boundary of the State of Missouri or Kansas. The penalty of violation is a fine not exceeding \$5,000, or imprisonment in county jail at the discretion of the court, not to exceed six months, together with all damages that may accrue by reason of such violation of the law. Any one driving or importing diseased sheep into the State, knowing the disease to be contagious, is deemed guilty of misdemeanor, and is punishable by fine of not less than \$50 nor more than \$100. The same fine is imposed upon any person who may turn out of his inclosure, or sell sheep, knowing them to be diseased.

Kansas.—In KANSAS when a majority of the electors in any township petition county commissioners for orders to confine animals during the night time, such orders shall be made and notice thereof given. The owner is liable for depredations of animals during the continuance of such orders, without regard to condition of fences. Persons damaged in their property have a lien upon the stock. If any stallion or jack over the age of two years is found at large, the owner, if known, must be notified of the fact, and if he fails or refuses to confine the animal he is liable to a fine of \$5 for the first offense, and \$10 for each subsequent offense, and all damages. Stallions and jacks, not used for breeding purposes, may be castrated by the person taking them up, if the owner fails, after three days' notice, to reclaim the same, and pay damages, or such animals may be killed after six days' notice. Any bull, boar, or stag found running at large may be taken up at any time or place. Electors of townships may decide whether swine may run at large or not, at least ten voters having petitioned for the submission of the question. No horse, mule, or ass diseased with glanders is allowed to be at large, under a penalty of not less than \$5 nor more than \$100. Knowingly to import or drive into the State sheep affected with contagious disease is a misdemeanor, with a fine not to exceed \$200. The same penalty is provided for any owner allowing such sheep to run at large, together with responsibility for

damages to other owners. Rams must be restrained between June 15 and December 15, under penalty of \$5 for each day allowed at large. In February, 1867, a sanitary measure was passed for the protection of cattle from the ravages of the Spanish fever. Stock from Texas and the Indian Territory brought into the State between the first day of March and the first day of December in any year, are not to be driven through the State except in the remoter parts of the plains, and then not within five miles of any highway or "ranche," except by the consent of the owner of the latter. Violation of the law is treated as a misdemeanor, and the first offense is punishable by fine of \$100 to 1,000, and imprisonment from thirty days to six months; for subsequent offenses the penalties are doubled.

Nebraska.—In NEBRASKA cattle and other stock are restrained in particular counties. The legislation concerning cattle, etc., is also of a local character in the State of CALIFORNIA.

Oregon.—The laws of OREGON interdict the running at large of any stallion, jack, or mule, over eighteen months old, within the months of April, May, June, July, September and October. If not kept for breeding purposes, the animal may be gelded. If kept for breeding purposes, the distrainer may return him to the owner, and recover \$2. The owner of such an animal is liable for damages. Animals affected with contagious diseases must not be brought into the State under a penalty of not less than \$50 nor more than \$500 for the introduction of each animal so diseased.

PUBLIC LANDS, Manner of Acquiring Title to.—The following directions for acquiring title to the public lands are communicated by the Commissioner of the General Land Office:

There are two classes of public lands; the one class at \$1 25 per acre, which is designated as *minimum*, and the other at \$2 50 per acre, or *double minimum*.

Title may be acquired by purchase, at public sale, or by ordinary "private entry," and by virtue of the pre-emption and homestead laws.

1. At public sale, where lands are "offered" at public auction to the highest bidder, either pursuant to proclamation by the President or public notice given in

accordance with directions from the General Land Office.

2. By private entry or location. The lands of this class liable to disposal are those which have been offered at public sale, and thereafter remain unsold, and which have not been subsequently reserved, or otherwise withdrawn from market. In this class of offered and unreserved public lands the following steps may be taken to acquire title:

Cash Purchases.—The applicant must present a written application to the register for the district in which the land desired is situated, describing the tract he wishes to purchase, giving its area. Thereupon the register, if the tract is vacant, will so certify to the receiver, stating the price; and the applicant must then pay the amount of the purchase money. The receiver will then issue to the purchaser a duplicate receipt, and at the close of the month the register and receiver will make returns of the sale to the General Land Office, from whence, when the proceedings are found regular, a patent, or complete title will be issued; and on surrender of the duplicate receipt such patent will be delivered, at the option of the patentee, either by the Commissioner at Washington, or by the register at the district land office.

Warrants, Location with.—Application must be made as in cash cases, but must be accompanied by a warrant duly assigned as the consideration for the land; yet where the tract is \$2 50 per acre, the party, in addition to the surrendered warrant, must pay in *cash* \$1 25 per acre, as the warrant is in satisfaction of only so many acres at \$1 25 per acre as are contained in the tract located. A duplicate certificate of location will then be furnished the party, to be held until the patent is delivered, as in cases of cash sales.

Agricultural College Scrip.—This scrip is applicable to lands *not mineral*, which may be subject to private entry at \$1 25 per acre, yet is restricted to a technical "quarter section;" that is, lands embraced by the quarter section lines indicated on the official plats of survey, or it may be located on a part of a "quarter section," where such part is taken as in full for a quarter; but it cannot be applied to different subdivisions to make an area equivalent to a quarter section. The

manner of proceeding to acquire title with this class of paper is the same as in cash and warrant cases, the fees to be paid being the same as on warrants. The location of this scrip is restricted to three sections in each township of land.

Pre-emptions.—These may be made under the general pre-emption laws, upon "offered" and "unoffered" land; and in certain States and Territories west of the Mississippi, including that part of Minnesota east of the river, may have legal inception by actual settlement upon *unsurveyed* land, although in such cases no definitive proceedings can be had as to the completion of title until after the surveys are officially returned to the district land office.

The act of March 3, 1853, extends the pre-emption from one quarter, or one hundred and sixty acres, at \$2 50 per acre, to every "alternate" United States or *reserved* section along the line of railroads.

The act of March 27, 1854, protects the right of settlers on sections along the line of railroads where settlement existed prior to withdrawal, and in such cases allows the tract to be taken by pre-emption at \$1 25 per acre.

Where the tract is "*offered*" the party must file with the district land office his declaratory statement as to the fact of his settlement within thirty days from the date of said settlement, and within one year from that date must appear before the register and receiver and make proof of his actual residence on and cultivation of the tract, and secure the same by paying cash, or by filing warrant duly assigned to the pre-emptor.

Where the tract has been surveyed and *not* offered at public sale, the claimant must file within three months from date of settlement, and make proof and payment before the day designated in the President's proclamation for offering the lands at public sale. Should the settler in either of the aforesaid cases die before establishing his claim within the period limited by law, the title may be perfected by the executor, administrator, or one of the heirs, by making the requisite proof of settlement and paying for the land; the entry to be made in the name of "the heirs" of the deceased settler, and the patent will be issued accordingly.

In those States and Territories in which settlements are authorized by law on *unsurveyed* land, the claimant must file notice of settlement within three months after the receipt of the township plat of survey at the district land office, and make proof and payment as required in the case of tracts which have been surveyed and *not* offered at public sale.

Homestead Lands.—The original Homestead act of May 20, 1862, gives to every citizen, and to those who have declared their intention to become such, the right to a homestead on surveyed lands. This is conceded to the extent of one quarter section, or one hundred and sixty acres, held at \$1 25 per acre, or eighty acres at \$2 50 per acre, in any *organized district* embracing surveyed public lands. To obtain homesteads the party must, in connection with his application, make an affidavit before the register or receiver that he is over the age of twenty-one, or the head of a family; that he is a citizen of the United States, or has declared his intention to become such, and that the entry is made for his exclusive use and benefit, and for actual settlement and cultivation. Where the applicant is prevented by reason of bodily infirmity, distance, or other good cause, from personal attendance at the district land office, the affidavit may be made before the clerk of the court for the county within which the party is an actual resident.

The Amendatory Act of March, 1864, relaxes the requirements of personal attendance at the district office to persons in the military or naval service, where the party's family or some member is residing on the land that it is desired to enter, and upon which a *bona fide* improvement and cultivation has been made. In such cases the said act of 1864 allows the beneficiary to make the affidavit before the officer commanding in the branch of the service in which he may be engaged, and the same may be filed by the wife or other representative of the absentee with the register, together with the homestead application. His claim in that case will become effective from the date of filing, provided the required fee and commissions accompany the same; but immediately upon his discharge he must enter upon the land and make it his *bona fide*

home, as required by the original act of May 20, 1862.

Upon faithful observance of the law in regard to settlement and cultivation for the continuous term of five years, and at the expiration of that time, or within two years thereafter, upon proper proof to the satisfaction of the land officers, and the payment to the receiver, the register will issue his certificate and make proper return to the General Land Office as the basis of a patent or complete title for the homestead. In making final proof it is indispensable, under the statute, that the homestead party shall appear in person at the district land office, and there make the affidavit required of him by law in support of his claim. Where, from physical disability, distance, or other good cause, the witnesses of said party cannot attend in person at the district land office, their testimony in support of the claim may be taken where they reside before an officer authorized by law to administer oaths. Their testimony must state satisfactorily the reason of inability to attend the district office; and the credibility and responsibility of witnesses must be certified by the officiating magistrate, whose official character must be certified under seal. Where a homestead settler dies before the consummation of his claim, the heirs may continue the settlement and cultivation, and obtain a title upon requisite proof at the proper time. Where both parents die, leaving infant heirs, the homestead may be sold for cash for the benefit of such heirs, and the purchaser will receive title from the United States.

The sale of a homestead claim by the settler to another party before completion of title is not recognized by the General Land Office, and not only vests no title or equities in the purchaser, but is *prima facie* evidence of abandonment, and gives cause for the cancellation of the claim. To the government only may a claim be relinquished; and in such case the duplicate receipt of the settler should be surrendered with the relinquishment indorsed thereon; or if the duplicate has been lost, that fact should be stated in the relinquishment, duly signed and acknowledged.

When application is made for cancellation of a homestead entry on the ground of abandonment, the party must

file his affidavit with the local land officers, setting forth the facts upon which his allegations are founded, describing the tracts and giving the name of the settler. Upon this the officers will set apart a day for hearing, giving all the parties in interest due notice of the time and place of trial.

The expenses incident to such contest must be defrayed by the contestant, and no entry of the land can be made until the local officers have received notice from the General Land Office of the cancellation of the entry covering the same. As the law allows but one homestead privilege, a settler relinquishing or abandoning his claim, cannot thereafter make a second entry. Where an individual has made settlement on a surveyed tract and filed his pre-emption declaration therefor, he may change his filing into a homestead, yet such a change is inadmissible where an adverse right has intervened, but in such cases the settler has the privilege of perfecting his title under the pre-emption laws. If the homestead settler does not wish to remain five years on his tract, the law permits him to pay for it with cash warrants, upon making proof of settlement and cultivation from the date of entry to time of payment. There is another class of homesteads, designated as "adjoining farm homesteads." In these cases the law allows an applicant, owning and residing on an original farm, to enter other land lying contiguous thereto, which shall not, with such farm, exceed in the aggregate one hundred and sixty acres. Thus, for example, a party owning or occupying eighty acres may enter eighty additional graded at \$1 25, or forty acres at \$2 50. Or suppose the applicant to own forty acres, then he may enter one hundred and twenty acres graded at \$1 25, or forty at \$1 25 and forty at \$2 50, if both classes of land should be found contiguous to his original farm. In entries of "adjoining farms" the settler must describe, in his affidavit, the tract he owns and is settled upon as his original farm. Actual residence on the tract entered as an adjoining farm is not required, but *bona fide* improvement and cultivation of it must be shown for the period required by the statute.

Lands obtained under the homestead

laws are exempted from liability for debts contracted prior to the issuing of patents therefor.

Pre-emptors, in all organized districts where surveys have been made, can pay for their tracts either in cash or with warrants, except as to double minimum or \$2 50 lands, within the lateral limits of railroad grants, it being required for the double minimum tracts that the warrant shall be taken as half the consideration, and the residue be paid in money.

Homestead Entry Fees.—For homestead entries on surveyed lands in Michigan, Wisconsin, Iowa, Missouri, Minnesota, Kansas, Nebraska, Dakota, Alabama, Mississippi, Louisiana, Arkansas, and Florida, the total commissions and fees to be paid on minimum lands are as follows: On 160 acres, \$18; on 80 acres, \$9; on 40 acres, \$7; on double minimum lands, 80 acres, \$18; 40 acres, \$9. On surveyed lands in California, Nevada, Oregon, Colorado, New Mexico, Washington, Arizona, Idaho, and Montana, the commissions and fees are as follows: On minimum lands, 160 acres, \$22; 80 acres \$11; 40 acres, \$8; on double minimum lands, 80 acres, \$22; 40 acres, \$11. By the act of the 21st June, 1866, the public lands of Alabama, Mississippi, Louisiana, Arkansas, and Florida, are subject to disposal under the provisions of the homestead laws only.

SOLDIERS' and SAILORS' HOMESTEADS.—Any loyal person in the naval or military service of the United States may acquire a homestead by reason of his family occupying land and making the application in his stead. All officers, soldiers, and sailors who have served in the army or navy for ninety days and remained loyal, may enter one hundred and sixty, instead of eighty acres of double minimum lands.

By act of Congress, persons taking government lands by homestead will be allowed to deduct from the time required to occupy the land, the term of service in the army or navy during the rebellion—provided, however, that no patent shall be given until the land has been occupied one year after his improvements, as aforesaid.

The following amendment was passed by Congress, in 1873:

WHEREAS, By act of Congress, entitled

"An act to enable honorably discharged soldiers and sailors, their widows and orphan children, to acquire homesteads on the public lands of the United States," approved April 4, 1872, and by the amendment thereto, approved June 8, 1872, it is provided that said soldiers and sailors, their widows and orphan children, shall have the right to enter homesteads of one hundred and sixty acres each, upon what are called and known as "double minimum" lands, or lands within the limits of railroad land grants; and

WHEREAS, Many soldiers and sailors had, prior to the passage of said act and the amendments thereto, entered homesteads within said limits, not exceeding eighty acres each, and are unable, under the terms of said act and amendment, and the rulings of the General Land Office, to avail themselves of the general advantages of entering one hundred and sixty acres of said "double minimum" land; and

WHEREAS, Such discrimination against the pioneer soldiers and sailors is unjust; therefore,

Be it Enacted, etc., That section two of the act entitled "An act to amend an act relating to soldiers' and sailors' homesteads," approved June 8, 1872, be amended so as to read as follows: That any person entitled under the provisions of the foregoing sections to enter a homestead, who may have heretofore entered

under the homestead laws a quantity of land less than one hundred and sixty acres, shall be permitted to enter so much land as when added to the quantity previously entered, shall not exceed one hundred and sixty acres.

LAW, Business. — Ignorance of the law excuses no one. It is a fraud to conceal a fraud. The law compels no one to do impossibilities. An agreement without consideration is void. Signatures made with a lead pencil are good in law. A receipt for money paid is not legally conclusive. The acts of one partner bind all the others. Contracts made on Sunday cannot be enforced. A contract made with a minor is void. A contract made with a lunatic is void. Principals are responsible for the acts of their agents. Agents are responsible to their principals for errors. Each individual in a partnership is responsible for the whole amount of the debts of the firm. A note given by a minor is void. Notes bear interest only when so stated. It is legally necessary to say on a note "for value received." A note drawn on Sunday is void. A note obtained by fraud, or from a person in a state of intoxication, cannot be collected. If a note be lost or stolen, it does not release the maker; he must pay it. An endorser of a note is exempt from liability if not served with notice of its dishonor within twenty-four hours of its non-payment.



Farm, Orchard, Dairy and Garden.

APPLE ORCHARD.—The following directions, if carefully attended to, will insure complete success in growing an apple orchard.

The number of trees or acres embraced in our plan for the apple orchard is not a matter of so much importance as the particular manner of preparation of the soil, and the planting and cultivating of the trees thereafter.

Observation demonstrates clearly the fact that there is not one first-class apple orchard in the country. The result is that universal disappointment prevails among those who have engaged in growing the king of all fruit.

For illustration, our orchard shall contain from ten to one hundred acres, as circumstances shall determine. The selection of the location will exert more or less influence on the successful results when profit is a primary consideration, therefore we recommend the highest ground in the particular locality, or the bank of the Missouri or Mississippi rivers. The immediate border of any considerable lake will do equally as well.

The land must be broke not less than twenty-four inches deep, which can be done with a plow and sub-soil plow at a moderate expense. When the sub-soil is not sufficiently porous, the entire plat for our orchard must be completely underdrained with tile. The drains must be so close to each other that the most complete and thorough drainage will be insured.

We recommend only the very best trees, three years old, from the bud or graft. Plant thirty-five feet apart, after the ground has been put in the most complete cultivation; set the trees as near the surface as the circumstances will admit. If necessary, stake each tree to hold it in an upright position. The uniform formation of the head should be carefully observed, in order to give symmetry and convenience

to the orchard. We recommend that the lower limbs should not be nearer than six feet from the ground. The lower branches of the tree should be above the team with which we cultivate the orchard.

If you plant only the most sound and healthy trees, and the ground is prepared as we have suggested, there will not be one failure to live.

The trees must be washed with strong soap suds, soft soap or weak alkali, from the ground to the limbs, commencing with the first of May, and the washing to be repeated three or four times, at intervals of one month apart. The washing and scrubbing process must be continued year after year, or as long as it exerts a healthy influence on the tree.

The trees must be wrapped with straw, commencing at the surface of the ground and up into the first limbs. The wrapping must be done in November, and the straw can be removed after the hard frosts are past in the spring.

We now come to pruning, which must be done sparingly—in fact, exercise care in pruning; as understood by many orchardists, we positively prohibit it. Trim only enough to admit the light of the sun and a free circulation of the atmosphere.

The ground can be cultivated in corn, potatoes or vines for the first five years after the trees are planted, without disadvantage. If in corn, we recommend, indeed insist, that it shall be hogged off. The fertility of the soil must be maintained and kept up equal to its virgin condition. After the trees have attained a size when it will be no longer profitable to cultivate in corn, then red clover must take its place. The clover will make pasturage for hogs, whose presence are wanted in the orchard, to assist in destroying the curculio and other enemies of the insect tribe which prey on the apple tree and its fruit.

The orchard should be grounds fre-

quented by all the poultry that can be maintained to advantage on the farm. Our plan contemplates a warfare on all the insects that are the destroyer of the apple tree and its fruit.

The tree must be well mulched every fall with tree leaves and sand. If tree leaves cannot be had then use straw. The mulching can be forked into the ground in the spring. The sand will add much to the fertility of the soil by keeping the ground in a pliable condition and admit the action of the atmosphere. Lime is essential to the perfect growth and development of the tree. The fruit will be much improved by the presence of lime. The amount of lime to be used will only be limited in proportion to the benefits derived. The last and not least in the list of our instructions which we insist must be followed to the letter, is the planting of a border of trees on the four sides of the orchard for a protection against the winds in both winter and summer. The first line of defense shall be a red cedar hedge. Outside of the hedge there must be a border of trees four rods wide. The Norway Spruce and White Pine can be grown successfully, and to great profit. The border of trees will afford fine protection both summer and winter for numerous insectivorous birds, who will aid in the destruction of the insects referred to. The ground must be prepared as for the apple orchard, which will insure an immense growth. If all our instructions are followed, we shall have apples enough the fifth year to pay expenses. From this time the increase will be rapid. By the time our trees are planted ten years, there will be twenty bushels to the tree. Twelve years planted, and we will have thirty-five bushels to the tree. In addition to large crops the quality of the apples will be superior to any grown on the imperfect management of orchards throughout the country. Our plan of an orchard contemplates a considerable outlay at the commencement. A careful examination will demonstrate that no better investment can be made. The plan above can be limited to any number of acres. No weeds or grass must be permitted to grow in the orchard except red clover.

APPLE TREES, Old, to Renovate.—Take fresh made lime from the kiln,

slake it well with water and well-dress the tree with a brush, and the insects and moss will be completely destroyed, the outer rind fall off, and a new, smooth, clear, healthy one formed, and the trees assume a most healthy appearance and produce the finest fruit.

APPLE TREES, Treatment of.—The limbs of apple trees are recommended by some to be brushed all over in the midst of summer; but it is difficult to brush the branches of trees when the fruit is upon them. Instead of brushing the trees in summer, as soon as the leaves have fallen every tree should be carefully and freely pruned; this will open a passage to the sun and air, and will contribute to health in the future season. In addition to this, says a correspondent of the Monthly Magazine for 1820, I should recommend brushing off the moss and cutting out the cankered parts at any season that it is convenient, and I further recommend the tree to be anointed some feet from the ground with a composition of sulphur and goose oil, and, unless the orchard is plowed, which is very much the case in Shropshire and Herefordshire, the soil should be opened at the roots.

APPLE TREES, Blight, to Preserve from.—Washing the branches with quicklime will preserve the trees from blight and insure a crop; those which escaped washing will suffer from the blight, whilst the others produce a good crop.

APPLE TREES, Disease, to Cure in.—Brush off the white down, clear off the red stain underneath it, and anoint the places infected with a liquid mixture of train oil and Scotch snuff.

Another Method.—Orchards are occasionally much injured by an insect appearing like a white efflorescence; when bruised between the fingers it emits a blood-red fluid. Mix a quantity of cow-dung with human urine to the consistence of paint, and let the infected trees be anointed with it about the beginning of March.

APPLE TREES, Canker in, to Cure the.—The only means of preventing the canker worm, which destroys the young fruit and endangers the life of the tree, when discovered, and which in many instances has proved to be effectual, was encircling the tree, about knee high, with

a streak of tar, early in the spring, and occasionally adding a fresh coat.

In Other Trees.—Cut off to the quick, and apply a piece of sound bark from any other tree, and bind it on with a flannel roller. Cut off the canker, and a new shoot will grow strong, but in a year or two you will find it cankered.

APPLE-TREE SUCKERS.—Many otherwise good orchards are allowed to become defaced, as well as seriously injured, by allowing a profusion of suckers to grow at the base of the trunks. Attempts are sometimes made to get rid of them by cutting them off down to the surface of the ground, and leaving considerable portions below in the form of short stumps. These sprout again, and they soon become quite as bad as ever. A better way is to wait until they are in leaf, at which time they are loosened more readily, and taking each separately in the hands, place a thick boot upon it near the tree, and they are quickly separated. If done at that time they will not be likely to sprout again.

ARTICHOKE, Jerusalem.—Boussingault says, in his "Rural Economy:" There are few plants more hardy and so little nice about soil as the Jerusalem artichoke; it succeeds everywhere, with the single condition that the soil be not wet. The tubers are planted exactly as potatoes, and nearly at the same time; but this is a process that is performed but rarely, inasmuch as the cultivation of the helianthus is incessant, being carried on for years in the same place, and after harvest, in spite of every disposition to take up all the tubers, enough constantly escape detection to stock the land for the following year, so that the surface appears literally covered with the young plants on the return of spring, and it is necessary to thin them by hoeing. The impossibility of taking away the whole of the tubers, and their power of resisting the hardest frosts of winter, is an obstacle almost insurmountable to the introduction of this plant, as one element of a regular rotation. Experience more and more confirms the propriety of setting aside a patch of land for the growth of this productive and very valuable root. Of all the various plants that engage the husbandman, the Jerusalem artichoke is that which produces the most at the

least expense of manure and manual labor. He then directs the reader's attention to an example where the artichoke had been produced for thirty-three successive years with success, while they had received no care or manure for a long time. Those who wish to try it must plant it as early as the condition of the soil will allow. The land after plowing is marked out with furrows three feet apart, and the small tubers are dropped about eighteen inches apart, and covered three inches deep. Go over the field in a week or two with a light harrow to kill weeds, and cultivate between the rows until the plants get large enough to render it unnecessary. It grows very readily in dry soil. Those who make trial of it should take care that the plant does not become established as a weed.

ASPARAGUS, Culture of.—Sow the seed early in spring, one inch deep, and three or four inches apart, in rows one foot apart. When two years old they may be transplanted into permanent beds, the plants placed a foot apart in each direction, and at least four inches beneath the surface.

To make it "giant," be particular to select for the bed warm, rich soil. Trench it at least eighteen inches deep, working in six inches or more depth of well-rotted manure. Every fall cover the bed with manure, and in spring dig it in lightly, care being taken not to disturb the roots.

AROMATIC, Pot and Sweet Herbs, Culture of.—The generality of aromatic, pot and sweet herbs may be raised from seed sown early in spring. As only a small quantity of these are necessary for family use, they may occupy a corner by themselves. They thrive best in a mellow, free soil; and care should be exercised to harvest them at the proper time. The greater part of the following named herbs are perennial, and will multiply from the seed they drop, or from parting from the roots. The offsets, roots, or young plants thus raised should be planted at suitable distances from each other. The beds should be kept free from weeds; and, as the herbs come into flower, cut them on a dry day and spread them in a shady place to dry for use. The best method for preserving them is to rub them through a sieve when thor-

oughly dry, and pack them in tin boxes. Put them in a dry place.

The following are some of the most useful: Angelica, anise, balm (lemon), basil (sweet), burnett, cardoon, coriander, corn salad, comelina, dandelion, dill, French sorel, pennyroyal, pot marigold, rosemary, sage, saffron, summer savory.

ANNOTTO, Choice of.—Annotto should be chosen of a good flame color, brighter in the middle than on the outside. It should feel soft and smooth, and have a good consistence. It should possess a strong smell.

ANTS in GREENHOUSES, To Destroy.—Place some arsenic, mixed with sugar and water, in a saucer, which cover with a slate, leaving room for the insects to pass between the slate and the saucer. A stone ought to be set on the slate to prevent any other creature but the ants from getting access to the poison. Lime water, poured into the nests, will also destroy them.

BARLEY, To Cultivate.—Our climate is not as favorable for barley as for oats and wheat. We cannot obtain a good crop unless the soil is dry, clean and rich. It seldom does well on a recently inverted sod. Its best place in the rotation is after a highly manured and thoroughly cultivated corn crop. The best crops are obtained on a rather heavy calcareous loam, provided it has been thoroughly pulverized during the preceding summer and autumn. But as this is seldom the case, the soils that usually give the best medium crops are those of a lighter and warmer character—or sandy loams.

Barley should either be sown very early, or rather late—say the moment the ground is fit to work in the spring, or not until after the heavy spring rains are over. Much depends on the season. If there has been heavy rains soon after the barley is sown, and then before the plants cover the ground, dry weather sets in, the surface of the soil becomes baked, and the crop suffers. An early sown crop would suffer less, because it would have got a good start before the drouth set in. A crop sown immediately after the spring rains, as soon as the land is in condition to work, commences to grow rapidly at the very first, and often does better than a crop that is sown two weeks earlier—but not as well as a crop sown a

month earlier. If the soil is rich and has been plowed the fall previous, sow as early as it will work without clogging.

When barley is grown to sell, the six-rowed, or what is usually the four-rowed (though there is no such thing as a four-rowed barley,) is the most profitable—because it brings from ten to fifteen cents a bushel more than the two-rowed. But when barley is grown to feed out on the farm, the two-rowed is altogether the best—especially on strong, rich land. It weighs a great deal more per bushel, and if the soil is rich enough, it will yield more per acre. It has another advantage—that of being later than the four-rowed, which ripens at the same time as wheat, and we have wheat and barley harvest on us at once. With the two-rowed, we can get through with the wheat by the time the barley is ready.

It is usual to sow from two to two and a half bushels per acre. If the land is very rich and it is sown early and drilled in, less seed is required. The yield varies more than that of any other crop, depending somewhat on the season, but much more on the condition and previous culture of the soil.

BARLEY, To Harvest.—When the straw is long enough, the best way to harvest barley is to bind it up the same as wheat. It requires to be cut just at the right time. If cut too early, the grain shrivels up, and if it is allowed to stand a few days too long, it “crinkles down,” and the heads drop off in reaping and are lost. We know of no better test than to squeeze the grain between the thumb and finger, and if there is the least appearance of milk, the crop should be allowed to stand longer. The real difficulty, however, is in the uneven ripeness of the crop. Some portions will be dead ripe, while others are still green, and it requires considerable experience and a sound judgment to decide whether we shall lose most by cutting before it is all ripe, or by letting a portion of it get so ripe that there is danger of the heads falling off. Much depends on the weather. In this, as in many other farming operations, we must calculate our chances—and not be discouraged if we sometimes miss the mark. When barley is clean and the weather favorable, there is perhaps no better—certainly no cheaper—

way of curing it than to allow it to remain in the gavels as thrown from the platform of the reaper. They may be turned or stirred to facilitate the drying, but otherwise may remain as left by the reaper until ready to draw in. By moving one or two swaths to make room for the team, two men with barley forks can pick up the gavels of three or four swaths on each side of the wagon, and place them on the load. In this way scarcely any of the barley will be scattered on the land.

But if there are weeds or grass in the barley, or the weather is threatening, it will be necessary to turn the gavels, and towards night put them into small cocks, which will have to be turned or opened the next day and recocked in the evening again, if not sufficiently cured to draw in. It should be borne in mind that barley is very frequently stained in the stack or the mow, from being drawn in too soon, or with the dew on it. Barley should be either thrashed as drawn from the field, or not until it has done "sweating" in the stack or mow. If the former, it will be necessary to watch the grain in the bin and turn it occasionally, or it will heat and become discolored. The rakings should be kept separate, as the grain is frequently stained, and if mixed with the rest may reduce the price of the whole several cents per bushel.

BEANS, to Cultivate.—These grow best in warm, rich, mellow soil. The bush beans are planted in drills, about two inches apart in the row. The drills may be from one foot to eighteen inches apart. When the plants are three or four inches high, the earth should be drawn up to the stems, and just before they begin to blossom they should be again earthed up with loose, mellow soil. They require to be frequently hoed while growing, that the ground may be loose and free from all weeds.

Pole or running beans are planted in hills, two or three feet apart, five or six beans to the hill, and covered about a couple of inches deep. It is of no use to plant until the soil has become warm. These beans need the support of a pole or rod, thrust deep enough into the ground to sustain the weight of the vines, usually about eighteen inches, and standing eight or nine feet high. Three healthy

plants will be enough to grow in each hill.

BEANS, LIMA.—The principal point in the successful culture of the Lima bean is to get the seed well started. The best way of doing this is to plant in a hill of light earth, made so by sifting the soil, if it can be had in no other way. A shovel-ful of well-rotted manure should go into each hill. Then mix sand and muck, and after placing each seed bean with the germ downward in the hill, sift the covering over it through a willow sieve. Corn-planting time is the right time to plant Lima beans. The after-cultivation is the same as for the common pole bean.

BEAN, CASTOR-OIL.—The best land for the growth of the castor-oil bean is a light, sandy, loam soil, with a substratum of clay. First, break up the ground well, as for corn, and then lay off the rows six feet apart. Between every seventh row leave an interval of six feet, to admit the passage of a horse and slide when the beans are being gathered, as hereafter explained. Before planting, put the seed in very warm (not boiling) water, and let them soak all night. Drop six or seven seed in each hill, the hills six feet apart each way. Thin out to two plants after the plants have got too large for the cutworm, which is sometimes quite destructive. At this stage, if the plants are vigorous and healthy, reduce to one plant, leaving two only where the plants look delicate. Keep the crop clean, first with the plow, then with the cultivator, and now and then drawing a little dirt around with the hoe. When the plants are some two feet high no more work need be done, unless, after a long spell of rain, you may loosen the earth with your cultivator. After the ripening of the beans, which will be in July or August, take your horse, and slide along the rows left for that purpose, and with a pair of shears clip off the pod-bearing spikes as soon as the pods begin to turn of a brown or chocolate color. They must be promptly cut, at this stage, or the beans will pop from the pod and be lost.

Have ready a shed with a plank floor, or a piece of ground, well cleaned, beaten and rolled like an old-time threshing floor, twenty or thirty feet square, well exposed to the sun, on which throw your spikes, and turn them over occasionally

until all the beans drop out. Then scrape away the husks, gather the beans, and go into the field for a new supply, as they will continue to bear and mature until frost. Do not allow the beans, when drying, to get wet. Hence an open shed is best. If you have no shed, when the weather is threatening, rake into a heap, and cover with a tarpaulin or boards. They should be well fanned and winnowed of chaff before being sacked for market. From 15 to 25 bushels per acre is the average yield.

BLACKBERRY.—For the cultivated blackberry the soil should be rich, dry and mellow. Barn-yard manure and bone-dust are its best fertilizers; it is a good plan to mix them with half-rotten straw, or some such thing. They should be planted three feet apart in the rows, and the rows should be six feet asunder.

BLIGHT IN FRUIT TREES, to Cure.—A smothering straw fire should be made early in October, in calm weather, under each tree, and kept up during an hour or more. This done, scrape the moss and other impurities from the trunk, and from every obscure hole and corner; set your ladders to the branches, carefully cleaning them in the same way, taking from the remaining leaves every web or nidus of insects. If need be, wash the trunk and all the larger wood, with a solution of lime and dung. Last of all, it is necessary to destroy the insects and eggs which may be dropped upon the ground, and it may be useful to loosen the soil in the circumference. In the spring or early blighting season, apply your ladders, make a careful survey of every branch, and act accordingly; repeat this monthly, picking off all blights by hand, and using the water-engine, where ablation may be necessary. To those who have fruit, or the market profit thereof, every orchard or garden, little or great, will repay such trouble and expense.

BUTTER, Hints on Making.—A lady who thinks that much that is written about butter-making is by "men," and not by experienced butter-makers, gives a few hints. For the improvement of winter butter, she very sensibly begins with the cow, and advises feeding on Indian meal. She says: "My rule in winter is to let the milk stand on a table in a cellar for 24

hours; set it on the stove until the cream wrinkles (do not let it get too hot), then let it stand another 24 hours, and skim. Use a skimming-ladle with holes, in order to have as little milk as possible with the cream. Stir the cream every day; and the day before churning put the pot near the stove, to allow the cream to warm and get sour. Some have the mistaken idea that cream should not get sour, but it makes butter, better and more of it. Stir the cream well, as much depends upon that. If a clear, yellow skin forms on the cream it will make the butter strong; it is as bad as mold, or worse. In summer throw a handful of salt into your cream-pot when you first set it; it will keep the cream sweet longer. Be sure to ventilate the cellar or milk-room. It is a mistake to churn sweet and sour cream together, as it makes the butter streaked. Do not work the butter too long; it will become oily; but have a fine cloth, squeezed out of cold water, to take up the buttermilk with."

CABBAGE PLANTS, Caterpillar in.—A butterfly has lately made its appearance in the neighborhood of New York and Long Island which is new to the gardens there, the caterpillar of which has already done very great damage. As a remedy, salt has been found more effectual than either tobacco, cresylic acid, soap or guano; and that by laying pieces of board between the rows of cabbages, supporting them about two inches above the surface of the ground, the worms will resort to them to undergo their transformations and can then be easily destroyed. The saponaceous compounds of cresylic acid are also recommended; but Mr. P. T. Quinn, of New Jersey, gives the following as his experience in combating this insect. On his return from California last summer he found his cabbages infested with worms, which threatened total destruction. After trying various remedies, he found this recipe to be the best: 20 parts of superphosphate made with slush acid, 1 part of carbolic powder, and three parts of air-slacked lime, mixed well together, and thoroughly dusted into each head four times at intervals of four days. The result was the saving of seventy-five thousand cabbages and a loss of only five per cent.

BUTTER MAKING.—Why is it that when superior butter brings twice the price of poor, there is so much that is decidedly unfit to eat? The art of making a good article has long been known, in all civilized countries, by thousands of people, still there is probably in no country a supply of the best for a tenth of the population. Some one recently asked in the New York Farmers' Club, why plain directions for making good butter could not be published with a prospect for their general adoption. A veteran member replied, with something of human philosophy in the remark, that human nature was so perverse, that few would follow any but the peculiar method early taught and long practiced. In many a city market a buyer of good taste may test the stock of a dozen stalls before finding one that offers a satisfactory sample; yet while the buyer honestly and properly says, "it is naught," the seller, perhaps, with equal honesty, declares it is "all right," either because it was made in his own family, or suits his own taste, perverted with a thousand samples of poor or medium quality. So many a dairy-woman, proud of her achievements, sends her produce to market with first-rate expectations, and receives in return a third-rate price. Yet, while it may naturally differ, a really good roll or tub of solid, fragrant, sweet, golden butter will always find an appreciating purchaser, and obtain a good price.

How can there be general improvement, approximation to perfection in quality, and avoidance of soap-grease, bearing the misnomer, "cooking butter?"

Hoping to lead to a practical solution of this problem, while despairing of offering anything actually new on the subject, we propose to give a few of the methods by which the most noted and acceptable butter of the country is made. It will be seen that methods vary, and that the butter is made in many different ways, and yet it will be observed that there are certain principles which rule in all, and that there is really less difference than appears; and these very differences prove the possibility of general improvement and comparative uniformity by attention to essentials.

To find the first of these essentials, it is necessary to go back to the pasture, and secure sweet and nutritious grasses, as

milk and butter of the finest quality can not be produced upon weeds, sour grasses, or distilled slops. Then the cows, selected for hereditary excellence, as elaborators of superior milk, should be gently treated, carefully and rapidly milked by the same person at regular intervals. The milk and cream must be kept at an even and comparatively low temperature, in a perfectly clean place, free from odors of every description; and the utensils and vessels must be kept scrupulously clean, scalded thoroughly after use to prevent the development of cryptogamic germs; if in winter, milk and cream must not remain at so low a temperature, or be kept so long as to become bitter. Then the butter, after churning, must be kept at a reduced temperature, worked thoroughly without much pressure, in such a manner as to exhaust the buttermilk or added water, but not so as to break down the grain of the butter and render it greasy. Notwithstanding the fact that a very good article has been made by working with the hands, it is an uncleanly practice, not so well adapted to rapid and complete expulsion of buttermilk as approved mechanical appliances.

A study of the peculiarities of the modes of making the most popular brands of butter, will reveal how fully the best practice agrees in the above essentials. We first describe the method adopted in making the

Butter, New York Factory.—In the New York butter factories, the milk-rooms are constructed with a view to thorough ventilation, and are provided with water tanks sunk in the earth, and arranged for a depth of eighteen inches of water. There should be a constant flow of water through the vats to secure a uniform temperature, which should not be below 48°, nor higher than 56°. As soon as the milk is delivered it is set in tin pails eight inches in diameter and twenty inches deep, the milk standing at a depth of seventeen inches in the pail. Milk cooled in this way throws up its cream rapidly, and the uniform temperature of the cream has a favorable effect on the churning. Good milk thus treated will keep sweet for thirty-six hours, even in the hottest weather, and as much cream may be obtained as from milk in shallow pans. The cream will nearly all rise in twenty-

four hours, and should be taken off before the milk sours. The butter makers of Orange County prefer the old-fashioned dash churn, and add cold water in summer and warm in winter, at the rate of sixteen to thirty quarts of water to fifty quarts of cream. Thus the temperate of the cream in summer, when the churning is commenced, is brought to about 60° , and in winter to about 63° . It is preferred that forty-five to sixty minutes be employed churning. The butter, after being taken from the churn, is thoroughly washed in cold spring water, and after salting and working is allowed to stand a certain length of time, for instance, from morning till evening, when it is carefully packed in strong hooped and perfectly tight oak tubs, and strong brine is poured in to fill intervening spaces.

BUTTER, The Philadelphia.—The description of the manufacture of the famous and costly "Philadelphia print" was given in detail in the Report of 1867. Great care, uniformity and system characterize all its processes. The milking is done quietly and rapidly, the same milkmaid always attending to the same cows. The spring-house is usually of stone, on a side-hill, the floor covered with running water, and therefore always cool and free from odors. Deep tin pans, painted on the outside, with bails for handling, are filled to the depth of three inches, placed on an oak floor, and surrounded with cool, clear water of a temperature of 58° . The cream is taken off in twenty-four hours, kept in deep vessels holding twelve gallons, and stirred whenever a new skimming is added. A barrel churn is used, the churning lasting an hour, when a little cold milk is added to cause the butter to gather. The buttermilk drawn off, ice-cold water is twice added, a few turns given to the churn each time, and the last water is scarcely colored with milk. A gentle rocking motion of the churn soon collects the butter, which is left two hours to drain off the remaining water through a small hole made for the purpose. The butter is worked by a corrugated wooden roller, revolving on a shaft supported over the center of the table, which also revolves under the roller. Bevelled blocks at each end of the roller force the butter from the ends toward the center, so that the rolls are

broken each time in fresh places. The roller does not quite touch the table, and there is no crushing of the particles, but a separation of the mass with a slight pressure which permits water and buttermilk to flow away. A cloth which has been wrung dry in cold spring water is repeatedly pressed upon the butter until not a particle of moisture is seen upon it as it comes from the roller, and the butter begins to adhere to the cloth. This is called "wiping" the butter. An ounce of salt to three pounds of butter is then thoroughly worked in by the aid of the same machine. Thus the processes are all conducted without any manipulation of the butter but the human hand. It is finally weighed out and put up in pound prints. One hundred pounds are churned in one hour and prepared for the market in another, and deposited in tin trays and set in water to harden. The next morning it is wrapped in damp cloths, each pound by itself, put in a tin case upon wooden shelves, with two compartments of pounded ice to keep it cool, and surrounded by a thoroughly made cedar tub, it is sent to market and sold (often) at a dollar a pound.

BUTTER, Vermont.—The Green Mountains have been famous for good butter, and the best dairymen of that region keep their milk in cool, well-ventilated cellars in summer, and in a sweet, clean milk-room at other seasons. The temperature desired is about 60° , and when it is reduced to 50° they scald the milk, and thus prevent bitterness, labor in churning, and loss of color. The milk is strained as soon as it is drawn, and skimmed before it becomes thick, generally in twenty-four hours when the temperature is up to 60° , but much longer in proportion as it is colder. Many prefer to stir the cream every twelve hours, and sprinkle over the top with fine salt. When the butter has "come," the buttermilk is drawn off and cold water or ice water turned in, and the butter thoroughly worked till rid of buttermilk; and if it is then "crumbly or spongy" the water is worked out by hand, very carefully, to prevent injuring the grain and rendering it greasy. David Goodall, in the *St. Johnsbury Times*, thus describes the mode of packing:

While the butter is warm, and as soon as salted, put it into the tub and pound

it down solid; and, if it does not fill the tub, cover it with a cloth, and put on it a pint of brine. Fill the tub within one inch of the top; cut a cloth one inch larger than the butter and spread it on the top of it; than cut another cloth, one inch larger than the last, and fit it on the top, spreading evenly and turning up each edge on the inside of the staves; but it must not hang over, as it would draw brine out. Cut a bar of sweet wood, two inches by half an inch, and fit it on the butter; bore through the stave into each end of the bar, and put in a wooden pin tight to keep the bar in place; fill the tub with fine salt, and fill again with brine, and keep it full. Some put in one-fourth inch of fine salt at the bottom of the tub and cover with a cloth. I think the cloth without the salt sufficient.

BUTTER, New York.—A correspondent of the New York Farmers' Club, writing from Adrian, Michigan, makes the following suggestions:

Set your milk where the wind will not blow on it, for the wind dries the cream, and dried cream will not make butter. In warm weather keep your cream still, for if you want your cream to be sour, stir it often. Very sour cream will not produce a good quality of butter. In cool or cold weather, don't think that you must let your milk set until it is sour before you take off the cream. Forty-eight hours is sufficient length of time for milk to produce all the cream it is capable of producing. In a right temperature it will rise in a less time. Much poor butter is the result of bad management of the cream. It is a good plan in warm weather to save strippings, about a quart, night and morning, from each cow, and churn every day. Churn your cream as cool as possible in warm weather. Much butter is spoiled by churning the cream too warm. If your butter comes rather warm, put in twice the salt you usually do, work your butter just enough to mix the salt well through it, and set it away in a cool place for twenty-four hours, then take it up and work it over. Much of this salt will dissolve and work out. Thoroughly cleanse your butter with salt. Use no cold water about your butter, for you cannot cleanse butter or any other lump of grease with water. Some women talk as though butter was not fit to eat unless

it is first washed with cold water. If butter is not fit to eat without being washed with water, it is not by being washed. Water always damages butter. Butter that is washed with water is not fit to pack, for it will not keep. When the brine which oozes from your butter, as you work it, is clear, that is, clear from milk, it is worked enough; don't give it another stroke, except to get it into shape. Pack your butter in perfectly clean vessels, and keep it well covered with strong brine. When you use your butter, set it on the table just as you cut it out of the tub, for it is injured if worked after it has been packed. If all butter was made after this plan we would see but little that is poor.

At one of the meetings of the club of Union County (New York) Agricultural Society, Mr. H. W. Garret, whose dairy product is represented as of excellent quality, gave in substance the following directions: Everything pertaining to the entire work of butter making should be kept scrupulously clean. Forty hours is the average period of time for a pan of milk to remain prior to skimming. It is necessary for the milk to sour before the entire cream can be obtained. If the atmosphere is such that the cream becomes rancid, immediately skim. Skimming at the proper time is absolutely necessary. The milk room should be kept at 61°. Twice a day stir the cream in the jars; let those jars stand in the coldest place in summer. When churning is necessary, let the cream be at 62°. Use a dash churn, which is superior to any other. When the globules are about breaking, reduce the temperature to 60°. Do not wash the butter. Work it as little as possible; too much working makes it salvy, and washing destroys the flavor.

BUTTER, Western Mode.—Western butter has not heretofore enjoyed a high reputation. It is possible that rank grasses and noxious plants may have been an element of this disrepute; impure water in some places may have had an influence; but the main cause has been a lack either of care or skill in the butter maker. It is rapidly improving, and while it commands a price less than that paid for New York butter, a considerable quantity is forwarded to the Eastern sea-

board, and some of it is of really superior character. It is probable that individual dairies may be found which produce an article unsurpassed by the best Orange County or Philadelphia products; yet these must be few compared with the aggregate number of Western dairies. The intelligence, skill, and care evinced by many butter makers of the prairies will prove a leaven that may be expected to work wonders in the general improvement of the butter of that great section. The following directions for butter making, by Mrs. M. A. Deane, of Farina, Illinois, recently received a prize from the Messrs. Blanchard, churn makers, at Concord, New Hampshire, as a model exposition of the subject and of general application:

Management of the Milk.—The advantage gained during the hot season by the rapid and complete cooling of milk as soon as it comes from the cow can hardly be over-estimated, as recent experiments show that the milk thus cooled will keep sweet much longer and yield its cream more readily and more abundantly; and as all experience has proved that the quantity of butter made depends greatly upon keeping the milk in such a state as to secure all the cream, a saving of labor is effected by this process, as the milk, when cooled to the required temperature (60°), may be set in deeper vessels, thus diminishing greatly the number of vessels required, and, consequently, the labor of cleansing them.

In a large dairy the washing and scalding of the shallow pans so much in use is always a laborious and tedious process. There are many methods, more or less simple, for cooling milk. Patents have been granted for various plans, and many enterprising dairymen are testing ingenious devices of their own with excellent success. If it is not convenient to procure a cooler, the milk may be cooled by setting some large pails into a trough or box partly filled with very cold water, and pouring the milk into these pails as fast as it is drawn from the cows, allowing it to stand until of the required temperature—if necessary, renewing the water.

The pails used in milking should be of tin, never of wood. It is very difficult, almost impossible, to cleanse wooden

pails so perfectly that they will not impart some degree of acidity to the milk, though it may be an insensible degree. Owing to this fact, some factories make it an absolute requisition that only tin pails shall be used by those who furnish them with milk.

The Dairy Room.—Much of the success of butter making depends upon the fitness of the place or room where the dairy is kept, and upon its condition as to cleanliness and freedom from taints and odors of every description. If a cellar is used, it should be a dry one, and perfectly clean to the remotest corners, having no hidden remnants of decayed vegetables or fruit, or anything which could possibly offend the most delicate olfactories. If a room in the dwelling-house is used, or a milk-house built separately, which is perhaps better, it should not be situated near a hog-pen, stable, or anything of the kind, nor should anything likely to impart its odor to the milk, as smoked ham, codfish, onions, or even potatoes, be allowed a place in the room. Nothing will receive a taint more easily than milk or cream; and all bad odors absorbed by the milk are certain to be concentrated in the butter, they not having the accommodating disposition to run off with the buttermilk. We have known butter to be spoiled in consequence of the milk standing in the room with a smoky furnace, and it is sometimes sensibly affected by the smoke of burnt grease and other unpleasant smells from the cook room. So if a milk-room communicates with a kitchen the door should be kept closed.

Temperature.—The milk, whether in a cellar or in a room above ground, should be kept cool in the summer, never being allowed to reach a temperature above 60°, though it may fall below that without detriment. Milk should be set upon racks, rather than shelves, so that the air may circulate freely under it as well as over and around it. Racks are made in various ways; the most convenient that we know of is constructed as follows: Take a 6 by 6 pine post, of a length suited to the height of the room, place it upright upon a pivot so that it will revolve, and nail slats of half-inch stuff to each side of the post, at such intervals as will give room for the pans or other

vessels used. Two such slats, nailed to opposite sides of the post, will support two pans of milk, one on each side of the post. The rotary arrangement enables one to stand in the same place to skim a whole rack-full of milk. If pans are used, the seamless ones are best, but deeper ones, either of tin or earthenware, are perhaps preferable, provided the milk is cooled before being set.

Washing the Utensils.—The greatest care is requisite in cleansing these vessels, of whatever material or form, as also of all the other utensils employed in butter making. This is a matter of much greater importance than many suppose, as the smallest neglect in regard to it is sure to tell upon the cream and butter. The pans and pails should be washed thoroughly, in two waters, each time being made as clean as possible with the water used; they should then be scalded thoroughly with boiling water. It is not sufficient that the water should be tolerably hot—that it should steam in the kettle, or anything of the sort; it must “dance as well as sing.” The churn, butter-bowl, and ladle, or butter-worker, if one is used, should be washed and scalded with equal care, and all should be carefully wiped and dried, unless some arrangement is made for drying in the sun, which will do very well for tin and earthenware, and save the labor of wiping. In summer it will be necessary to see that all utensils are cooled perfectly before using them.

Skimming.—The milk should be skimmed as soon as all the cream has risen, and before the milk has thickened. The exact time required for the cream to rise will, of course, depend upon the temperature; but a little experience will enable one to tell. At the time the cream should be removed it will have a bright, healthy appearance, a rich, yellow, uniform color, and such an adherency of particles as will enable one, sometimes, to remove the entire cream at one dip of the skimmer. If allowed to stand too long without skimming, both the quantity and quality of the cream will be seriously affected. The surface will become discolored, blotched, and knobby, while underneath, the cream is rapidly yielding to the corrosive tendency of the acid in the milk. The thickest cream may be as surely

destroyed by standing on the milk as would be the firmest fabric in a bath of sulphuric acid. When thus destroyed, the cream is replaced by a thin, watery substance, having no resemblance to cream or milk. These facts, which may be easily verified, show how essential it is that the cream should be taken off before the milk has acquired any great degree of acidity. Yet in order to make the largest quantity of butter care must be taken not to remove the cream too soon. Many neat, thrifty housewives make a practice of “skimming up” all the milk at stated intervals, so as to be through with the job. This is, of course, very pleasant, but it involves considerable loss, as they do not get the full cream from the newest milk. The milk should all be skimmed at the same age, provided it has had the same conditions as regards temperature, etc. It follows, then, that some milk should be skimmed every night and morning.

Winter Treatment.—It will be found that in winter milk and cream require somewhat different management. The effort must now be to keep the milk warm enough rather than to keep it cool; and a failure in this respect will very materially affect the quality of the butter. If the milk is very much too cold, it will have to stand so long for the cream to rise that it will become bitter often long before it becomes sour, and the quality of bitterness will be still more apparent in the butter. To prevent this, the milk should be kept at a temperature of 60° if possible; if not, the milk may be scalded as soon as strained, and the cream will then have a fair start before the milk has parted with this extra heat, unless the place where it is kept is very cold. If scalding is not found sufficient, two or three spoonfuls of sour milk (which has soured quickly and is not bitter) may be added to each pan of milk when it is set away. This will help to sour the milk and cause the cream to rise quicker, thus making it less liable to become bitter. It may also help to prevent bitterness to salt the cows often, and see that they do not eat decayed vegetables or any substances which may impart a bad taste to the milk.

The cream should be kept at about the same temperature (60°), and should be

well stirred as often as new is added. It should not be kept too long before churning, never more than a week—four or five days is better.

Churning.—The cream should be churned at a temperature of 62° or 63°. A great deal of experience may enable one to guess at this temperature with tolerable cleverness, but it is better to use a thermometer and be sure. This temperature will be increased during the process of churning to 68° or thereabouts, when the butter will come. If it should be hard and granular, refusing to come together well, throw in a little warm water, churning all the while, and the butter will soon be gathered and ready to take up.

Sweet cream should never be mixed with sour cream just before churning, as sweet cream is much longer coming, and hence likely to lose itself in the buttermilk. To salt the cows once a week is generally believed to facilitate the process of churning. In case they have not been thus salted, some put a little salt into the cream before churning; but we think that in most instances where butter is very long coming, it is owing to the temperature of the cream. It may be so cold as to require churning all day to bring the butter; a tax upon one's patience and strength, if performed by hand, equal to the cost of a dozen thermometers.

Coloring.—As a rule, it is absolutely essential in the winter to color butter, in order to make it marketable, or at all attractive as an article of table use at home. There may be a possible exception to this rule in cases where cows are fed largely upon yellow corn meal, pumpkins, carrots, etc., but this does not lessen the importance of the rule. Of the various substances used in coloring butter, we think that carrots (of the deep yellow variety) give the most natural color and the most agreeable flavor. Annotto, however, is principally used, and with most satisfactory results. Some of the most celebrated butter makers in the country color their butter with pure annotto, giving it a rich, deep orange color. They do not aim to produce the color which is natural to a summer butter, but one considerably richer; coloring it both summer and winter. If carrots are used, they should

be grated, the juice expressed through a thin cloth, and put into the cream just before churning. A small quantity of annotto, dissolved in warm water or milk, may be used in the same way, and with similar results; but a richer tint is produced with annotto by coloring the butter directly. To prepare the annotto for this purpose, steep it in butter for some hours over a slow fire, then strain through a fine cloth into a jar and keep in a cool place. When ready to work the butter, melt a small quantity of this mixture and work it in carefully. A small proportion of turmeric is sometimes mixed with annotto and prepared in the same way. With this method of coloring an inexperienced hand is in danger of working the butter too much, in the effort to produce the same shade of color through the entire mass, which is, indeed, a difficult attainment for a novice. Coloring in the cream obviates this difficulty entirely, the butter being a uniform color when taken from the churn.

Salting and Working.—While salt is not to be undervalued as a preserving agent, it must be remembered that too much of it destroys or overpowers the fine flavor and delicate aroma of the best butter. Be careful to preserve all the sweetness of the fresh butter, salting just enough to remove its insipidity. It is important to use the best salt. "Ashton's factory filled" has great fame, and is extensively used. But any one can test the purity of salt, and perhaps other brands of Liverpool salt may be found equal to Ashton's. Pure salt is perfectly white and destitute of odor. It will dissolve in cold water without leaving any sediment or throwing any scum to the surface, and the brine will be as clear as pure water and entirely free from any bitter taste. Prof. Johnson says, in the *American Agricultural Annual*, 1868, that the "Onondaga factory filled must take rank second to none, provided the ingenious processes of Dr. Goessman, which were employed in Syracuse a few years since, are still in use." The buttermilk should be nearly all worked out and the butter well washed before salting. Washing may abstract somewhat from the flavor of the butter, but it is, nevertheless, a necessity if the butter is expected to keep long, as it completely removes the cream and caseine of

the buttermilk, a part of which might otherwise remain in the butter. Butter should stand but a short time after salting before it is worked enough to remove nearly all the water, when it may be re-salted, if necessary; there should be sufficient salt left in the butter at this time to make a strong brine of the little water that remains. It may then stand until the next day, when it should be worked and packed. On no account should butter be allowed to stand long before working, as it is apt to become streaked, often so much so as to necessitate working over, in order to restore a uniform color. Besides, if neglected too long at this period, a tendency to rancidity will be developed. We realize the difficulty of giving explicit directions for the second and last working of the butter—its final preparation for packing. If not worked enough, every one knows that the butter will soon spoil; if worked too much, it is spoiled already; though the danger of its being overworked is less. A great deal of judgment and discretion and somewhat of experience are requisite in order to determine when it is worked just enough; the virtue of stopping in this, as in many other cases, being second only to that of doing. There are some suggestions, however, which may prove valuable, particularly to those having little experience. 1st. The butter should not be too warm when worked, nor should it be so cold as to make working difficult. Immerse the ladle for a few minutes in boiling water, and cool perfectly in cold water; then, if the butter in the bowl is warm enough to admit of putting the ladle through the whole mass without difficulty, and dividing it up without crumbling, and still hard enough to cut clean and smooth, not the slightest particle adhering to the ladle, then it is in the right condition to work. 2d. It should be worked with careful and gentle, yet telling, pressure, and not by a series of indiscriminate stirrings and mashings and grindings against the sides of the bowl. The butter is composed of minute globules, which are crushed by this careless handling, thus rendering the butter greasy and sticky, whereas it should retain its clean, solid individuality up to the time of packing, always working clear from the bowl, and never sticking in the least to the ladle. 3d. The butter should

not be worked until it is perfectly dry. When ready to pack it should have a slight moisture about it—a sort of insensible remains of the clear brine which has been working off, and at the last, enough, so that when a trier is thrust into it a drop or two of brine will ooze out around it, and the trier itself be slightly wet, as if by a slight dew. Overworking destroys all the beautiful consistency of the butter; makes it dry and sticky; greasy in summer, and tallowy in winter; gives it a dull appearance, and a tendency to become rancid. Altogether overworked butter is very disagreeable, if not positively bad.

Packing and Marketing.—Butter should be packed solid, leaving no interstices of air, and should completely fill the firkin, tub, or pail, as the case may be, leaving a flat surface. It is common to put a cloth over the top, and a layer of salt on the cloth. Some think it better to wet the salt, making a brine. The cover should then fit tightly, leaving no room for air between it and the butter. Some butter, also, goes into market in the form of rolls, some pine-apples, and other fancy forms for the table, etc. Every person should be guided by circumstances in his choice of styles for putting up butter, always being careful to give it a neat and attractive appearance. If living at a distance from market, and the dealers at his market place buy for New York, he should pack in firkins or tubs, so that the butter can be safely kept through the season, and the whole lot disposed of at once in the fall. If at a convenient distance from New York, fresh tubs or pails may be sent in at intervals all through the season, or the whole kept through, as he chooses; or, if in the vicinity of any city, good chances offer in the way of supplying hotels, restaurants, etc., the butter should be put in a style to suit the customers. Some, who are hundreds of miles away, make shipments of butter to New York on their own account, instead of selling to buyers at home, in which case, if their butter is really superior, they will not be long in making a reputation, and will soon be able to secure a high price. Some few have a stamp of their own, and labor assiduously to establish a value for it, as a trade-mark. It is said that the best butter-maker in the vicinity of Philadelphia (who never sells for less than a dollar per

pound), uses a stamp inherited from his father, and that "not a pound of inferior butter ever went to market with that stamp upon it." If you would attain to a goodly fame, then, as a butter-maker, and reap a rich reward for your pains, attend carefully to the minutest details in making, and never sell any but good butter, put up in neat packages; never allow your "trade-mark" to lose its value.

BUTTER, Winter.—There is much poor, pale, ill-flavored butter made in winter. There is also some produced of a fair average quality, only coming short of the fresh butter from the fragrant grasses of June. The difficulty lies partly in the winter food, and partly in the temperature of the milk. Willard says it should never be colder than 55°, and at churning the cream should be brought to 60° or 62°. If allowed to go above 65° the color and flavor are injured. It is liable to become bitter before the cream rises if the temperature is too low; and if it freezes the cream rises at once, but of poor quality, yielding white butter; if kept in a room heated by day and cold at night it will not rise well, and is apt to be bitter and acid. It is not easy to secure a temperature sufficiently uniform. Some scald the milk when first drawn from the cow. A common English mode is to let it stand twelve hours, and then place the vessel containing it in a larger one, filled with boiling water, letting it stand twelve hours longer. Before churning, the cream-pot is placed before the fire, and its contents stirred occasionally to secure equal warmth, until a temperature of 55° is attained.

The Philadelphia dairymen find no difficulty in making good butter all winter. One, who obtains one dollar per pound, keeps the temperature of his milk-pantry at as near 55° as practicable. Butter comes harder as cows advance in gestation, and he likes to have fall cows so as to mix their milk with that of cows coming in in the spring. He finds clover hay, cut and moistened, sprinkled with meal and wheat shorts, the best food for making chorce butter. As the food given makes a great difference in the flavor of the butter, it is important that no weeds be mixed with the hay. He thinks clover inferior to timothy or any other grass, and he does not feed cabbages or turnips on

account of the flavor. Cows differ greatly in their qualities as butter-makers, and in selecting he finds it necessary to reject many animals that would be valuable in a milk or cheese dairy.

BUTTER, Working of.—The universal testimony of good butter-makers establishes the fact that the least working of butter consistent with the expulsion of buttermilk, and the thorough incorporation of salt, are the requisites for superior quality. It is notorious that a large proportion of the market supply is over-worked, the grain injured, leaving the mass greasy rather than granular. Butter of the finest possible quality is often reduced to an inferior grade by excessive manipulation. There are several kinds of butter-workers; one much in use in the best Orange county dairies, is described by Mr. Willard as a slab four feet long and twenty-five inches wide at the broadest part, tapering down to four or five inches at the lower end, where an opening allows the escape of the buttermilk, and a slot into which a long wooden lever fits loosely allows its free movement over the entire surface of the slab. It has beveled sides, the lever is either square or eight-sided, the butter is placed upon the slab and worked by pressing the lever down upon the successive portions of it till the whole is worked. It is not patented and may be easily made, the size varied to suit the convenience of different dairies. It is rinsed with cold water until the water runs off clear. It is then churned to gather it together, the water pressed out when it is salted. The next day it is worked over and packed like other butter.

BUTTER, Rancid; to Restore.—To improve manufactured butter work it thoroughly with fresh cold milk, and then to wash it in clear water; and it is said that even old and rancid butter may be rendered palatable by washing it in water to which a few drops of a solution of chloride of lime have been added.

BUTTER, Improved Coloring for.—An improved coloring matter for butter—carotine—has been successfully employed by Dr. Quesneville as a substitute for annatto, to which it is in every respect superior, although somewhat more expensive. This carotine is the representative in carrot of alizarine in madder, and

is obtained by slicing, drying, and grinding the roots to a powder, exhausting the powder with sulphide of carbon, and having removed the solvent, rapidly crystallizing out of the carotine from the extract.

BUTTER, to Preserve Fresh.—Melt it in a well-glazed earthen pan, set in a water-bath at a heat not exceeding 180° Fahrenheit, and keep it heated, skimming it from time to time, until it becomes quite transparent; then pour off the clean portion into another vessel, and cool it as quickly as possible, by placing the vessel in very cold water or ice. This is the method employed by the Tartars who supply the Constantinople market. In this state it may be preserved perfectly fresh for six or nine months, if kept in a close vessel and a cool place.

CABBAGE AND CAULIFLOWER, Culture of.—The cabbage can be cultivated by the most simple and easy means. It grows in most soils, and produces its beneficial heads nine months in the year. The ground must be rich, or made so by a good coat of manure, as they have strong, tapering roots. Digging or plowing deep is very essential. For early use, sow in hot-beds in February or March; and for winter, the seeds may be sown in open ground in May or June. When five or six inches high, transplant to from twelve to thirty inches apart. Almost any manure, except hog manure, will answer for cabbages, as barn manure, rotten kelp, well diluted liquid manure, night soil, guano, phosphates, wood ashes, fish, salt, glue-waste, hen manure, all properly composted, or slaughter-house offal, and the richer they are in ammonia the better.

In New England the largest cultivators for market, drop the seed directly where the plants are to stand, instead of the old mode of transplanting from a hot-bed. Time is thus saved, risks incidental to transplanting are avoided, and all the plants in the field start alike. Half a dozen seeds are scattered in each hill, so that the cut-worm has to depredate severely before he really injures the field. As the plants grow, the feeble ones can be thinned out, and where the seeds in an adjoining hill have failed to vegetate, the deficiency can be supplied by the superfluous healthy plants. Four to six ounces

of seed thus placed in hills are sufficient for an acre.

CABBAGE PLANTS, To Preserve from the Fly.—Make the seed-bed on a platform or scaffold raised on posts about five feet from the ground. The jumps of the insect are limited to a certain height, and the plants are thus placed beyond their reach.

CABBAGE PLANTS, Enemies of, to Destroy.—Sprinkling wood ashes and air-slaked lime upon the young plants, while the leaves are damp with rain or dew, is an efficacious remedy for destroying the voracious fly, beetle and flea that attack them as soon as they have broken through the soil, as well as for most other insects. Until the plants have a stump as large as a pipe-stem they are subject to the ravages of the cut-worm, for which there seems to be no better remedy than sprinkling liberally wood ashes or air-slaked lime close about the stems of the plants. As this pest disappears about the middle of June, cabbages that are planted late suffer but little from it.

CABBAGE PLANTS, Clubfoot in.—Bainbridge Bishop, of New Russia, New York, states that he has found, by long experience, that clubfoot in cabbage can be remedied by boiling leaves and twigs of the scarlet-berried alderberry to a strong decoction, and pouring a gill, cold, on the center of the plant. One application is generally sufficient. On heavy soil it may be necessary to loosen the earth about the stem of each plant. As a preventive, water the plants once or twice with the decoction after setting out. The application has also a good manurial effect.

CARROTS, To Cultivate.—Select a good, rich clover sod, deep loamy soil, or even gravelly, well drained; spread on evenly fifteen to twenty ox-cart loads of good manure to the acre. In the spring, after the ground is well settled and dry, with settled warm weather, plow the ground thoroughly, eight inches deep, or more, depending upon its previous management. In plowing, it ought not to be plowed more than an inch deeper than before, unless the deeper soil has been ameliorated and is richer than the upper soil. A soil having a close, stiff subsoil, unless thoroughly subsoiled, will grow poor crops of roots generally. After

plowing, harrow so as to make the soil perfectly fine, and even this is essential to the ready drilling and germinating of the seed; now drill in the seed, putting the drills two feet apart. The seed should be fresh and of the previous year's growth. It is best to commence the culture as soon as the rows can be distinguished. Have a cultivator of light frame, with eight teeth, similar to the coulter of a plow, only narrower, and about ten inches long, and a shovel for the front. With this and a horse go through, cutting the soil deep close to the rows without covering the plants; this will save the greatest part of the work usually done with the hoe, and do it much better. When the carrots are well growing and about the size of the small end of a clay pipe stem, take a narrow hoe and cut them into hills, thinning them to four or five inches apart. The after culture is performed with the cultivator, going through once in about two weeks. If any weeds come in the rows, pull them out by hand—but it is not probable that weeds will trouble if the soil be selected as above, and well prepared before planting, and the culture as directed. To harvest, it is best to take a sharp hoe with a short handle and clip off the tops close to the crown, gather them, and then plow around the plat a deep furrow, as close to the roots as you can go; now take them by hand and draw them out, and throw four or more of the rows into one. Carrots should be taken out when the ground is dry, and lie a few hours to dry, and then be hauled to the root cellar to be stored, and if in tight bins and covered with sand they will keep better. They should be left in the ground to ripen as long as safe without freezing, as they improve till freezing weather, and keep fresher than if gathered before fully matured; be careful not to let them remain too long to get frosted, for a light freeze injures the carrot more than other roots.

CAULIFLOWER, Culture of.—See CABBAGE.

CELERY, Culture of.—The seed should be sown in hot beds in March, or in the open ground the last of April or the first of May; but when sown in the open ground it vegetates very slowly,

often remaining in the ground several weeks before it comes up. A bushel or two of stable manure put in a hole in the ground, against a wall or any fence facing south, and covered with a rich fine mould three or four inches deep, will bring the seed up much sooner. Sufficient plants for any family may be started in a large flower-pot or two, placed in a sitting-room, giving them plenty of air and moisture. As soon as the young plants are about three inches high, prepare a small bed in the open ground, and make it rich and the earth fine. Here set out the plants for a temporary growth, placing them four inches apart. This should be done carefully; and they should be gently watered once, and protected for a day or two against the sun. Make the trenches a foot or fifteen inches deep and a foot wide, and not less than five feet apart. At the bottom of the trench put some good, rich, but well-digested, compost manure; for if too fresh the celery will be rank and pipy, or hollow, and will not keep nearly as long or well. Dig this manure in well, making the earth fine and light; then take up the plants from the temporary bed, and set them out carefully in the bottom of the trenches, six or eight inches apart.

CELLARS, To Keep from Freezing.—

The following experiment was tried by a gentleman with the cellar of an out-house, in which on several occasions vegetables have frozen, though the cellar was fortified against frost by a process known to farmers as "banking." The walls and the ceiling were pasted over with four or five thicknesses of newspapers, a curtain made of the same material being also pasted over the window at the top of the cellar. The papers were pasted to the bare joist over head, leaving an air space between them and the floor. The result was that no frost entered the cellar, though the cellar was left unbanked. We do not counsel the special use of old newspapers for this purpose. It is just as well, or better, to use coarse brown paper. Whatever paper is employed, it will be necessary to sweep down the walls thoroughly, and to use a very strong size to hold the paper to the stones. It is not necessary to press the paper down into all the depressions of

els of dry white sand upon the roof of the stack before the thatch is put on. The sand is no detriment to the corn, and stacks thus dressed have remained without injury. So very effective is the remedy, that nests of dead young mice have been found where the sand has been used, but not a live mouse could be seen.

CORN, Broom.—Broom corn should be planted at the same time Indian corn is planted. It requires a richer soil than Indian corn—at least Indian corn will produce a better crop on a less fertile soil than is required for broom corn in consequence of its growing faster, and feeling the effects of fertilizers more perceptibly. Bottom lands on the banks of rivers that are annually overflowed in early spring are particularly adapted to the growth of broom corn. It is sowed in drills, about three feet apart, and the corn thinned out to stand from four to six inches apart. Any good upland soil that consists of a rich mould, easily tilled, will produce an excellent crop of broom corn, with the aid of barn-yard manure or other fertilizers. It requires careful cultivation, by running the cultivator between the rows as soon as the corn is well up; and then the rows require hand-weeding and thinning out to the proper distances. Boys and girls can do this work better than men can, and at one-third the expense that it would cost to employ men to do it. No weeds should be permitted to grow, as the value of the crop depends on the cleanness of cultivation.

The seed is valuable for fowls, and for every kind of live stock when ground, and some cultivators think that the seed alone is worth the cost of cultivation.

COTTON, Cultivation of.—To raise a bale of five hundred pounds of seed cotton per acre, on common cotton land, requires at least 500 bushels of good compost manure per acre, or its equivalent in superphosphate or guano, and very careful of cultivation.

The planter's first care, after having provided the food for his cotton, is to bring his rows as nearly as possible to a horizontal. The manure is spread uniformly over the field, and, with a good plow, the rows are bedded out deep and thoroughly, intimately incorporating the fertilizer with the soil, and at the same time securing perfect pulverization. The

rows are laid four feet apart, and the seed planted thirty inches apart in the row, giving 4,368 plants to the acre. A good stand being secured, the after culture consists of light plowing, and almost constant shallow stirring, hoeing and care.

Rotation of Crops.—A good rotation where cotton is the leading crop, is first year, cotton; second year, corn; third year wheat, rye or oats; fourth year grass—applying the fertilizer mainly to the cotton.

COTTON, Planting.—A planter near Columbus, Mississippi, experimenting on one acre, set his cotton plants three and a half feet apart each way, thinning to two stalks in the hill, and cultivating in the same manner as with corn. The yield was more than double that grown in the old way, and in respect to the maturing of the bolls, advantage was found in the readier access of the sun.

CUCUMBER, Culture of.—In the open air is of the simplest character. Merely dig out a hole about a foot wide and deep; fill it with rich sandy soil; raise it above the surface about six inches. The hills should be six feet apart each way. If the weather be warm, they will grow in a few days. If the nights are cold, protect them. There is frequently a little bug which preys upon the tender leaves; if so, soot and wood ashes, sprinkled over them while wet with the dew, will retard the progress of the depredator. To have young fruit in February and March is rather a nice operation; but any one who can command a few loads of warm horse manure can have them from April to October. That the amateur cultivator may have the articles either for family use or for sale, a few hints may be in place on forcing cucumbers. Prepare a frame, following the instructions laid down in another part of this work for hot-beds. After the beds are in order, put in a good quantity of good, light, rich loam—none better than the surface of the woods. In two or three days the earth will be sufficiently warm for sowing the seeds. If the plants are to be removed into other frames, sow them in pots; if not to be removed, sow them in a hill made in the center of the bed by placing a barrowful of soil in it. Cover the sash at night with straw mats, or any similar protec-

tion, and surround the bed with litter or boards to protect it from the piercing winds. The seeds vegetate quickly, and soon grow into strong plants. During their growth, admit air every day at the back of the frame, giving as much light as possible to the young plants.

CRANBERRY, Culture of.—In preparing a plantation the surface must first be cleared of the wood, timber, or brush; then it must be "turfed"—that is, the surface-soil and roots must be taken off with a hoe made for that purpose. The next step is to ditch it, by clearing out the main water-course and digging side drains running into it—generally in deep bottom-lands, about one and a half or two rods apart, but the distance should be varied in accordance to the nature of the ground. The floats removed in turfing are used for leveling up low places where needed, so that the surface may be slightly rounded between the side drains; they are also used for building the dam, which is constructed with two walls of floats filled in with sand, a ditch having first been cut between them to the sand beneath; the solid filling makes it water-tight.

After turfing and ditching, muck bottoms must be sanded from the depth of from four to six inches with pure sand, without mixture of clay or loam, and it should be taken from a sufficient depth below the surface to avoid seeds. The silex imparted to the vine from the sand stiffens it, materially promotes its productiveness, and tends also to prevent the growth of weeds. Many experiments have been made to ascertain the proper depths to which the sand should be applied; where little or none is used the vines grow long and slender, and do not fruit so well as when sanded. While some have thought two inches sufficient, others have tried a thickness of twelve or more, and with good results—though with this amount the vines make a slower growth, on account of the length of time for the rootlets to reach the peat beneath, from which they draw their support. Most cultivators have concluded that from four to six inches, and resanding every few years with a layer of from one to two inches, is preferable to using a much larger quantity at first.

After sanding, the vines are set in rows about twenty inches apart, and but a

moderate quantity of vine should be used for each hill. This is the usual method, though the distance is often varied each way. A gentleman, one of the original cultivators, from recent experiments has concluded that the vines should not be set over a foot apart, and that the additional cost of the vines, etc., will be more than paid for by earlier and larger crops, as well as by the matting of the vines, in much less than the usual time, which keeps down the other vegetation, and saves labor and expense in cleaning. Another has successfully adopted the method of layering the vines, or placing them in furrows in the sand, with which they are entirely covered to the depth of about one and a half inches. Vines grow finely by this method, but great care must be taken, to keep them moist. Wild vines have generally been preferred to cultivated ones for setting, from the fact that they appear to grow more vigorously at first, especially if the season is a very dry one.

Savanna-land can be plowed, and does not need sanding; this is a great saving of expense, but as large crops cannot be expected as from bottom-lands. Where possible on land of this kind, the turf not needed for the dam should be plowed or dug under the sand, as it is often the richest part of the soil, and is well adapted to the growth of the plant.

Plantations should be well flowed from December until May. The water fertilizes the vines, protects them from frost, and is the only reliable remedy known for the vine-worm, which is one of our worst enemies. It is thought that the water where held on the vines until the 10th or 15th of May, destroys the eggs deposited on the leaves the previous year; hence the advantage not only of late but of thorough flowing, as the portions not flowed often constitute a hatching-ground for the worms, from which they spread to the adjoining grounds, though it has been noticed that they apparently prefer not to go much beyond the water-line if they can find sufficient vines that have not been flowed.

GOOSEBERRY BUSHES, Mildew on.—

A weak solution of saleratus, pretty strongly tinctured with alum, sprinkled over gooseberry bushes, is sure to prevent mildew.

GARDEN SPIDERS, To Destroy.—

Various kinds of fruits and plants, both in the garden and the hot-house are frequently infested with insects, such as aphides, earwigs, red spiders and other pests. The vine, the peach, the melon, the cherry, the currant, and some humbler plants, afford them appropriate places of abode, to the discomfort of the gardener and the detriment of his fruit. Several modes of expelling these pests have been devised. One of the most successful is the frequent washing of the plants and fruit trees by means of the watering-pot and rose. This itself will vastly diminish the numbers, and at length destroy them. Lime-water, however, will be found much superior to the common water for the purpose, care being taken that the fluid shall reach the lower sides of the leaves, and those parts of twigs and branches in which the insects take refuge. Six o'clock in the morning is an excellent time to perform the work. And when the leaves and fruit have been thoroughly washed care should be taken to completely shade the plants in the hot-house or forcing-house with matting, to prevent injury to them from the heat of the sun while they are in a wet, cool state. The washing may be repeated about three o'clock in the afternoon.

GARLIC.—The common garlic is propagated usually by the offsets known technically as "cloves"—that is the old bulbs are pulled apart, and the small divisions planted in spring. They are usually set in rows eighteen inches apart, and the sets four to six inches in the rows; plant with a dibble, or by thrusting them into the soil with the forefinger and thumb. Give them the same culture as onions, gathering in autumn, and tie in bundles, the tops being left on for this purpose. The young bulbs will throw up long stalks, and if not checked are very likely to run to seed, which must be prevented by breaking down the stems, or tying them in a knot, which is the practice of European gardeners. Garlicks are mainly used by foreigners, especially the Germans, and by our people for medical purposes.

GRAFTING WAX.—1. Take 1 lb. of tallow, 3 lbs. of beeswax, and 4 lbs. of resin; put in a kettle and melt slowly until all the ingredients are combined.

If to be used in the open air in cool weather, add a $\frac{1}{4}$ to $\frac{1}{2}$ lb. more tallow. Melt the resin first, and be sure it is well melted before adding the wax and tallow. If this be not done, the grafting wax will be full of lumps. When melted pour it into cold water, and work it by hand into rolls of convenient size. In cold weather, soften the wax by putting it into warm water before using. When the scions are set—say as many as 20 or 30, or few as is wished—have the mixture ready and apply it warm, with a small wooden paddle. See that every part is covered and the air completely excluded. It requires no bandage.

GRAFTING WAX, Liquid.—Mr. L'Homme-Lefort invented, not many years ago, a grafting composition, which, when generally known, will no doubt supersede all others now in use, either for grafting purposes or for covering the wounds of trees. It is very cheap, very easily prepared, and keeps corked up in a bottle with a tolerable wide mouth, at least six months unaltered. It is laid on in as thin a coat as possible, by means of a flat piece of wood. Within a few days it will be as hard as a stone. In addition to all the advantages indicated above, it is not in the least affected by the severe cold of our winters; it never softens or cracks when exposed to atmospheric action or changes. There is no better preparation for covering the wounds of trees. As long as the inventor kept it a secret it sold at a very high price, and even now it is generally unknown. The recipe is as follows: Melt 1 lb. of common resin over a gentle fire. Add to it 1 oz. of beef tallow, and stir it well. Take it from the fire, let it cool down a little, and then mix with it a tablespoonful of spirits of turpentine, and after that about 7 oz. of very strong alcohol (95 per cent.) to be had at any druggist's store. The alcohol cools it down so rapidly that it will be necessary to put it once more on the fire, stirring it constantly. Still the utmost care must be exercised to prevent the alcohol from getting inflamed. To avoid it, the best way is to remove the vessel from the fire, when the lumps that may have been formed commence melting again. This must be continued till the whole is a homogeneous mass similar to honey.

CUTTINGS, to Choose. — The choice of cuttings should be made from the side shoots of trees and plants, and, when possible, from such as incline toward the ground, observing to leave a little wood of a former year or season's growth attached to them, as such are found to take root more readily than when they are wholly composed of new wood. The time to take cuttings is as soon as the sap gets into full motion. Before setting them they should be cut across, just below an eye or joint, with as smooth a section as possible, observing not to injure the bud. The superfluous leaves may be removed, but a sufficient number should be left on for the purposes of vegetation. The common practice of removing all or nearly all the leaves of cuttings is injudicious. In some cases leaves alone will strike root. When cuttings are set in pots they should be placed so as to reach to the bottom and touch the sides throughout their whole length, when they will seldom fail to become rooted plants. In the case of tubular stalked plants, it is said to be advantageous to insert both ends into the soil, each of which will take root, and may then be divided, when two plants will be produced instead of one. An equable temperature, a moist atmosphere, a shady situation, and a moderate supply of water, are the principal requisites to induce speedy rooting. Excess of any of these is prejudicial. When the size of the cuttings admit, it is better to place them under a hand or bell-glass, which will preserve a constant degree of heat, and prevent evaporation from the surface of the leaves, which is the most common cause of their dying, especially in hot, dry weather.

CUTTINGS, to Manage. — No cutting requires to be planted deep, though the larger ought to be inserted deeper than such as are small. In the case of evergreens, the leaves should be kept from touching the soil, otherwise they will damp or rot off; and in the case of tubular stalked plants, which are in general not very easily struck, owing to the water lodging in the tube, and rotting the cutting, both ends may be advantageously inserted in the soil, and, besides a greater certainty of success, two plants will be produced. Too much light, air, water, heat, or cold, are alike injurious. To guard against these extremes in tender

sorts, the means hitherto devised is that of inclosing an atmosphere over the cuttings, by means of a hand or bell glass, according to their delicacy. This preserves a uniform stillness and moisture of atmosphere. Immersing the pot in earth has a tendency to preserve a steady, uniform degree of moisture at the roots; and shading or planting the cuttings, if in the open air in a shady situation, prevents the bad effects of excess of light. The only method of regulating the heat is by double or single coverings of glass or mats, or both. A hand-glass placed over a bell-glass will preserve, in a shady situation, a very constant degree of heat.

What the degree of heat ought to be is decided by the degree of heat requisite for the mother plant. Most species of the erica, dahlia and geranium strike better when supplied with rather more heat than is requisite for the growth of these plants in green-houses. The myrtle tribe and camelias require rather less; and in general a lesser portion of heat, and of everything else proper for plants, in their rooted and growing state, is the safest.

CUTTINGS, to Protect. — A method practiced in Florida to strike cuttings in well-drained lands, and to preserve young seedlings from insects, is as follows: A square hole is dug in the earth from three to five inches in depth, with almost perpendicular sides, the ground at the bottom well stirred up, or the bottom earth taken out and good earth put in. The cuttings, or seeds are then planted, the hole is covered with a single piece of glass, and loose earth is scraped around the edges of the glass to render it insect-proof. It then forms a miniature hot-bed and shelter until the young plants are old enough to resist the attacks of insect enemies, when the glass can be removed and the earth drawn around the roots. In wet, cold situations the holes could be made on the summit of little mounds.

DRAINING. — A cheap mode of draining is, instead of digging the ditch altogether with a spade, to use the plow, taking land 15 or 20 feet wide, and leaving the dead furrow where the drain is to be. By plowing several times the dead furrow may be sunk nearly two feet, and from the bottom of this trench, the width and depth of the space, may be thrown out, and a drain made of 3 fence boards.

(4 inches wide will be sufficient) in the shape of the letter V, may then be put into this branch, and the plowing reversed till the ground is made level. This method has a double advantage—1. It is a cheaper method than to dig the full depth by hand, and the wood is cheaper than tile. 2. By turning up and thus loosening the subsoil to that depth on each side of the drain, the water would find its way into the drain more readily than if only a narrow ditch had been dug from the surface down, leaving the sides unmoved and almost impervious to water.

DOCKS, to Eradicate.—Cut them off close to the ground when the tops are fully out, but the seed not fully formed, and they are done for. The stalk dies in the ground; but you must cut them so close to the ground that you leave no leaves on the stalk, else they will not die. The end of June is generally about the best time to cut them; but it depends on the season. In the pasture-fields they are soon cut with a scythe. In wheat and meadows they have to be cut with a knife.

FIGG-PLANT, Culture.—Sow in hot-bed very early in the spring; transplant when two inches high, into a second hot-bed; if that is not done, thin to four inches apart. Do not plant out till the weather becomes settled and warm. Keep the plants watered for a few days if hot when put out. Where hot-beds are not convenient, a few plants can be started in flower-pots or boxes, and when planted out must have a deep, rich soil, and full exposure to the sun.

ELM TREES, Ulcers, to Cure in.—The remedy consists in boring every tree attacked by the disease, at the ulcer itself; and in applying a tube to the hole occasioned by the borer, penetrating about nine lines in depth. The sound trees, which are also bored, afford no liquor, whereas those that are ulcerated afford it in great abundance, increasing particularly in fine weather, and when the wound is exposed to the south. Stormy weather and great winds stop the effusion. In this manner the ulcers dry and heal in forty-eight hours.

FIGS, Drying.—The editor of the *Rural Alabamian*, who has had some experience in the drying of figs, says that there is no more difficulty in putting a first-rate article of dried figs into the market from the

Gulf States than from Smyrna. The difficulty has been that the right varieties have not been cultivated. The common large yellow fig of the South is not well adapted for drying, being too juicy, too hollow, and too open at the eye, and it is very liable to injury from damp or rainy weather at the time of its maturity. He recommends the Brunswick, Large White, Genoa, Smyrna and Figue d'Or varieties for drying.

FIG, Culture.—On warm, dry, rich, sandy soils here the fig grows with as much freedom as in the Gulf States, and on account of our exemption from late spring frosts, the first crop is more certain than in Georgia or Tennessee. One is astonished to see their luxuriant foliage, which is remarkably free from curled or yellow leaves, a fact doubtless due to the uniformity of heat, light and moisture of our climate. One peculiarity of the fig is that its fruit-buds start simultaneously with the leaf-buds, which can be readily distinguished the fall previous. The buds begin growth here the forepart of May, and by the middle of June the new shoots are about one foot in length, and the young figs the size of hickory nuts. Then they commence swelling very rapidly, and in a few days are the size of small green pears; in two or three days more, or about the first of July they become yellow, when they are ripe and ready for picking. In some countries they are used as daily food, eaten in milk, and are very wholesome and nutritious. They can be canned or dried, but are too good for that purpose until more abundant. The second crop begins to grow as soon as the first is removed, and usually gets ripe the forepart of September. It is not always necessary to give them protection in the winter, but for the purpose of dividing them, and to guard against extreme winters, it is advisable to heel them in, which can be done at any time after the frosts of autumn remove the leaves before severe winter approaches. The process is very simple; dig one plant and lay it on its side in the hole, then dig the next, throwing the dirt on the first, and so on until they are all covered. Reverse the process in the spring, at which time you can divide and prune into shape, using the cuttings for new plants, which strike root readily, and often bear fruit the first sea-

son. In setting out the plants, give them room according to their size. Taking them up or dividing them does not prevent them from fruiting if the roots are not badly bruised nor dried by exposure to the weather. Where one has but few plants, open boxes or barrels can be set over them, filling in with straw or dirt. The simple process of protecting the plants in winter should not deter any from growing and enjoying such delicious fruit.

FRUIT TREES, to Protect from Rabbits.—To protect fruit trees in the winter from rabbits, it is recommended to make a strong decoction of tobacco, simmer it down in lard to the consistency of thin paint, add a little soft soap, stir well, and it is ready for use. Apply with a little brush or swab from the root of the tree upwards until above the reach of the rabbits. This dose would seem calculated to spoil the appetite of the hungry depredators of whatever kind. See, also, "**APPLE TREES, TO KEEP RABBITS FROM BARKING.**"

HEMP, Culture of.—Hemp is a plant of very great importance; its tough, durable and elastic fibres being better suited for making cordage and canvas for shipping than any other substance yet known. The quantity required to supply the navy and commercial marine of the United States alone is immense.

This country is well adapted to the cultivation of hemp, which is a very profitable crop, well rewarding the careful and judicious cultivator; yet the supply is far short of the demand for home consumption, a great quantity having to be annually imported.

The soil most suitable, and always to be preferred, are those of a deep, black, vegetable kind, and which, from the location, are slightly inclined to moisture; such soils are easily found, particularly in the western country. Mellow, rich, clayey soils do very well, and none answer any better than old meadow land. Hemp may be raised on the same ground for successive years without degenerating, and without exhausting the soil, especially if the shives are returned to the land in the form of manure.

Hemp may either precede or follow a crop of grain, as its tendency is to smother and choke all other plants; in

fact, nothing else so well cleans and prepares the ground for other crops, especially for small grain or grasses. It eradicates all weeds, and when it is taken off, leaves the field clean, smooth and even.

The ground intended for hemp should be plowed in time to receive the influence of frosts, and after a crop of grain; besides a deep plowing before winter, it should be plowed at least twice in the spring, so as to reduce the soil to a fine tilth, as it is all important that it be thoroughly pulverized. To insure a good crop the seed must be fresh, which may be known by its being heavy and of a bright color.

When hemp is intended to be cultivated for seed for the crops of the next year, it is to be raised in a place distant from that in which it is raised for the fibre only, and sowed in drills about four feet apart. In the blooming season the male plants should be mostly pulled up and thrown away, and the female plants thinned out, leaving the stalks seven or eight inches apart. The male and female plants are easily known apart, as only the male plants blossom, and, when agitated, throw off farina—a yellow dust—which falls and colors the ground, or any other objects with which it comes in contact. A few of the male plants should be left scattered through the drills, until the farina is completely discharged. Between the drills a plow should be run sufficiently often to keep the ground from weeds, and between the stalks in each drill the hoe is to be used for the same purpose. The plants are generally cut after the first smart frost, between the middle of September and the middle of October, and carried to the barn, where the seed is easily detached by the common flail; the stalks which bear the seed, being too large, coarse, and harsh to produce good fibre, are usually thrown away, but they might be profitably made into charcoal for the use of powder-mills.

After the seed is threshed out, it is advisable to spread it thinly on the floor, to cure properly and prevent rotting, before being finally put away for use the next spring. The seed should be sown, the weather permitting, in April, or early in May; when the plant first shoots up it is very tender, and liable to be injured by frost, if sown too early.

When hemp is raised for the fibre, the seed is to be sown broadcast, a bushel and a half to two bushels and a half to the acre, according to the strength and fertility of the soil, and the care with which it has been prepared, as well as to the season. When the seed is sown, it is to be plowed or harrowed in; and rolling the ground afterward will prove beneficial.

The labors of the cultivator are then suspended until the plants are ripe and in a state to be gathered.

If the season be favorable for a few weeks, until the plants are six or eight inches high, they will then shade the ground and a good crop may be expected.

Hemp is generally ripe and fit to be gathered about the middle of August, varying according to the time of sowing; and by sowing at different periods, in order that the crop may not all ripen at the same time, a press of labor in harvesting may be avoided.

The maturity of a plant is determined by the shedding of the farina, already noticed, and by the leaves of the plant turning yellowish; it is then generally supposed to be ripe, but it is safer to wait a few days longer. A little observation will enable any one to judge when it is fully ripe; it is a very accomodating crop, for, if gathered a little too soon, the fibre will not be materially injured, and it will wait the leisure of the farmer a week or two after it is entirely ripe.

The plants are gathered by two modes, namely, pulling them up by the roots or cutting them off about two inches above the surface of the ground—the closer to the ground the better. Cutting is generally preferred, which is performed with a knife (often made out of an old scythe) or with a good reaping machine.

Whether pulled or cut, the plants are to be carefully and evenly laid on the ground to cure, which, in dry weather, will take two or three days; a light rain falling on them while lying down is rather beneficial, as it will then be more easy to remove the leaves, which should be done before the shocks are formed. When cured, the plants should be tied in small bundles, for convenience in handling, and

set up in shocks, the roots or butt ends resting on the ground, and the tops united or tied by a band made of the plants. As soon as convenient, the shock may be collected together and formed into stacks, and by remaining in the stacks a sufficient time before being exposed to be rotted, the plants go through a sweat, which very much improves the appearance and quality of the fibre.

HYACINTH CULTURE.—The hyacinth requires a light but rich soil, sandy loam, well dressed, and mixed with thoroughly rotted manure, but if the soil is not sandy, add a third of silver sand. The soil for a hyacinth bed must be deeply dug, well mixed and turned over. Plant the bulbs eight inches apart, and four inches under the soil.

To Grow Hyacinths in Pots.—Select the bulbs, and plant each one separately in a four-inch pot, well drained with potsherds, and filled within an inch of the top with the same soil recommended for the beds. If the plants are to remain outdoors until rooted, place them in a dry level place, and cover them about six inches deep with straw, decayed leaves, or cocoanut fibre, putting a piece of bass mat over to keep off rain; they will not require watering. In ten weeks they will have made sufficient roots, and may be brought into the house and watched carefully. If brought into the house directly they are potted, keep them in a dark, moist atmosphere for about ten weeks, then gradually expose them to the light, and give them water frequently.

To Grow Hyacinths in Glasses.—Single flowering hyacinths are the best for this purpose. Fill the glasses with soft water (rain water is the best) so as nearly to touch the bulb. Exclude the light totally from them for five weeks, by which time the glass ought to be full of roots; they may then be placed where they will have plenty of light and an equable temperature. Do not change the water while they are in the dark, but when exposed to the light pour out half the water in each glass once a week, and fill it up with fresh water, which should have been kept for some time in the same room, that the temperature may be the same. A very little guano, mixed with the water strengthens the plant.

FRUIT CULTURE.—The first question may be answered very readily, for most of those who have no fruits, it is simply because they do not try to have them, and this is the very natural result of their ignorance of the means of obtaining an abundance of these blessings upon almost every farm in the United States.

The latter question may be answered by enumerating some of the great advantages of fruit growing. These are primarily the health of the families of the producers, where fruits are freely consumed upon the table at all seasons of the year; next, the pleasure attendant upon their propagation, their culture, and, above all, the satisfaction derived from the harvesting and consumption of these products.

It is a well established axiom in the medical profession, that the regular consumption of fresh, well ripened fruit, if conducive to health, and it is also a fact that the farmers of our country are not so well fed as they should be. This is nobody's fault but their own. True, they cannot have so great a variety of meats as those who reside in towns and villages, but they may enjoy the greatest profusion of fresh vegetables, and a succession of ripe fruits the year round, if they will but choose to take the trouble to plant and cultivate even a small portion of their land as a garden and orchard.

An appeal on behalf of fruit culture may also be made to the more sordid motive of money making. No crops that are produced from the soil yield so great profits. The productiveness of small pieces of land appropriated to fruit culture is truly wonderful, and the money results in some cases are so great as to be worthy of the fashionable term of "fabulous."

It is well for the farmer to recollect that some of our fruit crops may be consumed with great advantage and profit by his stock animals. Hogs, sheep, cattle, particularly milch cows, and even horses, may be profitably fed upon some varieties of fruit. It has been asserted by a recent author, that "fruits of all kinds, but particularly what may be called the large fruits, such as are green in our orchards, may be profitably cultivated for feeding our domestic animals. Sweet apples have been especially recommended for fattening

swine, and when fed to cows they increase the flow of milk, or produce fat, according to the condition of these animals. . . . Orchards have been planted with a succession of sweet apples that will sustain swine in a condition of perfect health, growing and fattening simultaneously from June to November; and the late varieties may be cheaply preserved for feeding stock of all kinds during the winter. The farmer may also be reminded that portions of many farms can be appropriated to the culture of fruits, which are not adapted to crops that require cultivation on arable land. It has even been asserted that a given area planted with fruit trees will sustain more stock, or fatten more pork than the same space devoted to grain and forage crops.

Preparation of the Soil — DISAPPOINTMENT FROM BAD SELECTIONS.—Having assigned a portion of the farm to the apple orchard, which should be elevated, and of a light porous soil, the ground should be well prepared by thorough plowing, if this be practicable, though it is found that fruit trees will thrive in newly cleared land, if set among the stumps; they have been planted on prairie sod, and there are many fine orchards on rocky tracts, where the preparation must be done exclusively with the pick, the spade and the shovel. It may be the best economy for the owner of such land to appropriate it to the orchard, because it is unfitted for tillage crops. Even the holes for setting the trees may be made with the plow, by simply marking out the surface at the proper distances, and setting the trees at the inter-sections. This is done after the whole ground has been well prepared by a thorough plowing, and the trees are easily planted in the mellow soil in which they will thrive admirably. On low and flat lands that have no good natural drainage, tile should be used, if accessible, but even here surface drainage may be done with the plow, by throwing the furrows together where the rows of trees are to be set, what the farmers call back-furrowing, two or three times, so as to make a little ridge to plant them on. This will also make open furrows between the rows, that will give outlet for the surplus rain water, or at least lead it away from immediate contact with the roots.

Selection of Trees.—**VARIETIES.**—

Young trees are better for planting than older ones; small ones are more easily handled, and are surer to grow than larger ones. Two years from the graft or bud is long enough for the apple to remain in the nursery. This is true of most varieties, but there are exceptions to this, for some slow growing kinds require a longer period to attain sufficient size. The plants should be stocky and branched, and they should be taken up carefully, so as to preserve the roots.

Varieties are so numerous, and tastes so diverse, that it is almost impossible to make out a list of sorts that will be acceptable to all, and besides this, it is well known that the varieties which succeed in one locality may fail in another. Every planter should endeavor to ascertain what sorts have been tested and approved in his own neighborhood. Hardy and productive kinds, of second quality, are more satisfactory than those fruits of greater excellence, which have not these prime qualities of the tree. It is rare that we find all excellence united in one individual.

For the family orchard, it is best to have a succession in the time of ripening. The same is true of an orchard planted for stock-feeding, but in the commercial orchard, where a large quantity of fruit is to be produced for shipping, it is found best to plant only a few varieties, and these should be productive, hardy, and of such a character as to bear transportation and to command a ready market, less regard being had to the superior quality as table fruits than in the amateur and family list.

Apple Family.—**PLANTING.**—After the ground has been prepared, it is ready to mark off with the plow in two directions, so that the intersections of the furrows shall come at the stations for the trees. This is the best way to dig the holes, for the furrows may be made quite deep enough. Indeed, it is not desirable to set the trees deeply; some even advocate planting on the surface, and covering the roots with a little mound of soil, as is done when the trees are set on top of the sod of prairie or meadow. The distance between the trees will depend upon the habit of the variety. Some will require more space than others, but close plant-

ing has many advocates, who advance some cogent reasons for crowding the trees, instead of the wide planting of former years. A few of these may be mentioned: In the first place, it is now conceded that the land appropriated to the orchard should be given up to the trees, and not be used for other crops, therefore there is less necessity for space between them. In close planting, the whole ground is shaded, and kept from the baking influence of the sun, and thus remains more loose and friable than where exposed. The crowding of the trees also protects them, in a great degree, from the severity of the cold in winter, and from the injury incident to the sudden changes of our climate; but in exposed situations, this close planting especially shelters them from the trying winds.

The planting should always be done with the greatest care, the roots should be spread out in their natural position, the finest soil put next to the fibres, and worked in among them with the fingers, so as to be in immediate contact both below and above them. When the roots are well covered, slight pressure may be made with the foot, especially toward the end of the roots; or, if the ground be dry, a few quarts of water may be poured upon it to settle the soil, and this should be covered with more dry earth. All that portion of the tree which was underground in the nursery must be covered, and, in fall planting, a little mound should be heaped up against the stem, to keep it from being swayed by the wind, as well as to turn off the rains from the roots. This mound may be removed in the spring.

Cultivation should be thoroughly kept up in the young orchard for a few years, and, at first, hard crops, such as corn or potatoes, may be allowed among the trees, but no grain or grass, nor any weeds, should ever be permitted among them. This cultivation may be continued four or five years, until the trees are well established, and begin to cover the ground with their shade, when the spaces between them will be so occupied by their branches as no longer to admit the horse and plow. The land may now be laid down to clover, not for a hay crop, but simply to cover the surface as a

mulch, for which purpose it may be mowed and left on the ground.

Training and Pruning.—These topics should be considered together, since both have the same object—the forming of the head. The tree should be trimmed early in its orchard life, so as to produce the desired shape. It should be branched low, from two to four feet from the ground. The main limbs should be well balanced and well separated, while the leader must also be preserved, all interfering branches should be removed, and those which are too strong must be shortened in during the summer. All this will require some care and watchfulness, but will need the removal of very little wood, if it be done in time, while the tree is small, and this is the best time to do the work of pruning; midsummer is the best season, a strong, sharp knife and a pruning chisel the best instruments.

Pruning old orchards is quite another affair, and if they have been long neglected, the trees may need a very severe pruning to remove crowded, exhausted and decaying branches, in order to reinvigorate the organism by the production of new wood growth. The application of the saw will now be required, and the mild weather of fall, winter or early spring should be selected for doing the work. All large wounds must be pared smoothly with the chisel, and covered with some mastich to exclude the elements. In such trees it is sometimes better to thin out the branches and shorten them than to remove the larger limbs.

Pears are delicious fruits, and every farmer should plant at least a few trees. The crops are certain, and any surplus may readily be disposed of. The old saw about planting "for one's heirs" must give way before the advances of pomology, for we now have many varieties in cultivation that are early-productive, and modern horticulture has furnished us with means of forcing early fruitage upon those varieties that formerly tried the patience of the orchardist by their long-continued wood-growth, before reaching that condition of maturity that is attended by abundant crops.

The natural season for the maturing of this fruit being mid-autumn, we find as a

result of cultivation and the production of new varieties, that this period has been considerably extended in both directions, so that the pear season now reaches from July to March or even longer. A very experienced student and propagator of this fruit has suggested that in thus departing from the normal season of ripening, we may expect to find, under the law of compensation, that we shall lose some desirable qualities. The truth of this is a matter of common observation: thus, in quality, most early pears are inferior to those of a later period, and the general inferiority of the latest or winter pears is a matter of common remark; there are exceptions in both extremes, but autumn is the season of the best pears.

Soil.—Any good loamy land, with a predominance of clay, will produce good pear trees, and thorough plowing will be a sufficient preparation after draining, if the subsoil be tenacious and wet. The pear strikes its roots deeply into the soil; it is thus able to seek its food, and it is a gross feeder, but may thrive even on thin soils, at the same time it will be benefited by suitable manures. Analysis of its products shows that it needs lime and phosphoric acid; therefore, bones may be applied with advantage to lands that are deficient in these elements. Planting and cultivation of the pear may be the same as that advised for the apple.

Dwarf pears have been very highly recommended, and largely planted; but the majority of planters now prefer to have their trees on free-stocks. These are often erroneously called standards in contradistinction to those being dwarfed by being worked on quince stocks. The dwarfs are very satisfactory for limited grounds, and should have high culture and good care in trimming and training to produce their best results. The two styles of trees should not be planted together as has been advised; they require different treatment.

Training.—Pear trees will bear crowding, as most of them are of an upright habit; fifteen or twenty feet apart is wide enough for the majority, and many will succeed much closer. The trees should not be grown as standards, with tall, naked stems, but do much better if trained from the first in conical form, when they are generally called pyramids.

This object is attained by causing them to branch low, and by curbing the upper limbs, at both the summer and winter pruning, thinning them out and shortening them in such a manner as to keep the lower branches always the longest; the result will be the desired conical tree, which shall have all of its twigs, fruit and foliage well exposed to the sun and air.

Culture and Pruning.—The pear orchards may be treated like those of the apple, excepting that the general habit of the former is pyramidal, and of the latter globular, so that the pruning will require some modification, though conducted upon the same principles. While young, the ground among the trees should be well cultivated, but after they have attained some size, after six or eight years, they are found to do better in grass than if the cultivation be continued. These remarks apply to the pear on free-stalks, but those trees that are dwarfed upon the quince, or by severe and continued root-pruning will require high culture and even manure.

Peaches are always acceptable, easily grown, and they come into fruiting at an early age, generally the third year. Unfortunately they are not constant bearers, as the flower buds are often injured by the severity of winter or by spring frosts. Peach trees will grow on almost any soil, but light sandy or gravelly lands and elevated situations seem best adapted to them. The trees should be one year old from the bud, cut back to a bare stem about two feet long before planting. They should be set from fifteen to twenty feet apart in the orchard, planted in the spring, and the ground must be cultivated continually to secure the best results. Mounding the tree has been advocated, but it is an expensive operation, the merits of which have not yet been fully demonstrated. There is a great variety of this fruit, both in its color, flavor, consistence, and season. There are clings and free-stones of all colors. The former are the best, the latter are most popular. The season extends from the first of August until the middle of October in this latitude. Those which ripen earlier or later are of less value.

Plums are so sadly affected by the Curculio that few of us know how excellent a fruit this is. Occasionally the rascals

stand back, and thus we get a crop; and some cultivators have succeeded in counterworking the enemy so as to preserve their fruit. Trees planted in trodden places near houses have escaped the attacks of these insects, and have borne crops for many years, so that farmers are urged to continue planting plum trees in such situations. There are some varieties, however, which appear to escape these invaders, among them the little Damson, which is well worth cultivating, as it makes good preserves.

Cherries.—This delicious fruit appears to be more fastidious as to soil than any other; for though it will grow almost anywhere, it does not stand well on our rich limestone lands. Those soils that are natural to the chesnut appear to be the most suitable for cherries.

There are some very hardy varieties that seem to do equally well on any kind of land; these are called the Dukes and Morellos, they are mostly sour, and are chiefly valuable for cooking cherries; may be planted ten, fifteen or twenty feet apart, according to their class, as Morellos, Dukes, or Hearts and Bigarreaus, the last being the largest. The trees should not be too old when planted, two or three years from the bud or graft is enough. They should be headed back, so as to branch low, and should be grown as pyramids. All the pruning should be done while they are young, as they do not readily heal over the stump of a large limb. These trees are very apt to split and burst their bark, especially where the stems are exposed to the sun by trimming them up as standards; hence the importance of low heads. This accident is most common in the free growing kinds and in rich soils.

Quinces have been too much overlooked by our farmers, who could not present their families with a more acceptable offering than the fruit from a few trees planted in some low spot of rich, moist soil, such as that which receives the slops and drainage from the dwelling house.

These trees are rather hardy, and will occupy little space, as they never grow large, and can be planted eight or ten feet apart. They should be trained to one stem, branched about three or four feet from the ground, and kept trimmed to open heads.

Grapes.—Every farmer, every cottager, every householder or house ruler, should plant a few grape vines. It is a very simple affair, requiring no great amount of skill nor labor to plant, train and trim a grape vine, and its productiveness of fruits that every body, young or old, can appreciate is proverbial. Who has not heard of the famous grape cure? Who can object to trying it? Certainly not he who has planted and trained his own vines.

Almost any soil that has been deeply loosened and moderately enriched will cause the grape vine to grow luxuriantly. It may be set in out-of-the-way places, trained to a stake or a trellis, or be made to climb beside the walls of out-houses, and cover their bare sides with foliage and fruit, rendering them ornamental instead of ugly.

Training the young vines in an upright direction to encourage their growth, and at the same time concentrating their force into one or two shoots, by pinching or rubbing out the others, is a very simple affair, and light labor. Pruning them when dormant, cutting them back to two or three eyes in the fall or winter, is no great mystery. The same process of training two strong shoots the next season is but a repetition of the first summer's experience, with more satisfactory results; and the second fall, with canes nearly as large as the little finger, the pruning is less severe, because we now have bearing wood, which needs to be shortened in two or three feet in a strong vine. These canes are to be trained horizontally, as the arms of the vine, in which condition they may be left for years, unless they need renewal. In the third, and all succeeding years, we must still train the shoots upward, taking care only to remove the superabundance of the growths, by rubbing out, early in the season, and leaving one shoot, say every nine inches, which must be trained upward. In the fall of this year, we commence pruning these shoots for alternate production of fruit and wood, by cutting one cane about two feet long, and reducing the next, the weaker, to a spur, with only two eyes or buds. In this way the bearing wood of the vine is constantly renewed. The mystery disappears when we recollect that all the fruit of a grape

vine is produced upon green shoots that grow from the cane of last year's growth. By renewing these shoots annually from below, we can have bearing wood to cover the trellis, and strong new shoots to clothe the whole with abundant foliage. Various modifications of pruning and training have been suggested, and may be practiced, but the most simple, common and successful is the one indicated above. All depend upon the annual reproduction of new wood from which to draw our supplies of wood from year to year.

FRUITS, SMALL, How to Cultivate—

We now come to the consideration of the *small fruits*, which, however, may constitute a very large share of the food, comfort and luxury of a well regulated family, either in the country or city, and which will contribute in no small degree to the healthiness of the people, by substituting their grateful acids and sweets for the calomel, ipecac, tartar, soda and potash, in various forms, that are so freely drawn from the druggists' shelves, either for the cure or production of disease, according as they are administered by the doctor or by the cooks.

The strawberry comes first in the order of the season, and, indeed, it is the most universally welcomed and relished of them all. The cultivation of this fruit is so simple, and the returns so speedy and so grateful, that it should occupy a prominent place in every farmer's garden. This fruit will grow in almost any soil, but a good stiff loam, well stirred, is probably the best. The strawberry plants should be well rooted runners, or offshoots from an older plantation; they should be taken up carefully, so as to have good roots. If these have been formed in small flower-pots sunk near the parent bed, so much the better, as the fibres, being confined by the pot, will be less disturbed in transplanting, or the ball may be set entire.

Strawberries may be grown in hills, in rows, or in beds. The latter is the common method, and the beds are formed by planting two or more rows a foot or fifteen inches apart, setting the plants twelve inches one from another in the rows. In the beds, the runners are allowed to grow, and to increase the number of plants indefinitely, so that they are often injured by being crowded too closely together. When planted in hills, they are set eighteen

inches apart; the space between them is kept perfectly clean, and the runners are cut as soon as they appear. This results in the greater growth of the original plant, which has an increased number of crowns from which the blossoms and fruit proceed in great numbers. This method enables the producer to have the best possible results in the size and appearance of his fruit, but it is attended with more labor and expense than the bed system. Many cultivators prefer planting in rows, when they set the strawberries about a foot apart, and place the rows two feet or more one from another, according as they expect to use plows or hoes in their culture. In the narrow rows the runners may be cut off, and the fruit will be almost as fine as that grown in the hills, but in the wider rows the runners are generally allowed to strike root, and spread the row into a bed in the course of the first summer after planting.

Spring is the best time for setting out the plants, though this may be done at any time during the growing season. The advantages of early planting are the longer period allowed for the stools to grow and become thoroughly established in the soil. The plants are set by the line, a hollow is opened with the trowel, in this the roots are spread out, then covered with mellow earth and pressed firmly with the fist or even with the heel. If watered at once, a little fresh earth should be thrown in to prevent the cracking, but great care must be taken to avoid placing the crown below the surface of the ground—in other words, the roots must be planted and not the corm, from which the crowns arise. Thorough culture should be given through the season.

Mulching, with old, rotten manure, applied after planting, will encourage the growth of the strawberries, and keep the soil moist. Winter mulching with clear straw, leaves, or other material, should be liberally applied after the ground has frozen, and be left to protect the buds during the winter, and to be removed from the crowns of the plants in the spring. Being left between the rows, the straw will make a good summer mulch, and keep the fruit clean. In hill culture, saw-dust and old tan bark have been recommended, and still another material, spent hops from

the brewery, has been used with excellent effect.

Strawberries have a peculiarity in their blossoms, from which they have been classified as *Pistillate*, *Staminate* and *Her-maphrodites*. In the first class, the stamens are so defective that the flowers need the fertilizing influence of other kinds which must be planted near them. These furnish many of our favorite varieties, especially those which are largely cultivated in beds. The next class embraces most of those sorts which produce the largest berries, their flowers are often so deficient in the pistils that a large per centage of them fail to set fruit. This is particularly the case when these varieties are grown in beds and allowed to multiply their runners. They are, however, quite productive when cultivated in hills, and they have formed branching crowns from which spring numerous trusses of flowers. Beside these two classes there is another, in which the two sexes are so evenly combined that almost every flower is followed by perfect fruit, a very few varieties of the strawberry, either cultivated or wild, belong to this group.

Raspberries.—Next to the strawberry, and nearly allied to it in its botanical relations, is the raspberry, which furnishes a fruit of high flavor and exquisite fragrance. It is no wonder that this should be a favorite with all fruit-growers, since it is easily produced, hardy, makes quick returns is easily gathered, and commands a ready sale at high prices. And yet it is equally surprising that so few farmers' gardens are stocked with the raspberry.

Every soil that is cultivable will produce this fruit, but a good loam is best adapted to it. The only preparation requisite is ordinary plowing of the land, but deep cultivation and manuring are well bestowed upon the raspberry patch, and it should be kept clean by thorough summer cultivation.

The raspberry may be planted in the fall, but the early spring is generally preferred. They may be set about three feet apart, in rows that are from six to nine feet wide, or planted in hills five by five feet, or wider for some of the larger kinds. Planting in rows is usually preferred, but the hills allow of cultivation in both directions, or cross plowing, which saves

hoeing, and also permits the pickers to get among the plants more readily.

Trimming the raspberry was formerly done only in the winter, and consisted in shortening the canes, and removing the old dead wood, and the surplus feeble shoots, so as to leave from two to four on each plant or hill. This was done at any mild time between October and February or March. Fall pruning, if done too early, may prove very injurious, if followed by mild growing weather that causes the buds to grow, and thus destroys a portion or the next year's crop. Of course, it is understood that all the varieties and species of this genus, *Rubus*, including the raspberry and blackberry, produce shoots one year that become the bearing canes of the next summer, and then die; an apparent exception exists in the autumnal bearing raspberries, which produce blossoms and fruits upon the shoots the season of their growth.

Summer pruning is now practiced by all good cultivators. This is a very simple operation, and consists in pinching or cutting off the shoots as soon as they are two feet high, which causes them to branch out with strong laterals, and these are to be cut back, according to their strength, in the winter. By this means the plants are made more stocky and bushy; they resemble little trees, and are able to bear enormous crops. At the same time, all redundant branch shoots are to be cut away. This method also obviates the necessity for any kind of support, such as stakes or trellis, since the sturdy plants are able to stand alone.

We have two American species of eatable raspberries, the *Strigosus*, or red fruited, and the *Occidentalis*, or thimbleberry, the black caps. Besides these, the European species, the *Idæus*, furnishes many delicious raspberries, most of which are tender and need winter protection.

Blackberries.—The blackberry, though abounding in most parts of the country, is entirely deserving of care and cultivation. In the garden it is under our control, and may be allowed to reach perfection, by hanging until perfectly ripe, which is not the case that must be yielded to the "eminent domain" of any vagabonds who may come along and trespass on our farmers, and glean the fruit from our neglected fields and fence-corners.

Any rich, deep soil, well plowed, will suit this fruit. The plants should be allowed plenty of room, and may be set every four feet, in rows eight or ten feet wide. The ground should be well cultivated, or deeply mulched, and the suckers must be kept down, by cutting them with the hoe whenever they appear between the rows, and these should not be crowded—one stalk to every two feet will be sufficient. This being only another species of the genus *Rubus*, or bramble. The remarks as to the habit, and pruning of the raspberry are applicable to this species, and need not be repeated, except that the summer pruning should be practiced a little higher, say from three to four feet, according to the vigor of the plants, and the redundant shoots must be cut off.

Currant, the.—In almost every log cabin garden we used to find this health-giving fruit, which offers its agreeable acid in the heats of summer as an antidote or preventive of the bilious effects of our torrid season. And yet the currant is a sadly neglected fruit, and in many parts of the country there is not enough for home consumption.

This being a northern plant, it is thankful for a partial shade or protection from the scorching sunshine (in lat. 40° or southward). For this object it is well to plant the bushes on the north side of a fence or building, and even in the shade of young orchard trees, where they sometimes succeed very well for a long period, even after the apple trees have occupied and shaded the whole surface.

The currant delights in a deep, rich loam, and will thrive even where the soil is somewhat moist. The bushes should not be crowded, as they require about four feet space, each way.

Trimming is to be done in the fall or winter, as the buds swell very early in the spring. It should consist in shortening two or three of the strongest young shoots, cutting away all the weaker ones, and removing only the oldest and exhausted bearing wood. Unlike the raspberry, currants do not fruit on the young shoots, but upon little spurs that appear only on branches that are two or more years old.

The plantation must be kept clean, and free from grass and weeds. After cultivation in the spring, it is a very good plan

to cover the soil with a heavy coating of old hay, straw, fodder, leaves, or other suitable mulching material, which will retain the moisture, and preserve the fruit a long while in fine condition.

Gooseberries.—Fashion has wonderfully affected the production of this fruit. The fine, large, English varieties were generally so badly affected with a mildew, that their culture was abandoned, except by a few fortunate persons. The introduction of the Houghton, and American red varieties, worked a revolution—everybody planted them, and everybody purchased them at high prices for several years; when lo! the cost of sugar caused a change, and the demand fell off to such an extent that the plantations were rooted up, and there was no longer any sale for the plants, and nurserymen discontinued their propagation. Gooseberries are just as valuable, nevertheless, to the farmer's family as ever they were, and their cultivation is so simple that they may and should be grown in every household garden, and by every cottager.

FRUIT, Preparing for Market.—The truth can hardly be too often or too strongly impressed upon the minds of fruit-growers, and especially on those commencing the business, that on nothing does success so much depend in marketing fruit as in having it in good order. Superior fruits always sell quickest, and often at extravagant prices. Assorting and grading fruit, putting all uniformly fine together, and the inferior and damaged by themselves, selling each class on its merits, has always paid us well, and we have reason to believe, given good satisfaction to the customers. Many persons who appreciate first-class fruit will pay more for that only which is choice and neatly arranged than the producer can get for both superior and inferior packed and marketed together. Our mode is to have each picker carry in her hand two quart baskets, into one putting the large strawberries, and into the other the smaller ones; and a moment's care in arranging the berries on top, with the stems downward, gives a luscious beauty to this unsurpassable fruit, and compensates in quickness of sales. We think square quart baskets preferable where the market is several hundred miles distant. Rasp-

berries and blackberries, having no stems or hulls, press more closely together, and therefore do better, when sent long distances, if put into square pint baskets. The berries will generally keep better on the vines, or, if well aired, under the packing-shed, than in close cellars or store-rooms in the city. Everywhere "honesty is the best policy," and dealers are by no means slow in learning to discriminate in favor of the brands of honest packers.

GRUBS, White, Remedies for.—An authority says: A good coat of unrotted manure, plowed in six or eight inches deep, is almost a specific against white grubs in corn or potatoes. We suppose the grubs work in the manure and leave the corn plants alone. Plowing under clover, immediately before planting, often has the same effect.

HAY, (Clover), Management of.—Clover should be mowed as soon as it is well in blossom. There is no necessity to wait for a brown head; there will be plenty to be seen before the crop is well down. Cut when the dew is off, and allow to dry until the afternoon, when it should be shaken up and turned before the dew falls. If a tedder is employed, its constant use will fit the clover to be put in cocks the same day. If turned by hand, it may lie until the noon of next day, when it may be put in cocks, made as high and narrow as possible; they will shed rain better in this shape, and, if caps are to be used, a yard square will be sufficiently large to cover them. Caps are to be strongly recommended, and the above size is sufficient, as the top only needs protection. Put up, and thus protected, the hay may stay in the field until it is all made, when it may be hauled together. If any cock should be damp inside, spread for a few minutes; it will dry rapidly. Clover cured in the cock is much more valuable than that dried in the sun, and wastes less in hauling. Put away the first cut hay by itself, in a place convenient for use in the spring. Cows coming in early in the spring will thrive well on this hay; the milk will be largely increased in quantity, and be richer in quality, while the butter will come easily, be free from white curdy specks, and in color will not be far behind that made from June grass.

FOOD, Steaming Cheaply.—A farmer recommends, from personal experience, the following economical steaming apparatus: A large box, made steam-tight, placed within a larger box, with some non-conducting material, such as saw-dust, packed between, at least twelve inches thick. The food to be cooked being placed in the steam-box, hot water is to be turned in and the apparatus covered tightly with woolen covers in order to confine the heat.

FRUIT TREES, to Destroy Moss on.—Every second year fruit trees should be well scrubbed with a scrubbing brush dipped in strong brine, so as to moisten every part of the bark of the stem and branches. This not only destroys the moss, but insects of all kinds, and is beneficial to all trees, whereas applications of lime choke up the respiratory pores, and sometimes produce canker.

Carbolic soap and lye is also recommended. The poorest soft wood ashes will answer for making the lye, as it need not be strong; it is used simply to dissolve the carbolic soap; say $\frac{1}{2}$ pound of soap to a 3 gallon pail of boiling lye. It may be applied to old trees while boiling hot; use a swab or a large paint brush; go over the trunk and all the large branches. It will kill the eggs and larvæ of insects as well as the moss, and will greatly improve the appearance of the trees.

FRUIT TREES, to Prevent Ants from Injuring.—Make a line of gas-tar round the stem of the tree, or if it be trained on a wall, make a horizontal line near the ground on the wall, and one around the stem; this will prevent ants from ascending.

FRUIT TREES, to Preserve from Insects and Mice.—Apply, early in the fall, around the root a thick layer of lime and ashes. It would be well to sink the earth around the tree about six or eight inches; throw in a few shovelfull of the lime and ashes, and then cover up with earth, trampling it well down.

FRUIT TREES, Blight on, to Cure.—If the winter dressings fail and the pests appear in spring so as to endanger the crop, procure a quantity of ammoniacal liquor from the gas-works, and to every pailful of the liquor add six of water, and boil as soon as possible in a large copper.

Apply this in the evening, hot, with a syringe, drenching every part of the trees, and letting not a leaf escape. It should be used be as hot as can borne by placing the hand in it, and thrown with as much force as possible into all the crevices in the bark, on the under side of the leaves, and splashed vigorously against the wall on which espaliers are trained. It may be used also for roses and fruit bushes, with the most certain benefit. Two days after give another syringing with plain warm water. To clean the copper in which the mixture is prepared, fill it with water, throw in a shovel of cinder ashes and a pound of soda, and let it boil for half an hour.

FRUIT TREES, Blossom in.—Surround the trunk of the tree in blossom with a wisp of straw or hemp. The end of this sink by means of a stone tied to it, in a vessel of spring water at a little distance from the tree. One vessel will conveniently serve two trees; or the cord may be lengthened so as to surround several before the end is plunged into the water. It is necessary that the vessel should be placed in an open situation out of the reach of any shade, so that the frost may produce all its effects on the water by means of the cord communicating with it.

FRUIT TREES, Coating for Amputated Branches and Wounds in.—Shellac, dissolved in alcohol, forms an excellent coating for amputated branches and for wounds of fruit trees, making a waterproof artificial skin, under which the wood grows until the wound is healed.

FRUIT, Time to Gather.—It is well known by observing horticulturists, that winter-fruit may become over-ripe while yet hanging on the tree, so that its season is advanced. Such was the case during the very warm and late fall of 1875; and the following winter there was a complaint all through the country that fruit could not be kept. In some places it was gone before New Year. There is a time in the life of fruit when it is growth is complete—when it will receive nothing further from the tree. It is then tree-ripe. Shortly after begins after-ripening, a chemical change, whereby the starch, abundant in the un-ripe or green fruit is transformed into sugar. At the completion of this saccharine change the fruit is in the best condition.

for use. But almost immediately putrefaction sets in, first dissipating the volatile aroma and destroying the delicate flavor, and finally converting the grateful sugar into an unwholesome acid and consuming the very tissues of the fruit. Though a low temperature and dry atmosphere may sometimes retard this change, yet so easy and rapid is its progress that efforts to preserve the fruit after it has become ripe for use are of little avail. But the progress of the first change, the after-ripening, may be so delayed as to require several months for its accomplishment. It is done by taking the fruit from the tree at the moment of its maturity, and keeping it in a low, even temperature, in a dry, pure atmosphere, and secluded from the light. Fruit-houses are constructed where these conditions are secured almost in perfection; where the thermometer, for instance, does not rise above 34° for months together, and fruit kept in them has barely ripened for the late spring market.

Fruit should be gathered in a dry day. Plums readily part from the twigs when ripe; they should not be much handled, as the bloom is apt to be rubbed off. Apricots may be accounted ready when the side next the sun feels a little soft upon gentle pressure with the finger; they adhere firmly to the tree, and would over-ripen on it and become mealy. Peaches and nectarines, if moved upwards, and allowed to come down with a slight jerk, will separate, if ready; and they may be received into a tin funnel lined with velvet, so as to avoid touching with the fingers or bruising.

A certain rule for judging of the ripeness of figs is to notice when the small end of the fruit becomes of the same color as the large one.

The most transparent grapes are the most ripe. All the berries in a bunch never ripen equally; it is therefore proper to cut away the unripe or decayed berries before presenting the bunches at table.

Autumn and winter pears are gathered, when, dry, as they successively ripen.

Immature fruit never keeps so well as that which nearly approaches maturity. Winter apples should be left on the trees till there be danger of frost; they are then gathered on a dry day.

FENCE, Fire-Proof, Wash for.—Make a wash of 1 quart fine sand and 1 part wood ashes well sifted, and 3 parts lime ground up with oil, and mix together. Apply this to the fence with a branch—the first coat thin, the other thick. This adheres to the boards or planks so strongly as to resist an iron tool or fire, and is, besides, impenetrable by water.

FENCE POSTS, Preservation of.—Any sort of timber, when employed for fence-posts, will be more than twice as durable if allowed to become thoroughly seasoned before being set in the ground. The durability of seasoned posts may be promoted, so as to make them last for an age, by the application of a heavy coat of coal-tar to the portion buried in the earth, and a few inches above the surface of the ground. Some farmers set the ground-end in hot tar, and let it boil for fifteen minutes. When cool cover with coal-tar, thickened with ground slate or ground brick. The boiling stiffens the albumen, and causes the pores to absorb tar. The coating prevents the action of moisture. But such a treatment of green posts would do very little good, and perhaps mischief. Others contend that the better way is to season the post well before setting it, and when the post-hole is filled to within ten inches of the surface of the ground, to apply a heavy coat of tar and fill up with earth. As fence-posts always decay first near the surface of the ground, it is only necessary to protect the post a few inches above the surface, and about a foot below it. The timber begins to decay, usually, on the surface of the posts. Therefore, if the surface can be protected by some anti-septic material, posts will last a lifetime.

FLY ON TURNIPS, to Destroy.—Take 1 bushel of newly slaked lime, and mix therewith $\frac{1}{2}$ bushel of wood ashes; mix and blend the whole intimately together, and sift the powder lightly along the top of the drills.

FRUIT TREES, Over-Bearing.—The bending of branches of trees by an over-crop of fruit is most injurious; for the pores of the woody stalk are strained on one side of the bend and compressed on the other; hence the vessels through which the requisite nourishment flows being partially closed, the growth of the fruit is retarded in proportion to the straining and compression of the stalk.

GRAPE, Grafting.—One important fact should always be borne in mind in this connection, and that is, that the grape vine, having a very thin inner bark or liber, does not graft with the same ease as do the more common of our fruit trees, such as apple, pear, etc.; more care is, therefore, necessary in the operation.

Cleft grafting is the common mode employed, and is usually done by digging away the earth, and inserting the graft very early in the spring, two or three inches, or at the first smooth place below the surface. A horizontal cut of the stock is generally made, but a sloping one is, perhaps, preferable, from the fact that it enables all the gummy matter and excessive moisture which oozes from the cut, to run down, and not accumulate to the injury of the cion. Fuller recommends grafting in the fall; yet we give his method in his own words, as recently published in the *New York Tribune*:

"Select cions of the present year's growth, and from canes a quarter to three-eighths of an inch in diameter, and cut into lengths of three inches, with a bud near the upper end. The lower end should be made into a long, slender wedge. Remove the earth about the stock four to six inches, if the main branching roots will permit of this depth. Then cut off the vine a few inches below the surface and square across; then split it with a chisel or a knife, making as smooth a cleft as possible for the reception of the wedge-shaped cion. If the stock is an inch or more in diameter, two cions may be needed, one on each side of the cleft.

"The outer edge or the wood of the cion should be placed even with the outer edge of the wood of the stock, no attention being paid to the uniting of the two, because one will be very thick and the other thin. A nice fit of the two is essential, and in crooked-grained, gnarly stocks, a smooth, even cleft can only be made by cutting out the wood with a sharp instrument. But it does not matter how it is done so it is well done. After fitting the cions to stock, wind a strong cord about the two, in order to hold the former firm in place; then pack grafting clay or common soil about the stock, entirely covering the wound made and the lower half of the cion, but leav-

ing the bud uncovered. No grafting wax should be employed in grafting grape vines. After the cions have been inserted as directed, invert a flower-pot or small box over the cion; upon this place a quantity of leaves, straw or hay; then cover all with earth, rounding it up in order to keep the water from settling around the grafted stock as well as to prevent too severe freezing.

"Early in spring remove the covering, and if the operation has been properly performed, the cion will be firmly united, and will push into growth as the season advances. I have had Delaware, Iona and similar varieties make a growth of from forty to sixty feet of vine from a single bud in one season, set in strong stocks in the manner described. Grafting in the spring may be performed in the same manner, omitting the covering, but it should be done very early or after the leaves have started and growth begun. The cions, however, should be cut early and kept dormant in some cool place until wanted for use."

But valuable above all other experience for our own people, will be that of Mr. George Husmann, and as he has said little on the subject in his well known work, "Grapes and Wine," we take pleasure in giving that experience, as he has kindly communicated it to us:

"As you wished to have my views of grafting the vine, especially with the object of grafting some of our varieties most subject to the ravages of the Phylloxera upon roots of varieties which resist it, I will cheerfully add my mite to the researches which have already thrown so much light upon the history and the failure of so many of our otherwise most valuable varieties. My first attempts at grafting the vine were made in the spring of 1852, nearly twenty-three years since, and were made by grafting the then rare varieties of Norton's Virginia and Herbemont upon five years old Isabella roots. I found in the first edition of A. S. Downing's 'Fruits and Fruit Trees of America,' a few remarks on the practicability of grafting the grape below the ground, which led me, then a novice in horticulture, to try it, and with eminent success. I took the ground away from the crown of the vine until I came to a smooth place, then cut off the stock,

split it with a grafting chisel and inserted from one to two cions, according to size of stock, cut to a long wedge with shoulders on each side. I used no bandages, as the stocks were strong enough to hold the cions firmly, and only pressed moist earth on the cut to cover the wound. This was done on the 22d and 23d of March, and the cion covered and shaded to the top bud. About three-fourths of the grafts grew vigorously and fruited the next year. They have produced heavy crops ever since, and when at Hermann, a week ago, I still found them vigorous and healthy, while the Catawbias around them have "passed away" several years ago. I have practiced various methods since, with more or less success, and still think this the best and most practicable, though it is neither an easy nor a pleasant task, as it must be performed when the ground is still cold and moist, and requires a good deal of stooping. The inner bark or liber of the vine is very thin, while the outer bark is very thick on a large old stock. The success of the operation depends entirely on a good junction of the liber of stock and cion, and therefore requires a steady hand and a good eye to push the cion to its place. My friends, the venerable Fr. Muench and Samuel Miller, practice about the same method, and are both almost invariably successful. The cions should, if possible, be cut in fall and kept on the north side of a building or fence, so as to remain dormant. Should the stock not be strong enough to hold the cion firmly, it should be tied with basswood bark, or an oblique cut be made instead of a split. This is preferable in small vines any way, as by so doing, the fibres of stock and cions are both cut obliquely, and therefore make a closer fit.

There are other different methods. Another, which I will mention here, has been practiced at Hermann with very good success, though I have not been very successful with it. It has the advantage of saving the vine, provided the graft does not take. It is done by simply making an oblique cut into the stock below the surface or crown, and inserting the cion, cut a rather blunt wedge, by bending the stock to one side, and thereby opening the cut. If the cion takes, the stock is cut off above it. Another

method is grafting under the bark later in the season, when the sap flows freely and the bark peels readily; a long, slanting cut is made on one side of the cion, the stock cut off square, the bark lifted with a knife, and the scion pushed down under it. Every one who has practiced budding will readily perform this operation. The stock is then tied with basswood bark. I have followed this plan with varied success later in the season, but prefer the first method. I think grafting above ground impracticable in our climate, on account of the high winds and drying influence of our summer sun.

As to the advantages to be gained by grafting, they are manifold. They may be summed up as follows:

1. The facility it gives us to try and fruit new and rare kinds by grafting them on strong stocks of healthy varieties, where they will often make wood strong enough for fruiting the next season, and give us abundance of propagating wood, thus gaining more than a year.

2. Nearly every vineyard contains some worthless varieties, which are, however, strong and healthy growers. These can, by grafting, be changed into the most valuable varieties.

3. The facility by which varieties which are very difficult to propagate may be increased and multiplied, as nearly every variety will graft readily.

4. Last, but not least, it gives us a means of successfully combating the Phylloxera, as your experiments have so conclusively proven. If the Catawba and many of our most valuable varieties, have deteriorated because this little insect has been to work on their roots, and the roots of other varieties are comparatively exempt from its ravages, the remedy would indeed be a very simple one. By planting such varieties as propagate readily, and also graft with ease, they could be changed by grafting the second spring. I know, from experience, that slow growing varieties can be made to grow much more vigorously by grafting on stocks of strong and healthy growers. The most vigorous and productive Delaware I know around Hermann, was grafted on a Norton's Virginia, and produced an abundance of fine fruit, when Delawares on their own roots, in the

same vineyard, dropped their leaves, and did not ripen their fruit. It is certainly of the utmost importance that experiments of this kind should be made, and I would advise all lovers of the Catawba and Delaware to try it.

But now the question arises, what stock shall we choose? The Clinton, though easy of growth, is a poor stock, as it suckers inveterately, and, besides, has not the affinity to most of our valuable varieties which makes them take readily on it. In fact, I do not consider any of the Riparia or Cordifolia class as good stocks, for Labrusca and its hybrids, or *Æstivalis*. But the Concord seems to me eminently the stock to graft upon. Easy of propagation, within the reach of every one, with the adaptability to any soil it possesses, and as nearly every variety will unite readily with it, it seems as if hardly a better one could be found. But were I to plant it for this purpose, I would take good, strong plants, say at least one foot long from the cutting to the crown, plant them with their roots one foot below the surface, and trim off the surface roots clean, only leaving the roots on the two lower joints. Then cultivate well for one year, and graft as near the surface as practicable to insure the life of the cion. Should the plants make roots above the junction, I would cut them smoothly close to the graft every spring, and thus establish the plant entirely upon Concord roots.

This may seem very troublesome to our friends who plant vineyards entirely upon the easy plan, and let them take care of themselves. But I think that their days are numbered. This slovenly culture, or rather no culture at all, will never make us a wine producing country worthy of the name; and if we had not a single one of that stamp left among us, I believe we would be infinitely better off than we are now. If France can import millions over millions of our American varieties to regenerate her devastated vineyards, we can certainly afford to use the means ready at hand. Our American wines have a glorious future, and we have the material for the grandest results already.

* * * * *

Let none follow or commence grape growing in the future who are not willing

to do their best. We want brains and skill, as well as muscle. We want close observation, indefatigable exertion and intelligent labor in the vineyard as well as in the wine cellar. It is my belief that the darkest days of American grape culture are over, and the future will not fail to bring us glorious results if we labor for it faithfully.

Your labors have done a great deal to post us in regard to out insect enemies and friends, and should be gratefully appreciated by every grape grower, while all should do their part in sending you specimens and observing their habits.

GEO. HUSMANN."

It will be noticed that the above experience and directions refer solely to grafting underground. Both Fuller and Husmann deem grafting above ground impracticable in our climate, principally on account of our winds; and their advice has been so very generally followed that little attention has been given to this mode of grafting the grape vine. The consequence is that we have the most conflicting experience as to the results of grafting, for by the underground methods the graft will make its own roots in the course of a few years, unless very great pains are taken to prevent such an occurrence; that it has done so in the majority of cases of grafting in this country in the past, admits, we think, of little doubt. Yet, in grafting as a means of counteracting the *Phylloxera*, the first requisite is to prevent the graft from making any roots of its own; for it must be remembered that we are dealing with a root malady purely, and that the object is to grow those varieties whose roots succumb more or less to the attacks of the insect, by using the roots of those which resist; this object is necessarily frustrated in proportion as the graft forms roots of its own.

There are two methods of grafting above ground, which we have every reason to believe may be made more successful than grape growers have hitherto been led to suppose. The first is by temporarily making a false surface and grafting in the ordinary manner just described, *i. e.*, instead of digging away the earth and inserting the cion two or three inches below ground, it should be inserted two or

three inches above ground and the earth thrown up around it, to be removed only after the graft is thoroughly and permanently joined. There will then be no danger of the graft forming its own roots; and it is certainly as easy to throw the earth around the vine as to dig it away, while the mechanical work can be much more conveniently and agreeably performed above than beneath the surface. No doubt this mode of grafting needs greater care to make it successful, especially in a very dry season, as the mound is more apt to dry out than the level ground, yet there is not lacking evidence that this method will work well in our soil and climate. Mr. John Vallet, of New Haven, a grape-grower of much experience, has had eminent success in this grafting above ground, employing flax twine and paw-paw bard for bandaging. He considers that the vine grows more vigorously and that there is less danger of separating the graft when once formed, as there is no necessity for going below ground to destroy the suckers, the doing of which sometimes loosens the graft.

The second method is by inarching. This system of grafting does not seem to have been much practiced in this country, yet while it requires great care, and success may not as often crown the effort as in the former methods, we hope more attention will in future be given to it.

The operation is comparatively simple: A slice two or three inches long is cut from one side of the vine to be grafted, and a similar slice from the vine which is to serve as stock, as near the base or butt as possible. The two cut portions are then brought face to face, so as to fit as neatly as possible, and are then bound together with cord, basswood bark or other grafting bandage, which should be kept moist with moss. In the course of a fortnight partial union takes place, when the bandage should be somewhat loosened to admit the expansion. In six or eight weeks, if the operation is successful, the stock and cion are firmly united, when the bandage may be removed. The graft immediately below the union and the stock immediately above it should then be partially severed, and in a week or so more, entirely cut loose.

The following description of the method has been furnished us:

For this method it is desirable that two plants, one each of the variety which is to form the stock, and one of the cion, be planted close together, say about one foot apart. In June, (the first year, if the plants make a sufficiently strong growth, if not, the second year), or as soon as the young shoots become sufficiently hard and woody to bear the knife, a shoot is taken from both the stock and the cion vine, and at a convenient place, where they may be brought in contact, a shaving is taken out from each of these, on the side next to the other, for a length of two to three inches. This must be done with a smooth cut of a sharp knife, a little deeper than the inner bark, so as to obtain on each a flat surface. They are then fitted snugly together, so that the inner bark joins as much as possible, and wrapped securely with some old calico torn in strips, or soft bass strings. Besides this, it is well to place one tie a little below, and one above the grafted point, and also to tie the united canes to a stake or trellis to insure against all chances of loosening by the swaying of the wind. The rapid swelling of the young growth at this period of the year makes it desirable that the grafts be looked over after a few weeks, replacing such ties which may have burst, and loosening others which may bind so as to cut into the wood. A union will generally be made in the course of two or three weeks, which will be further consolidated in the course of six to eight weeks, when the bandages may be removed and the grafted portion left exposed to the sun, to thoroughly harden and ripen it. The shoots themselves are to be left to grow undisturbed for the rest of the season. In the fall, if a good union has taken place, the cane forming the cion is cut close below its union with the stock cane, which in its turn is cut close above the connection. Supposing the stock to have been a Concord and the cion a Delaware, we now have a vine of the latter entirely on the strong, vigorous root of the former. Of course constant vigilance must be exercised to prevent suckers from starting out of the stock. It is well to protect the grafted joint the first few winters by a slight covering of straw or soil to prevent the frost from splitting it apart.

The party in giving his experience

writes: "I have positively abandoned cleft grafting; it is too much trouble and too uncertain, and the graft often makes its own roots. I assure you that from a long experience in inarching, I am of the opinion that not alone the Delaware but most of our cultivated varieties will do better on native wild roots than on their own. I have fourteen acres of vines mostly grafted in this manner on wild stocks, and I have not lost one of such grafts. It is preferable to graft at from ten to fifteen inches from the ground."

Another mode of grafting above ground is thus given in "The Cultivation of the Grape:"

"After the first four or five leaves are formed, and the sap is flowing, you choose the place on the vine where you intend to graft. At that point wrap tightly a twine several times around the vine. This will, in a measure, prevent the return sap.

"Below the ligature make a sloping cut down, as shown at Figure 50, *a*; also, a similar reversed one above the ligature, as at *b*, about one inch in length. In selecting a cion prefer one that has naturally a bend. Cut it so that it shall be wedge-shaped at both ends, and a little longer than the distance between the cuts in the vine at *a* and *b*. Insert the cion, taking care to have the barks in direct contact, securing it with a string, *c*, bound round both cion and vine sufficiently tight to force the cion ends into their places. If the work is done well, no tie will be required at *a* and *b*, but the joints should be covered with grafting wax. In a

short time, the bud at *d* will commence its growth, after which you can by degrees remove all the growing shoots not belonging to the cion, and in course of the summer you may cut off the wood above *b*, and in the fall remove all above *a* on the stock, and above *c* on the cion.

Still another mode of grafting which has, we believe, seldom, if ever, been attempted in this part of the country, but which

has been employed with much satisfaction the past year by a few vine growers in France, and especially by M. H. Bouschet, of Montpellier, remains to be mentioned. It is the winter grafting of a cutting of such variety as is desired to grow, upon

another which is to be used as stock, the combined cuttings being planted in the usual manner in spring, leaving only the buds on the graft proper out of ground. This is very similar to our ordinary mode of making apple grafts; and while we have little or no experience in this country on which to base anticipations, the method is worthy of trial, and is illustrated at figure 51.

But not to weary With details, we here reaffirm my belief, strengthened by

each further observation, and by every additional experience of the past years, that just as the working of the root-louse is the primal cause of failure of some of our choicest varieties of the grapevine, so in judicious grafting we have the most available means of counteracting its work, and of thus growing successfully many of those kinds which cannot be grown in this latitude with any profit or success on their own roots.

GRAFTING.—In grafting, a sharp pen-knife and a good fine saw are indispensable. Splitting the stalk so that the bark shall not be at all bruised, and shaping the scion wedge-fashion both ways, preserving also the bark uninjured, and placing the rim of the wood of both stock and cion exactly together, so that the sap can intermingle, there is no danger of failure if they are properly waxed. One year's wood should always be used when it can be obtained, as it is more certain to take, and grows more vigorously. For grafting generally, any time is good when growth is going on, and there is not too much sap in the cion;



FIG. 51.

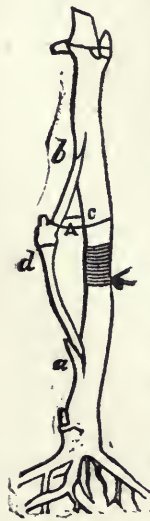


FIG. 50.

the amount in the stock makes no difference. If there is much in the scion, it is liable to rot before the union takes place. If scions are taken from healthy trees, and are kept from drying, sprouting, or other injuries, grafting may go on from early in the spring till midsummer.

GRAFTING, (Root), Apple Trees.—

This kind of grafting is performed as follows: Take seedling stocks one or two years old, cut off the stock at the collar of the plant, and remove the top root and all unnecessary fibrous roots, leaving only a few of them four or five inches long. Wash the stocks, and make a very smooth cut sloping upward an inch or so across the collar. In the centre of this cut make a slit or tongue to receive the scion. The scion, three or four inches long, should be made to fit the tongue exactly, both the woody part and the inner bark. On this close fitting depends the success of the operation. This done, cover the entire graft with the wax, or with prepared wax cloth, which is nothing more than cotton cloth spread thinly with grafting composition while it is hot. This work is commonly done in the leisure of winter. After the required number of stocks have been grafted, they are packed away in sand in a cool cellar to be planted in the spring.

HAY, Cutting and Curing.—1. Get ready for haying—that is, put your mowing machine, etc., in good order, so as to have no delay when you begin the work.

2. If you have a good deal of grass to cut, some of it should be cut a few days before it is actually mature, or you will be compelled to cut other fields so much later than it ought to be cut, that you would lose more by waiting till your earliest grass is fully ripe, than you would gain by waiting till it is mature; besides, grass cut a few days before it is strictly ready for the mower makes excellent hay, but not quite so much of it as when cut later.

3. When the time comes to commence mowing—which should be when there is a prospect of fair weather, go ahead and do not wait until the dew is off, on account of any injury the hay may sustain, as you will never be able to see any difference in value between hay, from grass cut with or without the dews upon it.

4. Just as soon as the sun has dried the upper surface of the grass, the spreading operation may commence; and you should have help enough to do the work well. No grass cut during the previous afternoon, and up to ten o'clock that day, should remain unspread at dinner-time, unless it be such as is light, and is left in good shape to dry by the machine, as is often the case. Keep the grass moving as long as possible before you begin to protect it for the night; and here we will say that we never would allow a load of hay to be put into our barns that was cut the same day, except when the grass had been delayed to be cut till it was past its prime and partially dry, so that a few hours of sun and wind sufficed to cure it.

5. After drying the hay as much as possible up to 3 or 4 o'clock p. m., according to the quantity of it, and hands to take of it, the question comes up: Is it best to cock it, or to rake it into windrows, and so leave it till the succeeding day, when, if the weather be fair, it may be put into the barn or stack? If left in windrows a great deal of labor is saved, and if the next day is fair, the hay is in a better condition to be spread than if in cocks; but if a storm ensues, the hay is in a bad shape, and will suffer injury, according to the length of unfair weather that takes place. No farmer should leave his hay over night in windrows, unless he shall have the very best of reasons for believing that the next day will be fair.

6. Hay may be injured by drying too much; but the wide-awake farmer will avoid that, and either get his hay into windrows or cocks before it is thus damaged.

HAY STACKS, To Ventilate.—Stacks of hay, corn-stalks, etc., may be ventilated by making a hole perpendicularly through the centre, with apertures through the base and top of sides of the stack to admit a current of air. The orifice should be constructed when the stack is being built, which can easily be done by filling a bag of the requisite size with hay or straw, placing it upright in the centre of the stack, drawing it upward according as the stack rises. In this way a chimney will be formed in the centre of the stack, which will carry off the steam, if the hay or corn-stalk should ferment,

and by admitting air will prevent damage from mold. The top of the air-tunnel should be protected by a roof to keep out rain.

HOGS, Time to Kill.—In fattening swine, so far as money profit is concerned, the farmer will realize the greatest net gain by slaughtering his hogs at the age of eight to ten months. With the smaller breeds and thrifty pigs he can get a weight of 250 to 300 pounds; while, as commonly managed, the additional eight months add only about 100 pounds; and experience has shown that it costs but a trifle more to grow and fatten a weaned spring pig to ten months old, than to fatten, a ten months' store hog from July to December; under favorable circumstances it may cost less, and the net profit be in favor of the pigs.

HOT-BEDS, to Make.—They should be in a warm position, fully exposed to the sun, facing the east or south, and sheltered by a fence or hedge on the west or north. The soil should, if possible, be light and dry, as in this case the bed can be sunk a foot or more in the ground; but if damp or cold, it should be built upon the surface.

Manure fresh from the stable is best. This should be thrown over and thoroughly shaken up with a fork, making it into a conical heap. In this state it should be allowed to remain four or five days, at the end of which time it should be turned over, shaking it up as before. At the end of another three or four days, it will be ready to make up the bed. Lay out the ground six inches larger than the frame, and put down a stake at each corner. The frame may be of any size; but the most convenient is nine by three feet, which will make three lights, three by six feet, the ordinary size, which can always be had ready made. Proceed to build up the bed to the height of two and a half or three feet, making it rather firm, and watering if the manure is dry. When the bed is finished, put on the lights, and let it stand and settle and exhaust the violent heat. In a day or two add three or four inches of light, sandy loam, spreading it evenly over the bed. If the seeds are sown in the soil of the bed, two or three inches should be added;

but, if in pots, no addition will be necessary.

The pots being ready, and sown with the various seeds, should be put into the frame shading them during the day, and regulating the temperature by tilting the lights at the back, both night and day, and covering at night with mats. Plunge the pots in the soil, and, with proper care, the seeds will soon be above the soil. A thermometer placed in the bed will be the safest guide to the inexperienced. It should not rise above 85 degrees in the day, nor sink below 60 degrees at night. As the heat declines, linings of fresh manure should be applied around the outside of the bed; but, ordinarily, for seed this is not necessary.

The length or number of the frames is immaterial; but they should be nine to twelve inches deep at the front, and fifteen to eighteen inches at the back. This will give a good slope to carry off the rain. Cold frames are simply the hot-bed frame set upon a warm spot of ground, covering it at night to keep in the warmth accumulated during the day.

IRRIGATION.—By judicious flooding the yield of grass land may be doubled; but by flooding at improper seasons the grass may be destroyed. Water should not be permitted to lie on grass more than two days at a time, nor more than two inches in depth, and not at all during the winter. If the land is to be seeded the coming spring, the water may be turned on at sundown as soon as the grass has become well started, and during the dry spells weekly, or bi-weekly if rains occur. It should never be turned on while the soil is heated during the day-time. When the grass has well covered the ground and it is nearly ready for cutting, no water should be given for two weeks before the hay is made. When that is done, watering should be repeated as before until another cutting is ready. No water should be given for a month previous to the winter, as it is very injurious during the frosts. The aftermath should be permitted to die down on the meadow on the approach of winter, as a protection to the roots from frost. Under such treatment four tons of hay has been gathered from one acre. Such a meadow would be improved also by underdraining with the irrigation.

HEDGES AND HEDGE PLANTS.—

Live fences, as they are very properly termed, have long been held in high estimation for inclosures when plants suitable for the purpose could be secured. The maintenance of efficient fencing is a heavy tax upon all who occupy land, and the cost is greatly increased when the materials are difficult to procure, and require frequent repairs. If the chronological history of fences should ever be written it might be divided into three epochs: the temporary, the equivocal and the permanent; or the period of the wooden fence, the live fence, (possibly including the wire fence,) and the fence of stone. To obtain a good hedge requires a suitable plant, care in its formation, and proper keeping afterwards. Neglect of any one of these essentials will prove fatal to the object in view, whether as a protection against depredators or as a shelter for ameliorating local climates.

For farm hedges there are only two plants which can be considered as being perfectly satisfactory. These are the Osage orange and the honey locust. The Osage orange is perhaps to be preferred in localities where it is sufficiently hardy. It is cheaply produced, of rapid growth, thickens its branches freely when pruned, has formidable thorns, is not liable to insect injuries, not eaten by cattle, and will grow in any soil of ordinary fertility. The honey locust is a good plant in more northern localities, where the Osage orange is destroyed by cold. It is also well supplied with thorns, is of rapid growth, and will make a fence as soon as the other. It has very beautiful and delicate foliage, and is more robust, but less dense, than the Osage—which is rather an advantage than otherwise for a strong fence. Some of the best hedges in the country are of this plant.

Seeds or plants of either of the preceding are easily obtained; but, where time is a matter of consideration, it will be advisable to procure plants, which are now produced in large quantities by nurserymen, and sold at prices much less than the cost of growing them on a small scale. It is scarcely possible to form a good hedge by sowing the seed on the position which the hedge is to occupy. The casualties of growth will certainly produce many weak plants that will be eventually de-

stroyed by their stronger neighbors, leaving unsightly blanks, and greatly diminishing the uniform efficiency of the hedge. When the plants are properly assorted as to size before setting, an equality of growth is at once established.

In preparing the soil for a hedge-row a breadth of three to four feet will be amply sufficient. If plowed, the ridges should be thrown toward the centre, forming a slightly mounded finish. In stiff soils this can be done to a greater advantage in autumn by throwing the furrows on each side from the centre of the hedge line, so that the frosts of winter may penetrate and loosen the subsoil; and then throwing them together in spring, to be ready for planting.

The best distance to set plants is from ten to fourteen inches apart, and in a single row. On poor soils, or for a mere ornamental dividing hedge, the closer distance may be adopted; and for a strong fence, or on rich soils, the wider will not be too great. They may be set either in fall or spring, according to the location. If the position is elevated, and the soil naturally dry, fall planting is to be preferred; in low positions, or in wet soil, spring planting is safer, as the plants are liable, in such soils, to be thrown out of the ground during winter. Even in wet soils, however, the practice of planting in the fall has of late been adopted, and with perfect success, by placing the plants in a slanting position, instead of an upright one, and covering them slightly with litter. No hedge will be perfectly satisfactory in soils saturated with water during winter.

The perfection of a hedge, even with the best plants, depends altogether upon the treatment it receives in its early growth. Neglect in pruning, during this period, can seldom be remedied in after years; and to this, more than to any other cause, failures in forming good hedges may be attributed. A brief statement of the principles involved in forming them will, therefore, be given.

The only form in which a hedge can be kept, to be of service as a fence, is that of a pyramid. When it has attained a height of five feet it should be at least three feet wide at the base or surface of the ground. All pruning must be directed with a view to securing this form.

When the plants are first set out they should be pruned back to within three inches of the ground, and allowed to grow undisturbed during the first season, their growth in the meantime being encouraged by judicious cultivation. At the termination of the yearly growth the plants should again be pruned down to within four inches of the first pruning, and the side shoots below this point also be removed to within an inch of the main stem. This severe pruning of the branches will give to the roots a vigorous growth; and, when the buds burst in spring, strong shoots will immediately follow. During this second year's growth the hedge may be partially shaped by repressing the growth of the strongest perpendicular shoots, and encouraging those of horizontal tendency. Practically this is accomplished by going over the plants about the end of June, and cutting all upright shoots back to a point about eight inches above the previous winter pruning, taking care not to disturb a shoot or leaf on the side branches below that point. In thus cutting back the upright shoots, the side growth will be increased, and a breadth of base secured, which, at this stage of growth, is the most important point of all. In the following winter the hedge, if it has progressed at all favorably, may be pruned down to fourteen inches in height from the ground surface, with the horizontal branches extending from nine to twelve inches on each side. The principles of pruning are that growth is repressed by summer trimming, and encouraged by pruning after the leaves have fallen. By keeping these facts in mind, and practicing accordingly, the shaping of a hedge is only a work of time. The lower branches can always be retained as healthy, and produce as much density of foliage as the upright portion of the plants, if the pyramidal form is strictly maintained; but if, at any time, the upright growth predominates, the lower limbs will proportionately lose vigor. The upright shoots should, therefore, be pruned during summer, in order to weaken the growth at that point, and to strengthen and keep the base of the hedge vigorous and close. The principal pruning of the lower branches should be performed during winter.

This is the only way in which a hedge

can be made that will be effective as a fence; and the neglect of the principles here suggested is generally the origin of the conflicting opinions with regard to the value and efficiency of hedges as farm fences. They may receive some attention for a year or two, but when it becomes thoroughly understood that they cannot be preserved unless trimmed during summer, when attention is wholly given to ordinary crops, farmers are not always disposed to give hedges the attention necessary to keep them in good condition; and therefore they fail to be of service. It should, however, be remembered that, as the hedge becomes perfect, the yearly labor to keep it in order gradually becomes less; and at no time does it require so much labor as that required to keep a common wooden fence in good repair.

For purposes of protection and shelter to gardens, or as dividing lines in the grounds of country and suburban residences, hedges are of the greatest utility. For these purposes there is an extensive choice of plants, both evergreen and deciduous. A well-grown evergreen hedge is found to be as congenial a protection for the garden as a brick wall. The commercial value of shelter, in accelerating early crops, is not so generally known as it deserves to be; yet it is fully appreciated and adopted by many of the most successful cultivators; and, as a means of arresting drying winds and lessening evaporation in level tracts destitute of trees, no just estimate can be made of the intrinsic value of close-foliaged hedges.

Among evergreen plants the Norway spruce is the most valuable where a high, strong, wind-break is necessary; and, for the purposes of sheltering orchards and vineyards, it is unsurpassed. It will, in time, form a very close and compact hedge when trimmed; but to produce an effective shelter in the shortest period, the plants should be set four to six feet apart in the row or line, and allowed to grow undisturbed, so far as pruning is concerned, until the leading or top shoot reaches the required height. Then by merely trimming the top, so as to keep it at this height, the side branches will spread and interlace, forming a screen quite as effective and more beautiful than a closely-clipped hedge.

For general purposes, perhaps the most useful plant, all things considered, for an evergreen hedge, is the American arbor vitæ. Its habit of changing to a dingy brown color during winter is a fault easily overlooked, and more than compensated by its numerous good qualities. It is a plant of free growth, readily transplanted, of comparatively small cost, and grows well in any good soil, but preferably in a clayey loam. Plants of one foot in height, set twelve to fourteen inches apart, will reach five feet in as many years. The variety *Siberica* is more compact in growth, and forms a perfect and shapely hedge, without any trimming whatever.

The most beautiful and graceful hedges are formed by the hemlock spruce. Although sometimes of slow growth after removal, yet it develops rapidly when once fairly established. Nothing can exceed the beauty of its pendant branches of delicate foliage; and no other plant will admit of shearing into so dense a wall of green as this. For a dividing line in the pleasure ground or flower garden it is most admirably suited.

There is a great variety of deciduous plants well adapted for inside hedges, such as may be planted for protection of crops, or as ornamental dividing lines in gardens, but which will not be suitable as fences for stock; of these a few of the best may be mentioned:

The Buckthorn, although of slender growth, forms a tolerably good hedge. It has a glossy and lively green foliage, which it retains quite into winter, thus affording protection for a lengthened period.

A very beautiful hedge can be produced from the common English maple. This small tree is naturally compact in its habit of growth, and requires very little pruning to keep it in form. For a shelter belt, when a smoothly trimmed hedge may not be desired, this will be found suitable. It has small foliage, and the whole plant is eminently neat, hardy, and free from insects.

The European hornbeam is a good hedge plant. It has a very dense foliage, and the small ovate leaves are closely set on the branches. It is rather slow in growth, but, in consequence of not requiring to be shortened by pruning, as is the case with luxuriant growing plants,

the growth is economical, and a hedge soon formed. In ancient gardening, when topiary work was fashionable and plants were trained and pruned into forms of birds, vases, etc., the hornbeam was largely used and held in high esteem.

A pleasing variety of color may be introduced by forming a hedge of the purple-leaved berberry. This plant persistently retains its color throughout the summer, and with care can be kept in good shape as a hedge.

For rapid growth, easy propagation, and ample foliage of shining deep green color, there is no plant superior to the Japan privet. This must not be confounded with the common privet, a small-leaved and much inferior plant. Cuttings of the Japan privet may be inserted at once where the hedge is to be formed. They will root quite as speedily as the easiest rooting willow twig. A splendid shelter or screen, eight feet in height and four feet in width, has been grown in five years from the time of inserting the cuttings. It is almost an evergreen, retaining its foliage even after severe frost. Twenty degrees of frost, in December, has no effect on the foliage, and for at least nine months of the year it is clothed with the richest verdure.

For sheltering orchards, vineyards, or fields, a free-growing plant, of compact habit, should be selected. Such are the Osage orange, white birch, English bird-cherry, honey locust, English maple, European larch, English alder, many of the willows, and the Lombardy poplar. Any of these will, in a few years, afford an efficient shelter. They may be planted from four to six feet apart, and allowed to take their natural habit of growth until they reach a height of ten or fifteen feet. If the tops are then removed or checked, so as to repress upward elongation, they will spread and interlace their lower branches, forming a thick shelter, without the trim, formal appearance of a regularly cut hedge.

It may be safely asserted that no lengthened period of uniform success in fruit culture can be realized in exposed situations, unless a systematic plan of sheltering by belts or hedge rows is introduced; and the time is fast approaching when no person will think of planting fruit trees, or raising fine fruits of any

kind, without first preparing for them a thoroughly protected situation.

HEDGE, Seed for Planting.—Gather them in the fall when fully ripe and commence to fall of their own accord, shell and store them in a cool, airy place, to insure them not to mold. In the spring in good weather, and at the time of planting corn, put them in a bowl or crock, and pour boiling water on them until the seed are covered, and let them stand in a cool place eight or ten hours; then pour off this water and put on boiling water as before. After standing from four to six hours drain off the water again, and they are ready immediately to plant in the ground, which must have been well prepared by plowing up into a ridge where the fence is designed to be. Then mark off a straight shallow furrow, and drop two or three seeds in a place, 18 or 20 inches apart; cover one or two inches deep, owing to the weather. They will be up in four or five days; cultivate as corn, and if necessary use the hoe to clear them of weeds. If all have come up well they can be dug up in the fall and saved, except one in a place, and those that have been kept through the winter can be planted in the spring the same as the Osage orange, only earlier in the season. If any have missed growing, be sure and fill the space with a strong, vigorous plant; cultivate the second year the same as the first. By having the plants the distance designated enables them to throw out a considerable number of side branches, which are essential and should not be cut off. At two or three years old they may or may not be cut and plashed down as Osage orange; if not cut down, they should be top trimmed, so as to keep the side branches alive and thrifty, which insures a growth of thorns on the side branches, and renders it stock-proof.

HOG CHOLERA.—We find the following in the Southern *Cultivator*:

"Last year I lost nearly all my hogs with hog cholera. My neighbor lost none scarcely, which led me to believe that he must possess a sovereign remedy for this evil. I asked why he lost no hogs. His reply was, that he 'kept them clear of worms, and stimulated with black pepper. I first fed them on corn soaked in lye and copperas, to clear them of worms; after-

wards, gave them plenty of black pepper. Those that were sick got well, and those that were well remained so, of course.'

"This year I have given my hogs an occasional dose, twice a week, of kerosene oil, said to be a preventive of cholera. Several of my neighbors lost nearly all their hogs, and six weeks ago mine showed signs of disease, and I concluded to try the lye and pepper. I prepared it as follows: First, shell an ear of corn and soak in strong lye all night; next morning add a half teaspoonful of pulverized copperas. Mix, and feed in a trough. This was repeated on the following morning, and a half teaspoonful of black pepper was added. After this I put a teaspoonful of pulverized pepper in the food, boiled grits, every other morning for a week.

"*Result.*—My hogs stopped dying; all that ate got well, and are as thrifty now as I could wish. The above is the dose for a single hog. It is simple and reliable; as a preventive it cannot be beat, and I have seen hogs sick—very sick, too—restored to good health by the use of this remedy."

HORSE RADISH, Culture of.—The soil must be deep, so as to allow the roots to penetrate a foot or more if possible.

The sets which are planted consist of the small roots taken from the large ones, and are from four to six inches in length. In order to distinguish the bottom from the top end of the sets, a slanting cut is made across the lower end, while the top is cut off square. When planted upside down they will grow, but the roots are apt to be irregular and branching. These sets are planted in May, in rows two feet apart and eighteen inches between the plants. During the summer it is only necessary to keep the weeds down and the soil loose. Horse radish is not injured by frost, and may remain in the ground until quite late. Just before the ground closes up the roots are dug, and after trimming off the small rootlets for sets for planting the next season, the large roots are either stored in pits in the open ground, or preserved in sand in a cool, dry cellar. The small rootlets are preserved in sand, taking care not to make the layers of roots so large that they will heat.

MANURE PILE, Management of.

Every manure heap consists of three portions, and all of these require very different means for their preservation. We have first the carbonaceous matter. This forms the chief bulk of every manure heap, and from the fact that it came originally from the atmosphere, and that it can be replaced from the same source, theorists who have not carefully watched the results attained in the practice are apt to depreciate its value. It is not as valuable as the other two constituents, but it serves to bring the land into fine, friable, mellow condition, and it is by no means certain that the carbonic acid, furnished by its decomposition, is not a source of plant-food. Under any circumstances, however, it is well to be economical of it, and allow none to go to waste.

The second portion is the inorganic plant-food of animals. It consists of phosphoric acid, lime, potash, soda, magnesia, soluble silica, etc., and the great source of loss of these constituents is from their being washed out. They cannot evaporate, but if the rain and liquid manure are allowed to fall on a manure heap, and drain through it and out of it, the manure pile becomes a mere *caput mortuum*—a worthless residuum of originally valuable materials. Hence every barnyard where manure is kept exposed to the weather, should be hollowed out in the centre and well puddled, so as to prevent the soluble matters from draining or soaking away. Moreover, if the farm is located in a region where a great deal of rain falls, it is necessary to place a large portion of the barnyard under the cover of sheds, which prevent excessive wetting. Some moisture is absolutely necessary. Too much is decidedly injurious.

The third constituent of the manure heap is nitrogen. This is a substance of great and undoubted value, and every care should be taken to preserve and increase it. When vegetable substances containing nitrogen undergo putrefaction, in a moist state, the nitrogen in general becomes converted into ammonia. The same process of putrefaction, however, produces carbonic acid in large quantities, and this combines with the ammonia to form carbonate of ammonia. This salt is comparatively volatile, and if

the manure is allowed to dry up, while exposed, in thin layers, the ammonia disappears. Several agents may be set to work to fix and retain it.

Water is one of these—carbonate of ammonia dissolves very readily in water, and does not then evaporate to the same extent that it would do from a dry mass.

The great agent in the fixing of ammonia on the manure heap is the humic and similar acids, produced during the decomposition of the straw. These acids do it very effectually, and hence the importance of mixing animal excrement with a large proportion of moist straw.

One of the most powerful fixers of ammonia is plaster or sulphate of lime. When this meets carbonate of ammonia in solution decomposition ensues. Carbonate of lime and sulphate of ammonia are formed, and as sulphate of ammonia is not volatile at ordinary temperatures, there is no danger of loss except by its being washed out.

Hence a few simple rules will enable us to manage a manure heap so as to avoid any very great loss:

1. Prevent all loss by drainage and soaking.
2. See that the animal excrements are covered with moist straw.
3. See that, while too much water is avoided, there is a sufficiency to keep the manure moist.
4. Moisture and packing prevent fire fanging—that is, too rapid fermentation.
5. If you find it convenient to use a few bushels of plaster, sprinkle them over the heap so that the plaster will be incorporated with the successive layers. It will thus prove of great service.

MANURE, to Shelter.—We lose a great deal from the washing of manure, when out of doors, as well as by evaporation. My experience has led me to the conclusion that we want a tight bottom to our manure receptacle as much as we want a tight roof overhead. When I raised my old barn to put a cellar under it I saw that the earth underneath looked damp and very rich, and I dug out and put away as manure all that had the slightest tinge showing that it had been colored by the manure that had soaked through the floor. I have no doubt I had lost for years quite a quantity of valuable manure in that way. But when I

got down to the clear sand, as white as the sand on the sea shore, we came to the conclusion that that was not good for anything, and we used it to grade up around my house, intending to spread some soil over it in order to make the grass grow. Very much to my surprise, this sand that we had taken from two and a half to three feet below the surface, that was entirely barren, as we supposed, threw up a rank growth of barn grass that lasted one year. We thought if it would bear barn grass we would wait and see what else it would bear. That barn grass went out the next year, and up came a growth of witch grass; and from that day to this, fifteen years or more, that ground has grown witch grass every year, without a particle of manure. What does this show? It shows that these fertilizers, particularly liquid manure, go down further than we have any idea of, and that we are losing more every year than we are aware of, by not having it in the bottom of our barn-cellars.

MANURE, Garden Refuse as.—Green stuff, such as cabbage leaves, radish and beet tops, and the like, should not be allowed to dry. Let them go while fresh to the pig-pen or to the compost heap. Young weeds—and old ones ought not to be found in the garden—should have the same destination. By saving all the refuse of the garden in a heap by itself, or putting it in the pig-pen, a surprising accumulation of valuable compost will be found at the end of the season.

MANURE, Hen.—A mixture of dung, unleached wood-ashes and plaster, frequently has a wonderful effect on corn. If the ashes and the hen-manure are perfectly dry, no decomposition or chemical change will take place when they are mixed together. But if moist, more or less ammonia will escape, and the plaster will not hold it. The only advantage of mixing these articles together, aside from the ease of applying them, is probably this: When the dry hen-manure is thoroughly broken up fine, and mixed with the ashes and plaster, and applied in the hill, the moist soil soon induces chemical action. This produces more or less heat immediately under the seed and favors germination; carbonate of ammonia would also be given off, and would be

absorbed by the soil immediately in contact with the roots of the young corn plants, and would, if everything is favorable, cause them to grow rapidly and assume a dark-green color. But care must be used in applying the mixture, or it may do more harm than good by burning the roots. It should be well mixed with the soil, and not come in direct contact with the seed. Some persons apply it on the hill after the plants are up, just as they frequently apply the plaster or ashes alone.

MANURE, Leaves as.—Forest leaves are excellent to supply the stable-yards, and, where straw is scarce, also the cow-stables and hog-pens. They can be most conveniently gathered after the first snow, or at least before the wintry blasts have scattered them. They then lay compactly, and, being moist, can be handled with greater facility. Leaves absorb large quantities of liquid manure, and are an excellent fertilizer in spring. They can be gathered, too, when other labor about the farm is slack.

INSECTS, to Destroy.—In some seasons the vegetables in our gardens are almost annihilated by worms of several species. Fall plowing, or spading the ground just before frost sets in, and strewing the ground with fine salt in the spring some time before the seeds are sown, are said to be sovereign remedies against these petty but powerful depredators.

Some vegetables are offensive to all insects, such as the elder, especially the dwarf kind, the onion, tansy, and tobacco, except the worm that preys on the plant. The juice of these may therefore be applied, with effect, in repelling insects; and sometimes the plants themselves when green, or when reduced to powder, particularly the latter, when made into snuff.

Set an onion in the centre of a hill of cucumbers, squashes, melons, etc., and it will effectually banish the bugs.

To destroy on trees, plants, shrubs, etc., tie up some flour of sulphur in a piece of gauze, and dust the plants with it.

LETTUCE, SNAILS, to Protect from.—If the beds are surrounded by a slate or board edging, made to stand five inches above the ground, and occasionally coated with a paste made of train-oil and soot,

it will form a barrier over which snails will not pass.

Lettuce in Winter.—It is said that heads of lettuce can be produced in winter in from 24 to 48 hours, by taking a box filled with rich earth, in which one-third part of slaked lime has been mixed, and watering the earth with lukewarm water; then taking seed which had been previously softened by soaking in strong brandy for 24 hours, and sowing in the usual way. We are assured, but will not vouch for the fact, that a good-sized head of lettuce may be obtained in the time mentioned.

MAPLE TREES, To Tap.—Much injury is often ignorantly and thoughtlessly inflicted on sugar maple trees by excessive tapping, and various negligent practices in connection with the operation. As a guard against such malpractice the following rules will be useful: 1. Use nothing larger than a three-fourth inch auger or bitt. One-half to five-eighths of an inch is best. 2. Do not open the trees until they will run equally well on all sides. 3. Select the thriftiest part of the tree that is farthest from an old orifice. 4. Never put more than one spout to a tree that is less than one foot in diameter, nor more than one bucket to one less than eighteen inches in diameter. 5. Never bore trees more than once in a season, but freshen them once, or any time after a long and hard freeze. 6. Never leave spouts in the trees a single day after they have done running. The quicker the orifices dry, the less they decay.

The following facts should also be remembered: The root of a tree will sometimes run more than the body. A healthy tree runs in proportion to the size of its top, and should be opened with respect to its capacity for production. Trees in open grounds, with spreading tops, discharge more and much sweeter water than those in a forest.

MAPLE SUGAR, Making.—First, the sweetness and cleanliness of the tubs, and everything connected with the sugar orchard, and without this requisite no one can make the best quality of sugar. And we think that tin tubs are much better than wooden ones, for tin tubs are easier kept clean and sweet. The sap will penetrate the wood of the wooden

tub, and sours and dries during the last part of sugaring; and another advantage tin has over wood is, you can gather the sap earlier in the morning from the tin tubs than you can from the wooden ones. Most of the wooden tubs are manufactured of timber embracing the sap as well as the heart timber. This sap-wood sours much quicker than the heart-wood, so that heart tubs are preferable to those containing the sap-wood. We notice that some use wooden tubs painted inside and out, and think them preferable to tin, as they do not warm the sap as much in a sunny day as the tin does, and will therefore keep the sap longer sweet; but the fact is that sap should not stand in any tub longer than one can help, and as the sap can be gathered from a tin tub whenever it is warm enough for it to run, and as it will keep longer in bulk if gathered when it is cold than it will in the sap tubs, it gives the tin tubs an advantage in this direction.

Sap should be gathered and boiled as soon as possible after it has left the tree. This is one of the main points on which good or poor sugar depends, for the longer sap stands after it has left the trees, before it is boiled, the more color there will be in the sugar. Sap should be strained before it is boiled, to take out all foreign substances, and in boiling it one should make it a point to syrup-off quite often, as the continued boiling of the same sweet for a long time will color it, and the boiling apparatus should be constructed with special reference to this idea, and the syrup should be sugared off as soon as it has stood sufficient time to settle, and it should stand in tin cans, and be kept in a cool, dark place, if possible. Sap commences to change as soon as it leaves the tree, and should therefore be worked up as soon as possible; and our motto should be, in making sugar, first, cleanliness, secondly, expeditiousness, and thirdly, to get all foreign substances out of it, and to put none in, either in boiling the sap or in sugaring off.

MILDEW, Sulphur for.—The efficacy of sulphur in destroying and preventing mildew is now well known, and it is the chief reliance of the vine-grower, whether he cultivates under his glass or in the open air. Where sulphuring is systematic

cally followed, it is applied at least three times—just before the blossoming of the vines, after the fruit has set, and when it begins to color; and, beside these stated periods, it is applied whenever the appearance of mildew indicates that it is necessary. The mode of application, by La Vergne's bellows is the popular way of applying the sulphur. The bellows may now be obtained at most implement stores. The character of the sulphur is of importance, as much of that found in commerce is liable to contain acid, and be injurious to the foliage. Sulphur contaminated by acid may be detected by the taste, but a more delicate test is litmus paper. This is paper stained with a blue dye, which turns red when it is touched by acids; it is kept by the druggists. The sulphur to be tested is mixed with a little water and the paper wetted with the liquid. If the least trace of the acid be present, it will be indicated by the change in color of the paper. Sometimes sulphur is not sublimed as above described, but the crude lumps are ground to powder in a mill. Sulphur thus prepared is free from acid.

MILK-ROOM, Charcoal in.—The fact that milk will absorb noxious gases to such an extent as to greatly impair its excellence as well as its healthfulness, is known to every dairyman. The power of absorption is not confined to the milk itself, but it extends to all the products that naturally form, or are artificially prepared from it, where they are cream, or butter and cheese. The ill flavor, as well as the disagreeable odor, of much of our butter and cheese, are not imparted to them from substances that existed in the milk when it was drawn from the cow, but which were taken up while the milk was setting in pans or tanks, during the manufacture into butter and cheese, or while these products of the dairy are awaiting sale. How shall the air that enters our milk-room be purified? The answer is easily made—use charcoal. This common and inexpensive substance, when freshly prepared, is capable of taking up and securely holding ninety times its volume of ammonia, and a proportionate amount of other cases. Not only does it tightly hold the portions of noxious matter that pass through its meshes, but it also seems to have the

property of attracting them from the surrounding air.

MILK, To Deodorize.—It frequently occurs in the spring, when the farmers are feeding the cows upon ruta-bagas, or turnips, that the milk becomes so strongly impregnated by their disagreeable taste and odor as to be unfit for butter-making. To obviate this, put a pinch of finely pulverized saltpetre into every gallon of cream. A little saltpetre worked into butter that has become sour, or rancid, will render it sweet and palatable.

MILDEW ON ROSES, Remedy for.—Mix equal parts, by weight, of powdered sulphur and quicklime. Moisten with water, and let the lime slake in contact with the sulphur. After the lime is slaked, place the whole in a kettle with plenty of water, and boil it until you get a saturated solution of the sulphuret of lime. This will be transparent and of an amber color, and should be drawn off and preserved in bottles for use. A gill of this added to a gallon of water, and applied with a syringe, will kill the mildew without injuring the roses.

MOTHS, (Codling), To Trap.—Take old cider, or cider vinegar, not very sharp; put half a pint in some open vessel, and hang it in all parts of the orchard when in bloom—empty fruit jars, or tin oyster cans with the top all off would do. The string holding the vessel should be so placed that it would not turn the water running down the limb into the vinegar or cider. If you have a large crop to harvest, you will want to look to them every week or two to empty and renew if necessary.

OATS.—Oats are chiefly sown after grass; sometimes upon land not rich enough for wheat, that has been previously summer-fallowed, or has carried turnips; often after barley, and very rarely after wheat, unless cross-cropping, from particular circumstances, becomes a necessary evil. One plowing is generally given to the grass lands, usually in the month of January, so that the benefit of frost may be gained, and the land sufficiently mellowed for receiving the harrow. In some cases a spring furrow is given when oats succeed wheat or barley, especially when grass seeds are to accompany the crop. The best oats, both in quantity and quality, are always those which succeed

grass; indeed, no kind of grain seems better qualified by nature for foraging upon grass land than oats; as a full crop is usually obtained in the first instance, and the land left in good order for the succeeding crops.

ONION, Culture of. — The onion is classed among the hardy vegetables, and, in fact, is one of the hardiest of the hardy.

It would be well to have the land plowed, cross-plowed and harrowed in the fall; and then in the spring, just as soon as it is possible for the ground to be worked, plow, cross-plow and harrow thoroughly once more.

Should your ground not have been plowed in the fall, give it as thorough plowing, cross-plowing and harrowing as you possibly can, early in the spring, breaking it into fine particles so as to leave no clods.

A sandy, alluvial soil is the best; but any rich loam, well manured, will answer. At all times a new soil is much the best, as the onions grow much more rapidly, and are less troubled with weeds.

Sow just as soon as the land can be got into good condition, in drills sixteen inches apart, and from half an inch to an inch in depth.

The Large Red Annual Onion, or Wethersfield Red, as it is generally called, is most likely to produce a good crop. Another variety, known as the Early Red, will mature perhaps a week in advance of the Large Red, but will not produce as large an onion. The yellow and white onions will not produce with us the full-sized onion the first year, but require first to have the seed sown thickly to produce what are known as the "sets." These "sets" are kept over winter, planted out in the spring, and then produce the large onion. The "sets" known as Yellow and White can be procured at any seed-store.

It will take five pounds of seed, if sown by hand, and four pounds, if sown with a good seed-drill, per acre.

When the plants are three to four inches high, thin out to a distance of two inches apart. Keep clear of weeds. In cultivating, be careful not to stir the soil too deep, nor collect it about the growing bulb. A top-dressing of wood-ashes would be found very beneficial after the second weeding, and would soon be observed in

the increased health and color of the plants.

Should there be any stiff-necked or scullions in the patch, roll the whole bed with a moderately light drum-roller. This will cause the necks or outgrowth to settle back in the bulb.

Gather when the tops are wilted and dried. Let them lie a day or two on the ground to dry; then top and remove to a cool place to keep for future use.

A cool, dry season is best to bring them to perfection. Hog manure, applied in the fall, and well plowed in, will be found one of the most beneficial for this crop. The onion, unlike other crops, can be grown in a constant succession, without the least deterioration on the same ground for a number of years.

ONION, Blight and Smut. — The onion-blight and smut is at times very destructive to the onion crop, turning the most promising fields in a few days to scenes of desolation, which is caused, in my opinion, by a parasitic plant, growing upon and consuming the vitality of the onion. The onion-smut so impregnates the land with its spores as to render it unsafe to plant onions for several years on land thus affected. White blight comes upon the crop at the period of its most vigorous growth, in a dry time, showing its effect perhaps in a small spot at first, but, in case the dry atmosphere continues, rapidly spreading over the whole field. Two or three days give sufficient time to stop entirely all future growth of the crop, unless a change in the weather occurs unfavorable to the growth of the parasite.

In many localities rank weeds might be procured in great abundance on fields infested by the fungi (on the field alluded to, weeds three feet in height grew in profusion); were they cut down, sun-dried, spread over the field, and with them, brushwood and all useless materials found about the farm burned, the surface-spores, and all germs of a parasitic life within reach would be consumed, and caustic potash, lime and charcoal would be liberated and diffused over the field for the benefit of the succeeding crops.

PARASITES, to Destroy. — The best and simplest, as well as the safest, wash to destroy fleas, mites, itch-insects, mange acari, and all external parasites of men and animals (and probably the mange in

horses), is a solution of sulphuret of potassium in water, say two to four ounces to a gallon of cold water, varying the strength according to the age and the tenderness of the skin of the animal, as the solution will contain some potash, which, if too strong, would irritate a delicate skin. There is no danger in its application, but it has the disagreeable odor of sulphuretted hydrogen. The sulphuret of potassium comes in the form of greenish or greyish lumps, put up in tight bottles. It is used in photography, and can usually be bought at the principal drug stores.

Carbolic acid, diluted in water, is also recommended as an excellent wash for killing most kinds of parasites.

PARSNIPS, To Raise.—Select a heavy, but clean and rich, loam. Plow it deep, and harrow it thoroughly as early as it can be worked; mark off in rows fifteen inches apart, and drill in the seed or sow by hand. Use plenty of the seed, two or three to the inch, and be sure it is fresh. Go through the rows with a pronged hoe, or other implement, as soon as they can be distinguished. When large enough, thin the plants to stand four or five inches apart, and be sure that they stand singly. Keep the land very clean by frequent hoeing.

PEACH TREES, Management of.—Seedling trees are the longest lived, most prolific and most profitable. Secure a good variety of pits which produce the same kind of fruit—these are rare. Plant pits where you desire your tree to remain, or, if transplanted, they should be of the first year's growth. After your trees have attained to a proper size, cut back, and prevent their bearing; this will cause the roots to spread in the soil, and will add to the longevity of the tree. Trees which send down one large root and small fibrous roots, will soon become covered with moss and die. Use coal ashes and soap suds plentifully, and if you wish to keep the trees from blooming early, spread manure, coal ashes or sawdust deeply upon the roots when the ground is hardest frozen, and do not remove till late in the spring. (This has been sold as a great secret.) The largest roots of a peach tree will be found upon the north and west sides. Branches grow fastest toward the south and the east.

PARSLEY, Culture of.—Sow it in drills half an inch deep, early in April. When the plants are three or four inches high, thin them to six inches apart; to keep a young stalk constantly for use, cut down about a third part at a time. Keep it only from severe frost. For this object, select a warm spot of ground, light and rich; sow it early in the season; cut them all over in September surround the bed, early in November, with boards, and cover with mats or shutters; glass is much better if it can be obtained.

PEACH, Yellows.—The disease termed the yellows is truly formidable. It is peculiar to the peach and nectarine. It has destroyed whole orchards in portions of the country, and for a time induced the entire abandonment of peach culture in certain localities.

The cause of this malady has not been satisfactorily ascertained. According to conjecture, it has arisen originally from exhaustion by deteriorated soil, overbearing and neglected pruning and bad cultivation. But whatever may have been its origin, it appears at present to be chiefly communicated from diseased trees. It is quickly induced by inserting the bud from an affected tree into a healthy stock. It spreads by contact with diseased roots; a knife used in pruning the tree will infuse poison if used on another. It appears to be communicated without actual contact, the healthy branches nearest a diseased tree being usually first attacked. It is also probable that the stones from diseased trees cause its development after a few years' growth. Its highly contagious nature, when in its most virulent form, is indicated by the equal facility with which young and vigorous trees, and old and feeble, may be inoculated by contact.

Its infallible indications are, first, premature ripening of the fruit, some weeks earlier than usual—accompanied with a rather insipid flavor, purple discolorations of the flesh. These usually occur the first season, and on a part of the tree which has first been inoculated with the poison. The following season, numerous small wiry shoots are frequently thrown up from the larger branches, the leaves become yellow, the whole tree assumes a sickly appearance, and eventually perishes. No instance is known where a

decidedly developed case of this disease has ever been cured. When once attacked, to prevent a spread of the disease, the tree should be immediately removed and burned. No young trees should be planted on the same spot, as the diseased roots still remain. Stones for seedlings should be procured from districts of the country where it has not been introduced.

In some parts of the country, possessing a strong fertile soil, as, for instance, Western New York, this disease has not spread extensively when introduced from abroad. It has generally destroyed a few trees near the affected ones, and has then disappeared.

ORANGE BLIGHT.—The branches become covered more or less, with a rust-like substance which ultimately destroys the affected parts. Probably the true remedies for the evils complained of consist in thorough drainage, proper culture of the soil, moderate manuring, and destroying the cocci and fungi by frequent washings with weak alkaline solutions, such as potash, soda, or ammonia. Orange-plants confined within glass structures suffer a great deal from insects and fungi, and the remedy in use in such cases consists in thorough washing with whale-oil soap and water, and the free use of a soft brush. Frequent washings are necessary.

PEACH TREES, To Prevent Mildew on.—In the months of January and February, if the trees are in a stunted or sickly state, take away all the old mould from the roots as carefully as possible, and put in its place fresh rotten turf from an old pasture, without any dung; and the trees will not only recover their health, but will produce a crop of fine swelled fruit.

PEACH TREES, To Save.—Peach trees, after producing a few crops, often not only cease bearing, but perish in a short time; whereas, the natural life is fifty or sixty years, or more. The cause of this defective power of growth is believed to be owing to a deficiency of potash in the soil, and that if this alkali be supplied to the tree so that it shall reach the small roots and be absorbed, the fruit-bearing power is restored, and the tree itself, prematurely perishing, is revived.

Dr. Wood recommends digging around

the base of the stem a hole four or five inches deep, scraping away all the worms that could be found burrowing at the junction of the stem and root, and filling the hole thus made with wood ashes from the fire, which, of course, retain all their potash. This was done in the autumn of 1868, and with a result the following spring at which he himself was astonished. The trees appeared to have been restored to all their early vigor and freshness; they put forth bright green leaves, blossoming copiously, and bore a crop of fruit such as they had never borne before, many of the branches breaking down under the load of peaches.

PEAR, Diseases of.—Mr. Meehan, in an essay on the diseases of the pear, says debility is the cause of much of the trouble; and this want of vigor is produced by excessive summer and root pruning, which so weakens the wood-producing principle as to induce inflorescence, according to the well-known law that nature always makes an effort to reproduce the plant, in proportion to the danger of death. When pear trees produce flowers and no fruit, and the blossoms have had no external injury, it may be safely assumed that the soil is deficient in nutritive elements, that too much summer pruning has been done, or too many surface roots destroyed by a persistent stirring of the soil. Pears cannot be grown to great perfection except in rich and generous soils. Root crops cannot be raised between the trees without breaking up the ground, which destroys their surface roots, the most valuable of all roots. The best method is to sow down with grass, and manure the surface two or three times a year, the grass roots will never run deep, nor exhaust the soil. Twice as many trees can thus be grown on ground where root crops are not grown; and, if too thick, after twenty years' growth, they can be thinned out. Any one will notice the comparative freedom from debility of trees grown for years in grass over those grown in constantly-stirred soils. Old pear trees in Mr. Meehan's garden, eight to nine feet in circumference, always bear when they have any flowers at all, always have healthy foliage, always set most of their blossoms, and drop only fruit punctured by insects, enough being always left to produce plentifully; while any-

where in soils with regularly-stirred surfaces will be seen innumerable flowers with little fruit, and with those which do set great numbers are found afterwards upon the ground, having fallen off from no other cause than sheer inability in the weakened vital principle to maintain them. Leaf-blight and innumerable diseases follow exceedingly weakened vitality; and though fire-blight, cracking, and other diseases are the means of destruction to many thousands of bushels of pears annually, debility destroys its tens of thousands.

At the discussion of the Lake Shore Horticultural Association, Mr. E. P. Powell, of Adrian, Michigan, a successful cultivator of pears, recommended mulching pear trees, as a preventive of blight, and as advantageous in other respects. He sometimes uses long manure, though preferring only grass. His soil is a clay underdrained. A few years after planting his orchard he ceases plowing the land, and simply cuts the grass and spreads it about the trees. No strength is taken from the land except what is gathered in the fruit, and this is replaced four-fold in mulching. No stimulus is given to hasten the growth of the trees, and the wood is consequently strong, compact, and ripe each year.

Mr. H. Pennoyer, another successful cultivator, sets his trees without manure or anything to enrich the soil; lets the grass grow around the trees; uses the knife freely, so as to bring the tree into proper shape and proportion. Pear trees, he holds, must not be stimulated; high manuring forces an unnatural growth, winter kills the soft wood, and blight finally finishes the tree.

PEAR, Slugs in.—The pear slug, a brownish-green, slimy slug, feeding upon the leaves of the pear tree, deposits its eggs singly in June, in incisions made by the piercer of the female under the skin of the leaf. The larvæ, hatching, eat the substance of the leaf, leaving the veins and under-skin untouched. The pupa is formed in oblong oval cavities under ground. The insect appears in about fifteen days after the slug has gone into the ground, in June and August, and lays its eggs for the second crop, which go into the ground in September and October, and remain until the following spring,

when the perfect flies come out to lay their eggs on the foliage. Mr. Saunders, of Canada, states that this insect is readily destroyed by dusting the tree with air-slacked lime. Coal oil will injure the trees, and road dust is of little value when dusted over the trees.

PEPPER, Culture of.—The plants are always propagated from seed. Sow in a hot bed, early in April, in shallow drills six inches apart, and transplant to the open ground, when summer weather has commenced. The plants should be set in warm mellow soil, in rows sixteen inches apart, and about the same distance apart in the rows. When all danger from frost is past, and the soil is warm and settled, sow the seeds in the open ground, in drills three-fourths of an inch deep, and fourteen inches apart; and, while growing, thin out the plants to ten inches apart in the rows.

PLANTS, To Banish Red Spider from.—Cut off the infected leaf. The leaf once attacked soon decays and falls off, but in the meantime the animals remove to another, and the leaf from the moment of attack, seems to cease to perform its office; but persevere in the amputation, and the plants become healthy.

PEAR ORCHARDS, Sites, and Shelter of.—Low situations should be avoided on account of the greater extremes of temperature prevalent in valleys than in places of moderate elevation, and the consequent probability of injury from late spring and early winter frosts. A sloping hill-side, contiguous to a well-defined valley, forms the choicest orchard site, not only for pears, but for other fruits as well. To insure the greatest advantage from position, the trees should not be planted lower than within fifty feet of upright elevation from the lowest point in the valley. The cold air will then settle during the night, in a stratum below the trees, and the warm air accumulated in the lower ground during the day will be pressed up to the higher altitude occupied by the orchard, and thus afford considerable protection in cold nights.

The obvious necessity of shelter to pear orchards has led, in some instances, to the mistake of selecting low grounds for their apparently well protected position, which, for the reasons given above, are the worst possible localities. Contrasted with val-

ley planting, even what might be termed bleak exposures have the preference, and the unsatisfactory results attending orchards in low protected grounds has led to a supposition that shelter is injurious rather than beneficial.

The addition of shelter to an otherwise judiciously selected site is altogether different from endeavoring to secure it by choosing a low situation. The efficacy of protection is now generally well understood, especially by those who attempt pear culture in regions that are comparatively treeless. Even the White Doyenne, the famed Virgalieu, or butter pear, worthless in exposed situations, is produced in all its pristine excellence where the tree is protected, as may be seen in many old gardens in cities, where this variety is very common.

The shelter required is not so much to repel or alleviate mere thermometric cold, as it is to arrest evaporation and its accompanying exhaustion of vitality, by checking the rapid and penetrating action of dry winds.

Evergreen trees afford the most perfect shelter in the least space. A single row of Norway firs, Austrian pines, or other equally hardy evergreen trees will give shelter for a considerable distance; thickly planted belts of deciduous trees will also render effective service. How far apart these belts and hedges should be placed, and in what direction they will be most useful, will depend upon the surroundings and local specialties. As the best mode of draining a field will depend upon its surface undulations, so the best mode of sheltering will be guided by the general aspect and position of the orchard.

PEAR ORCHARDS, Soil for.—The pear will exist in a variety of soils, but attains great perfection in clayey loam. Even on stiff clays the tree will grow and produce very satisfactorily under the ameliorating influences of the preparation and culture which such soils require. Draining first and subsoiling afterwards are the chief requisites for gradual amelioration; in short, while a water-soaked clay soil is the most utterly worthless of all lands for the growth of any crop, a properly drained and aerated clay soil is by far the most valuable, and only requires careful management to render it available for the best productions of the orchard, farm, or gar-

den. The prominent precaution in managing a clay soil is never to work on it while wet, but only when it is dry to friability. No expedient or process of culture will compensate for the injury sustained by working clay soils during summer, when they are saturated with water; the injury cannot be remedied except by a winter's freezing, which will again produce friability, under proper treatment.

Soils of a sandy or gravelly character are not well adapted to the pear. In these soils, so valuable in their degree of moisture, the trees ripen prematurely and drop their foliage early, if the weather proves dry towards the end of summer; then, in the event of moist weather following a period of drought, a late secondary growth will be produced, which, failing to mature, induces a tendency to blight, and predisposes to other diseases. Surface dressings of compost, repeated cultivation, or constant mulching, will counteract, to some extent, the effects of uncongenial soil for the pear roots, but where it is impracticable to select any but a thin gravel or sand for the growth of this fruit, the dwarf tree is preferable, as the roots of the quince can be confined to a small area, which may be prepared and maintained to meet all the requirements of growth.

PEAR TREES, Planting.—Where the soil has been prepared by deep tillage it will not be necessary to dig holes deeper than required to merely cover the roots of the plant. In heavy soils that have not been prepared in the most thorough manner the holes should be made wide rather than deep. In gravelly subsoils pits may be dug eighteen inches in depth, the surface soil and the subsoil being thrown out at opposite sides, and filled in equally until the proper height is reached for setting the plant. In either case about a bushel of compost, made up of leaf mold, rotted manure, and light soil, if carefully spread around the roots, will form an admirable rooting medium; this should be finely pulverized and rather dry than wet when used.

Deep planting and shallow planting are the injurious extremes in setting trees. The plain and incontrovertible rule is to set the plant so that the point from whence the stem and roots proceed in opposite directions will be about one inch

below the level of the surface of the ground. It is infinitely better to plant so that some future surface dressing may be required to cover the swelling exposed roots, than to have them buried below the ready influence of atmospheric heat and air.

PEAR TREE, Mulching.—The preservation of a proper degree of moisture in the soil surrounding the roots of the tree is the principal object of culture during the first summer after planting. Both the kind and amount of care will depend upon the nature of the soil and the condition of the weather; something will also depend upon the first preparation of the ground. Where the soil has been drained, deepened, and pulverized, and the surface is loose and mellow, nothing further will be required than merely to prevent a growth of weeds. If the surface is tenacious, frequent stirring, especially after rains, will probably suffice, but where the soil is shallow and largely composed of sand or gravel, mulching will most effectually accomplish the purpose.

Any loose material will answer as a mulch, such as coarse manure, strawy litter of any kind, or short grass as cut from lawns; where a few trees only are to be cared for, tan bark and refuse charcoal dust are frequently employed. Mulch should not be applied before the middle of June, unless the weather proves very dry and warm previous to that time, and on clean ground it may remain during the following winter, or be renewed if exhausted; but in rough, soddy ground, where field mice may lurk, the soil around the trees should be thoroughly comminuted, and kept clean and compressed.

PEAR, Culture.—The best mode of treating the soil in pear orchards is an important question both in regard to the health of the tree, and the production of fruit. Laying aside all special circumstances, it appears evident that the condition of the plants will indicate the treatment required; the object being to maintain health and encourage fruitfulness, the measure of successful accomplishment of these conditions will greatly depend upon the knowledge of the principles governing vegetable growth possessed by the cultivator. When the trees are young the chief object is to encourage

judicious growth, by employing expedients known to favor vegetable extension, such as the application of manures, breaking up and pulverizing the soil, surface stirring, and other similar operations. By judicious growth is meant a luxuriance not incompatible with maturity, and as this will depend upon climate and locality, it is evident that a discriminating knowledge of cause and effect will largely influence success. In northern latitudes, where the season of growth is confined to five months' duration, it will be impossible to mature the same amount of wood that can be produced on trees in a locality having seven months of growing season. In the latter case stimulating appliances may be used with the best effects that would only tend to dissolution in the climate of short summers. The great desideratum in fruit culture is ripened wood; all useful cultivation begins and ends with this single object in view, and is the criterion of good or bad management.

To cultivate, or not to cultivate, is a question to be determined by climate and condition of soil. Where it is deemed advisable to encourage growth, it will be proper to employ such appliances of culture as are known to produce that result; and again, when ample luxuriance is secured, and the tendency is still in that direction, all surface culture should be abandoned, and the orchard be laid down in grass, cultivation to be again practiced when the trees indicate its necessity.

PEAR TREE, Pruning.—The pear tree is usually a victim of excessive pruning. It is pruned in winter to make it grow, and pruned and pinched in summer to make it fruit. Why it is that the pear, more than other spur-bearing fruit trees should be supposed to require so close and continued pruning does not appear easy of explanation. It is evident that this immoderate pruning is not followed by satisfactory results, for while apple, plum, and cherry trees fruit with abundant regularity, with but little attention to pruning, unfruitfulness in the pear is a frequent cause of complaint, especially with those who pay the strictest attention to pruning rules, showing clearly that successful pear culture is not dependent upon pruning alone. While it is perhaps equally erroneous to assert

that pear trees should not be pruned at all—an extreme which no experienced cultivator will indorse—it is worthy of inquiry whether unpruned trees do not exhibit a better fruit-bearing record than those which have been subject to the highest pruning codes. How far the proverbial liability of the pear to suffer from blight may be due to the interference and disarrangement of growths caused by summer pruning, it may not be possible to decide, but the tendency to late fall growths, and the consequent immaturity of wood which is thereby encouraged, is well known to be of much injury, and greatly conducive to disease. Perhaps no advice that has been given is so fruitful a cause of failure and disappointment in fruit culture as that embodied in the brief sentence, "Prune in summer for fruit."

The physiological principle upon which this advice is based is that which recognizes barrenness in fruit trees as the result of an undue amount of wood growth, and that, in accordance with acknowledged laws, any process that will secure a reduction of growth will induce fruitfulness. The removal of foliage from a tree in active growth will weaken its vitality, by causing a corresponding check to the extension of roots, but the removal of the mere points of strong shoots has no palpable effect in checking root growth, the roots proceed to grow, and the sap seeks outlets in other channels, forming new shoots, which in no way increase the fruitfulness of the plant.

While it may be confidently stated that, as a practical rule, easily followed, and of general application, summer pruning for fruit cannot be recommended except as an expedient rarely successful, it is also true that there are certain periods in the growth of a plant when the removal of a portion of the shoots would tend to increase the development of the remaining buds, without causing them to form shoots. For example, if the growing shoots of a pear tree are shortened or pruned by removing one-third of their length, say, toward the end of June, the check will immediately cause the remaining buds on these shoots to push into growth and produce a mass of twigs as far removed as they be from fruit-producing branches. Again, if this

pruning is delayed until August, and the season subsequently proves to be warm and dry, the probabilities are that the remaining buds will develop into short spur-like shoots, from which blossom buds may in course of time be formed; but if the season continues wet, and mild and growing weather extends late into the fall, these same shoots will be lengthened into weakly, slender growths, which never mature, and are of no use whatever. There is no certainty as to the proper time to summer prune, because no two seasons are precisely alike, and trees vary in their vigor from year to year; and yet this uncertain, indefinite, and constantly experimental procedure is the basis upon which the advice to "prune in summer for fruit" is founded.

The pear tree, in fact, requires very little pruning, and that only so far as may be necessary to regulate branches in either of two exigencies. In the first place, when the young tree is placed in its permanent position in the orchard, its roots will be greatly disturbed and many of them destroyed; it will, therefore, be expedient in this exigency to abridge the branches, so as to restore the balance of growth that existed between the roots and branches previous to removal.

This pruning at transplanting has its opponents on the the theoretical grounds that, as the formation of roots is dependent upon the action of leaves, it must follow that the more branches and leaves left upon a plant the more rapidly will new roots be produced; but there is one important element overlooked in this reasoning, namely, the loss of sap by evaporation, which speedily exhausts the plant, while it has no active roots to meet the demand. The proper practice is to reduce the branches so as to give the roots the preponderance, and many kinds of trees can only be successfully removed by cutting the stem off close to the ground.

If the tree has been pruned close back at planting, the first summer will develop the foundation for a well-balanced, symmetrical plant, but as this result depends upon a good start, it is well to keep an eye on the young growths during the first season, and if any of the shoots appear to be developing to the detriment of others equally necessary for future branches, the points of such shoots be pinched off, but

in doing so let there be as small a removal of foliage as possible, the object being not to weaken, but merely to equalize growth. As a general rule, no advantage will be gained by pruning any portion of the shoots after the first season, unless in the case of weakly trees, which will be strengthened by pruning down during winter. The removal of branches during summer weakens growth, but when a portion of the branches are removed after growth is completed, the roots, not having been disturbed, will have the preponderance, and the number of buds being diminished, those that are left will receive increased vigor.

It should never be forgotten that there is nothing more certain than that by shortening-in or pruning back the ends of shoots, either in summer or winter, the fruit-producing period is retarded, and the fruit-producing capabilities of the trees abridged. Fruiting spurs will not form where the growths are constantly interrupted and excited by pruning; but, after the third or fourth year, young shoots will, in the majority of varieties, become covered with fruiting spurs the second year after their formation if left to their natural mode and condition of growth. Of course, this refers to trees in soils of moderate fertility grown in a climate favorable to the plant.

The only pruning, then, that is really essential, after the plant has become established, will be confined to thinning out crowded branches, and this forms the second exigency for pruning. If low-headed trees are preferred, those branches that have become destitute of fruiting spurs near the body of the tree may be cut out and a young shoot be allowed to take the place of the one removed. There will be no lack of young shoots for this purpose, as they will be produced from the base of the cut branch, selecting the strongest and best placed to occupy the vacancy, if such occupancy is desired. This mode of cutting back branches will be more particularly essential in the case of dwarf pears, as the quince roots are unable to support a tall, heavy-headed tree, but in all other respects dwarf pears should be treated the same as standards.

PEAR TREE, Stocks on, Growth and Quality of Fruit, Influence of.—In com-

paring remarks and observations made by different cultivators with reference to the merits of varieties, their growth, productiveness, size, and quality of fruit, and other characteristics, there is found so great a disparity as to lead to a supposition that different varieties are being discussed under the same name. No doubt this is occasionally the case, but the difference caused by the influence of the stocks upon which they are worked is frequently to blame for these discrepancies. Every nurseryman is aware of the great irregularity of growth in plants of the same variety; they may have been grafted at the same time on stocks of equal size—planted on the same day and in the same way and in the same soil, yet their comparative growths will vary considerably; so much difference exists that the plants will be classed into two or more sizes, and held at different valuations. Although the vigor of growth imparted is thus varied, the habit of the variety is not changed, the upright form growth will still characterize the Buffum, and the spreading habit of the Roztiezer will remain with each individual of that variety; but in a plantation of fifty of any sort there will be some weak growers, and an occasional specimen that, after lingering on a sickly condition for several years, will finally be removed.

It is reasonable to expect these diversities in the growth of stocks produced from seed, and the influence they impart to the graft, but it is seldom that allowance is made for the many peculiarities that may undoubtedly be traced to this cause. This is still further confirmed by the more uniform growth of dwarf pears, the stocks of which are produced from cuttings or layers, and are, consequently, of more uniform vigor, being an extension of one individuality, instead of the separate individualities of seedling plants.

The opinion is now becoming prevalent that close planting, so that the trees shelter each other, is advantageous. For standard trees, eighteen feet apart is considered a good maximum, and ten feet for dwarfs. These distances preclude the practicability of using horse-power in the culture of the soil, at all events, after a few years' growth, which, all things being considered, may be regarded as a step in the right direction.

PEAR-TREE BLIGHT.—"For nearly a hundred years blight of the pear has been the terror and despair to growers of its fruit." This disease is known under a variety of names—winter or frozen sap blight, leaf blight, summer blight, &c. It is quite different from insect blight. Since the temperature and hygrometric state of the atmosphere and the conditions of the soil, whether acid or alkaline, pulverous or stiff, affect fungi by either retarding or fostering their growth, it becomes a matter of interest to ascertain how far observations made in relation to pear-tree blight agree with the fungus theory. Some interesting experiments have been prosecuted in relation to pear tree blight, particularly during the last two years. A pear-tree which was badly blighted on its main trunk was made the subject of special experiment. Nearly all of the bark was blighted within three feet of the ground, only about an inch and a half in width being left to connect the upper part of the tree with the unblighted bark at the base. The affected part was removed and the sap-wood left quite exposed to view; but to prevent injury from the air it was at once coated with a composition of carbolic acid, sulphur, lime, and water, and used as a paint. After the lapse of two years the tree was wholly recovered, and the denuded part is again covered with new and healthy bark. The tree in all respects presents a healthy appearance. Many other trees much affected with blight were coated heavily with the sulphur compositions, and have evinced marked signs of improvement. It is intended to continue these experiments on a larger scale, until sufficiently numerous and well-established facts attest the best mode of treatment. These experiments were made on heavy, compact, partially undrained soil, lying low, and, therefore, unfavorable for the highest development of pear-tree culture.

PRUNING.—The practice of indiscriminate lopping off of limbs, large and small, is the cause of disease and a weakening of the constitution of the tree, which in numberless cases leads to premature death. It has been found in nine cases out of every ten, where a branch of considerable size had been taken off it would leave a rotten spot in

the tree. In a great many varieties of the apple tree there is a liability to decay and rot. The tree may, and perhaps in most cases will, heal over this, but a diseased spot is left in the tree, and hence to that extent is left in an unhealthy state. And the more these spots are multiplied, the more the tree is weakened and diseased.

PEAS, Culture of.—Peas, for an early crop, should be sown as soon as the ground is in working condition. The soil for their reception should be light, dry, and well sheltered. Mild manure, such as leaf-mound, has a beneficial effect. For general crops the ground should be well manured the previous year, which causes to yield more abundantly. They are usually planted in double rows three or four feet apart, and covered to the depth of two and a half or three inches. The height of the pea depends much upon the moisture and richness of the ground. The method of planting peas in the hills with potatoes of an early variety has been found successful. In dry weather, soak the peas a few hours before planting. Pour water into the drills when the ground is dry, before sowing the seed, which will cause them to grow at once, should the season continue dry.

PLANTS (Outdoor), Labels for.—A convenient method of preparing outdoor labels for plants, capable of resisting the weather, consists of cutting them out of smooth pasteboard, and writing upon them whatever may be desired in ordinary ink. When this is dry they are immersed in linseed oil, or, what is still better, linseed-oil varnish, until they are completely permeated by the liquid; after which they are hung in the open air upon threads to dry; they become like iron and resist wet for a long time, and are more durable than slips of metal.

POTATOES, Earthing Up.—It has been demonstrated that earthing up potatoes diminishes the product, and retards the ripening of the tubers. Long experiments in England have fully proved this fact—that hilling up the potato will reduce the crop one-fourth.

POTATOES, Raising, Under Straw.—We give an experiment in raising potatoes under straw, by a noted agriculturist:

"I fitted the ground as for planting in the old way, three feet apart, and dropped the potatoes on the mark, from eighteen inches to two feet apart, covering them slightly with soil. I then covered to about the depth of ten inches with old straw, and did nothing more with them. When the crop was ripe I raked off the straw, and raked out the potatoes, which were mostly on the surface, looking very nice, fresh and large. The result was, I had at the rate of one hundred and eighty-six bushels per acre; while the yield from those planted in the old way in drills, and cultivated on the ground beside of them, was only seventy-five bushels per acre, which was rather small for this section, owing to the dry season. The soil is a sandy loam.

POTATOES, SWEET, Culture of.—The cultivation is very simple; good stable manure is distributed along the surface of the ground in a line about a foot wide, as long as the ridge is to be, and as thick as the supply will warrant. A ridge is then formed over the manure by throwing a furrow toward it from each side. The ridge is then finished by the use of a spade and hoe, and should be about ten inches high, a foot across at the bottom, and while the sides are as steep as possible, the top should be a little flattened. Set the plants fifteen inches apart, putting them down so that the junction of the stem with the first leaf will be covered, and if the soil is not moist at the time of planting, water the holes. Keep the sides of the ridge clean until the vines cover them, and afterwards move the vines once a week to prevent them from taking root at the joints. Plants may be obtained from most seed-dealers and florists.

POTATO ROT, Barnet's Certain Preventive for the.—Sow unleached ashes over the field once a week for six or seven weeks, commencing soon after the second hoeing. Apply two or three bushels to the acre, using care to dust the tops well.

POTATO, Disease, Preventive.—A French farmer has discovered that the use of tan is an efficient preventive against potato disease. For three years he has introduced a small quantity of the residue of the bark used in tanning into each hole on planting his potato crop, and each time he has been completely

successful in preserving his fields from the annoying disease.

PLOWS (Rusty), to Clean.—Take a quart of water and pour slowly into it a half a pint of sulphuric acid. (The mixture will become quite warm from chemical action, and this is the reason why the acid should be poured slowly into water, rather than the water into the acid.) Wash the mould-board (or any other iron that is rusty) with this weak acid, and let it remain on the iron until it evaporates. Then wash it once more. The object is to give time for the acid to dissolve the rust. Then wash with water, and you will see where the worst rusty spots are. Apply some more acid, and rub those spots with a brick. The acid and the scouring will remove most of the rust. Then wash the mould-board thoroughly with water, to remove all the acid, and rub it dry. Brush it over with petroleum or other oil, and let it be until spring. When you go to plowing, take a bottle of the acid water to the field, and apply it frequently to any spots of rust that may remain. The acid and the scouring of the earth will soon make it very bright and smooth.

PUMPKINS Amongst Corn.—Almost all "old-fashioned farmers" take a crop of pumpkins off their corn fields, much to the annoyance of the theorist who demonstrates to his entire satisfaction that the one crop must detract from the full force of the other. But the most careful experiments show no loss to the corn. The very same weights result from an acre, with or without pumpkins.

RADISHES.—It is said that, when radishes cannot be grown on account of worms or unsuitable soil, if common wheat bran be strewed one inch thick on any good soil, well hoed in, and the seed is then planted, perfect radishes will result.

RENNET, Mode of Use.—The way to use rennet is to cut off a bit of suitable size (a piece an inch square is large enough to coagulate several gallons of milk) and soak it for some hours in water; then add the whole to the milk, a little warmed. The mixture is now very gradually heated to something above blood-heat, or about 120 degrees. Very soon it undergoes a great change, and a

solid white curd is separated from the whey.

PEANUT, Culture, Soil for.—Any soil that can be put in a friable condition, and kept in that state, will produce peanuts; but that which is best adapted to their growth is a light, gray soil, without being very sandy. The color of the pods always partakes of the color of the soil; and as the brightest pods always bring the most money, so the gray land is to be preferred. When harvested they are perfectly clean, scarcely a particle of soil adhering to them. Not so with red or chocolate-colored lands. They leave a stain on the pods, of which they cannot be divested even by washing—a practice frequently resorted to for the purpose of getting a fancy article. When taken to market the bright nuts will command from ten to fifteen cents more per bushel than the brown, though equal in all other respects. The gray soil is therefore to be selected when there is freedom of choice, but the brown soil, when of the right texture, is equally productive.

In choosing a sight for planting, reference should be had to the crop of the previous year. Peanuts require a clean soil; they will follow any hoed crop to advantage, with the exception, perhaps, of sweet potatoes. Corn land is generally preferred. In tide-water Virginia much of the land was heavily marled in former years, and whenever this is the case an important and perhaps the chief requisite to success has been already provided. The peanut will not fruit except on a calcareous soil. The vines may grow with the greatest luxuriance, covering the whole ground, but in the absence of lime or marl the pods do not fill: they turn out to be nothing more than what is popularly called "pops." If, then, the land has not been previously marled or limed, it will be necessary to apply say a hundred and fifty bushels of marl, or fifty bushels of lime, to the acre. The kind of lime chiefly used of late years is burned oyster shells, which may be had in abundance in all the large towns. It is applied in either of several ways, according to the convenience of the planter, and with about equally good effect. If there is any choice, spreading broadcast is perhaps the best, to be done before the land is plowed; in which case

the quantity should be about fifty bushels to the acre. A favorite mode, where a large surface is to be planted, is to strew the lime in the furrow over which the bed is to be raised for planting. In this case a less quantity will answer by reason of its being more concentrated—say twenty bushels. Other planters, again, who are hurried in their work, spread the lime over the beds after the crop is planted, at the rate of about thirty bushels to the acre. Either mode is attended with good success; but wherever it is practicable to have a choice of land that has been sufficiently marled or limed in former years, and preserved by judicious culture, the best results are found to follow. In such cases the yield not unfrequently reaches a hundred bushels to the acre. Last year the writer was told by a planter of the highest character, that on twelve acres of such land as has been just described he sold fourteen hundred bushels of nuts of prime quality, besides saving an ample supply for seed. The product ranges from the quantity stated down to twenty-five or thirty bushels to the acre, according to the skill, or want of skill, of the planter—a fair average of the whole being estimated at fifty bushels.

Few persons make peanuts part of a regular system of rotation, but the pre-eminent success of a gentleman who has followed the plan is worthy of special reference. Mr. Henry M. Butts, of Southampton County, Virginia, has for years pursued the following course: The lot intended for peanuts, say next year, has been seeded in stock peas this year, the vines to be plowed in some time in September. The vines afford a great quantity of vegetable matter, which becomes thoroughly decomposed by the time for planting the crop. When the season for planting is at hand, the ground is replowed and laid off, and ten bushels of lime and a hundred and fifty to a hundred and seventy-five pounds of superphosphate strewn in the furrows to be ridged over. The year following peanuts the land is planted in sweet potatoes, with a liberal dressing of stable manure. The third year it is laid down in stock peas again, to be followed by peanuts as before, always repeating the lime and superphosphate. The crops of

Mr. Butts averaged, one year with another, not less than one hundred bushels to the acre. Last year from ten acres he sold thirteen hundred bushels of prime peanuts, entirely exempt from "pops," and worth three dollars per bushel.

PEANUT, Cultivation.—Having selected the ground, it is to be plowed with a one-horse plow, in March or April, to a depth not exceeding four or five inches. The advantages of shallow culture will be apparent from the fact that the peduncles continue to penetrate the earth until a firm bed is reached on which to deposit the nut; and the still further fact of the increased facility afforded in harvesting, as will appear when we come to treat of that branch of the subject.

About the 10th to the 20th of May is the time for planting. If the land is thin and needs manuring, open furrows three feet apart, and strew in a hundred to a hundred and twenty-five pounds of Peruvian guano, or from a hundred and fifty to two hundred pounds of superphosphate of lime. The former is generally used, because of the greater certainty of getting a pure article, but nothing can be better than the latter when well prepared. The furrow is then to be ridged over and the whole surface thrown into three-foot beds, which should be reduced to within two or three inches of the general level of the field. Then mark off the rows, and at distances of eighteen inches plant two seeds, covering them an inch to an inch and a half deep—no more.

In ten days to two weeks, according to the weather, the young plants begin to come up. As it is very important to get a good start, the missing hills should be replanted at the earliest possible moment. It is the custom of some planters to put an extra quantity of seed in every fourth or fifth row, to furnish plants for transplanting, if needed; if not needed, they can be thinned out.

As soon as the grass makes its appearance give a light plowing, throwing the earth from the vines, and following with the hoe, thoroughly removing all the grass from the row. Plow again as soon as the grass reappears, this time using a double-shovel or cultivator, and the hoe as before directed. If the season should prove to be very wet, a third working may

be necessary, making use of the cultivator and hoe again.

Next comes the time for laying by, the vines having extended nearly half way across the space between the rows. This is done by running a mold-board once in the middle between the rows, and drawing the earth up to the rows with the hoe, care being taken not to cover the vines and to disturb their position as little as possible, as the fruit will now be forming. It will be necessary also to guard against making the bed too high. When there is grass in the row it must be pulled up by hand. Soon after this the vines will cover the whole ground, and repress every other growth, unless it may be a chance weed that escaped notice at the former working.

PEANUT, Harvesting.—The time for harvesting the crop is from the 15th to the 30th of October, immediately after the first frost. When the crop is forward, or when it is an object to get a portion of it early in the market, the operation may be commenced in the latter part of September; but the longer the vines continue to grow, the greater will be the number of sound pods. Select a time when the weather is settled and favorable, and with three-pronged hoes loosen the vines along the rows. Hands follow the digger, pull up the vines, shake the dirt from them, and leave them in the same place. In dry weather they will be sufficiently cured in two days to be shocked. Showery weather, though it may somewhat delay the curing, does no injury.

One of the advantages of shallow culture becomes apparent in harvesting. When the fruit is deposited only a few inches below the surface, the vine is detached from its position with little or no loss; when the depth is greater, the stems or pedicles are liable to be broken off.

In shocking, provide stakes seven feet long, made sharp at both ends; then lay two fence rails on the ground as a foundation, but with supports underneath to afford free access to the air. The stakes are stuck in the ground at convenient intervals between the rails, the stacks built up around them, and finished off by a cap of straw to shed the rain. The diameter of the stack is made to conform to the spread of a single vine.

After remaining about two weeks in the stack the picking should be begun, taking off none but the matured pods. These are to be carried to the barn, and prepared for market by completing the drying process, and then fanning and cleaning.

The most tedious part of the work is the picking. An expert discriminates at a glance between the mature and immature pods, but cannot pick more than two and a half or three bushels per day. A machine to perform the operation would be a most valuable invention. Unless the management in the barn is carefully conducted, there is great danger, where there is much of a bulk, that the peas will become heated and mouldy. The condition in which the early deliveries are often received at market renders this caution quite necessary. In fact, there is as much slovenliness in the handling of this crop as there is in regard to any other, perhaps more, for the reason that so many inexperienced persons engage in the culture every year. Until the pods are thoroughly seasoned the bulk should be frequently stirred and turned over.

A certain classification, in regard to quality, obtains in peanuts as in every other article of agricultural produce. The descriptive terms in general use are "inferior," "ordinary," "prime," and "fancy;" but these are not so definite as to admit of no intermediate grades. Assuming prime to be the standard, and that the prime are \$2 75 per bushel, then inferior will be worth, say, \$1 to \$1 50; and fancy, \$3. Seed peanuts always command an extra price, ranging from \$3 25 to \$3 50. These were the current prices for the crop of 1875.

PEANUT, Varieties.—There are two very distinct varieties of the peanut, known respectively by the names of the Virginia, and the Carolina or African. The diversity between them, however, does not amount to a specific difference, the chief characteristics being that the one has a large pod and bean, and the other a small one. The Virginia is cultivated almost exclusively for eating, while the Carolina is principally used for the manufacture of oil, which cannot be distinguished from olive oil, and is, accordingly, sold as such. The standard weight

of the Virginia peanut is twenty-two pounds to the bushel; that of the Carolina twenty-eight pounds. In the markets they are always sold by weight.

PEANUT, Seed.—A matter of primary importance is to provide seeds of good quality for planting; and in order to be assured of their excellence, the planter should either raise them himself, or buy them of a person on whose fidelity he can rely. If, after the vines are dug and they are lying in the field, they should be exposed to frosty weather, the germinating principle would be destroyed or impaired. As a merchantable article, however, their value is not at all affected. Neither should the nuts become the least heated or mouldy; nor should they be picked off the vines while wet, or before they are thoroughly cured. It is obvious, therefore, that the most careful attention is requisite in this matter. Previous to planting, the pods should be carefully shelled and every faulty bean thrown out; not even the membrane inclosing the seed should be ruptured. It takes about two bushels of peanuts in the pod to plant an acre.

The peanut crop is justly considered exhausting, but not more so, it is believed, than either of the others with which we have compared it. Planters who have been long engaged in the culture say that the same ground may be planted for a succession of years, provided the vines are restored to the soil, and a moderate application is annually made of guano or other fertilizer. Cotton, under a similar system, may be planted on the same land for an indefinite period without diminution of produce.

The vines of the peanut make a large quantity of very nutritious provender, which is eaten with avidity by cattle. If the crop is dug before frost, it is equal in value to any other forage plant. As the pods are picked off, the vines should be placed under shelter, secure from the weather.

On account of the profit of the crop, it has taken the place of tobacco to a considerable extent in places where the soil is adapted to it. This is the case in the large tobacco-growing counties of Amelia, Nottoway, Halifax, and Brunswick, besides others of less note. How far north the culture may be extended to

advantage is at present a matter of conjecture; but in the tide-water district of Maryland, and also in Delaware and the southern part of New Jersey, it well deserves a trial.

RHUBARB, Culture of.—Rhubarb succeeds best in deep, somewhat retentive soil. The richer its condition, and the deeper it is stirred, the better. Sow in drills an inch deep. Thin out to 6 inches apart. In the fall trench a piece of ground, and manure it well; then transplant the young plants into it, 3 feet apart each way. Cover with leaves or litter the first winter, and give a dressing of coarse manure every fall.

ROSE TREES, to Clear from Blight.—Take sulphur and tobacco-dust, in equal quantities, and strew it on the trees, in the morning when the dew is on. The insects will disappear in a few days. The trees should then be syringed with a decoction of elder leaves.

RYE, To Cultivate.—Rye ought never to be sown upon wet soils, nor even upon sandy soils where the subsoil is of a retentive nature. Upon downs, links, and all soft lands which have received manure, this grain thrives in perfection, and, if once covered in, will stand a drought afterwards that would consume any other of the culmiferous tribe. The several processes may be regarded as nearly the same with those answering for wheat, with the single exception of pickling, which rye does not require. Rye may be sown either in winter or spring, though the winter-seeded fields are generally bulkiest and most productive. It may succeed either summer fallow, clover or turnips; even after oats good crops have been raised, and where such crops have been raised the land will always be found in good condition.

SAGE, To Cultivate.—Put it out in rows two feet apart, and the plants a foot apart in the rows. Cultivate and keep clean; it does well in sandy soil. Dry in the shade. Put up in square pound packages hard pressed.

SEED CORN, How to Select.—In shelling corn for seed, discard the butts and tips, using only the central portion of each ear, as the early blade and root are in size in proportion to the kernel used; and a plant from the large grains of the

center of the ear will get the start and keep ahead of the small ones from the tip. And especially select from ears that have the grains as near uniformly large as possible.

SEED BARLEY, How to Select.—The best is that which is free from blackness at the tail, and is of a pale lively yellow, intermixed with a bright, whitish cast, and if the rind should be a little shriveled, so much the better, as it indicates a very thin skin.

SEED OATS, How to Select.—Place your oats in a heap at the leeward end of the threshing floor, on a day when a gentle breeze is blowing through the barn. Take a common wooden flour-scoop, and throw the oats against the wind, towards the other end of the floor. A few minutes' experience will enable you to throw them so that they will fall in a semi-circle at a nearly uniform distance from where you stand. The oats which fall farthest from you are the best for seed, and are to be carefully swept together as fast as they accumulate in considerable quantities.

SEED POTATOES, How to Select.—Be careful to secure large, sound, and well-ripened seed; cut the large potato into pieces of one eye. Begin at the butt end; cut towards the center, leaving a due proportion of the potato with each eye. Potatoes inadvertently left undug, if they do not freeze during winter, invariably produce sound ones, larger and more abundant than those kept in the cellar through winter. This has lately suggested the plan of keeping potatoes excluded from the air from the time of digging and planting, which has been found to invariably prevent rot.

SEED WHEAT, How to Select.—Seed wheat should not only be thoroughly cleaned from the seeds of weeds, but small grains should be taken out with a separator or suitable fanning mill, leaving only the largest, plumpest, and earliest ripened kernels.

SEED, How to Test the Vitality of.—By placing almost any of the larger seeds and grains on a hot pan or griddle, where the vitality is perfect the grain will pop, or crack open, with more or less noise. Where the vitality is defective or lost, it lies immovable in the vessel.

SLUGS and SNAILS, To Destroy.—

These are great enemies to every kind of garden plant, whether flower or vegetable; they wander in the night to feed, and return at daylight to their haunts; the shortest and surest direction is: "Rise early, catch them, and kill them." If you are an early riser, you may cut them off from their day retreats, or you may lay cabbage leaves about the ground, especially on the beds which they frequent. Every morning examine these leaves, and you will find a great many taking refuge beneath; if they plague you very much, search for their retreat, which you can find by their slimy track, and hunt there for them day by day. Lime and salt are very annoying to snails and slugs; a pinch of salt kills them, and they will not touch fresh lime; it is a common practice to sprinkle lime over young crops, and along the edges of beds, about rows of peas and beans, lettuces and other vegetables; but when it has been on the ground some days, or has been moistened by rain, it loses its strength.

SMUT IN WHEAT, Remedy for.—Soak the seed wheat in brine, and then dust it with unslacked lime. This will prove a perfect prevention.

SORGHUM CULTURE.—The soil and climate suitable for the cultivation of corn is well adapted to the growth of sorghum, but a rich upland loam will yield the richest juice. The land should be well worked, and kept clean, it requiring about the same treatment as corn. It may be either planted in hills or drills. As the cane is a very deep-rooted plant, it is very essential that the land should be made mellow to a good depth, but the seed should be covered shallow, not more than half an inch deep. It should be planted about the same time as corn. The young plants when they first come up look like blades of fall grass; they are of slow growth and feeble appearance for some time, or until the hot weather of July and August, when the plants will go far ahead of corn in a rank and healthy growth. It appears to delight in hot, dry weather, as its roots penetrate deep. Drouth does not affect it as it does corn; it is surprising to see at what a rate it will develop itself after the hot weather has come. It is also very hardy, and

may be transplanted with entire safety. There is a difference of opinion in regard to keeping the suckers pulled off. Experience shows that, although we may lose a little in quantity, it is more than made up in the quality of the syrup; therefore have a deep, mellow soil for the roots to penetrate in search of food by thoroughly cultivating it during the early stage of its growth; but avoid deep plowing after the cane has once acquired considerable size, as the roots then fill the ground, and if severed the plants are greatly dwarfed; keep the suckers off, and be sure and not let a weed show its head.

SORREL, To Remove.—This field pest may be eradicated by the judicious application of either lime or ashes. The souring principle of sorrel is oxalic acid; if this be removed from the soil, sorrel cannot grow. Lime or potash unite with the oxalic acid, forming oxalate of lime or potash. These substances are sometimes called sweeteners of the soil, from their ability to remove acids from it. Sorrel will never grow on lime soil.

SPINACH, Culture of.—Spinach is best developed and most tender when grown in rich soil. It should be heavily manured and deeply trenched. Sow early in March for summer crop, in drills, which method renders the cultivation and gathering of the produce more convenient. Encourage the growth with frequent hoeing, which draws the moisture to the roots. For a succession a few seeds of the summer varieties may be known, at intervals of a fortnight, from April.

SQUASH, Cultivation of.—The squash, being a tropical vegetable, requires much care and attention in northern latitudes, in order to be cultivated with success. Of all the varieties tested, the "Hubbard" has proved to be the very best for winter. The planting should be done as early in the spring as possible after the weather becomes sufficiently warm, so that there will be no danger of frost nipping the young plants, as they are very tender. A few hills can be planted earlier, and covered with hay or straw when there is danger of frost; in fact, if the season is late, it will pay well to plant a goodly patch and protect them in that way, for a very few young plants will cover a wide space of ground when old.

The land should be made deep and rich, the richer the better, particularly in the hills; the best manure being composted hen-droppings. The soil should contain a sufficient amount of sand to make it quick and warm, and a piece of land should be selected sloping well to the south, so that the rays of the spring sun can be quickly felt by the young plants.

Plant in rows at least sixteen feet apart, in hills from eight to ten feet; putting from two to three seeds in a hill, and when well started thin out to one plant. Cultivate thoroughly all the ground between the rows, as well as around the plants, until the vines cover the ground. If the above hints are followed a good crop will result.

STUMPS, To Pull.—Stumps of two to four inches may be pulled out by a yoke of oxen, by hitching the chain at the top of the stump, and taking two or three turns around it so as to get a twisting pull upon it. Large stumps, up to eight inches, may all be pulled out by using a block and tackle. Blocks of three sheaves should be used, and a rope sufficiently strong for the purpose. A hitch should be taken upon the largest stump, and all those around it drawn out, when another large stump may be chosen to hitch to.

Some scientific Frenchmen have been trying experiments in extracting them by means of dynamite, an explosive material resembling gunpowder in its action. The results were quite satisfactory. A hole from nine to fifteen inches in depth was drilled in the ground close to the stump, and a charge of eight hundred grains of dynamite was placed in it. This was exploded by means of a safety fuse, and the stump and roots were torn to fragments, so that they could easily be removed.

TRANSPLANTING During the Night.

—A gentleman anxious to ascertain the effect of transplanting at night, instead of by day, made an experiment with the following results: He transplanted ten cherry trees while in bloom, commencing at four o'clock in the morning. Those transplanted during the daylight shed their blossoms, producing little or no fruit, while those planted in the dark maintained their condition fully. He did the same with ten dwarf trees, after the

fruit was one-third grown. Those transplanted during the day shed their fruit; those transplanted during the night perfected their crop, and showed no injury from having been removed. With each of these trees he removed some earth with the roots. The incident is fully vouched for, and if a few more similar experiments produce a like result, it will be a strong argument to horticulturists, etc., to do such work at night.

TREES, Oak.—The process of deforesting our lands upon the Atlantic border has gone on for centuries, and in the very populous States has necessitated re-planting. It is a fact not sufficiently known, that oaks may be rapidly grown, and will develop, within an ordinary lifetime, fine groves of those noble trees which give so much dignity to an old homestead. Major Ben. Perley Poore has upon his estate in Massachusetts, a splendid oak forest or wood of thirty acres, every acorn for which was planted by himself thirty years ago. The trunks of the trees are now one and a half feet in diameter.

TOMATOES, Cultivation of.—Set your tomato plants in rows three and a half feet apart, and the same distance apart in the rows. Let the rows be of an even number, and, if possible, running north and south, for the better advantage of the sunshine.

Now, beginning with the first couple of rows, at one end set a pair of stakes in such manner that they will enter the ground just outside of the line of the rows, and cross each other at the height of about four feet over the middle space. Set corresponding stakes at the opposite end of the rows, and also intermediate ones, if necessary.

This done, along the outside of these sloping stakes fasten horizontal strips of edging, beginning with the first about eight inches from the ground, and finishing with the one which will run in the crossing of the stakes.

As the plants grow, carefully train them over this framework, securing them in place by tying with strings, and judiciously trimming when needed.

After the crop is removed in the fall, the material of this simple structure may be easily taken apart and laid away for use the coming and subsequent seasons.

TOBACCO CULTURE.—The subject of the culture and management of tobacco is one which, while it has been discussed at much length, by able writers, within the past few years, is, at the same time, one which, owing to many changes and improvements in its management, as well as in the various styles in which the "weed" is prepared for use by manufacturers, and the rapidly growing importance of the article as one of the "leading staples" of the country, would justify some further suggestions founded on actual experience.

One of the leading and most successful tobacco grower of the State of Kentucky furnishes us the following as the result of his experience and observation, covering a term of twenty years, both as a grower and seller of tobacco: "In the outset, I promise to give no startling discoveries or new theories on the subject, but will state facts which, for the most part, may be familiar to many of your readers, and my object in writing is to try and get such to practice better what they know, and others, who have given the subject no thought, and have never grown tobacco, to devote a portion of their farms to the culture of a crop for which our soil and climate are so well adapted, and which, when properly managed, yields a better profit than any other.

The plant-bed is the foundation of the crop, and is, therefore, of the first importance. The best time to sow seed is in January or February, if the ground is not too wet or frozen too deep; but they may be sown as late as the first of April sometimes, and come in time for a late crop. The most successful farmers sow plenty of seed, and sow them early as well as late.

In selecting ground for plant-beds, choose rich, loose soil in your new ground, if clearing tobacco; if not, in the woods, on some rich spot, where the sun will shine on the bed most of the day. Clear a space, say thirty feet square, of the grubs and large roots; rake off the leaves and trash, and then commence piling the brush by laying it first horizontally along that side of the bed from which the wind or breeze is blowing, to the depth and width of four or five feet, and extending across that side of the bed. Then continue the bed by setting the brush upright with butts on the ground, and the boughs

leaning against that which is lying horizontally. Set the brush as thickly over the entire surface of the bed as possible, mixing with an occasional good-sized stick of wood. It is important, in order to insure good plants, to burn the ground well, as it answers the double purpose of destroying the roots and seeds of foreign weeds and grasses, to prevent their springing up in advance of the tobacco plants, and also dries the earth and puts it in good condition to receive the seed in almost any kind of weather. In burning, set the fire on the side from which the wind is blowing, unless it is blowing so strong as to cause the pile to burn too rapidly to heat the ground sufficiently—the danger being not in burning too much, but the reverse. Three good men can pile and burn a bed ten yards square in a day. The following morning, the first thing, rake off the sticks, chunks and coals, which were not burnt, and with a mattock or grubbing hoe, pulverize the ground well, by digging to the depth of four or five inches, carefully removing roots of any considerable size, which last may be done best with a fine rake.

When the bed has been thoroughly pulverized and ready to be sown, mark it off in lands, five feet in width, with the hoe or rake handle, and cross in the same manner in the opposite direction. Mix with a common wasp-panful of dry ashes, one tablespoonful of seed (and no more), not heaped, but level full, and sow the ashes and seed over the ground in the same manner as sowing wheat; sowing first over the bed in one direction, and then in the opposite one, so as to distribute the seed uniformly over it. After sowing, rake the ground lightly, and then tramp it until level and comparatively smooth. Cover lightly with green brush having no leaves on it to protect against late spring frosts, and to keep leaves which may fall from adjoining trees from covering the young plants.

Many farmers imagine that their failure to obtain full prices is attributable to the kind of seed they sow, and are continually hunting new varieties, when in reality they may be using the best, and the fault lies in another direction. The best variety to sow will depend on the soil to be planted and purposes for which the tobacco is to be used. If to be planted in old land or manured lots, which are best adapted

to the growth of heavy fat varieties of tobacco, called shipping leaf, then the Blue Prior or Morrow are excellent varieties. For bright wrappers or fillers for chewing tobacco, the Orinoco, Yellow Prior or Little Vic are preferable. The Little Vic is now preferred by some of the best growers of bright wrappers in Kentucky, being, as they assert, much easier to cure a uniformly bright color, while it also possesses all the desirable chewing qualities of the other varieties.

It is said that one bed, the size we have described, will furnish plants for ten acres; but if we intended planting ten acres, we would have at least three such beds, and would prefer four, so that if one failed in part, the deficiency would be made up by others.

It is a well established fact that the most successful tobacco growers are those who get their crops set, and in order to do so it is indispensable to have an abundance of early plants. We would, therefore, recommend the sowing of seed in January, February, and also in March. It is a very common fault to sow too much seed on a bed. When they stand too thick on the ground they grow up very slim, and do not grow off readily when transplanted. In preparing new ground for planting, it should be broken first by a coulter plow, which cuts the roots well, then turned over by a two-horse turning plow, harrowed well each way; the roots, sticks, etc., piled and burned; then laid off in rows three feet four inches each way with a shovel plow. A small hill, at the crossing of each furrow, should be made, say two or three hoofuls of loose soil, to which give a sharp pat with the hoe in order to better retain the moisture after the plant is set. If bright wrappers are the aim, and especially if your new ground is rich, the rows may be only three feet one way by three and a half the other.

In fact, some of the best farmers in Kentucky, among them Mr. R. R. Wakefield, of Ballard county, have recently adopted drilling; that is, they plant only about two feet apart in the rows, which is the usual width apart, and only plow one way. In this way they obtain a more silky leaf, a finer and better color; and although the leaf is smaller by topping high, say fourteen to sixteen leaves to the plant,

with the increased number of plants the yield is equal and sometimes greater than by planting the usual distance. Old land should be fallowed deep in the fall if possible in order to turn under the weeds and grasses, and give them time to decay and enrich the soil, and it also gives the cut-worm a good opportunity of freezing, a thing to be desired, as it is often very destructive to the plants when set in old land, but never much trouble in new. Old land in the spring should be prepared in much the same way as new, except the rows should be three and a half feet apart each way, which gives 3,500 plants to the acre.

Plants will live when transplanted in fresh lands after a very light rain, but in old land a good soaking rain is desirable in order to insure success, besides it damages the plant-beds much less to draw from them after a good rain. Care should be taken when drawing plants from the beds to avoid trampling on the young plants, and only one plant should be pulled at a time, for by pulling a handful with half a dozen which are large enough to plant, there will be sticking to their roots perhaps fifty smaller ones, which would be large enough in a week or ten days, and which may be needed. Three experienced hands can draw the plants and set four or five acres in a day; and were I intending to plant a full crop, say four to five acres to the hand, I would prefer to have at least two-thirds of the crop planted during the first season, *i. e.*, at the first planting, and that as early in May as possible, and the remainder within ten or fifteen days thereafter. However, there are but few farmers ready to plant before the 15th of May, which is ample time, and good crops are made when planted as late as the middle of June, and sometimes later. It may be objected that too much of the crop should not be planted at once for fear of having so much to ripen at one time as to be unable to house and take care of it properly; but the reverse is usually, if not invariably, the case; and much more tobacco is cut too green than is damaged by standing in the field too long; besides, fully a third of the most regular stand, all planted the same day, will mature a week or ten days later than the other two-thirds. Plants to set in old ground should be of good size, say

from four to six inches high, while smaller ones will do well in new ground.

The process of transplanting is simple, and consists of making a hole in the hill, which will receive the plant well up to the leaves, and pressing the soil firmly around it, taking care not to leave a hole below the roots of the plant. Fresh land requires less cultivation than old, being quicker and free from weeds and grass comparatively — two to three good plowings and hilling once with the hoe are sufficient. Old tobacco land should be plowed at least four times and hoed twice. The matter of cultivating the growing plant, however, as it depends a great deal on the kind of season, whether wet or dry, will have to be left to the discretion of the farmer. In no case should the ground be plowed while very wet. Before the plant is hilled up, which is the last cultivation it gets, and when it is about large enough to stop, the bottom leaves should be broken off (which is called pruning) from the ground up from four to six inches, according to its size.

Topping, which is breaking, or rather pinching out the bud of the plant, in order to cause it to spread and mature, and also to prevent it running to seed, should be postponed as long as the circumstances will allow, so as to top as much of the crop at one time as possible. Early in the season, old land tobacco should be topped at ten leaves to the plant, which can be done without counting, by leaving the two top leaves hanging directly over the two bottom ones. Within a week or ten days from the time the tobacco is topped, the suckers which sprout just above each leaf, and also at the ground, make their appearance, and should be broken off when from three to six inches long. If neglected, they become so hard and so firmly attached to the stock as to bring away the leaf with them, and if entirely neglected would absorb all the nourishment from the plant, and cause a total failure. There are generally three crops of these suckers, all of which must be attended to at the proper time. The work of keeping off suckers and horn-worms is all the farmer has to do from topping until cutting and housing time, and is generally all he wants. There has been no way discovered to prevent the appearance of the horn-worm, nor to keep him

from imitating the example of his illustrious neighbor, "Young America," in chewing tobacco — in fact, he seems extravagantly fond of the green article, and claims it as his birthright, being born (hatched) on the leaves from an egg deposited by the tobacco fly. They are not usually abundant until about the full of the moon in August, which important fact furnishes a strong argument in favor of early planting; for tobacco planted in May is generally so nearly ripe by the 15th or 20th of August that young worms can do it but little injury.

The simplest and best way of disposing of these pests is to pull their heads off as quickly as possible. Some writer, who evidently labors under the delusion that they come to and go to eating again as soon as the farmer's back is turned, suggests gathering them in tin pails and carrying them out of the field to destroy them. They certainly never eat any more after their heads are taken off, and while one's hands are liable to be slightly soiled, this is the best mode of treatment, as both hands and eyes are needed in worming and suckering, both being carried on at the same time. It is much better to kill the worms while quite small, as a full grown one will destroy a plant of tobacco in a very few days. Whole fields are sometimes ruined by them, but we have always doubted the statement that they sometimes crawl on top of the fence, and ask passers by for a "chaw." The time usually necessary for tobacco to mature after transplanting is about ninety days, but varies some, according to soil, climate and the season.

Tobacco should never be cut until thoroughly ripe, unless forced to do so by prospect of frost. New ground tobacco, when ripe, turns to a yellowish color, and old ground becomes spotted; and both are brittle, and the leaf breaks easily by being pinched up between the thumb and finger.

If the crop is large enough and the force sufficient, enough should be cut in one day to fill a barn, so that the process of curing will be uniform. Cutting is done by splitting the stalk with a sharp butcher knife, from the top to within two leaves of the bottom, and cutting off just below the bottom leaf. The plant is then inverted and set over the stubble

from which it was cut. As soon as it falls or wilts it is put in piles of ten plants each, with the butts toward the sun. If the sun is shining very hot, care must be taken to prevent sun-burn, which injures it very much. Piling as above will generally prevent this. Each pile is hung on a stick, and if the tobacco is very large eight plants to a pile is sufficient. Stick your stick in the hill adjoining the one on which the tobacco is piled, and slanting slightly, and hang the tobacco in the field, instead of hauling to the barn or scaffold before hanging it, as it saves time and is bruised less. As soon as hung on the stick, haul directly to the barn, and hoist from the wagon to the tier poles, filling each room of the barn from top to bottom as you go.

A conveniently sized barn is twenty feet square, five firing tiers high. The lower tier poles should be about eight feet from the ground, the next three and a half feet above, the third three and a half above the second, and so on to the top. They should be four feet apart, giving five rooms in the barn from top to bottom. Such a barn will hold one thousand sticks of tobacco, usually about three acres, and can be built of logs at trifling cost. The sticks should be four and a half feet long, so as to lap the tier poles well and to prevent their slipping off. Scaffolding in the field has been entirely abandoned by the best farmers in Virginia and Kentucky, except when the tobacco is to be sun-cured. The distances between the sticks when hung in the barn should vary somewhat, according to the size of the tobacco, the amount of sap in it, and the process by which it is to be cured, from six to eight inches; and if intending to cure by action of the atmosphere, the barn should be quite open, and the sticks should hang ten inches apart at least.

We now come to the process of curing—the most important as well as the most difficult part of the work—requiring all the energy, watchfulness and intelligence the farmer can bring to bear. To cure the heavy, dark varieties for export, called shipping leaf, the usual mode of firing is supposed to be the best; and as a bright color is not indispensable to its value, the less fire used the better, so that it is saved from house-burn until cured fully. This does not apply, however, to a large and

valuable proportion of the **Missouri and Illinois** crops, called **shipping leaf**, and suitable especially for the English markets. This should be cured as bright as possible, which can be best done by the use of flues or charcoal; and at the same time avoid the very objectionable flavor and smell of smoke. In fact, the less smoke any kind of tobacco has, the better it sells; and when charcoal or flues cannot be had, as much of the curing as the weather will permit should be done by the sun and air. If the weather is fair and the barn room ample, tobacco will cure by the action of the atmosphere in about ten days, with the assistance of very little fire, and will be much sweeter and more valuable than if cured quickly by hard firing.

The climate, and a large proportion of the soil of Missouri, are as well adapted to the production of those fine and high-priced varieties of tobacco used in this country by manufacturers of both plug and fine-cut chewing, as Virginia, North Carolina or Kentucky; but our farmers have not yet attained anything like the perfection in the management of their crops, and consequently do not get near such prices. The use of flues for curing bright manufacturing leaf is gaining in popularity every year, and we have yet to see the first farmer who ever tried them and abandoned them for any other process. Less than ten years ago there was not one in western Kentucky, and now a very large proportion of the farmers of that section cure their entire crops with them, and they invariably get nearly double as much as the same tobacco, even with the same color, would bring if cured by firing in the old way. Even if they fail—as they sometimes do with any process—to get a strictly bright color, the tobacco is so sweet and has that peculiar flavor which manufacturers desire. Besides these advantages, they are very much more convenient, saving a great deal of fuel, and the farmer is saved the disagreeable task of smoking his eyes out.

The construction of the flues used in Kentucky is very simple and not very expensive. Two parallel nine-inch brick walls, about eighteen inches apart, and eighteen or twenty inches high, across the centre of the barn, and these brick walls;

covered with cast-iron caps twenty inches square, and so made as to lap each other half an inch where they join, with a brick furnace to receive the fuel on the outside of the barn, and a chimney six or seven feet high on the opposite outside of the barn, to carry off the smoke, completes the flue. The flue should extend through and a few feet beyond the barn, and the chimney should be that distance from the logs or planks to avoid danger, as the blaze sometimes reaches through and out at the top of the chimney. Such a flue can be built at a cost of \$75 or \$85. The cast caps should be slightly arched, as they throw out the heat better.

As soon as the tobacco is housed, the fire should be started in the flue, and a low degree of temperature, say about 95 deg., kept up for ten or twelve hours, until the leaves are yellow, when the heat should be gradually increased to 120 deg., and so remain until tails are partially cured and curl up, when the heat should be increased to 160 deg., and kept so until the leaf is thoroughly cured, and the stalk nearly so.

In order to regulate the heat, a thermometer must be kept hanging in the barn in a corner and frequently referred to. While the above is as near a rule as can be given, yet the judgment of each farmer and in each particular curing will be needed, as the amount of heat necessary will vary according as the tobacco is light or heavy, the season wet or dry, etc.

Coat-curing is practiced successfully in Virginia, North Carolina and portions of Kentucky, and throughout Missouri, but it is not so certain of success as to color, is more trouble, and in the end more expensive than flues. To cure with coal, a thermometer is needed, and the amount of heat necessary the same as with flues.

After the fires are withdrawn, the tobacco in a short time will come in case, unless the stalks are entirely dried; and then, if a good bright color has been obtained, it should be hung in the barn as close as possible, by putting two or three sticks in the space occupied by one, to prevent its losing its color by the damp spells of the weather during the winter. It will dry in this condition, and remain so until stripping time in the spring; or,

if stripped during the winter, should be hung back on sticks, and kept crowded until ready to prize.

Having rather tediously followed you through the laborious and disagreeable part of your work, we now come to the comparatively easy, but decidedly most important, because most profitable part, namely: stripping, assorting and prizing; and here allow us to say that the farmers of Missouri, as a class, are far behind those of the other tobacco growing States. This is attributable mainly to the fact that our farmers, after working a year and making a crop, in order to save a few weeks' extra labor, are in the habit of not marketing that crop, but turning it over to some country re-handler or speculator at a sacrifice, and he about half way prepares it for market.

It looks reasonable that if re-handlers can take the tobacco as the farmers deliver it, tied in large bundles, lugs, leaf and trash altogether, and assort it, and make one bundle into four or five, at an expense of one dollar and a half or more per 100 pounds, that the farmer can better afford to do it right at first. The farmers are told that "we buyers" would rather have it tied thus, so that we can assort and classify it to suit ourselves, and when so tied, the competition is gone, except as between the two or three country buyers in each county; whereas, by properly assorting, tying and prizing, which the farmer can do much cheaper than any one else, he gets not only the competition of all the great American markets, but has his crop in a condition to ship to any market in the world.

It would not cost farmers over fifty cents per 100 pounds in excess of the present mode of delivering to country dealers, to prize their crops properly, and the work, in a great majority of cases, would pay them better than any other they could do.

Shipping leaf should be carefully assorted, putting all the ground leaves, bruised or sunburnt, etc., into lugs, and leaf should be neatly tied in bundles of not over six leaves. The lugs even pay to tie into small hands. At present prices there is a difference of at least \$1 per hundred pounds in favor of small

hands in lugs, and from two to four times as much in good leaf.

If tobacco is too soft when stripped to prize, it should be hung back in the barn until thoroughly dry, giving good room between the sticks for the air to circulate. It may then be taken down the first damp spell and bulked ready for prizing. Tobacco intended for the English market should be prized in much drier condition than for any other, owing to the fact that there is an import duty in that country of over seventy cents per pound on the article, and the importer wishes to pay duty on as little water as possible. A large proportion of the shipping leaf of this State is prized by the country operators with a view to the English market; and we think if managed differently it would do better for some other markets, and can be prepared with less expense. For instance, we would prize all dark, heavy leaf in simply good keeping order, and not in what is called "factory dried," and only factory dry that which is bright or colory. Dark shipper should be prized in hogsheds of 1,600 or 1,700 pounds net; lugs, 1,800 to 2,000 pounds net; factory dried, 1,250 to 1,400 pounds net. Care should be taken in all kinds to handle neatly, and not put two kinds in one hoghead when possible to avoid it.

Bright wrappers and fine fillers should not be prized so as to bruise the leaf, and if very fine wrappers, should be put in half hogsheds, or tubs of 300 to 600 pounds net; fillers from 800 to 1,000 pounds. The most important point in these varieties is the assorting or classification; and if our farmers will once get to prizing their crops, and attend a leading market in person occasionally, where they can see specimens of the best managed crops of different States, they will soon learn more than can be written on the subject in many long articles, and the information will be such as will lead to their prosperity; and if only a few of them will try the experiment, our object in writing this will be accomplished.

TOMATO PLANTS, To Raise.—Make a hot bed in the customary way, about three by six feet. On about three square feet at one end, sow your seed one-sixteenth of an inch thick; cover with one-half an inch of rich, sifted soil. When

the plants are three inches high, make a trench across the bed, leaving one side at an angle of fifty-two degrees. Wet the plants so that they can be taken up without injuring the roots. Place them in the trench two inches apart. Cover them up to the last leaves by making another trench so near that the rows of plants will be three inches apart. When they are from four to six inches high transplant them into the garden, taking care not to injure the roots. Plants raised as above directed will be very stocky, will not wilt when transplanted, and will ripen their fruit before frost comes.

TURNIP CULTURE.—The most desirable soil for the cultivation of this root is a sandy loam free from stagnant water—one easily cultivated to a considerable depth, notwithstanding a heavier crop may occasionally be obtained from a clay loam.

Early in the fall the land intended for turnips should receive a heavy coat of farmyard manure, and be deeply plowed; cross-plowed in the spring about the end of May or the beginning of June, harrowed and rolled until a fine tilth is secured. Getting the soil into a finely divided state is a matter of the highest importance. It is a well established fact that all soils have the power of absorbing and retaining to a greater or less degree a certain amount of moisture, and the more finely divided and thoroughly pulverized the land, the greater amount of moisture will it absorb and retain. It would be very difficult to state absolutely when it is the best time to sow, inasmuch as soils and seasons vary. On clay or clay loam perhaps the most desirable time is from the fifth to the fifteenth of June, and on sandy loams from the tenth to the twentieth of that month. The quantity of seed required per acre will also vary with the weather. In damp weather, on sandy soils, 2 lbs. is ample, and on clay loam, and in weather ordinarily dry, it will be well to use 3 lbs. or more. The depth of the seed should be 1 to 1½ inches below the surface. It is better for plants to come up thickly, for they grow faster than when thin, and are more apt to escape the ravages of the fly; and, moreover, they require immediate attention as soon as they are large enough to thin. Sowing

upon drills is altogether preferable to sowing on the level; not only can a much larger crop be produced, but the weeds are far more easily destroyed. The distance between the drills should be 26 to 30 inches, and the plants should be left, by thinning, 12 to 15 inches apart. When a good braird has been secured, the great secret of success is in stirring the soil frequently when dry, and keeping the ground perfectly free from noxious weeds.

WAGONS, To Grease.—But few people are aware that they do wagons and carriages more injury by grasing too plentifully than in almost any other way. A well made wheel will endure common wear from ten to twenty-five years, if care is taken to use the right kind and proper amount of grease; but if this matter is not attended to, they will be used up in five or six years. Lard should never be used on a wagon, for it will penetrate the hub, and work its way out around the tenons of the spokes, and spoil the wheel. Tallow is the best lubricator for wood axle trees, and castor oil for iron. Just enough grease should be applied to the spindle of a wagon to give it a light coating; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulder bands and nut washers into the hub around the outside of the boxes. To oil an iron axle tree, first wipe the spindle clean with a cloth wet with spirits of turpentine, and then apply a few drops of castor oil near the shoulder and end. One teaspoonful is sufficient for the whole.

WATERMELONS, Large.—Mr. Stanley, of South Carolina, gave his plan for raising watermelons which weighed from twenty-five to forty-five pounds apiece. Holes are dug two feet square and eighteen inches deep, twelve feet apart, filled with fresh stable manure tramped down, the surrounding soil drawn over; or better still, fresh soil from the woods or corners of fences, mixed with road sand. Make the hill of the shape of an inverted saucer, a little well-rotted manure or guano being slightly raked in, and some coal dust applied to absorb the sun's rays, which also prevents a crust from being formed. Let no grass or weeds appear, and never disturb the vines when the dew is on them. The

best varieties are Orange, Bankright, and Bradford.

WHEAT, To Prevent Mildew in.—Dissolve three ounces and two drachms of sulphate of copper, copperas, or blue vitriol, in three gallons and three quarts, wine measure, of cold water, for every three bushels of grain that is to be prepared. Into another vessel, capable of containing fifty-three to seventy-nine wine gallons, throw from three to four bushels of wheat, into which the prepared liquid is poured, until it rises five or six inches above the grain. Stir it thoroughly, and carefully remove all that swims on the surface. After it has remained half an hour in the preparation, throw the wheat into a basket that will allow the water to escape, but not the grain. It ought then to be immediately washed in rain, or pure water, which will prevent any risk of its injuring the germ, and afterwards the seed ought to be dried before it is put in the ground. It may be preserved in this shape for months.

WHEAT, to Prevent Rust in.—Some hours—at the longest six or eight before sowing—prepare a steep of three measures of powdered quicklime, and ten measures of cattle urine. Pour two quarts of this upon a peck of wheat, stir with a spade until every kernel is covered white with it. By using wheat so prepared, rust of every kind will be avoided. I have often noticed, while in the neighboring fields, a great part of the crop is affected by rust; in mine, lying closely by it, not a single ear so affected could be found.

The same writer says he takes the sheaves and beats off the ripest kernels with a stick, and uses the grain thus obtained for seed.

WHEAT (Slugs Upon), to Destroy.—Collect a number of lean ducks, keep them all day without food, and turn them in the field toward evening; each duck would devour the slugs much faster than a man could collect them, and they soon would get very fat for the market.

WORMS, Wire.—For the protection of grain crops against wire-worms we advise the sowing of six bushels of salt per acre, just as the plants are coming through.



STRAWBERRY CROWN BORER.



BOTS IN HORSES.

See page 91.



RASPBERRY GALL BEETLE.



WIRE WORM LARVA.

See pages 368-560.



WIRE WORM MOTHE.

See pages 368-560.



PEA WEEVIL LARVA.

See page 382.



PEA WEEVIL.

See page 382.

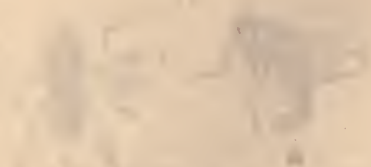


RASPBERRY GALL.



RASPBERRY BORER.

See page 406.



Phaenocarpa
caesia



Phaenocarpa
caesia



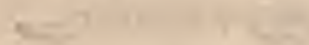
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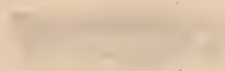
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Miscellaneous and Useful Knowledge

AXLE-GREASE.—1. Water, 1 gallon; soda, $\frac{1}{2}$ pound; palm oil, 10 pounds. Mix by heat, and stir till nearly cold.

2. Water, rape oil, of each 1 gallon; soda, $\frac{1}{2}$ pound; palm oil, $\frac{1}{4}$ pound.

3. Water, 1 gallon; tallow, 3 pounds; palm oil, 6 pounds; soda, $\frac{1}{2}$ pound. Heat to 210° Fahrenheit and stir until cool.

4. Tallow, 8 pounds; palm oil, 10 pounds; plumbago, 1 pound. Makes a good lubricator for wagon axles.

BEANS, to Shell Easy.—Pour upon the pods a quantity of scalding water, and the beans will slip very easily from the pod. By pouring scalding water on apples the skin may be easily slipped off, and much labor saved.

BED-TICKS, to Clean.—Apply Poland starch, by rubbing it on thick with a wet cloth. Place it in the sun. When dry, rub it if necessary. The soiled part will be clean as new.

CARPETS, to Wash.—Shake and beat it well; lay it upon the floor and tack it firmly; then with a clean flannel wash it over with a quart of bullock's gall mixed with three quarts of soft cold water, and rub it off with a clean flannel or house-cloth. Any particular dirty spot should be rubbed with pure gall.

CARPETS, to Clean.—Before proceeding to sweep a carpet a few handfuls of waste tea-leaves should be sprinkled over it. A stiff hair broom or brush should be employed, unless the carpet is very dirty, when a whisk or carpet-broom should be used first, followed by another made of hair, to take off the loose dust. The frequent use of a stiff carpet-broom soon wears off the beauty of the best carpet. An ordinary clothes brush is best adapted for superior carpets. When carpets are very dirty they should be cleaned by shaking and beating.

Beat it well with a stick in the usual manner until all the dust is removed, then

take out the stains, if any, with lemon or sorrel-juice. When thoroughly dry rub it all over with the crum of a hot wheat-en loaf, and if the weather is very fine, let hang out in the open air for a night or two. This treatment will revive the colors, and make the carpet appear equal to new.

CARPETS, Spots on.—A few drops of carbonate of ammonia, and a small quantity of warm rain water, will prove a safe and easy antacid, etc., and will change, if carefully applied, discolored spots upon carpets, and indeed, all spots, whether produced by acids or alkalies. If one has the misfortune to have a carpet injured by whitewash, this will immediately restore it.

CARPETS, Ink Spots, to Remove.—As soon as the ink has been spilled, take up as much as you can with a sponge, and then pour on cold water repeatedly, still taking up the liquid; next rub the place with a little wet oxalic acid or salt of sorrel, and wash it off immediately with cold water, and then rub on some hartshorn.

CLOTH, Cleaning and Scouring of.—The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, etc., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, etc., with it, and to rub them well with a stiff brush, until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark-colored cloths the common practice is to

add some fuller's-earth to the mixture of soap and gall. When nearly dry, the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, is passed several times over it, which will give it a superior finish. Cloth may also be cleaned in the dry way, as follows: First, remove the spots, as above, and, when the parts have dried, strew clean, damp sand over it, and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out, and bring the dirt with it. Black cloth which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. Scarlet cloth requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water, to which a tablespoonful or two of solution of tin has been added. If much faded, it should be dipped in a scarlet dye-bath. Buff cloth is generally cleansed by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

CLOTH, Renovation of.—The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the thread-bare parts rubbed with a half-worn hatter's card, filled with flocks, or with a teasle or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded, it is usual to give it a dip, as it is called, or to pass it through a dye-bath, to freshen up the color.

CLOTH, To Revive the Color of Black. If a coat, clean it well, then boil from two to four ounces of logwood in your copper, or boiler for half an hour; dip your coat in warm water, and squeeze it as dry as you can; then put it into the copper and boil it for half an hour. Take it out, and add a piece of green copperas, about the size of a horse-bean; boil it another half hour, then draw it, and hang it in the air for an hour or two; take it down, rinse it in two or three cold waters; dry it, and let it be well brushed with a soft brush, over which a drop or

two of the oil of olives has been rubbed, then stroke your coat regularly over.

CRAPE, To Restore.—Skimmed milk and water, with a little bit of glue in it, made scalding-hot, is excellent to restore rusty Italian crape. It clapped and pulled dry like muslin, it will look as good as new; or, brush the veil till all the dust is removed, then fold it lengthwise, and roll it smoothly and tightly on a roller. Steam it till it is thoroughly dampened, and dry on the roller.

DYEING, General Principles of.—Dyeing is a chemical process, and the mode of its performance depends upon the substance operated on. Thus, it is found that the process by which wool is dyed black would only impart a rusty brown to linen. Wool unites with almost all coloring matters with great facility, silk in the next degree, cotton less easily than silk, and linen with even more difficulty. Preparatory to the operation of dyeing, each of these substances undergoes a species of preparation to free the fibres from adhering foreign matter, as dirt, grease, etc., which would prevent the absorption of the aqueous fluid to be afterwards applied, as well as impair the brilliancy of the edge. Wool is cleaned or scoured by means of a weak alkaline lye, soap and water, or putrid urine; the latter being very generally used for this purpose. Silk is cleaned from the natural varnish that covers it, by boiling with white soap and water. Cotton and linen are cleaned with alkaline lyes of more or less density. The substances so prepared are ready to undergo the various operations of dyeing.

Among the various coloring materials employed by dyers, some impart their tints to different substances by simple immersion in their infusions or decoctions, and have hence been called substantive colors; but by far the greater number only impart a fugitive dye, unless the fibres of the stuff have been previously filled with some substance which has a strong affinity for the latter on the one hand, and the coloring material on the other. The substances applied with this intention are called "mordants," and generally exercise the double property of fixing and striking the color. Thus, if calico be dyed with a decoction of madder, it will only receive a fugitive and

dirty red tinge, but if it first be run through a solution of acetate of alumina, dried at a high temperature, washed, and then run through a madder bath, it will come out of a permanent and lively red. The principal of mordants are the acetates of iron and alumina, sulphate of iron alum, and some other chemical salts. A perfect knowledge of the behavior of mordants, with different coloring substances, is of paramount importance to the dyer.

After having received the proper mordants, the goods are dried and rinsed, after which they are passed for a shorter or longer time through an infusion, decoction, or solution of the dyeing materials which constitute the dye-bath, they are again dried and rinsed. In many cases the immersion in the dye-bath is repeated, either with the same materials or others, to vary or modify the color. After the substances have been properly dyed, they are subjected to a thorough rinsing or washing in soft water, until the latter runs off uncolored.

DYES (Aniline), General Rules.—It is very important, especially when light and bright shades of aniline colors are required, to have a pure water-bath, free from all foreign ingredients, which may be injurious to the dye.

In dyeing with aniline colors, it is essential to use only wooden or tin vessels; copper or iron is very injurious to the color. For family dyeing, any earthen or enameled basin will do.

When sulphuric acid is mentioned in our recipes, the common commercial quality is meant.

Where woolen yarns contain much grease, it is important to wash them well in a bath of soda and soap, at a temperature of 100° to 120° Fahr.

In speaking of temperature, the Fahrenheit scale is always understood.

DYES, Anilines, Quantity to be Used.—One pound of aniline dyes the following quantity of goods a medium shade:

Aniline Red—One ounce dyes 19 pounds wool, or 12½ pounds of cotton, or 9½ pounds of silk.

Crimson—Same proportion as aniline red.

Blue or Violet—One ounce dyes 15½ pounds of wool, or 9½ pounds of cotton, or 7½ pound of silk.

Brown or Yellow—One ounce dyes 11½ pounds of wool, or 7½ pounds of silk.

Green, oxidized Powder—One ounce dyes 3¾ pounds of silk (night green).

Green, Iodine Paste—One ounce dyes ¾ of a pound silk (atlas night green).

Picric Acid—One ounce dyes 16 pounds of wool or silk, yellow; 17½ to 18 pounds of wool, green, according to shade.

DYES, Aniline Blue, Soluble in Water—Reddish Blue, or Blue de Lyons. Bluish Blue, or Blue Blue. English Opal, or night Blue.

Dissolve the blues by boiling in sufficient water, and filter the solution through paper, flannel or shirting. If a sediment remains mix it with sulphuric acid, and boil again with more water.

DYEING, on Wool.—*Recipe a.* For every twenty pounds of goods mix one-half pound of good starch with cold water, so as to make a thick paste, then add to it 1¼ pounds of sulphuric acid, and put the whole with the dye, into the bath; stir and let it boil well before taking the goods into it. This recipe is liked well for both light and dark shades.

Recipe b. For every ten pounds of goods add to the bath one-half to one pound dissolved gum arabic; then sour the bath with sulphuric acid till it obtains a perceptibly sour or biting taste. The goods are then dyed in the usual manner, but care must be taken in not adding the dye all at once; it has to be done in two or three installments, letting the goods boil a few minutes during the intervals. The bath will at first show a very light appearance, which must not induce the dyer to add too much of the dye, because the color develops itself during the process of dyeing, particularly through the boiling, which results in the fine, intensive and even color of the goods. The use of gum arabic has proved successful in obtaining the utmost beauty and clearness of color, and at the same time the utmost use of all the dye.

If the bath after using it once, is to be used for the second lot of goods, only one-half to three-fourths pound of gum arabic, and of course proportionately less sulphuric acid than in the first instance need be added: and for the third lot only half the quantity of gum arabic as

for the second lot is necessary; and for all the following lots, same proportion, three-eighths of a pound of gum arabic, is sufficient.

For this process the cheap sulphuric acid is entirely sufficient, and the dearer mordants, such as oxalic acid and chloride of tin, become unnecessary. Boiling for about one hour suffices to dye a lot of goods. Begin with a cold bath, and gradually heat it to the boiling point. More sulphuric acid shades the color off into a bluish tint.

To avoid the crocking (rubbing off) of the color, which circumstance is sometimes causing complaints, give, after dyeing, a lukewarm water-bath, in which, for every ten pounds of goods, one-fourth pound of cream tartar has been dissolved. Turn them five or six times in such bath, and dry them without further washing.

On woolens which have to be scoured, dye a deeper shade than wanted, because the scouring takes off two shades of the color.

DYEING, on Cotton.—Recipes *a* and *b*, for fuchsine, are also applicable to blues, adding the dissolved blue gradually, so as to obtain even shades.

A little alum, or sulphuric acid, added to the dye-bath, heightens the brilliancy of the color.

DYEING, on Silk.—Prepare the silk with Marseilles (castile) soap; sour the bath with sulphuric or tartaric acid. Dye and stiffen with fuchsine.

DYES (Aniline), Black, on Wool.—For two pounds of wool a bath is prepared of twenty quarts of water, three ounces of permanganate of potassa, four and a half ounces of sulphate of magnesia.

The use of sulphate of magnesia has for its object to prevent the formation of caustic alkali, and has already been proposed by Tessie du Mothay. The wool is impregnated with this solution, and left it until the fluid has become colorless or nearly so, whereby it is colored dark-brown and covered with brown oxide of manganese.

This process takes place easily in the cold, but it is best to dissolve the permanganate in hot water. The wool is now pressed out, and without washing conveyed into a bath of twelve ounces of commercial aniline oil; twenty-one

ounces of commercial hydrochlor. acid, eight quarts of water, where it is moved about in the cold: it attains here directly a dark green-black-appearing color. It is pressed out again, washed in water containing a little soda, and treated with a weak solution of red chromate of potassa.

This solution is prepared by dissolving one-third of an ounce of bichromate of potassa in ten quarts of water. The color becomes now dark black, when the wool is washed with water and dyed.

DYES, Aniline, Orange, or Corallin.—Dissolve by boiling one pound carefully in ten pounds best alcohol.

DYEING, On Wool.—Wash the wool well; bring the bath to nearly the boiling point; add the dissolved dye gradually, and it will readily go on the fibre.

DYEING, On Silks.—Add to the water bath (temperature 100° Fahr.) a solution of Marseilles (castile) soap. Take the silk through it, raising the temperature to 130°; then add the dissolved orange to this bath, heating it gradually. When the silk has taken the color, add to the bath a little sulphuric acid, which sets it on the fibre; then handle the silk quickly, heating the bath to 170°, but not higher. Wash well after dyeing.

DYEING, On Cotton.—Same as for wool.

DYE, Aniline Red, or Fuchsine.—*a*. Aniline red (roseine), a bright red, used extensively, and answering all common purposes.

b. Aniline red, diamond crystal, preferred for silk and fine woolens, giving a still more brilliant shade than roseine.

Dissolve the crystals in the proportion of one ounce to twelve pounds of water, in a stone jar, by pouring boiling water into it gradually, stirring it well meanwhile, till all is dissolved. Then, after the solution has become cool, filter it before use through paper, muslin, or flannel, to avoid specks on the fibre. The sediment on the filter can be boiled again, and will gradually dissolve almost entirely,

You can also dissolve the red readily in 95° alcohol. One ounce crystals to one-fourth pound alcohol.

DYEING, On Wool.—Prepare a bath of a temperature of 150° to 160°; put into

it as much of the dissolved dye as will give you the desired shade, and then put in your goods, which, after a lapse of twenty or thirty minutes, will be completely dyed. Wash the goods only slightly, after dyeing, in pure water.

DYEING, On Silks.—Prepare the silk by carefully washing it in a solution of Marseilles (castile) soap. Dye in a luke-warm (about 95°) bath, adding the dissolved fuchsine gradually; the silk will take the color readily and rapidly. In order to intensify and increase the brilliancy of the color, wash the silk in a bath soured by sulphuric acid, or, better, tartaric acid, after dyeing. If the goods or ribbons require any stiffening, put them through a bath containing a little dissolved gelatine or gum arabic.

DYEING, On Cotton.—*a.* With soap. Boil three-eighths of a pound of soft soap for every ten pounds of goods in water, with an addition of a little olive oil; make a concentrated bath of it in a small vat, at 120° , turn the goods five times, and let them lie in it one hour. Then wring three times, and wash them in cold water, to which is added one-fourth ounce sulphuric acid for every twenty-five pounds of goods. Turn four times, then wring four times, and dye with fuchsine in a third bath, giving the dye into the bath gradually, which is necessary to get an even shade.

b. With sumac. Boil a decoction of one-half pound of good sumac (Sicily) for every ten pounds of goods. Filter the solution and pour it into a small water-bath, temperature 140° to 150° . Turn the goods five times, and let them lie in it one hour. Wring three times, then dye with fuchsine, in a second bath, just as in the above. For dark shades a little more sumac may be used, but not more than five or six ounces for every ten pounds of goods. Too much of it would make the color too yellowish. If several lots are prepared in the same sumac-bath, take proportionately less sumac for the second and third lots than for the first. The sumac decoction must not be too old; if it has become sour it is useless for fuchsine dyeing. Do not prepare more than three lots without renewing the sumac-bath.

DYE, Aniline, Yellow.—This color dissolves entirely by simply boiling it in water and filtering it

DYEING, On Silk.—Add the solution to a water-bath, soured by some acetic or sulphuric acid, and dye at a temperature of 140° to 170° .

DYEING, On Wool.—Dye same way as for silk, only sour the bath with sulphuric or oxalic acid.

You can obtain every shade, from orange to cherry-red, by shading off the yellow of aniline with fuchsine. An addition of dissolved Marseilles soap will heighten the brilliancy of the color.

ALDEHYD, Green Powder, or Night Green.—The best means for dissolving this color is sulphuric acid. Take for every ounce of powder about one ounce of sulphuric acid, 66° Beaume, or in proportion for every dram of powder, about one dram of sulphuric acid. Stir well, and put the mixture either at once into the hot dye-bath, or else dissolve it before doing so in a rather large quantity of hot water.

DYEING, On Wool, Flannels, etc.—Prepare the goods as follows: Mix one ounce chloride of lime in cold water, then add about six pounds of water to it, and let it settle. Draw off the clear solution, and bringing it up to 90° or 100° Fahrenheit, put in the yarn, which must have been well washed and be still moist; draw it through for fifteen minutes, then let the yarn cool off, wash again, and put into a new bath of 100° Fahrenheit, which contains for every 6 pounds of water, one ounce of hyposulphate of soda. Draw the yarn through this bath also for fifteen minutes, let it cool, and then wash again thoroughly.

Woolens or yarns prepared in this way will then dye in the green bath without further additions of mordant, and at a temperature of the dye-bath of about 175° Fahrenheit. In order to obtain light and yellowish shades, add picric acid, which by itself dyes yellow. The preparation must be moderated more or less, according to the desired shade; at all events, it must be done carefully and slightly, so as not to injure the goods.

DYEING, On Silk.—Prepare the silk by careful washing in a solution of Marseilles white (castile) soap. Dye at a temperature of 125° to 175° Fahrenheit; add the dissolved dye-stuff gradually to the bath, when the silk will take the color

easily and rapidly. In order to intensify and increase the brilliancy of the color, wash the silk in a bath slightly soured by sulphuric acid, or, better, cream tartar, after dyeing. If the goods or ribbons require any stiffening, put them through a bath containing a little dissolved gelatine or gum arabic. Add picric acid to obtain yellowish tints.

DYE, Bismarck Brown.—This color has become very popular, not only by its own beauty, as a bright brown, but also by combining readily with fuchsine in topping, when it yields splendid garnet and maroon shades.

Dissolve by adding sufficient warm water to dampen the color, pouring on it more water gradually till it is all dissolved. It is important to observe great care in dissolving; if the water is poured on too fast, the color will not dissolve, but remain as sediment at the bottom of the vessel.

DYEING, On Wool.—Prepare a hot water-bath and add the color; the goods will dye readily. For maroon and garnet, dye first with fuchsine, or mock crimson, and top off with the Bismarck.

DYEING, On Silk and Cotton.—Same recipes as for fuchsine, but add no acid to the dye-bath, and give the dissolved color to the bath in three or four installments, so as to obtain even shades.

DYE, Crimson.—A kind of cherry color is produced by this dye. Dissolve and dye exactly like aniline red or fuchsine.

DYE, Hoffman's Violet or Purple.—Soluble in water. No. 1, reddish shade of purple; No. 2, medium shade of purple; No. 3, blueish shade of purple.

The water soluble Hoffman's are dissolved by boiling in sufficient pure water.

Dampen first with a little boiling water, in order to prevent a caking of the dye. Add gradually more till all is dissolved. Filter the solution through paper, flannel or shirting.

These Hoffman violets, soluble in water, are very valuable, not only by reason of their very brilliant shades, but also by the very simple method of dyeing.

DYEING, On Wool.—The color is dyed like fuchsine, without any acids whatever, only the bath, to which the dye has been added, is brought to the boiling point. Any shade of the primula flower can be obtained, and the simplicity of

the process of dyeing has made it also very popular in Europe for family dyeing. It has proved very successful for all Hoffman's soluble in water, to add to the bath, together with the dye for every ten pounds of goods, one pound of dissolved gum arabic, which helps to make the color even and fast on the fibre.

Splendid gray tints are also obtained, if you dye the wool only a light tint.

DYEING, On Cotton.—Same recipes as for fuchsine.

DYEING, On Silk.—Same recipes as for fuchsine, but add only a little acid to the dye-bath, and give the dissolved color to the bath in three or four installments, so as to obtain even shades.

DYE, Iodine Green, New Atlas Green, OR VERT DE CHINE IN PASTE AND CRYSTALS.—Dissolves in water—four pounds water to one-half pound of paste; fifty pounds water to one-half pound of crystals.

DYEING, On Wool.—Two separate baths are required, viz.:

a. An alkali bath, in which the wool takes the dissolved dye-stuff, but remains still colorless.

b. A sour bath, in which the dye-stuff is fixed and developed upon the fibre.

For bath *a*, you take three to four pounds silicate of soda for every ten pounds of goods; add the dissolved dye and manipulate the wool in this bath at about 150° to 160° Fahrenheit. The wool ought not to show any color in this bath; if it does, more silicate must be added.

Bath *b* contains only water, soured by acetic acid; temperature about 150° to 160° Fahrenheit. A little tannin is added to make the color fast.

In order to find how far the wool has been dyed in bath *a*, you take out a small sample skein, rinse it a little, and put in the sour bath *b*, when it will instantly turn green. In case the sample does not show the desirable strength, then the wool must remain in bath *a* till this is the case. Exact shade, according to sample, is indispensably necessary, because the wool cannot be taken back into bath *a* from the sour bath *b*.

As soon as the sample shows the desired strength of color, take the wool out of bath *a*, let it drip off well over the bath, in order not to lose any dye-stuff,

and rinse a little; put it in bath *b*, where the color develops vividly. Bath *a* can never be exhausted, but, like an indigo bath, can be used constantly, with proportionate additions, to supply the used-up-dye-stuff and silicate.

Do not be frightened by the apparent tediousness of manipulation; the result recompenses for the same, and by correct use you obtain a chemical combination of the color with the fibre, very different in results from the present dyeing, which touches the surface only. All shades, from the lightest to the darkest, can be produced.

Picric acid, or, still better, flavine, is used to shade the green into desired yellowish tints and added to bath *b*, but care must be taken to prevent specks; then wash and dry. One-half a pound of paste will dye five pounds of goods a full medium shade. One-half pound of crystals, from thirty-five to thirty-seven and one-half pounds.

Some have found it still better to dye the flavine bottom first, and then to top it with the iodine green, as above, getting more full shades by it.

DYEING, on Silk.—Prepare the silk, by carefully washing it in a solution of Marseilles (castile) soap. Dye in a bath of 95° temperature. Sour the bath slightly by acetic acid. Add the dye in three to four installments; the silk will readily take the color.

If the goods or ribbons require any stiffening, put them through a bath containing a little dissolved gelatine or gum arabic.

DYE (Napthaline), Bismarck Brown.—Gives very brilliant goldish brown tints. Dissolve, and dye the same as Bismarck brown.

DYE (Picric Acid), Crystals and Powder.—This color has become very important in dyeing, not only bright-yellow shades, but also brilliant greens and drabs, on wool and silk.

Picric dissolves readily in boiling water, and dyes quickly and evenly in sour baths, avoiding the trouble which fustic and other yellow dyes often give. Besides brilliancy of color, it facilitates correctness in shading off, a very important point where samples have to be matched. Use either wooden or cop-

per vessels; in tin the color becomes dull.

DYEING, Green, with Picric, on Wool.—Purify the water-bath at per general rules above; add for every five pounds of woollens, one-half pound of alum, one-half pound glauber salts, about one ounce sulphuric acid, and as much indigo, carmine, and picric acid as the desired shade of green requires. Let the bath boil, and mix together for a few minutes before dipping the goods in. Dye as usual at the boiling point, for about three-quarters of an hour. By adding a proportionately larger quantity of indigo, carmine, and less picric, or *vice versa*, a more bluish or yellowish green will be produced. In short, any shade of green can be obtained. Picric acid yields a great deal of color; care must therefore be had in using it.

DYEING, Drab Colors with Picric on Wool.—Sour the bath as above, omitting the alum, and add the picric acid, together with the indigo, carmine, archil or cudbear.

DYEING, Yellow, with Picric on Wool.—Sour the bath and dye as above for green, omitting the carmine of indigo.

DYEING, Green, with Picric on Silk.—Prepare the silk as fuchsine, and add the carmine of indigo and picric acid to the bath, which has been soured by sulphuric acid. For silk dyers, take a neutral picric (free from acid) which is preferred for many purposes.

DYE (Saffranine), Aniline.—A rose pink on silk or wool dissolves very readily in boiling water, and has to be carefully filtered before adding it to the dye-bath.

DYEING, on Wool.—The same as fuchsine.

DYEING, on Silk.—For dyeing on silk, add the color to a bath in which you have dissolved some castile soap, and dye, keeping the bath lukewarm.

SCARLET of Aniline.—Dissolve in boiling water only, one pound of scarlet to twenty pounds of water.

DYEING, on Wool.—Add to the boiling bath for ten pounds of wool, two pounds of Epsom salts, one ounce of boracic acid, and as much of the dissolved dye as the light or dark shade you want to get requires. Keeping the goods in the bath on the boiling point one-quarter to

half an hour dyes the color thoroughly on the fibre. If you add sulphuric acid to the same dye-bath, and turn the goods in it, you can change the scarlet into a bright orange.

DYEING, on Silk.—Dye exactly like the orange, but do not add any sulphuric acid to the bath.

DYE (Catechu), Brown.—Steep four ounces catechu and half an ounce blue vitriol about one hour in a brass or copper kettle, with the amount of water deemed necessary to work in easily. Then put in the goods and steep, at a scalding heat, from five to ten hours, stirring often, and adding water from time to time to make up for the loss in steam. Lift out, cool, rinse in clean water, and dry. If the color is not dark enough, make a bath, using half an ounce of bichromate of potash in five or six gallons of water, and steep the goods in it, at a scalding heat, one hour, stirring often. Lift out, cool, rinse, and dry. This is sufficient for two pounds of cotton.

DYE (Chemic), Blue, to Make.—Chemic for light blue and green, on silk, cotton, or woolen, and for cleaning and whitening cottons, is made by the following process:

Take one pound of oil of vitriol, which pour upon one ounce of the best Spanish flora indigo, well pounded and sifted; add to this, after it has been well stirred, a small lump of common pearlash as big as a pea, or from that to the size of two peas; this will immediately raise a great fermentation, and cause the indigo to dissolve in more minute and finer particles than otherwise. As soon as this fermentation ceases, put it into a bottle, tightly corked, and it may be used the next day. If more than the quantity of pearlash be used, it will deaden and sully the color.

DYE (Chemic), Green.—This is made the same as chemic blue, by adding one-fourth more of oil of vitriol. If the chemic is to be used for woolen, East India indigo will answer the purpose even better than Spanish indigo, and at a less price; but the oil of vitriol is good for both green and blue.

DYE COLORS, to Discharge.—The dyers generally put all colored silk which are to be discharged into a copper,

in which half a pound of white soap has been dissolved. They are then to be boiled off. The copper beginning to be full of color, the silks are taken out and rinsed in warm water. In the *interim*, a fresh solution of soap is to be added to the copper, and then proceed as before, till all the color is discharged.

DYE, Compound Colors.—Compound colors are produced by mixing together two simple ones; or, which is the same thing, by dyeing cloth first of the simple color, and then by another. These colors vary to affinity, according to the proportion of the ingredients employed. From blue, red, and yellow, red-olives and greenish-grays are made.

From blue, red, and brown, olives are made, from the lightest to the darkest shades; and by giving a greater shade of red, the slated and lavender-grays are made.

From blue, red, and black, grays of all shades are made, such as sage, pigeon, slate, and lead grays. The king's or prince's color is duller than usual; this mixture produces a variety of hues, or colors almost to infinity.

From yellow, blue, and brown, are made the goose-dung and olives of all kinds.

From brown, blue, and black, are produced brown-olives and their shades.

From the red, yellow, and brown, are derived the orange, gold-color, feuille-mort, or faded leaf, dead carnations, cinnamon, fawn, and tobacco, by using two or three of the colors as required.

From yellow, red and black, browns of every shade are made.

From the blue and yellow, greens of all shades.

From red and blue, purples of all kinds are formed.

DYE, Crimson, a Shawl to.—Take about a table-spoonful of cudbear; put it into a small pan, pour boiling water upon it, stir and let it stand a few minutes, then put in your silk, and turn it over a short time, and when the color is full enough, take it out; but if it should require more violet or crimson, add a tea-spoonful or two of purple archil to some warm water, and dry it within doors. To finish it, it must be mangled or calendered, and may be pressed, if such a convenience is at hand.

DYEING, Cotton with Madder as Practiced at Smyrna.—Cotton, at Smyrna, Mr. Eton tells us, is dyed with madder in the following manner: The cotton is boiled in common olive oil, and then in mild alkali; being thus cleaned, it will take the madder dye; and this is the fine color so greatly admired in Smyrna cotton yarn. "I have heard," adds the gentleman, "that the sum of five thousand pounds was given in England for this secret!" It is, doubtless a secret in preparing cottons, and perhaps other articles, for the reception of a particular dye, very well worth knowing.

DYE, Gray.—Sumach, two pounds; logwood, one pound; make a decoction with water, pass the stuff through it, and afterwards through weak iron water (sulphate or acetate); lastly, add a little iron liquor to the decoction, and again turn the stuff through it. This gives a pearl gray.

a. Dissolve one pound of tartar in four gallons of water, turn the stuff through the liquor for half an hour; add a decoction of galls one-fourth of a pound, and sumach one and one-half pounds; put in the stuff and boil for half an hour; then take out the stuff, add sulphate of iron one pound, and when dissolved again, put it in, and work it well for an half hour longer. Ash gray. This will dye fifteen to twenty-five pounds of wool.

b. Galls bruised, two pounds; wine-stone, one pound; water, sixteen gallons, boil for thirty minutes, then put in the stuff and work it well for half an hour; take it out, add three pounds of green copperas, and when dissolved again, put in the goods and work them well. Ash gray. This will dye sixty to seventy pounds of wool. The addition of a little alum converts this into a mouse gray.

c. Pass the stuff through a weak fustic bath, and next through a very weak decoction of galls, to which a little alum has been added; then remove the goods, refresh the bath with a little logwood, boil half an hour, add some blue and green vitriol, and when dissolved, finish the stuff therein. Yellowish gray.

d. Give the stuff a pale blue tint in the indigo bath, then pass it through a weak decoction of galls and sumach, take it

out, add a little iron liquor to the bath, and work the stuff well through it. In this way may be given every shade of iron gray, slate gray, and the other shades that turn upon the blue.

DYE, How to take the Stains from the Hands.—Take a small quantity of the oil of vitriol, pour it in some cold water, in a wash-hand basin, and wash your hands with it, without soap; the dye will then come off. You may afterwards cleanse them completely in hot soap and water, taking care that all the acid is washed away before the soap is applied.

DYE, Indigo Blue for Yarn.—To dye this beautiful blue, use wine-pipes or some other large casks, sunk in the earth at a depth convenient for the operator to work at. Five of these constitute a set, and are worked together and kept of the same strength. The yarn being worked in quantities of one hundred pounds, twenty pounds are passed through each vat.

Each vat is filled about three-fourths with cold water; there are then added eight pounds of indigo, sixteen pounds of sulphate of iron (copperas), and twenty-four pounds newly-slacked lime. The whole is well-stirred with a rake for half an hour, and this stirring is repeated every hour and a half for the first day.

The stirring must be continued until the solution becomes a rich oak yellow, having large blue veins running through it, and a fine indigo froth on the surface. When these signs are all favorable, the solution is allowed to stand for several hours till all the solid matter settles, when it is ready for use.

The mode of dyeing consists in simply immersing the goods, and working them in the solution for fifteen minutes, taking out and wringing or pressing, and then exposing to the air; repeating this operation until the desired depth of color is obtained. The yarn is then washed in cold water and dried. When the shade required is very deep, the yarn may, previous to washing, be passed through a tub of water acidulated with vitriol till it tastes acid, and then washed; this adds brilliancy to the color.

DYEING, Kid Gloves.—In dyeing kid gloves the first thing needed is an iron hand on which the glove is drawn. If the glove is to be dyed black, it is first

brushed over with alcohol and allowed to dry; it is then immersed in a decoction of campeachy wood for a few moments, and the operation is repeated in ten minutes, and in ten minutes more it is brushed over with a solution of green vitriol. If the color is not dark enough a decoction of fustic or quercitron is added to the campeachy solution. Instead of sulphate of iron the nitrate can be used with advantage. When the glove begins to dry it is rubbed with olive-oil and soap-stone and then laid between folds of flannel and pressed. It is afterward again rubbed with oil and soap-stone, and drawn on the iron hand to dry. A brown is obtained from fustic, campeachy, and camwood, with the addition of some alum. For bright colors the process is far more simple, it being only necessary to paint the glove with a brush or sponge dipped in a solution of aniline dye of the desired color.

DYE, Red.—The various shades of red are given by madder, cochineal, lac-dye, safflower, etc., fixed by aluminous or tin mordants. Less permanent dyes are produced by Brazil-wood, peach-wood, and archil. Safflower contains a yellow as well as a red coloring matter. The first, being soluble in cold water, is extracted by putting the safflower in a bag and kneading it under water. The safflower, thus deprived of yellow matter, yields its red color to alkaline liquids, at the time of using which, lemon juice or some other acid is added sufficient to saturate the alkali. Pink saucers are made by adding lemon juice to the alkaline infusion of washed safflower, and allowing the coloring to deposit. Madder also contains a dun coloring matter, which deteriorates the red, unless previously removed. This may be partially effected by washing it in cold water; another method is to treat the madder with its own weight of sulphuric acid, which carbonizes the other matters, but leaves the red color uninjured. As madder gives out but little of its red coloring matter to water, the decoction is not strained off, but the madder is left in the bath. With acetate of iron madder yields a purple tint. Lac-dye is imported from India; requires acids for its solution.

DYE, Red-Brown.—Remarkably bright, and the cost of the dye is not more than

sixpence. For a middling-sized woman's pelisse, when your copper boils, put in the following dyeing-materials: Half a pound of ground camwood, two ounces of sumac (ground), one ounce of logwood chips, one ounce of elder-bark, two ounces of chipped fustic. A larger quantity of ingredients may be used, but they must be in the same proportion as mentioned in this recipe. When these ingredients have boiled half an hour, cool your copper by throwing in a pint of cold water; put in your goods, and boil from one hour to an hour and a half; take them out, and add from half an ounce to one of green copperas, a teaspoonful of powdered argol, take out your goods, and rinse them in one or two clean waters, and hang in the air to dry; send them to the press to be finished.

DYE, Scarlet.—For one pound of cloth, cream of tartar, one and three-fourths ounce; water, q. s.; boil in block-tin vessel, and when dissolved, add solution of tin (made by dissolving two ounces of grain tin in a mixture of one pound each of nitric acid and water, and one and a half ounce of sal ammoniac) one and three-fourths ounce; boil for three minutes, then introduce the cloth and boil it for two hours; drain and cool. Next, take cream of tartar, one-fourth ounce; water, q. s.; boil, and add powdered cochineal, one ounce; boil for five minutes, then gradually add solution of tin, one ounce, stirring well all the time; lastly, put in the goods and dye as quickly as possible.

FEATHERS, to Dye and Clean.—Feathers, to be dyed, must first be cleaned by passing them through or between the hands, in warm soap and water, and by giving them fresh liquors of soap and water, and at last rinsing them in warm water. Previously to their being dyed, it is necessary that they should be soaked in warm water for several hours. The same degree of heat should be kept up, but the water must be but little more than blood-warm. If for yellows or reds, they must be alumed in cold alum liquor for a day or two, according to the body of color you require the feathers to imbibe; then immerse them in your dye-liquor.

The only difficulty in dyeing feathers

is in compounding the dyeing materials, and making a homogeneous liquor of them, so as to produce the desired shade, after being saddened or made of a dark color by means of green copperas, which is generally used to darken brown grays, blacks, slate colors, etc. Sumach and fustic, or sumach alone, is the general ground of browns, the red, as I have before observed, is obtained by archil, and the black hue by green copperas in warm water; after the feather has been put into the copperas-water, it may be returned again into the dye-water, and back again into the copperas; but care should be taken, each time, that the feather is rinsed from the copperas-water before it is again returned into the dye-liquor, otherwise copperas would spoil it.

The same preparation as would dye silk of the same color will dye feathers; in short, feathers as well as silk, being animal substances, are more alike in nature than any other two bodies, either animal or vegetable. You must remember that in dyeing silks that the water is used hot, or on the simmer, for most colors; but feathers must always be dyed in cold liquors, except for black, the dyeing materials being first boiled, and then left to cool; your feathers must then be put in, and when this liquor is exhausted, add a fresh one, pouring off the old liquor.

Mordants are earthy and metallic compounds, the base of which unites both with the fibres of the material to be dyed and the coloring matter. In calico printing the mordants are formed into a paste, with some gum or other thickening material, and printed with wooden blocks on the cloth, which, after being dried, &c., is passed through the liquid dyes. The coloring matter combines with the parts so printed, but is easily discharged from the other parts. The principal mordants are the following:

Mordant, Alum, an alum, with one-fourth its weight of tartar, *acetate of alumina*. This is commonly prepared in a solution for this purpose; one hundred and fifty parts of alum, in pyrolignite of lime of twenty degrees density, is sometimes employed.

b. A solution of alum with crystallized

carbonate of soda, in the proportion of one ounce to each pound of alum.

c. This is a solution of alum with sufficient strong solution of caustic potash to re-dissolve the precipitated alumina, to which mixture a portion of linseed oil is added.

d. To fifty gallons of boiling water add one hundred pounds of alum; dissolve, and add slowly ten pounds of crystallized carbonate of soda. When the effervescence is over add seventy-five pounds of sugar of lead.

MORDANT, a Protochloride of Tin.

—**a.** To strong muriatic acid add gradually small pieces of grain tin till no more is dissolved. It may be obtained in crystals by evaporation. In dissolving them, it is necessary to add to the water a few drops of muriatic acid.

b. Nitro-muriate, or perchloride of tin. Mix one measure of nitric acid with four of muriatic acid, and add tin in small quantities as long as any is dissolved. Or mix four ounces of muriatic with one of nitric acid and one of water; dissolve in it, by small portions at a time, two drachms of grain tin.

c. Aquafortis (or equal portions of nitric acid and water) eight parts; sal ammoniac, one part; mix, and add gradually one part, or as much as it will dissolve, of grain tin.

d. Dr. Bancroft's murio-sulphate of tin. Digest two parts of tin with three of strong muriatic acid for an hour. Add very cautiously one and one-half part of oil of vitriol. Keep up the heat as long as hydrogen is evolved; on cooling, it crystallizes. Dissolve this in salt and water, so as to form a solution containing one part of tin in eight.

e. New tin crystals. Add three pounds of sal ammoniac to a gallon of solution of tin; evaporate and crystallize.

f. Mordant for lac-dye. Mix twenty-seven pounds of muriatic acid with one and one-half pounds of nitric acid (sp. gr. 1.19.), put into a stone bottle, and add in small bits, till four pounds are dissolved.

g. Stannate of soda. Digest litharge thirty-six parts, or minium twenty-seven parts, in a metallic vessel, with a soda lye of one and thirty-five one hundredths density; when dissolved, eight parts of tin in grains are gradually added. The

lead separates at once in a spongy state, and the solution of stannate of soda may be decanted.

h. Lac Spirit, used as solvent for lac-dye, in preference to muriatic acid alone, is thus made: Add gradually three pounds of tin to sixty pounds of muriatic acid. Digest three-fourths of a pound of this solvent on each pound of the dye for six hours. Plum or puce spirit, peach spirit, and grain or scarlet spirit, are names given by dyers to different solutions of tin employed in dyeing these colors. For scarlet, the nitro-muriatic solutions (Nos. 2 and 3, above) are used.

i. Iron Liquor. Scraps of iron are placed in casks or other vessels, are covered with rectified raw pyroligneous acid. There are usually a series of vessels, through which the solution is successively passed till it is fully saturated.

FEATHERS, To Clean and Curl.—

White soap must be used (curd will answer best), cut into small pieces, upon which boiling water should be poured until it be quite dissolved, a small quantity of pearlash being added. When the latter has sufficiently cooled for the hand to bear its temperature, the feathers may be drawn through it. This should be repeated several times, and the feathers gently pressed with the hand, or carefully passed between the fingers a few times, so that the dirt may be squeezed out of them. Another lather containing less soap must now be prepared, and used in the same manner. On removing the feathers from this, they should be well rinsed in cold water, and the water taken from them by beating them against the hand or a clean cloth, and then waving them backward and forward in the air a short distance from the fire. Before they are quite dry, with a pen-knife curl each fibre separately, by drawing it carefully over the edge of the blade, which should be a blunt one. If it be wished that the feather should be flat, it may be pressed in drying, after the curl is given to the fluey part. This process may be used for white feathers and also for fawn-colored, or brown. Black ones may be cleaned with water, adding to it some gall, and following the above directions in all other respects. Feathers of brighter colors cannot be cleaned, but must be re-

dipped, as they usually fade very much by exposure to the sun.

FEATHER BEDS, to Cleanse.—When feather beds become soiled and heavy, they may be made clean and light by being treated in the following manner: Rub them over with a stiff brush, dipped in hot soap-suds. When clean, lay them on a shed, or any other clean place, where the rain will fall on them. When thoroughly soaked, let them dry in a hot sun for six or seven successive days, shaking them up well and turning them over each day. They should be covered over with a thick cloth during the night; if exposed to the night air they will become damp and mildew. This way of washing the bed-ticking and feathers makes them very fresh and light, and is much easier than the old fashioned way of emptying the beds and washing the feathers separately, while it answers quite as well. Care must be taken to dry the bed perfectly before sleeping on it. Hair mattresses that have become hard and dirty, can be made nearly as good as new by ripping them, washing the ticking, and picking the hair free from bunches and keeping it in a dry, airy place several days. Whenever the ticking gets dry, fill it lightly with the hair, and tack it together.

FISH, Culture.—Fishes, whether in the freedom of nature or in artificial receptacles, show plainly enough the approach of spawning. The belly of the female becomes distended and yields readily to pressure. There is a fluctuation under the hand, which shows that the eggs are free from the ovary and easily displaced. This being the case, take up in your left hand a female fish, and hold it suspended by the head and thorax over a flat-bottomed vessel containing clear water. Then with the right hand passed from above downward, squeeze the loosened eggs through the anal opening. A male fish is then taken, and the milt is expressed in the same manner, though often it flows by the mere act of suspending. This substance, white and cream-like, soon gives to water the appearance of whey. To insure effectual fecundation, the mixture in this state should be gently stirred with the hand or with a soft brush. It requires but a few minutes to accomplish the fecundation.

Build your ponds according to the amount of water you have. If you have but little, build small. The water should be changed every twenty-four or forty-eight hours, and the oftener it is changed the better. Your trough should be so arranged that the water will run in at about twelve feet per minute. The water should be filtered by running through gravel or cloth screens, to prevent the sediment from reaching the spawn. Mr. Seth Green, the noted fish culturist, states that he runs about one inch of water over his spawn, and if any sediment gets on them, that it will surely kill them. Remove all sediment with the bearded end of a quill by agitating the water, without touching the spawn.

Large troughs with but little water get too warm in summer and too cold in winter for trout to do well. It is detrimental to have any other fish with trout. Any kind of fish or fish spawn is good for feed. The young should be fed twice a day very slowly—if fed fast, the feed sinks and befouls the trough, and the trout sicken and die. If fed regularly, and the trough kept clean, with a good change of water, and not kept too thick, they will live and do well. If neglected, they will surely die.

The sun, sediment, rats, mice, snails, crawfish, and many water insects are death to spawn.

Mr. Green's troughs are twenty-five feet long and fifteen inches wide. The water that feeds each trough goes through a half-inch hole with a three-inch head. Use fine gravel that has no iron rust in it. His troughs are three inches higher at the head.

Trout hatch the soonest in warm water. The average temperature of the water is forty-five degrees, and the fish hatch in seventy days. Every degree colder or warmer will make a difference of six days in hatching. The sack of their bellies sustain them from forty to forty-five days after hatching; then they need food. Beef liver, chopped with a razor or sharp knife, nearly to the consistency of blood, is good. If you have small streams or shallow water near the bed of your pond, put a few trout in a place in the stream and pond, and they will take care of themselves better than you can. The object of distributing them is that they

will get more food. All old streams and ponds have plenty of food for small trout and large, which you will find by examining the moss, sticks and stones in your ponds and streams, as they are full of water insects.

Trout begin to spawn the first of November, and cease the first of March. Mr. Green furnishes young trout, one inch long, for forty dollars per thousand, delivered at your nearest railway station or express office. They can be carried in barrels or cans any distance when small, and during the months of January, February, and March. Impregnated spawn can be had from November 1st to March 1st, for ten dollars per thousand, shipped in moss. The moss box is placed in a tin pail, filled with saw-dust, so that the spawn will not feel the change of heat and cold. They cannot in safety be shipped in warm weather.

Pick the moss carefully off the top of the spawn. Then put the box in a pan of water and turn it nearly bottom-side up, and pick the moss out very carefully. The spawn will sink to the bottom, and you can pick the moss out of the pan. If there is a little left in it will do no harm. Then pour the spawn in your hatching-trough, by holding the edge of your pan under water, and place them without touching the spawn, by agitating the water with the bearded end of a feather. The dead spawn will turn a milk-white color, and should be picked out.

A few hints to those making it a business may not be out of place here. In selecting a site for fish ponds be very sure that the supply of water is unfailing. The strength of a chain is always measured by the strength of its weakest link. If a spring should give twenty inches of water most of the time, but only one inch in a very dry season, then the flow of that spring is one inch. It has more than once happened that a would-be fish breeder has found his ponds without water, and his beautiful spring dried up. Then, too, it would be exceedingly convenient, though not absolutely necessary, to have such a fall that every pond could be drained, and the pond should be so situated that a rising and overflow of the stream should not overflow the ponds. This cannot be arranged very well if the ponds are made as has been often re-

commended, by dams in the stream itself. They should be made at one side of the stream, taking all the water if required, but leaving the bed of the stream itself as a convenient waste-gate in case of overflow. One dam across the stream will turn the water into the ponds, and the flow can be made even.

The distance of a spring from a market makes but little difference in these days of railroads and refrigerator-cars. But the amount of water and shape of land make much difference. It is also well to own the spring itself, if possible, in order to prevent disputes with other owners, and to have the water always pure.

Ponds for fattening purposes are now generally made small—say about twelve feet wide by twenty-four feet long, either in the shape of a square or of an oval. It is a matter of fact that trout will find more natural food in a large pond than in a small pond. A large pond has also several other advantages over a small pond. For instance, it is more economical to build one large pond than two small ones, and it is less trouble to take care of one race-way and one set of screens than of two. But the fatal defect in large ponds is that the fish cannot be equally fed. The larger and more voracious will follow the feeder as he moves around the ponds, and drive away the smaller and weaker fish. But in a small pond the food can be thrown all over the surface at once, and all the fish have an equal chance.

The materials of which ponds should be constructed vary with the nature of the soil. In heavy clay ground embankments alone are necessary. But in fact so much trouble has been caused by muskrats perforating embankments and liberating the water, that we are tempted to say that embankments alone should never be used. In most soil either stone or wood should be used in construction. If stone is used it should by all means be cemented and the bottom of the pond finished in grout, or large flat stones, with the interstices filled with cement. In order to clean out the lime, water should be run through the pond some weeks before putting in fish. The cement and stone will crack and in time become defaced at the water-line. This may be remedied by a facing of board

along the surface-line. We have lately constructed very good and cheap ponds of rough hemlock boards (our cheapest lumber), and find that they answer exceedingly well. Thirty feet long, four feet wide, and six inches of water will do very well for race-ways to small ponds.

The supply of water necessary to raise trout for market purposes (making it a business) should not be less than thirty or forty inches, and would be better if larger. Adults should be fed regularly once each day. The only rule to be given as to quantity is to feed them till they will eat no more. It is economy to cut the feed finely and feed slowly, as most of that which is not eaten at once will be wasted. A little water should be mixed with the meat, and wetting the knife or cleaver often makes easier chopping, and causes the food to spread evenly when thrown into the pond. Cut the toughest food for the largest fish. Keep your pans, chopping-block, and meat-house clean, and feed your meat before it spoils. It is good economy, before commencing to build ponds, to take the advice of some experienced man, and also to read all obtainable works on the subject. On the main points there will be found very little difference of opinion, and on those comparatively unimportant everybody's experience will help you to form a sound judgment.

A few hints to those raising trout on a small scale, that is, not making it an exclusive business: There are many persons who have trout streams, either wholly or in part on their farms, which streams bring them in no revenue, except an occasional day's amusement. Let us suppose such a stream to be stocked annually with five thousand trout-fry, at an expense of \$100. In about three years the stream will be in full bearing. Let us look at the returns. At the lowest estimate three hundred pounds of trout, worth one dollar per pound at present prices, may be taken from the stream annually. Then, too, there is always a demand for fishing privileges, and in most places such a stream could be let to sportsmen at a profitable advance on the cost of stocking. Besides, if a place is to be sold, a well-stocked trout-stream on the premises will add several dollars per acre to the value of the ground.

Even a little spring rill, across which a man can step, if stocked yearly with a thousand fry, costing twenty dollars, will yield a profitable interest on the money expended. The labor of catching them is, of course, to be considered. But in most cases their capture is thought to be a pleasure, and if there should be a proprietor who finds no enjoyment in trout-fishing, he will find enough to do that work for him without wages. It must be obvious that stocking streams, though limited as to results, is yet in its degree more profitable than the other method of fish-raising, inasmuch as there is no outlay for feed, and the trout require no care.

The two methods may often be combined with advantage. We once met an old farmer who was taking a trout to the village hotel for sale. The fish weighed plump four pounds, and was a beauty. We learned that he was in the habit of bringing such fish occasionally, and on questioning him, found that he had a little spring stream of water running through his land, and that in its course he had dug out a deep hole—simply a hole in the ground, without screens or apparatus of any kind. The larger trout from the stream collected in this hole, and he would feed them with scraps from his table, refuse meat from his butchering, etc. With the outlay of very little trouble, and no cash, the old gentleman must have gathered a good many dollars per year from his hole-in-the-ground trout-pond. As a hint of what can be done in fish-raising with small means, his example is worthy of consideration.

There are a few erroneous impressions still lingering in the public mind which it might be well, if possible, to correct. No man need ever expect to make a more rapid fortune in this business than in any other. The same qualities which command success in farming or the mechanic arts, will command success in trout-culture. He who fails at everything else will not succeed in raising fish. It has also been imagined that trout required no feed, and many ingenious estimates as to the profits of the business have left this item out of account. Now, when the time arrives that pigs can be fattened without feeding, or calves turned into beef without food, then trout

may be grown without expense. Food they must have in some way. In a natural trout-stream a limited number can forage for themselves; but trout in a pond are like cattle in a barn—they must have food furnished to them or starve. In other words, fish cannot live on water.

PORK, Cutting Up and Curing.—Have the hog laid on his back on a stout, clean bench; cut off the head close to the base. If the hog is large, there will come off a considerable collar, between head and shoulders, which, pickled or dried, is useful for cooking with vegetables. Separate the jowl from the face at the natural joint; open the skull lengthwise and take out the brains, esteemed a luxury. Then with a sharp knife remove the backbone the whole length, then the long strip of fat underlying it, leaving about one inch of fat covering the spinal column.

The leaf lard, if not before taken out for the housewife's convenience, is removed, as is also the tenderloin—a fishy-shaped piece of flesh—often used for sausage, but which makes delicious steak. The middling or sides are now cut out, leaving the shoulders square-shaped and the hams pointed, or they may be rounded, to your taste. The spare-ribs are usually wholly removed from the sides, with but little meat adhering. It is the sides of small, young hogs cured as hams that bear the name of breakfast bacon. The sausage meat comes chiefly in strips from the backbone, part of which may also be used as steak. The lean trimmings from about the joints are used for sausage, the fat scraps rendered up with the backbone lard.

The thick part of the backbone that lies between the shoulders, called grisken or chine, is separated from the tapering, bony part, called backbone by way of distinction, and used as fresh. The chines are smoked with jowls, and used in late winter or spring.

When your meat is to be pickled it should be dusted lightly with saltpetre, sprinkled with salt, and allowed to drain twenty-four hours; then plunge it into pickle, and keep under with a weight. It is good policy to pickle a portion of the sides. They, after soaking, are sweeter to cook with vegetables, and the grease

fried out from them is much more useful than that of smoked meat.

If your meat is to be dry salted, allow one teaspoonful of pulverized saltpetre to one gallon of salt, and keep the mixture warm beside you. Put on a hog's ear as a mitten, and rub each piece of meat thoroughly. Then pack skin side down, ham upon ham, side upon side, strewing on salt abundantly. It is best to put large and small pieces in different boxes for the convenience of getting at them to hang up at the different times they will come into readiness. The weather has so much to do with the time that meat requires to take salt that no particular time can be specified for leaving it in.

The best test is to try a medium-sized ham; if salt enough, all similar and smaller pieces are surely ready, and it is well to remember that the saltiness increases in drying.

Ribs and steaks should be kept in a cold, dark place, without salting, until ready for use. If you have many, or the weather is warm, they keep better in pickle than dry salt. Many persons turn and rub their meat frequently. We have never practiced this, and have never lost any.

When the meat is ready for smoking, dip the hocks of the joints in ground black pepper and dust the raw surface thickly with it. Sacks, after this treatment, may be used for double security, and I think bacon high and dry is sweeter than packed in any substance. For sugar-cured hams we append the best recipe we have ever used, though troublesome.

English Recipe for Sugar-Curing Hams.

So soon as the meat comes from the butcher's hand rub it thoroughly with fine salt. Repeat this four days, keeping the meat where it can drain. The fourth day rub it with saltpetre and a handful of common salt, allowing one pound of saltpetre to seventy pounds of meat. Now mix one pound of brown sugar and one of molasses, rub over the ham every day for a fortnight, and then smoke with hickory chips or cobs. Hams should be hung highest in meat-houses, because there they are less liable to the attacks of

insects, for insects do not so much infest high places—unlike human pests.

Pickle.—Make eight gallons of brine strong enough to float an egg; add two pounds of brown sugar or a quart of molasses, and four ounces of saltpetre; boil and skim clean, and pour cold on your meat. Meat intended for smoking should remain in pickle about four weeks. This pickle can be boiled over, and with a fresh cup of sugar and salt used all summer. Some persons use as much soda as saltpetre. It will correct acidity, but we think impairs the meat.

WASHING PREPARATION.—Take a $\frac{1}{4}$ of a pound of soap, a $\frac{1}{4}$ of a pound of soda, and a $\frac{1}{4}$ of a pound of quicklime. Cut up the soap and dissolve it in 1 quart of boiling water; pour 1 quart of boiling water over the soda, and 3 quarts of boiling water upon the quicklime. The lime must be quick and fresh; if it is good it will bubble up on pouring the hot water upon it. Each must be prepared in separate vessels. The lime must settle so as to leave the water on the top perfectly clear; then strain it carefully (not disturbing the settlings) into the wash-boiler with the soda and soap; let it scald long enough to dissolve the soap, then add 6 gallons of soap water. The clothes must be put in soak over night, after rubbing soap upon the dirtiest parts of them. After having the above in readiness, wring out the clothes which have been put in soak, put them on to boil, and let each lot boil half an hour; the same water will answer for the whole washing. After boiling each lot half an hour drain them from the boiling water, put them in a tub and pour upon them two or three pailsful of clear, hot water; after this they will want but very little rubbing; then rinse through two waters, blueing the last. When dried they will be a beautiful white. After washing the cleanest part of the white clothes, take 2 pails of the suds in which they have been washed, put it over the fire and scald, and this will wash all the flannels and colored clothes without any extra soap. The white flannels, after being well washed in the suds, will require to be scalded by turning on a teakettle of boiling water.

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