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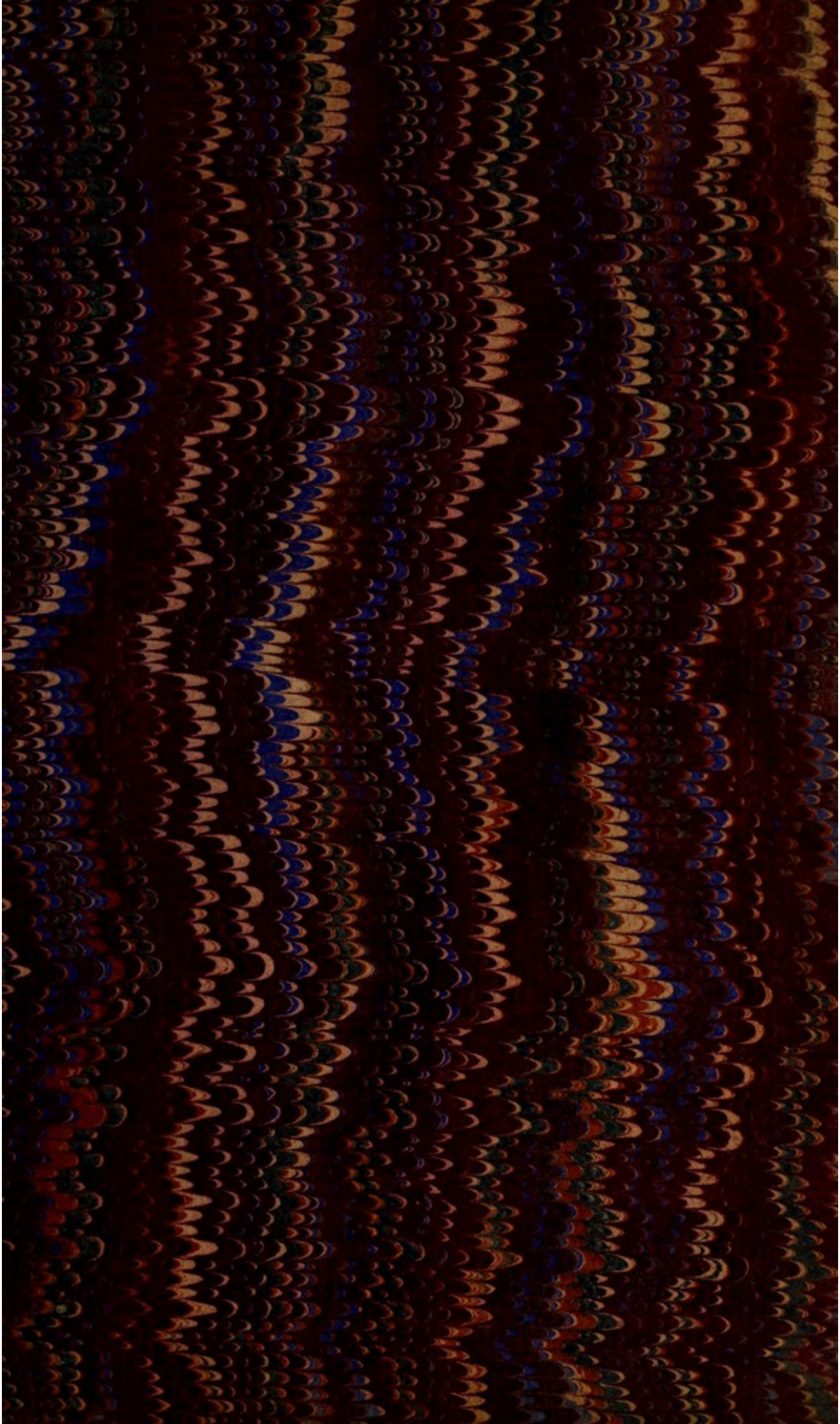
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PLATE V.



STRANGULATION OF SMALL INTESTINES.

EVERY MAN

HIS

OWN HORSE DOCTOR.

BY

GEORGE ARMATAGE, M.R.C.V.S.

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AUTHOR OF "THE CATTLE DOCTOR," "THE HORSEOWNER AND STABLEMAN'S COMPANION," "HOW TO FEED THE HORSE," ETC. ETC.

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WITH NUMEROUS RECIPES,

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FOURTH EDITION, REVISED AND CONSIDERABLY ENLARGED.



LONDON AND NEW YORK:
FREDERICK WARNE & CO.
1892

PREFACE.

THE aim of the writer of the present work is to furnish a means of ready reference, to the professional and general reader, on the treatment and prevention of horse diseases. The call for such a production appears to be indicated on several grounds. Never greater, or more urgent than at the present moment, have been the demands for the services of the horse in ministering to the various wants in human industry; while we are also practically convinced of a large augmentation to his former monetary value: for probably at no other epoch has the nation's wealth in this department amounted to such enormous proportions—exceeding, as they do, the present estimated total value of the horned stock, sheep, and swine of the United Kingdom. With such advance there has arisen a greater desire for the proper conservation of this colossal wealth; thus, opportunities for extended observation have been permitted, and, during late years, progress in the study of equine diseases—leading up to the entire subversion of former errors, discovery of new truths, and confirmation of others already held as tenable—has been remarkable, and with the gratifying result that Veterinary Science in Britain was never in such an advanced position.

Impelled by conclusions arising from a consideration of

the foregoing facts, an attempt has been made to arrange and present an outline of the most important information on the subject, and, as far as possible, in keeping with the present state of progress in the Veterinary Art; but how far that has been accomplished, the reader will decide.

In the general arrangement of the treatise, the same form has been adopted which was used in *Every Man his Own Cattle Doctor*, to which the present is designed as a companion volume; in addition, the publishers having become the proprietors of the copyright of *Blaine's Outlines of the Veterinary Art*, have deemed it expedient to embody whatever was valuable in that work with the present; and, thus constituted, it is sent forth, with the earnest hope that it will be found a simple yet serviceable aid to the horse proprietor and breeder, &c., on the various subjects of which it treats.

PREFACE TO FOURTH EDITION.

THE rapid sale of three large editions of the "HORSE DOCTOR" has prompted the issue of the fourth.

A remarkably increasing intelligence is engaged in diligent investigation, and the reward is the discovery of important information in relation to Veterinary Science. In order to put the inquirer into possession of this, the Work has been carefully revised, and such new matter introduced as is thereby demanded.

GEORGE ARMATAGE

12th Month, 1891.

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SECTION I.

THE BLOOD.

THE BLOOD.

THE blood is the coloured fluid that circulates through the whole of the body by means of appropriate vessels carrying nourishment, which it derives from certain processes exerted upon the food taken into the digestive organs. The properties and functions of the blood may be briefly enumerated as follow :—

The *Circulation or Movement* is designed as an effective means whereby the necessary materials are properly conveyed to all parts, in order to nourish the various tissues, and provide for their regular growth and maintenance. It also admits of the return to the proper centre of all the effete or useless materials which find their way into the blood—substances the result of an incessant change or decay of the different tissues. The blood, therefore, not only contains the elements necessary for the building up of the body, but also substances which are of no farther service, with others incapable of being utilised ; and the flow or circulation proves equally important in the distribution of the first, as in promoting the exit of the rest from the body.

The heart is the great organ of propulsion. It receives constant supplies of blood by means of a special cavity called a ventricle, on the right side, and by forcible contraction distributes it through the lungs, where, by the influence of the atmosphere in respiration, it becomes charged with oxygen, assumes a brighter colour, and is purified. From

thence the blood returns to the ventricle on the left side of the heart, and by the usual contraction is distributed over the body by means of special tubes or vessels, called arteries. These arteries, as they are extended to the farther portions of the body and various organs, break down, or undergo a series of division and subdivision into smaller and yet smaller branches, and ultimately are so diminutive, that they have been termed capillaries, or *hair-like* tubes. They are the seat of some of the most important vital and chemical changes which are incessantly going on within the blood, and likewise certain mechanical operations which determine the movement and direction of the various elements. These changes consist in, principally, the selection of, and distribution to, certain parts and organs, the required elements of nutrition, receiving the worn-out, useless, and unsuitable particles, and determining their passage onwards; the union of various substances in chemical combination develops animal heat or temperature, and the change of colour from a bright scarlet to a darker or Modena red is apparent. Gradually the capillaries disappear, and in their place larger and fewer vessels are seen, which by repeated union with each other become common trunks in each part or limb, and these finally joining one large vessel, terminate at the heart. The arrangement of vessels conveying pure or scarlet blood is known as the arterial system, and that confined to the return flow of blood—the impure having the Modena colour—is named the Venous

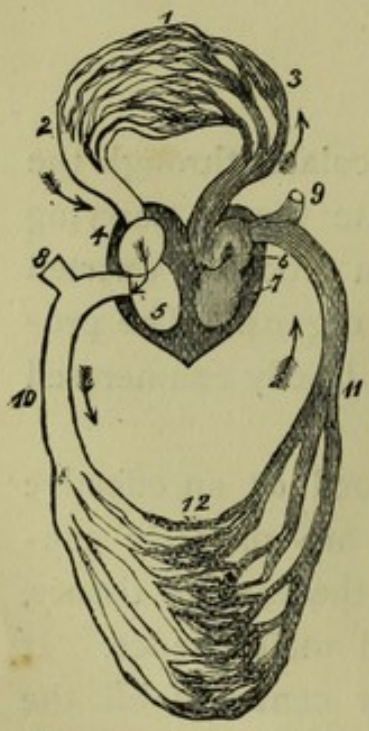
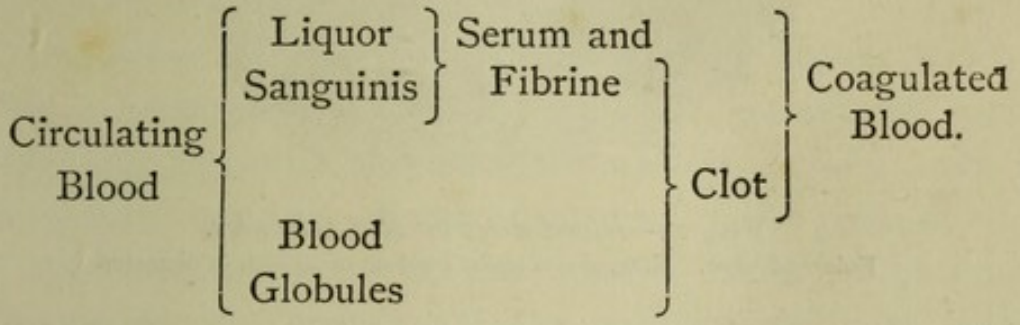


FIG. 1.—*Plan of the Circulation.*

1. Capillaries of the lungs.
2. Pulmonary veins,
3. ,, artery.
4. Left auricle
5. ,, ventricle } of the heart.
6. Right auricle
7. ,, ventricle
8. & 9. Branches to the head and neck.
10. Posterior aorta.
11. ,, cava.
12. Capillaries of the general surface, &c.

System, distinctions which, if remembered, will materially assist the reader in his progress through the work.

Density of the Blood.—The specific weight or gravity of the blood, as compared with water, varies from 1·052 to 1·057. This property is derived from the different compounds that enter into its composition. The following diagram shows the condition of the blood under two aspects—circulation and coagulation :—



In further elucidation the following remarks are necessary : If a minute drop of blood is examined under the magnifying power of a microscope, it will be found to consist of two portions—one, a solid, or apparently solid, floating in the second, a clear fluid. Under closer inspection it is observed that the solid portion is made up of a number of separate particles—blood globules, blood discs, red globules, &c. These vary in size in different animals, being about $\frac{1}{4000}$ of an inch in diameter in the ox or horse ; in the dog they vary from $\frac{1}{3500}$ to $\frac{1}{3200}$; in the elephant, $\frac{1}{2745}$; musk deer, $\frac{1}{12325}$; dromedary, $\frac{1}{6921}$; goat, $\frac{1}{6400}$; reptiles from $\frac{1}{1231}$ to $\frac{1}{1400}$; fishes, $\frac{1}{2461}$ to $\frac{1}{1143}$; birds, $\frac{1}{1649}$ to $\frac{1}{2666}$. The thickness is about one-fourth of their width ; and in shape they are flat and circular, with some exceptions in mammals—hence their name blood discs (Fig. 2). Among the lower animals they are oval, and in reptiles each disc or globule contains within itself a nucleus, or secondary cell, for the purpose of reproduction. Besides the coloured discs there are others—colourless globules, smaller in size, and

much less numerous, being in the proportion of about one to thirty of the former.

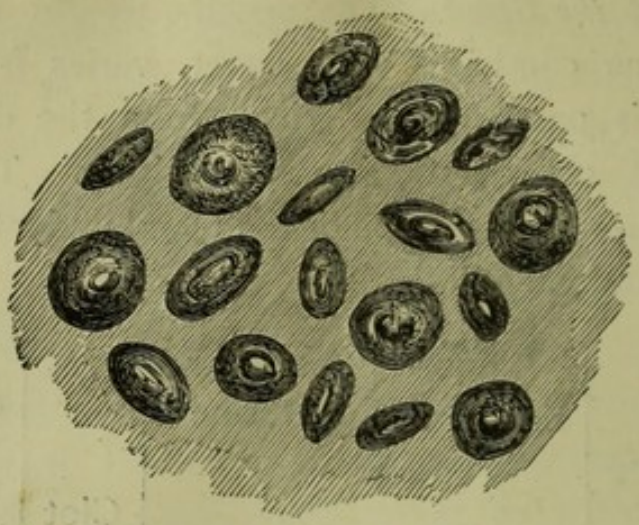


FIG. 2.—*Blood-discs or Red Globules.*
Enlarged View. Natural size about 1-4000th of an inch in diameter.

The clear fluid in which the globules float is called *liquor sanguinis*, or blood liquid ; it has a mucilaginous consistence, a yellow colour, and, outside the body, is separable into two portions—serum and fibrine, the latter of which undergoes a process of solidification known as coagulation, and, by surrounding the blood discs, carries them down with it. Blood, which has been suffered to remain at rest some little time after being collected in a glass vessel, then appears to consist of two parts, the clot or crassamentum at the bottom, and over which is a clear straw-coloured fluid, the serum—the whole constituting coagulated blood. It is not our intention to discuss here the various arguments relative to the cause and process of the coagulation of the blood. The fact of such an inevitable result being common to healthy blood, possesses an important significance—it not only points to the effect of external causes when removed from the living body, but also explains some of the morbid conditions which take place within the circulation, consequent upon disease. The causes of coagulation of the blood appear to have their origin in vital as well as chemical influences. These are,

absence or removal of the power and effects of living tissues, and propelling action of the heart and bloodvessels, as well as the want of the power of maintenance, which is conferred upon the blood within the body ; contact with foreign bodies or tissues rendered inanimate or temporarily devitalised by injury, and multiplication of such points of contact ; rest, as favouring a physical separation of the heavier particles from the lighter ; and, lastly, attraction of the blood globules and their adhesion with each other.

The *liquor sanguinis*, besides containing fibrine, also contains a principle called albumen, with water and various salts, fatty and other adventitious matters, certain gases, &c. The proportions are : of water from 730 to 815 parts in 1000 ; of fats, in accordance with the mode of feeding, 1 to 2 parts in 1000 in the horse. Of the various salts and organic principles great variation is observed, their presence depending greatly upon the mode of life, kind and quality of food, activity of functions, &c.

In all the higher animals blood is *warm*, having a temperature which varies in accordance with the kind of animal, as well as from the vigour of vital forces within. The origin of heat is due to chemical changes taking place in the blood actuated by the presence of suitable agents which have the power of, and affinity for, union with each other. Such agents are doubtless both chemical and vital, and being brought together in contact with, and under the influence of, vital powers, combination ensues, new compounds are formed, and heat is given out exactly as is observed in the simple experiment of adding cold water to oil of vitriol, and in the percussion-cap after being exploded by a blow. The temperature of the blood is a safe guide to the state of the system in general. It is communicated to the tissues, as the blood flows through them, and the whole body is warmed. Decline of function, whether it arises as a result of disease,

starvation, &c., is inevitably shown by decline of temperature of the blood, and, therefore, by the body as a whole. It points to an obstruction to proper nutrition—the incomplete passage of the elements of food into the blood ; to an arrest of chemical and vital action ; to impregnation of the blood with poisonous materials ; to a want of maintaining or purifying power on the part of the blood, or certain organs, &c. A proper elevation of temperature is consistent and correlative with healthy function ; and the influences of certain disease and other actions within the organism, also bring about certain elevations and fluctuations known as "diurnal variations," a knowledge of which proves of very essential service to the Veterinary Surgeon.

The temperature of animals in health and disease is doubtless influenced by surrounding conditions : thus those of the former kept under close confinement, although fed liberally, have been found to exhibit a lower reading by the thermometer, than when taken to work, or allowed the quiet run of a pasture ; likewise animals suffering from identical diseases will indicate variations of temperature dependent on the state to which they are subjected—the close atmosphere of buildings having the opposite of the invigorating effects of the open air of the field. We have elsewhere recorded some useful observations on this subject, to which the reader is referred for minute details.*

The maintenance of a proper circulation of the blood, and propagation of animal temperature, is of vast importance in insuring a healthy condition. Circulation and temperature bear a certain, but by no means an invariable, relation to each other, and, therefore, a knowledge of the essential characters of the blood, and its connexion with such vital

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* "The Thermometer as an Aid to Diagnosis." London and New York : Frederick Warne & Co. Price 1*s*.

forces as are contained within itself, becomes of paramount importance to all who desire to clearly understand and treat properly the diseases of the animal body. It is, however, impossible to attempt more than an epitome of these in a work not exclusively devoted to the subject of animal physiology ; as the various maladies are brought under discussion, further references will be made to the conditions which are recognised as leading agencies in the morbid processes known as disease.

In the circulation of blood through the vessels in health, the current is very accurately regulated by various means : the elastic nature of the arteries, pressure and movement of surrounding tissues, force of the heart's action from behind, and an aspiratory or drawing power in front, capillary attrac-

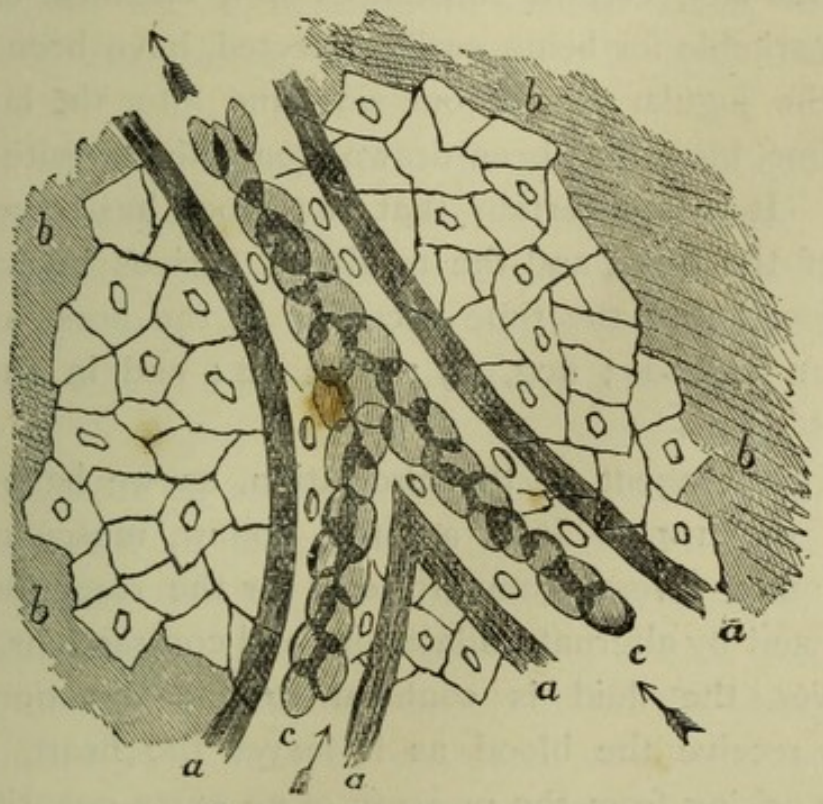


FIG. 3.—*Circulating Blood.*

tion, consistence of the blood itself, being essential and instrumental to proper performance. In the accompanying diagram (Fig. 3), the state of healthy blood circulation is

shown. The current is indicated by arrows; *a a* are the walls of the bloodvessel; *b b b*, surrounding tissue, from its form and composition being termed cellular; *c c*, the red globules, maintaining a steady and uniform current through the *centre* of the tube. Upon their outside is shown a number of white or colourless globules, moving at a slower rate. The clear space surrounding the stream of red globules is occupied by the fluid portion of the blood —*liquor sanguinis;* indeed, it is the fluid in which all the particles of the blood are floating.

The Pulse.

The flow of blood is constant and rapid. In order to prove this fact, certain substances of a chemical character, and remarkable for being easily detected, have been injected within the jugular vein of one side, and after the lapse of a given time, blood has been drawn from the opposite vein for testing. It is thus certain that the blood has traversed the whole of the body, and the results of various investigations have proved that the time occupied in the horse and ox is about 20 seconds; dog, 15; goat, 12; and in the rabbit 6 or 7 seconds.

The great agent of the circulation, as we have already said, is the heart. It is a large, hollow, muscular organ, divided into several compartments for the reception of the blood; and by alternate dilatations and contractions, assisted by valves, the fluid is confined to one direction. The arteries receive the blood as it leaves the heart, and the impulse arising from the pressure of an extra quantity forced into them, is communicated first to the column already within the tube, and next to the elastic walls, causing them to expand rapidly, immediately, however, contracting to their former calibre. Such alternate expansions and contractions

are continuous, entirely in accordance with the action of the heart, and constitute what we term the "pulse." Without the contractions of the heart, there can be no pulse. The alternate swelling and subsidence of the artery under pressure of the finger exhibit certain modifications according to circumstances, and recognised conditions plainly indicate the state of the heart and circulation generally. The arteries in all parts of the body afford similar evidences, but those far removed, as in the limbs, do not as a rule expand immediately on the contraction of the heart, as in larger trunks, and those nearer that organ. A perceptible time elapses, and the impulse is also diminished. There is no pulse in the veins, except in an instance to be referred to. After the blood has passed through the capillaries, the current is equalised by obstructions of various kinds, the pulse is lost, and the return by the veins is slow and uninterrupted.

The pulse is conveniently felt at the jaw. At this part the submaxillary artery comes from the inner side, and winding along passes over the lower edge of the bone, and mounts upwards on the outside of the face. Here the artery of the left side is readily felt by means of the first and second fingers of the right hand, which are pressed upon it towards the inner side of the bone, while the thumb is placed outside, in order to maintain a firm position. The artery of the right side also may be conveniently examined, when the left hand must be used, the right being placed over the nose of the animal to secure stillness. When the animal is masticating, the pulse may be examined at another part. The brachial artery may be felt at a point on the inside of the forearm, below the shoulder, and nearly on a line with the elbow-joint, but in advance of it. A little practice is required to detect the vessel at this part, but if the situation of the joint be noticed, and the vertical ridge of the arm-

bone (radius) is selected as a centre, the fingers need not wander far to discover the pulse.

Other parts also conveniently offer the means of examining the pulse, as the fetlock-joint, where the metacarpal arteries are present; the facial artery may also be found a little higher than the point at which the submaxillary is felt at the jaw, below the eye, and behind the angle of the mouth. In some cases it is necessary for the practitioner to pass his hand up the rectum—*anus*, or fundament—in order to examine the condition of the large abdominal and iliac arteries. Any difference in the calibre of, or obstruction to the flow of blood in, these vessels are significant tokens of damage to the hind parts.

It is not necessary to exert a great amount of pressure on the vessel under examination. When two fingers are employed, the artery should be included in the hollow existing between them when held together, and thus the liability to roll or move is lessened. Pressure should be moderate and well regulated, when the impulse will be communicated with precision and certainty.

The number of pulsations in health varies in different animals. Thus between the large and coarser breeds of horses, and the smaller ponies, there is probably a difference of six or eight beats in the space of one minute, the highest number being, of course, observed in the lesser and more active animal. In adult horses the average numbers, according to breeding, will range from thirty-five to forty; in the colt at the period of birth it will be as high as sixty; but as time advances a gradual diminution will take place until the adult standard is reached.

The pulse is influenced in health by various conditions, for which careful allowances have to be made when appealing to it as an aid to the investigation of disease. *Temperament* exerts powerful effects upon the circulation. This must be

admitted without reservation, when it is remembered that the heart and all the bloodvessels are under the control of the nervous system. Any particular condition, therefore, which serves to stimulate the nervous system through the brain and spinal cord likewise accelerates the action of the heart and flow of blood. This will be singularly apparent on examination of the pulse in two animals—one a thoroughbred horse, and the other of a heavy coarse breed. In the first the artery will have the sensation of fulness and hardness, while the beats are strong, well defined, and bounding under the fingers. In the second, the artery, although full, is soft, the beats are slower, and much less distinct from each other. At the same time, it must be observed that, apart from the class or breeding of the animal, peculiar constitutional differences occur, and these not uncommonly produce a variation in the number of pulsations, being more or less than is found in members of the same class.

Heat and want of proper ventilation have great influences upon the animal body : the arteries are relaxed, action of the heart is quickened, and the pulse will reach ten or more beats above the actual standard, or that observed among animals in the open air. Warm clothing, stimulating food, and a heated atmosphere within close buildings, produces an unnecessary amount of wear and tear of the system, and creates an undue susceptibility to disease ; besides which, there is a greater tendency for such to assume irregular and unmanageable forms. The object to be attained is the requisite information by which we may use the necessary agencies for the comfort and preservation of our horses ; without this, in our praiseworthy efforts, we may "kill them with kindness."

The Pulse in Disease.

The pulse is particularly affected by disease, and the various modifications and characters are recognised as generally reliable indications of certain changes, and the progress of morbid states within. Such modifications are chiefly recognised in the frequency of the beats taken in conjunction with their strength and departure from measured regularity. Different terms are employed to denote the various kinds of pulse ; the principal are :—

1. As regards the number of pulsations, the terms *frequent* or *infrequent* are given. By frequency the idea of *rapidity* is conveyed. The pulse is said to be frequent or rapid when the beats, without regard to other characters, are accelerated, following each other in quick succession, and consequently above the normal standard. The infrequent pulse, on the contrary, may number as many beats as the normal pulse, but usually is much below it.

2. In reference to the *nature* of the pulsation, as afforded by an estimate of the length of time occupied by each beat, without any reference to the time existing between them, the terms *slow* or *tardy*, and *quick* are employed. The contraction of the heart is prolonged, and, in consequence, the expansion of the artery is of longer duration. The origin and termination of the beat are plainly evident to the touch, and the pulse is then described as *slow* or *tardy*—a common result of affections of the brain. The term "quick" is too often confounded with, and substituted for, the word "frequent," an error fatal to correct description, and liable to lead to awkward action.

3. In proportion to the amount of dilatation or expansion of the artery, in length as well as diameter, the pulse assumes the character of being *large* or *full*, and *small*.

4thly, and lastly. With reference to the effects of pressure

on the arterial tube, the degrees of compressibility favour the employment of the terms *hard* and *soft.*

The characters of the pulse are not necessarily to be observed in the order now given ; they frequently exist in combination, when terms of a double or compound nature are made use of to express the state. Thus we speak of the pulse being "full or large, hard and frequent," or "full, soft, and slow," "full, soft, and tardy," "small, hard, and frequent," &c. &c. Such combinations of the original titles, with others that are suggested to the practitioner in his daily observations, are ample for accurate description. Hitherto we have been fettered with too many terms, which have led to perplexity rather than to clearness and facility.

In certain diseases the pulsations exhibit great variations with respect to each other, as well as to time. A few beats succeed each other very rapidly ; their strength or force is unequal, and the time between each is not the same ; then comes a pause of greater or less duration ; beats again succeed each other as before, and are followed by another variabie pause. This is known as the *irregular* pulse.

Under other circumstances the pulsations continue with regularity, but greater frequency, when suddenly the beating ceases. Such a pause may occupy as much time as three or four ordinary beats, and at the termination the pulsations are resumed with their former regularity. This is the *intermittent* pulse.

When disease continues to affect the system, and weakness increases, the pulse becomes smaller, more frequent, and, after being indistinct, is altogether imperceptible, when death speedily follows. Such are the characters of the *running down* pulse. When, on the other hand, disease declines in severity, and all the concomitant signs disappear, the pulse acquires strength and volume, and it is then said to be a *rising* pulse.

We must impress upon the minds of our readers the great need of being acquainted with the foregoing special characters of the pulse in disease, if successful treatment of the affections of the lower animals is desired. Too little attention has been paid to the subject, whereby the system of bleeding, as well as the administration of hurtful remedies, has indiscriminately increased. The pulse, although a silent monitor, yet speaks with wonderful power by signs more expressive than mere words, and claims to be authentic in all states of diseased action. If we disregard or do not understand its teachings, our treatment of the animal body becomes automatic and empirical, science is spurned for quackery, and the animal becomes in estimation but a machine incapable of injury, yet liable to infinite suffering and hardship under the deceptive term of medical treatment.

Venous Pulse.

The phenomenon described as the venous pulse is observed in the jugular veins upon each side of the neck. It was for long regarded as a sure sign of disease in the lower animals, just as the palpitation of dyspepsia in the human subject has been ignorantly ascribed to heart disease. Authorities on this question have also decided that it consists of a "regurgitation" within the jugular veins, and the fact remains as a warning against accepting even the simplest statement in science without at least an attempt to verify it by personal observation, and, if needs be, by experiment also. It is well known the direction of the jugular veins, being from above downwards, greatly favours the descent of blood towards the heart, and all return to the head is effectually guarded against by the presence of valves situated at regular intervals within the tube. In the flow towards the heart the impulse of blood is probably greater than in any other vein,

and the effect must be proportionately exerted upon the surrounding tissues whenever an obstruction arises. If the fingers are tightly pressed upon the vessel towards the lower part of the neck, it will be observed to fill gradually from the seat of pressure until the whole course to the angle of the jaw is in outline. When fully charged, imitate a tilting action by the fingers that are stopping the flow, and the whole column will be seen to move, which, in effect, is simply agitating the charged vessel from one end to the other. Identical states are to be seen when from the agency of similar causes interruptions in the flow are produced. If we notice a horse or cow grazing or eating from the ground, the characters of the venous pulse are seen in all their force; when these animals are quietly at rest in a recumbent position after the stomach has been filled, the same phenomena are to be observed, and we have no difficulty in ascribing the cause to the action of the valves preventing a return towards the head in the first instance, while from the position of the vein being reversed, the blood cannot escape until the vessel is filled to the upper end. In the second, while the veins act as before, there is some obstruction to the flow of blood towards the heart, arising from pressure, all the organs of the chest and abdomen being shifted as the animal lies and limiting the capacity of the heart; and in both cases the action of the muscles of the neck, together with the pulsation of the carotid artery, which runs in company with the jugular vein, momentarily retard the flow. An abrupt or imperfect closure of the tricuspid valves in the right auriculo-ventricular opening of the heart also exerts a similar effect; the result in each case, therefore, is precisely the same: the weight of the column of blood is exerted on the walls of the vein, at one end of which the blood is constantly entering, and at the opposite the escape is intermittent; the walls expand and vibrate, and the motion being always towards

the head, in the direction of the supply, thus are developed the signs which have led to much confusion and have been so frequently pronounced as the result of some occult diseased action.

There are, however, instances in which disease exists in the heart and large vessels connected with it, together with emphysema of the lungs, in which the blood circulates with extreme sluggishness, and the venous pulse is characteristic as well as continuous ; but other signs are always present. Such states will receive their share of attention in the proper place.

General Treatment of the Patient.

In the management of sick animals, that department entirely non-medical, which comprehends the diet and nursing, is of the utmost importance—indeed, the services of the veterinary surgeon are of little aid, and all his art and scientific skill dwindle into uselessness if the domestic attentions are incomplete or withheld. Just as there are general rules by which internal disturbance is attacked, so are there general rules for the dieting and restoration of the invalid. These we propose to deal with briefly before passing on to the consideration of separate maladies, under which the more precise and special instructions will be given.

Stable Accommodation.—There are few instances in which it is not advisable, but rather imperative, that the sick animal should be removed to a separate building, a well-lighted, ventilated, drained, and comfortable loose box being the most desirable. An abundance of pure air is a valuable aid to the cure of disease, and this cannot be obtained in places where numbers of animals are collected, particularly where cleanliness is not observed as much as it should be. On the other hand, where this recommendation is ignored,

or from irremovable causes it cannot be adopted, disease in one or more animals among a number not unfrequently terminates in a fatal typhoid or malignant form, which medicine fails to arrest, and large proprietors of working horses have had reasons, more than once, for testing the truth of this assertion during the prevalence of those recent periodic attacks of influenza, by which thousands of victims have fallen under its ravages. A simple shed as a protection from the sun and rain, even in cold weather, would be preferable to many town stables, and draughts may be fairly dealt with by hanging up large waterproof sheets where necessary. We have frequently improvised such a hospital box in a town yard, and in fields miles from a house, and, when other domestic attention has been fairly carried out, the end has invariably justified the means.

Warm clothing and woollen bandages, when necessary, amply make up for the warmth of the usual stable; but it must be remembered that warmth acquired under usual stable rules is but of an artificial kind, whereas the pure air of an open space or roomy box furnishes the natural means of warmth—oxygen, for the aëration of the blood, and by which healthy processes are more likely to be established and maintained.

The *Diet* of sick animals should be carefully selected and judiciously administered. It is by far the too common practice of putting anything, or everything, that happens to be near at hand before the patient, which he may take or refuse. If he partakes of it awkward results follow, and if he refuses, the mess is allowed to remain and spoil under his nose. This is the very worst of domestic management, and from which many animals are lost, particularly in the stables of farmers and others who grudge the time of a man or boy to afford the needful attention. There is one recommendation which should become a stereotyped rule in every horse-

keeper's mind ; it is this : *prepare small quantities of various easily digested articles of food, and offer them at suitable intervals in clean vessels ; approach the sick animal quietly, and speak softly and soothingly ; if he partakes of the food, do not interrupt by withdrawing or spoiling it by the absurd practice of mixing and stirring with the hands ; if he refuses the offering, let it be removed entirely, and do not present the same mixture a second time.* It must be remembered that in many forms of disease the absence of appetite is conducive to recovery ; to load the stomach would be equal to doing so much mischief. In these cases the animal is not inclined to eat, and, moreover, eating will not prevent him dying, but may probably hasten his end. In some cases the animal would like to feed, but is unable to do so from various obstructions ; here, then, it is clearly our duty to assist him to receive suitable nourishment, being directed by the peculiar circumstances at the time. Injudicious feeding must always be avoided in sickness ; inattention to this has carried thousands of animals beyond the power of medicine to restore, and we have reason to believe the right person has seldom received his share of the credit in the matter.

There are a number of useful articles which prove serviceable and tempting to the sick horse, such as *bran, linseed, oatmeal, barley, malt, carrots, turnips, parsnips, potatoes, fruit, green forage, hay-tea, water, gruel, &c.*

In *Bran* we recognise a most useful agent in treating the ailments of horses. It is laxative, and when green food and roots cannot be readily obtained, their place is usefully supplied by it. The usual form in which it is offered is that of mash, warm or cold, but we think more useful when made with warm water, and in this state, having less stimulative qualities than other kinds of food, being light and of easy digestion, its passage through the bowels tends to allay fever, and produces a feeling of comfort in disease

which grain and the leguminous seeds would not. Certain medicines in powder are conveniently given in a bran mash, and it very properly takes the place of the usual food before the administration of purgative medicine, or performance of particular operations. In catarrhal affections, bran, over which boiling water has been poured, and placed in a bag held over the nostrils, proves useful in relieving the charged vessels and membranes, the steam being disengaged more profusely and beneficially than from water alone. Another purpose for which bran is applied, is with hot or cold water as a poultice, when parts are to be influenced by heat, or cold, and moisture, and additional properties are conferred by the use of certain medicinal agents.

It is a mistake to make use of bran too extensively as a sick animal's diet. It contains but little nutrition, and therefore cannot sustain life in vigour. As it speedily undergoes fermentation after being moistened with water, it is advisable to supply it to the animal in a separate vessel, rather than the manger which cannot be washed out with so little trouble.

Linseed is a highly nutritious article of diet; being mucilaginous, acting gently on the kidneys and bowels, it proves very useful in certain forms of disease affecting those organs. It is simply prepared by mixing with water, in the proportion of a pound to a gallon, and allowing it to digest about twelve hours, being occasionally stirred, when the whole has become a thick mucilaginous fluid. Half a pint or more of this added to bran, a mixture of grain, or water for drinking, renders the whole palatable and refreshing. *Linseed meal*, or ground linseed cake, is frequently used in the place of, or added to, bran as a poultice. It has the property of maintaining heat longer than bran alone, and, probably from the presence of a small quantity of oil, soothes and softens the parts to which it is applied. Bran poultices are thought

to be improved by the addition of linseed meal, a more plastic mass being produced than bran alone furnishes. *Oatmeal* forms a valuable article of diet, when it is desirable to introduce a larger amount of nutrition in small bulk, and in a form to be easily digested. It is very suitable for enriching other articles, in order to coax the appetite, but the most common use is in the form of gruel, or added to water and thoroughly mixed, when a most nutritious, refreshing, and agreeable drink is produced, suitable alike for the healthy horse and invalid. In the forms just mentioned, oatmeal is employed as a clyster when nourishment cannot be taken by the mouth.

Barley is highly nutritious and digestible, and may usefully be alternated with other articles of diet in the sick-stable and for convalescent animals. For this purpose it is boiled until the grains burst by swelling, and after the water has been poured off, oatmeal or linseed mucilage may be added ; or the grain alone, when sufficiently cooled, can be offered in suitable vessels. *Malt* advantageously enters the list of the sick dietary, and is often partaken of when other articles are refused. It is usually prepared by adding boiling water in sufficient quantity to make a moist mass, and given when cool. Ground malt is useful to flavour drinking-water, and is often preferred.

In *carrots*, *swedes*, and *parsnips*, are articles almost indispensable among sick horses. They possess the remarkable properties of furnishing to the blood essential saline materials, which promote its fluidity, and preserve its normal condition. Besides, they coax the appetite, allay fever, promote a lax state of the bowels, furnish necessary elements of nutrition, and it may be truthfully stated, in many cases, their judicious use will frequently set aside the need for certain medicinal agents. Other roots and tubers may be employed, as the *mangold*, *kohl-rabi*, and even *potatoes*, under variable circum-

stances, with like benefit, it being understood that in every instance they should be carefully washed ; and sometimes, as when the digestion is feeble and strength low, it is desirable to remove all hard outer skin or peel. To guard against choking, mincing, pulping, or chopping into small diamonds is requisite, sufficient quantity being prepared as called for. In addition to the roots and tubers, or when they could not be obtained conveniently, and valuable lives are in jeopardy, the garden has been taxed in order to contribute its fruits, apples, pears, &c., doing good service, and well repaying cost and trouble expended in their provision.

Green Forage, by which is implied clover, the grasses, tares, &c., are not by any means valuable as nutritious articles of diet, but nevertheless accomplish much good by means of properties which they possess in common with roots. A fresh tuft of grass, clover, and the like, will often tempt the most fastidious appetite, and lead the way to a consumption of more nutritious articles, while beneficial effects ensue in the allaying of febrile states, and keeping up a laxative condition of the bowels, with less cost to the system than when drugs are employed.

Hay-tea.—There is probably no other preparation or article in the sick dietary which has been known to yield so much comfort and benefit, as a simple remedy, which costs so little, and requires so little trouble in its preparation. A handful of the sweetest hay is selected, and, being first twisted into a circular roll, is placed at the bottom of a clean pail, and covered with boiling water. A cloth or sack is then thrown over the pail, and the whole allowed to stand a quarter of an hour or longer, when cold water may be added to reduce the temperature suitably for drinking. Thus made there is an agreeable fragrance, which the sick patient is not slow to appreciate, and seldom refusing to drink a little, even when water has been declined for some time. Oatmeal and

ground malt may also be added to hay-tea, if preferred, but as a rule we have found the simple preparation by far the best. Besides hay-tea, let us not omit to include cold water in our list. It is Nature's beverage, provided for all animal creation, and, simple as it is, a vast amount of good arises to the sick creature by availing himself of frequent sips from constant fresh supplies, whereby the parched tongue is moistened and cooled, and by that which, even in limited quantities, finds its way to the stomach and intestines, the most useful medicinal and beneficial effects are brought about. We have often to regret that grooms and others are so niggardly in their supply of cold water to the sick horse, and here venture an appeal on his behalf that, when illness overtakes him and he is feverish and oppressed, he may have at least sufficient with which to moisten his mouth, and, in the absence of hay-tea, &c., a judicious allowance for drinking.

FEVER.

Simple or Common Fever.

This is a condition, often so slight as to occasion no apparent inconvenience or give rise to significant outward signs, that its existence has been frequently denied. To the practised eye of the intelligent practitioner in distributing his attention over a number of animals, there are unmistakable evidences of the existence of a state, the reverse of perfect health, and which merit the term given above.

Nature and Definition.—Simple fever is not to be regarded as the undoubted manifestation of internal disease or serious organic changes. It is purely of a transient character—a disturbance *per se*, and in consequence has been emphatically named *ephemeral fever*. The term "fever," unassociated with necessary qualifications, is so generally understood to convey

an idea of extensive mischief or protracted disease, that, doubtless, a dislike for the term has arisen, and therewith an objection to use it, except as a note of alarm.

Simple or ephemeral fever is common to man and all domesticated animals, indeed to all in proportion as they are removed from their usual habits. It may be defined as a general disturbance of important functions of the body, a disarrangement in their order and regularity, rapidly produced, of very short duration, and hence escapes notice.

Causes.—Inactivity, combined with a highly nutritious and stimulating food, particularly after a change from green forage or a laxative diet has been made, a heated atmosphere in crowded and ill-ventilated buildings, &c., a peculiar idiosyncrasy or habit of body which creates a susceptibility to the causes named; lastly, long journeys by road or rail, without due regard to food and comfort. Any or all of these, exerting their effects upon the nervous system and circulation, accelerate the assimilative functions by which an increase of temperature is produced. An unusual activity of blood flow in the skin will temporarily arrest the exhalations from it, and thus the animal heat is also increased. (*See* "The Thermometer," p. 46.)

Other functions are disturbed from similar causes, and the resulting secretions are checked.

Symptoms.—The pulse is more frequent, and somewhat larger and harder than in health. The ears, extremities, and skin generally are warmer than natural. The mouth is hot, partially dry, and the fingers are more or less tainted after being passed between the lips. The lining membranes of the eyes, and nostrils, hereafter described as the visible mucous membranes—*see* Glossary—exhibit an increased colour; the urine is deficient, skin dry, and probably harsh under the hand, bowels costive, and the thermometer placed

in the rectum registers 102° F. or 103° F. Sometimes the animals are thirsty and even reject a meal ; but after a few hours the symptoms have entirely disappeared.

Treatment must be adopted in accordance with the causes. When irregularities attending the mode of feeding, housing, &c., are discovered, they should be suppressed ; usually removal from the exciting cause is sufficient. Highly stimulating food should be used sparingly with inactive animals, and long periods of rest should always be attended with a less nutritious and more laxative diet. Linseed tea, bran with the food, or as a mash at intervals, the roots and tubers, will obviate constipation as a cause ; and when the organs of respiration are unduly stimulated, the skin may be sponged with cold water followed by friction. Medicines are not necessarily called for unless the conditions recur at frequent intervals, when advice should be sought in order to avoid inconvenience arising from the transition of disorder into disease. Over-stimulation will induce disease of important organs, and in all cases such is foretold by continued attacks of simple or ephemeral disorder. Well-ordered domestic management, with suitable alteration of diet to suit the various changes of outward circumstances, will be of untold importance in the state under discussion, and profitably take the place of drugs ; but when, as we have already pointed out, medicines are called for, let the most simple remedies be selected. We have a strong aversion to useless drugging, for we believe that each dose represents the loss of so much vigour of constitution, known as "condition," the production of which is costly, and not within an hour's call. Half an ounce of saltpetre may be dissolved in the drinking-water, or placed among the manger food in the form of powder. The same quantity of carbonate of soda or potash may be substituted, if preferred, or a dose of aloes, one-half or two-thirds' strength may be given. Enemas or clysters are of

great value, and with linseed or bran mashes may suitably replace aloes for opening the bowels.

Sympathetic or Symptomatic Fever.

To an ordinary observer the signs of this and the preceding affection are analogous, and even by close attention in the earliest stages he may fail to pronounce correctly as to the termination. The important distinction is the *persistence* of the signs. They are liable to aggravation in proportion to their duration. The horse consumes his evening meal in apparent good health, although the earlier signs of fever are upon him, which have either been altogether unobserved, or, if seen, estimated as nothing, and on the following morning he is labouring under acute suffering.

The *symptoms* are those already given under "Simple Fever," being, however, of greater continuance and intensity, while acute suffering is apparent more or less in accordance with the exciting cause.

Nature and Causes.—As its name implies, sympathetic or symptomatic fever is to all purposes a condition which betokens the existence of other more serious states, by a series of unvarying signs constant in their prevalence, and terminating only with the disease which gives rise to them. Thus a horse receives a puncture in his foot, abdomen, &c., by which pain is evinced in the part by appropriate and special signs, and, proportionately with the extent of the injury, there is disturbance of the respiration, in the form of rapid breathing; of the circulation of blood, by a frequent and hard pulse; of the skin, by increased heat, and probably perspiration also; of the kidneys, by suppression of the urine; of the bowels, by the passage of few small hard pellets of dung, the anus being tightly contracted, and the visible mucous membranes are deeply reddened by increased blood

determination. Symptomatic fever, then, exists *pari passu* in company with other diseases ; it is an evidence by which their presence, progress, and intensity are judged ; it is always significant of alarming conditions, and rightly calls for the exercise of prompt and well-directed measures.

Treatment.—The suppression of this disease is entirely dependent upon the removal of that which gives rise to, or is, in other words, the cause of it. To direct our attention to it alone would be only treating signs and leaving untouched the disease. Whenever symptomatic fever is present we must at once look out for the cause, and, removing that, the effects cease. Full and complete instructions will be included in the directions given under the various headings throughout the work.

INFLAMMATION.

Every part of the body known as organised material—*i.e.*, having special sources of nutrition, nervous sensation, &c., as determined by presence of bloodvessels and nerves within its substance—is liable to the process known as "inflammation." Hoof, horn, hair, teeth, feathers, wool, down, claws, nails, &c., are excluded from this category ; they are *organic products*, but *not* organised structures.

Nature and Definition.—These are points not yet definitely settled ; opinions are by no means unanimous regarding them. Although by a comprehensive acquaintance with the laws of physiology we may arrive at a satisfactory conclusion, and also successfully combat the ravages of inflammation by a suggested course of medical treatment, yet the many points from which it may be viewed afford as many reasons for special deductions ; hence the great diversity of opinion and wide discrepancies, which, however, become as one in the hands of the practitioner. We have not space for

a lengthened discussion of the various theories adopted regarding the nature and definition of inflammation, nor is it strictly within our province; sufficient for all practical purposes will be gathered from the following remarks.

By a reference to Fig 3, page 9, it will be observed that in circulating blood the central line of the current is composed of red globules, or blood-discs, moving freely upon and over each other. There is no disposition to assume awkward shapes, or block up the vessels; on the contrary, they are perfectly elastic, and with the utmost willingness become wider or longer, or are pressed into smaller space, to enter a smaller vessel. The influence of living tissue, as derived from the nervous system, appears most probably a predominant and essential condition; but when, from whatever cause, that influence is withdrawn, the order, precision, and certainty of the flow is disturbed, or totally arrested. The bloodvessels relax, and no longer maintain their controlling power. The blood globules have lost their disposition to flow on harmoniously together, regardless alike of pressure from behind or from each other, size of vessels, or the peculiarities of shape which their neighbours choose to assume. They now throw aside their discoidal or circular form, peculiar to man and the lower animals, become elongated, attract each other, and resolve to assist in a general obstruction. Their sides present surfaces by which they adhere to each other, or to the walls of the vessels, and the appearances presented are after the form given in Fig. 4.

Inflammation, from whatever cause, is essentially the same, neither does locality or nature of tissue bring about any specific kind. The *effects* or *results*, however, are various. The constituents of the blood undergo an alteration during the inflammatory process; this is particularly noted in reference to fibrine and the red and white corpuscles. Doubtless the influence exerted by the original cause upon the

nervous system has much to do with the augmentation, by accelerating the assimilative process, as we find that an increase of general temperature, the result of an augmented combustion, is always present. Blood drawn from patients

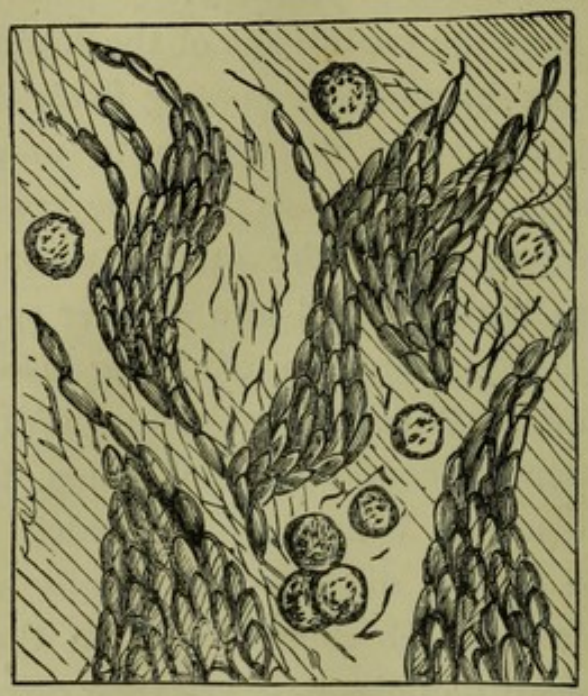


FIG. 4.—*Blood in a state of Inflammation.*
The appearances presented under the microscope.

suffering from extensive inflammation has, therefore, a peculiar property of firmly coagulating. The contraction is also greater than in health, and this causes the whole to separate into two unequal parts, the solid portion being in excess of the fluid. In addition, also, from excess the solid parts, particularly fibrine, assume a *buffy* appearance upon the upper surface, which is somewhat *cupped* or hollow—conditions pre-eminently due to the power and amount of contractility which the mass possesses. The cupped appearance of coagulated blood is closely represented by solid fats, which have been melted and poured into earthern vessels. If the surface is examined when the mass has cooled, it will be found that the centre portion is lowest, and highest round the edges, or at the circumference of the vessel, where the

surface of the walls present greater attraction than which takes place in the middle.

The *buffy coat*, then, is the yellowish colour presented by an unusual amount of fibrine, and the cupped appearance of the upper surface is due also to the same cause, which involves a firmer coagulation than that which is seen in the blood of healthy animals. These are viewed by some as infallible signs of the presence of extensive inflammation, and erroneous practices have been founded on the belief; really, however, they are tests of the presence of an unusual amount of fibrine, which we now have determined may arise from other causes, as will be shown farther on. Inflammation, as regards its position, is of two kinds—viz., *local*, and *general* or *diffuse*. In the first we recognise the action as being confined to the vessels of one particular and small part of the animal body; the second is understood to comprise acute febrile action, the result of inflammation in large and important organs, as the lungs, bowels, womb, &c., including, of course, the process within those organs.

As to character, inflammation is also regarded under two aspects—acute or sthenic, and chronic or asthenic. In the former we observe the tendency to progress with great activity and vigour; the nature of soft parts, as muscle, &c., from its elaborate organisation, being eminently favourable to the process. Chronic or asthenic inflammation, on the other hand, is slow and tardy, by which much destruction of tissue invariably occurs, reparation of parts being attended with some difficulty, and sometimes totally impossible.

Inflammation, according to the locality or tissues affected, and the unvarying results which follow, is known under several subordinate terms; thus the rheumatic or scrofulous forms are called *specific*. When only the ordinary phenomena are observed it is called *common*; if the disposition is locally to form tumours and abscesses, the term *phlegmonous* is

applied, while another form, having not that tendency, but affecting the skin and subjacent tissues, is known as the *erysipelatous* inflammation.

Symptoms of Inflammation.—The physical appearances of inflammation are *heat*, *pain*, *redness*, and *swelling*, or *tumefaction*. These are, for the most part, less easily demonstrated in the lower animals than in man. A few brief remarks under the several heads are necessary.

Heat.—Of the various signs that characterise the process of inflammation, probably none are so remarkable as heat—animal temperature. Whether the morbid action is confined to a small circumscribed area, or it is general, an elevation of temperature in the affected part is the inevitable result; and it is rare that the whole system does not exhibit a similar condition. The source of increased heat in these cases is exactly the same as under healthy conditions of the system, the process being accelerated *generally* by widespread influence upon the assimilative functions, through the nervous system, and *locally* by the same process upon the circulation of the part affected. We have thus increased blood formation, increased quantity of blood in the part, and, as a result, increased combustion or production of animal heat. During the existence of inflammatory action, of whatever kind or character, the thermometer proves a safe guide as to the intensity, rise, or decline, which is demonstrated by placing it upon the part, if externally situated, or within the rectum.* Constant reference will be made to this as we proceed.

Pain is the result of pressure. Under the effects of an increased quantity of blood in the part, bloodvessels are distended, and the nerves, already rendered acutely sensitive through influences of a morbid character, are laid under

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* *Op. cit.*

greater pressure and irritation. The sensation of an inflamed part is doubly acute, as is evident upon the slightest touch in some animals, and continues to the end of the morbid process. Coarser-bred animals exhibit this in a somewhat lessened degree.

Redness.—From the great amount of covering which the skin of the horse possesses, increase of colour is not always visible ; and even were that removed, the natural pigment would often obscure it. In general inflammation, however, the visible mucous membranes exhibit the character to the fullest extent, and which is taken as a close approximation of what is going on within. The hue spoken of, is that which the blood exhibits when viewed in mass. During the distension of bloodvessels under inflammation, the increased quantity they contain is plainly visible through the walls, now become thin and transparent from internal pressure and stretching. Redness of inflammation, then, is due to the colour of the blood as seen through semi-transparent membranes forming the affected tissues.

Swelling.—This phenomenon is not always observed : when internal organs are affected it is impossible, except under few conditions, and, when situated locally, it may be altogether hidden by the nature of the part affected or the covering it possesses. Thus, when ligament, tendon, or bone is involved, swelling is rarely observed at the time ; and when the feet are suffering from inflammation, the hoofs effectually bind down the internal structures, and prevent our observing it. Whenever it can be detected, swelling is a most incontrovertible sign, and furnishes evidences of a reliable character. The nature and cause of the swelling of inflammation has led to as much controversy as that of the morbid process itself. It was at one time believed to be due to the distension of the bloodvessels ; later it was discovered that a large amount of lymph always existed in

inflamed parts. The question then appeared to be fully decided. As to the origin of the lymph all are not agreed. One teaches that it results from the distension of the blood-vessels, when their stretched walls would favour the exudation or passage of fluid outwards. As somewhat opposed to this view, we must point out another, and in every way a reasonable one. There are a number of vessels extensively distributed over the entire system, keeping company with the bloodvessels, whose office is to take up and convey to proper receptacles—the circulation generally, that substance called fibrine existing largely in the fluid called lymph, which is conveyed to the various parts of the body by the capillaries for their nutrition. Such vessels are called *lymphatics*—lymph-vessels and absorbents, and are employed to collect the excess of nutritious material, and prevent waste by conveying it where it can be employed in its proper time. During inflammation the formation of lymph is going on largely, particularly in and around inflamed structures. After a time the offices of the absorbents are suspended by reason of the morbid process, they cease to take up the fibrine or lymph, which goes on accumulating and spreading itself throughout the tissues, giving rise to the enlargement under consideration, and known as the swelling or tumescence of inflammation. The presence of lymph is characteristic of inflammation, and by it tissues are thickened and structures obliterated, signs which should not be overlooked in judging of internal organs affected. Congestion, extravasation, ecchymosis, &c., are frequently mistaken for inflammation—a most unpardonable error, but quite common among the illiterate and pretenders.

Causes of Inflammation.—It is doubtless unquestionable that the agency of the nervous system is the main source from which all tissues derive that complex principle called

life, and through it alone is the circulation of the blood controlled and preserved in harmony and obedience to general as well as special laws. We may, therefore, infer as a natural sequence, that all forces, actions, or agencies which interfere with, disturb, or destroy the harmony of nature in the animal body, do so through the nervous system ; and as far as they are concerned in such disturbance which constitutes inflammation, they are to be regarded as causes. For the sake of clearness in distinction such have been termed *mechanical, chemical,* and *vital.* Under the first we include blows, friction, pressure, cuts, tears, bruises, &c., all of which destroy or disturb the nervous power of the part, and by its withdrawal living tissues become as dead animal matter. Blood can no longer circulate through tubes of such character, nor with any other result than if a tube of lead or india-rubber, &c., were substituted. Chemical agents, as strong acids, caustics generally, and the hot iron destroy or devitalise the part, and the same results are brought about ; and under the more complex causes termed vital, we must likewise recognise the same effects—viz., a withdrawal of the controlling and harmonising nervous power, mostly under the operation of some profound and occult agency, probably some disturbance of other organs or functions, but we must refrain from precise and decisive statements as to their *modus operandi.* Cold, we are well aware, depresses, and, by long continuance, destroys the tone of nervous power ; poisons generally, we believe, do the same ; a want of sufficient pure air for respiration brings about a long train of diseased conditions which we usually include under one term—asphyxia. It is a matter of little difficulty for the senses to accept and even comprehend the existence of these laws, but it is altogether another, and insurmountable, to express in words the method by which such changes are produced. Life may be viewed as a collection of harmonious functions

working with and for each other; and all and every agency which destroys or temporarily interferes with that harmony, immediately issues a warning proportionate to the extent and power exerted. The most common result is inflammation, local, and it may be slight, or it may be general or diffuse—so extensive that the whole of the functions of life are eventually destroyed and life can no longer remain. Both are processes essentially the same, differing only in the extent and operation of the disturbance.

Termination of Inflammation.—The results of inflammation are variously described as *Resolution*, *Effusion*, *Suppuration*, *Ulceration*, *Interstitial Deposition*, and *Mortification.*

Resolution.—By this term we understand a gradual decline of the morbid process within an affected part, followed by a restoration to original health and condition. Thus an eye is inflamed in consequence of a blow, or entrance of some foreign body, but after the institution of proper measures, and, if possible, the removal of the cause, the active signs, as heat, pain, and intolerance of light, disappear, and the organ is useful as before.

By *Effusion* we comprehend the accumulation of large quantities of fluid—serum—within closed cavities, as the abdomen, chest, and even beneath the skin, the common result of turgid vessels, the walls of which are stretched, and admit of the passage outwards of the thin or watery parts of the blood.

Suppuration is the removal of the solid products of inflammation by change of constitution, the result being a creamy-looking fluid termed *pus* or *matter.* Membranes affected by inflammation at a certain stage discharge pus from their external surfaces; but when the substance of glands, muscles, organs, &c., are seized by the process, the formation of pus commences in the centre of the mass of

inflammatory products—the lymph before alluded to—and this we term an *abscess.*

Ulceration may be defined as the loss of substance at a particular part, occasioned by inflammation at the circumference cutting off nutrition. Such a condition has been termed *unhealthy*, in contradistinction to the regular form of inflammation; but why use that which may lead to the wrong conclusion, that the latter is a *healthy* rather than what it is—viz., a *morbid process?* It is more correct to regard ulceration as the result of an asthenic form of inflammation, for it is a common result when the system has been reduced by previous disease and devitalising influences, the parts surrounding points of irritation, inflammation, or abscess, become involved in a slow or tardy form also, which has the effect of cutting off the supply of blood to the interior; no reparation can take place, the required support for the restoration of parts under disease cannot reach them, death is the result, and they are gradually removed in the form of a thin sanious discharge. *Sloughing* is an extended form of the same process, by which whole parts and masses are detached without undergoing slow solution.

Interstitial Deposition is the enlargement or augmentation of tissues, as the result of inflammation. The addition, however, is not of the nature of the tissue in which it has been placed; thus, when muscles have been torn asunder, the lost substance is replaced by an unyielding and insensible, non-contractile material, called condensed tissue. The muscle has, therefore, lost its power of action, more or less. When the substance of the lungs has been inflamed, the products invade and obliterate the air-cells, and the substance assumes a state called hepatisation; and when the outer surfaces inflame, they unite with the sides of the chest, the lymph of inflammation being the medium in both cases. When the liver is inflamed, the same lymph takes the place

of the bile-cells, and the partitions or *septæ* of the organ enlarge by the addition ; this state is then known as *scirrhus* or *induration.*

Mortification.—This is a term implying death of a part. It is an example of sloughing on the most extensive scale ; while the latter implies the removal of parts from within each other, mortification denotes the cutting off from the circulation and nutrition of whole parts or limbs. When the bloodvessels going to a particular locality are destroyed, or the flow of blood is permanently arrested by other means, the part beyond the point of obstruction gradually dies, and separation is effected where the nutrition is first cut off.

Treatment of Inflammation.—The means employed are regulated in accordance with the form presented, as well as other peculiar and surrounding circumstances. Local or circumscribed inflammation usually presents but comparatively feeble powers of resistance, and retires before ordinary remedies, as cold or evaporating lotions. The object of their use is to restore the tone or contractile power of the vessels, and induce a return of the normal circulation. With such a result, the accompanying signs, as heat, pain, redness, and swelling, disappear, and resolution is said to take place. Cooling and evaporating lotions are thus constituted :—

RECIPE NO. 1.

Take of Goulard's extract	4 fl. oz.
Dilute acetic acid	2 „
Distilled water	1 qt.

Mix together. The parts affected should be surrounded by a linen bandage, if possible, or covered loosely by layers of rag, kept continually wet with the mixture.

RECIPE NO. 2.

Take of muriate of ammonia	1 oz.
Muriatic acid--pure	½ fl. dr.
Water	1 pt.

Mix, and apply as already directed.

RECIPE No. 3.

Take of muriate of ammonia in powder	1 oz.
Dilute acetic acid	4 „
Spirits of wine	4 „
Water	1 pint.

Dissolve the ammonia in acetic acid, then add the spirits and water, and use immediately as an ablution to the part.

RECIPE No. 4.

Take of muriate of ammonia in powder	2 oz.
Nitrate of potash in powder	2 „
Spirits of wine	8 „
Water	1 qt.

Mix the spirits and water together, and add quickly the salts. The parts are then to be kept constantly wet with the lotion as long as it lasts, or the necessity of the case requires.

RECIPE No. 5.

Take of the solution of the acetate of ammonia, and spirits of wine, each	4 oz.
Water	1 pint.

Mix and apply as stated under No. 4.

There is one great disadvantage attending the use of cold applications; if they are not continuous or incessant, they do more harm than good. Their first effect is to constringe the vessels, and reduce the quantity of blood within them; but if that effect is not continued, the secondary result is *reaction*, in which the vessels dilate, and accommodate an increased quantity of blood. The disease is thus aggravated instead of being diminished. Cold applications are most suited to sprains of ligament and tendon, and such parts of low organisation as are common to the legs.

When soft parts are implicated, as whole tracts of muscle, *fomentations* are of great service in softening and relaxing the substance, removing pressure, and restoring the circulation; but even these must be persistent. No good will

result from periodical fomentation. Reaction as readily sets in after the effects of heat have passed away, as after spasmodic attempts in the use of cold applications; therefore, when a fomentation is needed, the temperature of water should be constant, and the supply unremitting. The following particulars should be carried out in a scrupulous manner:—

If the injury is severe and affected parts extensive, arrangements should be made for a plentiful supply of hot water. Woollen coverings may be employed in the meantime to protect the surfaces from the atmosphere, particularly in very cold weather. The animal being conveniently placed, one man undertakes the sole duty of applying the remedy. This is to be accomplished by first placing over the injured parts three, four, five, or six thicknesses of woollen, according to its substance, after being saturated with hot water. A pail or tub is to be placed near at hand, that the water used may fall into it, if it can be so arranged. An assistant gives his entire attention to the animal, so as to preserve a position most favourable to the proceedings; and a second is to be employed in keeping up a constant supply of hot water in regular proportions, as called for by the operator, who should see that the quantity in the pail or tub never falls below 110° F., or rises higher than 118° F. By means of a suitable small vessel, such as a small tin bowl, pint can, or earthenware cup, the water is to be carried to the highest point of the coverings, and so regularly that a continuous stream is produced, flowing over the skin beneath the covering into the pail or tub below. *The time for such an application will vary from one to six, eight, or ten hours, after which the parts should be dried by soft cloths, or moderate friction, if possible, and subsequently well protected from cold and cooling from evaporation by thick warm and dry coverings, carefully adjusted.*

Poultices are sometimes required, and when under proper supervision are especially serviceable in promoting suppuration and the formation of abscesses. They may be composed of bran, linseed meal, or a combination of the two; and fine sawdust will answer quite well for the feet, the efficacy of each being the respective capabilities of maintaining heat or cold, as the case may be, with moisture. The method of applying poultices is variable, and arranged in accordance with the part affected. The feet and lower parts of the extremities are conveniently placed in bags, the mixture being afterwards packed all round by the hand. Upper portions of the limbs, as the knees and hocks, are best enveloped in the leg of a worsted stocking, or similar case made from some stout material, which is first drawn over the foot upwards to the seat of disease. In each sufficient additional space should be allowed for the introduction of the necessary poultice, and, when properly packed, the whole is to be secured by several turns of a bandage at the upper and lower portions. Strings and twisted tapes should be avoided as much as possible, as they compress the parts under swelling, and occasion much irritation. Bearing this in mind when applying poultices to the knee or hock, we have found it best to secure the lower end of the stocking or case first, and before the poultice is packed in, by means of one half of the bandage; then to put in the bran, &c., as required, and finally to carry the remainder of the bandage as the figure 8 over the whole, finishing at the top. To other parts the single and double many-tailed bandage is of great service (Fig. 5).

Poultices, as commonly made and applied, are frequently very obstructive to the desired ends. When too large and heavy, great discomfort is caused in weakly animals; when applied beneath, or to the side of parts affected, even slight motion and ordinary weight cause them to get out of posi-

tion—they hang away from the skin, and, by admitting air, rapid and hurtful cooling ensues. The much to be desired maturation of abscesses is thus seriously retarded, and chronic forms of disease, together with fatal systemic complications, may be the result. Under all circumstances, the application of poultices should be effective and perfect, the temperature and moisture constantly maintained, and all such beastly concoctions as cow-dung, human excrement, &c., the suggestion of filthy minds, scrupulously avoided, if successful results are desired.

There is now to be obtained in every town a substance known as spongio-piline—a sheet of waterproof material covered on one side by a thickness of wool. When this is cut to the proper size, dipped in hot water, and applied to the part, it retains the heat and moisture for a great length of time besides being much lighter and more comfortable than an ordinary poultice. It may be secured in position by the common many-tailed bandage (Fig, 5), according to circumstances.

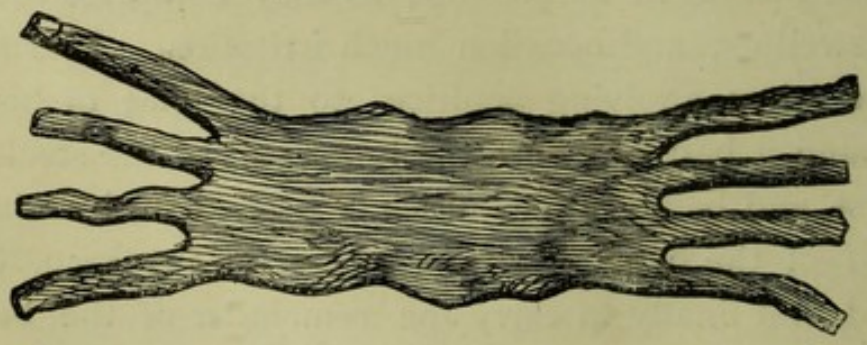


FIG. 5.—*Many-tailed Bandage.*

Take a stout piece of calico or pack-sheet, in length sufficient to encompass the parts one and a half times; the width must be formed according to circumstances. At each end cut a number of slits at equal distances, thus forming corresponding bands or tails. The central part is to hold the application, and the bands or tails of opposite ends

are to be tied to each other, after the whole has been properly adjusted on the parts.

Counter-irritants.—These comprise *blisters, setons, rowels,* and the *actual cautery* or *firing-iron.* In veterinary practice the first and second are mainly employed; the third is discarded as antiquated, unscientific, and barbarous; the last is only occasionally required.

Blisters, variously constituted, are to be obtained at the shops of all dealers in drugs, and, not uncommonly, more or less disappointment is experienced from the action of a curious admixture, unless they are made up after some authentic formula. Chemists and druggists are very useful men in their way, and, behind their counter, perform very essential and important functions; but they cannot be expected to know much about the nature and treatment of the maladies of live stock, and anything they may be inclined to recommend as remedies cannot be warranted on the score of their medical experience. It is always safer, therefore, to rely on the advice of a veterinary surgeon as to the selection of a remedy, calling in the aid of the chemist to make up the compound according to a form which he may give. For all ordinary purposes, blisters are merely admixtures of powdered cantharides—the Spanish fly—and lard; but as there is much temptation to pass off proprietary preparations, there is often reason to doubt the suitability of such to all animals and at all seasons. The action of cantharides is sometimes supplemented by other agents, in accordance with the requirements of the case, forms of which immediately follow. A new vesicatory insect—the Mylabris Cichorii—has been introduced in late years, which we have found to answer remarkably well under certain conditions hereafter to be described, particularly in high-bred animals, in which the skin partakes of an unusual sensitiveness. Such compounds as savin, euphorbium, corrosive sublimate, arsenic, &c., ought never to

enter into the composition of a blister for the horse; but there are grave reasons for believing that ignorant pretenders have done more damage than absolute good by their employment. Turpentine and croton oil are likewise resorted to; and although their use may be sanctioned occasionally, we would offer a word of caution to our readers, by advising them not to admit such agents without the knowledge of the attendant practitioner. The following are reliable forms of blisters, arranged according to strength or power of irritation:

RECIPE NO. 6.

A MILD OINTMENT.

Take of powdered cantharides	1 oz.
Hog's lard*	8 „

Put the whole into a water bath, or, what answers quite as well, a clean glue kettle, such as is used by the carpenter. Let hot water be placed in the outer vessel, and kept at a point a little below boiling for eight hours, occasionally stirring the ingredients; then remove, and strain through a coarse cloth by means of pressure, and set aside to cool in a covered earthen vessel.

RECIPE NO. 7.

Second degree of strength.

Take of powdered cantharides	1 oz.
Hog's lard	4 „
Resin powdered	1 „

Mix, and prepare as No. 1.

RECIPE NO. 8.

Third degree of strength.

Take of powdered cantharides	1 oz.
Resin powdered	½ „
Hog's lard	3½ „
Oil of thyme	1 fl. oz.

Mix, and prepare as No. 1, excepting the oil of thyme,

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* In all cases the lard must be perfectly free from salt.

which is to be added after the ointment has been strained and set to cool.

RECIPE NO. 9.

TINCTURE OF CANTHARIDES, OR LIQUID BLISTER.

Take of powdered cantharides	2 oz.
Powdered euphorbium	2 dr.
Proof spirits of wine	40 fl. oz.

Mix, and set aside to digest seven days.

This is the "Sweating Blister," so called—a very useful preparation, which may be repeated without first removing the hair, or fear being entertained as to blemishes.

RECIPE NO. 10.

OIL BLISTER.

Take of powdered cantharides	3 oz.
Olive oil	1 pint.
Oil of thyme	2 oz.

Mix the oil and flies together, and digest in the water bath six hours, occasionally stirring ingredients; afterwards strain through a coarse cloth, add the oil of thyme, and preserve in a well-stoppered bottle.

The application of blisters should always be attended with smart friction, and a large surface covered when the object is to overcome extensive internal inflammation. It must be borne in mind, however, that all preparations of cantharides are slow but powerful, and on account of the first peculiarity they are unsuited for the treatment of those affections which run their course rapidly, as enteritis, when not only powerful but prompt remedies are needed. In such instances, oil of turpentine, alone or with spirits of ammonia—hartshorn, and at times boiling water, are used with greater effect. In order to hasten the action of ordinary blistering ointment, oil of turpentine, &c., is sometimes added; likewise powdered euphorbium, croton oil, and even sulphuric acid; they are, however, dangerous remedies in the horse, which is very

susceptible of their action. Even cantharides will produce alarming conditions in some animals by absorption, acting on the kidneys and bladder; the addition of turpentine would then of course aggravate the case to a serious extent. Where such consequences are anticipated, it is well to employ other agents, as mustard, or substitute the mylabris for the cantharides in the same proportions, this agent having no tendency whatever to affect the urinary organs.

Blisters, we believe, are more useful in subsequent stages of acute disease than in the first, during which an unusual amount of nervous excitement is present. In our experience we have found it to be a highly beneficial plan to first combat the action of severe constitutional disease by well-known powerful remedies, with the decline of which the attendant nervous excitement will also diminish. A blister applied after such results have been achieved will accomplish a far better derivative effect; indeed, to blister during the first stages of acute suffering is an aggravation of the complaint, and a fruitful cause of that untoward result—fatal engorgement of the lungs, as indicated by the insensibility of the skin to the action of the remedy. "The blister has not risen;" and as far as it has been concerned in the treatment, nothing would have been better.

It is not advisable to apply blisters immediately over the affected part when the object of treatment is to overcome or remove the inflammation within it. If ointments are employed, a large surface at some distance should be selected, and the hair clipped off; the "sweating" and oil blister may be used without removing the hair at any time. When, however, the object of applying a blister is to promote the formation of pus—suppuration—in a part, a spot over the centre of the affection should be chosen, light friction being used there, and a thick layer of ointment left upon it at the close.

The surface to which blisters have been applied should be kept soft by means of a suitable application, otherwise hard encrustations are apt to form, and pus confined beneath, from which unsightly blemishes may be expected. Simple olive oil forms a good agent for this purpose, and it may be greatly improved by adding a preparation of lead in the proportions as follow :—

RECIPE NO. II.

LEAD LINIMENT.

Take of olive oil	6 fl. oz.
Goulard's extract	1 „

Mix, and agitate until a thick creamy fluid is obtained, which may be applied in small quantity daily to the blistered surfaces, by means of a soft paint-brush.

Setons.—These consist of pieces of tape, passed by the aid of a proper needle (Fig. 6) beneath the skin from one

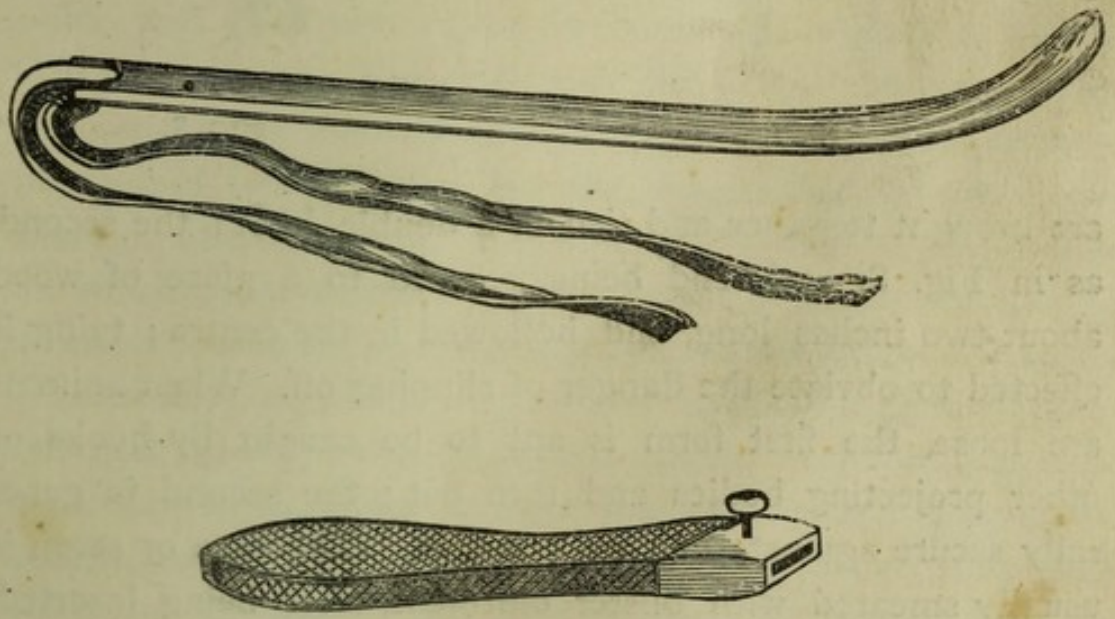


FIG. 6.—*Seton Needle (armed with Tape) and Handle for use when force is required.*

point to another, in order to set up an amount of irritation to counteract some deeper-seated inflammation, or to drain off the contents of an abscess, or cyst, &c.

As the tape thus passed under the skin would shortly

"work" its way out, by reason of the moving of the muscles, &c., in the vicinity, and acts of the animal, it is secured in two ways: one, as in Fig. 7, in which both ends of the tape



FIG. 7.



FIG. 8.

are brought together and tied in a double knot; the second, as in Fig. 8, each end being secured to a piece of wood about two inches long, and hollowed in the centre; tying is effected to obviate the danger of slipping off. When animals are loose, the first form is apt to be caught by hooks or other projecting bodies and torn out; the second is generally secure against such an accident. The tape or seton is usually smeared with blister ointment, after being inserted, to augment the irritant action. Setons as a rule are slow agents, and cannot take the place of a blister when activity and greater promptitude are required. In order to facilitate the discharge of pus from the wounds of the seton, the tape may be gently drawn upwards and downwards every morning and evening; a fomentation, or washing with hot water,

is also occasionally called for, as accumulations and needless irritation are avoided, and to prevent the likelihood of blemishes in the course pursued by the pus down and over the skin, the parts should be smeared regularly with the lead liniment, recipe No. 11, p. 47.

The Actual Cautery.—Happily, the use of this instrument of barbarity is fast disappearing in the treatment of the diseases of the horse. For many years, and there are yet evidences of the cruel torture being inflicted, the actual cautery, or firing-iron, was a most prominent remedy, and, in consequence, there was scarcely a working horse to be seen which did not exhibit the fantastic lines of some skilful operator. The remedy consists of an instrument not unlike a hatchet in form, which, after being raised to a red heat in the fire, is drawn over the skin in various directions, the object being to set up an amount of irritation more extensive, and deeper seated, than a simple blister will accomplish, and thus remove or overcome an already existing internal malady. We deal with the actual cautery here as one among the many counter-irritants employed in the suppression of inflammation, but the subject will receive a full share of attention under the head of "Firing." The object for which counter-irritants are employed is, as already stated, an endeavour to set up in another part a second form of disease —inflammation, which in power or intensity is greater than the first or original disease, but having such position and characters as to render it more manageable and easily controlled, and by its existence to draw away or overcome that which is inferior to it. The practice is founded on the assumption that two diseases of equal intensity cannot exist at the same time; and also, that when the healing action is fully established in such parts wherein disease has been artificially induced, an equal and contemporaneous recovery takes place in the parts or organs originally diseased. Successful

applications of the various remedies are attended with all the signs of local inflammation being produced ; but when blisters do not rise, and setons fail to produce a discharge, the original disease is then understood to be intense, unmanageable, and fatal.

The treatment of inflammation is also accomplished by the use of medicines, which, like counter-irritants, effect all their good by means of a derivative action : thus, *sedatives* are used to lower or depress the heart's action ; *purgatives* to divert the flow of blood to the intestines, by *diuretics* to the kidneys, and by *diaphoretics* to the skin ; besides special agents which materially alter the constitution of the blood itself, and deprive it of the means of supporting the inflammatory action. *See* also "Enemas or Injections."

Abstraction of Blood.—Bleeding, or as it is variously known as *venesection* and *phlebotomy*, at one time constituted the only reputable remedy for the cure of inflammation. At the present time it is usefully replaced by other remedies, and is resorted to only on rare occasions. The locality formerly selected for the operation was also as various as the diseases for which it was proposed, and scarcely a part of the body of an aged animal could be found which had not been seized upon for puncture. Later experience has determined that, if bloodletting is necessary, it should be practised in the course of the jugular vein, by which a more abundant and rapid flow is obtained, and reliable depression of the heart's action, effects that are recognised as the *desiderata*, and only means of good in the operation.

Bleeding from the Jugular Vein.—A few particulars relative to the situation of this important vessel will be serviceable to those who find it necessary to perform the operation of abstracting blood from it. In the horse two vessels bearing this name are to be found, a right and left,

passing from the chest beneath a mass of muscles at the lower portion of the neck, where the division is effected from a large vessel called the anterior cava (Fig. 9). They are

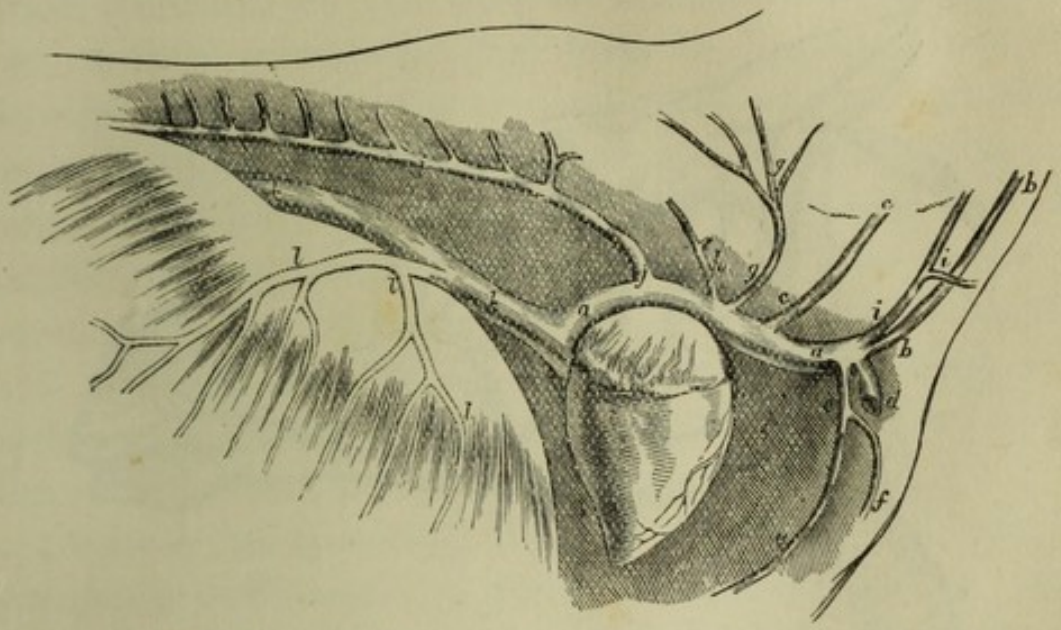


FIG. 9.—*The Terminations of the Cavas in the Heart; right side.*

a. The anterior cava.
b. The jugular.
c. The vertebral.
d. The axillary.
e. The internal pectoral.
f. The external pectoral.
g. The dorso cervical.
h. The anterior intercostal.
i. The inferior cervical.
j. The vena azygos.
k. The posterior vena cava, divested of its covering of pleura.
l. The phrenic sinuses.

named right and left, from the course they pursue, one on each side of the neck upwards in company with the wind-pipe, trachea, and carotid artery. (*See* also Plate II.) About the middle of the neck it emerges from beneath the thicker layer of muscles, and becomes more superficial; a little behind the angle of the lower jaw it divides into two portions, and is shortly lost to the view. If the fingers are placed upon the vein at the bottom of the neck, the longitudinal hollow being the guide to its situation, and moderate pressure be applied, the vessel will rapidly fill from below upwards until the whole course is plainly marked out. The course of the vein in the upper portion of the neck will be better understood by a reference to Fig. 10. Two kinds of instruments are made use of for opening the

jugular vein—the lancet and fleam, the first being employed for simple puncture, while the second is held in one hand and struck by the other, or by a clumsy instrument

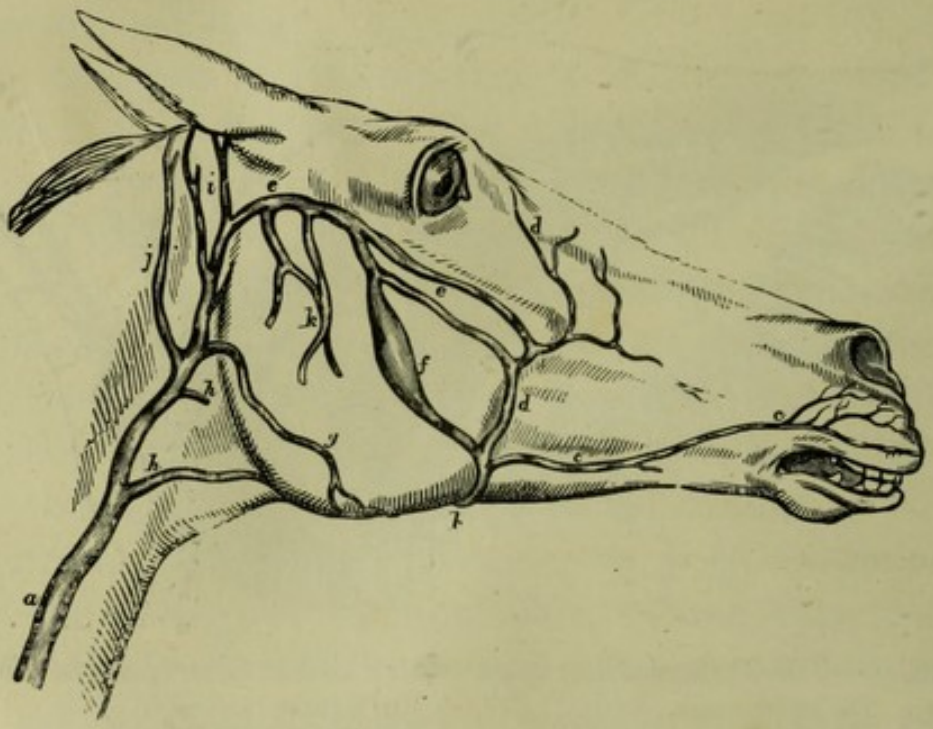


FIG. 10.—*The Veins of the Head and Face.*

a. The jugular.
b. The submaxillary.
c. The labial.
d. The facial.
e. The temporal.
f. The sinus, or pouch, within the masseter muscle.
g. The posterior masseter.
h. The parotideal.
i. The auricular.
j. The occipital.

called a blood-stick. Few veterinary practitioners now use the fleam, the lancet being preferred as superior in every respect. The part usually selected for opening the vein is about three inches below the division at the upper portion. It may, however, be punctured with safety three or four inches lower, and in some cases it may be requisite to operate above or below the first-named point—such, for instance, when the vein has previously been opened—as it is always advisable to avoid an old scar, because there is greater difficulty of piercing the consequent enlargement. There are to be observed also at certain equal distances from each other in the course of the vein small elevations

or knots across it. These are the situations of the valves with which the jugular vein is provided, and we need to avoid these important agents when operating. Setting aside, therefore, the first kind of exceptions to our rule, we may broadly recommend that from two inches below the division already named to a point about six or seven inches lower down the neck the vessel may be opened, always first observing to fill it up by pressure below, by which a correct outline of the course will be obtained. The results of opening too low are often serious ; inflammation of muscle, and probably also of the vein itself (*See* Phlebitis), with ultimate obliteration or loss, and infiltration of blood within the cellular tissue, terminating in abscess.

Previous to operating, the hair over the spot may be smoothed downwards by means of a wet sponge. Next apply the needful pressure on the vessel below with the left hand, at the same time keeping the parts somewhat tense and steady by drawing downwards. The lancet (Fig 11) is held between the thumb and two forefingers of the right hand, the point of which is directed to the centre of the vein, and in a longitudinal direction, *not* across, as some ignorant persons have actually attempted, when sufficient pressure must be exerted to penetrate the skin, thin layer of muscle, and, lastly, the vein itself ; and before withdrawing the instrument it is to be directed forwards and upwards, still in the direction of the vein, so as to enlarge the opening as the lancet leaves the wound. At this stage the operator requires to study his attitude and position as well as movement of the wrist. If dexterously accomplished, the stream

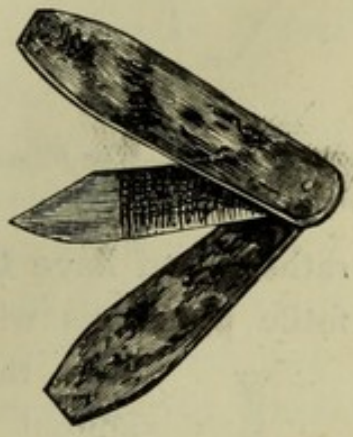


FIG. 11.—*Lancet for Bleeding.*

of blood will shoot out *beneath* his hand, and pass his right side, all danger of having the clothes, &c., soiled being entirely prevented. In the above outline we have represented the operator as standing on the right hand or off side of the animal, and puncturing the right jugular vein; but when the operator is left-handed he may select the other side with advantage. In bleeding from the right side one important object is thought to be obtained—the protection of the mane, which hides the resulting scar from intending purchasers and others, who might form an unfavourable opinion as to the general health and soundness of the animal. In the hands of unpractised persons the fleam (Fig. 12) is undoubtedly the safest in bleeding from the jugular vein; and barbarous as the method may be, if horses are to be bled by such, we decidedly give it preference rather than have to deal with the results of frequent and futile punctures with a lancet. When the fleam is to be used, the left jugular is usually selected, and the animal held by an assistant, who covers the eye of the same side with his hand while the blow is being struck by the operator. The hair is smoothed as before, and the open fleam is held between the thumb and forefingers of the left hand, the tips of those unemployed pressing on the vein to obstruct the flow of blood. The right hand holds the blood-stick (Fig. 13), and the arm is elevated to strike the blow, the time for which will be ascertained by a full vein and

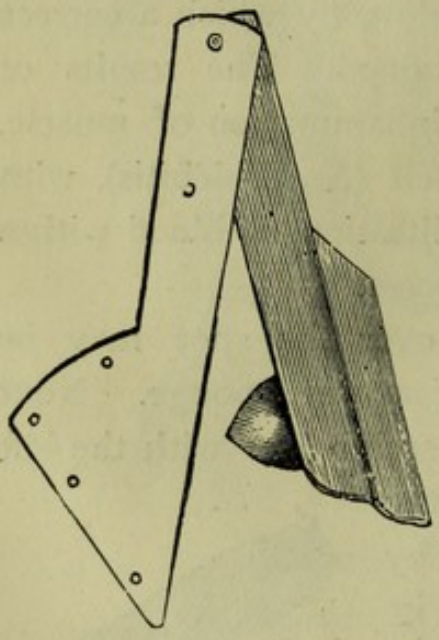


FIG. 12.—*The Fleam.*



FIG. 13.
Blood-stick.

the point of the fleam nicely placed on the centre of the swollen part. The stroke, which should be rapid and devoid of clumsiness, at once opens the vein, and blood flows freely as long as pressure is applied, which is best accomplished by holding the can used to receive and measure the blood closely up to the neck with moderate firmness. As soon as the prescribed quantity of blood has been obtained the can is removed, and the vein is to be closed. This is an affair of much greater importance than many suppose. The sides or lips of the wound are to be brought in direct apposition, all pulling and pinching being carefully avoided ; and a small pin, the point of which has been previously prepared to insure easy passage, is then caused to penetrate both, the direction being *across* at the centre of the orifice. The next step is to pass some very soft string or tow in form of the figure 8, as shown in the accompanying illustration (Fig. 14), which constitutes the *twisted suture.* Lastly, snip off the free end of the pin when it has been pressed down to the head, and the operation is completed.



FIG 14.—*Twisted Suture.*

It is not always an easy accomplishment to pass ordinary pins through the skin of animals, and if any difficulty occurs when the wound produced in bleeding is to be closed, there are ten chances to one that the pulling and tugging which always accompanies the endeavour, will give rise to awkward consequences. It is, therefore, particularly desirable to close the wound quickly, effectually, and with as little alteration in the position of parts as possible. If the pin will pass rapidly through, requiring but little pressure, the success of the affair is more complete, but common pins will rarely do this. This difficulty, with many allied to it where the use of pins is resorted to, having been experienced by the writer, his attention was devoted to the question, and he shortly

succeeded in adopting a plan by which suitable materials may be readily prepared, leaving little to be desired. It consists of placing the point of a pin within one of the triangular grooves formed in block of steel, technically known as a "stake," as shown in Fig. 15, and striking it with a

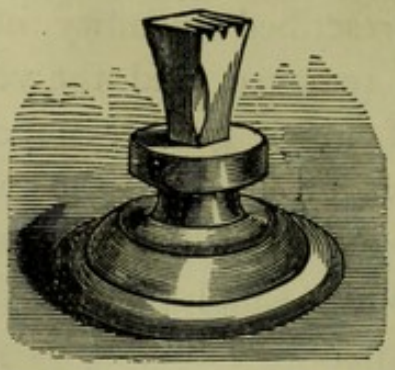


FIG. 15.—*Instrument for giving triangular points to Pins used in closing wounds after Bleeding, &c.*

hammer. By repeated turning and striking, the hammer produces one plane or face, while the blow drives the substance of the pin into the groove which imparts its shape, thus furnishing two other planes, with three cutting edges, constituting a triangular point capable of passing through the skin with the greatest ease.

Simple as the operation of bleeding from the jugular vein is reputed to be, and competent as all connected with horses believe themselves to be to perform it, there are nevertheless serious accidents occasionally arising from puncture of the carotid artery which runs in company with the vein, as will be explained by a reference to the accompanying illustration, Fig. 16.

The results of this accident are failure to arrest, by ordinary closing of the wound, the flow of blood, which is distinguished by the florid red colour and pulsatory stream. The best plan is to apply a plug and pressure, or put the finger to the bottom of the wound and retain it there an hour or two until a coagulum is formed which acts as a

natural plug and eventually closes the wound. (*See* Wounds of Arteries and Veins.)

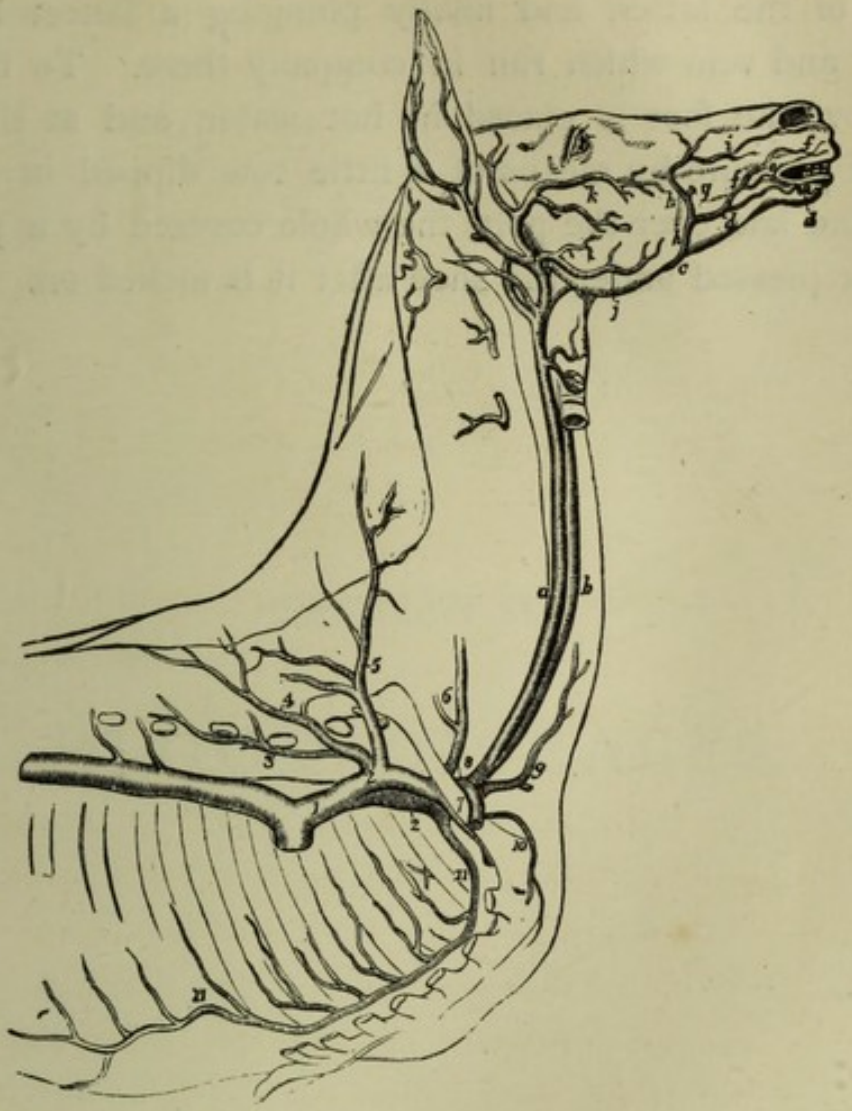


FIG. 16.—*The Thorax, divided to display the branching of the Anterior Aorta.*

1. The anterior aorta.
2, 2. The arteria innominata.
3. The interior intercostal.
4. The dorsal.
5. The posterior cervical.
6. The vertebral.
7. The axillary.
8. The common carotid.
9. The inferior cervical.
10. The external pectoral.
11. The internal pectoral.

a. The left carotid.
b. The right carotid.
c. The submaxillary.
d. The inferior labial.
e. The coronary labial.
f. The superior labial.
g. The buccinator.
h. The facial.
i. The false nostril.
j. The posterior masseter.
k. The temporal.

It is sometimes the practice of grooms and others to bleed from other parts of the body, as the arm or thigh, palate, &c., the value of which is at least questionable. Bleeding from the toe is probably of greater use as in

founder, &c., and is readily effected by first paring the hoof very thin at the junction of wall and sole, at the toe or front of the latter, and finally plunging a lancet into the artery and vein which run in company there. To facilitate the flow, the foot is placed in hot water, and at the close simple pressure by means of a little tow dipped in carbolic acid and laid over the part, the whole covered by a piece of leather pressed under the shoe after it is tacked on.

SECTION II.

BLOOD DISEASES.

BLOOD DISEASES.

UNDER this head we have to consider a class of diseases, the existence and peculiarity of which depend upon certain changes in the constitution of the blood, having their origin in various causes, and giving rise to special manifestations —local as well as general—which form their distinctive characters.

It will be apparent to the reader after careful attention to the foregoing remarks on the blood, that the circulation is the essential channel for conveying to all parts of the system the necessary materials by which it is built up and kept in repair from time to time; and, at the same time, performs an equally important function in being the great highway along which all the elements of broken-down and decayed animal tissues, materials no longer useful, those which if retained would prove hurtful, others unsuited to the wants, and many supplied in excess of the requirements, pursue their way, and, being directed to appropriate organs, are separated and eliminated from the system. In absolute health this kind of flow and return, change and interchange, is ever present, but when from any cause interference with the functions of one or more of the organs necessary to the purifying or separating process takes place, there is a corresponding accumulation of elements which sooner or later materially affect the well-being and constitution of the blood. It is not necessary to look upon these materials in

the character of poisons, but their presence alone in undue quantity may in certain instances be conducive towards a state of blood disease. Again, a deficiency of the natural constituents of the blood, as caused by imperfect assimilation, digestion, &c., will bring about effects of an opposite nature, and a blood disease ensues—the system cannot be nourished—and death is as certain as described in the preceding illustration.

A third form of blood disease consists of the presence of certain foreign elements, animal products, the result of some morbid process or secretion, inducing within the same system peculiar actions and special forms of disturbance, and a poisoned condition is evident by outward eruptions confined to the skin, mucous membranes, &c., or both. There are yet other varieties; one in which the poisonous condition of the blood is such as to propagate the same disease in the same or other species of animals by simple inoculation with it, or the secretions from mucous surfaces; and, lastly, those depending upon an acknowledged blood poison, but which do not communicate the same disease to other animals, inoculation with the blood, serum, mucus, &c., giving rise to a septic or putrid fever in man and almost all other animals.

In order to present the various blood diseases before the reader in a simple form, and arranged in accordance with their leading characteristics, the following classification has been adopted :—

I. *A.*—Blood diseases having their origin in an excess, inordinate, impaired, or arrest of function, sporadic and non-contagious—viz., Plethora; Anæmia; Rheumatism; Uræmia.

B.—Blood diseases of similar origin, sporadic and septic in character; Purpura Hæmorrhagica; Azoturia; Malignant Sore Throat.

II. Blood diseases of similar origin, non-contagious and Enzoötic ; Enzoötic typhoid Catarrh ; Enzoötic Pleurisy.

III. Blood diseases having their origin in an unknown animal poison, attended with eruptive fevers or intumescence ; Enzoötic and of septic characters ; Scarlatina, Strangles, Suppurative Catarrh.

IV. Blood diseases also arising from an unknown animal poison ; Enzoötic, highly contagious, and capable of producing the same disease in other animals of the same species by inoculation ; Glanders ; Farcy.

I. *A.*—BLOOD DISEASES HAVING THEIR ORIGIN IN AN EXCESS, INORDINATE, IMPAIRED, OR ARREST OF FUNCTION, NON-CONTAGIOUS AND CHIEFLY SPORADIC.

1. PLETHORA.
2. ANÆMIA.
3. RHEUMATISM.
4. URÆMIA.

PLETHORA.

By this term we indicate such a condition of the blood in which the essential elements are present in excess. The term "fulness," as frequently applied to this affection, should be understood to refer only to the "quality" of the blood, for it is not sufficiently obvious that there is an undue quantity. It is a state common to many horses subjected to quiet living and little exercise, while good food in abundance is supplied. Growing colts exhibit at times a fast thriving propensity, and in both varieties of animals there may be in addition vigorous digestive as well as assimilative powers, which combined, and, by the assistance of collateral agencies, are productive of so much pabulum to the blood in excess of the natural requirements of the system, and beyond its powers to appropriate.

Symptoms.—General health perfectly good, and evidences of rapid improvement in condition, combined with unusual cheerfulness. Close observation will enable the attendant to detect from time to time the evidences of simple fever, which

recur at intervals as the causes are suffered to operate, when at length some special form of disease sets in, and not uncommonly proves fatal. If such animals are bled, the fluid almost immediately forms a coagulated mass, having little serum, and presenting all the characters already described under the head "buffy coat" and "cupped appearance" of the blood. Bloodletting does not appear to weaken, but rather to refresh them, and they will sustain the loss to an extent quite marvellous: their whole vascular system is inordinately charged with an over-nutritious blood, which, in certain instances, not only predisposes the animal to disease, but also may assume all the characters of absolute disease itself.

Treatment is sufficiently indicated by the foregoing facts. If more work or exercise cannot be undertaken, the diet allowed may be reduced in its nutritious elements, blood may be abstracted and a purgative administered, or occasional doses of salines should be mixed with the food. Suitable directions will be found under "Purgatives" and "Diuretics," among the list of remedies given at the end of this work.

Anæmia.

When animals suffer a continued loss of blood by slow hæmorrhage, or bleeding is practised at short intervals; when the use of purgatives and diuretics is persisted in, and females are allowed to continue too long under lactation, by which the system is drained of its nutritious elements; and when, in addition to any of these, food of proper quality is withheld, or that which is supplied falls far below a proper standard of nutritive value, or the subject has continued long in suffering from some debilitating disease, making little or no progress towards recovery, a condition of anæmia is contracted, which is otherwise known as the *bloodless state*. It may assist

the reader to comprehend more our meaning if we observe that, just as plethora is essentially due to *over*-nutritious blood, anæmia, on the other hand, represents a direct contrast, inasmuch as the nutritious elements of the blood are almost absent. The blood corpuscles are very deficient, and the solid constituents are likewise wanting; the blood itself is thin and watery, and when drawn into a vessel rarely or slowly coagulates. The bloodvessels contain a fair quantity of fluid, but the watery elements predominate, and to this may be added a feeble circulation, which allows the vessels to become distended, and by stretching under internal pressure together from a want of nervous tone, the walls finally admit of the infiltration of fluids, from which the closed cavities—as the abdomen, chest, &c., as well as the spaces between muscles, and beneath the skin, assume dropsical conditions. Other complications are usually present in long-standing cases—*e.g.*, intractable congestion of the lungs, partial paralysis, farcy, and even glanders.

Symptoms.—Gradual and general wasting of the whole body; visible mucous membranes are pale, sometimes intensely so; the pulsations are exceedingly weak and vibrating, the calibre of the artery being unusually small, and strange thumping sounds are heard in the vicinity of the heart; there is an evidence of increasing weakness and prostration, aggravated by attendant conditions, as well as a deficient or very capricious appetite. Animals thus affected, if caused to move quickly are attacked with giddiness—*vertigo;* and fainting is not uncommon. Respiration is performed slowly and with difficulty; the bowels are extremely irregular, and a rumbling noise, called borborygmus, is constantly proceeding from them, while flatus passes from the anus, which is in a semi-relaxed condition. In walking, the creature makes awkward attempts, the limbs cross each other and he occasionally falls—apparently helpless. Such cases speedily

lapse into hectic states, and death puts an end to further sufferings.

Treatment.—It is obviously of little use doing anything to such animals as are exhibiting complications of disease with anæmia, except by way of reducing suffering. In many instances the most humane plan is to put them out of their misery as soon as it is sufficiently understood that fatal terminations are inevitable. Immediate cases of anæmia, however, are very different, and the remedies must be selected in accordance with the cause ; as, for instance, open veins or arteries must be stopped by suture, ligature, plugging, &c. (*See* Wounds of Arteries, &c.) Injudicious systems of drugging must be discontinued, and nutritious food carefully supplied in the place of inferior kinds. Young growing colts suffering as a result of defective keep, &c., during a previous winter, should receive great attention, particularly as to diet ; richer food must be cautiously introduced, while at the same time tonics, as gentian, and nitric ether as a stimulant may be given in order to restore the balance of lost functions. In those instances where constipation is present, strychnia or nux vomica may be very advantageously employed with the foregoing remedies, in order to stimulate the nervous system and rouse the digestive organs. In adult animals, the periods when the coat is being changed, and hard work as well as the vicissitudes of weather during the spring and autumn months, often create great mischief ; in some stables where ventilation is not as it ought to be, and horses are allowed to retain long coats, by which they are caused to perspire, seldom having a dry surface, they become anæmic and dropsical, for which rest and careful domestic treatment, combined with the use of nitre and gentian, &c., as medicines, are specially required ; and in the latter cases clipping is urgently called for.

Rheumatism—Rheumatic Fever.

Nature.—A specific condition of the blood, or constitutional disturbance, in which the whole system participates, while local manifestations take place in particular structures of the body, as in tendons, ligaments, coverings of joints and muscles, also membranes of the heart, lungs, &c. A special character of the inflammation which seizes the structures named is its disposition to move rapidly from one joint or organ to another, without any appreciable cause, sometimes producing large hard swellings, while in other instances enlargement is not apparent.

Causes.—Continued exposure to cold and damp, by which, together with other causes not exactly made out, some alteration or interference with the assimilative functions takes place, producing the characteristic poison of the disease. It is often the sequel of other diseases, as influenza, epizoötic pleurisy, &c., creating much disappointment when the animal is thought to be recovering.

Rheumatism assumes two forms, the *acute* and *chronic.*

Symptoms.—General uneasiness and stiffness, or sudden lameness, sometimes without any swelling of parts, but usually the hock, fetlock, or stifle is affected, or one of the flexor tendons, which is found to be swollen, hard, and sensitive; at other times the loins or quarters are seized, or the sides of the chest are implicated—pleurodynia, when the power of turning will be seriously interfered with. The usual signs of fever are generally present, but the attack may commence without any significant indications of disorder, and in a few hours we may observe an entire removal of the disease to one or more regions of the body previously not affected. The pulse is hard, frequent and unyielding; membranes slightly injected; mouth hot and dry; bowels constipated; the urine scanty and deeper in colour, and in

place of its healthy alkaline reaction, it has become either neutral or acid. The blood is found to possess an excess of fibrine, as exhibited by firm and excessive coagulation after being drawn, the watery portions being proportionately less. Suppuration rarely ensues from the swelling of acute rheumatism.

In the chronic form of rheumatism there is less tendency to metastasis and attendant fever. A joint extensively affected continues to be the locality of serious disease, and consequent changes of structure, ending probably in the formation of a bony tumour or excrescence, which in time entirely surrounds and fixes it immovably. This untoward condition will be better understood by comparison of the accompanying figures, one illustrating a healthy joint, the other as affected by rheumatism (Figs. 17 & 18).



FIG. 17.—*Knee-joint.* Front View.



FIG. 18.—*Knee-joint, after Chronic Rheumatism.* Front View.

Treatment.—It is a most useful proceeding to administer first a laxative dose of aloes, by which, not only will the

bowels be moved, but the attendant fever will probably suffer a check, and the process of assimilation altered in character, and not be without ulterior good effects on the blood. Some practitioners combine opium with the aloes, and continue it in doses of half a dram or more twice during the day, while pain is excessive. Others, first observing the bowels have entirely recovered from the action of the aloes, combine calomel with the opium, to prevent its liability to constipation. The following is the preparation :—

RECIPE NO. 12.*

MERCURIAL BALL.

Take of powdered opium	3 drs.
Calomel	3 „
Common mass.....	6 „

Rub the opium and calomel together first, and, when thoroughly incorporated, add the mass, all of which should be worked for five minutes, and afterwards divided into six balls ; one to be given morning and night, avoiding their use as soon as the pain subsides, and before signs of salivation appear.

As there is considerable danger to be apprehended from the use of mercurial preparations in the hands of those unacquainted with drugs, and their actions on the system, we have usually recommended a substitute in the subjoined forms :—

RECIPE NO. 13

Take of solution of acetate of ammonia	2 oz.
Tincture of aconite—Fleming's	10 drops.
Nitrate of potash, powdered	2 drs.
Water	½ pt.

Mix, and administer as soon as the potash has been dissolved. The dose may be repeated in ten or twelve hours ;

See the introductory remarks on the doses of medicine. Section XIV. The Dispensatory.

afterwards the aconite must be reduced to one half, and not repeated after the fourth dose without a break of twenty-fours at least, during which the other ingredients may be given alone.

If the form of ball is preferred to that of drench, it may be prepared as given in—

RECIPE NO. 14.

Take of nitrate of potash, powdered	2 to 4 drs.
Aconite	10 drops.
Common mass	2 or 3 drs.

Mix the nitrate of potash and mass together, and when incorporated drop in the aconite. Give this dose morning and night, observing the cautions given with the drench, No. 13.

When the aconite is withdrawn, powdered colchicum may usefully take its place, in doses of half a dram or a dram, according to size and constitution, when debility is not particularly great. Moderate bloodletting may be practised at the outset in young and robust animals.

Local Treatment.—When the joints, &c., are swollen and painful, blisters are often very useful in promoting a free elimination, it is supposed, of the virus or poison of rheumatism, and thus greatly avoiding the tendency for the affection to become located in the heart, &c. The blister should be severe, and after a full effect has been produced, linseed meal poultices may be applied, in order to maintain a lengthened discharge from the skin, and lesson the liability for the disease to attack the interior of the joint and synovial fringes. With the same object in view, the "endermic method" of treatment—which see—has been adopted with some success.

In those cases attended with less pain and swelling of the joints, blisters may be set aside, and strong liniment substituted, the form of which is here given :—

RECIPE NO. 15.

Take of olive oil	10 fl. oz.
Liquor ammonia	1 „
Spirits of turpentine	2 „

Mix, and shake until a white liniment is produced, with which the affected parts may be rubbed morning and evening until the skin shows signs of inflammation by a dewy moisture among the hair, which now stands erect, and tenderness under the touch. In later stages, and when the external tenderness has subsided, the following will be found useful towards reducing swelling, and creating absorption of the products of the inflammatory process :—

RECIPE NO. 16.

Take of soap liniment	4 oz.
Tincture of iodine	3 „
„ opium	2 „

Mix, and apply with moderate friction.

In the treatment of these cases the patient must be induced to lie down as much as possible, and thus relieve the inflamed limbs, and ensure ample protection from cold currents of air. If the body is not in any way implicated, do not omit the essential brushing of the skin, which keeps it active as an excretory organ, and make use of warm light clothing. The food should be light, easily digested, and offered temptingly (*see* Diet, page 19). Green forage, roots, &c., with small quantities of boiled corn, with bran or linseed for keeping the bowels open, are suggested, with water cold or chilled, hay or linseed tea, as the patient prefers, as drink. In the administration of medicines use no unnecessary force, and let no gruel or other preparation of food be horned down the throat.

Happily this affection is not so prevalent among horses as in horned stock, but whenever it does occur there are grave reasons always for expecting a return, each time with worse

results. In an ox, a stiff joint may prove of little consequence, as life is only preserved so long as to enable the owner to make meat of him, if possible; but such a termination of disease at once renders the horse valueless. Enlargement of joints by the formation of osseous matter will, therefore, enable the practitioner and owner to decide on what may be done without unnecessarily increasing a needless outlay of time, trouble, and expense.

Uræmia.

By this term is understood a saturation of the system with the elements of urine, which having no means of discharge by reason of some cause leading to retention, are absorbed and dispersed over the body. It is a state of blood poisoning (*see* "Retention of Urine").

Symptoms.—In addition to other signs which are indicative of some aggravated condition of the urinary organs, we may observe an unusual dulness and heaviness of expression in the countenance; the appetite is absent; mouth clammy, or slimy and fœtid; bowels costive, and the evacuations scanty, hard, and offensive; pulse and respiration slow and tardy; pupils dilated; and a strong and sickly odour of urine is largely eliminated from the surface of the skin, the hair of which stares, is harsh under the hand, and has lost its bright and glossy appearance; general temperature is low, and rapidly declining; and shortly the animal becomes comatose, and dies during insensibility.

Treatment.—As uræmia is not a disease *per se*, but rather a collection of signs distinctive of several other serious maladies, essential treatment is obviously to be directed towards their removal. We can only urge here the necessity for evacuating the bladder as soon as possible when full, or promoting the usual action of the kidneys when such are

suspended. All the essential details will be described under the various affections of urinary organs in Section V.

Apnœa.

A form of blood poisoning dependent on an arrest or obstruction to the action of the skin. The common integuments of the body are required to perform wonderful and elaborate functions, besides acting as a mere envelope to bind and keep together all that have been placed within it. If the skin is covered by any substance which proves impervious to air and moisture, a condition of blood poisoning ensues of a similar nature to uræmia, and, if continued, death will inevitably take place in a like manner. All such excretory organs as the skin, kidneys, &c., may assume under certain conditions a vicarious action—in other words, they may perform some of the functions of other organs rendered unable to act by reason of disease ; but they are totally unsuited for doing this constantly and entirely, or in the same way as the appropriate organs would accomplish it. For a time, therefore, the functions of life appear to be regularly carried on, although some special and indispensable organ is entirely laid by. The skin can throw off much of the elements of urine in a gaseous form, but the remainder go round and round the circulation until at length they prevent the nutrition of the nervous centres, and, indeed, of the whole body. The kidneys may also for a time eradicate from the system much that should go off by the skin, but they likewise fail to draw *all* to them, and hence similar toxic effects are the result. All organs have special functions assigned to them, and while some of the more subordinate actions may be delegated to or taken up by others, the first they cannot give up. The result is, then, if such special functions are not performed by the organs to which

they have been assigned, they are not performed by any other.

Death by apnœa in the horse chiefly occurs through accident, when the supply of air is from some obstruction to respiration cut off, in which it is known as the *immediate cause.* But there is one condition to which he is often subjected, regardless of consequences, in which a state of apnœa is ignorantly engendered, and, although it is not the cause of death in a direct manner, it is so frequently occasioned that a very great susceptibility to disease is contracted, and untimely death is the end of it—we allude to the practice of working horses with thick, heavy coats in the autumn and early winter months, whereby they perspire so freely that the hair afterwards seldom gets dry or clean, and as such proves an impediment to the proper process of excretion. It may not in all cases be advisable to clip horses, and we do not desire to lay down a hard-and-fast line of action; but, as a large experience has demonstrated that the major proportion of the cases of influenza arise from this cause alone, and disappear immediately after the coat has been removed, we feel bound to utter a protest and warning in the interest of an animal for which we have the fondest attachment, and on behalf also of those for whom these pages are specially written.

Apnœa, or difficult breathing, in the sense as applied to the cases we are considering, gives rise to no acute distressing signs, and, for the difficult breathing, the non-professional reader would examine in vain. The term does not apply to outward and unequivocal signs of agony and suffocation, but to an internal non-aërating or non-purifying of the blood slowly and gradually going on, failing to nourish tissues or appropriate the elements of nutrition which the food supplies. The circulation of blood, charged with such principles constantly accumulating from various sources

by reason of the arrest of, or interference with, the function of the only organ which can eliminate them, becomes slow and tardy in proportion as it ceases to nourish the nervous centres, especially in the lungs, where it should exchange its carbon for life-giving oxygen. As the outlet by the skin is retarded, the lungs experience greater difficulty in bringing up the relays of blood, and at length congestion arises, when, in conjunction with other organs which suffer in the general disturbance, a category of signs appear, and we lose sight of the primary complaint in the existence of another; probably losing ourselves also in a maze of speculation as to the wide-spread nature of an evil which has befallen our quadrupeds, finding that we are setting contagion against non-contagion, and, without deciding, abandon the point as soon as the horse has been clipped, to renew the contest probably at the next and succeeding seasons. We shall have much to advance on other causes of disease, but we cannot deal with them as apnœa is presented to us. As a distinct affection, it has no existence; but as a powerful and important indication of a mine of mischief it requires our greatest and most immediate attention. As we regard it, so must it be treated in a medical aspect. What are the causes? Take these out of the way, and, in obedience to natural laws, the effects *will* cease.

I. *B.*—BLOOD DISEASES HAVING THEIR ORIGIN IN AN EXCESS, INORDINATE, IMPAIRED, OR ARREST OF FUNCTION, SPORADIC AND NON-CONTAGIOUS, BUT SEPTIC* IN CHARACTER.

PURPURA HÆMORRHAGICA.
AZOTURIA.
MALIGNANT SORE THROAT.

PURPURA HÆMORRHAGICA.

Nature.—A specific blood disease, in which local manifestations are confined in major part to the skin, and next to analogous tissues, as mucous membranes, cellular tissue, certain portions of organs, as the parenchyma of the lungs and kidneys, and spaces between the coats of the intestines. It is the "Malignant Epidemic Fever," or *Typhus gravior* of Blaine. There is unquestionably such a grave alteration in the characters of blood pabulum in this complaint, that we can no longer doubt the existence of a septic poison, and, from this point of view, it might be regarded as belonging to the following category of diseases. We must, however, bear in mind that, although the septic state is admitted as entering into the nature of purpura, there are yet strong reasons for retaining it under the present head. As a blood poison, it is no other than a sporadic disease, attacking animals here and there, and, as far as we know,

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* Non-contagious in a strict sense, but producing by inoculation putrid fever in other animals. These affections are the analogues of charbon in cattle.

never assuming enzoötic characters. This view is clearly strengthened, we believe, by a consideration of the many different conditions essential to its production.

Causes.—By far the greater portion of animals attacked by purpura are those which have recently suffered from enzoötic typhoid catarrh, or other equally distressing and debilitating affections; in certain instances, it will appear in animals occupying the same stable as those suffering from the enzoötic referred to, although themselves have been, as far as is known, quite free from it. Again, it arises independently of these known causes, and there is little difficulty in associating it with defective ventilation and want of proper cleanliness, when there are corresponding irregularities in the system of feeding and work; but these cases are by no means so frequent as we might suppose, seeing that such causes tend, as a rule, to produce other affections which naturally precede purpura. Lastly, there are cogent reasons for believing that, through various agencies, the essential septic poison may gain admittance to the blood of a susceptible animal as by means of drinking-water, &c., when portions of the carcases of others slaughtered or dying from debilitating diseases are carelessly left about to putrefy and contaminate buildings, land, pools, &c. &c. We have frequently had cause for remonstrating with farmers and others upon the careless way in which *post-mortem* examinations are conducted, and disposal of the offal and resulting *débris*. When the latter, such as blood, pieces of flesh, excretions, &c., are suffered to lie exposed and dry in the sun, portions assume light and imponderable characters, and are carried by the wind in every direction, some finding their way into food, thence to the stomach, or by the respiration to the lungs. Thus we may not hesitate to affirm, that the causes of purpura do occasionally consist of certain septic products imbibed from without, the operation of

which are greatly insured by a want of proper ventilation ; and, in other instances, it arises from morbid changes within the blood of the subject, and probably an unusual degeneration of tissue consequent upon the existence of previous debilitating disease.

Symptoms.—This disease is particularly characterised by an extreme amount of debility and indisposition to move, with the presence of variable diffused swellings upon every part of the body, by which the skin is elevated. These are to be observed especially about the head, lips, breast, abdomen, between the legs, &c. (Fig. 19). *Petechiæ*, or mulberry-coloured

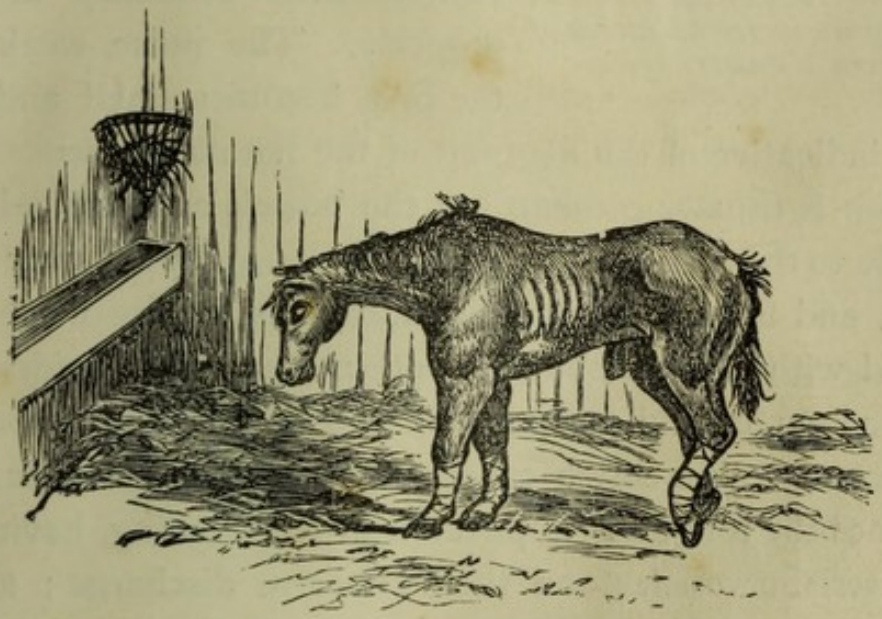


FIG. 19.—*Purpura Hæmorrhagica.*

spots, are present over the surface of the visible mucous membranes, and not unfrequently hæmorrhage takes place from their surfaces, the blood being of a dark colour, and having a fœtid smell. The legs swell also as a result of the general extravasation of blood beneath the skin, and within the cellular tissue ; and, besides, small vesicles shortly appear low down on the surface, which burst, and together with cracks or fissures, forming at the same time in flexures or bend of the joints, pour out an amber or purple-coloured

fluid, which irritates as it flows over the skin, and gives rise to much uneasiness. Swelling of the face, eyes, nostrils, and lips is sometimes very severe, closing the eyes, and so seriously interfering with breathing as to cause suffocation (Fig. 20); while the jaws cannot be opened, although the animal has a desire to eat. Eventually the skin over the swollen parts sloughs off, and leaves large open sores, which give out a disagreeable fluid, and exhibit little tendency to heal properly. The pulse, weak from the first, becomes small and irregular, indicative of the flagging of the natural powers. Constipation is usually present, but the bowels are strangely susceptible to the action of medicines, for purgation is very easily set up, and under ordinary circumstances the fæces are often covered with black blood, and internal pains are evident. A coffee-coloured fluid escapes from the nostrils, and probably a hoarse and hollow cough causes the sufferer much uneasiness. At times the tongue is implicated in the swelling, having the characteristic vesicles and their offensive discharge; and on the surface of the mucous membranes sloughings of the *petechiæ* take place and discharge a similar fluid, which hangs about the air-passages and disturbs the breathing, giving rise to a constant snuffling noise. The urine has a high colour, an offensive, strong, ammoniacal odour being apparent, and from the great amount of solid constituents present, decomposition sets in very shortly. In some cases, the bowels suddenly become excited, and severe colicky pains ensue, when blood is rapidly distributed throughout the intestines, and in such large quantities that death immediately follows.

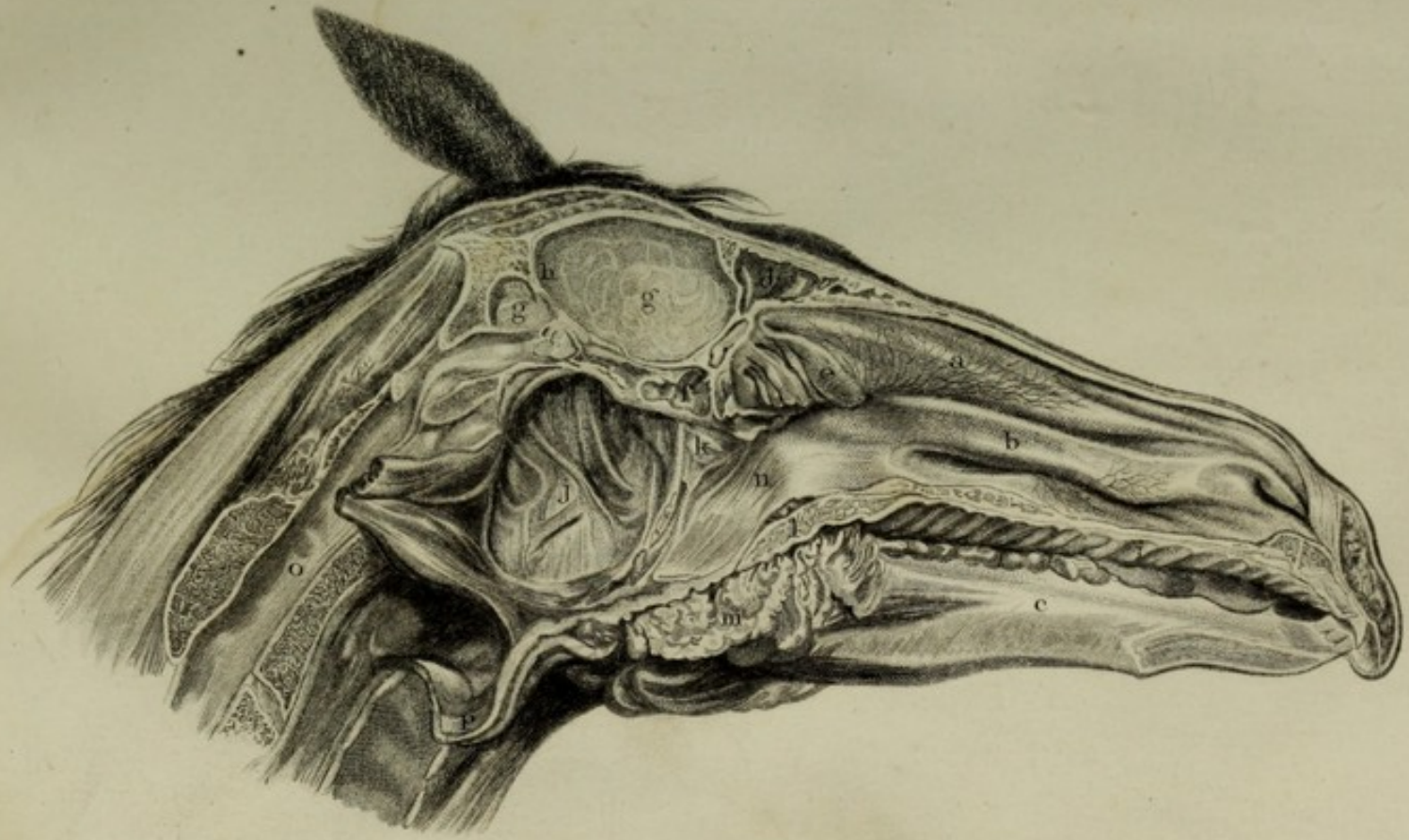


FIG. 20.—*Head of the Horse as it appears under an attack of Purpura Hæmorrhagica.*

DESCRIPTION OF PLATE I.

"THE LEFT DIVISION OF THE HEAD, SEPARATED BEFORE THE MESIAN LINE IS ATTAINED.

"*a*, The superior turbinated bone, covered with the Schneiderian membrane and its ramifying vessels; *b*, the inferior turbinated bone in the like condition; *c*, the mouth and gums of the lower jaw; *d*, the facial and frontal sinuses; *e*, the ethmoid cells; *f*, the ethmoid sinuses; *g*, the cavity of the skull, deprived of the brain and its membranes; *h*, the portion of the bony triquatrum which separates the cerebrum and the cerebellum (*see* Plate IX.); *i*, the bars upon the roof of the mouth; *j*, the guttural pouch, formed of merely mucous membrane, which shows the various adjacent structures through its sides; *k*, the opening into the fauces of the guttural pouches; *l*, the soft palate (*see f*, also Plate IX.); *m*, a portion of the lacerated submaxillary gland; *n*, the opening of the nostril into the fauces; *o*, the spinal canal; *p*, tissues disarranged in dissection. Owing to the division of the muscles, the pharynx has fallen down and concealed the larynx."



W. Bagg ad. nat. del.

H. Adlard sc.

Post-mortem Appearances.—Beneath all the swollen parts the cellular tissue is filled with a reddish-yellow fluid, having a feeble power of coagulatlon, in which purple-black blood freely admixes, and similar conditions are to be observed between the coats of the intestines and most secreting organs. The blood within the circulating system is very dark, fluid, and, like the exuded portions, has little tendency to coagulate ; the colouring matter, however, soon finds its way into the substance of membranes, &c., whereby they are saturated and dyed a dark red, sometimes mistaken for inflammation. Upon the surface of muscles and membranes generally there are petechial spots, those in the former penetrating some distance, which become black on exposure to the air. The fluid in the pericardium is increased in quantity, and the heart is invested by patches of imperfectly coagulated masses similar to those already referred to. The various glands are usually congested, swollen, and readily broken down ; the abdominal organs suffer equally, being either congested, swollen, softened, or charged with dark-coloured blood ; and the lungs are enlarged, heavily charged with the prevailing exudation, which finds its way into the air-passages. The brain and nervous system exhibit the petechial spots, and their bloodvessels contain the usual dark-coloured and fluid blood.

Duration, Prognosis, &c.—Fatal cases in the acute stages succumb as early as the second day after the attack has become pronounced, but generally go on to the third or fourth. The disease does not observe an evanescent course, but rather assumes such a tendency to fluctuate, that it becomes very difficult to estimate what the next few hours may develop ; animals appear to be improving satisfactorily, and next day are dead ; others also, apparently progressing towards convalescence, suddenly cease to feed, emaciation and debility supervene in a marvellously rapid manner, so that the creature cannot rise if he falls or lies down. In

some instances extensive sloughing takes place in all the swollen parts, but the reparatory process is so tardy that it may almost be said to be absent. Such cases live on from day to day, exhibiting the most variable progress, and after some time, ranging from two to six weeks, death takes place from hectic, gangrene of the lungs, glanders, or farcy. The hopeful cases are those in which the swellings and congestions are slight, and important organs as the lungs are able to carry on their functions. Improvement may be looked for on the third or fourth day, and all the care and watchfulness that can be given will be required, not so much with the view of being ready to do something, as, on the contrary, to avoid doing too much, for life is here but like a flickering light ; slight interference, with ever so good an object, may serve to snuff it out altogether.

Treatment.—Pure air, perfect cleanliness, and ventilation are of essential import in the first attempts to suppress the malady. Unless these are attended to, and the sufferer is still in contact with the effluviæ of stables in which disease and dirt prevail, we had better *not* do anything, which in the end will prove a saving of time, medicines, and money. Moderate bloodletting in the first stages is likely to prove beneficial, if debility is not great ; the pulse must be the guide. In later stages, to bleed is to kill. After these conditions are provided, the next step is to employ such remedies as are known to be efficient in overcoming the tendency to extravasation of the blood ; these are, turpentine, perchloride of iron, &c. Of the first, about an ounce may be given three times in the day, beaten up with eggs or thick gruel, observing great care so as to withdraw the medicine as soon as there are any signs of irritation of the kidneys. In order to avoid this, some practitioners use alternate doses of turpentine and perchloride of iron, or after using two doses of the first, two of the latter are given at the prescribed times—one, say, every eight hours. The iron medicine is thus prepared :—

RECIPE NO. 17.

Take of perchloride of iron	1 or 2 fl. dr.
Spirits of nitric ether	2 fl. oz.
Infusion of quassia	6 „

Mix, and administer as carefully as possible. The acid nature of the perchloride of iron has a great tendency in some animals to produce irritation of the bowels and diarrhœa ; on this account its use must be carefully watched, for while it is desirable to preserve a lax state of the bowels as conducive to eliminating the poisonous elements from the blood, absolute diarrhœa and purgation may be hurtful and dangerous. At the outset, some practitioners always commence their treatment of these cases by giving an oleaginous purge ; when constipation is present, such a proceeding is commendable. The following is the form usually prescribed :—

RECIPE NO. 18.

Take of linseed oil	8 oz.
Sulphuric ether or spirits of nitric ether	1 or 2 fl. oz.

Mix.

Besides the foregoing, the mineral acids have been found useful in dram doses, given frequently ; such are the sulphuric, nitric, or hydrochloric, combined as in the subjoined prescription :—

RECIPE NO. 19.

Take, say, of sulphuric acid	1 dr.
Infusion of quassia, gentian, or colombo	6 fl. oz.
Nitric ether	1 or 2 fl. oz.

Mix.

Professor Williams, in his admirable work,* advocates strongly the use of chlorate of potash in purpura, stating the marked results achieved by it. We can endorse the opinions expressed, and trust that other practitioners will make an extended use of the salt, and report the results. Other

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* Principles and Practice of Veterinary Medicine.

remedies are rarely called for; indeed, it is unwise to extend the number beyond those already given; besides which, we must caution the reader against using large doses at any time. It is far better to depend upon small quantities, frequently administered, by which there is greater likelihood of keeping the system under a *continued* influence—a state too little understood and appreciated in the treatment of disease. Ammonia is a dangerous remedy in this affection, and should not be prescribed, as the system already contains too much, and from which the urine assumes a thick mucilaginous state.

Let the food be of the most nutritious and digestible kind, offered frequently, and in small quantities—above all, selecting green forage, or the roots, &c., which produce salutary conditions of the blood. As convalescence is established—which in all cases is extremely slow—food may be allowed more liberally, and a little exercise given when stiffness is passing off. The time to decrease or leave off the foregoing acid medicines will be indicated by the decline of swelling and external effusion, together with the return of natural functions in the various organs, as the bowels, kidneys, &c. For a time it may be useful to continue the nitric ether and gentian only, and, in somewhat later stages, to commence a course of mineral tonics such as the following:—

RECIPE NO. 20.

Take of sulphate of iron in fine powder	.....	3 oz.
Carbonate of soda ,,	.....	1½ oz.
Coriander seeds, finely ground	.....	3 oz.

Mix thoroughly, and divide into 24 powders, one to be given night and morning in the corn.

Local Treatment.—Carefully sponge the nostrils frequently to prevent irritation from accumulating discharges, but beyond this, for a time at least, nothing further of the kind appears to be called for. If the breathing at the outset is

inclined to be difficult on account of the nasal swelling, lose no time in opening the windpipe (*see* Tracheotomy)—as in every hour afterwards the act of respiration is impeded more and more, and plenty of fresh air means so much life to the sufferer. In constipation of the bowels, clysters—which see—are of great benefit towards promoting the action of laxative medicine; it may also be advisable to remove the contents of the bladder (*see* Catheter), and thus assist in promoting comfort by removing that which often causes much irritation, especially when it is retained on account of excessive debility.

AZOTURIA, Nitrogenous Urine (WILLIAMS); *Enzoötic Hæmaturia* (GAMGEE); *Hysteria* (MOORE and HAYCOCK); *Albuminuria*; "*Schwarze Harnwinde*" of the Germans.

Nature.—A blood disease dependent upon the presence of an unusual amount of nitrogenous material, producing impairment of the nervous system, convulsions, and death within a few hours. The disease has been noticed by a few persons, and English text-books have been unusually silent with regard to it. In Germany and on the Continent of Europe it appears as an Enzoötic disease, but in Britain it is not seen as such, being common to both horses and mares, sporadic, and terminating with the essential characters of a septic or putrid disease. It is only during late years that it has been made out to be due to a blood poison, alterations in the system of feeding having doubtless much influence in its production, whereby an extended observation has been given to it. The late Professor Dick, in describing the malady before his class, named it "Sprain of the Psoæ Muscles."

Symptoms.—The attack always commences very suddenly, affecting animals in apparently the best of health and condition. At first the animal is observed to be restless,

frequently shifting his position, and perspiration, often of a profuse character, comes on ; colicky pains set in, and he attempts to lie down ; the pulse and respiration are accelerated, and blowing is not at all unfrequent, aggravated by violent contraction of the muscular system, especially over the loins, and inability to discharge urine. Unless relieved, the spasms increase rapidly ; large and firm swellings take place over the hips and loins, severe stiffness seizes the limbs, the countenance bears an anxious expression, the visible mucous membranes grow deeper in colour, perspiration is intense ; the breathing is difficult, paralysis affects the hind-quarters, from which the animal falls and cannot rise again ; convulsions are frequent, and quickly followed by coma and death.

If urine is discharged during the attack it is thick and ropy, having a disagreeable odour and deep colour, very much resembling boiled linseed oil. Such is the nature of the fluid, that decomposition commences after a short time if kept in open vessels.

Recovery is denoted by copious discharge of urine and fæces, cessation of sweating and abdominal pain, as well as falling of pulse and respiration.

Post-mortem examination reveals no specific lesion of the spinal cord, as believed by some. Any redness that may be present is to be regarded as a sign rather than the disease itself. The blood is dark-coloured, and possesses a smell of ammonia ; the heart contains blood clots, and the lungs are congested. The bladder contains a large quantity, and is sometimes full of dark-coloured viscid and offensive urine, and its coats are occasionally reddened as a result of the irritating action of ammonia developed in the fluid. If the urine is allowed to stand exposed to the air, ammonia is also largely formed in the rapid decomposition which ensues ; other tests identify the nitrogenous character of the urine as

associated with the disease. When boiled, it loses its viscidity and becomes a thin fluid, giving off freely a large amount of ammoniacal gas, a proof that albumen in the usual form is not present, as is often said to be. If nitric acid is added, violent effervescence results from the presence of carbonates and liberation of carbonic acid, and afterwards the urine becomes lighter in colour and a copious precipitate of brown scales falls to the bottom ; these are the crystals of urea, the nitrogenous principle of the urine, which in excess as derived from the abundance of food has been the direct cause of the mischief.

The disease is traced to animals having too little to do, and supplied with an abundance of rich food. Among farm horses, it is known to arise at those times when, after rather severe work and when living on good food, frost, &c., puts a stop to the ploughing, &c., and they are suddenly confined to the stable for some days. Horses in low condition, belonging to farmers who are noted for a defective system of feeding, are not victims to this disease.

Treatment.—If we fully bear in mind the causes of the disease, and the fact that the blood already contains such an excess of nutritious matter as to be literally poisoned by it —that nervous power has been reduced thereby, and excreting organs, as the kidneys and bowels, are inactive as a direct result, both probably charged with the effete matters which they are employed to expel—we shall not hesitate, indeed no time must be lost, before we decide what should be done. The bowels must be caused to act, and the following purgative draught is to be prepared, and immediately administered :—

RECIPE NO. 21.

Take of solution of Barbadoes aloes (prop. 1 dr. to oz.)	8 fl. oz.
Croton oil	1 or 2 drops.
Spirits of nitrous ether	2 fl. oz.

Mix.

During the time the above draught is being prepared, if warm water can be obtained, make a solution of soap quickly, and throw it up the rectum by the enema funnel or syringe.

In some instances we have found that impediments to the discharge of urine existed in the shape of spasm at the neck of the bladder, when the animal makes frequent and ineffectual attempts to urinate. It is then required to pass the catheter and draw off the contents of the bladder, particularly when the animal is lying down. The practice is not useless if no urine is obtained, as we are thereby assured of the exact state of the bladder, and no fear need be entertained of rupture, which might take place as when distended during the violent struggles of the animal. Place him in a well-littered and roomy box ; allow hay-tea or water to drink while thirst is present, and keep up the use of enemas for several hours as may be needed.

If all goes well, further medicines will not be required for some time, or at least until the first dose has proved to be of no effect, which rarely happens. Make the animal as comfortable as possible by keeping a dry bed beneath him, especially if he cannot rise, placing bolsters of straw between him and the wall, &c., to prevent injury to the limbs or body. During the time he is compelled to lie, he must be turned from time to time, as he becomes tired of his position, or at least two or three times during the day ; and ounce doses of nitrous ether may be given morning, noon, and night, to overcome the tendency to depression and weakness. At the end of three days he should be assisted to rise if he cannot do so by himself, for which purpose the slings may be used. The first attempt will, in all probability, prove a failure, as far as his standing is concerned ; yet good will be done if care is exercised, and the animal will have greater confidence when the second effort is made. As soon as he is on his feet, employ hand-rubbing to restore warmth to limbs, and

remove stiffness; let him remain in the slings a few days, and watch him carefully when first allowed to lie down, that he may be helped to rise if unable to do so alone.

During the first eight or twelve hours of the attack, no harm will ensue from a total absence of appetite, and afterwards for a day or two the supplies should consist of bran mashes or sloppy food, with a large share of bran, linseed, &c., in it. As soon as better food is required, let it be light and nutritive; barley or oats, swollen and cracked by boiling, answer best; avoiding large meals, as the stomach is weak; for errors of this kind often kill at these stages, instead of proving a cure. As a medicine, give gentian along with nitrous ether, as recommended in recipe No. 27; or, if desirable to recruit the powers of the nervous system in a more direct manner, give the following draught:—

RECIPE NO. 22.

Take of nitrous ether	1 fl. oz.
Tincture of cardamoms	½ „
Nux vomica	½ dr.
Water	8 fl. oz.

Some practitioners prefer to use a solution of strychnia, and pass it directly beneath the skin (*see* Endermic Method); but there is no great advantage to be gained by the plan in this case, as the animal can swallow readily, and other medicines are required with which either strychnia or nux vomica may be combined.

At later stages, exercise must be taken as the patient can bear it, and a gradual return to the usual food insured in proportion to the requirements; and as soon as he is able to perform labour, let care be observed so as to avoid overwork and over-loading. In order to prevent the occurrence of the disease in future, send all idle and resting horses that have been feeding highly for a few miles' walking exercise daily, and reduce the corn to one half, making up the bulk by an addition of bran and chaff.

In the medical treatment of azoturia, we caution the reader against the use of ammonia internally, and of blisters, oils, or liniments externally. The system is already charged with the first, and will only do more harm in larger quantities ; the latter are not required, and are usefully substituted by gentle friction and wisping at occasional intervals.

MALIGNANT SORE THROAT—*Œdema Glottidis, Cynanche Maligna ; Typhus, Putrid Sore Throat,* or *Laryngitis Maligna* of PERCIVALL.

Nature.—Malignant sore throat consists of an extensive inflammation, attended with rapid effusion in and around the various tissues and organs situate at the back of the mouth and entrance to the windpipe and gullet. Considerable fever of a typhoid character accompanies the disease, due to the presence of a blood poison, as signified by the formation of petechiæ, rapid prostration, early death, and tendency to gangrene in the affected parts.



FIG. 21.—*Malignant Sore Throat*

Symptoms.—In the early stages the case appears as one of simple catarrh, but in a few hours swelling of the throat is evident (Fig. 21), with enlargement of the parotid and submaxillary glands. The pulse is rapid, but small and compressible, numbering 90 or 100 per minute, and weakness already appears. The membrane of the nostrils is of a dark crimson or bordering upon a purple colour ; the mouth is offensive, and the tongue is furred, of a dingy colour, and

probably swollen. If the mouth can be opened, the tonsils are seen to be swollen, and often livid in colour. Breathing becomes difficult in proportion as the throat swells, being first harsh and whistling, next loud and stertorous, and an intolerable fœtor accompanies each expiration. As the disease advances, purple spots appear on the tongue, and shortly give way to the formation of ulcers. The pulse grows weaker and more frequent, until it becomes almost imperceptible at the jaw. The countenance betrays great agony, and if relief is not obtained the animal dies from suffocation.

Post-mortem Appearances.—The mouth, together with the tongue, larynx, pharynx, &c., are involved in a general tumefaction, and their investing membranes are covered by a copious putrid discharge, mainly the produce of large ulcerated sores on the surface. The whole of the glands in the vicinity are immensely swollen by a prolific effusion of offensive fluid throughout their substance, and various parts of the affected tissues are bordering on a state of gangrene. The lungs are congested, blood throughout the bloodvessels black and fluid, and evidences of blood poisoning are variously present in the internal organs, as ecchymosis or blood spots, and softening of the liver, &c.

Treatment.—As soreness of the throat is present from the first, it is not advisable to attempt to give medicine by the mouth. The sufferer cannot swallow, and liquids poured down are most likely to pass along the windpipe, causing death in a few minutes. Solid medicines, as boluses, are precluded for the same and even stronger reasons. The only plan we can adopt is, by means of plastic preparations and washes applied to the mouth, to endeavour to reduce the pain, swelling, and inflammation at the back of the throat, and thus assist the animal to swallow. For this purpose the following wash may be made up :—

RECIPE NO. 23.

Take of solution of chloralum	½	fl. oz.
Tincture of myrrh	1	„
Cold or tepid water	10	„

Mix. Have the head elevated for a few minutes, and pour about two or three tablespoonfuls into the mouth several times a day. This will cause the patient to move his tongue, and distribute the mixture over the surfaces.

If by elevating the head discomfort is produced, substitute the electuary No. 25, which may be placed on the tongue or molar teeth without moving the animal. When the breathing is so bad as to threaten suffocation, no time should be lost in opening the windpipe (*see* Tracheotomy), which will give instant relief, and delay the effects of the disease until the remedies have had their effect.

During constipation, enemas of soap and water must be used frequently, and it may be necessary also at convenient times to make use of the rectum as a means of passing medicines into the system. For this purpose gruel must be made, with which nitrous or sulphuric ether is mixed in rather larger proportions than is used for the mouth.

In a few days the swelling of the throat may subside under the action of the electuary or mouth wash, when medicines may be swallowed, the nitrous ether being the most serviceable in doses as already recommended in recipe No. 27. Provide cold water for drinking, and light and easily-digested food as soon as he can take it, and otherwise add to the comfort of the animal in the shape of pure air, warm clothing, bandages, bedding, &c. These cases require great patience, and the owner must be content to work with the complaint, not against it, for a definite course will be pursued, and the most we can do is to mitigate suffering to a certain extent, and assist in supporting the system. Everything beyond this is mere unwarrantable interference

with Nature, and usually productive of adverse results. The great object is to enable the creature to swallow. He cannot do this until the disease abates, and for that we must wait, having adopted all known principles of sustaining the system until the violence of the disease is exhausted. The treatment of the animal under states of convalescence has been already given, and will be repeatedly alluded to throughout the work.

The dangerous nature of the flesh of animals dying from malignant sore throat is convincingly set forth in the following account, furnished by Mr. Proctor, V.S., Solihull, to Mr. Percival, and reported by him :*—"Two stirks were found dead in a field, or nearly so, with affections of their throats. The butcher was sent for to dress their carcases. His own horse partook of some grains mixed with some of the blood taken from the beasts ; and in less than twenty-four hours afterwards he died from swelling of the throat, producing suffocation. A sow and nine pigs ate of the blood and grains, and were soon afterwards seized with throat affection, with sonorous breathing, of which all of them died. The others, after much trouble, eventually recovered."

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* Hippo-pathology, vol. ii. p. 27.

II.—BLOOD DISEASES ARISING FROM AN EXCESS, INORDINATE, IMPAIRED OR ARREST OF FUNCTION, NON-CONTAGIOUS, AND ENZOÖTIC.

ENZOÖTIC TYPHOID CATARRH.
ENZOÖTIC PLEURISY.

ENZOÖTIC TYPHOID CATARRH; *Panzoötic Catarrhal Fever* (WILLIAMS); *Influenza; The Protean Disease; Distemper; La Grippe* of the French.

History.—The earliest records of reliable authority do not date prior to the tenth century.* As a disease alike prevalent among mankind and the lower animals, a study of its history is important and interesting. It prevailed fatally throughout France in 1311, and in 1403 the Law Courts of Paris were closed from the number of resulting deaths. Later it prevailed extensively over considerable tracts of land, and in 1557 assumed the characters of a fatal epidemic throughout the whole of Europe and northern hemisphere, originating in Asia and proceeding westward until it reached America, where its progress terminated. In the eighteenth century it again appeared, and taking a westward course as far as the Elbe, passed over the countries intermediate, and fell upon England, where two streams were produced—one, pursuing its course across the Atlantic to America, the other, returning in a south-easterly direction, attacking the inhabitants and

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* The Science and Practice of Medicine, by Wm. Aitken, M.D., vol. i. Fifth Edition.

animals of France, Spain, and Italy, ultimately disappearing in the Mediterranean.

It is remarkable how frequently this disease has prevailed in one country contemporaneously with, or very soon after, other typhoid diseases, in the same or in one adjoining; likewise how often some peculiar condition of the atmosphere, or extreme states of temperature, have been present at the time of its appearance; and, lastly, electrical or planetary phenomena and volcanic disturbances have been noticed as affecting the earth.

In 1782 Spain suffered violently from it, while yellow fever killed thousands in America, and *el vomito negro*, or the "black vomit," destroyed others in South America, and even on board many vessels. Poland, Austria, Siberia, the Island of Bourbon, Tripoli, Damascus, and Aleppo, also suffered. Scarlet fever appeared in Edinburgh, and England was visited by chincough. Miliary fever, or the "sweating pestilence," broke out at the same time, and continued for seven years to devastate France, the Lower Rhine, and Northern Europe. In 1703 the Thames rose to an unusual height, and Westminster was inundated. Chili was visited by an earthquake, and Cadiz suffered from the "black vomit," domesticated animals being the first attacked; poultry, pigeons, &c., also suffering severely from a dysenteric form which continued up to 1738. In 1731 China was shaken by an earthquake, and Naples from the same cause, many houses being destroyed, and upwards of 2000 persons were killed. In 1732 the pestilence visited London, 1500 dying in one week. The United States of America still suffered from yellow fever, and in the following year influenza again appeared, Spain and Europe generally suffering in an alarming degree.

In 1761 influenza appeared in the United States of America, and declined into a malignant yellow fever. The

same occurred in the West Indies, and after appearing among the dogs of Madrid, it spread over the whole canine race of the kingdom of Spain—no other animal suffering from it.

The great fire occurring in Constantinople in 1782, in which 7000 houses were destroyed, and, a month later, the destruction of 20,000 more by a similar event, caused the inhabitants to crowd together ; succeeding which, fever, famine, and pestilence appeared. Men and animals alike in various parts of the world suffered, and down to 1786 earthquakes occurred in many places, and have left their evidences in the form of wholesale human destruction, as well as in the production of some of the finest examples of subterranean movement, exhibited in landslips, fissures, falls of sea-cliffs, formation of ravines, lakes, waterfalls, and other changes of a more complicated nature.

In 1803 Britain was again visited by influenza, and other nations suffered from its ravages in a degenerate form ; and, for years, unusual phenomena occurred periodically—such as black and offensive fogs, in one instance lasting several days, excessive cold and humidity, falls of snow to the extent of several feet ; frost and fog combined with continued prevalence of wind from the east or north-east, which, being also very high, rendered the cold more intense. These occurrences were not without their effect upon the human population, the miseries of the poor being aggravated by the want of fuel, which was dear and scarce. They were denied necessary comforts, and influenza attacked persons of all ages in London, degenerating into a malignant type, and causing extreme mortality. Simultaneously yellow fever broke out at Gibraltar, and created great havoc among the troops engarrisoned there. "It has frequently been observed that epidemic anginas, catarrhs, measles, &c., generally precede great and destructive pestilences—a fact that has been frequently noticed in our day. The terrible pestilence

cholera of 1817 and subsequent years, was preceded by influenza," &c.*

In 1827, after extensive inundations in Holland, Belgium, and Lower Germany in the previous year, influenza broke out, and assumed such alarming characters, that the Dutch Government were compelled to minister to the wants of the suffering population in a special manner. Yellow fever prevailed in the United States, remittent fever raged in England, and in the Island of St. Thomas a rheumatic form of epidemic typhoid catarrh seized a population of 12,000 people. This peculiar malady, termed "dandy fever," was characterised by formication in the hands and feet, followed by increasing numbness, which extended to the whole of the body. Erysipelatous states also ensued, and eruptions took place over the body. In some instances the sufferers became permanently deformed, and others were carried off by cholera, which appeared as a sequel to the malady.

In 1837 the influences of unusual cold, frost, wet, and stormy weather, with absolute hurricanes, were again visited on the population of Great Britain. Influenza broke out, and countries from the Cape of Good Hope, and even Sydney, northwards to Russia, Sweden, and Denmark, were devastated. Yellow fever and epidemic erysipelas also succeeded the visitation, the former in the West Indies, and the latter in France. It is also remarkable that, contemporaneous with these outbreaks, sometimes preceding them, or happening immediately afterwards, the appearance of some unusual and peculiar planetary body has taken place. In many instances one species of vegetation has suffered blight; and the inhabitants of some countries have succumbed to ergotism after escaping the effects of malignant influenza.

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* A History of Epidemic Pestilences, by Edward Bascome, M.D.

After the existence of an epizoötic murrain among oxen, and to a smaller extent in horses, dogs, and sheep, during 1846-7, throughout Europe, pleuro-pneumonia, affecting man and beast, raged in East Lothian, Ayrshire, Aberdeenshire, and north of Scotland generally; and rapidly following came influenza, which visited Spain, Valparaiso, New Zealand, coast of Syria, west coast of Africa, and Hong-kong. Later Paris was assailed, when more than five thousand persons were at one time prostrated by "la grippe," as it was then known. Madrid also suffered to the extent of more than half its population. At this time also Java was seized by epidemic diseases; virulent small-pox and typhus raged in Ireland and at Prague; cholera visited Moscow, St. Petersburg, Cronstadt, and Stockholm; while influenza passed on to Copenhagen and Marseilles. In Ireland the medical profession, to the extent of one-fifteenth of its community, and Marseilles, had more than 40,000 persons attacked. In the north of Scotland, the latter part of the month of November was peculiarly remarkable. A form of influenza succeeded a rainy season, and commencing at Dundee passed to Kinnaird's Head, along the coast, thence westwards to Huntley, Keith, Elgin, and Inverness. The University and King's College had to be closed; greater part of the students attending Marischal College were ill; and the grammar-schools suffered in like manner. At Edinburgh and Montrose the like also existed; yellow fever prevailed at New Orleans, cholera raged at Trebizond, and Constantinople was afflicted by dire pestilence. A famine fatal to many people, to the extent of 20 per cent. of the population, also occurred at Rybensk and Plesg. A committee of relief, appointed at the time, state that "hundreds of orphan children were seen standing beside the corpses of their parents crying for bread."* During these two years scarcely

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* *Op. cit.*

any part of the world escaped an epidemic pestilence; and in 1847, particularly, influenza raged throughout England. In connexion with this visitation among men the following particulars are worthy of note:—A great scarcity of potatoes was experienced, resulting from "blight," in consequence of which the poorer population suffered immensely; scurvy developed itself, and the mortality was suddenly increased by the setting in of typhus. Succeeding these came diarrhœa, dysentery, and cholera. The Registrar-General, in his report, says: "The wind blew from the first week in October S.S.W. and S.W. The weather was universally warm; a brilliant aurora was observed, and shook the magnets, October 24th. It appeared eight times during the quarter. On Tuesday, November 16th, there was a remarkable darkness; the wind changed to N.W., and amidst various changes still blew from the north over Greenwich at the rate of 160 and 250 miles a day. The mean temperature of the air suddenly fell from 11° above to 10° below the average. On Sunday it was 54°; Friday 32°; and Friday night 27°. The earth was frozen: the wind was calm three days; and on Saturday evening a dense fog lay over the Thames and London for the space of five hours. No electricity stirred the air during the week—all was still, as if Nature held her breath at the sight of the destroyer, come forth to destroy her children. On Monday the sky became overcast, the air damp; the wind changed in the night to S. by E., and passed for four days over Greenwich at the rate of two hundred and three hundred miles a day. The temperature suddenly rose, and remained from 2° to 9° above the average throughout the week ending on the 27th November. Influenza broke out: in the first week in December, 2454 persons died; the week following, 2416 persons; and in six weeks, 11,339. The epidemic in that time carried off 5000 over and above the mortality of the season. The country

districts do not appear to have been much affected to any extent—a fact which shows how much purity of the air has to do with the outbreak of epidemic diseases.

"Influenza, it has been observed, is often associated with other epidemics. It preceded and accompanied the plague, or 'black death,' in the fourteenth century; it preceded the great plague in London, A.D. 1665; it followed epidemic typhus, A.D. 1803; preceded typhus, A.D. 1837; and occurred in the midst of the typhoid epidemic in the year 1847. Influenza also preceded and followed epidemic cholera, 1831 to 1833. In short, it may be said that influenza has from time immemorial pretty generally preceded and accompanied epidemic pestilence in every quarter of the globe, as is noted by the Registrar-General to have been the same in England, A.D. 1728, 1733, 1758, 1762; five years after, A.D. 1767, 1775, 1782; again, A.D. 1788, 1803, 1831, 1832, and following year, 1833, as also A.D. 1846 and 1847."*

Thus far we have referred to the chronological order of the alarming ravages of "influenza" among mankind, the leading feature in the record. Such, however, is invaluable, as it indicates at almost every point unmistakable evidences of preceding, simultaneous, or succeeding attacks among the lower animals. Horses generally have suffered largely, while the signs of the malady have existed so slightly in ovine, bovine, and canine animals as to escape notice, or passing into forms of disease peculiar to each tribe, have been more or less confounded. Thus sporadic as well as epizoötic pleuro-pneumonia and vesicular aphthæ of cattle, sporadic pleuro-pneumonia of sheep, distemper of dogs and cats, &c. &c., have been known to exhibit aggravated and unusually extensive characters; but before their special signs have become deve-

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* *Op. cit.*

loped they have been ushered in by catarrhal or typhoid symptoms, which, for a time at least, mask or obscure the terminal affection. Records are preserved in which we find that with close companionship the influenza of horses has existed side by side almost with the analogous affection in man. At times it has succeeded or preceded it almost immediately. Youatt and Gibson assure us of outbreaks in 1714, and almost yearly up to 1732. Professor Brugnone describes one of 1783 ; Gilbert, one of 1795. Youatt again particularises its prevalence from 1815 to 1823. Hurtrel D'Arboval gives an account of its occurrence in Paris in 1825, and men of our own day record outbreaks of 1828 and 1831–2, 3, 4, 5, 6, 7, and 40. In 1850–1 and 2, also in 1853 and 1854, it prevailed more or less, and in succeeding years up to the present time the spring or winter rarely passes without some manifestation of the disease, usually partaking of malignant characters, and insuring extensively fatal results.

Towards the close of 1870 the horses in the metropolis were seized by enzoötic typhoid catarrh, thousands of which speedily succumbed ; and the disease continued through the winter and following spring, by which the major part of the animals working in public vehicles, as cabs, omnibuses, and tramway-cars, were unable to leave the stables. Horses also of the heavier breeds were similarly affected, and suffered greater mortality, the studs of the various railway companies and carrying agents being fearfully lessened. The disease continued to the following year, other towns in Britain suffering likewise ; and at length it was discovered in America under the name of "American Horse Disease," inducing frightful losses, and the stoppage of all public vehicles. In 1873 it still continued in Britain and America, and each year up to the time of writing this we have intelligence of the havoc the affection is making, more especially among the hard-working horses of large towns. Recently

however, we have learned that many farm horses in Essex and Hertfordshire have suffered, and in personal conversation with several large proprietors we have been assured that work was completely suspended on several farms in the commencement of 1876, following the rainy season at the close of 1875.

Although we have given at some length a history of enzoötic typhoid catarrh, it forms but an epitome of the legitimate whole, and for more extended information we refer the reader to Fleming's admirable book on "Animal Plagues," as well as Bascome before referred to.

Nature.—A febrile affection, with which is associated an unusual amount of prostration of strength, as well as inflammation of the membrane of the air-passages, giving rise to sore throat, bronchitis, &c., or combined with disease of the membrane lining the digestive track. Other complications are also observed, and Professor Hering, with that deep intelligence which characterises the observers of the French and German veterinary schools, separates each under its distinctive head ; thus he enumerates :—catarrho-rheumatic ; gastric, or bilious rheumatic ; and gastro-erysipelatous, in accordance with the kind of tissue affected, as the lungs, liver ; fibrous and fibro-serous structures, as the pleura, covering of muscles, ligament, tendon, articulations of joints, connective tissue, &c. There is scarcely any disease of the lower animals, the nature of which has admitted of so much speculation and controversy, as enzoötic typhoid catarrh. For a long time its nature has been undefined, as indicated by the numerous appellations it has borne, being for many centuries known as "catarrhus epidemicus," because it was recognised to be identical with disease of the same name in man. Percival,* only a recent

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* Hippo-pathology, vols. i. and ii.

writer of no mean talent, alludes to it as "influenzal bronchitis," and in another part of his work it is specially treated under the old name alone; and White confounds "epidemic catarrh" with "vesicular epizoötic."* We, doubtless, incur some risk of censure from some who may think differently for terming the disease "enzoötic." We do so for important reasons; first, although it prevails at times very extensively, there are, nevertheless, many places where it never enters; and second, as its behaviour is such, as in our estimation does not characterise contagious affections, to which the term "epizoötic" should be more strictly applied, we prefer the title given at the commencement, and which will hereafter be employed to designate the disease formerly called influenza, &c.

Causes.—To describe these would be a task of great difficulty. As sufficiently indicated under "history," it will be accepted by the reader that certain atmospheric conditions have no mean part in producing enzoötic typhoid catarrh, but what those conditions are no one at present can tell. The disease has followed a season of extreme wet, unusual heat and dryness, fog, and frost; and yet we have known such seasons without any appearance of it whatever. It appears on any kind of soil, in any locality, in all seasons, and under various temperatures, but the most common time is during spring and autumn, when the system is heavily taxed for the process of forming a new coat. As a rule, horses in country districts escape, or suffer slightly, while those of large towns die off by scores. Such a fact may not point to actual causes in town stables, but it certainly suggests one of a predisposing character. There is no evidence that this disease follows the course of the wind, nor is there any which favours the theory that ozone in excess produces

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* White's Cattle Medicine.

it; food must be left out of the question, and the only element we can tax is the air. Even there we encounter difficulties, for we have known stables at opposite angles to those having sick animals where no cases occur, although free communications have existed, and by removing the sick from one to the other, a marked improvement has been made. The same is known to take place in connexion with the human subject, for during visitations of the epidemic, those on one side of a street will suffer acutely, while those of the other, observing free intercourse, entirely escape.

Although there is much to be said on the subject of enzoötic catarrh being contagious, we have to bear in mind that it cannot be conveyed by inoculation, or transfusion of blood; that it appears suddenly in districts, attacking large numbers of animals simultaneously, independent of the introduction of diseased animals, or matter, &c.; and when it occurs in man, or other domestic animals, it does not always appear in the horse. Some have endeavoured to account for the wide-spread character of this disease in the assumption that it may consist at first of only a sporadic or enzoötic nature, but by propagation from one animal to another manufacture a poison which acts as the contagium, and conveyed "o'er hill and dale," establishes it as an epizoötic or contagious malady. This, however, is only an assumption, and fades away on critical examination. If a few animals first affected manufacture such a large quantity of animal poison, what a vast amount it must be to seize so many animals simultaneously in so many districts; and yet not so large or so powerful as contagious maladies usually are, or no locality or animal would escape.

There are, however, *predisposing causes—e.g.*, small and crowded, ill-ventilated, badly-drained, and badly-cleaned stables. It may not be necessary for all these bad characters to be present at one time, any one of them, in the

sense as understood to be bad, will have full effect, and animals subjected to such influences are frequently the first to fall and die, or last to recover. Heavy draught horses, and others of coarse breeds, having long coats in early winter, often suffer acutely. Mares and geldings are alike affected, the young and immature as well as the weak and senile, perhaps, being the greatest sufferers. While it will attack the horses of well-kept establishments as well as those of the poorest owner, yet we have to urge that, whatever constitutes neglect or bad management, as innutritious or deficient food, overwork, exposure to extreme states of weather, &c., are fruitful predisposing causes, and render the subjects of such more susceptible in proportion as the defects are allowed to operate.

We shall consider the disease first in its simple form, and subsequently in its complications.

Symptoms of Enzoötic Typhoid Catarrh.

The Simple or Catarrhal Form.—Usually a fit of sudden coldness, commonly known as a shivering fit, or rigors, precedes the manifestation of other signs; such may, however, be slight and entirely escape notice. Then follows coldness of the ears, legs, and nose, with a staring or harsh-looking coat, and the visible mucous membranes are dry and unusually red. The thermometer placed within the rectum shows an elevation of temperature, probably 102° or 103° F. The eyes are half closed, and lids are swollen, tears freely escaping and running over the face. At first a watery discharge takes place from the nostrils, and fits of sneezing occur, usually preceding a hacking short cough. (Fig. 22.) The discharge shortly becomes viscid and acrid, causing scalds on the surfaces over which it flows, and in common with the aggravation of other signs, within a period

of one, two, or three days, it has changed to a thick flaky fluid, and is increased in quantity. At this period we may expect an elevation of temperature, ranging from 104° to

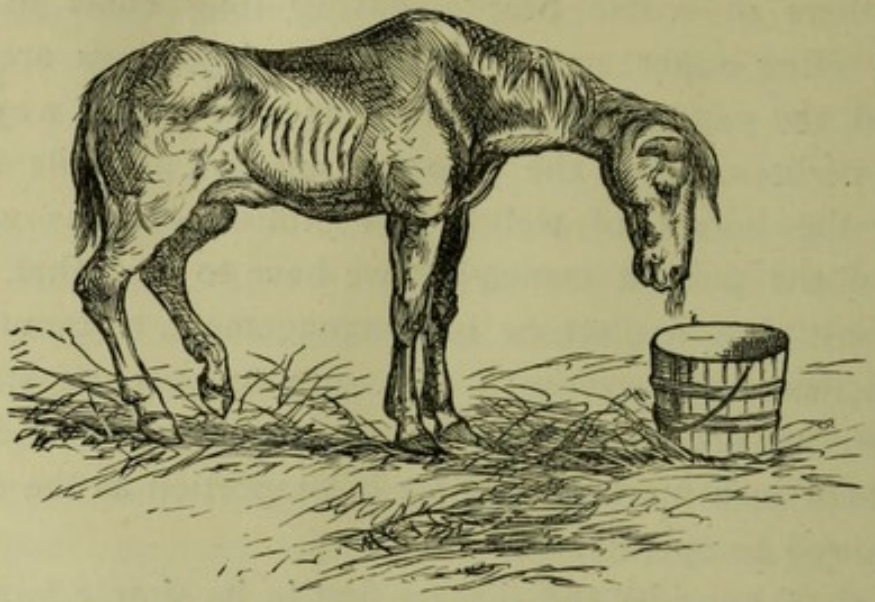


FIG. 22.—*Catarrhal form of Influenza.*

105° F., together with a deep, painful cough, which, occurring in fits or paroxysms, shakes the whole body, the animal evincing his distress and irritation by stamping the feet; one or both eyes are probably now inflamed, causing opacity of the cornea and blindness, and the temperature of the body is variable, one leg being hot and the others cold as clay. The pulse, which at first was probably of usual fulness, is now small, frequent, and compressible; the animal is thirsty, and watches eagerly for water; the mouth is hot and clammy, and usually has a disagreeable smell. A great prostration of strength is perceptible as the sufferer hangs his head, and reels to and fro if caused to walk. Soreness of the throat is a common addition to the list of signs, and is known by the animal refusing food, or coughing violently after attempting to swallow, when water returns by the nostrils, and solids are forced into the nasal chambers, where they mix with and discolour the discharges. The bowels at first are constipated, the evacuations being few, hard, small,

and glazed with mucus, but diarrhœa is easily provoked. The discharge of urine is small, and it is highly coloured, thick, and mucilaginous from the presence of albuminous matters somewhat resembling linseed oil, a condition which increases with the waste of the body.

Favourable terminations are marked by gradual decrease of the frequency of the pulse and animal temperature ; the cough ceases to be husky and hard, is soft, loose and less frequent, giving rise to less pain and distress, and the nasal discharge increases in quantity as well as consistence, being thick and yellow from the admixture of pus ; the swallowing of food and water occasions no cough, the appetite increases, rest is taken, strength returns, discharges abate, swellings subside, and at the end of twelve or fifteen days the animal is convalescent.

Complications.—Cases are sometimes retarded by the extreme amount of debility which ensues, swelling of the glands under the throat with probable suppuration, and remarkable loss of flesh. Dropsical swellings also take place in the legs or beneath the chest and along the whole abdomen. Notwithstanding, by the exercise of proper care and attention, domestic and medical, these states are overcome, and the animal afterwards progresses satisfactorily. In such stages any wrong or false kind of treatment produces sad effects. *Lung complications* set in, which are known by a fearfully distressing cough, great difficulty of breathing, pulse rapidly increasing in frequency but losing strength and volume, being as high as 100 or more per minute, and as the animal gasps for breath the nostrils spasmodically vibrate in strong and alternate opening and contraction. In placing the ear to the sides of the chest or at the bottom of the windpipe, the practitioner is enabled to decide by the sounds emitted during inspiration how matters stand within ; inflammation of the bronchial tubes or substance of the lungs has

set in, and gives rise to loud or rasping sounds of various degrees of intensity, and interferes with the purification of the blood, which was bad enough to begin with ; but now, as the body wastes and the products enter the blood, it literally carries poison to the nervous centres, from which the animal becomes more or less unconscious. The membranes become dark or purple in colour, blood mingles with the nasal discharge, giving it a coffee-coloured appearance ; the pulse grows weaker and less perceptible, partial sweats with coldness take place, and the animal gradually sinks towards the eighth or ninth day.

The *second form of complication* is that in which the abdominal organs suffer. As there is not only great sympathy existing between these and other organs, but also similarity of structure, it is not unlikely that they participate in any special kind of irritation to which mucous membranes or the skin are subjected. There is an extreme tendency for this in Enzoötic typhoid catarrh, and practitioners are ever on their guard in order to avoid absolute purgation at any time. The bowels are costive and fæces are scanty, besides being small, dry, hard, smelling offensively, and coated with thick mucus ; the animal is tormented by colicky pains, and he scrapes, turns round in his box, lies down, quickly rises, puts the nose towards the flanks, and kicks at the abdomen. Sometimes diarrhœa is present at the first, which adds to the general prostration of strength. The liver is congested, and the mucous membranes have a yellow tinge as well as increased redness, that of the rectum being more intense probably on account of the straining which takes place. The mouth is hot and the tongue furred, dry and fœtid ; the urine is similar to that already described, and thirst is intense.

The *third form of complication* is the *rheumatic ;* one of the most troublesome conditions. Usually it appears at the

close of simple states, but may be combined with them at an early stage. The first noticeable signs are cracking of the joints when the animal moves, with restlessness, alternate raising of feet; by-and-by, joints, &c., or tendons swell, the most common being those of the flexors below the knee, when the parts are hard, hot and painful, causing lameness, from which some animals seldom recover.

It is rare for one animal to suffer from a second attack in the same season, but this must not be understood to imply that one attack creates an immunity from another. Under careful treatment mortality is trivial.

Treatment.—As the tendency to great prostration of strength is evident at the outset of this disease, every attention should be directed towards furnishing ample nutrition in the form of good and easily-digested food; and it may be useful to remark here that an immense advantage is to be secured by the selection of such kinds as will properly take the place of medicines. Thus, constipation may be relieved by bran, linseed, &c., and during diarrhœa these should be set aside for some of the nutritious kinds of corn. Enemas also suitably replace purgatives in conjunction with laxative food. When diarrhœa has set in during the early stages, it should be at once attended to by administering the following draught:—

RECIPE NO. 24.

Take of linseed oil	10 fl. oz.
Tincture of opium	1 „
Chloroform	1 fl. dr.

Mix, and give to a large horse, or reduced proportionately with size.

After a few hours it will be apparent whether the action of the bowels have ceased, which in most cases is effected; we may then turn our attention to other conditions. If the throat is sore and swallowing impossible or difficult, make up the following electuary:—

RECIPE NO. 25.

Take of powdered alum	4 oz.
„ „ galls	1 „
Extract of hyoscyamus	2 dr.
Honey	Sufficient.

Rub the alum and galls together first, afterwards add the extract, and triturate until it disappears in the powder; afterwards add the honey so as to make a semi-solid or plastic mass, one tablespoonful of which is to be placed on the tongue five or six times during the day.

To the outside of the throat apply the "sweating blister," No. 9; not, however, with the intention of actually blistering, but only to produce a slight irritation without disturbing and distressing the patient. Ordinary soap liniment will mostly answer the purpose. If the membranes of the air-passages are dry, having a dark colour, use warm vapour inhalations as shown in Fig. 26, page 131, medicated with "Sanitas" oil, observing the directions given under "Inhalations" in the Dispensatory. The spray distributor is also invaluable. In most cases such a process proves beneficial and useful by relieving the cough and promoting discharge. Nothing farther in the way of medicines must be given until the throat is better and the animal is able to swallow. Some persons ignorantly force boluses or draughts down, and commit an immense amount of mischief at these times. When the patient begins to take food, which he usually will after soreness leaves the throat, we may then assist nature usefully in combating the prostration of strength, by giving preparations of ammonia combined with potash, &c., as here detailed:—

RECIPE NO. 26.

Take of carbonate of ammonia	2 dr.
Carbonate of potash	2 „
Extract of gentian	1 „
Cold water	12 fl. oz.

Rub the ammonia and potash to powder separately, afterwards triturate with them the gentian, until the whole forms

a dry powder, adding flour or powdered gentian if required to hasten the process. Shake the whole together in a bottle, and give as a draught three or four times a day.

Sometimes the above draught will occasion slight irritation of the urinary organs, when the following may be given alternately with it :—

RECIPE NO. 27.

Take of spirits of nitrous ether	2 fl. oz.
Powdered gentian	4 dr.
Tepid water	6 fl. oz.

Mix.

The value of this course of treatment will be apparent only in proportion to the extent to which it is adopted, and supported by contemporaneous nursing and care. The action of the skin should be insured by frequent wisping, a wet sponge being at times previously used, followed by light, warm clothing. Flannel bandages will be of great use for promoting warmth in the legs, and a good bed invaluable for rest ; add to these pure air, a roomy box or shed, and entire removal from the close atmosphere of crowded and ill-adapted stables. Place cold water or hay-tea within reach of the patient, and carry selected and tempting morsels of boiled corn, a lock of sweet hay, sainfoin, green forage, &c., or an occasional root, apple, &c., from time to time, and on no account force anything of the kind down the throat. Food thus passed into the stomach does no good, but often much harm ; and, for a time, we need feel no concern about the want of appetite when it has been removed under such circumstances.

We now proceed to notice the treatment required in certain complications.

In some cases, which unfortunately are not of very rare occurrence, the laryngeal affection or sore throat assumes a serious aspect. The lining membrane and tissues at the bend of the neck are involved in an extensive tumefaction, which

limits the breathing powers, bordering on suffocation. The animal stands with the nose straight out, nostrils dilated, the eyes protrude, and inspiration is performed with a loud roar. He must now be relieved, or suffocation soon takes place, and the most suitable plan is by opening the windpipe (*see* Tracheotomy); and the subsequent treatment consists of using the electuary No. 25, and following the directions given therewith.

In that form of complication which involves the abdominal organs, often described as the "bilious" or "catarrho-bilious," a little modification is required in the way of treatment. The yellow tinge which characterises the mucous membranes is an indication of congestion of the liver, further supported by the constipation, scanty and offensive fæces, while the urine is thick, mucilaginous, and highly coloured. All that is necessary here is to administer an oleaginous purgative:—

RECIPE NO. 28.

Take of linseed oil	1 pint.
Carbonate of soda or potash	2 dr.
Water	2 fl. oz.

Dissolve the soda or potash in the water, and add to the oil afterwards, shaking until a creamy fluid is formed.

Enemas of warm water may be used also to supplement the oil.

Sometimes acidity of the stomach causes the animal some uneasiness, when he will lick the walls and various objects near. For this purpose give soda or potash in the doses stated above each day, with water as a drench, or dissolved in the water allowed for drinking.

When colicky pains come on, use enemas of warm water, and administer the following as a draught from the bottle:—

RECIPE NO. 29.

Take of linseed oil	1 pint.
Spirits of nitrous ether	2 fl. oz.

Mix.

Such a draught usually accomplishes all that is needed; but if the pain continues during any lengthened time, and the bowels have not responded to the action of the remedy, give one ounce of chloric ether in cold water.

Having succeeded in suppressing the violence of the special signs of the disease, and the animal approaches convalescence, we must prepare to take him from his box for a short walk. First let him be carefully dressed over, the clothing and bandages being removed for the purpose, and replaced afterwards. A few minutes will suffice the first time, and afterwards he may take extended walks as strength returns. In proportion to the increased desire for food the supply must be regulated, always bearing in mind that overloading the stomach will oppose a speedy cure. A little at each time, and those times frequent, will form the safest rule to observe; and when the animal is taken to work, he should not have too long or too hard journeys at first.

From the time he is able to take regular exercise, he may receive some powders in his food, night and morning, for ten or twelve days:—

RECIPE NO. 30.

Take of sulphate of iron, powdered	3 oz.
Coriander seeds, ground	3 „
Locust bean „	3 „

Mix, and divide into twelve powders, to be given as directed.

The attention of the reader is next directed to the necessity of removing, if possible, all known predisposing causes. Having succeeded in restoring a useful animal to his wonted place, and gaining some experience of the various conditions that aid in rendering him unfit for service, it will be found a profitable undertaking to place his habitation on as high a scale as possible, whereby he will receive a fair share of pure atmosphere, as well as ample shelter. On the score of

economy horses are sadly crowded together in our large towns, many proprietors having in the end unwillingly to pay dearly for the principle.

In the treatment of animals of the heavier and coarser breeds, in whom the disease has appeared late in the autumn or early winter, after unusual demands have been made on the system in the production of a fresh coat, and when the skin is invested with a covering long and thick, the question of clipping deserves consideration; while we regard the long coat as having a part in the production of enzoötic typhoid catarrh, associated as it always is with great perspiration, and becoming a great obstruction to proper exhalation from the skin, yet we can only accept it as one of the predisposing causes; doubtless hastening the attack, and contributing much towards prolonging it. In all probability the animal will take the disease if he has no long and heavy coat, and we know those of the lighter and finer breeds are frequently attacked; but they exhibit the least susceptibility as compared with the former, and the attacks, as a rule, are lighter, less fatal, and more quickly passed over. Our experience is, that the clipping of such animals as described, which are employed in fast work, is a radical means of cutting short attacks of this protracted malady, and we never hesitate to delay the operation, providing that every care is observed to supply an abundant clothing, and avoid undue exposure afterwards. Now that the various machines are made use of, three or four men may do all that is required in a very short space of time; and thus within the first twelve hours an important step be gained in the work of arresting the progress of an insidious foe. In large studs of horses, we have found it a profitable plan to employ hands whose special work was that of removing the coats of the working horses, not merely on the score of ease in cleaning, but as conducing to their more complete comfort, and especially as diminishing

the susceptibility towards typhoid catarrh, as well as being an undoubted means of cure in those already affected.

We have devoted more than usual space to the consideration of enzoötic typhoid catarrh, on account of its importance and wide-spread destructive characters. The principles laid down will form a sure guide to the management of animals labouring under typhoid disease generally, while the same information will prove eminently useful in assisting the reader to a conclusion as to the relative characters of those maladies supposed or pronounced to be contagious or non-contagious.

Enzoötic Pleurisy ; Epizoötic Pleuritis.

Nature.—Under the latter term, Professor Williams describes an affection which we believe has not been sufficiently recognised as of independent existence, being hitherto considered as "influenza," or one of its complications. It is essentially an inflammatory condition of the pleura or lining membrane of the chest, and its extension over the lungs, heart, &c., associated with great debility, together with implication of the substance of the lungs ; and from this circumstance it has been mistaken for the rheumatic form of influenza. Later experience has shown that it is decidedly of distinct nature and characters, being a disease of the serous and fibro-serous structures : while influenza is confined to the mucous membranes and similar tissues.

Like enzoötic typhoid catarrh, enzoötic pleurisy attacks large numbers of animals. It rages during some seasons to an alarming and fatal extent, and has been known to cause many proprietors to relinquish the keeping of horses altogether, preferring to hire rather than incur the risk consequent upon such attacks.

Causes.—We believe none are so powerful as alternations of extreme temperature, such as are prevailing in the early months of spring, when the sun shines with great brilliancy, and possesses unusual powers of heat; while east and north-east winds prevail, with alternate clouds and dulness of sky. Animals are peculiarly susceptible of changes at this season from the delicate sensibility of the skin in producing its usual covering of hair, and hence we find numbers are attacked almost simultaneously, and in some seasons with greater fatality. Under these circumstances, considerable heat of controversy has been expended for and against contagion; but, without entering into it here, we may briefly state that, as far as our experience has led us over the many opportunities for observation during upwards of a quarter of a century, we cannot subscribe to the contagious view of the malady; hence our reason for giving it a place side by side with "influenza," so called. Without seeking to depreciate even to the extent of a hair's-breadth the authenticated views of Professor Williams, we prefer, however, as our conclusions tend, to regard it as enzoötic pleurisy, rather than as an epizootic affection, a point—the only one—upon which in all probability we shall mutually agree to differ, yet lose no part of our desire to prove practically useful to those who seek our counsel and assistance.

Besides the causes of atmospheric nature, we must not omit to state, that whatever tends to weaken the system creates a susceptibility to enzoötic pleurisy, and probably none so prolific as the common practice of using aloes, nitre, &c., by dealers and grooms.

Symptoms.—The early signs are rarely more than dulness and lassitude, with more or less evidence of weakness at work, and tendency to perspiration. Somewhat later the pulse and temperature are elevated, the first being smaller than usual, somewhat harder and frequent, numbering 60,

70, or 80 per minute; and the latter ranging as high as 103° or 104° F.; while the general temperature is variable, as exhibited by the staring coat, occasional rigors, and alternate heat and cold of the ears and extremities. There is rarely any cough at the outset, but after a few days one of a hacking and convulsive character ensues, which causes great pain; and to guard against it the sufferer gathers himself "of a heap," it has been said. The appetite is now absent, and he does not lie down. The mouth is hot, dry, and foul, and the membrane sometimes implicated in an eruption, other mucous membranes being reddened, dry, and rough. As he stands the abdomen is drawn upwards, described as being (Fig. 23) "tucked up," and the breathing

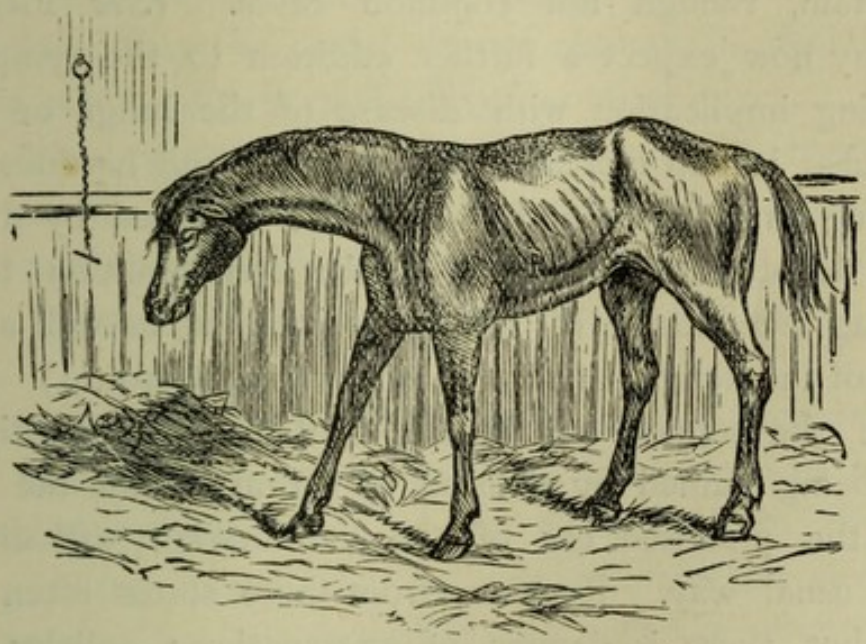


FIG. 23.—*Enzoötic Pleurisy.*

movements are in the main apparently performed by its muscles; while a long line or ridge of constriction is perceived to exist parallel with the cartilages of the ribs, extending from the fore limb to the flank; the elbows are turned outwards, and by these means Nature's efforts are directed towards limiting the movement of the ribs to prevent friction between surfaces now diseased, which in health

moved freely over each other. He now obstinately refuses to move, and may sometimes resist forcible pulling by the halter ; but when he stirs a grunt is heard, and pressure or percussion on the sides of the chest will produce the same. This symptom is of much importance, and during the very early stages, or in slight attacks even, we have noticed that it exists in a marked degree, when ordinary observers would detect nothing otherwise wrong with the animal. It is well to remember this when purchasing horses, that a more minute examination may be made, and, if needs be, special terms agreed upon. In addition to the grunt, we may observe short and catching breathing, and, by placing the ear to the sides, a creaking sound is heard on one, or both in certain, though not common cases. (*See* Pleurisy.) We may now expect a further addition to the symptoms, indicating implication with disease of the lungs or heart. The pulse is still increased in frequency and hardness, the breathing is hurried, and sounds are detected by the ear which denote an extension of the inflammation to the investing membranes of the organs named, as well as substance of the lungs. (*See* Pneumonia and Carditis.) After a time the sounds are absent, and signs are mitigated, relief being gained by effusion of serum within the chest, which the practised ear of the veterinarian will discover in the usual way. Recovery from these states often takes place, but there is danger of aggravation ; colicky pains come on, the breathing suddenly becomes hurried, distress is evident, and he attempts to lie down. After a time these signs abate, the swollen legs become fine and gain warmth, the animal persists in standing, the neck is outstretched, nostrils dilated, and flapping of the sides takes place. The pulse is small and imperceptible at the jaw, the ear detects no sounds in respiration, and shortly the creature falls and dies from absolute internal drowning.

Post-mortem Appearances.—Death arises from several causes: effusion, or the formation of large quantities of fluid within the chest, causing suffocation by pressure on the lungs; by obliterating the structure of the lungs, effusion of lymph having taken place within it, and thus destroying the air-cells; failure of the heart's action by impediments produced from inflammation, as bands of lymph, effusion of serum, &c., within the pericardium, &c. In addition to these conditions, the lungs will be united to the ribs by similar adventitious formations, thus creating a secondary cause. That they are new, and of recent formation, we shall have no difficulty in deciding, for they are soft, friable, easily detached, and torn. Old adhesions are firm, require cutting, and bloodvessels are found in their substance. These facts may be useful to our readers in deciding on cases in which dispute of liability has taken place.

In more protracted forms, abscess, and even gangrene of the lungs, will be discovered, and sometimes a thick fœtid fluid nearly fills the chest; not an uncommon sequel when animals have been badly treated and neglected.

Treatment.—No possible good will come of any treatment unless the animal is taken off work, and placed in a warm, comfortable place, where entire freedom from cold and other exciting causes can be secured. When neglect of these precautions has prevailed, the sufferers stagger from their work, and die on reaching the stable.

Ample warm clothing and suitable flannel bandages should be used to maintain the circulation, and the patient must be preserved in the utmost quiet. Let him have access to cold water, hay-tea, &c., and supply moderate portions of boiled grain, bran mashes, when needed as laxatives, and roots, hay, grass, &c., as can be obtained. If the extremities, ears, &c., are cold, or shivering is observed,

administer at once nitrous ether, as advised in recipe No. 27, or the following :—

RECIPE NO. 31.

Take of aromatic spirits of ammonia	4 fl. dr.
Tincture of cardamoms	4 „
Water, cold	8 fl. oz.

Mix.

Such medicines counteract the tendency to depression, which is very common in this and allied diseases, and may be continued two or three times a day until a change of signs warrant their withdrawal ; or if continued, it may be necessary, on account of the chest affection, to administer between moderate doses of nitrate of potash, say two drams three times a day, until the signs abate. Some practitioners give a ball, composed as follows :—

RECIPE NO. 32.

Take of carbonate of ammonia	2 dr.
Nitrate of potash	2 „
Common mass.	

Rub the ammonia and potash to powder, and add the mass to make up a bolus to weigh 6 or 7 drams, and give one every eight hours.

When the symptoms run high, and appear more acute, the pulse being hard and pleuritic complications severe, let aconite in one of the subjoined forms be given :—

RECIPE NO. 33.

Take of nitrate of potash, powdered	2 dr.
Common mass	2 „
Tincture of aconite (Fleming's)	10 drops.

Make into a ball, to be given every eight hours ; or,

RECIPE NO. 34.

Nitrate of potash	2 dr.
Tepid water	6 fl. oz.
Tincture of aconite (Fleming's)	10 drops.

Mix, and administer every eight hours. If debility is marked, the nitrous ether may be given at times four hours after one of the above.

Local Applications.—We have to warn the reader against the use of blisters or strong counter-irritants to the sides; we estimate their employment as so much maltreatment, and have strong reasons for stating many deaths have been due to them alone. Greater benefit, we believe, is to be derived from the use of a mild embrocation, soap liniment, &c., which produces no systemic disturbance, but simply rouses the circulation in the parts to which they are applied. The following is a simple and useful form :—

RECIPE NO. 35.

Take of liquor ammonia	1 fl. oz.
Oil of thyme	1 „
Water	1 pint.

Mix the first and second together, afterwards add the water, and use with moderate friction.

When the acute signs are sufficiently reduced, as known by the fall of the pulse and temperature, and the appetite has increased, it may be advisable to add vegetable tonics to the ether, as directed in recipe No. 27, or the following may be substituted :—

RECIPE NO. 36.

Take of powdered gentian	2 dr.
Powdered ginger	2 „
Honey, or treacle	Sufficient.

Mix the gentian and ginger together, afterwards make up a bolus with the honey, and give three daily.

Should there be still swellings of the legs, &c., two drams of the nitrate of potash may be added; and when the appetite is fully established, the balls may be discontinued for powders, as given in recipe No. 20. Further treatment is to be pursued, as recommended for enzoötic typhoid catarrh.

III.—BLOOD DISEASES HAVING THEIR ORIGIN IN AN UNKNOWN ANIMAL POISON, AND ATTENDED WITH ERUPTIVE FEVER, OR INTUMESCENCE, SPORADIC, ENZOÖTIC, AND OCCASIONALLY OF SEPTIC CHARACTERS.

SCARLATINA.
STRANGLES.
SUPPURATIVE CATARRH.

SCARLATINA—SCARLET FEVER.

Nature.—A specific febrile blood disease, attended with eruptions on the surface of the skin, scarlet spots or petechiæ on the mucous membrane of the nostrils, sore throat, and, under certain conditions, also with the formation of abscesses in various parts of the body. It usually appears as a sporadic disease, confined to one or two horses among a number, and at those times when some among them are suffering from enzoötic typhoid catarrh, or other similar affection. In the usual sense of the word it is non-contagious; but there are reasons for believing that by inoculating other animals with the blood, diseased products, &c., a putrid fever is established, as described under malignant sore throat. Two kinds are observed in the horse—the simple, *scarlatina simplex;* and the complicated, *scarlatina anginosa.* A third has been described, but authorities are somewhat agreed that it is but purpura.

Symptoms of Scarlatina.

Scarlatina Simplex.—Simple scarlatina usually makes its appearance after an attack of "influenza," so called, has existed some days, or it may appear in an animal hitherto apparently free from the disease named. It consists of a number of "blotches," affecting the skin of body, face, neck, and legs, which give rise to scarcely any swelling, but cause the hairs upon them to stand erect and staring. Those parts covered with loose, thin skin, and having little hair, are usually the best places for seeing the true nature of the "blotches," which there appear as rounded pimples, and may be distinctly felt as well as seen. The legs swell, and cause stiffness in some instances, but they are not always affected. The nasal membrane is likewise studded with scarlet spots, having no uniformity in size, which shortly give rise to a thin serous discharge, subsequently changing to a yellow or brownish colour. Occasionally these are confined to one nostril only; and they may constitute the whole of the outward signs, neither eruption nor swelling of the limbs being present. Soreness of the throat is evident, which sometimes creates inconvenience by causing the animal to leave off feeding. The scarlet spots—petechiæ—gradually fade, and disappear after a few days; and the skin eruption also declines, and the cuticle, or scarf skin, peels off in large quantities, by which the coat becomes very scurfy, and causes much trouble in cleaning for a long time afterwards.

Scarlatina Anginosa appears as an aggravated condition of the simple form. In it the limbs swell rapidly, and pit under pressure of the fingers at first, but suddenly form circumscribed tumefactions, hot and tender, which may unite to form large swellings, some of them rapidly declining, while others appear in distinct and separate parts, at a later period becoming moist on the surface, by reason of the discharge

of a thin yellowish fluid. Smaller swellings or pimples occupy the rest of the surface of the skin, which are similar in character to those described under the simple form; the spots on the nasal membrane likewise enlarge, and frequently run into each other, forming large blotches, or one entirely covering the membrane, having a deep scarlet colour, sometimes merging into a purple. The throat is involved greatly, the irritation which the soreness gives rise to producing a frequent noisy cough, in which abundant discharges of mucus, having various shades of red and yellow, are forced from the mouth. Respiration is interfered with, the inspirations partaking of a "roaring" kind of sound, with snuffling through the nostrils, signs of diminution by swelling in the usual calibre of the air-passages. Swellings take place beneath the jaws, sometimes also under the shoulder, and in other places, the formation of pus being slow and tardy, and rarely developed until the severity of other signs has passed off. Symptomatic fever usually runs high in proportion to the amount of eruption and soreness of the throat; the pulse is weak, small, compressible, and frequent, numbering 60 or 70 beats in the less severe cases, and probably 100 in the most intense; respiration is rapid, and increased as the lungs become congested; the bowels are constipated, but acutely sensitive to all irritating agents, diarrhœa being readily induced; the urine is deficient, being thick and mucilaginous, of a brown colour, having an offensive odour and tendency to rapid decomposition; animal temperature is high, and surface heat, apart from the tumefactions, variable.

In the most favourable cases, the throat affection disappears almost side by side with the eruption on or about the fifth day, and occasionally the latter declines some days before the throat recovers, but generally both are absent by the tenth or eleventh day after attack, when we have to deal

with an animal weak and emaciated, having decidedly an unpromising appearance, foul skin and swollen legs, which signs for a time apparently resist all attempts to remove them, or establish even the beginning of health. Farcy or glanders is not an uncommon termination.

Treatment.—The principal directions are the same as already detailed under malignant sore throat, p. 90, for the severe forms of the disease using the electuary No. 25, p. 110, or mouth-wash No. 23, p. 92 ; under the effects of rapid swelling the breathing may be so difficult as to threaten suffocation, when tracheotomy must be performed without delay. (*See* Tracheotomy.) A light hood may be put on, thick *spongio-piline*, first dipped in hot water, being applied to the outer swollen parts of the throat, and held *in situ* by the usual strings. We have found great benefit also from using dry thick *spongio-piline* (as shown in Fig. 27, and referred to under Strangles), closely applied, as favouring warmth and promoting suppuration, having none of the cooling and retarding properties of moisture. Some practitioners employ poultices or hot fomentations — which see. The discharges from the eyes and nostrils should be cleared away regularly, and gently moistened with a sponge previously dipped in a weak solution of "Sanitas" or perchloride of iron, one fluid ounce of either being mixed with a pint of water. Clear the bowels by enemas, but do not give any medicine by the mouth unless the throat will allow it. Combat the prostration by using nitrous ether, recipe No. 27, p. 111 ; and use linseed oil as a laxative when constipation exists, and the patient can swallow ; and febrile states may be met by the use of nitrate or chlorate of potash given in the drinking-water, or administered as a drench. Open abscesses as soon as maturation is complete, and keep the parts clean, afterwards using the astringent lotion to the surfaces. Support the system by light nutritious food, in

small and repeated quantities. Substitute ammonia, recipe No. 32, p. 120, for the nitrous ether after fever has abated, and follow after a few days with mineral tonics, recipe No. 30, p. 113; let the animal be carefully exercised over short distances occasionally—too much exertion may prove injurious by retarding recovery; and avoid work completely until health has been entirely restored. Fatal cases are those in which, by aggravation of the disease, it degenerates into purpura, the *post-mortem* evidences being identical, having, in addition, the diseased condition of the throat.

STRANGLES; *Febra Pyogenica—Pyogenic Fever; Adenitis Scrofula Equorum*, or *External Scrofula* of GAMGEE; *Specific Adenitis. Gourme Struma, Etrangler*, and *Etranguillion* of the French.

Under the above titles we have a disease incidental to young horses, dependent upon some undefined specific condition of the blood, characterised by acute glandular swellings and remarkable tendency to suppuration. Vague estimates of its contagious as well as scrofulous nature have been frequently hazarded, and as yet the affection has not found a definite place in our classification of diseases. We have given it here in accordance with conclusions drawn from a careful consideration of its special characters. We regard it as a non-contagious, eruptive, febrile blood disease, incidental to youth only; and considering the importance of the malady, we propose to notice its peculiarities at some length.

Symptoms.—Strangles appears at first as an ordinary mild catarrhal affection, gradually assuming severe characters until relief is obtained by maturation of abscesses, or prolific discharge from the nasal membrane, or elsewhere.

Usually a shivering fit betokens the commencement of fever, but this may be so slight as to excite no observation among those in attendance ; dulness shortly succeeds, and the food is untouched ; the coat begins to stand erect or to " stare ;" surface heat is low, and the legs and ears are cold ; a cough is present in a few hours, and soreness of the throat is plainly evident (Fig. 24) when the animal attempts

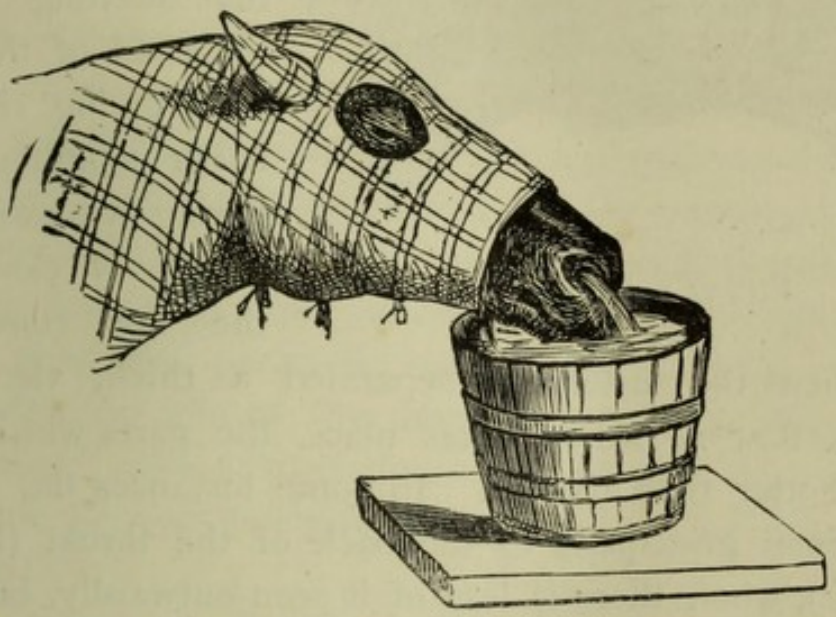


FIG. 24.—*Swelling of the Throat causes the fluid to return by the Nostrils.*

to drink, as loud and violent gulping takes place, but the fluid mainly returns by the nostrils, and generally occasions a severe fit of coughing. On the second day, perhaps, a hard, hot, and painful swelling is discovered in the hollow space between the jaws, and not infrequently extends up one or both sides, involving the parotid or salivary glands as far as the ear. The animal has now refused food altogether, and the third day will find him standing fixed and immovable, with the head depressed but " poked" forwards (Fig. 25), the neck being straightened, and, if the sufferer is caused to move, the head and neck are carried as if they were one unyielding portion. The tumours beneath the jaws are now considerably enlarged ; in a day or two hair is removed from

the centre, and a half serous and half pustular fluid oozes from the skin at that part, and increased heat and tenderness are evident; a discharge more or less purulent issues from the nostrils; the breathing is interfered with by the swelling around the head of the windpipe, giving rise to a harsh snuffling noise during inspiration; the mouth is closed and the lips compressed, and when the latter are separated a thick, viscid, and copious flow of saliva takes place, the parts within being much hotter than natural. In some instances the swelling is confined principally to the back of the throat (Plates I. and IX.), when there is less of it seen outwardly, but generally the obstruction to respiration is greater, with liability to suffocation. At first the pulse is full, soft, and somewhat increased; as local tumefaction proceeds, it becomes harder and more frequent, still maintaining its volume, and soon declines after abscesses are open and discharge is obtained. In proportion as the breathing is interfered with, the lungs will become congested (Plate II.), and the pulse then loses its volume and strength, and acquires greater frequency, numbering 80 or 100; the beats are not easily recognised, and even slight pressure stops the flow—it is then known as the *oppressed* pulse. If relief is not obtained death may take place in the more benign states, from implication of the lungs, and in those characterised by large tumefactions from absolute suffocation.

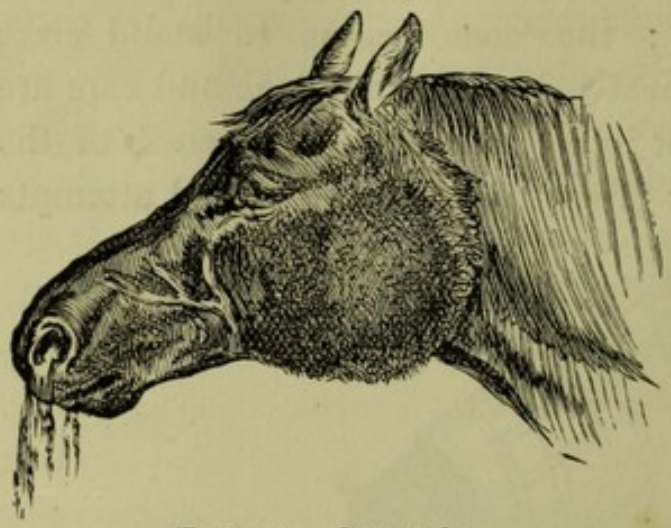


FIG. 25.—*Strangles.*

Favourable cases are those in which the abscesses at the

jaws gradually mature in two or three days, and either naturally or by surgical means discharge the contained pus, after which the animal resumes his appetite; other signs of disturbance quietly subside, and by the eighth or ninth day the animal is convalescent.

Adverse states are betokened by slow and tardy swelling, having less pain and tenderness, scanty discharge from the nostrils, much constitutional disturbance for a time, irregular bowels, continuance of cough, which becomes hollow and harsh; appearance of swellings in other parts of the body, as at the shoulder, groin, flank, &c.; partial suppuration of abscesses, or total disappearance of the swelling; loss of condition; resumption of severe constitutional disturbance, difficult breathing, rapid emaciation, painful cough, colicky pains, cerebritis, paralysis, sudden death. This may appropriately be termed the degenerate form of the disease. Protracted cases, especially when treated by reducing measures, terminate in farcy or glanders. (*See* Suppurative Catarrh.)

The symptoms of strangles do not always show themselves in the way or order just described. Pathologists recognise the mild or benignant form, the acute, and protracted. In the first the animal suffers little, and speedily recovers; in the second the signs are severe, and danger from suffocation not uncommon; in the third, the disease apparently makes little progress, and the tendency to diffuse abscess, pyæmia, and death is great.

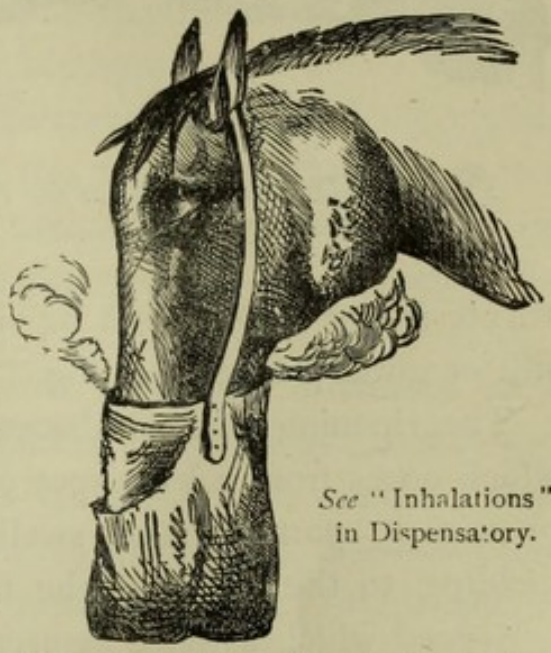
Post-mortem Appearances.—The lungs are congested, heavy, and sink in water, and when cut across dark-coloured blood oozes from the substance, and probably large clots slip out from some of the larger vessels. The right side of the heart is full of blood, and the body generally shows indications of an impure, or rather a non-purified, blood having run the round of the circulation, which is incapable of

nourishing the tissues. The parts about the throat are swollen by infiltration and inflammation, the glands particularly being involved, the products of inflammation undergoing the usual process of pus formation. Excepting the congestion above named, other parts are free from disease. Such are the principal states witnessed in those animals dying from inability to breathe by reason of the swelling.

In those of a tardy nature, the whole of the glands of the body are frequently swollen and contain matter; those of the abdomen, situate in the folds of the membrane connecting the intestines, known as mesenteric glands, sometimes are greatly implicated, one or more having burst, the contents being distributed over the organs; in other instances, a tumefied gland near the chest maturates and also discharges the products among the lungs, with which a considerable quantity of water may also be present. The lungs are congested or partly inflamed, and abscesses are found in their substance; the liver is softened, and the parts about the throat originally affected are inflamed and infiltrated without any pus being present. Rapid decomposition sets in if the body is exposed to the air.

Treatment.—Good nursing at the outset is far more valuable than any kind of medicines. The great object is to secure free maturation and discharge of the abscesses beneath the jaws, and it must be borne in mind that every agency which retards that process, or causes it to recede, is to be regarded as so much influence towards producing adverse states, and probably death. Bleeding and purgation, with the use of saltpetre and diuretics generally, are to be strictly avoided as the veritable agents just alluded to. Place the animal in a cool shed or open place, where he will obtain plenty of fresh air without being exposed to dangerous currents; clothe the body loosely, merely to avoid determina-

tion of blood to internal organs during weak and sensitive conditions. Rub the blister ointment, No. 7, page 44, into the swollen glands, having first clipped off the hair, and conclude the operation by leaving a layer on the surface thus prepared, which should be larger than the affected parts in order to increase the inflammation and hasten pus formation. It is a common and useful practice to secure a nosebag on the head, the bottom of which has been charged with bran and boiling water, the vapour arising therefrom having a powerful tendency to promote discharge from the nostrils (Fig. 26). Sawdust will answer quite as well, also hay or straw cut into chaff, and the "flyers" or outer husk of grain removed in the process of threshing, when bran cannot be had, as we have had many times to experience at lone stables a mile or two from the main establishment. All or any of these may be used, and the vapour action be sustained by pouring hot water from a kettle through a slit or hole in the side of the bag. We have a decided objection to poultices in this disease, as they annoy and exhaust the weak animal, and often by their weight defy all attempts to keep them sufficiently close to the swollen glands; thus evaporation, rapid cooling, and retarding the abscess is safe to follow. In place of poultices we take a piece of *spongiopiline*, half an inch or more in thickness, about a foot square; this we dip in hot water, and afterwards press out the excess, applying the woollen side towards the glands, curving the ends up each side the jaws outside and backwards on each



See "Inhalations" in Dispensatory.

FIG. 26.—*Steaming the Nostrils.*

side of the throat, securing it there by means of a tightly-fitting hood or tailed bandage (Fig. 27). It is well to have a second piece in readiness to apply to the parts the moment the first is removed, which will avoid the danger of cooling as already alluded to. Some persons have endeavoured to substitute several thicknesses of woollen rug, but this, as objectionable as the poultice, we discard; the best substitute is dry cotton wool or very soft tow, covered by oiled silk or gutta-percha sheeting.

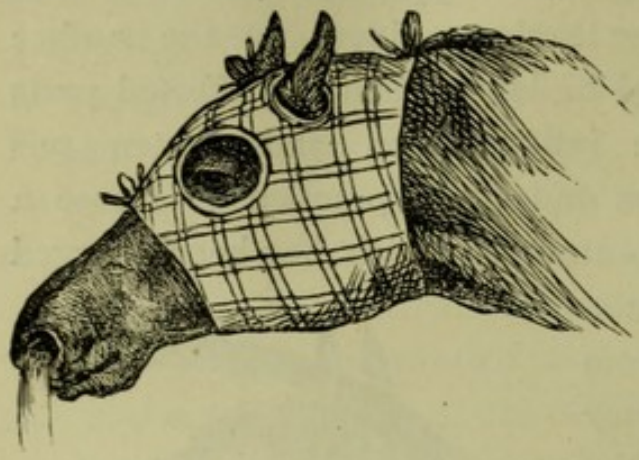


FIG. 27.—*Dressings applied for the Abscesses of Strangles.*

The ripening of the abscess is known by the discharge which oozes from a bare spot of skin in the centre or most prominent part of the swelling, and by being soft and yielding to the touch of the finger; a sensation being experienced which at once assures the inquirer that a fluid, and no longer a solid, is present. The nose is then to be elevated by an assistant, and the operator, by means of the lancet or sharp-pointed bistoury, punctures the skin at the softest point, and in withdrawing the instrument lengthens the cut in order to secure complete evacuation, and prevent premature closing by healing. The nosebag may now probably be dispensed with, and all that remains to be done in the way of treating the wounds is to keep them clean, and nothing better can be adopted than by continuing the application of the *spongio-piline* for a few days. The nostrils also should be kept clean by using the sponge and tepid water, to which a little chloralum solution has been added. As the appetite returns allow nutritious food, roots,

grass, &c. &c., in moderate quantities ; let the patient take a little exercise daily, and if the bowels are constipated, regulate their action by the addition of linseed, bran, or both, with grass, roots, &c., in accordance, not omitting first to throw up enemas of warm soap solution, repeating the operation, if necessary, two or three times during the day. If cough continues use liquid blister, No. 9 or 10, page 45, round the throat from ear to ear, and put repeated doses of the electuary, No. 25, page 110, upon the tongue or molar teeth. To promote the return of strength, and create greater powers of assimilation, use the tonic powders, No. 30, page 113, night and morning, in the food for a week or ten days, at the end of which time no further treatment will be needed. In adverse states proceed as directed for scarlatina.

Is the disease contagious?—It is usually advanced as a proof of contagion when a number of animals are attacked by it ; but the assertion loses its importance when we consider that in all the simple forms of enzoötic diseases there is a remarkable rapidity of transmission, and simultaneousness of attack. Thus, by common cold, influenza, &c., hundreds of animals in a district will be seized within a few hours, the whole area probably representing many miles ; these are special characters of *non-contagious* diseases, and entirely different from the behaviour of contagious maladies. Strangles appears suddenly, and is communicated rapidly, all the young animals becoming affected, or very few escaping. Now glanders and farcy, which are highly contagious diseases, are communicated slowly, and depend upon the transmission of the direct poison from one animal to the other ; hence we find that a diseased horse may remain on certain premises for months without our ever hearing that the poison of glanders or farcy have been blown into the stables of the adjoining buildings. If such a mild disease as

strangles be really contagious, and its poison is carried over hill and dale to other animals, then glanders and farcy ought to be propagated similarly, for their poison is by far more subtle and powerful. Again, if strangles is contagious, it should be capable of transmission by inoculation. This has been for a long time a vexatious question, and, to determine the matter, we had recourse to many experiments.

At the time when the inquiry was instituted, we had about thirty animals under care suffering from the disease; and, in order to test its propagative powers, or, in other words, its contagious nature, if possible, the contents of an abscess situate beneath the jaws, having matured properly and opened with due care, were collected and used as follows :—

I. A pony, eighteen years old, in excellent health and condition, was selected, placed in a roomy box, and supplied with plenty of green food. By means of rowelling forceps an incision was made in the submaxillary space, into which matter from the abscess referred to was introduced.

1st day.—No swelling; wound closing with slight scabs, but is rather tender.

2nd day.—Further improvement.

6th day.—Healed. No further result followed for six weeks, at which time he was sold, but continued under observation for some months, remaining in perfect health.

II. An aged horse was similarly treated, and placed in the same box with the subject of the first experiment. No disease followed.

III. A pony, nine and a half hands high, three years old, one of a new purchase; has a cough, but at present no submaxillary swelling. Matter from the abscess was freely brushed over the nasal membrane three days in succession. No effects followed.

IV. Pony, five years old; has slight enlargement of submaxillary glands. Pus inserted beneath the skin, near the

glands; six days afterwards the wounds were perfectly healed. No other effects followed.

V. A number of young animals were suffering from strangles, and others were repeatedly introduced, some of which gradually became affected. Of those not affected several were inoculated, and at once isolated. All were subjected to the same liberal feeding and treatment; but the disease assumed a slow and tardy form, owing, it was believed, to the very ungenial weather which prevailed at the time and low condition of the animals at purchase, several deaths occurring in those not inoculated.

Several of the animals subjected to inoculation like the others, became slowly and gradually affected, but exhibited no difference whatever in the origin or progress of the malady; two died, the rest going through the disease tardily, while as many did not take the disease at all.

Although the experiments might have been carried further, yet we think sufficient was obtained to establish the non-contagious nature of strangles by inoculation. The test was in every respect a crucial one. Older animals were subjected to the experiment as well as young ones; and the young animals which had resisted the power of inoculation were afterwards placed with those suffering from the disease, that they might become infected, if possible; yet they remained perfectly free. The conclusion we arrive at is, that "Strangles," so called, is a febrile blood disease, incidental to youth, non-contagious, dependent probably upon the operation of external causes upon the systemic functions, which, at that period of life, are susceptible of influences that either operate differently, or have no effect whatever in later life. In this respect it resembles measles in the human subject. Apart from complications, "Strangles," so called, is not a fatal disease.

Taking these points into consideration, we are led to an-

other conclusion, which is borne out by experience:—It is essential that the disease should be gone through during the youth of the animal, as in later life those that escape the malady, or those in which it appears in a tardy form and afterwards recedes, are likely to become subject to a variety of blood disease, to be described hereafter, known among horsemen as "bastard strangles." We are prepared to admit there are exceptions to this rule, and proof may sometimes be wanting in consequence of animals being lost sight of; but we do not hazard an opinion on mere surmise. It has been our experience, and other veterinarians can support the statement, that animals escaping strangles in their youth, or having the disease imperfectly, are not so safe. Further remarks will appear under Suppurative Catarrh.

Is the disease of a scrofulous nature?—This question may be set at rest briefly by placing side by side the principal features of scrofula and strangles under the subjoined arrangement:—

SCROFULA.	STRANGLES.
Is hereditary, depending upon a cachexy, or particular depraved state of the body.	Is *not* hereditary.
Appears frequently during the lifetime of the patient, the seeds or germs of which always remain in the system, often increasing in severity.	Appears but once in the lifetime of the animal, if the usual conditions are fulfilled.
Tuberculous from the beginning, affecting the whole system, and, in the end, vital organs.	Is not tuberculous, or every horse must be in an unsound state from birth; but tuberculous states may be produced by maltreatment or non-fulfilment of essential conditions—*i.e.*, degeneration or disease.
The maturation and discharge of abscesses do not terminate the disease.	The opening, naturally or artificially, of abscesses when well matured terminates the disease successfully.

Suppurative Catarrh: *Morbus Glandulosus; Bastard Strangles; Strumous Adenitis; (erroneously) Pyæmia.*

Nature.—A blood disease characterised by subacute catarrhal febrile symptoms, accompanied with general tumefaction and suppuration of the lymphatic glands. Common to animals of all ages.

Symptoms.—The usual appearances of a common cold at first are presented—*e.g.*, discharges from the eyes and nose, shivering fits, cough, &c. The animal, having suffered a day or two, becomes stiff and disinclined to move. The cough is harsh and frequent, surface heat irregular at first, and later the legs and ears are cold, and the coat rough and dead in appearance. The bowels are irregular, and fæces smell offensively; the mouth is hot and slimy, but when the throat is sore large collections of viscid saliva escape on opening the lips. The pulse is rapid, somewhat hard, but does not possess large volume. The appetite is often absent from the first, more particularly when the throat suffers. Animal heat runs high, 103° or 104° F. being not uncommon, and the lungs are liable to be implicated from various causes.

For some time the disease makes little progress one way or the other, and while the signs already named only prevail, it is difficult to pronounce correctly not only as to the real nature of the affection, but also as to its termination. By-and-by, however, the glands beneath the throat grow hot, tender, and are observed to enlarge somewhat suddenly; and if at this time the system is supported by good food, when the patient can take it, or stimulative tonic medicine, the malady may come to a



Fig. 28.—*Suppurative Catarrh.*

speedy termination with the discharge of pus from the abscesses which form (Fig. 28). Animals in low condition and of coarse lymphatic temperament generally exhibit a more tardy form of the complaint, and contemporaneous with the submaxillary swelling others appear at the shoulder, in the groin, round the anus, and also in the glands of the abdomen. As long as suppuration can be confined to the external parts, there is generally little to fear; but when these form slowly, partially recede or disappear from one part, and others take on swelling, we have reason for not being altogether satisfied, for these are signs most frequently to be regarded as indicative of internal abscesses, from which death will take place sooner or later. Horses so affected will sometimes apparently recover for a time, but do not work satisfactorily or improve much in condition. Frequent attacks of colic come on with alternate diarrhœa, and death puts an end to the sufferings at variable periods, probably in one of the attacks of even usual severity.

Post-mortem Appearances.—These are intensified in accordance with the duration of the disease. Generally the lungs are congested, but in old-standing cases the suppurative action has extended to their substance, as well as to the glands in the neighbourhood, and possibly one or more have discharged their contents into the cavity of the chest. In the abdomen the glands of the mesentery are tumefied, with probable discharge of matter from one of them; and the liver and kidneys are softened, also having pus in their interior, the immediate cause of death being usually the discharge of an abscess in either the chest or abdomen, or interference with organic functions from the presence of pus within important structures, a complication constituting what is known as pyæmia.

Treatment.—Support the animal by good and easily-digested food. While the early signs of catarrh are present,

stimulate the nostrils by hot vapour to promote discharge (*see* Fig. 26). Blister tumefied glands, and develope suppuration as quickly as possible, insuring free discharge by opening abscesses freely at the earliest period. Rouse the bowels by enemas only, and give frequent doses of nitrous ether and gentian as given in recipe No. 27, p. 111, or use alternately with it the following :—

RECIPE NO. 37.

Take of aromatic spirits of ammonia	1 fl. oz.
Tincture of cardamoms.....	1 „
„ gentian	2 „
Cold water	8 „

Mix.

As strength returns and febrile symptoms decline with the decreasing discharge from abscesses, the tonic powders (No. 30, p. 113) will be of service, or the following :—

RECIPE NO. 38.

Take of sulphate of iron, powdered	.....	3 oz.
Nitrate of potash „	.....	3 „
Carbonate of soda „	.....	12 drs.
Locust bean „	.....	6 oz.

Mix, and divide into twelve powders. One to be given in the manger food morning and night. Some animals, but rarely, refuse to eat food in which medicines have been placed. Whenever this occurs we may be required to give it in the form of bolus. For such cases the subjoined formula may be adopted :—

RECIPE NO. 39.

Take of sulphate of iron, powdered	.....	3 oz.
Nitrate of potash		3 „
Common mass, a sufficiency.		

Mix, and divide into twelve boluses, one to be given morning and evening.

Let the animal have a roomy box, plenty of fresh air, and

good food, with changes of roots, &c., as may be obtained; promote comfort by clothing, grooming, cleanliness, and good beds; send out for regular exercise as soon as he can take it, beginning by small distances at first, taking care that no work is enforced until health is sufficiently established.

IV.—BLOOD DISEASES ARISING FROM AN ANIMAL POISON—HIGHLY CONTAGIOUS, AND PRODUCING THE SAME DISEASE BY INOCULATION.

FARCY.
GLANDERS.

FARCY AND GLANDERS.

Nature.—A highly contagious and malignant form of disease, due to the presence of an animal poison, which involves the whole system, and manifested by swellings and ulcers on the skin, erosions of the Schneiderian mucous membrane, enlarged lymphatic glands and their ducts, with ultimate abscess and ulcers of the lungs. The poison of farcy and glanders is capable of transmission from horses to the ass tribe and mankind, and of re-transmission to man also.

Farcy is but the preceding or milder form of glanders, into which it often merges. Nevertheless, the two forms of disease exist totally separate and distinct, remaining as such for months, or even longer; and from this circumstance it has been found necessary to view the various states of each as acute and chronic. Farcy and glanders appear as common diseases in temperate climates, being rare in very cold and totally unknown in very hot ones; capable of spontaneous development, but, as a rule, the active spread of these diseases may be distinctly traced to contagion. In

the first instance they may be said to be sporadic, in the latter epizoötic.

Causes.—Want of proper cleanliness and ventilation, producing a vitiated state of the blood, by introducing within the system some degenerating or decomposing principle or animal poison from without; by interfering with the due elimination of useless and hurtful matters, and by developing within the system the poison itself. The disease is rife among the animals of many badly-managed coal mines, as a result of deficient ventilation, overwork, and want of cleanliness; on board ship, when from continued stress of weather the hatches are kept closed; in the stables of some large establishments, as a result of similar causes, aided probably also by inoculation. Glanders was formerly the bane of the British army, and destroyed as many horses at home during peace as fell in many wars; and even at this day it follows the movement of belligerent forces, who necessarily impose hardships on their horses, and correspondingly reduce the comforts. The extended or habitual use of purgatives and salines in health, but more especially in low forms of disease, are prolific causes; while both farcy and glanders often prove the termination of many such complaints, even with an opposite kind of treatment. Although the diseases exist independently of each other, yet animals now and then are seen in which they are undoubtedly combined. Farcy usually precedes glanders; but it may succeed it, and *vice versâ*.

There are other phases also on which we might dilate to a great extent, but that would be beyond our present object, and of little interest to the reader; we therefore confine our remarks to the diseases as they appear under general circumstances, in order to furnish the evidences by which a certain decision may be arrived at, treatment being of secondary importance.

Symptoms of Farcy.—The chronic form of farcy is characterised by a series of corded swellings in one or more parts of the body, as along the sides of the neck, inside of the legs, &c.; and situate upon them, at variable distances, small round tumours or swellings exist, generally in the neighbourhood of a wound, congregating round it, or spreading from it. These may exist some time without the evidence of much constitutional disturbance; but at length the tumefactions enlarge by additional inflammation, and it is known as a "farcy bud," shortly bursting, and discharging first pus, afterwards a sanious fluid, and refusing to heal. Such appearances go on for weeks, and even months, and merging into glanders, kill the animal. Acute farcy is known by the above signs being ushered in by those of fever, as shivering followed by heat of body, a frequent and hard pulse, dulness, accelerated respiration, rapid elevation of animal temperature, &c. Such attacks may kill the animal attacked in a week or ten days, the origin being doubtless due to inoculation—a common occurrence in stables where farcy or glanders are suffered to exist.

Symptoms of Glanders.—In the acute form, as in acute farcy, the first signs are those of fever, as there described, to which succeeds dulness and heavy appearance of the countenance. A discharge, at first watery and afterwards purulent, flows from one or both nostrils, and the submaxillary glands beneath are correspondingly affected, being enlarged, hard, and solid, and adhering firmly to the bone. The nostrils sometimes swell, and the discharge "glues" them together, while a fœtid odour is emitted, and it changes to a thin or sanious fluid. Such signs will lead to the opening of the nostrils, when pustules and ulcers may be seen on the Schneiderian membrane, occasionally in the chronic cases, perforating the nasal septum, or partition between the two passages. Chronic glanders is that variety in which the

discharge from the nostrils, together with ulceration, exist without much fever; the animal continues at work, but the appetite is somewhat capricious, and the ear applied to the sides of the chest detects the absence of respiratory murmur in some parts, while others convey louder sounds, indicative of the formation of abscesses and surrounding inflammation. Such cases gradually affect the animal's appetite, and wasting of the body goes on rapidly; urine is discharged in large quantities—polyuria; breathing becomes difficult; weakness and general anæmia follows; and the animal dies in a state of hectic. In acute cases, blood poisoning takes place, causing stupor, coma, offensive secretions and rapid death, the causes of which are direct inoculation from one animal to another.

Treatment of Farcy.—As this loathsome disease has its origin in causes which produce a low, vitiated state of the blood and system generally, by which tissues are not nourished as they should be, it is clear that our plan should be that of effecting a removal of the blood poison, and restoration of the assimilative powers, that they may minister properly to the direct wants of the system. The treatment must be of two kinds, local and general; the buds must be dispersed, and ulcers caused to heal. To those that are situate on the lower parts of the extremities, especially if the wound is greatly inflamed, poultices may be applied for a day or two; afterwards they may be treated in the same way as the others, by caustics or blisters. Of the first, some choose the actual cautery or budding iron (Fig. 29),



FIG. 29.—*The Budding Iron, with hollow handle.*

which is heated to redness, and after being properly cleaned, to remove scales, &c., the point is inserted in the centre of

each bud, and open wounds are likewise stimulated ; bearing in mind that it is not necessary to make the application so severe as to destroy tissues, the reparative powers being already far below the usual standard. Nitrate of silver, or lunar caustic, is a valuable remedy ; caustic potass, or potassæ fusa, equally powerful, either of which may be used in the stick or pencil form. Blisters are very much approved of by some veterinarians, being applied round the buds after the caustics already named have been employed, and the plan is decidedly very effective. This constitutes the local treatment.

The general or systemic plan of treatment consists of supporting the system by the allowance of good beans, peas, and oats, &c., while the assimilative functions are stimulated by tonics. Of the medicines made choice of there are many kinds, the principal being arsenic, quinine, cantharides, the sulphates of copper and iron, &c. &c. As a rule, we have found iron to answer very well, being made up into powders or boluses as required, and combined with some agent, such as potash or resin, in order to excite the action of the kidneys, and carry off the morbid matters from the blood. Such a combination will be found in the following directions :—

RECIPE NO. 40.

Take of sulphate of iron, powdered	.....	6 oz.
Nitrate of potash or resin ,,	.....	6 ,,
Gentian and ginger, of each ,,	.....	3 ,,

Mix, and divide into twelve powders ; one to be given morning and night.

To smaller animals the form given in No. 38 may be adopted, or the above doses may be reduced one-third or one-half as needed.

From the day succeeding the application of the caustics to the wounds, some antiseptic fluid should be regularly made use of, that the contagious properties of the discharge may

be destroyed, as well as to stimulate the parts to healthy action; for this purpose, solutions of "Sanitas," Condy's permanganate of potash, chloralum, chlorine water, chloride of zinc, &c., will be found to be all that is required.

A caution is needed in reference to the use of diuretics: they must not be persisted in too long, as irritation of the kidneys may supervene, or effects of the tonic medicine will be interfered with. After the quantity recommended (No. 30) has been exhausted—viz., at the end of six days—the nitre or resin may be omitted; afterwards an occasional laxative ball will be required, to obviate the constipation produced by the iron, the diuretics being given about once in five or six days. Much may be done by the use of linseed or bran in the food, together with a regular or occasional allowance of roots; indeed, it is better to act on the bowels in this way rather than use purgative medicine too freely. Clysters are likewise of valuable assistance in supplementing the action of a laxative diet, and should not be forgotten in the list of remedies.

Preventive Measures.

In all stables and buildings where farcy or glanders have appeared, especially if other animals are there, certain operations for the prevention of the disease must be rigorously carried out. The usual plan, and it is that insisted upon by the Contagious Diseases (Animals) Act, 1869, is to allow all animals to remain in contact with the one diseased, forbidding their removal under penalties, thus insuring a certain propagation of the malady. A second, and, we think, an equally erroneous plan is, to move the affected animal rather than the healthy ones, so that if they escape direct infection from the diseased animal, they will in all probability receive it from something he has left behind. As all contagious diseases are characterised by a period of latency or incubation,

there is every probability that the removal of all apparently healthy animals, immediately on the earliest intimation of the existence of such in any one of them, will most successfully prevent their extension. This, from experience, we find to be the best plan, especially if the additional process of individual segregation can be carried out. We know very well this cannot always be done by the owners of stock, but when Government professes to watch over the interest of proprietors in preventing the spread of contagious maladies, it should also provide for the wants of the community in this respect. Animals apparently healthy, nay, even infected, or those in whom the disease may be in a latent or incubative stage, may be moved with impunity; therefore, we would thus endeavour to limit the spread of glanders and farcy, and at the same time, of course, save the lives of valuable animals.

First then we would, if possible, remove all not actually diseased, putting them under proper care and surveillance, and subject the affected animal to suitable treatment within the only building at present contaminated. At the same time, every attention should be paid towards purifying the air of the place and keeping it pure, by means of disinfectants; the burning of *small* quantities of sulphur will readily accomplish what ventilation fails to do, without inconvenience to the inmates, if carried out properly. The benefits derived are, owing to the action of the resulting gas, *sulphurous acid*, which has a powerful action on all miasmata; a simple arrangement for its production is shown in the adjoining woodcut (Fig. 30).



FIG. 30.—*Arrangement for disengaging Sulphurous Acid Gas.*

A small tin bowl, having the capacity of half a small tea-cup, is supported on

three pillars or legs of the same material, and joined near the bottom by a circular plate, on which a spirit-lamp is placed. Less than half a teaspoonful of sulphur is placed in the bowl, and the lamp ignited; gas is quickly disengaged, the quantity being easily regulated by the size of the flame. After the removal of animals and all metallic articles, harness, &c., the disinfection of buildings may be accomplished by sulphurous acid very effectually as follows:—A few hot coals are placed between several bricks laid on the floor, covered by a plate of iron reaching across from the bricks of one side to those of the opposite. A handful of the flowers of sulphur is placed on the iron plate, and shortly ignites, burning with a beautiful blue flame, disengaging powerful, deadly fumes in large quantities, until the whole is consumed. The building should be closed entirely, excepting some convenient place for retreat, and the gas confined to the interior for some hours, after which doors and windows may be opened from without, to clear the place before any one enters. We have reason to believe this plan to be the most efficacious of any for the purpose of disinfection.

Chlorine Gas is occasionally used for the purification of stables. It is generated in the following manner:—A quantity of the black oxide of manganese is placed at the bottom of a glass flask—an ordinary Florence or salad oil flask answers the purpose—and covered with muriatic acid. The arrangement is completed by fixing the flask, thus charged, in a proper stand, as shown in the engraving Fig. 31, and heating the whole by the flame of a spirit-lamp. A yellowish green gas is rapidly evolved and pervades the building, the action of which should be assisted by having previously closed all doors, windows, &c., and arranged also to withdraw as soon as the process has been put into action. A more simple arrangement consists of placing the ingredients in a shallow

dish, set on an iron plate, beneath which a fire of coals has been made. In these cases it must be understood no animals must be allowed to remain, for the process will be required to act some hours, the lamp or fire being charged to last the prescribed time. Chlorine gas may be liberated in a gentle manner by mixing carefully one part of common salt, one part of the black oxide of manganese, and two parts of strong oil of vitriol together in a saucer or shallow dish. No heat is necessary, but the ingredients must be frequently agitated. For many ordinary purposes this answers well, as animals may remain in their stalls during its use; but the vessel must be placed at a great height if the air of the place is to be purified, as the gas, being heavier than atmospheric air, falls to the floor, and in still states forms a low stratum. *Solutions of chlorine gas* are very useful agents for washing woodwork and floors. It is made by passing the gas as it is evolved from the mixtures already given by the aid of heat, through water,

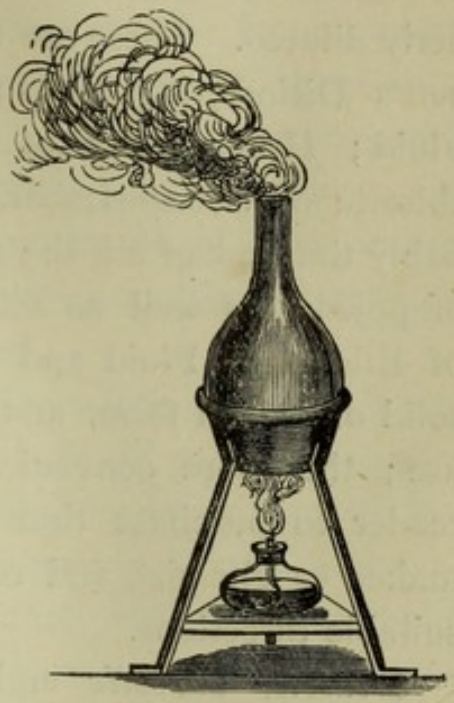


FIG. 31.—*Apparatus for generating Chlorine Gas as a purifier of Buildings.*

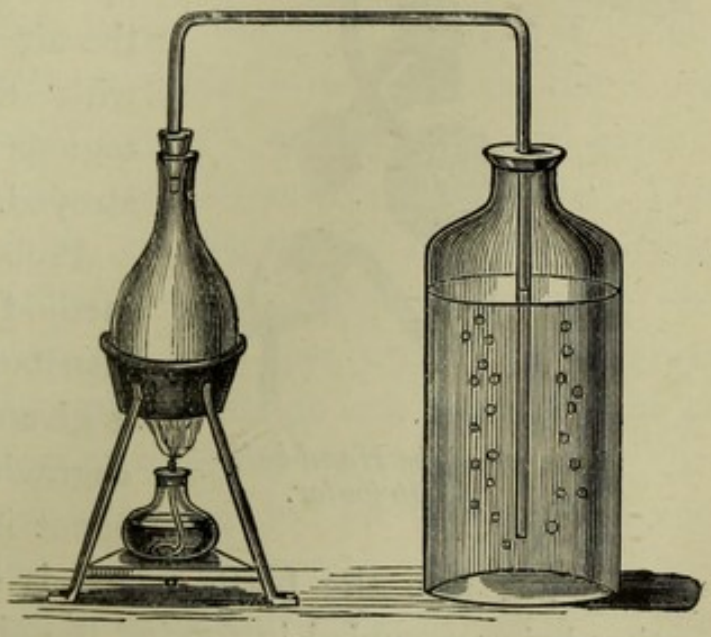


FIG. 32.

as shown in Fig. 32. Nearly all the compounds into which chlorine enters are good disinfectants, and are usefully applied in solution to the floors, animal matter, wounds, &c., when properly diluted. These are Chloride of Zinc—Sir Edward Burnett's Disinfecting Fluid; Perchloride of Iron—Ellerman's Fluid; Hypochlorite of Potash—Eau de Javelle; Hypochlorite of Soda—Labaraque's Liquid; and last, but probably the best of all, the new agent—Chloralum, in the form of powder as well as solution. These, with the exception of Ellerman's Fluid and Chloralum, may be obtained in the solid or crystal form, and, dissolved in water, are ready for use; the more convenient way, however, will be for the reader to purchase that which he selects direct from the maker or chemist, and ready for use, along with which are suitable directions.

Creasote, *Carbolic* and *Cresyllic Acids* are useful for fumigation on a small scale during the presence of animals, and offer many advantages when alternated with sulphurous acid. Being volatile, they may be placed upon an earthenware plate, and laid over a vessel in which water is kept up to the boiling-point, when the air is quickly impregnated with the vapour, and contagious miasma effectually destroyed.

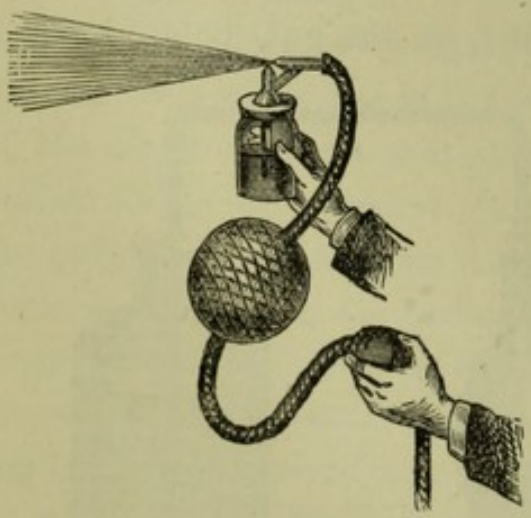


FIG. 33.—*The Hand-ball Spray-distributor.*

Probably the most effectual method is to use the spray-distributor, one form of which is given in the accompanying engraving (Fig. 33). The agent is here used in solution, being put into the bottle which is held in one hand, the other being occupied in forcing the air through the tube by

compressing the india-rubber ball at the opposite end. Solutions of chlorine or sulphurous acid gases, the mineral acids and acid salts, the various disinfecting fluids, chloralum, &c., are equally available, and may be thus employed to purify the atmosphere of buildings occupied by diseased animals. A more effective plan consists of driving steam instead of common air through the india-rubber tube, water being heated in a suitable vessel by means of a spirit-lamp, by which a tiresome process is avoided, and larger quantities of the required agent are produced.

Fluid Carbolic Acid.—An impure solution of carbolic acid is now sold at about the rate of 3*s.* 6*d.* per gallon, which suggests an extended use as an efficient disinfectant. Poured from the rose of a common watering-can, it may be used to the floors of buildings after dilution with an equal weight of water. Rugs, cloths, sacks, harness, and stable tools, woodwork and ironwork, &c., may be washed with a soapy solution of the fluid. One pound of soft soap is boiled in a gallon of water, to which two pounds of fluid carbolic acid are added, and after being thoroughly incorporated is ready for use. It is of great importance to note that temperature has much to do with the decomposition of organic matter; therefore, when the carbolic solution is to be used, it should be as near boiling-point as possible—poured over the floors, brushed over wood and ironwork, &c., the rugs and harness being immersed in it, and afterwards scrubbed. This solution diluted answers excellently for cleaning surfaces over which discharges from diseased parts are flowing. The purulent secretions from the eyes and nose in contagious diseases are constantly emitting the poison, and it should be the duty of an attendant to clear them away regularly. An equal bulk of water should be added for this purpose, and used by means of a rag or sponge.

"*Sanitas*" has now been sufficiently long before the public

to justify the statement that it is by far the best preparation as a disinfectant for general use, being preferable to McDougall's disinfecting powder. It is non-poisonous, therefore no fear need be entertained of any danger arising from sponging or washing the skin of diseased animals in watery solutions of any strength. Mangers, pails, and other utensils used in feeding may be also freely and safely washed even with the concentrated preparation. It effectually purifies the harness, clothing, &c., steeped in solution of proper strength, and when applied to the floors, poured from the rose of an ordinary watering-pot, the air is rendered delightfully cool, fragrant, and pure. It does not irritate, but is soothing. Being highly volatile, every part of the building is reached, and the air thus treated becomes pleasant and exceedingly refreshing to the weak and suffering patient. The preparation suitable for stables is the *crude "Sanitas" oil*, which is sold at the rate of about 8s. 6d. per gallon, full directions being given with it. See "Sanitas," under "Antiseptics" in Dispensatory.

Chloride of Lime, so called, is an efficient remedy for the disinfection of urine, fæces, &c. It should be thrown over the floor and excrement, &c., to be purified, by means of a large dredger, and, after lying some little time, the whole is carefully swept together, treated with a further addition of the disinfectant thoroughly mixed, and removed to a proper receptacle. Chloride of lime possesses several disadvantages—a strong suffocating odour, which often renders its employment among diseased animals highly injurious, particularly in affections of the respiratory organs. On a large scale, and where constant and complete disinfection is required in buildings where animals are confined, chloride of lime is objectionable. It renders the manure worthless for agricultural use. It may be purchased wholesale at about

20*s.* or 21*s.* per cwt., and in small quantities from the nearest chemist or oilman at 2*d.* or 3*d.* per pound.

Then there are the permanganates of potash, "Condy's Fluid," which are renowned as antiseptics and disinfectants, and purchasers will find in them all that is desired, either as solutions for purifying the air by means of the spray-producer or for cleaning wounds and decomposing the contagious nature of discharges and excretions.

Ventilation.

Besides cleanliness and disinfection, ventilation is of absolute importance where sick animals are. A want of pure air vitiates the system through the respiration, and converts healthy animals into weak, ill-favoured, and diseased ones, while the malady, whatever it may be, is always retarded and aggravated. Efficient ventilation cannot be secured in dark, dreary stables, where the sunlight cannot enter. The want of light admits of dark corners and heaps of dirt in them out of sight; the latter moulder and decompose, emitting offensive smells which shut out good and fresh air. We should always endeavour to have large windows so as to admit plenty of light, especially direct sunlight, which is the best purifier we know; added to these, arrangements should be made for securing a free current of air through the stable when unoccupied, and air-shafts should pierce the ceiling and chambers above, going direct to the roof, the openings there being guarded by valves to prevent down-currents of air. Valves of similar construction likewise should be placed in every wall, immediately below the ceiling, that in whatever direction the wind may be no obstruction may arise to prevent the passage outwards of foul, heated air. As difficulties often present themselves by reason of position of buildings, the various plans must be modified, or adopted in accordance

therewith ; and, if due consideration is given to the question, we have no hesitation in affirming that any building may be ventilated, no matter what are the peculiarities. Isolated stables present no difficulties, as a rule ; and here we have found one or more central air-shafts, as already named, from the ceiling upwards, beneath which the necessary gaslights are placed, to be thoroughly efficient ; or when such could not be made use of, then a few brick valves in the walls may answer the same purpose. The following is a description of one which we have adopted :—

"*Improved Valve for Ventilating Stables and other Buildings.**

"We have had an opportunity of examining an improved ventilating valve for stables, cow-houses, &c., and other buildings where animals are confined. The apparatus is designed by Mr. G. Armatage, formerly connected with the teaching of veterinary science in the colleges at London and Glasgow, and may be manufactured in wrought or cast iron.

"Upon the question of ventilation as closely connected with the welfare of domestic animals, Mr. Armatage, we believe, has spent much time and thought, and the result of his labour and study is, that he has produced an apparatus which seems likely to do its work well.

"The great object in ventilation is to secure a proper regulation of currents of air through a building. Holes may be made anywhere, but to insure the passage outwards of heated and impure air, is another matter. The common plan of inserting grates or air bricks in stables over the horse's head, is a constant source of annoyance in two ways. If foul air ascends in that direction, the animal breathes it ;

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* From the *Farmer*, May 15, 1871.

and if the brick ceases to be an outlet for impure gases, a common enough occurrence, it then becomes an inlet for a weighty column of cold air, which causes nasal catarrh, cough, sore throat, influenza, and even more serious events. Chronic cough, and even roaring, has been successfully traced to the presence of common air bricks and grates over the mangers. Such a position is condemned for the common apparatus, and while it is not recommended for the improved valve, the evils may be greatly neutralised. The sides or ends away from the animal's head are selected as near the hind-quarters as possible, and in the proximity of gaslights. When animals are tied up to the middle of buildings, or allowed to run loose, no particular choice of locality is needed, as long as a free outlet occurs at the outside, and a gaslight, when in use, burns beneath on the inside.

"The design and action of the valve will be best understood by a reference to the engraving. The proper size is that of an ordinary brick; the valve is composed of cast iron. In front a movable plate is fixed by a screw at each corner (*see* elevation), and is perforated by a number of elongated apertures. Behind this plate, an oblique diaphragm is fixed (*see* section), being cast with the outer frame. This is perforated like the front plate, in order to admit of the free passage of air. Behind the front plate sufficient space is left to inclose between it and the upper portion of the diaphragm, a sheet of very thin india-rubber (*see* section), which forms a *hanging* valve, and constitutes a sensitive means of preventing sudden gusts of air in an opposite direction. The diaphragm is arranged, in the form described, to prevent the valve from passing too far outwards and becoming fixed. When in position, the front

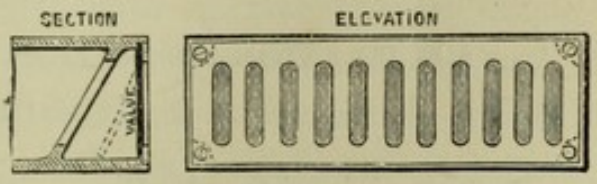


FIG. 34.

plate is placed on a level with the inner surface of the building, and the situation and movement of the india-rubber valve perfectly insures the stoppage of cold currents of air inwards, while the gentle pressure of warm air from within pushes it backwards and passes outwards.

"In stormy weather the use of the valve is most apparent. The wind blowing in one direction closes the valves on that side of the building effectually, while those on the opposite side—unacted upon from without—are left free to the action of warm air within. By these means, we understand, many places have been successfully ventilated, and in those where their application was impossible, the same principle, under modification of form, has succeeded admirably. When our enthusiastic admirers of pure air in buildings are informed that the valve has been supplied at the low cost of half-a-crown, we do not think many will allow their stables and cow-houses to remain long without such an apparently useful agent in maintaining the health of animals."

Legislation in Reference to Farcy and Glanders.

The provisions for dealing with these dangerous maladies of equine animals are comprised in the Contagious Diseases (Animals) Acts 1878 to 1886, and numerous Orders in Council, from which the following extracts are given, with their references :—

Order in Council, No. 3446.

91. It shall not be lawful for any person—

(*a*) To expose a diseased or suspected animal, horse, ass, or mule, in a market or fair, or in a sale yard, or other public or private place where animals or horses are commonly exposed for sale.

"(*b*) To place a diseased or suspected animal, horse, ass, or mule in a lair or other place adjacent to or connected with a market or a fair, or where animals or horses are commonly placed before exposure for sale.

"(*c*) To send or carry, or cause to be sent or carried, a diseased or suspected animal, horse, ass, or mule on a railway, canal, river, or inland navigation, or in a coasting vessel.

"(*d*) To carry, lead, or drive, or cause to be carried, led, or driven, a diseased or suspected animal, horse, ass, or mule on a highway or thoroughfare.

"(*e*) To place or keep a diseased or suspected animal, horse, ass, or mule on common or unenclosed land, or in a field or place insufficiently fenced, or in a field adjoining a highway, unless that field is so fenced or situate that animals therein cannot in any manner come in contact with animals passing along the highway or grazing on the sides thereof.

"(*f*) To graze a diseased or suspected animal horse, ass, or mule on pasture being on the sides of a highway.

"(*g*) To allow a diseased or suspected animal, horse, ass, or mule to stray on a highway or thoroughfare, or on the sides thereof, or on common or uninclosed land, or in a field or place insufficiently fenced.

"(*h*) But this Article shall operate subject to Article 15 (*b*) and Article 87, Regulation A, B, and C, and Article 92, providing for or directing the movement of diseased animals in cases therein mentioned."

Article 15 (*b*) and 87 provide for the movement of diseased or suspected animals when first found in public places, and Article 92 empowers an Inspector or other officer of the Local Authority to seize such animals when exposed in contravention of the Animals Order 91 above quoted.

The owner of a diseased or suspected animal is required Act 1878, Section 31)—

1. To inform a police constable; or

2. Give notice of such direct to an Inspector of the Local Authority, who shall proceed to enforce the powers and discharge the duties conferred and imposed upon him. (Animals Order 3446, Art. 59). These may consist of—

(*a*) Issuing a public warning of the existence of disease (Art. 60).

(*b*) Prohibiting or regulating the movement of diseased animals (Art. 61).

(*c*) Dealing with animals which have been in contact with those diseased; and

(*d*) Regulating the removal of fodder, litter, or any other thing which has been in contact with a diseased animal.

Article 62, Animals Order No. 3446, provides for the slaughter of diseased animals; and Regulation A (iv.), Article 92, Animals Order 3446, provides for the place of slaughter.

Sections 60 and 61 of the Act 1878 deal with penalties for offences.

Section 32, disinfection of stables; and burial of carcases (Art. 95, Animals Order No. 3446).

For further information the reader is referred to the Handbook for England, Wales, and Scotland of the Laws and regulations relating to Contagious and Infectious Diseases among Animals.*

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* London: Eyre & Spottiswoode, East Harding Street, Fleet Street, E.C.

SECTION III.

SPORADIC OR GENERAL DISEASES.

DISEASES OF THE RESPIRATORY ORGANS.

SPORADIC OR GENERAL DISEASES.

WE now arrive at another stage of discussion, in which we take up a class of diseases—totally distinct from those which have occupied previous sections—named sporadic, so designated from the fact that they do not arise from wide-spread causes, as a rule rarely affecting above one or a few animals in a place, or whole district, but, on the contrary, are owing to the operation of local causes—something exerting an influence upon one or a few animals only. Such diseases are neither infectious nor contagious; although in one instance, shortly to be pointed out, appearances may sometimes prompt the conclusion, which is not unlikely when rare exceptions to the common rule take place.

In this and following sections the various diseases to be described will be grouped in accordance with the class of organ affected. As they have no specific characters, in which respect they differ entirely from blood diseases, this appears to be the simplest form and arrangement. The symptoms are mainly constituted by a morbid physiology—a vicarious or excessive action and function of organs, and various combinations, which do not take place in health; they are readily understood by all who are fully acquainted with the normal or healthy functions, a study of which forms the essential qualification of the veterinary practitioner.

The following will be the order of the classes under which the diseases will be discussed :—

1. Respiratory Organs.
2. Circulatory ditto.
3. Digestive ditto.
4. Urinary ditto.
5. Organs of Generation.
6. The Nervous System.
7. The Organs of Vision.
8. Organs of Locomotion.
9. Skin and its Appendages.
10. Parasitic Diseases.
11. Local Injuries.

DISEASES OF RESPIRATORY ORGANS.

CATARRH—COLD—CORYZA.

Nature.—Catarrh consists of an inflammation of the lining membrane of the nostrils and sinuses of the head (*see* Plate I.). By unmitigated exposure to the prevailing causes it may, and does frequently, extend to the eyes, throat, and air-passages.

Causes.—Sudden alternations of temperature ; defective ventilation of stables ; exposure to wet and cold ; occupation of stables recently whitewashed, being damp ; excessive use of saline and purgative medicines. A want of properly nourishing food, and the state of system at the time of providing the new coat of hair, are strong predisposing causes.

Symptoms.—Simple catarrh is characterised by first redness of the mucous membranes of the nose and eyes, quickly followed by a thin, transparent, watery discharge, which soon becomes opaque, turbid, thick, of a creamy colour, and eventually profuse. Symptomatic fever is asso-

ciated with catarrh in proportion to the severity of the attack; dulness and debility are likewise combined. These signs are generally preceded by a shivering fit, or rigors of greater or less intensity; but apart from complications, it is usually slight, and as such attracts no attention.

Treatment.—This is a simple matter if promptly instituted. Simple laxative food, as bran mashes or linseed, hay or green forage, are necessary. The animal should be placed in a cool, well-ventilated box, and the body clothed in cold weather. If the animal is detected in the shivering stage, give at once the following:—

RECIPE NO. 41.

Take of nitrous ether	2 fl. oz.
Tincture of ginger	½ „
Water	8 „

Mix.

Or the following:—

RECIPE NO. 42.

Take of aromatic spirits of ammonia	1 fl. oz.
Tincture of cardamoms	1 „

Mix with half a pint of cold water.

When the membranes are congested and dry, the foregoing must be omitted. Inhalations of steam will now be found serviceable; a simple plan, and one most commonly adopted, is that of the nose-bag, as shown in Fig. 26, and referred to under "Strangles," at page 131. Another method consists of holding a pail of hot water beneath the nose, and distributing the vapour by agitating with a bundle of twigs or wisp of hay. These operations have the object of promoting discharge from the mucous membrane, for the relief of distended vessels. The following ball may be given:—

RECIPE NO. 43.

Take of nitrate of potash	4 drs.
Tincture of aconite	5 drops.
Common mass	Sufficient.

Mix.

If the animal is still taking food, the following powder may be given in it, taking the place of the ball :—

RECIPE NO. 44.

Take of nitrate of potash, powdered		4 drs.
Ground locust beans „ coriander seeds	of each	1 oz.

Mix, and incorporate with food made slightly damp with water, or linseed-tea, &c.

Continue the food as recommended, and give the powder again the second and third day, if required by urgency of symptoms ; but if debility ensues, substitute the draught No. 26 or 27. Clothe comfortably, and use friction to the skin, bandages to the legs, and put a hood and neckcloth on. *On no account use purgative medicines ;* if the bowels are constipated, throw up enemas, allow roots, linseed, green forage, &c., *ad libitum,* or administer the draught here given :—

RECIPE NO. 45.

Take of linseed oil	8, 10, or 12 fl. oz.
Nitrous ether	1 „

Mix.

As soon as the symptoms of fever abate, a little gentian may be added to the nitre in the following doses :—

RECIPE NO. 46.

Take of nitrate of potash, powdered	2 drs.
Ground gentian	4 „

Mix ; to be given daily in the food for two or three days ; if debility comes on at this stage, substitute iron for the gentian, or give it in addition in two dram doses. Follow with good food, gentle exercise ; gradually remove clothing and bandages, and bring the animal quietly and easily into work.

LARYNGITIS ; *Laryngo-Pharyngitis ; Angina ; Sore Throat.*

Nature.—An acute inflammation of the lining membrane of the larynx, gradually extending to both muscles and tissues surrounding it, sometimes including the pharynx.

Symptoms.—The earliest signs are loss of appetite, a hard, dry, and frequent cough, thirst, a difficulty in swallowing, solids are usually rejected or are expelled into the nares, and fluids wholly return by the nostrils (*see* Fig. 24) ; the throat is tender under pressure, and external swelling is frequently visible, involving the whole of the parotid gland upwards to the ear ; mucous membranes are red, pulse frequent, breathing quick and not uncommonly difficult from the first. Symptomatic fever runs high in proportion to the amount of effusion within the muscles, and swelling of the membranes. The cough becomes less hard and frequent as the swelling advances, and the inspiration is performed with difficulty, often producing a loud, prolonged, harsh sound, followed by a short, rapid expiration. A discharge, at first thin and clear, afterwards purulent, flows from the nostrils, and when the jaws are separated a viscid saliva flows, having accumulated largely at the back of the mouth.

Laryngitis sometimes terminates in bronchitis or pneumonia, chronic cough, and roaring.

Causes.—The same as detailed under catarrh. Young horses are often seized, when first put to work, especially if kept in heated stables, having too little ventilation. High feeding under these circumstances creates a greater degree of susceptibility. Horses coming from dealers' stables are common subjects of the disease.

Treatment.—Some practitioners put nitre in the animal's drinking-water. We, however, consider it an unsafe and uncertain method, as when the power of swallowing is so

difficult, the water is refused, and consequently no medicine is taken; and when we find the pail empty, it is a difficult matter to learn correctly whether the water has been drunk or not. We prefer an electuary of the following composition :—

RECIPE NO. 47.

Take of nitrate of potash	4 oz.
Camphor	1 „
Extract of belladonna	4 drs.

Reduce the potash and camphor separately to powder; mix, then add the belladonna, rubbing until it disappears among the powders. Add four ounces of linseed meal, and make up into a soft mass with treacle, a dessert-spoonful of which is to be placed on the tongue five or six times a day.

If the bowels are constipated, throw up enemas frequently, and let the first food that he takes be composed of bran and boiled or steeped linseed. Balls must not be given, nor any attempt made to hold up the head to force gruel or fluid medicines over the throat.

As soon as the acute symptoms subside, the following change in the electuary may be made :—

RECIPE NO. 48.

Take of common alum	4 oz.
Tannic acid	2 drs.
Ground gentian	4 oz.

Mix, and add treacle to make up to the required consistence, and use as directed for No. 47.

The liquid blisters, No. 9 or 10, may be used to the outside of the throat; some practitioners advocate fomentations used for a long time. Poultices are also recommended. When the swelling and effusion are excessive, the breathing passage is more or less closed, and respiration is difficult, often threatening suffocation; in such cases, no delay should take place in affording relief by opening the windpipe. (*See*

Tracheotomy.) With the restoration of normal respiration and circulation, decrease of fever, &c., the treatment must be adopted which will promote the return of appetite and strength, as already given under Catarrh.

Congestion of the Lungs; *Pulmonary Apoplexy; Mechanical Engorgement.*

Nature.—Stasis or settling of the blood within the lungs, originating first in an irregularity of the flow or circulation, ultimately ending in engorgement.

Causes.—Reckless driving and riding, particularly if prolonged; very common among horses "not in condition" for the road, field, or course, and arises also in all kinds and breeds of horses as a result of continued irritation which induces high symptomatic fever.

Symptoms.—These are indicative of intense agony and constitutional disturbance. The animal exhibits a great want of power to breathe properly by standing with the head held low (Fig. 35), legs wide apart, nose out, nostrils

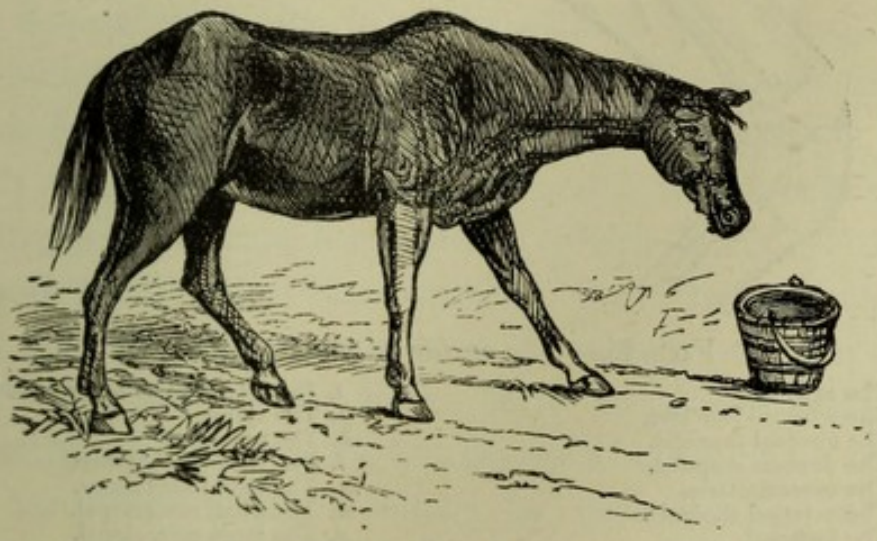


Fig 35.—*Congestion of the Lungs*

dilated, eyes bold and prominent, panting, heaving at the flanks, with general uneasiness; the pulse cannot be felt at

the jaw, and therefore we search for it in the inside of the arm at the brachial artery (Fig. 36), where it is found to be

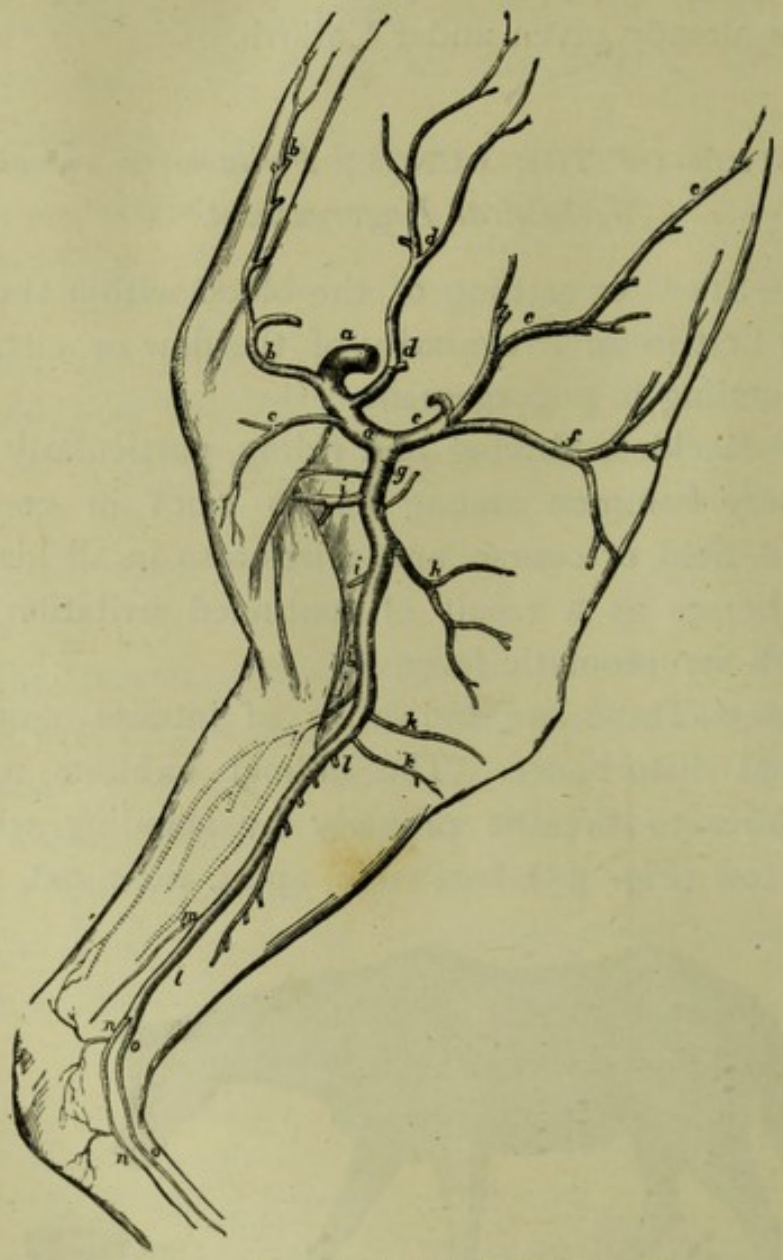


FIG. 36.—*The inside of the Fore Leg.*

a. The axillary.
b. The humeral thoracic.
c. The internal thoracic.
d. The dorsalis scapulæ.
e. The subscapularis.
f. The external thoracic.
g. The humeral.
h. Branches to the triceps extensor brachii.
i. Branches to the flexor brachii.
j. The spiral.
k. The ulnars.
l. The radial or brachial.
m. The radial medullary.
n. The small metacarpal.
o. The large metacarpal.

small, weak, and compressible, numbering 80, 90, or 100 beats, and the sounds of the heart's action are audible as a violent or tumultuous beating. Discharges of blood appear

in some cases at the nostrils, due to the rupture of minute vessels in the air-cells. Pain is known by the animal grunting and being restless, partial sweats, &c. The legs and ears are cold, and the mouth is dry, hot, and fœtid. Bloodletting is unsatisfactory, as only a very imperfect flow can be obtained, the blood being black, and, it is said, it resembles tar, having no power of coagulation. Pulmonary congestion not unfrequently proves fatal in a few hours, when due to excessive or hard running in the hunting-field. It rarely merges into such inflammatory diseases as bronchitis or inflammation of the lungs, the powers of life being too prostrate, death arising from interference with the functions of the nervous centres from the non-aëration of the blood.

Post-mortem Appearances.—The whole ramifications of the pulmonary vessels are engorged with blood, and in many parts ruptured, by which the contents are distributed throughout the substance of the lungs. In this condition the organs resemble in appearance the natural structure of the spleen; hence the term "splenification," commonly used to denote the state in contradistinction to "hepatisation," which we shall refer to hereafter. The exact nature will be at once apparent if we divide the lungs across. The colour is that of a very dark purple, and the open vessels permit the flow of blood from within, which is very dark or black, and having the consistence of thin tar; sometimes there is also an admixture of clot or coagula, and throughout the substance of the lungs there are dark-looking or black patches. These mark the places where rupture of the vessels has taken place, followed by extravasation of the blood material. Notwithstanding this state, in which the lungs are heavier than in health, they will usually float when put into water, a circumstance owing probably to the large admixture of frothy serum, and forming a good test of

distinction from the state of the hepatisation of pneumonia. Splenification is the usual terminal condition of pulmonary congestion, a disease of a few hours only ; while hepatisation is the corresponding one of pneumonia, telling of disease which may have happened months back. The fact is useful in a legal point of view. The heart on the right side, both auricle and ventricle, is filled with black blood, and the left side also contains a portion ; and the large pulmonary veins are fully charged also, the blood being of the same kind as already noticed.

We must caution the reader against the risk of confounding a very common condition of the lungs after death with that we have been considering. Owing to the gravitation of blood, as the dead body lies on one side, one of the lungs—that which is lowest, of course—becomes charged with blood, while the upper one is brighter-looking, and considerably lighter. This, known as hypostatic congestion, differs essentially from pulmonary congestion, there being but one organ affected, and a total absence of extravasation and engorgement of the heart and vessels ; besides which, the special manifestation of other diseases will be present to add additional confirmation.

Testing the Lungs.—During life it is possible to obtain a very correct state of the lungs by two useful methods —viz., auscultation and percussion. The first consists of applying the ear directly to the sides of the chest, or interposing an instrument named a stethoscope. In either way the medical practitioner detects a peculiar rattling sound called a crepitus, not unlike that produced by crumpling tissue paper in the hands, or rubbing hair between the fingers near the ear. The position of the sounds indicates the seat of disease. By percussion, we mean rapping with the knuckles or a suitable instrument the sides of the chest, when the absence of a hollow sound—dulness and deadness

being in place of it—declares the extent to which the lungs are affected.

Treatment.—In the majority of cases no help is at hand when the animal first shows signs of this disease, and he may even have to travel some distance to a farm or stable ; thus the early stages are past before the veterinarian can be summoned, when different treatment will be required. Some practitioners bleed when the attack first commences, and afterwards administer a strong stimulant, such as nitrous or sulphuric ether, aromatic spirits of ammonia, chloroform, &c., or the forms already given in recipes No. 26, 31, 37, and 41. In the absence of any of these, a tumbler of brandy, whisky, or gin, with moderately warm water, may suffice to generalise the flow of blood.

The body should now be actively but carefully wisped over, legs rubbed, and clothing and bandages put on, providing also that plenty of fresh air is allowed, and all cold draughts avoided. In order to give an impetus to the circulation, the legs may be first rubbed with some stimulating fluid, the sides of the chest likewise ; but we do not see the necessity to torment by the use of blisters. Such an application as the following :—

RECIPE NO. 49.

Take of liquor ammonia	2 fl. oz.
Tincture of arnica	2 „
Water	1 pint.

Mix.

As soon as the pulse shows signs of fulness and greater strength, either of the following may be given twice or thrice in the day :—

RECIPE NO. 50.

Take of solution of acetate of ammonia	2 fl. oz.
Nitrous ether	1 „

Mix with water, and administer from the bottle.

RECIPE NO. 51.

Take of nitrate of potash, powdered	4 drs.
Tincture of cardamoms	1 fl. oz.
Water	10 „

Mix the potash and water, and when a clear solution is formed add the tincture, and give from the bottle twice or thrice in twenty-four hours.

There is a possibility that bronchitis or pneumonia may follow pulmonary congestion, therefore some amount of care and discrimination is needed, particularly if the usual signs have been rapidly dispersed; it will be necessary under these circumstances to watch the pulse and temperature while the above treatment is carried out, that at any moment the stimulants may be withdrawn and necessary substitutions or additions be made. With the return of strength and appetite, observe the usual cautions as to food, &c., which have been already given.

BRONCHITIS.

Nature and Causes.—Inflammation of the bronchial or smaller air-tubes, the terminal twigs of the windpipe, within the lungs. Like catarrh and laryngitis, this disease sometimes appears as an enzoötic, attacking animals throughout a district. The causes are thus wide-spread, due no doubt to an unusual cold and prevailing high wind, with wet, in exposed situations. Winter and spring are the more common seasons for its appearance generally, when we look for the cause in alternations of extreme temperature at periods when the system is more susceptible to such influences. Heated stables, accumulations of foul air, combined with cold and wet out of doors, are among the common causes. It also results as a sequel to catarrh, laryngitis, and pulmonary congestion.

Symptoms.—Signs of catarrh and laryngitis are not un-

commonly present from the first, and with those of fever, short, hacking, frequent, and painful cough, disturbed respiration, we are led to examine the respiratory organs. The pulse is full, hard, and frequent, breathing quicker than usual, mucous membranes inflamed, ears and legs cold, and the animal stands fixed, the spine being rigid in order to oppose movement; great thirst is present, but he will not take food, and is dull and listless (Fig. 37). The bowels are



FIG. 37.—*Bronchitis*

constipated, but diarrhœa may readily be established, and is sometimes present from the first; the urine is deficient as the disease proceeds.

The process of respiration requires earnest attention. It is accelerated, numbering 30 or 50 per minute; the expirations are short and easy, but the inspirations are prolonged, difficult, and painful, while an audible sound or "roar" may be heard during its performance, which is due to the reduced calibre of the air-tubes, as well as rigidity of their walls, the result of inflammation of the mucous lining and submucous tissues. The roar or abnormal inspiratory sound is heard to greatest advantage if the ear is applied to the windpipe at the bottom of the neck, and at the part where it enters the chest. Here it will be discovered that

the accumulation of viscid mucus from and on the surface of the lining membranes has much to do with the reduction in the size of the air-tubes, as well as forming obstructions to the passage of air, as proved by the diminution of the roar or *rhonchus* after a fit of coughing. The cough of the first stages throws up a thin watery and frothy fluid, but as the disease advances it becomes viscid, opaque, and progressively purulent, having large solid masses of mucus, &c., dislodged from some part where it has been causing no little irritation and difficulty in respiration. In proportion as the discharge is poured out, relief is afforded, and it is expelled more readily as the cough becomes stronger, and is less frequent than at first. Occasionally the disease assumes a chronic form, and the muco-purulent discharge, drawn in by forcible inspirations, forms accretions in certain parts, giving rise to coliapse of the cells, loss of function, and probably in the end abscess of the lungs. Another termination, and which is more common, is that of thickening of the membrane of the cells and tubes with eventual or partial obliteration, accompanied with emphysema, giving rise to a state of difficult breathing known as "thick wind." Bronchitis also occasionally terminates in death, which is due to a want of blood purification, and suffocation—apnœa. Bronchitis has a variable period of duration. The crisis usually is reached on the third or fourth day, and convalescence is established on the eighth or ninth, but chronic forms continue some weeks.

Treatment.—It is not advisable to bleed in this affection, as the tendency to prostration is already too apparent. Great good may result from the use of inhalations of steam impregnated with camphor or even common turpentine. In the way of medicine, let the following draught be given during the stage of acute fever :—

RECIPE NO. 52.

Take of solution of acetate of ammonia.....	2 fl. oz.
Chloroform	1 fl. dr.
Tincture of aconite	10 drops.

Mix, and administer in half a pint of cold water every eight hours, until the pulse is affected and respiration subdued. In all probability three doses may be sufficient, when the aconite may be withdrawn, the remainder being continued one or two days, or the forms No. 49 and 50 may be substituted. If the cough proves troublesome the subjoined form of draught may be used :—

RECIPE NO. 53.

Take of solution of acetate of ammonia	2 fl. oz.
Chloroform	1 fl. dr.
Tincture of belladonna	½ fl. oz.
Syrup of squills	1 „

Mix with water, and administer as No. 52. During constipation throw up enemas, and apply a strong liniment to the front and sides of the chest, or the solution, No. 49, page 171, but we do not advocate blisters in the common sense of that term. Allow plenty of fresh air, throwing open doors and windows, but avoid draughts ; clothe warmly and use friction to the skin, with bandages to the legs as needed. About the sixth or eighth day, when all acute signs have passed away, the pulse and temperature have declined, tonics may be prescribed as for catarrh, No. 46, page 164, exercise and work being enforced as progress and other circumstances allow.

PNEUMONIA ; *Peripneumonia ; Inflammation of the Lungs.*

This disease is common to all our domesticated animals, and in the horse it occurs more frequently than bronchitis, especially in the younger and more vigorous animals, and

with tendencies to relapse. The causes are the same as noticed under Catarrh, Laryngitis, Bronchitis, &c.

Symptoms.—In most cases the earliest sign consists of a shivering fit of more or less intensity, being regulated according to the severity of the attack. The body, ears, and extremities are first cold, but afterwards are hot ; the visible mucous membranes are red and dry, mouth hot, and an expression of anxiety is seen in the face ; breathing short and frequent, the greater action being performed by the walls of the abdomen, and numbering perhaps 40 in the minute. The pulse rapidly rises to 60 or 70, and is full, large, and vigorous, but shortly oppressed. The disease gives rise to a dull, dry, and harsh cough, and animal temperature is considerably increased, the thermometer showing a reading of 103° or even 105° F. The animal is often restless, moving about as if in search of something ; but as the disease acquires severity and breathing becomes more difficult, he will maintain a

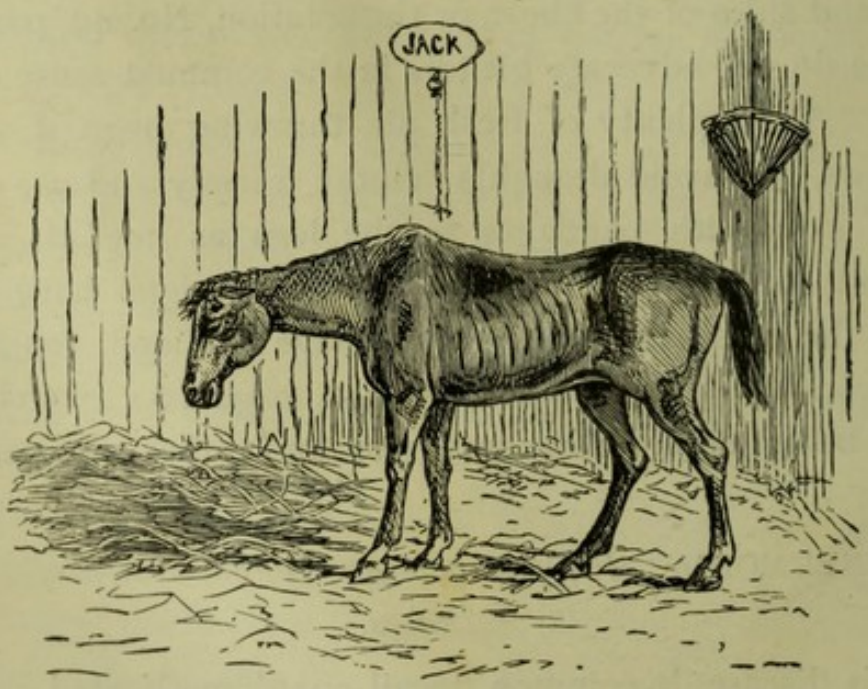


FIG. 38.—*Pneumonia.*

fixed position, with legs apart, back rigid, and the chest set to avoid motion as much as possible (Fig. 38). The bowels

DESCRIPTION OF PLATE II.

"THE CONTENTS OF THE THORAX.

"*A*, the trachea ; *B B*, the right lung ; *C C*, the left lung, both lungs being deprived of their mediastinums ; *D*, the heart ; *a*, the œsophagus, or gullet ; *b*, the common carotid artery, dividing into the right and left carotids ; *c*, the right vertebral artery ; *d*, the recurrent nerve of the right side ; *e*, the par vagum and sympathetic nerves of the right side, journeying in company down the neck. The enlargement perceptible upon the nerves, marks the situation of the cervical ganglion on the sympathetic ; *f f*, the anterior lobes of the right and left lung ; *g g*, the posterior lobes of the right and left lung ; *h*, the small extra lobe of the right lung. The portion of lung occupies the space between the inferior mediastinum and the posterior cava ; *i i*, &c., the first seven of the costæ, or true ribs, divided ; *j j*, the remaining ribs ; where the letters are placed would be the posterior lobes of the lungs ; *k*, the cartilages of a few of the ribs, and of the sternum sawn through to expose the contents of the chest ; *l*, the ensiform cartilage of the sternum ; *m*, the skin dissected back ; *n*, the coronary artery of the heart which has been deprived of the outer layer of pericardium."


A
B
C
D
f
g
h
i
k
m
m
j
j

are constipated, urine highly coloured and in deficient quantity ; skin harsh, dry, and tight on the body.

The aspect of affairs is more accurately discovered by auscultation. As the ear passes over various parts of the sides and front of the chest, we detect the absence or increase of respiratory murmur. Sometimes only one lung is affected, at others both are seized. There is more or less bronchitis present, and this gives rise to increased sounds in the normal parts of the lung ; while those that are diseased give no sound whatever. The breathed air is hotter than in health, and greater difficulty in respiration occurs as the disease makes progress ; a distressing, though occasional cough, produces excitement, from which partial sweating appears, while the legs are cold, and the pulse becomes small, weak, and indistinct. Greater suffering from difficult breathing arises, and consolidation of both lungs is now rapidly going on, death putting an end to the sufferings of the animal from the twelfth to the fourteenth day.

Post-mortem Appearances.—The lungs or portions of them are involved in a state known as hepatisation, so called from the liver-like appearance presented. Such parts are charged with an exudation of lymph with more or less admixture of blood materials, which gives rise to a dark-red or brown colour ; they are also circumscribed, the surrounding tissues being either free, or undergoing transition from disease to a healthy state. When this disease arises from the accidental passage of medicine down the windpipe, there may be found in addition to the signs already named, certain insoluble matters adhering to the lining membrane. If the medicines were wholly fluid—*i.e.*, perfect solutions, then such evidences will be absent ; but, nevertheless, the resulting signs of bronchitic lesions, and consolidation of the lungs in their lowest parts, leave little doubt as to the cause. As absorption from the bronchial membrane is very rapid and effectual, we

must not expect to find always the actual presence of the fluid administered.

Treatment.—We would not counsel the reader to resort to bleeding, except in the very earliest stages, while the pulse is full and strong ; then only to abstract a moderate quantity to relieve the breathing, and not to create debility, which will appear soon enough. Open the bowels when constipated by a dose of oil, and continued enemas ; rub the legs and apply bandages ; stimulate the skin by gentle brushing or wisping, and clothe immediately with warm but light extra coverings, giving the animal all the pure, cool air possible, without subjecting him to any unnecessary cold or draughts. Next prepare the draught No. 52, and administer as recommended at page 175 for bronchitis, the object of which is to reduce the fever as soon as possible, substituting No. 53 rather than use the aconite too long. With regard to the use of counter-irritants, we prefer at least to defer them until the desired effect has been produced on the circulation by medicine, when we believe a greater result is achieved. Mustard, or the blisters (9 and 10) may be used as preferred. Professor Gamgee recommends the following, much used by Danish veterinarians :—

RECIPE NO. 54.

Croton oil	1 part.
Sulphuric ether	10 parts.
Spirits of wine	10 „

Mix, and rub well into the skin, and after a full effect has been produced, the application is to be carefully washed off. We must also caution the reader against the insertion of setons and rowels ; we have no faith in them as remedies in pneumonia, being too slow and tardy in their action, besides being cruel means, giving rise to an unnecessary amount of pain, and securing no corresponding good. As the fever subsides, in all probability the animal will prove to be weak, and even prostrate, when stimulants will be needed, but they

must be cautiously administered : nitrous ether will then be of great service. The treatment from that stage in which reduction of the pulse and fever has been accomplished, to the termination of the case, may be followed on the plan as already laid down for catarrh, laryngitis, and bronchitis, to which one especial injunction must be added—let the tonics made use of be of the vegetable kind, *avoiding iron altogether.*

Abscess or Suppuration of the Lung.

Horses that recover tardily from protracted attacks of bronchitis or pneumonia, are liable to the formation of abscess or suppuration within the substance of the lungs. One or more portions having undergone the process of inflammation, and containing the resulting exuded materials, have suffered such changes in structure that the process of resolution is not established ; these portions are involved in the condition termed hepatisation, and contain such elements as are capable of forming pus, that being the only action the system can adopt by way of eliminating the residual particles of disease. All other parts of the lung have become clear and healthy, their functions being for the most part restored as in health; but the veritable spot of grey hepatisation takes on the process of gradual softening in the centre, and, by enlarging, including the products of inflammation as it extends, at length forms a larger or smaller cavity, which is filled with a thick opaque creamy-looking fluid—pus, and which, by a subsequent process of ulceration of lung tissue, a communication is established between another abscess or a bronchial tube, when, by constant coughing, portions of offensively-smelling discharge are expelled. In some instances, of a rarer occurrence, the abscess bursts outwardly, and the discharge of pus is poured into the cavity of the chest, where it collects and gives rise to great irritation—a state known as empyema.

The presence of an abscess within the lung is known by continual wasting of the body, and anæmia, frequent and feeble pulse, fœtid breath, a constant, moist, rattling and feeble cough, and discharge of offensive pus, and even portions of lung (Fig. 39). The appetite is capricious, and a

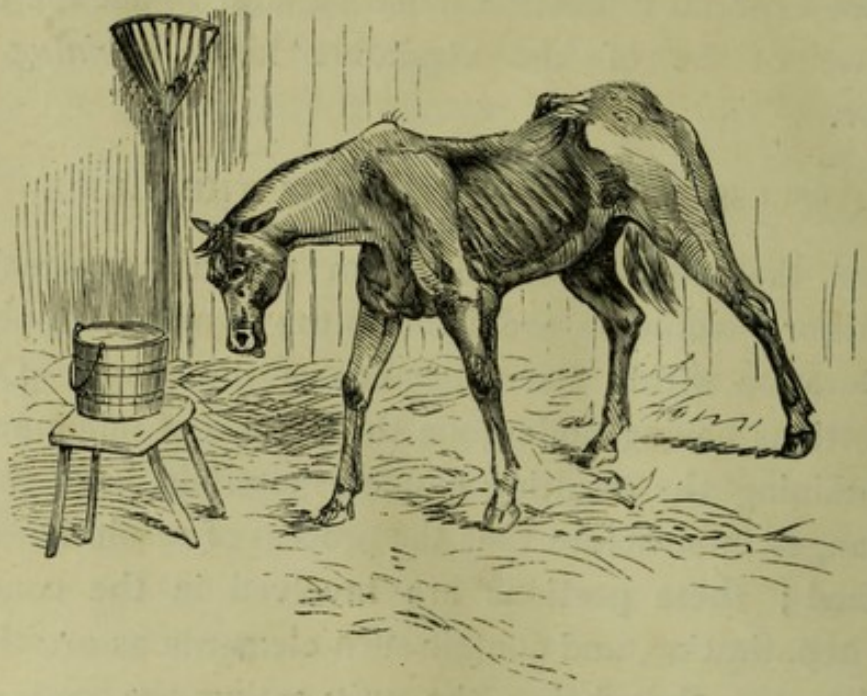


FIG. 39.—*Pulmonary Abscess.*

sound called the "cavernous *râle*," caused by the air passing in and out of the abscess during respiration, is heard when the ear is placed over the ribs near the spot. Such animals are apt to linger long, and present pitiable conditions; at length found dead, hectic fever being established at the conclusion of the illness.

Treatment is frequently tedious, and not always successful. The animal requires fresh air and opportunities for gentle exercise, good food, prepared by boiling, and alternated with roots, green forage, &c., as convenient. Linseed cake, and the oil in small and repeated doses, are very useful; beef-tea has been used with great benefit. Stimulants and tonics, both vegetable and mineral, should not be forgotten, as the draughts No. 27, page 111; No. 31, p. 120; No. 37, page 139; or No. 39, page 139. The following will be valuable,

as combining the properties of a stimulant as well as mineral tonic.

RECIPE NO. 55.

Take of nitrous ether	1 fl. oz.
Tincture of muriate of iron	2 fl. drs.
Water	10 fl. oz.

Mix, and administer with great care three times during the first and second days; afterwards only twice. If the bowels are acted on, the evacuations being black and fluid, withhold the tincture of iron for several days, and substitute ground gentian in half or ounce doses. Some practitioners blister over the affected parts. We have little faith in the proceeding, only as an additional torment to the suffering animal.

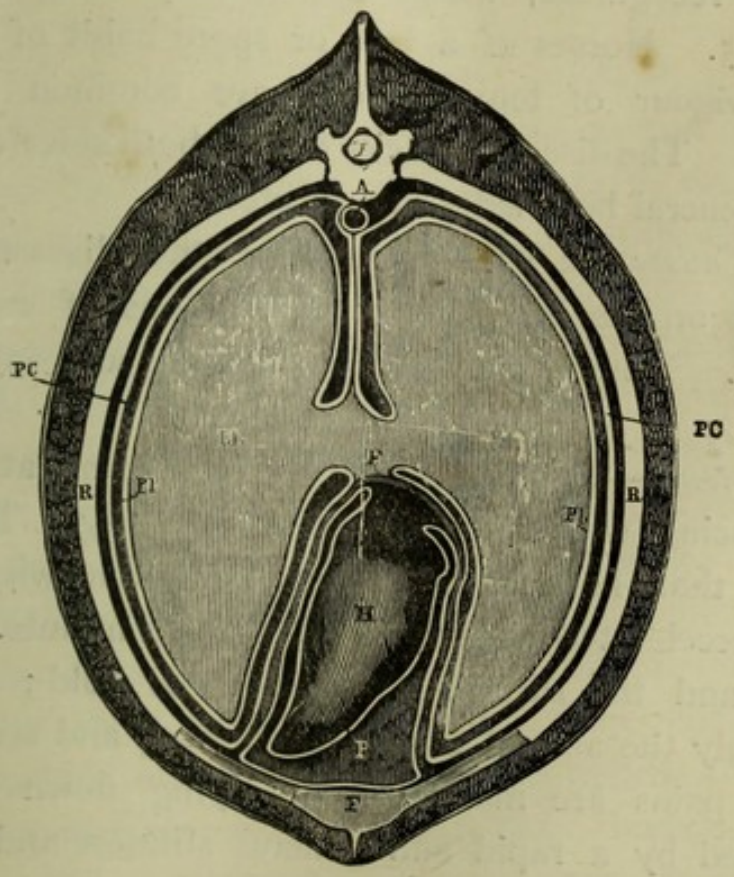


FIG. 40.—*Transverse Section of the Thorax or Chest.*

(The dark substance outside represents the flesh or muscles, the white body at the top is the vertebra.)

A. Azygos vein.
R, R. The ribs.
E. Sternum and cartilages of the ribs.
P. C. Pleura costalis.
P. L. Pleura pulmonalis.
L, L Lungs.
H. Heart.
P. Pericardium.
F. Fibrous layer of the pericardium.

Pleurisy or Pleuritis.

By the term pleurisy we understand the process of inflammation going on in the serous membrane termed the "pleura," or covering of the lungs and heart, as well as lining of the whole of the cavity of the chest. Pleurisy is observed as an independent affection, and is apt to recur as a result of rheumatic diseases, when the heart and its appendages suffer extensively. More generally, however, and apart from rheumatism, it is associated more or less with pneumonia, when the compound term, pleuro-pneumonia is made use of. In such a form it may appear as a sporadic disease, or from the prevalence of easterly winds, an enzoötic form is recognised, which has already been described at page 115. Horses of a lean or spare habit of body, combining vigour of temperament, are common subjects of pleurisy. The disease attacks one or both sides of the chest, but in general both sides are affected.

The *Causes* are such as produce other diseases of the respiratory organs, particularly alternations of extreme temperature. Pleurisy may follow clipping, and injuries to the thorax.

Symptoms.—Sympathetic fever is present at the outset, commencing with rigors of some intensity. The pulse is smaller than natural, and is also firm and wiry, the beats being accelerated to fifty or sixty per minute. The coat stares, and the surface of the body is cold; and not uncommonly the animal is restless, pawing and scraping; and colicky pains are manifested by lying down and rolling, succeeded by a rapid and general stiffness and soreness of the body, movement or pressure, and even fright causing the animal to groan (Fig. 41). He is now fixed, and declines to move; the breathing is abdominal, and the act in expiration, as well as in inspiration, is imperfectly accom-

plished, owing to the rigid state in which the ribs and walls generally of the thorax are held, as denoted by a long line,



FIG. 41.—*Pleurisy.*

or furrow, existing on the side of the chest, and extending from the fore limb backwards and upwards to the point of the hip, and by the elbows being turned outwards; the inspiration is short, catching, and interrupted; the expiration easier, freer, and prolonged. Sometimes the muscles of the side may be seen to quiver, and pressure on the spaces between the ribs immediately behind the fore-arm, will give intense pain, causing the sufferer to grunt. The head is held low, and stretched, or "poked" forward; the ears droop, and the eyes are half closed, while anxiety is depicted on the countenance. The animal sneezes or coughs, which causes much disturbance, and each paroxysm is evidently dreaded by him; the flanks are hollow and tucked up; the appetite is lost; mouth hot: bowels costive; urinary secretion restrained; and the ears, nose, and extremities are cold. When the ribs are struck, the sounds produced are resonant and clear, denoting a healthy state of the lungs; but when the ear is applied, it is found such

is not the case with the pleura that covers them. The surfaces which, in health, glide smoothly over each other, emitting no sound whatever, now are thickened, opaque, painful, and rough, and two of these, in close apposition, move uneasily and irregularly, giving rise to a grating or friction sound not unlike that produced in the bending of thick leather. The lungs are further proved to be not included in the mischief by the respiratory murmur which is heard over all their surface.

Pleurisy terminates in resolution, or effusion—hydrothorax.

Resolution.—By this term we denote a gradual decline of all signs of the disease, which takes place on or about the fourth or fifth day, and a general but progressive resumption of the whole of the functions is contemporaneous with it.

Effusion or *Hydrothorax.*—Horses dying from pleurisy of the later stages exhibit the condition known under this name. As a result of the inflamed condition of large surfaces, effusion of serum within the cavity of the chest is always to be expected more or less ; in one case it is slight, or poured out in such quantities that it may be readily absorbed, and the case goes on to resolution, but in another instance the effusion is abundant, increasing beyond the power of the absorbents to take it up, and the result is that the chest is filled, pressure on the lungs follows, and death ensues from suffocation or internal drowning.

When effusion takes place, there is relief given, and the major part of the symptoms abate, giving place to others as the quantity of fluid increases. Respiration now becomes longer and deeper, the abdomen drops, swelling of the legs disappears, the pulse is soft and more distinct, but continues frequent, with variable periods of infrequency, and notwithstanding there is an evident improvement of symptoms, with little or no pain, a considerable degree of

anxiety still is exhibited by the face of the animal. After a few hours the breathing is laboured, muscular quiverings and twitchings occur, and a flapping of the nostrils accompanies the respiratory acts. Sometimes the legs commence again to swell, and dropsical conditions are seen in front of the chest, extending backwards between the fore-legs along the abdomen to the sheath or mammary gland, both of which are implicated in the general swelling. The breathing is short and laboured, especially during inspiration, and on auscultation the respiratory murmur cannot be detected in the lower regions; percussion gives a dull sound as high as the fluid has accumulated, and above this both methods prove the resonant and free state of the lungs. Weakness and distress follows, the animal stands propping, the legs being wide apart, head low, or resting on some object, with neck outstretched, nostrils flapping, eyes staring, and heaving



FIG. 42.—*Hydrothorax. Last stage.*

respiration. The pulse is more frequent, small, irregular, fluttering, and finally indistinct or imperceptible; the ears, nose and legs are cold, rattling sounds are heard in respira-

tion, the animal totters, weakness rapidly increases, and at length, in periods varying from one to several weeks, he falls, to rise no more.

Treatment of Pleurisy.—In all cases of true pleurisy, or those in which no actual pneumonia is present, we may accomplish much in the first stages by the administration of a purgative draught, constituted as here directed :—

RECIPE NO. 56.

Take of solution of Barbadoes aloes ..... 8 fl. oz.
Tincture of aconite ..... 15 drops.

Mix, and after it has been given throw up enemas. Let the legs be hand-rubbed and covered with bandages, the body gently wisped and clothed, allow plenty of cold water to allay thirst, and after making the animal comfortable, leave him for a time.

In five or six hours the state of the pulse must be taken, and if it is not much reduced give the draught No. 13, page 70, or the ball No. 14, page 71, which should be continued every four hours. After four have been given, a marked change for the better is usually apparent, and the animal progresses towards recovery, when the treatment must be that suitable to the stages leading to convalescence as already repeated.

Treatment of Hydrothorax.—The great principle of treatment here is the use of diuretics and laxatives, in order to carry off the effused fluid by the various organs; in these cases diuretics are particularly valuable. For this purpose it is good practice to alternate the remedies rather than give too much or too frequent doses of one kind. The draught No. 51, page 172, may be given every six or eight hours during the first day, and substituted on the second by the draught No. 50, page 171. The following preparations will also prove of great service, given singly or alternated with each other :—

RECIPE NO. 57.

Take of nitrate of potash	½ oz.
Camphor, powdered	2 drs.
Nitrous ether	2 fl. oz.
Water	1 pint.

Dissolve the camphor in the nitrous ether, and the potash in the water, then mix and give as directed.

RECIPE NO. 58.

Take of digitalis	½ dr.
Nitrate of potash powdered	½ oz.
Linseed meal	2 drs.
Common turpentine	sufficient.

Let the first, second, and third ingredients be carefully triturated, then add the turpentine to make up a ball. This dose to be given every four hours.

RECIPE NO. 59.

Take of powdered cantharides	20 grs
„ digitalis	1 dr.
Linseed meal	1 „
Soft soap	sufficient.

Make into a ball, and give every eight hours until three have been used.

Great attention must be paid towards securing every comfort for the animal by way of clothing, bandages, fresh air, small quantities of suitably prepared food, roots, &c., and when the kidneys are caused to act as desired by one or more of the above remedies, a change may be necessary. Doubtless much weakness will be present; we can then resort to tonics as directed in the succeeding prescription :—

RECIPE NO. 60.

Take of sulphate of iron powdered	2 drs.
Common alum	2 „
Ground gentian	2 „
Treacle	sufficient.

Make into a ball, and give one every eight hours during two days, afterwards, as the case progresses, one every 12 hours.

Besides the administration of remedies by which the removal of the accumulated fluid may be effected, an operation is sometimes resorted to, known as *paracentesis thoracis*, or tapping the chest. It is performed in the following manner: The skin over the ribs is drawn into folds, as shown in the annexed figure (Fig. 43); the space between the eighth and ninth rib is then selected, and a small vertical incision is made, either by plunging a lancet through the skin only, or by means of a common scalpel or dissecting knife, near to the front border of the ninth rib. A small trocar and canula, as shown in the engraving (Fig. 44), is then carefully passed through the muscle; and immediately the point has entered the chest, the outer case, or canula, is gently pushed inwards, while the pointed stilette is being withdrawn. The fluid then flows at once from the tube, and a small whalebone probe must be in readiness to remove small plugs of lymph which pass into the tube and obstruct the current.



FIG. 43.—*Method of drawing the Skin into folds prior to making the primary incision.*

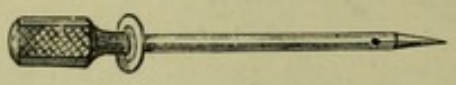


FIG. 44.—*The Trocar and its outer case, the Canula.*

As the removal of fluid produces no little effect upon the animal, stimulants as the ethers, ammonia, &c., are required, followed by a generous diet, with mineral and vegetable tonics.

EMPHYSEMA OF THE LUNGS.

Although we regard this condition more in the light of a symptom of disease than as a distinct affection, it, nevertheless, merits a place in this section as an important form

of derangement of the lungs. In adopting this arrangement, we shall merely refer to it by name in other parts of the work.

Nature.—A chronic disease of the lungs, in which there are dilatations of the air-cells, and probably also artificial cells or cavities formed within the connective tissue, and beneath the investing membrane—the pleura, containing gases, which interfere greatly with the functions of the organs. Thus there are two forms, the *vesicular* and *interlobular*. The vesicular is that in which the air cells are concerned. Some are merely dilated, and others are ruptured, two or more coalescing to form other cavities of larger dimensions. The second or interlobular form is probably due also to the rupture of the cells, and, from the constant motion of the lungs, air is passed into the substance, causing the meshes of the tissue to separate and form cavities here and there. By a succession of such ruptured air-cells we have resulting a number of interlobular cavities always containing air, and, as the elasticity and contractility of the organs are thus destroyed—for the cavities thus formed have

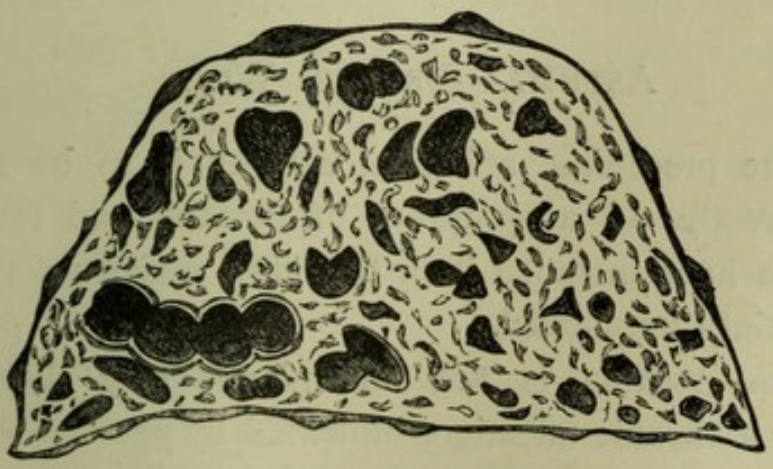


FIG. 45.—*Section of the Lungs,*

Showing the enlarged or ruptured air-cells, and large cavities formed by coalescence with each other, as well as the appearance caused by an elevation of the pleura or investing membrane.

rigid, unyielding walls—they are never emptied, but by slow absorption their contents are lessened; while the natural action of the lungs under certain forms of obstruction tend

to force in more air, and produce the formation of other cavities. The appearances of emphysematous states of the lungs are shown in Fig. 45.

Causes.—Emphysema results from bronchitis, and remote causes exist in the various forms of questionable feeding and work. In the horse it is a sign of "broken wind." From repeated attacks of bronchitis there arises a degeneration of the tissues previously diseased, doubtless due to obliteration of the nutrient vessels; in addition, when obstructions to free respiration take place, and under severe efforts to distend the lungs, the weakest parts give way, as shown by rupture. Tightly-fitting harness or saddle girths and severe exertion, especially when the stomach is too full, are able causes of emphysema. Besides these there may be also constitutional tendencies resident in some nervous defect, as well as imperfect condition of organs, and when such are present the disease will originate imperceptibly, and progress moderately even under the most favourable and unexceptionable kinds of management. Further remarks will be continued under the head of *asthma.*

Asthma—Broken Wind.

Like the preceding affection, asthma is to be regarded more correctly as a symptom of disease, and for similar reasons we have included it in the class which refers to the organs mainly implicated.

Nature.—Asthma is not an inflammatory disease, but essentially a chronic affection, indicated by peculiar and difficult breathing and remarkable cough, all of which are often painfully aggravated by errors of diet and work.

Causes.—From numerous observations made upon animals for the purpose of investigating the troublesome malady, it is now understood that the causes are generally of a plural

character. In those instances where it appears to have arisen spontaneously, as already referred to, there are some defects of the digestive system with impairment of the function of the pneumogastric nerve; probably disease also of the diaphragmatic nerve arises. These naturally lead to a deficient power and imperfect function in their respective organs, when they are more readily deranged and injured under severe strain, as produced by rapid work, hard gallops, &c., when the stomach is replete with food.

In other cases we may trace the cause to repeated attacks of bronchitis, pneumonia, &c., or continuations of a low form of inflammation of the lesser bronchial tubes and air cells; enlargement of the stomach and digestive organs generally, as arising from indigestion and constant over-feeding, or consumption of large quantities of inferior kinds of food—*bulimia*, by which undue pressure is always exerted on the lungs, limiting their expansion; hepatisation and induration of portions of one or both lungs. These causes act partially in a mechanical manner, for whatever limits the action of the lungs at the same time raises the liability to injury of some portions of them during forcible respiration; the susceptibility also towards asthma is efficiently increased by disease, which limits the breathing spaces, and engenders a degeneration of tissue from a want of due nourishment, and by thickening of membranes by interstitial deposition, the result of previous inflammation. We must not omit to direct the attention of the reader to the fact also, that there are minute muscles surrounding the smaller bronchial tubes, which are designed to produce a proper expulsion of air from the lungs during expiration; they may be regarded as supplemental agents to the ordinary muscles of respiration, and in asthma they are materially affected. From a minute consideration of the pathology of asthma, it appears to be now generally decided that the bronchial muscles are affected

in two distinct ways—viz., in the more recent stages they are subject to spasm, due to irritation of the vagus nerve, arising from dyspepsia, &c. ; and, in the later stages, to paralysis, or inability of action. Peculiarity of formation has somewhat to do with the origin of asthma. It has long been known that horses having round, shallow chests possess a greater aptitude for laying on of flesh and becoming fat, than given to acts of swift progression, and are common subjects of broken wind. The explanation of the question is simply this : there is a deficiency of chest space, and under severe exertions the lungs suffer from an inability to expand—air is forcibly drawn in, and, as a result of the limits thus placed upon the lungs, the air cells are injured. In addition, we must not forget that in such animals the irritation from dyspepsia is present, often in a great degree.

Post-mortem Appearances.—Horses rarely die from asthma. Death is usually due to accident or other diseases for which asthma in all probability has created a susceptibility. In the most recent cases no morbid lesion of structure can be recognised by the unaided eye ; in those more advanced an enlargement of the stomach is a common sign, and it is usually impacted. In confirmed cases emphysema of the lungs is more or less marked with one or other of the following :—Hepatisation and hardening of one or both lungs, thickening of the mucous lining of the bronchial tubes, dilatation of the air cells with atrophy, anæmia, and degeneration, as well as rupture of their walls, general anæmia of the lung tissue, and thickening—hypertrophy, of the right side of the heart. Sometimes the heart is considerably altered in structure throughout.

Symptoms.—Respiration is wholly altered. The lungs are inflated with tolerable ease, but the act of expiration is performed in two stages or efforts, and, when these are executed, the relaxation of muscles usually called into play

is accomplished suddenly, as with a jerk, the flanks exhibiting this phenomena very remarkably. There is also present a cough, which is equally peculiar. It is weak, aspiratory, and prolonged, being more like a grunt, modified by the open mouth and fauces, &c. There is also another very marked sign of asthma, the almost entire absence of the respiratory murmur, or it is weakened to such an extent that it cannot be heard unless the animal is put through some exercise previously ; but wheezing or bubbling sounds may be detected in various parts of the chest proportionate with the amount of emphysema present. In percussion we find the chest fuller and rounder (Fig. 46) than natural, and

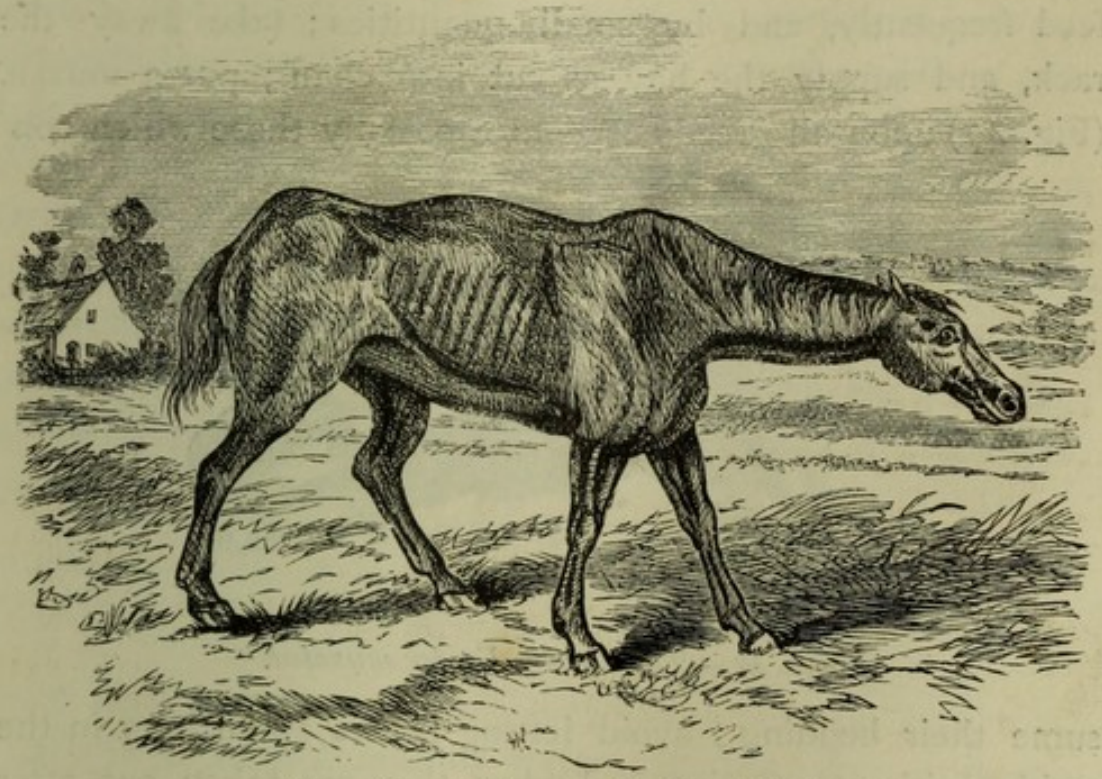


FIG. 46.—*Asthma or Broken Wind.*

the sounds emitted are resonant, loud, and hollow. The movements of the ribs are very slight, but those of the abdominal walls are great and spasmodic, especially during the paroxysms. The animal is worse after feeding and when at work, but as the stomach is relieved comparative

ease is obtained until the animal feeds again. Tympany of the stomach and bowels is common, arising from a weak and impaired digestion, in which much flatus is discharged by the anus, and greatly to the annoyance of all who sit behind the sufferer when being driven. A general state of harshness of the coat is apparent, said to be unthrifty, the belly is pendulous, and disorder and want of condition and aptitude for work are evident almost to those least knowing in horse matters.

Treatment.—The most scrupulous attention to diet should be given, without which no good can possibly be gained from any kind of treatment. Let the quantity of food be regulated carefully, and limit the use to that of the best; feed frequently, and by small quantities; take away the rack, and supply the hay as cut into chaff; put a muzzle (Fig. 47) upon all greedy feeders, especially those which con-

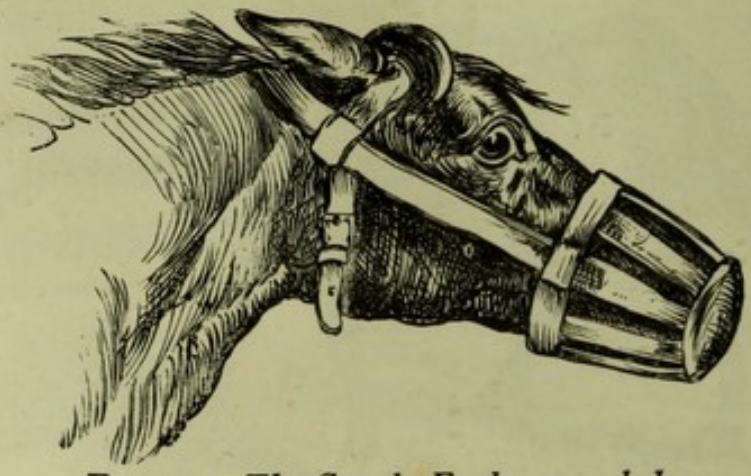


FIG. 47.—*The Greedy Feeder muzzled.*

sume their bedding; avoid letting horses stand long in the stables without exercise, and when they are taken out after feeding drive carefully. Promote regular action of the bowels by means of linseed or linseed oil in the food, bran, and bran mashes, with occasional purgatives. The cough may be greatly relieved, and with chances of greater success in the more recent cases, by the use of calmative medicines. Professor Dicks's famous "broken-wind balls" were composed of

digitalis, opium, camphor, and calomel, which, however, have been improved, we have thought, by omitting the calomel entirely. A more favourite compound, and one which we have used largely with uniform success, is the following :—

RECIPE NO. 61.

Take of carbonate of ammonia	2 drs.
Powdered squills	2 „
Extract of belladonna	½ „
Oxymel squills	sufficient.

Powder the ammonia and triturate together the remainder, adding the oxymel as required, to make up a mass for a bolus. Let this quantity be given morning and night. Care must be exercised in order to make the animal swallow the bolus, for if he succeeds in getting it between his teeth the mouth will be blistered severely, causing profuse ropy salivation, swollen tongue, and loss of appetite. When we have had occasion to leave such preparations in the hands of grooms and horsekeepers who were not experts in giving a ball, we also left a bottle containing the following wash or lotion for the mouth, to be used in case of such an accident as we have alluded to, by which the suffering of the animal is almost at once set at rest, and appetite resumed :—

RECIPE NO. 62.

Take of solution of chloralum	2 fl. oz.
Tincture of myrrh	1 „
„ opium	1 „
Water	1 pint.

Mix the chloralum and water together, then add the remainder. A few tablespoonfuls to be poured into the mouth, the head being held up for a short time.

In addition to the above medicines, nux vomica, strychnia, arsenic, vegetable and mineral tonics are used by various practitioners with variable success.

Roguish horse dealers practise various means for the de-

ception of purchasers. By experience they have learned that an empty stomach is conducive to easy breathing, and they not only keep the animal without food, often for long periods when sales are not brisk, but cause him to swallow shot, lard, opium, gunpowder, &c., in order to produce an extra quieting effect. To the practised veterinarian these frauds are well known, and the disease is not thereby hidden. Intending purchasers would always do well to secure the services of a well-known veterinarian, if they seek to avoid being victimised with animals rendered worthless by confirmed asthma, more especially when they are brought into contact with strangers. The neglect of this precaution has cost thousands of pounds.

Roaring, Whistling, Grunting, &c.

We have now to notice several conditions, temporary, or permanent, and for the most part chronic in their nature, usually symptomatic, and dependent upon present or pre-existing disease of one or other of the respiratory organs. The first which will claim our attention are the abnormal sounds developed under various circumstances, and which destroy the utility, and impair the value of the animal in which they are produced.

Roaring.—Whatever diminishes, and, at the same time, deforms the opening in the larynx, gives rise to a loud baying kind of sound during inspiration, and is known among horsemen as "roaring." In the acute form of laryngitis it is often (Plate IX.) present, consequent upon the pressure due to inflammatory swelling in the mucous membrane and subjacent tissues. This is, of course, temporary, and gradually declines with the disease, as it was generated by it. The chronic form is permanent, slight, or altogether absent during comparative rest, but loud, severe, and distressing when

developed from fright and in accelerated respiration. The *causes* are various; dyspepsia, acting through the nervous system, and pulmonary diseases, acting through the same influence, appear to interfere or destroy the nutrition of certain muscles of one side of the larynx, by which paralysis also ensues (Fig. 48); the antagonist muscles then produce a contraction and alteration of the size and form of the air-passage, and this gives rise, during inspiration, to the sound referred to.



FIG. 48.—*Muscular Paralysis of Larynx, causing roaring.*

Besides the causes named, roaring is sometimes due to the formation of false membranes within the glottis or opening of the larynx (Fig. 49); thickening of the vocal chords and consequent contraction, with deformity of the passage; tumours within the opening; ossification of the cartilages. Roaring, as a rule, is gradual in its development, and progresses in direct ratio to the disease which occasions it. Some horses are predisposed to it by an arched form of the neck, small space at the throat, and great tendency to suffer from sore throat, even under very simple circumstances. The "bearing-rein," as a useless and senseless adoption has been, up to the present (Fig. 50), a prolific cause of the disease among carriage and harness horses generally, and should be discarded by all proprietors who have sufficient moral courage not to allow their coachmen and grooms to have everything their own way in connexion with the



FIG. 49.—*The opening of the Larynx obstructed by false membranes.*

animals under their care (Fig. 50). The disease is often hereditary, and from present malformation, or susceptibility, the



FIG. 50.—*The Windpipe distorted by the bearing rein.*



FIG. 51.—*The Healthy Larynx.*

operation of the ordinary causes of cold need only be exercised slightly, and but a few times to produce it. Hot, foul, and ill-ventilated stables often produce it, by combined influences on the air-passages, digestive organs, and nervous system. We have, within our recollection, seen many such stables, in which every horse doomed to spend two or three weeks inevitably became a roarer. Generally then, roaring is due to a mal-condition of the larynx, but there are modified sounds, also understood to be within the meaning of the word, which are produced from some impediment of the nasal passages—*e.g.*, bony tumours, nasal polypi (Fig. 52), or fleshy tumours; fracture and depression of the bony walls; softening and enlargement of the bones; thickening of the lining membrane; tumours



FIG. 52.—*Polypus in the Nostril.*

on the false palate, which at times fall into the laryngeal opening, and occasion paroxysms of roaring and difficult breathing ; enlargement and induration of the glands near the larynx ; abscess or accumulation of pus within the guttural pouches (*see* Plates I. and IX.) ; fracture and malformation of some of the cartilaginous rings of the windpipe.

The situation and cause of roaring is made out by applying the ear to the course of the air-passages, but in general the cause is so apparent that little difficulty is experienced in pointing out the seat of disease, even from a distance, by practised hands. In Yorkshire, a horse given to loud roaring, from whatever cause, is said to have the "bellans," or "bellones." Entire horses that are roarers always beget offspring which at one time of their life become similarly affected, and this holds good in all breeds. Mares, except when hereditary taint is peculiarly strong, rarely are affected, and small ponies, although liable to sore throat, strangles, &c. &c., as well as the larger breeds, enjoy a strange immunity. The only animal of this kind that we remember to have seen as guilty of roaring, was a Welshman, of eleven hands, used as a harness pony. The noise gradually became a perfect nuisance, and we were consulted as to its cure. During rest the sounds were not heard, and as the creature stood all was silent. In an examination of the nasal passages, we discovered an encysted tumour in the false nostrils, which almost completely closed the opening. The animal was at once cast, and the tumour dissected out, and with its removal there was an end of the complaint.

Roaring is a prolonged sound, emitted only when air is being breathed inwards or inspired, and such animals when tested usually indicate the existence of a cough which is dry, harsh, loud, hollow, and short. The usual plans of detecting a roarer are often rude and cruel. As the suspected animal stands unconsciously in the stable, or by the side of a

wall, &c., some one rushes violently up to him, and kicks or strikes him in the flank, or the whip is laid unmercifully upon him, when by sudden inspiration the sounds are produced. The more perfect plan is to ride or drive the animal over various kinds of road, and at different speeds, or if he be one of the heavier kinds, place a load behind him and cause him to draw it up hill, when the faults, if present, will soon be discovered.

Treatment.—Mechanical causes, such as tumours, may in most instances be removed by operation, but the progressive form of disease resident in the deformity of the larynx, is one which has hitherto admitted of very little opportunity for cure. Blisters, setons, and firing have variously been tried, but failure has met almost every attempt. Continental veterinarians have succeeded in removing it by abscising the arytenoid cartilage of the affected side—a small triangular-shaped body situate at the opening of the larynx or glottis (Figs. 48, 50 and 51), which during the disease hangs down, and is drawn within the opening in the act of inspiration. The operation has succeeded in the hands of British veterinarians also in a few instances, and in others, such an amount of enlargement and permanent thickening eventually followed as to induce another form of roaring, differing from the first only in pitch or sound.

In performing this operation, the horse is cast in the usual way, propped on his back, and the head secured in a perfect line with the body. By means of a proper knife, an incision is made in the throat over the larynx, and the principal ligament divided, which at once admits of the affected parts being seen. Forceps or suitable hooks are passed forwards, and the arytenoid cartilage laid hold of firmly and securely, when a curved knife is used to cut it off. As soon as the portion is detached, the operator requires to be very careful not to let it fall off, or it may be drawn into the windpipe

by sudden inspiration, and set up violent pain and irritation.

Grunting.—This propensity usually accompanies roaring, and is but a less severe indication of chronic states which give rise to that disease. The sound is heard when the animal is suddenly frightened, kicked, struck, turned sharply round, or put backwards. When associated with the permanent causes of roaring, it is mostly incurable, and, as will be already understood, constitutes unsoundness. Yet there are temporary causes of grunting, such as pleurisy and pleurodynia, resulting therefrom, as well as from enzoötic, typhoid catarrh, enzoötic pleurisy, &c., when the chest is sore; then among heavier breeds of horses, particularly gross-feeders, grunting is not uncommon. Whenever the sound is heard, the tests for roaring should be employed, as well as examination for recent causes, which, as a rule, are readily made out.

Whistling.—Causes which do not produce such extreme diminution, malformation, or constriction of the laryngeal opening, may give rise to a prolonged shrill note of high pitch, known as "whistling," which exists slightly during expiration, but loudest during inspiration. Thickening of the lining membrane, vocal chords, or trachea, with some other abnormal conditions of the tube, with tight reining, &c., are the usual causes, permanent in their nature, irremovable, incurable, and constituting unsoundness. Temporary states are present in and dependent upon sore throat—laryngitis, and apart from hereditary predisposition, are removed with the subsidence of the disease. It is of great consequence, therefore, that sore throat should always be attended to promptly, and energetic measures instituted to avoid the ulterior liability to whistling which may take place.

Chronic Cough.

By this term, we can hardly expect to convey to the reader what is actually implied. Chronic cough means simply a cough long standing, dependent upon some existing disease, and as permanent as the cause. We have already alluded to the weak, prolonged, and aspiratory cough of asthma, and in that we present as good an example of chronic cough as the reader may expect ; but in the estimation of the horseman that is a "broken-winded cough," and therefore not chronic cough. Then, again, we have the soft hollow cough of horses suffering from derangement of the lungs, as well as the dry, harsh, hollow, loud and short cough of the roarer. We fear any description of what constitutes the disease in question will only be vague at the best, and the real test by which it can be truly known and recognised is that of experience. There are, however, certain signs and tests by which we distinguish what we generally understand to be *the* chronic cough, about which much difference of opinion exists, and is not an uncommon cause of endless disputes in law courts. A hard, dry, short cough generally exists as one of the signs of laryngeal irritation, but it recedes with the disease ; such a cough may remain after the disease has passed away, owing to permanent thickening of some of the structures of the bronchial tubes, trachea, or larynx, and its constant presence under all circumstances proves an interminable nuisance. The animal coughs in the stable, out of doors, at rest, at work, when feeding, or when hungry ; in short, there is never a period when he is never free from a paroxysm. It may be aggravated by cold and causes of catarrh generally, but the animal can cough as well in his comparative health as others do in acute disease. Usually, chronic cough is hard, dry, short, and frequent, being also firm, hollow, as a rule, dissociated from acute forms

of laryngitis, bronchitis, pneumonia, and all appearances of symptomatic fever. As already remarked, its long continuance after the subsidence of one or other of the foregoing diseases, is of itself sufficient to stamp its real nature. Chronic cough rarely gives way to the action of remedies. From this circumstance horses often prove a source of great inconvenience and disappointment after purchase, when this disease is upon them. We therefore mainly rely upon the usual wind tests, which, if properly conducted, will fairly demonstrate the existence of chronic cough, and, if the veterinarian withholds his opinion for a few hours, while the subject of it is fed, housed, and left at rest, he will obtain farther confirmation by hearing it repeatedly, while there is a remarkable absence of elevated temperature, pulse, or respiration. There may be difficulties in the way when the horse has a sore throat, but even then we would counsel thorough auscultation, and if any doubt exists, let the animal be put back into the hands of the present owner until the active signs are past, when all difficulty will be at an end.

Chronic Nasal Catarrh—Nasal Gleet—Ozæna.

Nature.—A discharge of purulent matter from one or both nostrils, remaining after the period of decline from simple catarrh. A common kind is observed as a result of chronic states of the nasal membrane (Plates I. and IX.), in which a tendency towards excessive secretion has been set up ; and a second form depends upon the existence of some organic lesion or obstruction within the passages, sinuses, or guttural pouches.

I. *Simple Nasal Gleet* is characterised by a muco-purulent discharge from one or both nostrils, variable in quantity, but constant. The glands beneath the jaws are sometimes enlarged, but this is not an invariable sign ; and they are

not adherent to the bones as in more chronic states, or in glanders. The mucous membrane is of a pale pink hue ; a general want of condition is soon manifested ; the coat stares ; precarious appetite ; dulness and inaptitude at work, with more or less of a moist, and sometimes rattling cough.

Treatment.—The practitioner will ascertain correctly the absence of actual lung or bronchial disease in connexion with the case, before instituting remedial measures ; and being fully satisfied of the local nature of the complaint, will proceed to the task of altering the condition of the secreting membrane. This will be accomplished by local as well as constitutional means. The mucous membrane is powerfully acted upon by turpentines, and for this purpose we have found tonic powders, after the subjoined form, of great service :—

RECIPE NO. 63.

Take of sulphate of iron, powdered	4 drs.
Powdered resin	4 „
Arsenious acid	5 grs.
Ground locust beans.....	4 drs.
„ gentian	2 „

Make up into a powder ; one to be given every night and morning for four or five days ; then omitting two or three days, resume the doses during a similar period, and so on until a change is effected.

The nostrils should be attended to, and fluid remedies are most serviceable, being sometimes forced up by means of an ordinary syringe, which is, however, a very imperfect plan, as the various nasal chambers are not reached by it. A second plan is to hold up the head, and pour the liquid into the nostrils ; but this method is as uncertain and inefficacious as the last. The last, and certainly the most superior plan, consists of using an appropriate tube, by which one of the nasal passages, together with the sinuses on that side, are flooded with the lotion. The tube in question

(Fig. 53) is the invention of Professor Rey, and is of the following dimensions: in length about fifteen inches, and one and a half in diameter, forming a funnel at the top, which is about an inch wider than the tube itself. At the lower end it turns at a somewhat acute angle, and decreases rapidly in diameter to about half an inch or five-eighths at the outlet. The short arm from the bend is about five inches, and upon this is placed a piece of leather, fitting tightly, which, with a bundle of tow, is pressed against the false nostrils to close the opening during the operation, which is performed as follows:—All being in readiness, the animal being either blindfolded or twitched at the ear, if likely to be unruly, the short arm of the tube is passed up the nostril until the leather is in contact with the opening, when wet tow is placed on the outside, and firmly held by the hands to prevent the escape of fluid. The tube is held by the operator, who also pours the lotion to be used into the funnel part until it flows freely from the opposite nostril, the arrangement being continued for a time, in order to allow the lotion to act upon the diseased structures; after which, the other nostril is to be dressed in the same manner.

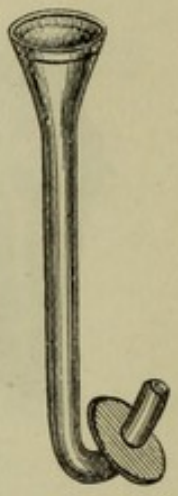


FIG. 53.
Professor Rey's Nostril Tube.

The lotion to be used may be thus made:—

RECIPE NO. 64.

Take of sulphate of zinc or copper	1 dr.
Tincture of myrrh and aloes	½ fl. oz.
Water	12 „

Reduce the first to powder, and dissolve in the water, then add the tincture, and use daily. In cold weather, it is advisable to warm the lotion, by which it will be tolerated more readily by the animal.

While the administration of arsenic is being administered,

the most watchful attention is needed, as it is apt to cause derangement of the bowels, having a specific action on mucous membranes; when such takes place, or irritation of the Schneiderian membrane is observed, the remedy must be withdrawn at once. If the medicine is given as directed, with the intermissions, these untoward states will probably be avoided, and a tendency to constipation will be the result, which must be met from time to time by a common laxative ball.



FIG. 54.—*Pus on the Frontal Sinus.*

a. Place for opening the frontal sinus.
b. Place for opening the maxillary sinus.
The disease is shown on the right side, and place for opening on the left.

II. The second variety of nasal gleet arises from an accumulation of pus within the frontal sinuses (Plate I. *d*, Fig. 54), which have a communication with the nostrils. As these cavities are filled to overflowing, the excess passes away by the nostrils, giving rise to an offensive smell as well as appearance. The pressure of pus in the frontal sinuses is detected by a dull, dead sound, on percussion. Sometimes, also, swelling of the bones is present, or only one is affected, when the contrast will be readily observed.

Treatment.—The use of Rey's tube will not always answer in these cases, and an operation of an extended surgical character will be required. It consists of opening the sinuses from the front, removing the collections, and applying lotions for the arrest of discharges, and is performed in the following manner :—

The horse is cast in the usual way, and if only one side is affected, that must be uppermost. The point of opening will be decided by observing an imaginary line drawn from the orbital arch of one side to that on the opposite, and noting the centre of the space between the orbit and a line drawn down the middle of the face, as shown in Fig. 54,

below the first line. The hair is first closely clipped, or shaved off, and a crucial incision made through the skin by a scalpel; the portions are then dissected off the bone, and laid back; and by means of an instrument called a trephine (Fig. 55), or circular saw, a piece of the bone is removed, and the fœtid pus escapes from the sinus probably, also, hard or concrete portions will also be present, which have had something to do with the persistent discharge. It is usual also to open the maxillary sinus of the same side (Fig. 54, *b*), and pass a tape, or seton, from one opening to the other, to facilitate discharge, maintain free communication, and admit of the cavities being washed out daily with an astringent lotion, as given in No. 64, page 205. Besides this operation the powders, as recommended in No. 63, page 204, will be required, when the cautions there given must also be regarded.



FIG. 55.
The Trephine, or Circular Saw.

III. *Nasal Gleet arising from Accumulations within the Guttural Pouches.*—The situation of these cavities will be understood by a reference to Plate I. *j*. On each side are the parotid glands, outwardly and below are the pharynx and larynx, and by having such a position assigned to them it appears their functions, or at least one of them, is to admit of the organs named having suitable space for action—rising and falling during swallowing. Their close proximity to glands, &c., naturally causes them to be involved in inflammation and abscess during severe strangles or catarrh; and as evacuation is not always readily effected, the pus dries up into hard masses which remain some time, giving rise to irritation and prolonged discharge. One or both pouches may be affected.

The *symptoms* are usually interpreted readily. The submaxillary glands are swollen, but free and mobile. The dis-

charge is not regular, but intermittent, and always observed when the animal feeds from the ground, when at work, or when drinking from a pail. Movement of the jaws and muscles of the vicinity when the head is held downwards greatly facilitates the flow, when nothing is observed if the animal feeds from the rack or manger. The discharge does not always take place from both nostrils when both pouches are affected ; plugging of the Eustachian tube of one side is not an uncommon occurrence, which prevents escape, and favours concretion into hardened masses. Then pus largely accumulates, the parotid glands are sometimes swollen, and an abscess points at the angle of the jaw ; sometimes the discharge takes place in the pharynx, and suffocation has been the result. Old-standing cases are recognised by swelling of the throat and neck, roaring, general unthriftiness, capricious appetite, &c., and the animal is generally regarded most suspiciously as having contracted glanders.

Treatment.—The guttural pouches have a natural communication with the pharynx, and when the head is held down, as in grazing, accumulations of pus may obtain an easy discharge ; for this purpose an essential plan of treatment consists of causing the patient to feed from a vessel placed on the ground, or when a run at grass can be obtained, that will answer the desired end. When there is any fear of the disease becoming chronic, it will be advisable also to institute a course of tonics as well, such as already prescribed for nasal gleet, No. 63, page 204. These may also be advantageously given when the animal is at grass, being mixed with a quantity of corn, cut grass, &c. In long-neglected cases, an operation must be performed, by which the guttural pouches are opened from the side of the neck, behind the jaw, and at the top or thereabouts of the parotid gland.

An opening is also made below the throat, near the angle of the jaw, also communicating with the guttural pouch ; this

admits of a seton being passed through the upper orifice and guttural pouch, and, emerging from below, to maintain a constant discharge, and is also useful for washing out the cavities daily with an astringent lotion. After the operation, the animal should be fed from the ground.

The evacuation of the guttural pouches is by no means an easy matter ; the operation, which is known as hyo-vertebrotomy, is not unattended with risk, and must not, therefore, be attempted by any but skilful hands, well acquainted with the anatomy of the parts. About three weeks will suffice for most cases, at the end of which the seton may be withdrawn, and, by keeping the parts clean, also injecting an astringent lotion, the wounds gradually close, and the animal is cured. Exceptions to this rule occur now and then, from the accumulation and non-removal of hardened masses.

We are sometimes called upon to pronounce upon other cases of nasal discharge, and effect a removal, in which the causes are totally different from those we have already considered. These are *caries* and *abscess* of bone.

I. Caries usually take place in the facial, nasal, turbinated, and superior maxillary bones, arising from long-continued inflammation and pustular discharges, due to the presence of foreign bodies, or, as a common occurrence, a projecting molar tooth in the lower jaw grinding its way through its antagonist and bones of the upper. Sometimes the cause has existed in the presence of a piece of straw or splinter of wood lodged in the sinuses in a fit of coughing, which, owing to the formation of the cavities, cannot pass out with the discharges.

The *symptoms* are, fœtid and occasionally bloody discharge from one side only, enlargement, but mobility of the submaxillary gland ; whole or partial absence of passing air in the nasal passage. Examination of the mouth discloses a diseased tooth in the upper jaw, which is worn and broken

down by an opposite one in the lower, which, growing rapidly, at length advances on the bones themselves.

The treatment consists of removal of projecting portions of sound teeth, and, if possible, of carious ones also, together with such parts of bone as are implicated in the ulcerative process. The use of astringent lotions, by means of Rey's tube, will also be of great benefit.

II. *Abscess.*—The turbinated bone is the most common seat of this disease, which, as a rule, is present only on one side of the head. Young animals are the chief subjects, after attacks of simple catarrh, &c., when the lining membrane swells and chokes up the passage, giving rise to much disturbance and difficult breathing, and, after some time, swelling outwardly of the bones of the face, as shown in the annexed engraving (Fig. 56).



FIG. 56.
Abscess of Turbinated Bone.

The discharge is by no means regular. An important distinguishing sign consists in an abundant flow after the head has been elevated—entirely different from what occurs in disease of the guttural pouches—and is owing to the situation of the opening of the turbinated bone, which is above, preventing the escape of pus until the cavity is full, or, as already explained, when the head is suddenly thrown upwards, the fluid is emptied into the posterior part of the nostrils or pharynx, giving rise to a cough, and forcible expulsion of a large quantity.

Treatment.—An essential principle in the restoration of these cases to health, is to cause a natural evacuation of matter by feeding the animal entirely for a time from a high rack. Sometimes the bone at the side must be trephined (Fig. 54 *b*), and even portions of the turbinated structure removed. Before the severer operation is attempted, it may

be advisable to wait the result of the proposed method of rack-feeding, and the use of astringent lotions by means of Rey's tube.

Spasm of the Diaphragm.

The diaphragm is the musculo-membranous partition between the thorax and abdomen, shown in Fig. 57, an important agent in respiration, and singularly liable to a spasmodic attack after severe runs or rapid harness work, &c. It is also witnessed in tetanus.

The principal *symptom* is a rapid jerking or convulsive movement of the whole body, attended with a dull, heavy, and tolerably regular thumping sound, evidently arising from within or near the abdomen, and totally distinct from the pulsations of the heart and circulation; frequently the action of the heart is indistinct or imperceptible, and the pulse is small and extremely weak; respiration is also disturbed and often difficult, especially as by the irregular action of the diaphragm, congestion of the lungs is not an unfrequent accompaniment.

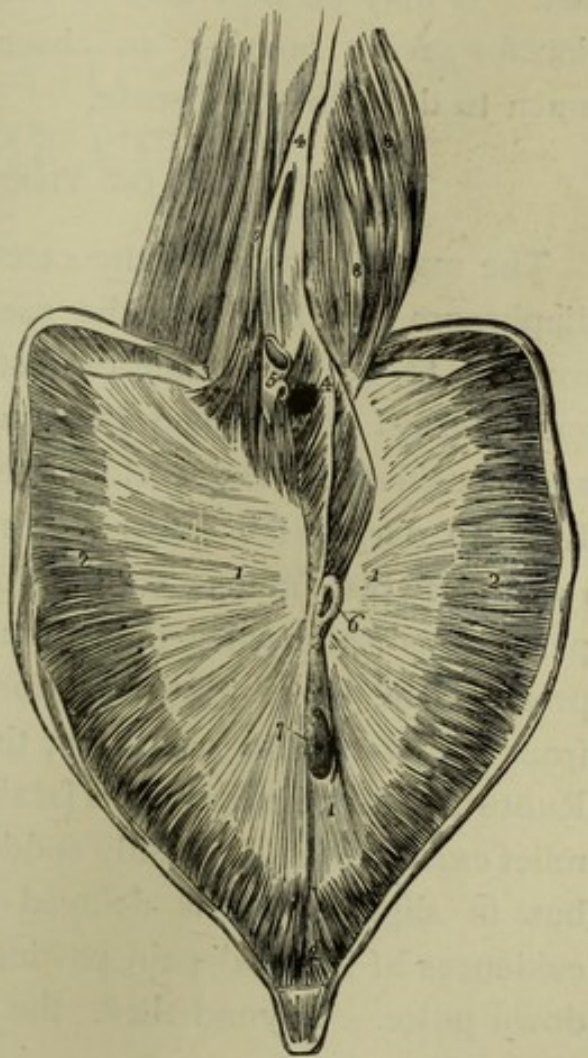


Fig. 57.—*The Diaphragm.*

1, 1, 1. The cordiform, or tendinous portion.
2, 2, 2. The great muscle.
3. The left crus.
4. The right crus.
5. The aorta, piercing the left or superior opening.
6. The œsophagus, coming through the middle opening.
7. The inferior, or right foramen, for the vena cava to pass through.
8. The sacro-lumbalis muscle.

Treatment.—These cases are, generally speaking, easily managed, and nothing answers so rapidly and so well as the following draught, if given immediately :—

RECIPE NO. 65.

Take of chloric ether	2 fl. oz.
Tincture of cardamoms	1 „
Water	1 pint.

Mix, and administer at once, and with all the ease and quietness possible.

Put on warm clothing and bandages, to aid in restoring the circulation ; and if congestion of the lungs supervenes, abstract a small quantity of blood, and repeat the stimulant in three or four hours. The animal will require some days of rest, and when put to work, he must not be pushed so fast. It may be well also to see that he is in fitting condition for severe running, an absence of which may have had much to do with the disease.

RUPTURE OF THE DIAPHRAGM.

The major portion of the cases reported as rupture of the diaphragm, and as being the cause of death, have been discovered to be the result of distension of the abdomen by gases, *after death*, when the muscular portion is softened, and considerably less yielding than the tendinous portions. Rupture during life generally takes place in the latter, by reason of the intense contraction of the former in severe paroxysms ; and when the muscular portion is the seat, the presence of blood extravasation will distinguish the case from a *post-mortem* condition, the wound of which is *clean*. Rupture of the diaphragm is fatal, and no known remedies for relief exist. Death is usually sudden, owing to severe dyspnœa, but in slight cases is delayed some hours, and there are evidences of internal pain, pawing, uneasiness, and a running-down pulse. Beyond these, the cases are not well marked.

SECTION IV.

DISEASES OF THE ORGANS OF CIRCULATION.

DISEASES OF THE ORGANS OF CIRCULATION.

"Arteries and Absorbents.

"The *arteries* are canals originating from the ventricles of the heart by two trunks, the aorta and the pulmonic, whose subdivisions are destined to supply the whole body with blood. Considered generally, arteries are long tubes; which by reason of their numerous bifurcations become smaller as they proceed to the extreme parts. However, the extremities of the arteries, though so much smaller than the original trunk, nevertheless, if put altogether, would contain ten times as much as the parent vessels. In their course an especial regard is observed towards their safety; hence they are mostly deep seated, and invariably pass on the inner sides of the limbs, or on the side that is flexed. They appear equally guarded against accidental pressure or tension, by passing over the bending surface of a joint; and where they are situated in soft parts, liable to extension, as in the tongue, the arteries pursue a serpentine or very crooked course. Their being thus convoluted, however, answers another end than saving them from being stretched; as the arteries, before entering the brain and the testicles, are to be seen winding about in various directions; the intention of which construction is to prevent the blood from

being urged too violently upon such important organs. All arteries are composed of three different coats or coverings, united to form one elastic tube: the *external* coat is of condensed cellular tissue, whose *elastic* powers are so considerable as to preserve the cylindrical form of the principal canals when empty. The middle coat consists chiefly of yellow elastic tissue, and the internal coat is serous tissue, or similar to synovial membrane. By their elastic power the arteries are capable of being distended: by this likewise they can adapt themselves to a smaller quantity of fluid than usual. It is by this elasticity, which operates longitudinally as well as circularly, that, in cases of injury, the divided ends of an artery retreat within the cellular substance around, and thus close its orifices. When this contraction is prevented by a partial division only, the hæmorrhage continues; but even the entire division of the punctured vessel is not generally effective in arteries of the first, second, or third magnitude. The elastic powers appear in dissimilar proportions in different horses, as in different men; from which arises some constitutional phenomena in the individuals of each species; giving to some a greater disposition to hæmorrhage and inflammation, which is called a sanguineous temperament. The elastic coat appears to exist in greater proportion in the horse than in the human being. To this cause it is probably owing, that acute inflammations of the vital organs, in the horse, run through their stages so much quicker, than similar affections in our own race. To this power it is to be attributed, that a horse can bear the division of a much larger artery without danger than a man.

"Arteries, in their different courses, send out branches, which freely join with other branches sent out by other arteries; in consequence of this circumstance we are able to deprive the horse of large and essential vessels; the small

arteries which have united with others then enlarging, and thus carrying on the circulation. Most arteries terminate by means of their capillary branches in veins; we know this, because we can empty the arteries, by drawing the blood from the venal trunks; and because injection forced into the arteries, in many instances enters the veins, but is prevented from so doing if the fluid used be of a coarse description. A more scarce termination of arteries is in cells, from which veins arise to take it up again, as in the spleen, &c. Different parts are more or less plentifully supplied with arteries according to their nature: secreting organs have usually large trunks, as the kidneys, spleen, &c. Arteries are likewise themselves furnished with arterial and venal branches, for the nourishment of their tubes. They are chiefly supplied with nervous energy by the sympathetic system of nerves, which accounts for their being little endowed with feeling. It also renders easy of explanation their being possessed of eccentric powers, such as directing more blood to the face, as in blushing, and driving more blood to a part, as in local inflammation, while their action in neither case can be controlled by the will.

"The evident use of the arteries is to convey the blood from the heart to the different parts of the body, thus keeping up the vital principle in these parts, by being the bearers of nutriment and heat. An intimate knowledge of their functions, and a well-grounded acquaintance with their situation, is therefore essentially necessary to the veterinary surgeon.

"As the use of the arteries is to convey the blood from the heart, so the heart itself appears to be the first, but not the only agent exerted in its propulsion through the vessels. And as the force of the heart decreases with distance, so there is, at last, a column pressed on in almost a continuous stream, by the force from behind: thus, when a very small

artery is divided, there is a regular flow, with scarcely any jet ; this, however, only takes place in their minutest branches. We thus see why there is no pulsation in the veins, they receive the blood from the arteries in one equable stream. Pulsation is a certain sensation caused by the artery, which, from various experiments, is found to arise from its being alternately in a state of distension and relaxation. It appears that, when the ventricles contract, and force the blood into the arteries, the pressure of the fluid occasions a distension of their coats ; when the ventricles cease to act, and become contracted, the impetus against the sides of the vessels ceases, and now the coats of the artery contract also, and lessen its size.

"ABSORBENTS are distributed to every part of the body ; it is true we cannot see them, neither are they to be traced, save by the very finest of liquid injections ; but their existence is known with certainty, because their effects are perceived. Thus the hardest part of bone is removed by a natural process, or absorbed. Inorganised cartilage is likewise taken away, to allow the arteries and veins to enter, and bone to be deposited when ossification ensues.

"Absorbents are very minute, thin-coated, transparent vessels, having numerous valves, like to veins ; they are spoken of as deep-seated and superficial ; but as the difference of position is accompanied by no difference of structure, we shall here regard them as of one kind. Every absorbent conveys the materials it takes away from various parts into the blood, with which their contents mingle, and ultimately become blood ; or they are emitted with the excretions. In starvation it is by means of the absorbents that the marrow is carried out of bones ; and the fatty matter from other places in the body, and emptied into the blood ; which in this manner helps to support, or keep alive, the subject starved. It is thus that it is accounted for why a fat

animal is longer dying from starvation than one that is thin.

"Certain absorbents, which take up the nutritive portion from the food within the intestines, are called lacteals; because the substance they abstract is at first white, like to milk; otherwise they are the same as common absorbents; all of which enter and pass through one or more of the little reddish bodies, called absorbent glands. Of what use these glands are remains to be discovered; but they doubtless promote some change in the fluid contents of the absorbent vessels; they also serve to mingle what the vessels contain; for if two or three absorbent branches enter a gland, only one is seen to leave it; which one must convey away the materials the others brought; as the glands themselves do not appropriate, or enlarge, or fatten upon the contents of these vessels.

"The functional effects of this system are abundantly active in the constitution at large; we are certain that the various organs of the body are continually changing, wholly or partially. It appears to be the office of the arteries to build up new parts, and to repair the waste of others; but the old ones must be first of all pulled down and removed by *absorption;* which is least active at youth; equal with the arteries in middle life; and predominates in age. By this wonderful power the roots of the temporary teeth are absorbed; that their crowns may give way: by this also the gubernaculum testis, having fulfilled its office, is absorbed; and the thymus gland is likewise removed: it is thus cartilage is taken up, to make room for a bony deposit when the animal approaches maturity. By the absorbents the fluids as well as solids are continually changing; being taken up and carried back, but always in a fluid state, into the mass of blood. It is by them that the dead parts are separated from the living in sloughing and ulceration. By the

superficial absorbents, even gases are received from without ; the water held in suspension by the atmosphere is thus taken in ; hence grazing horses require little or no water ; more especially if not exposed to the heat of the sun, whereby evaporation or exhalation is promoted. The functional office of the absorbents is most important also in the preservation of life under casualties. Long fasting is thus borne ; their capability of displacing the animal oil or marrow from the bones, and the fat from the body generally, is here employed to make up the want. Hybernating animals live during their torpidity by a slow absorption of the adipose matter ; thus it is found in the instance of the torpid bear, that, however fat he may enter his seclusion, he returns lean and emaciated.

"To our acquaintance with the power of the absorbents the practice of medicine is greatly indebted ; and although we own few means of lessening absorption, we fortunately have many of increasing it. Mechanical friction is the most active and universal agent in stimulating the absorbents ; as the hand-rubbing of horses sufficiently proves. Pressure also increases their action ; thus we bandage the swollen legs ; we girth the bodies of our horses, to promote absorption of the interstitial fluid. Exercise, by swelling the muscles, produces pressure ; and thus exercise will remove swelled legs, and promote absorption generally. Blisters likewise exercise an influence over absorption. A still stronger stimulant is iodine ; which is especially useful in enlargement of the glands. Purgatives and diuretics, and whatever tends to lower the pulse, promotes internal absorption ; for, by offering an impediment to the circulation, removing the contents of the intestinal canal, and increasing the urinary secretion, an absence is caused in the materials for building up, which the absorbents endeavour to repair by removing other parts."

Diseases of the circulatory system have not met with the attention they deserve by writers on veterinary medicine. Until almost recently the text-books available to the student have been nearly silent regarding them, and while it has been admitted that such diseases are neither rare nor unimportant, we have been placed under great disadvantages in pronouncing correctly respecting them. The difficulties have been great, and the profound acquirements in the sciences of anatomy and animal physiology do not yet clear them away. Peculiarities of formation in the lower animals will for ever stand as an insuperable difficulty against prosecuting correctly, as in man, an investigation of heart diseases. In him the organ is exposed, and the practitioner has little difficulty in obtaining a fair idea of its condition under all circumstances ; but among the lower animals it is covered, first, by the lungs on each side, next, a mass of muscle as well as the ribs, and, lastly, the ponderous bones and muscles of the shoulder, and these militate exceedingly against the forming of such accurate conclusions as may be arrived at in man. Nevertheless, by means of careful observation and intimate acquaintance with the health, habits and conditions, of animals, aided by correct anatomical and physiological knowledge, there is now no longer the same mystery. The subject of heart diseases is being more widely understood, and their signs more perfectly interpreted ; and when we take into consideration the state of our knowledge in reference to some other affections—such as those of the liver, spleen, and pancreas, &c.—we may indeed feel confident that great has been the progress during the past quarter of a century.

Anæmic Palpitation.

We have already referred to certain abnormal heart sounds heard in the bloodless state, anæmia, at p. 65 : we have now

to notice it in connexion with the heart as due to other causes. Anæmia, as will already be understood, is not a disease of the heart, but may be confounded with such states as are decided heart disease. The cause of anæmia rests with the attenuated and watery condition of the blood, in which it readily admits of the production of sound, when different portions or columns are forcibly brought into contact within the bloodvessels by powerful muscular effort such as is common to the heart. A heavy or dense fluid like healthy blood is incapable of giving rise to such sounds, by reason of its consistence and property of being elastic. Loud and well-marked sound from concussion is, therefore, next to impossible ; but fluids of less density, as water or blood of similar density, do not possess the quality of being elastic, and thus by different currents meeting each other—particularly in channels like those of the heart and bloodvessels leading from it—at once give rise to the development of sounds characteristic of their unyielding nature. Such are louder than the sounds arising from heart disease, and moreover, are removable by a tonic plan of treatment, a generous diet, and proper exercise, although in some instances they return as depending on some remote incurable disease. In the course of the jugular vein a continuous kind of hum is heard—a result of anæmia—distinguished between the heart-beats, and as it were connecting the sound of one pulsation with the succeeding one. It is due to the state of the blood, which readily conveys the sounds arising from the union of many currents, their contact with the walls or valves of vessels, particularly at those parts also where the latter split, break up, or branch off, and the current is divided into many others.

The liability of animals to dyspeptic palpitation has not been generally recognised among the lower animals ; there is, however, little doubt that such does occur, but slightly,

and therefore attracts no observation. In other states, as in purpura and blood-poisoning generally, debility, &c., the blood acquires the suitable thin and watery condition, and while nervous derangement contributes to irregular action, the blood furnishes the quality necessary for the sounds. Anæmic palpitations are irregular and intermittent actions of the heart, accompanied with blood sounds of an unusual character, due to the condition of the blood and functional derangement of the heart.

Ruptures of the Heart, &c.

Occasionally we meet with instances of rupture of the heart and large vessels in the neighbourhood, due to very severe running or drawing of heavy loads over hilly roads, &c. ; and several instances are in our recollection which have occurred in horses when drawing manure over heavy ground to the fields, when the wheels become imbedded deeply ; also among horses used by builders when taking their immense and heavy loads of earth and bricks, &c., to and from the foundations, no suitable road being in existence, and when the utmost exertions have to be made.

The place of rupture is not always the same. Sometimes the union of the aorta with the left ventricle (Fig. 58, 1) is the seat ; at others, the right auricle, as it joins the ventricle (Fig. 9, p. 51). Such lesions are, fortunately, not frequent, and the fact points to a bountiful provision of Nature ; while the *modus operandi* of their occurrence are, to say the least, interesting in a physiological point of view, indicating on one hand what an amount of strain and even injury may be sustained by other structures, placing ruptures of the heart far behind among the isolated instances of extreme violent action ; and, on the other, showing that similar influences exerted upon the walls of the chest produce their effects, not

upon the structures first acted upon, but upon the heart. Professor Gamgee refers to an instance where a girl was

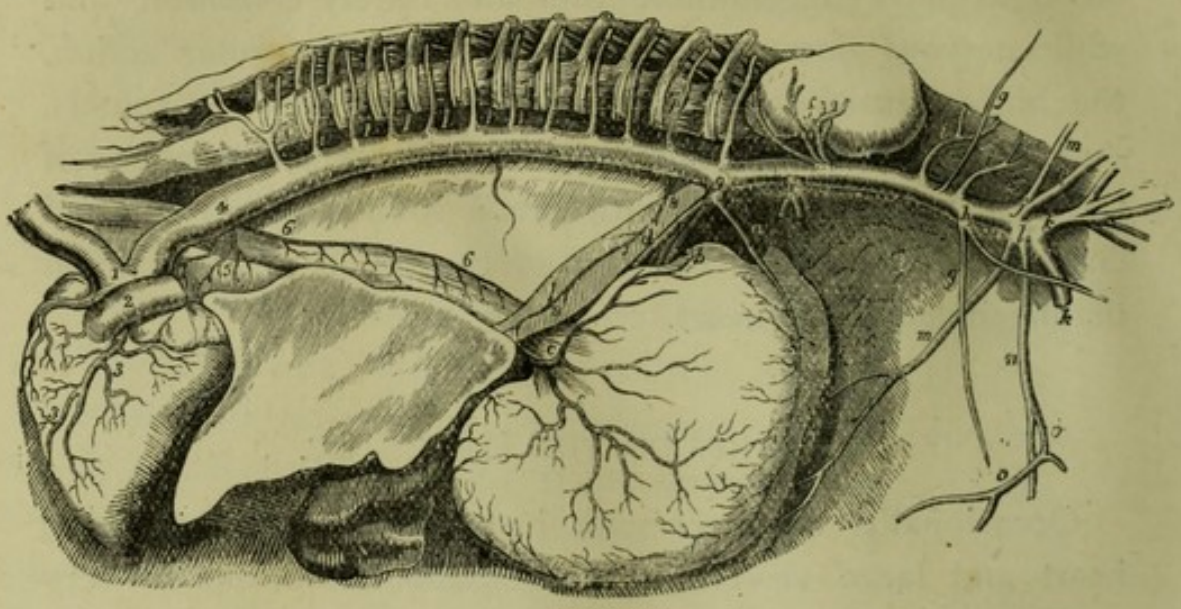


FIG. 58.—*The length of the Posterior Aorta exposed.*

1. The aorta.
2. The pulmonary artery.
3. The left coronary.
4. The posterior aorta.
5. The left bronchial.
6. The œsophageal.
7. The intercostals.
8. The left phrenic.
9. The cœliac.
a. The splenic.
b. The gastric.
c. Arteries derived from the gastric.
d. The hepatic.
e. The anterior mesenteric.
f. The renal.
g, g. The spermatics.
h. The posterior mesenteric.
i. The lumbar arteries.
j. The left external iliac.
k. The left internal iliac.
l. The right external iliac.
m. The circumflex artery of the ilium.
n. The profunda femoris.
o. The epigastric.

suddenly killed by being run over by a cart, the wheel passing over the chest, and, instead of the ribs being injured, "the heart was literally smashed."* This entirely coincides with what we have observed in horses which have been crushed between laden stone or coal waggons running on metals, and in ponies crushed between the coal tubs in coal mines. Sudden death arising from such injuries appears to arise from the momentary violent pressure placed on the pulmonary artery (Fig. 58, 2) obstructing the flow of blood, the heart at the same time acting with redoubled vigour

* Domesticated Animals in Health and Disease.

DESCRIPTION OF PLATE III.

"THE ABDOMEN, DEPRIVED OF THE INTESTINES.

"*A*, the posterior aorta, near its termination ; *B*, the posterior cava ; *C C*, the ureters ; *D D*, the kidneys ; *E*, the renal artery ; *F*, the renal vein ; *G*, the stomach ; *H*, the duodenum tied ; *I*, the splenic artery ; *J*, the liver ; *K*, the anterior mesenteric artery."


G
H

under the stimulus of shock, by which it is also reduced in tonicity or power, and rupture consequently takes place at the weakest point. Such cases are, of course, fatal, death ensuing at periods proportionate with the injury and escape of blood (Fig. 59). If the animal lives some little time after such an injury, the principal signs are a peculiarly haggard expression of the countenance, difficult breathing, pallor of mucous membranes, feeble and indistinct, or running-down pulse.



FIG. 59.—*The Countenance expressive of pain and serious internal states.*

CYANOSIS—BLUE DISEASE.

In consequence of the imperfect or non-closure at birth of the opening in the middle wall of the heart, known as the *foramen ovale*, the blood of each side mixes and circulates indiscriminately through the system. The heart, most persons know, is composed of four compartments—two upon each side communicating with each other, but those on different sides being entirely independent of lateral connexions. The cavities of one—the right side—are engaged in receiving and propelling venous blood, and the opposite are concerned in the distribution of arterial or purified blood. Previous to birth, the upper cavities or auricles communicate, in order to admit of a perfect flow of blood which is supplied direct from the mother, and needs no separation as in after life, when purification is performed within the system. When the opening alluded to is pervious after birth, it leads to peculiar results—anæmia, venous pulse, anæmic palpitations; the skin and mucous membranes assume a deep blue tinge, and the body becomes puny,

emaciated, and cold. Moderate exertion gives rise to extreme exhaustion, and the animal sinks and dies.

This state is mostly confined to very young animals which do not long survive their birth ; but it may happen that, the opening being small, the progress of the disease is delayed to the time of domestication, when the animal becomes sickly and an annoyance, and he is probably destroyed in consequence.

Carditis—Inflammation of the Heart.

It does not appear that this affection exists but as a complication with other diseases, as pericarditis, endocarditis, &c., and even under those circumstances the inflammatory action is never general, but confined to portions only of the substance : it is circumscribed. Fortunately, general or diffused inflammation of the heart does not exist, or fatal consequences would immediately arise from interference or arrest of function. Such partial states of disease occasion no special signs during life, and being the result of diseased states of contiguous structures, as will be expected, the outward and physical manifestations are those of the organs or tissues principally affected.

The heart is, however, liable to certain organic changes, which interfere with the well-being of animals, and are chiefly confined to enlargement of various kinds, with degeneration of structure.

The various alterations of size are known as *hypertrophy*, or enlargement ; and *atrophy*, or wasting.

I. Hypertrophy may occur in three ways :—

a. *Simple*, as when the muscular walls are enlarged or thickened, the cavities remaining the same.

b. *Eccentric*, in which enlargement of the walls is combined with an increase in the size of the cavities.

c. *Concentric*, or when the walls are enlarged, and the cavities diminished.

The causes exist in some obstruction to the circulation, such as long-standing disease in the lungs or large vessels, and are manifested during life by palpitation and blood sounds, with increased force of the pulsations. The treatment must be directed to the cause, strict attention being paid to the diet.

More common forms of organic change of heart structure are those known as *atrophy*, and *fatty degeneration*. Aged animals, fed and pampered, having much to eat and too little exercise—killed by kindness—are common subjects; and those which have previously suffered from purpura, scarlatina, pericarditis, azoturia, &c., also may become victims, as shown during life by a progressive debility of the general circulation, irregularity of the pulse, with diminished force of the beats, swelling of sheath, legs, &c., and want of power to perform the simplest acts of exertion. The appetite is capricious, and a peculiar expression of anxiety is seen in the face, increased blood sounds are heard, while the pulse even becomes more feeble and irregular. The *appearances after death* exhibit the structure of the heart throughout of a clay-yellow, or fawn colour, soft, and easily rubbed down, and in numerous parts the muscular fibre is totally replaced by fatty matter.

Treatment is of no avail in confirmed states.

Pericarditis.

Inflammation of the pericardium, or covering of the heart—the heart-bag—occurs in two forms; first, as a primary or idiopathic disease; and second, as a complication with rheumatism and enzoötic typhoid diseases. The causes of the first are cold, extreme alternations of temperature; indeed, such as are known to induce diseases of the respiratory organs generally.

Symptoms.—The usual signs of fever are present, usually ushered in by a violent shivering fit ; after which, the fever itself runs very high ; the respiration is quickened and laboured ; nostrils dilated ; a peculiar hardness and irritability characterises the pulsations, which are short or quick ; and the heart's action being extremely irregular, at one time feeble and fluttering, is succeeded by a period of violent bounding. Animal temperature is increased, and the nose, ears, and extremities are cold. Twitching, spasms, or cramps of the muscles over the neck, breast, and hind-quarters, legs, &c., take place, and these parts are sometimes violently affected. Friction sounds are heard, not unlike the action of a rasp, keeping time with the movements of the heart, gradually becoming obscure, and even absent, as the effusion of fluid increases within the sac. It is, however, replaced by another, which has been compared to a churning sound, due to the presence of fluid effusion and an exudation of lymph. The friction or rasping sound is merely hid

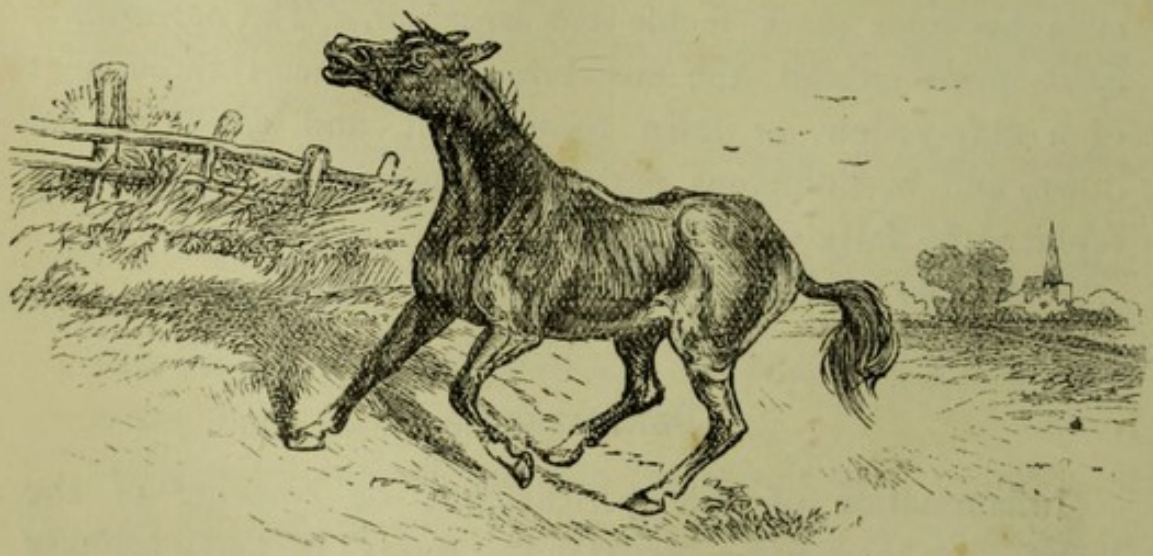


FIG. 60.—*The Fainting Fit.*

for a time, for as soon as the fluid is absorbed, and in proportion to the decrease, it reappears. Sometimes the inflammatory action extends to the endocardium (*see* Endo-

carditis), when the heart sounds are increased by a blowing or bellows sound. The breathing becomes difficult, and there is a tendency to faint (Fig. 60) when the head is elevated. The legs, breast, and abdomen are swollen from infiltration of fluid—dropsy. The pulse gradually becomes smaller and more feeble, besides being irregular and intermittent; and death takes place in three or four days from the commencement of the attack. Animals living beyond the sixth day usually recover.

Post-mortem Appearances.—The disease is seldom unattended with effusion within the chest, which escapes as soon as the walls are divided; and the quantity is very large when pleurisy has existed in conjunction. Independent of this affection, the heart-bag in pericarditis is full and distended, opaque and thickened, and, when cut open, a fluid more or less opaque flows out, and the lining membrane, as well as that covering the heart itself, is roughened, having an outer layer or exudation of a reddish-yellow colour, which unites the pericardium more or less to the heart. The substance of the heart beneath the membrane is rarely affected except in circumscribed portions, or a small abscess may exist towards the end of the case.

Treatment.—The first essential consists in allaying pain and irritability of the heart and its inflamed membrane. For this purpose opium is prescribed by some practitioners, in repeated doses. Under watchful care, we believe greatly in the efficacy of aconite in either of the subjoined combinations:—

RECIPE NO. 66.

Take of nitrate of potash	1 oz.
Tincture of aconite	10 or 15 drops.
Water	1 pint.

Mix, and dissolve; or the ingredients may be made up into a ball.

RECIPE NO. 67.

Take of solution of acetate of ammonia	3 or 4 oz.
Tincture of aconite	10 or 15 drops.
Water	12 fl. oz.

Mix.

After one of the above forms have been administered, proceed to make the animal comfortable by bandages and clothing ; allow plenty of fresh air and cold water, and leave him at rest for a time, taking occasional observations to learn the effects of the medicines before they are repeated. If the signs are not materially lessened at the end of four hours, give draught No. 67, taking care to reduce the aconite at least five drops, and at the end of eight hours it may be repeated ; and afterwards the aconite may be left out altogether.

Relieve constipation by moderate doses of aloes in solution, or oil, and fail not to use enemas conjointly. When the urgent signs are suppressed, give nitre and digitalis as prescribed in recipe No. 58, page 187 ; and if debility supervenes, let the draught No. 57, page 187, be given. Bleeding rarely does any good, and blisters we generally dispense with in the first stages, resorting to them, or stimulating embrocation, when the case shows signs of recovery, in order to promote a more speedy absorption of the effusion, with which tonics and diuretics are used internally, No. 30, page 113.

When rheumatic complications are present, colchicum will be of service, the general treatment being pursued as laid down for Rheumatism at page 68.

ENDOCARDITIS.

Inflammation of the lining membrane of the heart is not known as a primary or idiopathic affection. It arises as a

sequel to rheumatism, and is also complicated with pericarditis.

Symptoms.—Acute irritative fever, with the development of signs of interference with the heart's action, manifested by irregular contractions, combined with vigour and vibratory sensation. This insures an unequal beat or strength of the pulse; its regularity is degenerated into an intermittent form, in which three or four beats follow each other at variable intervals, and these are followed by a pause also of variable duration. It is therefore said to be irregular as to force and time, and intermittent as to the duration of time between the pulsations. One of the most distinguishable features of endocarditis, even apart from its association with rheumatism, is the peculiar smallness of the pulse as contrasted with pericarditis—an effect of the inability of the heart to contract upon a large quantity of blood. A peculiar sound is also heard during contraction, known as the *bruit de souffle*, or sound of bellows-blowing, occasioned by the action and passage of blood over the roughened and inflamed surfaces. Such states greatly interfere with the action of the auriculo-ventricular valves, by which the descent of blood from auricle to ventricle is obstructed. This form of impediment is perhaps more readily observed in connexion with the right side, inasmuch as the presence of the venous pulse is due to it, and conjointly the difficulty of breathing is increased. Spasm of the various muscles, as already described under pericarditis, is present, with greater tendency to fainting on elevation of the head, which must be borne in mind during the attempts to administer fluid medicines (Fig. 60). Endocarditis is probably the most fatal of all diseases of the heart, by reason of the various serious conditions with which it is often associated, such as blood diseases, tendency to fibrinous depositions which adhere to the valves and cause death by impeding the circulation, or, carried by

the blood in small particles, they plug the vessels in various parts of the body, and, destroying nutrition, produce paralysis (*see* Embolism), softening, abscess, and sudden death, or by a slow process of blood poisoning which ensues on subsequent degradation.

Post-mortem Appearances.—Considerable thickening of the lining membrane has taken place, and its surface and that of the valves is freely covered with fibrinous exudation, not unlike warts or excrescences of variable dimensions. Sometimes an abscess is found in the substance of the heart, and by ulceration an opening is made between the cavities. The valves also are liable to perforation from similar action.

Treatment.—This is essentially the same as prescribed for pericarditis, with, however, one or two exceptions. The use of aconite may not be dispensed with, but it must be attended with extreme caution, and in small and repeated doses, say five drops, in combination with the nitrate of potash. The heart is in such a condition, as well as the circulation generally, which favours the formation of fibrinous deposit, and the more we promote debility or feebleness of circulation the greater the tendency becomes for such untoward states. We have used the following ball with benefit :—

RECIPE NO. 68.

Take of carbonate of ammonia	1 or 2 drs.
Iodide of potassium	2 drs.
Tincture of aconite	3 to 5 drops.
Common mass	Sufficient.

Mix, and give one every four or six hours until a visible effect has been produced on the action of the heart and circulation.

Avoid bleeding and blisters as agencies of undoubted deadly tendencies in this disease. The results of endocarditis, as already alluded to, are ultimate disease of the valves of the heart, which have, more or less, the effect of

inducing other diseases, as pulmonary apoplexy, &c., embolism, and ultimately sudden death.

Diseases of the Valves.

From the great tendency to the formation of lymph masses within the heart in endocarditis, great obstructions arise and interfere with the heart's action. The valves are frequently the seat. Morbid growths take place, and prevent the close approximation during contractions of the organ. By shrinking of these morbid growths the valves are drawn out of shape, and cannot properly defend the opening against the pressure of blood. Ulceration leads to perforation, and thus a constant communication is established between auricle and ventricle; and besides these, there are large deposits which ultimately become permanent tumours within the ventricles. The result in each case is that the valves do not effectually guard the opening, and blood returns in part from the ventricle to the auricle, and gives rise to the venous pulse in the jugular vein; the animal suffers from vertigo or megrims, with swelling of the legs, belly, and sheath, together with certain sounds of the heart, which can only be detected by the acute ear of an experienced veterinarian. Such cases are chronic in nature, and animals suffering therefrom are not expected to recover; they are only suitable for light and slow work, and sooner or later are liable to frequent attacks of difficult breathing, and eventually sudden death.

Embolism.

The result of fibrinous formations within the heart is not confined to the attachment of morbid growths to the walls or valves: certain portions or flakes of lymph obtain free egress with the stream of blood, and find their way to the pulmonary artery, where, setting up an obstruction, lead to

congestion of the lungs; besides this, other arteries are liable to be plugged, as the iliacs *d* and *i*, and the femoral *h* (Fig. 61, &c.), giving rise to paralysis of one or both limbs,

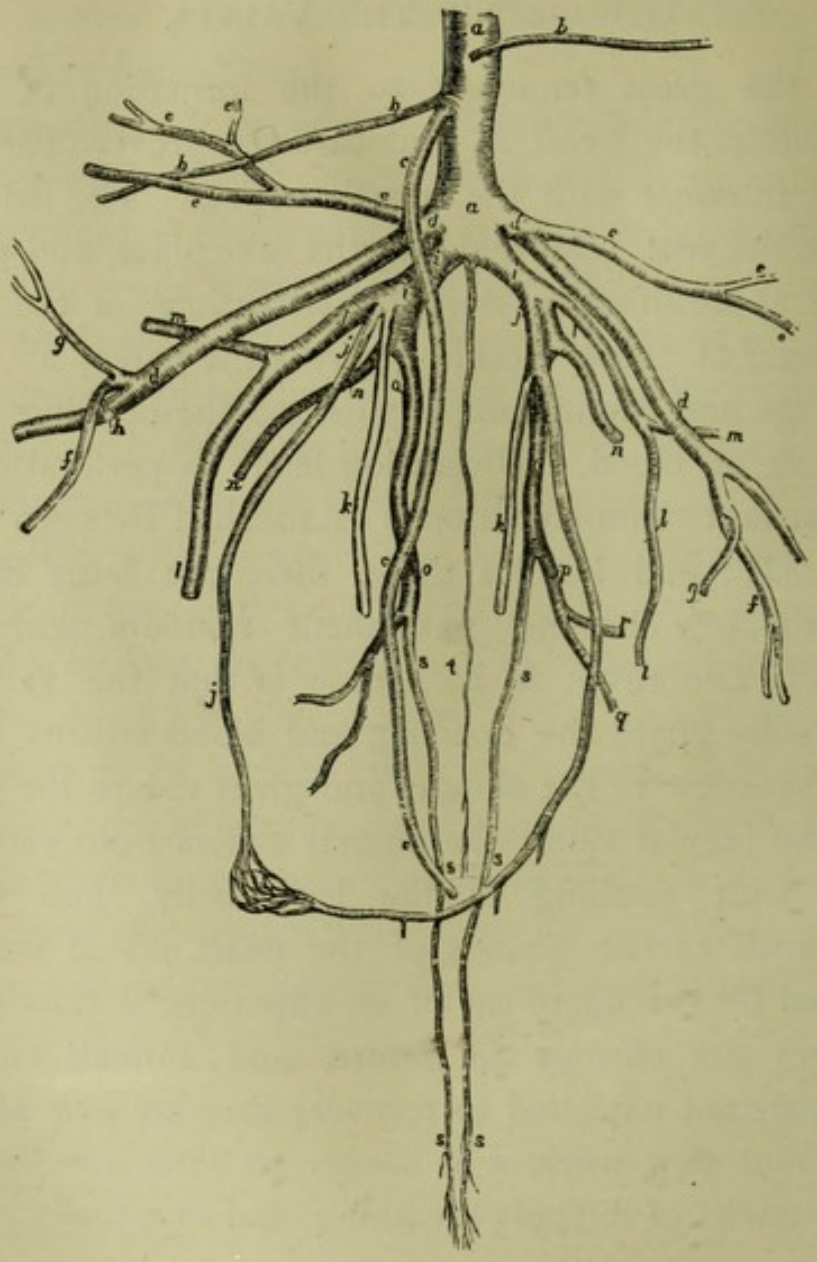


FIG. 61.—*The Termination of the Aorta in the two Iliacs, with the numerous branches that spring from those vessels within the trunk.*

a. The abdominal aorta.
b. The spermatics.
c. The posterior mesenteric.
d. The external iliac.
e. The circumflex of the ilium.
f. The profunda femoris.
g. The epigastric.
h. The femoral.
i. The internal iliac.
j. The arteries of the bulb.
k. The remains of the fœtal umbilical arteries.
l. The obturator.
m. The arteria innominata.
n. The gluteal.
o. The lateral sacral.
p. The peroneal.
q. A branch to the back of the thigh.
r. A gluteal branch.
s. Continuation of the lateral sacral.
t. The middle sacral.

with paleness, and wasting of the muscles after a time. In recent cases a false kind of movement is established, which



FIG. 62.—*The Outside of the Hind Leg.*

a. Gluteal branches.
b. The arteria innominata.
c. The anterior tibial.
d. The metacarpal.

may be mistaken for fracture of the hip bones, rupture of ligament, &c. Professor Gamgee records a case in which it may be concluded the cause existed in the absorption of pus from the abscess of strangles. In order to arrive at a correct conclusion of the case, the previous history of the animal and his ailments must be known.

Symptoms.—Plugging of an artery gives rise to special indications in the part to which the blood is carried by virtue

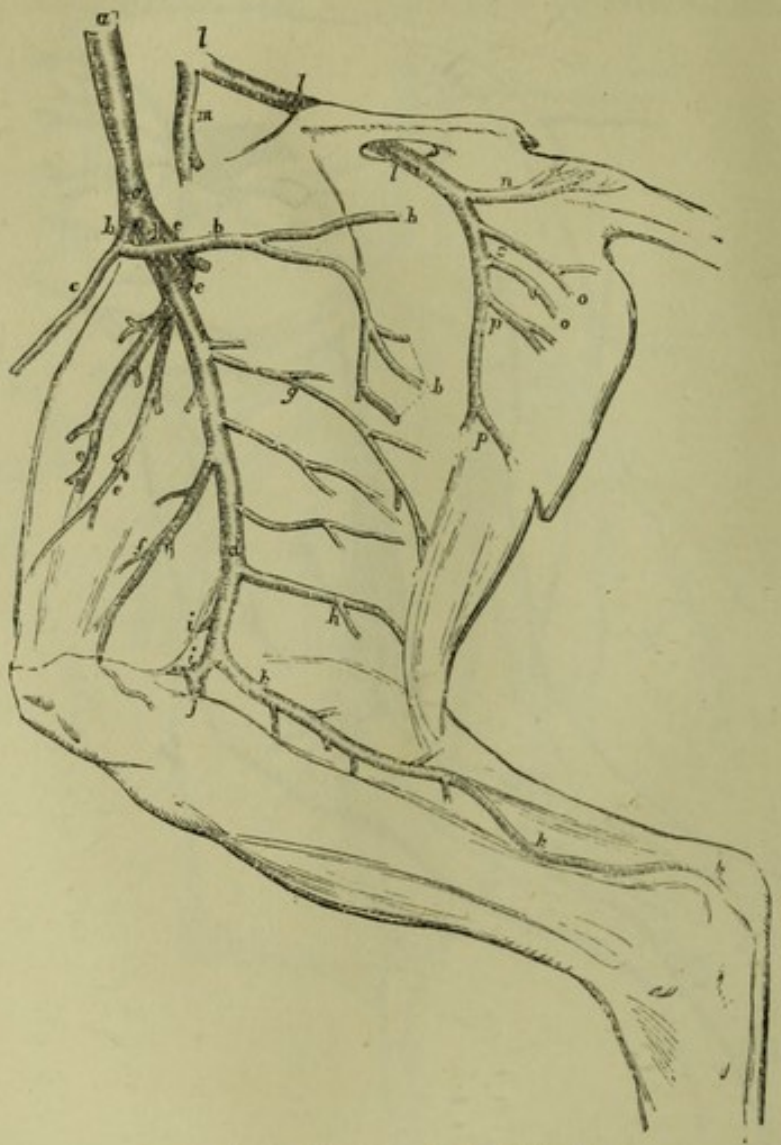


FIG. 63.—*Inside of the Hind Leg.*

a. The external iliac.
b. The profunda femoris.
c. The epigastric.
d. The femoral.
e. The inguinal.
f. Large branch to the stifle.
g. Branch to the triceps abductor femoris.
h. Branch to the posterior border of the gastrocnemius.
i. Popliteal branches.
j. Anterior tibial.
k. Posterior tibial.
l. The obturator.
m. The arteria innominata.
n. The pubic.
o. The ischiatic.
p. The internal pudic.

of the loss of nutrition which ensues; these are, coldness of the whole locality or limb beyond the point of obstruction, weakness of the muscles, which, as movement is persisted in, becomes more decided, and eventually degenerates into absolute inability to raise or carry the limb, while wasting of

the muscles goes on somewhat rapidly. When the artery is examined, *per rectum*, as in case of the iliacs (Fig. 61), the absence of pulsation is diagnostic of the disease. If the animal is kept at rest, the smaller branches of arterial twigs are able to maintain almost a sufficient supply of blood ; but when both arteries are plugged, or when exercise is persisted in, the signs of paralysis of a part or whole of the hind-quarters becomes evident. The large supply of blood sent to the hind extremities may be estimated, first by the abdominal vessels shown in Fig. 61, and further understood by a reference to Fig. 62, which shows those on the outside of the limb ; and by Fig, 63, showing the course of the arteries along the inner aspect.

Aneurism.

Enlargement of an artery at one particular point, either by means of general dilatation of the whole of the coats or by rupture of one which leads to a bladder-like swelling, is not an uncommon occurrence in the horse. In some instances the disease may be seen in a superficial vessel, when it will be detected by the pulsation within, corresponding to the contractions of the heart ; but in most instances one or other of the deep-seated arteries, as the aorta (Plate III., Figs. 58 and 61), the mesenteric arteries (Figs. 58 and 61), or the iliacs, (Fig. 61), &c., are affected when the disease is not made out so early ; and even if it be suspected, the locality may be too far away to be felt when the hand is passed up the rectum. Other signs are usually obscure, and consist chiefly of loss of flesh and spirits ; weakness and dulness at work, dragging of the hind limbs probably ; cramps ; paralysis of a temporary character ; complications with other diseases, &c. In several cases we have found parasites—worms of the kind known as the

Strongylus — with aneurismal tumour of the mesenteric artery, after death ; no evidence particularly pointing to such a condition being positive during life.

Phlebitis.

By this term is understood inflammation of a vein or veins. The most common form is that witnessed after bleeding at the jugular, when the operation has been performed in a clumsy manner, such as repeated puncture, the use of a blunt or rusty instrument, or one not properly cleaned after previous use. It may arise even after the most careful treatment, when the cause is not sufficiently apparent—probably some predisposition to inflammation—or by the animal being able to rub the neck, and also when a thrombus has formed.

Symptoms.—Considerable local tumefaction takes place, accompanied with great heat, pain, and tenderness ; sometimes the neck also swells, and the head may be involved. Severe constitutional irritation succeeds, and a discharge issues from the original wound beneath the pin and suture ; if we remove the pin a quantity of pus is found, after the discharge of which an angry, red-looking wound is formed. In some instances a flow of blood—hæmorrhage—takes place, but generally the circulation within the vessel has been stopped by a coagulum, which eventually causes the vein from the point of injury upwards to the angle of the jaw to assume the form of a cord, the clot becoming organised, and for ever afterwards rendering the vein useless.

Treatment.—In the first instance, or during the early stages, the pin need not be removed, but a strong dose of sedative medicine should be given at once, such as recommended in No 33, page 120. Some practitioners give a dose

of aloes. Hot fomentations are extremely useful, providing they are carried on incessantly and the parts are carefully protected afterwards. A smart blister is preferable, when placed over the course of the vein, and is available whether the disease is in the first or second stages, the head being tied up to prevent the animal rubbing the parts. When abscesses form they should be opened as soon as possible, as absorption of pus may take place, or, what is more likely, it may find its way direct into the circulation, and cause death. If the above line of treatment is energetically carried out during the first stages the circulation may be restored, and no evil consequences arise; but when treatment is delayed, the vein is said to be "lost," and animals having suffered to this extent from phlebitis should not be turned out to grass, as the remaining vein of the opposite side is not able to return the whole of the blood from the head when held to the ground, and thereby much swelling of the face, lips, cheeks, nostrils, &c., arises, which in some cases interferes with mastication, and even breathing. From similar causes, and when the veins of both sides have been operated upon, phlebitis takes place, which terminates in their obliteration, when the animal becomes worthless. A diffuse or general form of phlebitis arises in some animals from a peculiar constitutional tendency to inflammation and suppuration, as already referred to, when wounds have been inflicted upon or near one or more vessels at the same time. When horses are injured by coal waggons, or by running away, blows, punctures, lacerations, &c., an abscess often speedily follows, and by the process of invasion, or ulceration, the veins are opened, and the contents of such abscesses pass into the circulation. Previous to this, the injured vessels become inflamed along their lining membranes, which results in fibrinous clots being formed, the heart and many vessels becoming involved; while the lungs, liver, and even

the joints partake of the disorder, and exhibit the formation of abscesses. The treatment is essentially the same as in the traumatic or circumscribed form of phlebitis, while prevention is to be mainly secured by ample and efficient treatment of wounds, and injuries of every kind, in their early states.

Thrombus.

When sufficient care is not observed in the manner of closing the wound after bleeding, a condition known as thrombus is not an uncommon result. A swelling arises over the seat of puncture, which is due to the infiltration of blood within the cellular tissue, and originating when the orifice has been too small, by drawing the skin too far away while the pin is being inserted; or, if the vessel rolls during puncture, and other tissues are divided instead of the walls of the vein. Thrombus is not a serious matter, if attended to at once. The head must be elevated by tying to the rack all food withheld, and cold-water effusions applied at short intervals. Usually this is all that is required, but when the causes have been aggravated, the result is phlebitis. Fortunately, in the present time, thrombus and traumatic phlebitis are rare occurrences, owing to the disuse of phlebotomy in the cure of diseases among the lower animals.

Admission of Air into the Veins.

The consequences of the entrance of atmospheric air into the veins are more or less serious, in proportion to the amount. Small quantities taken in slowly causes very distressing symptoms, and if large, and injected with rapidity, sudden death results. Usually the admission of air is accidental, as in bleeding from the jugular, particularly when a large opening has been made low down in the neck, or within the space through which the suction or aspiratory

force is acting. As soon as the pressure is removed from below the bleeding orifice, a gurgling sound is heard, and, as already stated, proportionate with the amount of air taken in, the animal exhibits signs of syncope or fainting ; he falls, and endures difficulty of breathing, while loud sounds are emitted in the heart's action, which is nevertheless very feeble, and the animal either becomes unconscious and dies, or his end is preceded by severe convulsions.

When but a small amount of air has passed down the animal may recover, particularly if an arrest to further admission be made by pressing the finger on the course of the vein, as when blood is being drawn, and closing the orifice immediately. Stimulants also should be given at once when signs of fainting come on, and if the animal is down, the head should be placed a little lower than the body ; friction applied to the legs and body, and depletive medicines given if signs of inflammation of the lungs subsequently arise.

In consequence of the known results of the passage of air into the veins, it has been the practice of veterinarians for a long period to introduce it purposely, when old and worn-out horses are to be put to death without suffering much agony. The mode in which death ensues is somewhat as follows :—An admixture of blood and air assumes a frothy state, and in this form is incapable of free circulation. The action of the heart insures this. Passing from the right side of the heart, it next traverses the pulmonary artery to the lungs, and is distributed through the capillaries there, where a stoppage ensues, and by which the vessels leading from the heart become filled. These conditions are progressive, and being carried on for some time result in gradually diminishing the flow of blood through the lungs ; from this no purification takes place, the brain lacks nourishment and stimulus, and ceases to regulate the supply of nervous force, causing syncope, unconsciousness, and death, the heart at

last receiving no blood. In order to avoid these results, when abstracting blood from the jugular vein, the necessary pressure for insuring the flow should be removed slowly and carefully, and the orifice closed as soon as possible by the twisted suture (Fig. 14, p. 55), as directed. Attention must likewise be given to the choice of place for puncture, in order to avoid the locality through which the aspiratory force is capable of acting, particulars of which have already been given at p. 52.

Varicose Veins.

When veins exhibit tumour-like enlargements along their course, or at one spot only, they are said to be varicose. Such knotty protuberances sometimes assume large dimensions in the jugular, or vena saphena of the hind-leg, the enlargement or dilatation being due to rupture or attenuation of the walls of the vessel, probably also the formation of a clot or coagula from inflammation, and complete arrest of the flow. Varix, as applied to a vein, is a similar condition to aneurism, as referring to an artery. The causes are sometimes due to bleeding oft repeated, by which the jugular vein is weakened and attenuated, and in the vena saphena, as well as other superficial vessels, the same results may be brought about by pressure, direct injury, or, conjointly with these, internal pressure from the column of blood. In certain instances, the sac can be emptied by pressure directed in the course of the current, by which no doubt will be entertained of its nature, a sure test of distinction from bog spasm, when varix occurs upon the hock-joint. When the current has been arrested by internal coagula the test cannot be applied with such certainty, but, as sometimes happens, though rarely, suppuration is established, and discloses the disease of the vessel.

The usual *treatment* consists of passing a needle or liga-

ture beneath the vessel above and below the dilatation, and thus effectually consolidate that part which is diseased; but when abscess has formed, the sac must be first opened, and a blister applied to the surface of the skin. In minor conditions of unimportant vessels, simple pressure by bandages, good food, and internal tonic treatment are necessary.

Vein Stones—Phlebolites.

In addition to the various conditions which have been already described as affecting the veins, there are occasional instances in which enlargement and obstruction arises from the presence of hardened concretions, to which the above-named terms have been given. The first notice of these in England was given to the profession by Professor Morton, in 1844, in his valuable essay on "Calculous Concretions," but practitioners of human medicine here, and veterinarians abroad, have given great attention to the subject, by reason of more frequent opportunities coming before them. The jugular vein is an occasional *locale* of phlebolites, but when seen in a superficial vessel, the inference is that others are present in other veins, and sooner or later obstructions arise which prove fatal. The suggestions as to their origin and formation are various, and even speculative, and we need not go into them here. Their composition, as stated by Mr. Morton, is as follows:—

"Animal matter	27·5
Phosphate of lime	53·5
Carbonate of lime	15·5
Magnesia and loss	3·5
	100·0"

Their presence is undoubtedly due to some peculiar disposition on the part of the system, in which numerous par-

ticles are formed within the circulation, capable of passing from a fibrinous to a calcareous stage, and, by gradual increase of size, are arrested at various parts of the circulation, most likely in some of the most important organs, where they set up irritation and obstruction. The rarity of these occurrences have not enabled us to record any reliable or constant signs. Lameness has been known to arise in one leg, due to the implication of the nutrient vessels and synovial cavities, and derangement of some internal organ is evident by negative signs. After death, venous obstructions are found, together with abscess of organs, softening, and hæmorrhage.

Megrims—Vertigo—Venous Obstruction.

As a result of pressure upon the jugular veins induced by badly-fitting collars, especially when any peculiar conformation exists, horses are subject to a disorder to which the terms megrims and vertigo have been given. The case assumes greater intensity when both jugulars are pressed upon, if the day is hot and the road hilly, the effects being an obstruction to the return of blood from the head.

Symptoms.—There are indications of uneasiness, as shown by twitching of the ears and shaking of the head; the eyes are staring and bloodshot, and shortly the animal assumes a wild kind of frenzy in darting forward in a blind condition, and either throwing himself forwards, falling over something, or dropping head foremost, and lying in violent convulsions for some time. In such a state, the horse cannot be held by human strength, and when the fit comes on during a drive there is scarcely any warning before the occupants of the vehicle are prostrate in all directions, and probably injured seriously. Besides pressure from the collar, the heat of the sun has, doubtless, a part in the production of megrims, so far as it has a tendency to promote congestion of the brain;

and the certainty of the disease is greater when one or both jugulars are obstructed as a result of previous phlebitis. Owing to the few instances now in which horses are bled, phlebitis is a rare disease, and thereby the tendency to megrims is likewise materially lessened.

Treatment.—Immediately on witnessing the first signs of uneasiness, especially if the animal stops suddenly, the driver should quickly dismount, and *push forward the collar*, sufficient time being allowed before the journey is resumed. The bearing and pressure of the collar may be easily altered, so as to prevent a recurrence of the attack, by securing a roll formed by a towel, &c., beneath the front of the collar on the breast, and afterwards seeing to the permanent improvement of the seat. Cold water may be dashed over the head at the moment, and a wet rag or sponge, covered by oiled silk, &c., has been found useful.

Such horses are not really safe for driving, as in hot weather they are liable to lose condition, and a well-fitting collar ceases to be such when the objectionable disease is produced. Under the saddle they lose none of their usefulness, or when drawing with a breast collar.

DISEASES OF THE ABSORBENTS.

Lymphangitis, or Lymphangeitis.

This affection, arranged as to cause, might more properly come under the head of "diseases due to errors of diet;" but for reasons already explained we place it in connexion with the maladies of the circulatory organs.

Lymphangitis, or inflammation of the lymphatics, is known by various synonyms in different parts of the country: thus, in Scotland it is termed "Weed;" in England we term it "Thick-leg," "Shot or Shewt of Grease," the "Shake," "Water-farcy," "Dropsy," and, emphatically, the "Monday-

morning, or Holiday Disease." The last, although probably the least scientific, certainly hints very pointedly towards the generally accepted cause.

Nature.—Lymphangitis consists of inflammation of the lymphatics, or absorbents of one hind-leg, attended with a great amount of tumefaction and lameness. Occasionally both hind-legs are involved, and still more rarely one of the fore-limbs. As a rule, the off hind-limb is the one affected, and after the animal has once been attacked, subsequent seizures, with increasing permanent enlargement and corresponding stiffness, must be looked for.

Symptoms.—The animal, left perfectly well and hearty on the previous evening—which almost invariably happens to be that of Sunday or other rest day—is discovered on the following morning (Fig. 64) either suffering from extreme

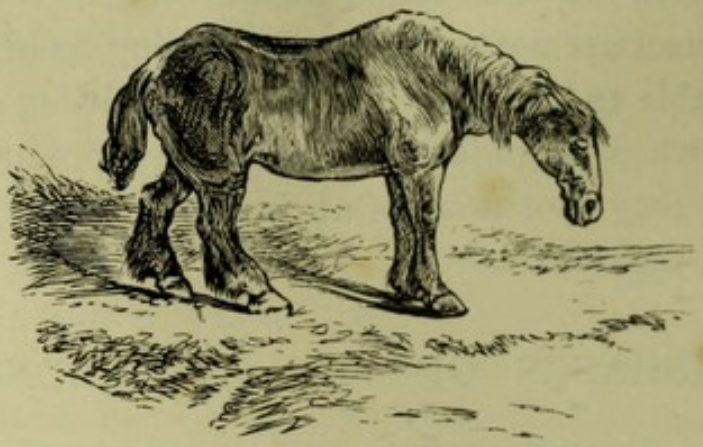


FIG. 64.—*Lymphangitis.*

irritative fever and restlessness, to which rapidly succeeds the immense swelling of the limb, or, the febrile stage having more or less subsided, he is immovable from the latter cause. The commencement of the malady is betokened by a severe fit of shivers or rigors, which may extend over several hours, the intensity of the fit characterising accurately the severity of the attack. The shivering gives way to reaction, when the animal blows heavily, the skin becomes hot, and he at length sweats profusely. The pulse is hard, full, frequent,

and strong: visible mucous membranes reddened; urine high-coloured, scanty, and containing large quantities of urea and hippurates, the proceeds of the destruction of nitrogenous compounds derived from the food and system; the bowels are constipated; the leg is immensely swollen, and if the hand is passed, even with only moderate pressure over the course of the enlarged absorbents, or the superfices of the inner side of the thigh, the animal experiences much pain; the neighbouring glands are also tumefied and painful. The swelling commences above and extends downwards, giving the leg a distended and almost cylindrical appearance, forming at the heels a number of rolls and creases, with redness of the skin where the hair is thin and light. Lameness is intense, and the leg is held up from pain, while the animal frequently looks round with an expression of anxiety depicted on his countenance. With the increase of swelling the pain and lameness usually subside. The disease does not, as a rule, run on to suppuration; protracted cases, in which the glands of the groin, &c., are involved in chronic inflammation, may do so, when the swelling extends along the abdomen, &c., and constitutes a state of infiltration, abscess being the exception.

Causes.—Excess of nitrogenous or fibrinous material in the blood, in almost every case due to over-feeding at a time when the animal is set aside for rest, particularly when the duties are unusually heavy. Draught-horses, and others of large visceral capacity, are the common subjects of the disease. Under these circumstances, there is a large manufacturing power, ample material of the richest quality, and no demand for it; hence the absorbents, whose office is to carry it forward, are irritated and inflamed by the excess and over-stimulation. Sometimes the disease follows an attack of indigestion, colic, or diarrhœa, consequent upon a full allowance of green food.

Lymphangitis is also seen in certain debilitating affections, as influenza, &c., when, by reason of the rapid destruction or change of tissue, the system is surcharged with the proceeds, and irritation of the absorbent system follows, as described; excepting, however, that the disease assumes probably a less violent form, and the fore-leg is often the sea'.



FIG. 65.
Elephantiasis.

Lymphangitis is liable to terminate in permanent thickening of the leg, due to successive attacks, and hypertrophy of the areolar or subcutaneous tissue; and the condition termed Elephantiasis has been given to it (Fig. 65).

Treatment.—During the attack of rigors, nothing answers so well as persistent fomentations regulated as directed under that head (*see* Dispensatory—Fomentations), the leg being enveloped in several thicknesses of woollen material. The body should be clothed or "strapped" to produce warmth, and if the coldness be great, notwithstanding these measures, a dose of nitric ether may be given, or the following:—

RECIPE No. 69.

Take of solution of aloes	8 or 10 fl. oz.
Nitric ether	2 fl. oz.
Tincture of aconite	10 drops.

Mix, and give from the bottle.

Throw up enemas of tepid water, and allow plenty of the cold fluid for drinking.

Some practitioners bleed; but after some considerable thought on the propriety of the proceeding, we abandoned it in favour of the treatment just described, depending upon the action of a purgative, administered as soon as possible, in combination with aconite to prevent severe reaction; and in the second stages, after the purgative has been given, to follow with repeated doses of the neutral salts in combination

with aconite, as required. At first, the diet must be cooling and laxative, and when the pain and swelling are reduced the animal may be sent to gentle work and exercise, the attention of those in charge being directed to the observance of care in feeding, especially on rest days. The prevention of the disease may be secured by substituting bran mashes for the Saturday evening meal, walking the animal out a mile or two on the following morning, and giving a dose of neutral salt in the food at this time.

In the debilitating form, the treatment will be regulated according to the original complaint which produced lymphangitis. For the dissipation of the swelling we have found an infusion of digitalis, rendered alkaline by carbonate of potash or soda, a valuable remedy, when poured on warm, the leg being covered by woollen bandages, &c.

SECTION V.

DISEASES OF THE ORGANS OF DIGESTION.

DISEASES OF THE ORGANS OF DIGESTION.

IT is a fact worthy of particular note, that diseases of the digestive organs in the horse are of rare occurrence under circumstances which secure good management, and it is equally important to bear in mind that the great majority of diseases, not only of the digestive organs, but those incidental to the urinary system, are the outcome of errors in diet. Indeed, to a larger extent than is usually conceded, we may also trace to the same causes everything needful for the production of maladies in connexion with the circulatory, respiratory, and even nervous systems.

It is not our intention to enter into a lengthened and elaborate detail, and array of conclusions, in reference to the physiology of digestion; indeed, in a work like the present, essentially treating of the diseases incidental to the horse, we should be trespassing on the time and patience of the reader. The subject has been fully treated in a separate work, to which reference may be profitably made with the view of prevention.*

Keeping before us the lengthened catalogue of what may be correctly termed dietetic diseases and disorders—in other words, diseases fairly ascribed to errors of diet, and primary disorders and diseases of the digestive organs—it becomes a

* "How to Feed the Horse." London and New York: Frederick Warne & Co.

matter of no small difficulty in giving each malady its proper place and classification ; we shall find, for instance, that certain diseases arising from disorder of the alimentary canal are known by their effects on the kidneys or urinary organs generally, and therefore have been usually described as diseases of those structures. We have to admit such a course is not warranted by a close observance of causes, but in a work like the present, believe it to be the most simple, and of easy reference to the non-professional reader. We shall therefore pursue the plan as originally adopted in "The Cattle Doctor,"* grouping the diseases according to the organs affected, endeavouring faithfully to furnish all information as to known causes ; and we believe that course will demonstrate more perfectly than words how complex the classification might become, while some must be dealt with in a miscellaneous way in order to give them a place under any circumstances. With the professional reader the question assumes altogether a different aspect.

INJURIES AND DISEASES OF THE MOUTH, &c.

Wounds of the Lips and Cheeks.

The lips and cheeks are occasionally wounded by sharp instruments, or bruised by bits, &c., and considerable inconvenience in mastication is the result. The wounds are of several kinds : incised, lacerated, or contused. They are treated on the general principles laid down for wounds in succeeding pages, with such exceptions or additions as nature of the part calls for. One thing is to be particularly observed—viz., that the animal cannot lose any part of the lips, cheeks, or tongue, without becoming more or less worthless, and therefore we must not resort to the use of the

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* Armatage's Cattle Doctor. London : F. Warne & Co.

knife for removing portions until we are assured that the hope of reunion is lost, or that gangrene is present. When the lips, cheeks, &c., are divided by a sharp instrument, the parts are to be brought together by sutures, and our endeavours should be directed towards securing perfect rest, or such absence of motion as will conduce towards reunion, thus avoiding loss or tearing out of the pins. This may be accomplished in most instances by putting on a head gear such as is shown in the annexed figure (Fig. 66). If it is desirable to keep the jaws effectually closed, the broad strap should be employed ; and when the lips are required to be quiescent, and, in addition, dressings applied, the lower part or muzzle may be attached—*see* cut.

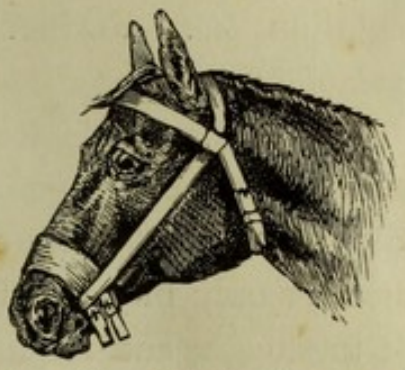


FIG. 66.—*The jaws secured against movement.*

Of the various preparations for promoting the healing process, one or other of the following may be selected :—

RECIPE NO. 70.

Take of solution of chloralum	2 fl. drs.
Tincture of myrrh	2 fl. oz.
Water	1 pint

Mix, and apply several times daily.

RECIPE NO. 71.

Take of sulphate of zinc	1 oz.
Tincture of myrrh and aloes	4 fl. oz.
Water	1 quart.

Mix.

A very efficacious remedy recommended by the late Professor Dick, consisted of preparations of lead and zinc as follows :—

RECIPE NO. 72.

Take of acetate of lead	1 oz.
Sulphate of zinc	1 „
Water	1 quart.

This was the famed "white lotion." It is kept for use in a small long-necked bottle, such as contains anchovy or Worcester sauce, and when it is to be applied, the fore-finger, being held over the orifice, is momentarily raised as the vessel is quickly dashed towards the wound, when sufficient is thrown without waste or disturbing the sutures, coagulum, &c. Further instructions will be found under the head of Wounds.

Lacerated wounds are occasionally inflicted by means of nails, hooks, &c., against which the parts have gone in violent contact. Sutures cannot always be used here, and union is only imperfectly accomplished. Such wounds are apt to slough, and require dressings as tincture of arnica, or tincture of aloes and myrrh.

Occasionally a large tumour is seen on the lip, or side of the face a little behind the angle of the mouth, and it is hot, tender, and enlarging. The one on the lip probably bursts inwardly, and thus disappears without any treatment; the other does not generally prove so simple in its termination. The causes are—entrance of foreign bodies which have been mixed with the food, and these are liberated if the abscess is opened artificially; sometimes they have been discovered in the manger after the tumour has naturally discharged the contents. We have found thorns, sharp pieces of iron and steel—as nails, points of penknife blades, and file tangs, &c.—firmly imbedded in the substance of the lips and cheeks; and when the latter has been wounded, a large opening may be eventually established by abscess, from the outside to the interior of the mouth, allowing the food to pass out during mastication, the tumour previously greatly interfering with the process (Fig. 67). Abscess in the cheek also occurs in consequence of ill-usage in breaking. We remember a colt-breaker whose treatment of the animals placed under his care gave rise to a number of such cases,

large and heavy bits being used, and, we believe, associated with much brutality. Injuries to the lips and cheeks also arise from some sharp substance becoming wedged between the teeth, causing great pain, insalivation, and loss of appetite.



FIG. 67. — *Wound in the Cheek, the result of Abscess, communicating with the interior of the mouth.*

The *treatment* of these cases is usually of a simple character. Swellings of the parts should be examined for foreign objects, which are to be extracted. Abscesses already pointing must be opened with the lancet, and afterwards kept clean. When openings have been made through the cheek, the animal should be fed on sloppy food for a time, and dressings applied to hasten the closure of the orifice. In several cases which have come beneath our notice, the edges of the wound have been healed and hardened, and a permanent orifice has been left, through which the animal lost much of the food supplied. Union in each instance was successfully attained by the use of the actual cautery (Fig. 29) to the cicatrised borders of the wound, and a small blister on the outside, the first having the effect of producing granulating raw surfaces, while the resulting swelling maintained by the blister brought the edges together, and finally healed them in four or five days.

A great amount of harm ensues from the use of improper bits, especially in colts, a general impression being abroad that a good mouth can be produced only in proportion to the amount of laceration it has undergone. When prudence and discretion guide the breaker, animals generally go well in common snaffle bits, and we have known careful men who could ride their broken colts by means of a packthread ; but we fear the competition of the present day rather militates against the expenditure of so much time as is needed for that state of perfection, while the love of intoxicating drink

annihilates both patience and gentleness, and the resulting want of money hastens the return of the animal, probably but imperfectly handled.

The lining or buccal membrane of the mouth greatly sympathises in the general disorder of the system, and swelling is observed, as well as an increased colour or redness. Besides this, the bars or rugose folds of the palate and the papillæ of the various glands are enlarged and red, and the animal is probably "a little off his feed," and feverish. Stupid persons then fly off to the veterinary surgeon, who is desired to cut or burn out the "lampas," "barbs," or "paps;" and if the practitioner refuses, all he may say on the score of humanity will have no avail, for in all probability some blacksmith, farmer, or cow-leech will be found who will assume the responsibility of "curing" the animal, or the groom will do it himself. We have seen an animal nearly bled to death by incisions carelessly made in the palate by ignorant people, and disease of the jaws from frequent burning and pricking the parts. When horses take a simple cold, or the stomach and bowels are disordered, or the process of dentition is going on, such states as we have described are not uncommon, and are really of such little consequence that they need not occasion any alarm, unless the loss of appetite accompanies the state, when a simple dose of mild cathartic medicines, salines, &c., will effectually remove the whole, more especially when assisted by a simple mouth wash, as given in No. 23, p. 92.

Paralysis of the Lips.

This is a common affection among the heavier breeds of horses, to which it is not entirely confined, as others occasionally suffer. It is indicated by a hanging and flabby state of the lower lip principally, which swings with the motions of the

head, and exposes the lining membrane. The animal has no power to raise it to the proper position, and hence a continual flow of saliva is present (Fig. 68); neither can he employ the lips in eating or drinking, for in gathering food the teeth only are used, and in drinking he plunges his head nearly to the eyes. Such a horse feeds badly at grass, and under all circumstances a continual waste of food is going on during mastication, owing to the absence of the necessary covering of the lips.

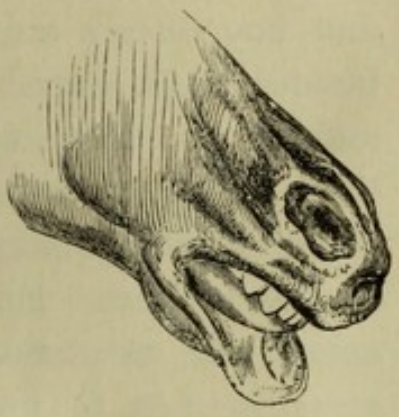


FIG. 68.—*Paralysis of the Lower Lip.*

The *causes* are believed to be various, some ascribing the paralysis to chronic conditions of the nerves arising from indigestion; others believe it to be due to the infliction of blows, and Professor Williams says his experience leads him to conclude that it results from heavy and tightly-fitting bridles.* We entirely agree with him, and at the same time urge our conviction that blows have a fair share in the production of the disease. It is very common among the horses and ponies used in coal-mines, where only a simple light head-stall without winkers is used; and we remember being considerably concerned at one time to account rightly for it, and after a time finding that the drivers made a regular practice of striking the animal on the side of the face. We also have vivid recollections of a whole stud of farm-horses, numbering twenty-two, being affected with this disease on the *left* side principally. In the latter case we are not so certain that brutal treatment was the cause, as no opportunity for discovery could be obtained, and the wearing of heavy bridles might be accepted as sufficient; but the

* Principles and Practice of Veterinary Surgery.

frequent occurrence of the disease argues strongly in favour of the operation of additional powerful causes, and as a further aid to the conclusion, we need only to be reminded that men and boy drivers are usually armed with a whip or stick; besides, they invariably walk on the left side of the animal, and are very liable to punish the horse about the face and head—the left side, of course, presenting itself without their going out of the way to inflict the blows. Such treatment readily produces inflammation, and the nerves are implicated; the exudation consequent on that morbid process gives rise first to pressure, and afterwards to a destruction of nerve function.

Treatment.—Under this head we might recommend first of all "watch for the infliction of injury, and bring the offender before the nearest magistrate;" for, happily, there is law by which real cruelty to animals may be arrested and

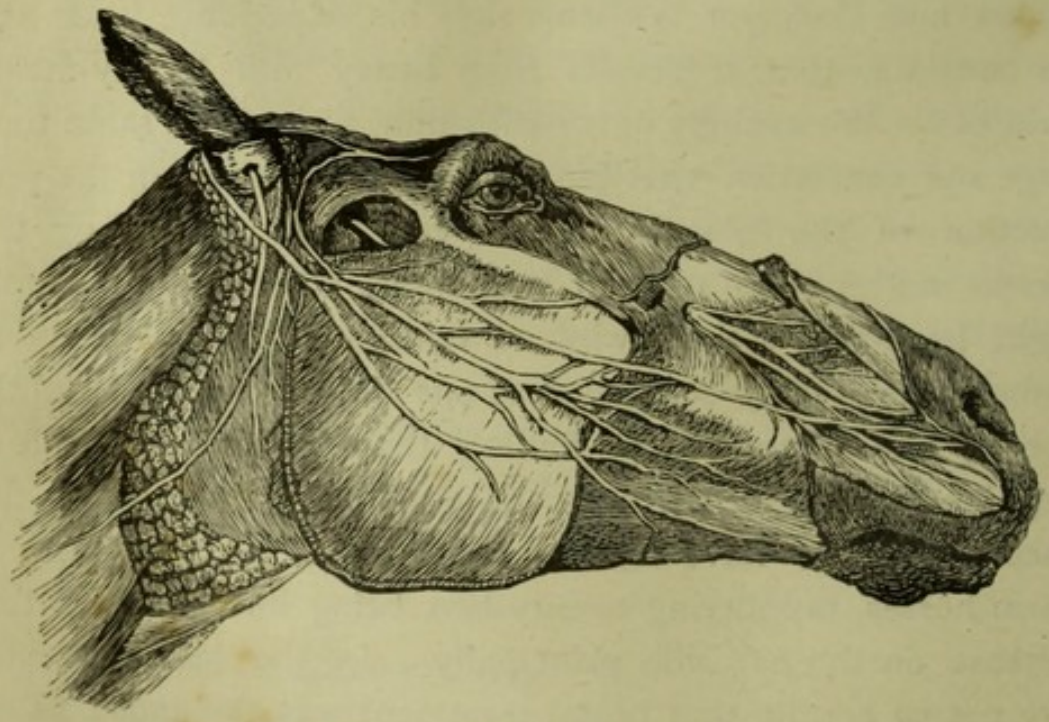


FIG. 69.—*Nerves of the Face.*

the culprit punished. In recent cases only can we hope for good from medical treament. The animal should be allowed to run loose in a box when at rest, and the food, selected for its nutritious and digestible qualities, placed in

a deep box or manger, from which he cannot turn it out to waste. According to circumstances, sedatives or purgatives may be used internally, cooling and sedative lotions to the side of the face, particularly over the large flat muscle (Fig. 69) named the masseter, on the surface of which the nerves have been doubtless injured. Incessant fomentations may be used with great advantage, and at a later stage a blister of biniodide of mercury, with the internal administration of iodine salts. In older standing cases setons, and even the actual cautery, have been used when the previously named agents have failed.

Sporadic Aphtha—Thrush.

An eruption of small vesicles or bladders appearing on the lining membrane of the mouth, as well as on the tongue, is known by the above names. Sometimes the insides of the lips are implicated, and, after a few hours, the clear, limpid fluid of the vesicles changes into pus, and as they burst a somewhat angry-looking ulcer is left behind. In mild cases a few days suffice to see the end of the malady, but occasionally a more severe and even fatal form is witnessed, which gives rise to much constitutional disturbance, fœtor of breath, and derangement of the bowels by extension of the eruption. The *causes* are derangement of the digestive organs, inducing faulty assimilation ; and in the aggravated form the blood is implicated.

Treatment.—Administer chlorate of potash internally, and wash the mouth with solutions of alum and zinc, as already recommended.

Affections of the Tongue.

These are due to disease and injury. Under the first term are included *glossitis*, or inflammation of the tongue, and *ulcer ;* under the second, *mutilation* and *paralysis.*

Glossitis.

The simplest form of inflammation of the tongue is witnessed after the careless administration of hot fluids, caustic medicines, &c. In those places where it continues the practice to give cooked food, portions are sometimes served "scalding hot" to hungry horses, and the tongue usually suffers. We have seen thirsty animals obtain access to a vessel containing a caustic fluid, as black ashes in solution, and strong solutions of ammonia have frequently been given without sufficient dilution. When boluses containing ammonia are left to the grooms for administration, they are apt to perform the operation carelessly; the animal does not swallow the bolus, but gets it between his teeth, holding it and chewing it alternately, and shortly the whole train of symptoms are set up. When hot liquids or substances have been given, the tongue is red and swollen, filling the mouth; the cheeks are also involved, and a copious stream of saliva flows when the lips are separated in the sipping action, which the creature persists in performing. When caustic alkalies have been used the tongue is peeled, red and swollen, and if grasped by the hand it has a soapy feel, and usually slips away, leaving much of the buccal membrane on the fingers. The saliva is very copious in quantity and ropy in consistence, and food is altogether refused, while the animal suffers from irritative fever.

Ulcer.

This usually depends upon the pre-existence of sporadic aphthæ, arising from constitutional causes. But there are also other causes, as bruises from bits, punctures from nails, thorns, &c., scratches from irregular teeth, all of which may set up first an abscess, the parts giving way to a low form

of inflammation ; and the result is a spreading sore, causing much inconvenience by loss of appetite and condition.

Mutilation of the Tongue.

It is a common practice, when using only a halter in riding, to pass the rope through the mouth, to act as a means of restraint in the absence of the usual bit. "Putting the cavil into the mouth" frequently means winding the rope round the jaw, and including the tongue in a gradually tightening noose ; and at the end of the journey some careless persons tie up the animal, leaving the rope in the same position. If the horse "hangs back," the tongue or jaw suffers ; and considering the many instances in which these acts are perpetrated, we are puzzled to account for the small number of accidents. Then, some sensitive persons feel they have been grossly insulted by the animal, and at once punish him by running the noose of a sharp, small cord over the tongue, and lead him about, occasionally jerking the cord ; or else tie him up to a fence, thus secured during such time as their honours deem sufficient. Others deliberately cut and otherwise wound the organ by various instruments, in spite towards the owner. The action of the halter and cord is to bruise or strangulate the tongue, and besides the usual inflammation, loss of one half by sloughing is not unlikely. Jerking of the cord, and running back when tied to some fixed object, secures a state of paralysis, and the tongue hangs loosely from the mouth a perfectly useless member (Fig. 70). In some instances it is pulled out entirely. Some persons, when giving medicines, pull out the tongue too far, or draw it aside between the molar teeth, which closing upon it, repeatedly



Fig. 70.—*Paralysis of the Tongue.*

cut, tear, and bruise it severely. The tongue has been pulled right out in the operation of "balling" a horse. Lastly, paralysis of the tongue may arise from disease of the brain, by which nervous power is withdrawn.

Treatment.—In all cases of inflammation and injury to the tongue cooling and astringent lotions are invariably useful. Alum, zinc, vinegar, and the mineral acids are useful, not only on account of their constringent action, but in addition to their neutralising effect upon the caustic alkalies, when they have been the cause of injury. Electuaries, also made up with mineral and vegetable astringents, are used by some practitioners. When portions have been partially separated, every effort should be made towards saving the organ from sloughing and loss by diligent treatment, local and general: mouth washes or electuaries, and chlorate of potash internally. Paralysis is a difficult condition to deal with, and leaves little chance of useful results. The only plan which suggests itself is to return the member to the mouth, and maintain it by means of bandages, and treat the animal constitutionally. The loss of a part of the tongue renders the animal a faulty feeder; and although he may preserve a fair amount of condition, he nevertheless requires much care and attention, and is valueless in the market. Gangrene of the tongue arises from being tightly compressed under the rope, or cord, and sometimes also from inflammation. Abscission can only be warranted in these cases, and it should be performed as soon as possible; or by the absorption of the products blood poison results, and the animal quickly dies.

Injuries to, and Diseases of, the Jaws, &c.

The bones of the face and jaws, as forming agents in mastication, are occasionally the seat of injury and disease.

Whenever such takes place the case needs especial care and surgical attention, such as can only be given by an experienced practitioner; the following remarks will therefore be intended to furnish such information and assistance as will enable the reader to find out the nature of the morbid condition, rather than providing the means of cure. Surgical cases cannot be undertaken by amateurs with profit or advantage, but they may mitigate suffering, and avoid much aggravation in existing conditions, by possessing a certain amount of information relative thereto; and to this end we shall direct the reader.

Fractures of the Inferior Maxillary Bone.—The lower jaw bone is liable to injury from falling, when the animal strikes the ground with the front of his mouth. The fracture may be *longitudinal—i.e.*, from before backwards, along the median line (Fig. 71, *a a'*), by which the incisor teeth are displaced; oblique, as from *b* to *a'*, and *transverse*, or across one or both branches, immediately behind the point of union (Fig. 71, *c c'*). In some rare cases the bone may be fractured a little below the articulation, or joint. Other causes of fracture of this bone are kicks from other horses, blows inflicted by iron instruments in sheer brutality by those having the care of horses, punching out of teeth by improper instruments, in the hands of incompetent operators, and the use of too powerful bits and curbs.

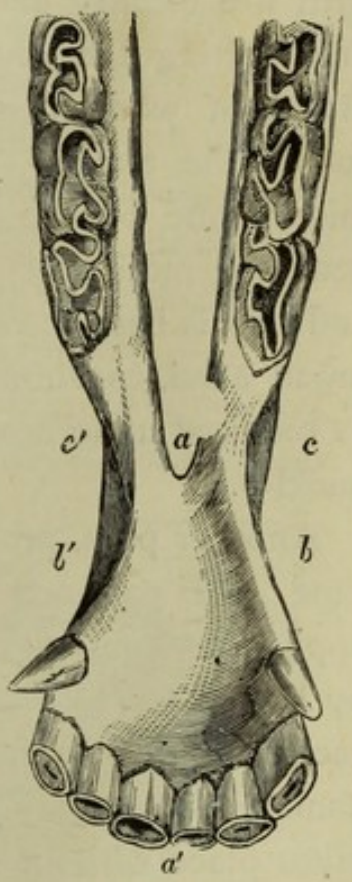


FIG. 71.

a, a'. The median line of union, or symphysis.
b, a'. Line of oblique fracture.
b, b'. Line of transverse fracture.
c, c'. " " "

Fractures are detected by such *symptoms* as the following:—Drivelling of saliva; inability to gather and

masticate food, while it is evident the animal desires to eat; slight or extreme deformity of the jaw; looseness of incisor teeth; dislike to have the mouth examined; and, added to some or all the above, when a compound fracture exists, the saliva will be mixed with blood, or perhaps hæmorrhage will be profuse; a piece or pieces of bone may protrude through a wound in the fleshy coverings, and the lining membrane of the mouth will show the result of bruises and laceration in sundry patches of swelling and inflammation.

The *treatment* is conducted on various plans in accordance with the locality of the fracture. One method consists of first uniting the divided bones, and maintaining them by means of wooden splints and bandages, with wire passed round the teeth. We refer to fractures of the neck or middle line of the bone. The next procedure is to prevent the motion of the jaws, which leads to displacement, and this is best accomplished by using a head-stall, having a broad band, as shown in Fig. 66, p. 255, which is tightened as required underneath by several straps and corresponding buckles.

Another plan, probably more effective, but requiring much time and patience to effect a proper adjustment of the appliances, consists of moulding gutta-percha when softened by hot water to the form of the jaws, beneath and upon each side, thus to form a counterpart or bed in which the damaged parts may lie; while being strapped down, union takes place without much liability to displacement. Plaster of Paris has been used in a similar manner with good effect. The third agency is a piece of wood hollowed to fit and receive the lower jaw, the concavity being made large enough to receive a bedding of soft tow or cotton wool, by which a more perfect mould or adaptation to the form of the injured parts can be obtained. Above these the head-stall,

already referred to, is put on, and the use of wire passed round one or more teeth may be adopted in addition towards keeping on the arrangement. The animal will need nourishing, but constantly a fluid or semifluid diet, which he can draw through a small space between the teeth; and when a compound or comminuted fracture exists, portions of bone may need removal, and the external wound requires great care and attention. In the latter instances there will be a discharge of pus, and provision must be made for its free escape, or serious consequences will be the result. In such cases applications of "Sanitas," known as the antiseptic treatment, are the most valuable and safe, as promoting the healing process by simple or adhesive inflammation, and arresting the formation of pus. Fractures of the second variety are even more difficult in management. Side splints and bandages are needed, together with perfect stillness of the jaws until union is perfectly secured, the same principles, modified according to the locality, being adopted.

Injuries to the Articulation.—The infliction of blows on the side of the face by heavy instruments sometimes do more immediate damage than producing inflammation of the nerves and resulting paralysis of the lips, which is exhibited in fracture of the zygomatic portion of the temporal bone (Fig. 72), involving injury to the joint, with probable ulceration and the flow of synovia, or joint oil. These are unsatisfactory cases as a rule, for, notwithstanding the flow of synovia may be arrested, and the orifice by which it escaped has been healed, the bones continue to participate in the

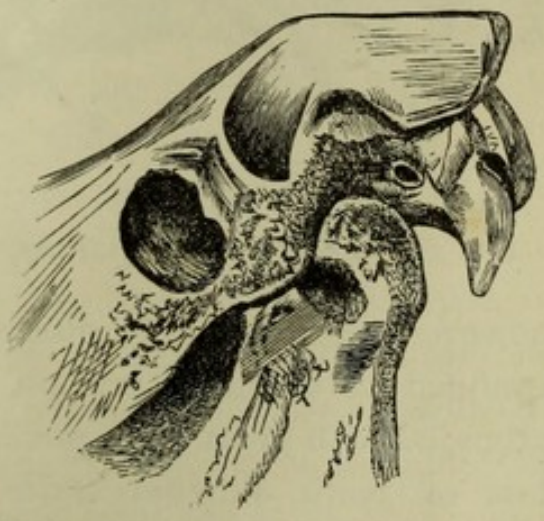


FIG. 72.—*Partial Anchylosis of the Maxillary Articulation or Joint.*

inflammatory process by which bony matter is thrown out, in the end locking or setting fast the joint, and completely preventing mastication. The animal eventually dies of starvation or lock-jaw—tetanus—and sometimes blood poisoning from purulent inflammation carries him off long before that can be accomplished.

Treatment.—The jaws must be kept at perfect rest, as shown in Fig. 66, by means of the head-stall, and closure of the orifice should be attempted, using the actual cautery to the inner surfaces and a blister outside. The antiseptic treatment proves very useful. In successful cases the wound may be closed in about ten or twelve days.

Disease of the Bones.—In consequence of blows, or the use of a tight curb or head-stall (Fig. 73, *a*), severe bit, &c., inflammation of the bone structure arises, and a large tumour forms, giving an unsightly appearance to the usual contour of the jaws. Such are irremovable, but seldom give rise to inconvenience after being fully consolidated. Occasionally, however, an intractable disease appears, which is generally confined to the front portion of the upper and lower jaws, attended with great pain, swelling, abscess, displacement and loss of teeth, fungoid states, intense fœtor, wasting, and eventual death from starvation. At this day it is known as Actinomycosis, said to be due to the attack and ravages of a parasitic fungus derived from the vegetation of the pastures. Some practitioners, however, still view the disease as the local manifestation of a tubercular diathesis for which

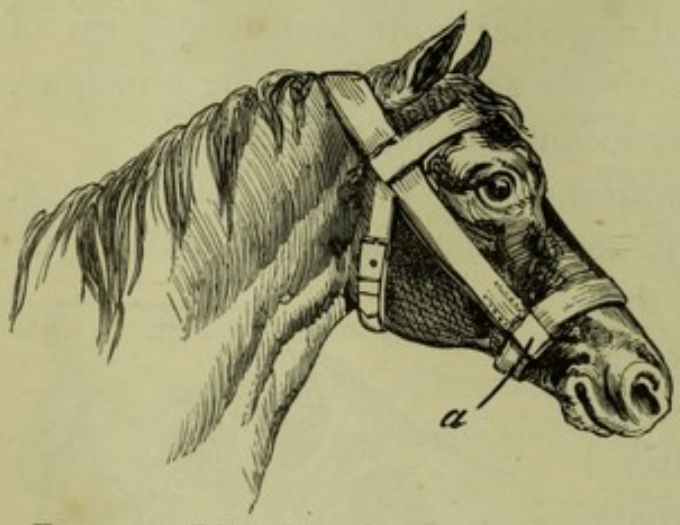


FIG. 73.—*The Tight Strap is shown at a.*

a cure is impossible. Several animals thus affected have come beneath our immediate notice, in one only of which the disease was confined to the upper jaw, as shown in Fig. 74; in the others the lower jaws were affected.

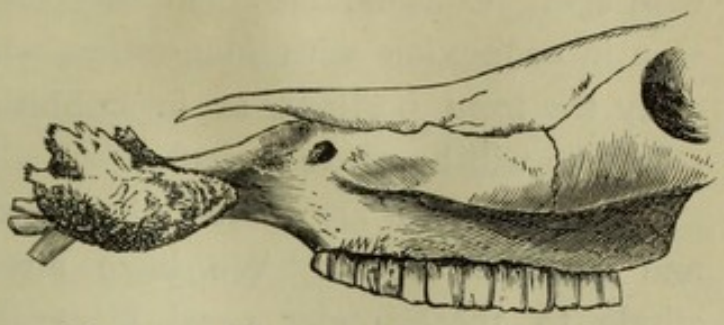


FIG. 74.—*Disease of Upper Jaw-bone, displacing Incisor Teeth.*

Deformities and Irregularities of the Teeth.—These are of such common occurrence under various forms that they need a short notice. They give rise to interference with mastication more or less, and therefore also to loss of condition, and even starvation, amidst the most luxuriant pastures. The conditions we have named are chiefly due to deviation in growth, by which incisor teeth, instead of meeting in actual contact, probably pass each other aside and grow beyond, whereby the projecting ones, being brought under no wear, are continually growing longer. A good example is seen in Fig. 75, a state known as *parrot mouth*, and which entirely interferes with the power of grazing or gathering food. Occasionally the teeth curl inwards, or on one side, and call for extraction; otherwise in later life a condition as bad as that just described may be induced, in which the whole mouth may be twisted or turned on one side. If temporary teeth are observed to grow irregularly, they should be removed at once, when in all probability the permanent one following will rise from the gum in a more direct manner. The incisor teeth are sometimes broken, and even loosened, calling for immediate removal in the latter instance. As fractured teeth are allowed to grow,



FIG. 75.
Parrot Mouth.

they may assume a deformed or irregular position, and thus require extraction, but as a rule the deformity disappears with age. Considerable deformity of the incisors is often seen in connexion with indigestion, when the animal wears away the front portions, as in cribbiting, to which further reference will be made hereafter.

The *molar teeth* are subject also to irregularities of growth, and caries or decay. We have already had occasion to allude to these under nasal gleet and ulceration of the tongue. In the first condition, some are out of the proper line, and give rise to much pain and irritation during mastication, wounding and lacerating the tongue. During ordinary growth even, the edges become so sharp and worn up to numerous points or spiculæ, that similar results are produced ; the animal exhibits difficulty in mastication, and sometimes refuses food altogether, and portions of food, half masticated and rolled into pellets, are found between the molars and cheeks as well as in the manger. The animal is then said to "quid his food." For this state, the remedy is the tooth-rasp, by which the inner edges of the lower teeth and the outer sides of the upper are to be levelled, after which the process of mastication is usually resumed. Occasionally, however, the previous injury to the tongue prevents this, when an astringent mouth wash, No. 23, page 92, or the electuary, No. 47, page 166, may be used with benefit. In a few days afterwards give a course of tonics to restore the lost condition ; a suitable form of powder is given in No. 20, page 84.

Occasionally, small shelly supernumerary molar teeth are found ; usually one is present in front of both upper or lower rows.* When called to examine animals thus possessed,

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* Various "auld wife's" fables attach to these wonder-working powers in the production of disease, especially in the eye, which hitherto we have failed to discover.

the only nuisance the supernumerary teeth appear to be is the production of irritation by being loose, sharp, and projecting, which readily passes away on their removal. These have been termed "wolf-teeth," and similar productions among the incisors, or those growing obliquely from the usual line, are known as "buck-teeth." In the removal of such from the horse's jaws, let the proprietor forbid any interference by non-experienced persons. The hammer and chisel are rarely of use in these cases, and likely to fracture the bones at the tooth sockets, if more formidable states are not produced.

Occasionally deposits are observed to take place round the lower part of the teeth, forming large tumours. They are similar in construction to the tooth substance, and are readily removed by punching.

Carious teeth give rise to imperfect mastication, fœtor of the breath, and *toothache* is evidently causing the animal much suffering, for the head is depressed, the eyes closed, and tears find their way down the face (Fig 76), and at other times the head rests on the manger, stall partition, or other convenient object, and relief is only obtained by a removal of the offending object. A carious tooth, when allowed to remain, suffers an amount of softening and disintegration, by which an opposing surface to the corresponding tooth in the other jaw is removed. The first breaks down under the wear of the sound one, which grows rapidly, and eventually injures the bones, causing inflammation and abscess, and chronic discharges. (*See* Nasal Gleet.) Such teeth call for early removal, and as the opposite tooth grows it should be cut down, in order to avoid the results already named.



FIG. 76.—*Toothache.*

In order to examine the mouth without endangering the hands, an iron gag, like the one shown in the engraving (Fig. 77), is used. It is known as a balling-iron, because originally it was designed to keep open the jaws while balls are being passed by the hand to the back of the throat. Care is required in placing it, as the animal may be rendered shy and awkward if the iron is rudely knocked against the teeth, or caused to bruise the membrane of the mouth. The left hand first is passed into the mouth, between the incisors and molars on the right side, as the operator stands in front of the horse, and seizes the tongue; the balling-iron being held in the right hand is placed sideways in the mouth, and as the animal separates the jaws, the iron is turned in a vertical direction, and there held by the left hand, the tongue being now set at liberty, while with the right hand the cavity of the mouth is examined. The mouth-rasp, used for levelling the molar teeth, is shown in the annexed engraving (Fig. 78); the blade portion is hollow, and the edges are

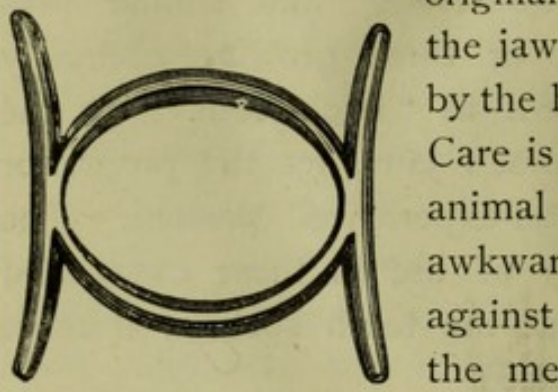


FIG. 77.—*Iron Gag or Balling-iron.*



FIG. 78.—*The Tooth Rasp.*

usually mounted with a raised bead on each to act as a guard, or preventive against slipping off and wounding the mouth in the operation. The handle is about eighteen inches long, and mounted with a wooden handhold, by which the instrument can be more easily directed. The bend or direction of the rasp blade has much to do with the effectual performance of the operation, and we have found it

advisable in practice always to have *two mouth-rasps in use at one time*, the value of which will be apparent after a consideration of the fact that teeth of the upper and lower jaws are presented to the operator in different ways. The teeth of the upper rows represent almost a horizontal line, generally above the level of the practitioner's hands, which completely prevents the possibility of using the whole of the surface of the rasp. With such an instrument as represented in Fig. 78, the operator will find the point wears away rapidly, because it is the only part which can be used. If then the same is employed to reduce the lower rows, the heel only acts, while the point, being turned somewhat upwards, is constantly striking violently against the upper rows, and the chances are the operation is only partially successful. The object should be to cause the whole of the rasp surface to traverse the molars, and this can be accom-

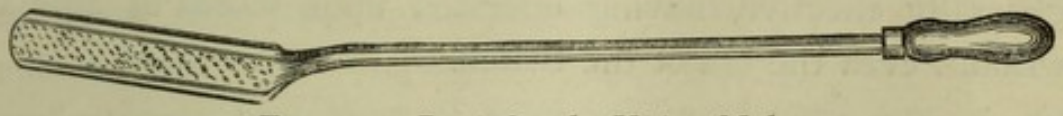


FIG. 79.—*Rasp for the Upper Molars.*

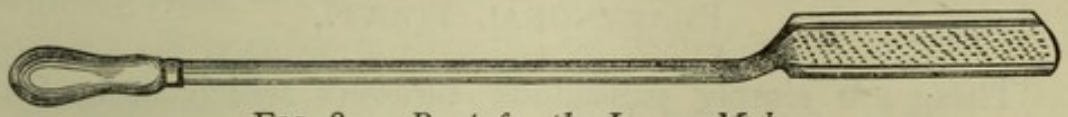


FIG. 80.—*Rasp for the Lower Molars.*

plished only when two instruments are used, each having a different bend, as shown in the annexed engravings (Figs. 79 and 80).

We must now refer to the method of securing the animal for the operation. Two assistants generally only are necessary. One stands on the off or right-hand side of the animal, holding the ear by the left hand, the right being placed flat over the nose, six inches above the opening of the nostrils, by which the head may be held tolerably steady. Assistant No. 2 holds the left ear in his right hand, and the tongue in his left. The operator then directs his attention

to the upper and lower rows of the right side of the mouth; afterwards the assistants exchange the duties of one hand only, No. 1 taking the tongue from the right side of the mouth, and No. 2 placing his left hand on the nose from which No. 1 had just removed his right. The tongue must only be held, *not pulled out of the mouth*, the requirements being that the animal be not allowed to interfere with the motion of the rasp by the powerful acts of the tongue, by which also serious wounds might be inflicted if it were at liberty. The hand directed to be laid on the nose must hold by the bones entirely. Some assistants think that, in order to hold a horse, they need to seize and compress the nostrils, thus stopping his breathing, and, doubtless, they are somewhat surprised because he becomes restive, not unfrequently being actuated to inflict worse punishment. In a lengthened practice we have found the simple plan as here described generally effective, having operated upon scores of animals without even the use of the twitch.

Pharyngeal Polypi.

These are simply pendulous tumours which hang from the false palate, and by enlargement are sufficient to block up the passage when drawn backwards in the natural act of swallowing. Their presence is denoted by frequent attempts to swallow, coughing, and relief when the head is held downwards, a position favourable to the falling forwards of the tumour. Such tumours also interfere with the process of respiration, for with each inspiration the body is drawn into the opening to the windpipe, giving rise to loud, stertorous sounds, and partial suffocation.

The removal of pharyngeal polypi is comparatively easy and simple. The mouth is gagged by means of the balling-iron (Fig. 77), and the operator seizes the tumour with one

hand and twists it upon its neck until separation is effected; should there be any difficulty in this, suitable forceps are used, which may be manipulated by both hands outside of the mouth. The operator may find it necessary to cast the horse, which should be managed as quietly as possible, as in sudden and violent inspiration the tumour might be detached and drawn into the windpipe. The propriety of this step will of course be carefully weighed before it is adopted.

Choking.

Obstructions within the gullet of the horse, leading to choking, originate in several ways. Voracious or greedy feeders, bolting dry and only partially-masticated food, imperfectly insalivated, are common victims: other animals by no means greedy are known to suffer from choking after returning from long journeys, and equally long fasts, tired and hungry, when the digestive organs lack necessary tone, and eagerly partaking of food swallow it too quickly, and without being softened and moistened with a due quantity of saliva. A portion is arrested on its way, from which irritation and spasmodic contraction arises, holding the pellet fast, while other portions follow and block up the gullet. At other times, a piece of turnip or carrot may be the cause; balls also when too large, wrapped in coarse paper, or when delivered across the throat instead of longitudinally, more particularly in cases of illness and weakness arising from it. It was much more the practice formerly than at the present time for grooms, and others "knowing about horses," to administer an egg whole, with the view of promoting fine condition, and not uncommonly the object would pass down the gullet to that portion within the chest, away from observation, giving rise to obstruction and serious states, which could hardly be accounted for at the time, and the guilty party professing

entire ignorance. Many valuable horses have been lost from this cause, and when the secret has oozed out, we have felt not a little surprise and inability to account for the fact that such men usually object to administer balls, because they are afraid of injuring their hands or choking the animal ; yet they can manage to convey an egg unbroken to the back of the throat, by which such mischief is perpetrated in a few minutes that may defy all the art of man to rectify.

Besides these causes, there are certain conditions which prove favourable to choking, and in comparative health act as a predisposing cause, even when we can attach no blame to the kind or quality of the food, or want of insalivation. The throat or gullet may be inflamed or ulcerated, and in these states morbid irritation is speedily set up. Then there may be injuries, obstructions, or disease of the salivary apparatus ; irregularities of the teeth, leading to imperfect mastication and moisture with saliva. Again, there may be organic diseases of the gullet itself, whereby certain parts are constricted or narrowed, at which points accumulations of partially-masticated food are liable to be detained.

The *symptoms* of choking vary somewhat in accordance with the locality of the obstruction ; hence we observe a set of signs common to choking generally, and others which belong to the various stages of the passage to the stomach. The most common and general signs are inability to swallow, and when liquids are poured down they are speedily ejected through the nostrils ; violent coughing, difficult breathing, continuous action of the jaws, and drivelling of saliva, with attempts to regurgitate or force upwards the obstruction ; general uneasiness prevails, and the animal often in violent impatience scrapes and beats with his fore-feet.

In addition to the foregoing symptoms, the special indications are manifested by the position and size of the obstruction. Pharyngeal obstruction gives rise to much distress

from difficult breathing, violent coughing, and spasmodic contraction of the muscles of the neck, and ejectment of fluids. The position of the mass may be detected by the hand through the mouth, or by pressure upon each side of the throat.

If the accumulation is in the cervical or neck portion of the gullet, swelling will be observed on the left side in the course of the œsophagus, proportionate with the amount of ingesta accumulated, and the animal appears with depressed head, anxious countenance, trembling, partial sweats, occasional uneasiness and violence, difficult breathing, coughing, and finally exhaustion.

When the substance is located within the thoracic portion —that is, within the chest—the urgent symptoms are absent, excepting when fluids are swallowed which give rise to violent retching in order to clear the passage, and their return by the nostrils. This form of choking is rendered more intense and serious when the gullet is filled throughout. In most instances there is accompanying tympany of the stomach and bowels, as indicated by an unnatural roundness; and, as in the latter cases, which sometimes extend over several days, there will be constipation of the bowels, loss of appetite, depression, and further aggravations are denoted by bloodshot eyes, the head is carried low, and exhaustion speedily follows.

Treatment.—The first important principle consists of first obtaining a clear knowledge of the exact locality of the obstruction. Being certain of this, various methods of procedure may be adopted.

Pharyngeal Obstruction.—The hand must be passed to the back of the mouth, and if the offending substance can be grasped, it may be also drawn forwards, and eventually out of the mouth altogether; failing this, forceps may be used. If the cause be a polypus, its removal must be effected as

already explained at page 274. In all probability, the offending mass will be a portion of root, or an accumulation of hay, chaff, or mixture of food partially masticated, dry and impacted. Its removal will therefore be difficult, as the fingers may not be able to seize it: the tongue should be drawn out, and an assistant manipulate upwards by pressure on the outer sides of the pharynx. Much time and patience will be required; but eventually removal of the impaction will be accomplished. Solid substances may be removed by the forceps when the fingers cannot retain the hold; and some practitioners have relieved even desperate cases of choking by means of an improvised hook, made by twisting several strands of wire together, and bending them into a loop hook, which is passed beyond the substance, gentle traction sufficing to bring it into the mouth. The form of such a hook is given in the figure annexed (Fig. 81).

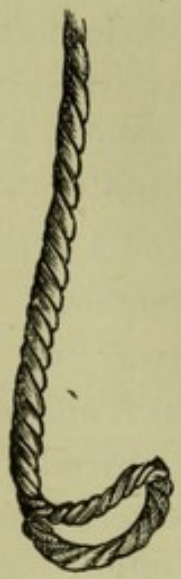


FIG. 81.—*Extempore Hook to remove obstructions from the back of the mouth.*

It would be well to add to the *Armamentarium chirurgicum* of the veterinarian a simple permanent instrument of this kind, to be kept in the same case with the stomach-pump and probang, with smaller ones for the sheep, dog, &c.

In relieving such cases of choking, we must caution the reader against using violence; in all the acts required, the operator cannot be too gentle, always bearing in mind that living tissues are at stake, and bruises, lacerations, &c., are readily produced, which may at any time prove fatal.

Cervical Obstruction.—When the obstruction is too far back in the throat, or midway down the œsophagean canal, the attendant operator must endeavour to remove it by means of gentle pressure, and rubbing upwards and downwards, &c.,

over the course of the gullet. An impacted mass may thus be caused slowly to break up and pass downwards, especially if occasional small draughts of gruel, water, oil, &c., are given. We have frequently been enabled to disperse such by patient working, and the use of the following draught, especially when choking has occurred in tired animals :—

RECIPE NO. 73.

Take of linseed oil	½ pint.
Chloric, or sulphuric ether	½ oz.

Mix, and administer in small and repeated doses.

If the offending body be an egg, on no account attempt to fracture the shell by inflicting blows on the outside with the fist, &c., as the gullet will in all probability be ruptured instead. The crushing may be more readily accomplished if an exploring needle is first passed through the tissues, and caused to enter the shell, by which the contents will escape. The flat hand then laid upon the swelling, administering gentle but firm and gradually-increasing pressure, will not fail to do all that is needed. Sometimes the probang is passed, and the stilette, armed with a sharp point, being caused to strike the egg, the shell is evacuated, and the whole readily descend to the stomach. It is always advisable first to work patiently with the oil and ether, conjointly with the hand-rubbing, before the needle or probang are used ; but on no account to allow the animal to become faint and exhausted before they are resorted to. If the obstruction is a piece of root, it is most likely that the probang will be required, more especially if it be large ; but, under all circumstances, the attempts as described should be first made.

Thoracic Obstructions.—The offending body having passed along the gullet beyond the neck into that portion within the thorax, we can form no conception of its true nature, and must rely upon the information obtainable from the attendants, which may not be great or satisfactory. A

negative mode of cross-examination, however, is sometimes successful in aiding the practitioner to form useful conclusions, and even eliciting truth. As the symptoms in these cases are not urgent unless the whole course of the canal be filled, the operator must rely solely for a time upon the use of the draught No. 73, p. 279, observing that not more than the quantity of oil there prescribed is to be given to a horse. The further administration of fluids must consist of water, gruel, &c., which may contain the dose of ether if required. The object is to soften the mass by moisture, and relieve spasm by the ether, a proceeding very generally successful if practised early and persistently.

Failing to remove whatever may be the obstruction after due use of fluids, recourse may be had to the probang; and here we must again utter a word of warning in order to avoid certain mistakes, and even fatal consequences, which may ensue without the necessary information on such matters. Solid obstructions, as pieces of turnip, carrot, &c., are usually pressed downwards with little difficulty, and an egg may be evacuated, crushed, and caused to descend with ease by means of the probang; but impactions of dry and half-masticated food are liable to become harder and more solid by the application of force from above. We therefore urge ample trial of the oil and fluid draughts first, and if these do not sufficiently soften and remove the mass, they will at least leave little for the probang to do, and involve less pain to the animal as well as damage to the gullet.

Passing the Probang.—Formerly common sticks, whip-handles, &c., were much in use to relieve choking in cattle, which in them is a much more common occurrence, than in the horse, and fortunately attended with less danger as a rule; but modern science has produced a more appropriate and useful instrument, known as the probang, which we now describe.

The substance and strength of this instrument is derived from a coil of stout wire covered with leather or gutta-percha, the centre being open to act as a tube, through which a small rod or stilette is passed when occasion requires, or withdrawn to admit the escape of gas from the stomach. Upon each end a mount of lead or brass is fixed, one being cup-shaped, the other a bulb. The whole when complete measures about six feet, and in diameter the tube is about one inch, the bulbs one inch and a half. A size somewhat smaller is best for horses, and one smaller still for ponies.

When the instrument is to be used, the animal is cast by some practitioners ; others succeed while he stands. We will describe the method in both instances. The animal being prostrate on his right side on a straw bed, the balling iron (Fig. 77) is placed in the mouth, held by one of two assistants, who secure the head, and at the same time stretch out the nose in a line with the neck, so as to form a straight passage from the mouth to the stomach. A more suitable instrument which we have adopted, and may be obtained from Messrs. Willows, Francis, and Butler, 101, High Holborn, at a low cost, is shown in Fig. 82 ; it is known as the wooden mouth gag, and when properly placed in the required position is easily maintained there by the strap or rope which is passed over the head. The tongue is held by one assistant, and the operator passes the instrument through the hole in the gag cautiously along the upper surface of

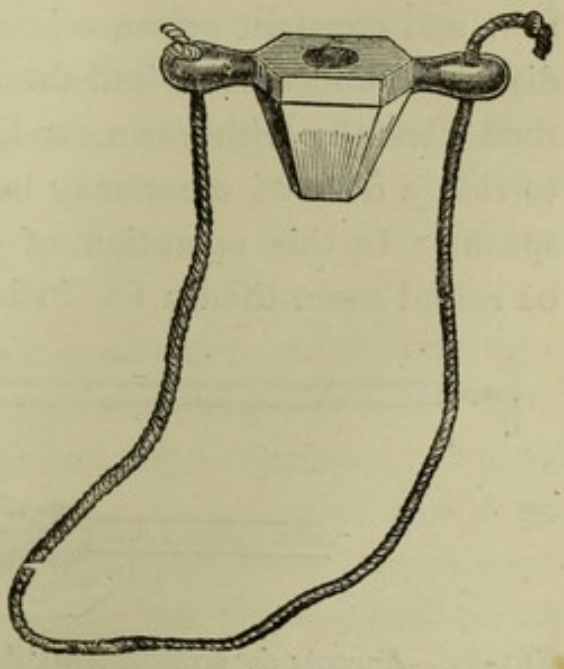


FIG. 82.—*Wooden Gag.*

the tongue backwards to the throat, where a slight opposition is met with, and the animal often struggles violently, during which the operator must rest, but he need not always withdraw the probang. During quietness it is advanced beyond the pharynx with great caution, and must now be felt for in the depression on the left side of the throat; indeed, if it has entered the gullet, the enlarged end may be seen to elevate the tissues as it goes onward. If the probang cannot be felt after a sufficient length has been delivered to extend beyond the throat, it is likely to have entered the windpipe; it must therefore be instantly withdrawn with care, and again presented at the pharynx, and advanced until it is known to be within the gullet, when it is gently pressed home to the seat of the obstruction. As soon as the substance has been reached, the sensation of striking something will be at once imparted to the hands of the operator, as well as the resistance to its further progress; and thus, being doubly sure that all hands are at their posts, firm and constant pressure is exerted until the substance is dislodged and moved into the stomach. The instrument is then carefully withdrawn, and, before the animal is allowed to rise, a dose of ether may be given to allay irritation and spasm. In this operation of drenching the head must not be raised more than a few inches from the ground, and small

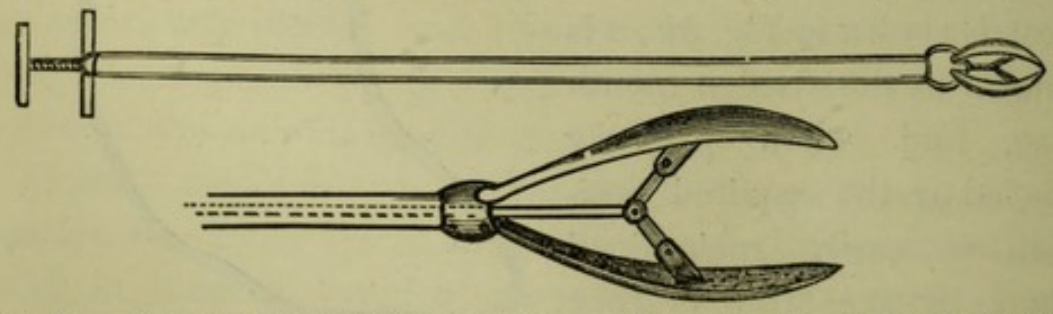


FIG. 83.—*Forceps for withdrawing pieces of Turnip, &c., from the Gullet.*

quantities only poured into the mouth. The best probangs are fitted to the stomach-pump, and by this aid medicines can be injected perfectly and rapidly at once into the

stomach before the instrument is withdrawn. A form of probang, having a pair of claws or forceps at the extremity, is used by some practitioners for the purpose of extracting pieces of turnip, carrot, &c., an illustration of which is given in Fig. 83.

We have performed the operation with the animal standing in the following manner :—The horse is first reversed in the stall, and several assistants are told off to special positions. A twitch is put on the nose and held by No. 1, who stands a little to one side and rather in front of the operator. No. 2 holds the right ear in his left hand, depressing the head, and at the same time elevating the chin by his right hand being placed underneath. No. 3 stands on the left side, and performs similar duties with, however, different hands. No. 4 straps up a fore-leg, and holds on by it.

The wooden gag being inserted between the jaws, the probang is to be passed as already described, every precaution being taken to avoid accident, as the animal is apt to rear and plunge forwards, especially when the obstruction is moved ; indeed, some animals arch, twist, and contract their necks so as to render the operation impossible as he stands ; and when this is attempted, it is best to cast him at once and save time, as well as avoid risk from his violent actions.

The continuance of such symptoms as retching, arching of the neck, &c., sometimes causes annoyance, and the belief that the offending body has not been removed ; indeed, choking will in all probability recur in a day or two if due care is not exercised. The signs of uneasiness are owing to the irritation of the gullet, caused by the removal of the substance from between the contracted walls, where dry solid food would rapidly accumulate. The fact that fluid medicines are swallowed, water, &c., drank, sufficiently negatives the idea of an obstruction remaining, and supported farther by

a gradual decline of the symptoms after ether alone, or in conjunction with laudanum, belladonna, &c., have been given. Nothing but soft or sloppy food should be allowed for several days, and when a ravenous appetite continues the purgative draught No. 21, p. 87, may be given. Wherever disease of the gullet exists extra care in feeding is called for.

Opening the Œsophagus.—As a last resource, when other means have failed, the obstruction being firmly imbedded, and probably the impaction from dry food extending throughout the greater part of the gullet, relief is to be obtained by the use of the knife. After the animal is properly secured, an incision is made along the course of the swelling; first through the superficial tissues, dissecting carefully down to the gullet, which is opened last, the mass being abstracted in successive portions. This operation is more usually performed in the horse for the purpose of passing the probang direct to the seat of thoracic obstruction, when greater power can be exerted for its removal after failure in other ways. The surgical operation, together with the closing and after treatment, require great care, and can only be performed by an experienced practitioner, to whom the case must be entrusted.

Diseases of, and Injuries to, the Gullet.

We now arrive at the stage when a brief consideration of the diseases and injuries to which the œsophagean canal is liable, and which give rise to frequent choking, &c.

Dilatation of the Gullet.

A condition of the gullet, known scientifically as *Œsophagus ventriculosus*, consisting of a dilatation or enlargement of its calibre at some particular part, attended with attenuation and weakness, is not uncommonly seen in the

horse. Sometimes the dilatation exists almost throughout the gullet; but, as a rule, the chief seat is at its union with the stomach. Food and liquids distend the part, and continual regurgitation goes on while the animal feeds, and for some time after, the swelling in some instances being small, and in others assuming rather large and alarming proportions. The only remedies that can be applied are—1st, an operation termed "œsophagotomy," or opening the gullet, and after taking out a portion of the walls, in order to diminish the calibre, the lips of the wound are brought together for healing; 2nd, pressure. These can only be applied when the seat of the disease is in the neck. The results of dilatation of the gullet will be referred to under Vomiting.

Laceration of the Gullet.

In the efforts to relieve an animal suffering from an obstruction in the gullet, the movement of the substance may produce a rupture of the walls, eventually giving rise to a pouch, or dilatation, as shown in Fig. 84, annexed.

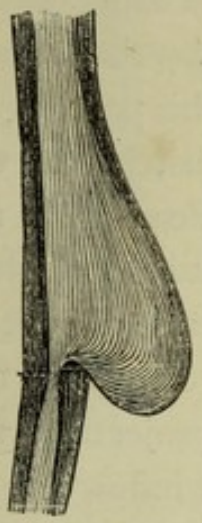


Fig. 84.
The Œsophagus after dissection.

This is one of the untoward results which the practitioner has to fear, the violence of the animal probably being the greatest cause. The offending substance appears to move before the probang, when in reality it has passed on one side within the pouch. Swelling and inflammation follow. There is also danger of abscess and discharge of pus within the cavity of the thorax when injury occurs at a point low down in the neck. If unrelieved, further accumulation takes place, choking, and death.

Accident sometimes gives rise to laceration of the gullet, as the following case will show :—

A foal was left in a stable during the long absence of the dam, and it was noticed that great uneasiness prevailed, and frequent attempts were made to jump through a large square hole, which existed as an apology for a window. The creature lacking the natural food (the mother's milk) and becoming hungry, eagerly devoured some green forage, which produced an obstruction in the cervical portion of the gullet, with all the violent symptoms of choking. The writer was summoned in haste, and found a large diffuse swelling in the neck, extending from the throat to the chest on the left side, which left the impressions of the fingers. The creature stood almost pulseless, breathing hurriedly, nostrils dilated, membranes reddened, eyes bloodshot, &c. ; partial sweats were present over the body, and the legs and ears were cold. The owner was informed that the animal could not recover ; that the gullet was ruptured, and the swelling was due to extravasation of masticated food within the tissues around. Nothing would satisfy him but having the probang passed, and he was hardly convinced when the instrument was caused to go by the swelling to the stomach. Bearing in mind the information given at the outset of the case, that the creature had been jumping up to the window, and discovering a long wide scratch on the swelling, with removal of hair, we directed our attention to the former, and projecting from a piece of wood, which did the duty of window-sill, was a large spike, on which harness was usually hung, the head of which was covered with hair from the foal. The solution of the question appears to be this : the gullet, being distended during choking, when the creature jumped against the nail, suffered rupture, and allowed the escape of the food among the muscles of the neck, as a natural consequence ; the canal being then re-

lieved, no obstruction would be offered to the passage of the probang. As the animal was evidently sinking no further treatment was adopted, and we proposed to make a further journey, and call on our return. After the lapse of four hours he was much worse, and the owner promising to send information of his death, we left. On the following morning a messenger informed us of his death during the night; and we attended to make a *post-mortem* examination, which revealed the conditions exactly as they have been described.

Stricture of the Gullet.

In consequence of some injury, or other cause, which induces inflammation of the walls of the œsophagus, a contraction or stricture may result; the canal is narrowed and the walls approximate closely, only small portions of aliment being able to pass. Stricture is often associated with dilatation (Fig. 85), for as food is retained in the gullet above the contracted spot, the coats are likely to suffer from strain, weakness, and at length attenuation, giving rise to enlargement of the canal. The worst forms of choking exist in these cases, and in the end usually rupture of the gullet and death. The animal swallows with difficulty, and food as well as liquids are regurgitated—that is, they are seen to pass upwards and downwards in the gullet, and are sometimes ejected from the nostrils. The swelling is observed to exist above a certain point, which forms the stricture, sometimes being considerable, and giving rise to all the urgent signs of cervical choking. When the stricture is within the chest the swelling cannot be seen, and the true state of



Fig. 85.—*Dilatation, a, and Stricture, b, of the Œsophagus.*

affairs is known when the probang is being passed—the obstacle cannot be moved, and pressure gives rise to a great amount of suffering.

Stricture is ordinarily caused by injury, or is the result of operations, and occasionally it arises from cancer, melanosis, or other diseases, which set up thickening of the coats of the gullet.

Treatment is not likely to do much good. The animal should be fed on semi-fluid food; and if the owner has no objection to an operation, the knife may be used. This, of course, can only apply to cases of cervical stricture of the gullet.

Vomiting.

The act of vomition in various animals is the natural means by which the stomach is relieved of hurtful and indigestible substances, and it is induced readily by medicinal agents, a knowledge of which enables the practitioner to take advantage of the reducing effects which always follow, as a means of combating disease in the human subject, and in certain lower animals, as dogs, cats, &c. In each of these a peculiar susceptibility for the act always exists; but in the horse, as far as is at present known, no agent will produce it. It is not natural for the horse to vomit, and he cannot perform it in health; we must therefore regard the subject of vomition in him as a morbid condition, arising from one or more of several causes, to a consideration of which the present chapter will be devoted.

We have always regarded the subject as one replete with very great interest, and have given it some amount of attention, not only with the view of clearly comprehending why the horse rarely vomits, but also with the desire to be acquainted with the causes which prompt the act under the various conditions in which it is observed.

Previous to entering upon a consideration of the questions just alluded to, we will first direct the attention of the reader to the signs which characterise the phenomenon in other animals, to which it is natural. The chest is first expanded and the lungs inflated, which has the effect of maintaining a fixed position of the ribs, an essential preparation for the action of the diaphragm (Figs. 57 and 97, pages 211 and 330), as the anterior boundary of the cavity of the abdomen. The muscles of the legs become rigid, and the feet are firmly set on the ground; the neck is shortened, the muscles are rigid and contracted, the head depressed and nose elevated, in order to produce a straight line from the stomach. Antiperistaltic action, or regurgitation, takes place in the gullet, as seen in the repeated enlargement and contraction, with passage of ingesta upwards and downwards; the muscles of the abdominal walls also contract violently at the same time, and quantities of froth, fluid, with half-digested or indigestible matters, are ejected through the mouth. It may serve a useful purpose hereafter if we here briefly refer to the antiperistaltic action of the gullet and digestive canal generally, as by it we may account for the facility with which the contents of the stomach are expelled. Under ordinary circumstances and the control of the nervous system, the action or contraction and worm-like movements of these organs are directed towards conveying alimentary substances from the mouth towards the stomach, thence through the intestines, to be expelled as fæces from the rectum. This is known as the *peristaltic*, vermicular, or worm-like action of healthy digestion. In the act of vomition, there is first a nervous susceptibility to irritation from the presence of foreign substances within the stomach or circulatory system, and that leads to a perversion of the nervous influence, manifested by the movements of the digestive canal being reversed, and are then known as *anti*peristaltic.

Without this vomition could not take place. The usual preparatory efforts, together with muscular contraction of the abdominal walls, would be in vain, and the stomach might suffer rupture without its contents being evacuated through the œsophagus. Antiperistaltic action is therefore an essential agency in the act of vomition, and is not confined to the stomach or gullet, but often extends to a distance along the intestines. A knowledge of this fact enables us to account for the presence of various substances within the stomach after death, which are common only to the large or small intestines in health or disease; or, as sometimes happens, they are ejected by the mouth in vomition.

We will now turn our attention to the consideration of the fact why the horse rarely vomits.

The question has occupied the attention of physiologists from a remote period, and some of the erroneous conclusions they arrived at were the following:—1. The existence of a sphincter or circular muscle at the entrance of the gullet to the stomach. 2. A spiral valve guarding the opening within the stomach. 3. Isolated situation of the stomach. 4. Insusceptibility to the action of nauseating medicines, &c. Later observation has demonstrated truthfully that no such sphincter muscle exists at the lower end of the gullet, nor indeed is there any trace of a spiral valve within; and although the stomach of the horse may be said to occupy an isolated position among the abdominal organs, it nevertheless is acted upon most powerfully by the abdominal walls, and, as we shall shortly learn, they are by no means insignificant agents in the act of vomition. With regard to the fourth proposition, it is now definitely acknowledged that the equine animals are not so susceptible of the action of some nauseants as others, yet they know what it is to be "sick as a horse," apart from the act of vomition. Any one who has observed the effects of hellebore, aloes, &c.,

upon the horse will readily understand this. The stomach of the horse is comparatively small, when we take into account the size of his body and the length of the intestines. At the most it will not accommodate more than fifteen quarts and when replete with a solid mass of food, it does not hold more than thirty pounds weight, excepting when it is immoderately enlarged as a result of over-feeding, the use of soft, bulky food, &c. Annexed we give an illustration of the external form of the organ (Fig. 86).

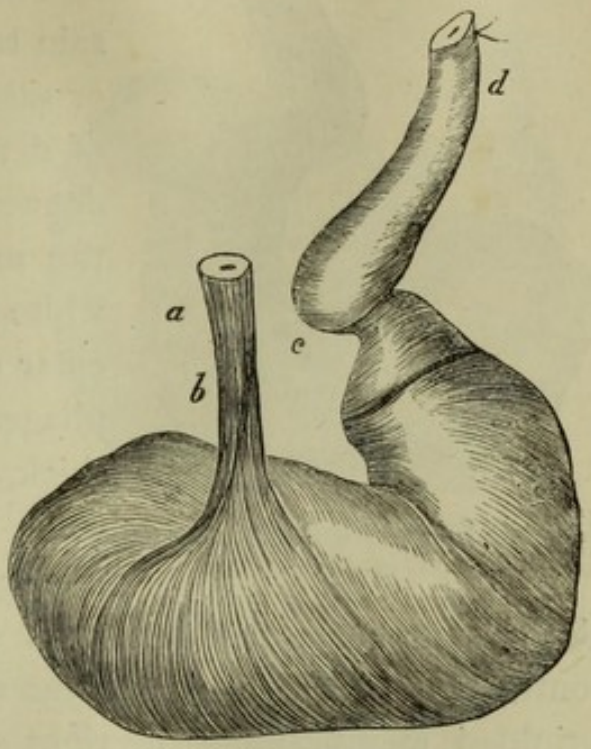


FIG. 86.—*Stomach of the Horse.*

a. The gullet.
b. Cardiac entrance.
c. Pylorus.
d. Duodenum or small intestine.

The stomach of the horse is a hollow musculo-membranous bag or pouch, forming as it were a dilatation of the alimentary canal, and, for the purposes to which it is applied, is supplied with bloodvessels, nerves, and muscular tissue, &c. (Fig. 58). The outer covering is derived from the peritoneum, a highly sensitive membrane, which invests the organs generally of the abdomen, and lines its walls on all sides (Fig. 97). The next beneath is the muscular coat, composed of several layers, arranged in different directions, by which the movements of the organ are varied, and rendered appropriate to the functions of digestion, trituration, and movement of the aliment acted upon. The internal coat is formed of mucous membrane, which exhibits certain characters worthy of notice in our study of the act of vomition. The arrangement of this membrane

is shown in the annexed engraving (Fig. 87). (*See* also Fig. 94.)

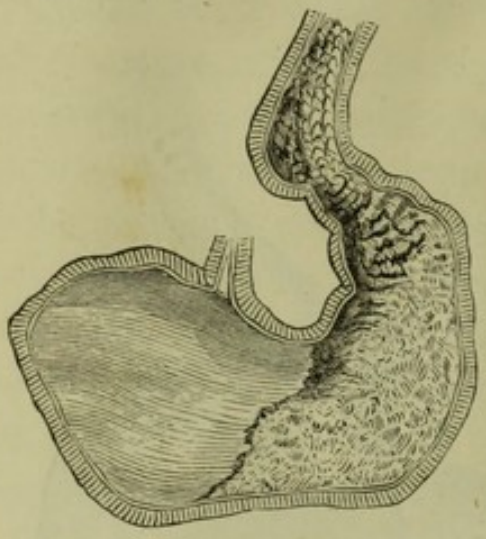


FIG. 87.—*Interior of the Stomach of the Horse.*

The stomach of the horse is said to be divided into two parts or sacs—right and left—the line of demarcation being that which defines the sudden transition of the mucous membrane from the white and leathery-looking cuticular extension of the true œsophageal lining, to the rugose, thick, reddish-brown, highly vascular, spongy-looking, and secreting layer. Outwardly this line is also visible near the centre, as shown in Fig. 86, where a contraction occurs, and thus the division is complete. The wrinkled membrane of the right sac secretes the true gastric juice, or solvent fluid, while that on the left secretes, like the œsophagus, a thick viscid mucus, which coats every substance, and facilitates its passage onwards. We return to this immediately. There are two openings leading to the interior: the œsophageal or gullet, known as the cardiac, on account of it being towards the heart; and the duodenal or pyloric, at which commences the duodenum, or first part of the small intestines. The latter is guarded by a powerful sphincter, which, when closed, effectually arrests the passage of all matters from the stomach until they are sufficiently changed by the process of digestion. At the cardiac or œsophageal opening no such valve exists, but the mucous membrane has the appearance of being too large for the sac which it lines, and is therefore drawn into folds, which are disposed at the entrance of the gullet, thus permanently closing it to all matters within the stomach. The gullet here also as it enters becomes much narrower in calibre; it does not widen

funnel-shaped as in other animals (*see* Figs. 88 and 89), but viewed from the surface of the membrane it is perfectiy shut,

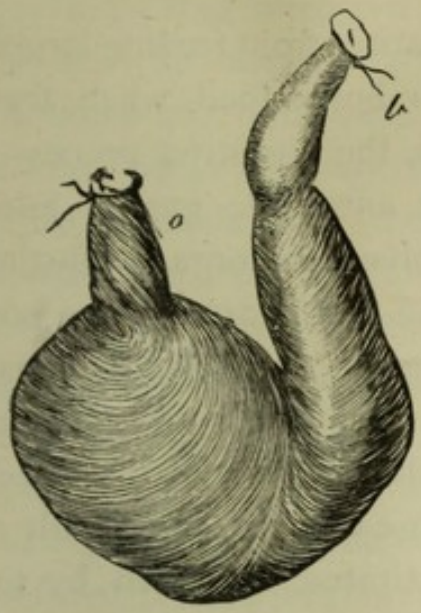


FIG. 88.—*Stomach of the Dog.*
a. Gullet. *b*. Duodenum.

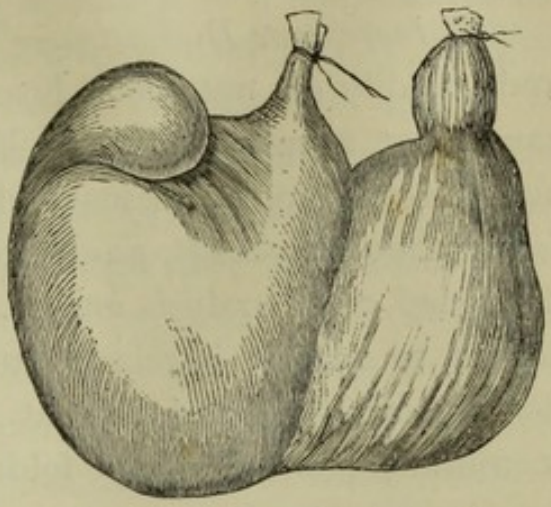


FIG. 89.—*Stomach of the Pig.*



FIG. 90.—*Mucous Membrane closing the cardiac orifice of the œsophagus within the stomach.*

the folds apparently rising and radiating from a small centre (Fig. 90).

Having pursued thus far, although but briefly and simply, the anatomy of the horse's stomach, we will now see how these provisions interfere with the process of vomition. The conditions necessary for the act are—1st. Inordinate distension of the stomach, by which the muscular fibres are more or less paralysed. 2nd. Dilatation of the cardiac or lower end of the œsophagus, and obliteration of the folds of mucous membrane. 3rd. Complete obstruction by contraction of, or external pressure upon, the pylorus. 4th. Rupture of the stomach; and, lastly, ulceration of the mucous membrane, or disease which impairs the contractility of the organ.

We will take up a further illustration of these points, but at this stage the reader must be informed that the first

second, and third conditions are usually associated; the first and second always, and in some cases the whole are present.

1st. *Inordinate Distension.*—This arises from feeding largely and greedily on nutritious, heavy, or bulky food, when, from causes not always readily explained, the digestive process is arrested, and, in the absence of the antiseptic gastric juice, fermentation proceeds, gases are evolved, the organ is further distended, and paralysis ensues. The muscular coat has now ceased to act; it is relaxed and flaccid, the organ is considerably enlarged, and this at once draws out the mucous membrane, obliterating the folds at the entrance of the gullet, leaving an open free passage. Nausea arises as a result of indigestion, and reflex action is instituted, as shown by the action of the abdominal walls and ejection of the food through the nostrils—a result always observed in the horse, passage by the mouth being interfered with by the length of the false palate. (*See* Plates I. and IX.) From among the numerous instances of vomition in the horse which have come beneath notice, we select the following extract from a communication furnished by the writer to a professional journal.*

"It is a common practice among the farmers of South Yorkshire to send their horses considerable distances for the purpose of carting lime from the Derbyshire kilns for agricultural use, when two nights and a day are occupied upon the journey. The animals are fed upon the principle of plenty; a large meal of hay or chaff, with corn, forming a dry mixture, is given before starting, and repeated at intervals throughout the journey, when the cold lime-water from the springs of Derbyshire being given, produces all the effects desirable for a case of colic.

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* Veterinary Records: *Edinburgh Veterinary Review*, vol. vi. p. 643. 1864.

"Three horses, owned by one person, had reached a distance of sixteen miles from home on one of these journeys, and were put into a stable at a road-side public-house, when symptoms of colic soon manifested themselves. A horse was borrowed, and ridden in haste to apprise the owner, who called upon me to accompany him to the place. Two animals had recovered under native remedies—*gin*, *butter*, and *soot*; the third, although free from pain, looked 'sick as a horse'—countenance haggard, pulse weak and accelerated, and there existed evidences of great depression to a very great extent. Around the nostrils were attached portions of dry hardened egesta, and a sour smell continued to be detected. The ears and legs were cold, and all food refused; borborygmus continued, but the bowels had not acted. My attention was next directed to the straw and floor of the box, and I discovered a quantity of chaff, beans, bran, &c., which had constituted the food of the morning at home and on the journey, mixed with mucus and froth, leaving no doubt of the truth of the statement of the attendants, that the horse had *spewed*. Upon further inquiry, I found the animal had suffered great pain, and rolled very much during the paroxysms, the vomiting occurring when he had risen from the ground, from which considerable relief appeared to be derived. Spt. ammon. aromat. were given after a dose of cathartic medicine, warm rugs to the body, bandages were applied to the legs, and a man left to stay with him the few hours that remained of night. I saw him again after a short rest, and found him considerably improved, when the other animals were despatched to their destination for lime, my patient to resume his journey homewards when they returned. Nothing further took place worth record, save that the horse was alive and well two or three years afterwards, but I never heard of his being guilty of emesis.

"Similar cases have occurred on several occasions among heavy horses, to which my attention has been directed for an attack of colic, most of which were gross feeders and animals of great capacity and visceral development.

"Mr. Thomas Thompson, M.R.C.V.S., Sunderland, gave me the following particulars of a case of emesis in the horse :—

"On July 9, 1864, he was called to see a grey colt, three years old, which was said to be suffering from gripes and sickness. When he arrived, the animal was lying and rolling in pain, frequently rising as in colic ; tympanitis present ; pulse slow, weak, small, and irregular ; temperature natural. The animal was made to rise, and when he had done so retchings came on, and with very little preparatory effort vomited through the nostrils as much matter, composed of grass, mucus, and froth, as could be held in both hands together. Spt. eth. nit., eth. sulph., spt. ammon. aromat., tr. aconit., tr. zingib., and tr. opii., were used, but the animal continued to vomit, at periods of fifteen minutes, upwards of an hour. Quiescence was gradually restored in four hours, since which time the horse has continued well and healthy.

"The long-continued drought of 1864 had deteriorated pasturage, and rendered the small quantity of grass which remained dry and innutritious, no doubt causing the extreme symptoms of indigestion. Although not ascertained, I have no doubt the large intestines were considerably impacted, as well as the stomach ; in fact, Mr. Thompson asserts, stercoral matters were brought up towards the close of the case.

"Mr. Luke Scott, M.R.C.V.S., describes a case of vomiting in an aged mare used for farming purposes, which had exhibited symptoms of impaction of the stomach from a full meal of oats which had been swallowed very greedily. There was no disposition to roll or lie down, as all symptoms were speedily developed. Vomiting had commenced before

he arrived, about a pint of matter being ejected from the nostrils each time, which occurred at intervals of ten or fifteen minutes if the animal was left quiet and alone. If the head was raised from the very low position in which it was held, vomition came on instantly. She recovered without treatment."

2nd. *Pyloric Obstruction.* — It is not improbable that, independent of contraction of the pyloric sphincter, pressure derived from the abdominal walls will impel the organs against the duodenum, and thus greatly assist in closing the passage, while the intestines may also be impacted, thus adding to the pressure. Seeing this, we may probably explain why towards the end of the case the contents of the intestines have found their way into the stomach and afterwards being ejected by the nostrils, the pressure being mitigated on account of the emptiness of the stomach, the paralysis remaining and relaxation of the pyloric sphincter ensuing from depression. We quote again from the communication before referred to.*

"Any one who has hitherto described a case of vomiting in the horse, has not failed to take cognisance of the utter prostration which results.

"A young brown mare, after suffering from repeated attacks of colic, at length presented symptoms of approaching dissolution ; emesis being accomplished before death, which certainly and with great rapidity accelerated the termination of affairs. Three large fibrous tumours were found attached to the mucous surface of the ilium by a pedicle ; inflammation had taken place, and consequent upon the action of the viscus, dislodgment of one of the smaller ones—the fourth—which was found near the stomach, doubtless having been forced on its way there by antiperistaltic action.

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* Veterinary Records: *Edinburgh Veterinary Review*, vol. vi. p. 648. 1864.

"A pony, used in one of the coal-mines of the Marchioness of Londonderry, died, after much suffering, indicative of some serious affection of the bowels, accompanied by retchings; and in the small intestines was found a calculus, surrounded by diseased tissue, in which ulceration had been set up, allowing the stone to be partly evacuated. In the stomach a second was found, no doubt also carried there by the reverse action of the intestine."

4th. *Rupture of the Stomach.*—It seems a most incredible statement that horses with ruptured stomach, and immediately before death, are capable of vomiting. The fact confirms the belief that the stomach itself takes litttle or no part in vomition; and strengthens the assertion, that the absence of the mucous folds at the cardiac opening, together with the loss of muscular contractility in the organ, are indispensable to the act. As having an important bearing on this position of the subject, the following paper, by the writer, is transcribed from the pages of the journal in which it appeared.*

"I am indebted to Mr. A. Mann, sen., Lambton, for the morbid specimen which accompanies this report. The case possesses features of peculiar interest, and I think it is worthy of a place in our *Veterinary Records.*

"The subject of this notice was a brown horse, seventeen hands high, and about fourteen or fifteen years of age, used on the collieries of the Earl of Durham, principally as a crab-horse—that is, he was employed in a kind of windlass, by which the workmen are lowered or raised during their examination and repair of the pumps, &c., of the shafts of coal-pits. Such an occupation is often long-continued, necessitating an exposure frequently to most inclement weather; but when men only are to be lowered, the work

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* Strangulated Inguinal Hernia and Rupture of the Stomach in a Horse: *Edinburgh Veterinary Review*, vol. i. p. 234. New Series.

is not considered laborious, nor was he found to suffer from it in any way whatever.

"On one occasion, six years ago, when drawing coal-waggons on a slight gradient, he stumbled and fell, and was pushed along the rails a distance of about thirty yards, receiving extensive bruises about the haunch and loins, which appeared to be superficial, however, and were quite well in the space of a month, the animal being again put to the crab work, none the worse to all appearance. From this time to December last he continued to work well, maintained his strength and condition, yet appeared somewhat dull, but never required medical assistance. On the 12th of that month he was seized with slight colic, for which Mr. Mann prescribed an anodyne mixture, and he returned to his work in half an hour.

"Nothing further took place until the 2nd of the present month—March—when the driver again brought the animal, now *in extremis*. Symptoms were urgent and speedily developed, consisting of hurried respiration, cold perspiration over the whole body, which, in the first instance, broke out abruptly on each side of the thorax behind the shoulder. As he walked he reeled, and when allowed to stand trembled much, and with difficulty escaped falling. The hind-legs were placed widely apart, and he constantly attempted to urinate, succeeding in passing only a few drops of normal-looking fluid. The eyeballs protruded in the extreme, the neck arched, and muscles strongly contracted, drawing the nose in close approximation to the chest, where it was retained. The tongue was black and hung from the mouth, which was tightly closed, allowing, however, of white froth to be discharged in great quantities. Mucus and froth, of a dirty colour, also came from the nostrils profusely. The conjunctiva was of a pale yellow colour, with its network of vessels finely injected.

"As nothing had passed the bowels for some time, it was

attempted to introduce the hand; but this could not be attempted on account of extreme spasm. At times he would attempt to lie down, and continued thus, experiencing no relief from treatment, from 10 A.M. to 3 P.M., when he suddenly dropped dead.

"From the first the pulse was imperceptible at the jaw and radius, accompanied with extreme coldness of the ears and extremities.

"A *post-mortem* examination was commenced on the morning of the 3rd inst. On opening the abdomen, a considerable amount of fat adhered to the intestines; and about four gallons of red serum escaped from the opening made in the walls. About half the quantity also came away by the rectum, when the carcass was moved in the act of flaying. The transverse colon exhibited a patch of peritoneal inflammation, six or eight inches in area; but all other tissues were blanched and flaccid. Food was distributed throughout the cavity, and extended to the pelvis. The intestines were next turned aside, and found to contain fluid only; but in the omental sac was a large mass of half-masticated hay and oats, with whole beans, occupying a space equal to double the quantity found in any stomach during health. The small intestines were traced, when a portion was found to form an inguinal hernia, with adhesions; at the pyloric end it was free. The œsophagus was divided, when the stomach on being raised was discovered to be extensively lacerated along the greater curvature, and the lacerations extended to the pyloric half.

"When this case was first related to me, and special reference made to the apparent absence of much of the tissue composing the coats of the stomach, I fancied it might be one of ulceration and perforation; but on carefully examining the parts, and ascertaining some of the facts, I can glean that the horse was first seized with symptoms of severe and

immovable obstruction of the bowels. The tenesmus, violent contraction of the rectum on the arm being forced up, the partial sweats bedewing the body, indicate, with the aid of the information derived from a *post-mortem* examination, that the animal had a strangulated inguinal hernia. This is so rare in geldings, that its having been overlooked need not astonish us, especially as the symptoms were very decidedly those of ruptured stomach.

"On examining the omentum and stomach at my leisure, I have found that the particles of undigested food still adhering to the omentum indicate that the gastric laceration must have occurred shortly after the ingestion of a quantity of food. As is usual in these cases, the over-distended organ had become lacerated along the great curvature by tearing of the peritoneal coat first, then of the muscular, which had receded so as to deceive one as to the amount of destruction the stomach had sustained, and the mucous membrane was soft and irregularly torn, and in a condition as if it had suffered somewhat from the action of the gastric juice.

"This case is replete with interest, and it shows how careful we should be in diagnosing cases which appear at first sight trivial and unimportant. Who thinks of examining the inguinal region of a gelding, though he may be suffering from some extraordinary and unaccountable obstruction? It is very important to make a close examination in all cases in which injections cannot be given or retained in the rectum. The strangulation in the case above related cannot have occurred before the horse had taken the full meal which rendered possible the rupture of the stomach; and I am disposed to believe that the animal was fresh and well until he took his last feed, after which the strangulation supervened, and this indirectly led, through the horse knocking himself about, &c., to the coats of the stomach giving way.

"When I say the horse was perfectly well before the

attack which ended in his death, I do not wish it to be understood that he was entirely free from inguinal hernia, as few will doubt that, in all probability, the inguinal hernia, with its adhesions, had existed for some time, and at last led to the horse's sudden destruction through one of the many causes which are capable of producing hernial strangulation."

Œsophagus ventriculosus, or saccular dilatation, favours the expulsion of food from the stomach, two cases of which came under notice almost at the same time, about sixteen years ago, the particulars of which are as follow :—

"A grey colt, five years old, bred from a Suffolk mare by a thorough-bred horse, the property of Sir George Dashwood, Bart., Kirtlington Park, Oxford, was the subject of repeated attacks of colic, with violent attempts to *belch*, as expressed by the messenger. Usually the attacks came on after the morning meal, when probably the food supplied the night previous still to a great extent occupied the intestines. The animal was a good feeder, but not considered a ravenous one, and scarcely ever known to be affected but at the times stated.

"The attacks were ushered in by restlessness, pawing with the fore-feet, attempts to urinate, &c., symptoms which would gradually increase in their intensity, and assume a violent form. Next, attempts to eructate would be made, the nose being brought into contact with the breast repeatedly, and a spasmodic effort at the same time made by the muscles of the neck, chest, and abdomen, until vomition was effected. The pulse seldom assumed any irregularity of movement, and during these paroxysms the colt rarely lay down or rolled—a fact which first attracted my attention, and induced me to attribute the affection to some interior part, as the stomach, pylorus, or duodenum. In watching carefully, however, I observed large pellets of food repeatedly pass as high up-

wards within the gullet as the bifurcation of the jugular vein during slight retching, and slide down again. This I saw on several occasions for half an hour after medicine had been administered, when the action gradually ceased. During attacks of colic this action was most severe, and could always be detected when the animal had eaten too much. He was afterwards sold from the neighbourhood, and lost sight of.

"Another case, but of less intensity than the first, came under my notice about the same time—viz., 1861, in a cob horse about 14-2 high, of the Welsh breed, belonging to a farmer near Islip. In this instance no symptoms of colic appeared, the pellets of food after a full meal passed upwards and downwards with regularity, but which admitted of some aggravation amounting to excessive preparatory exertion, resulting in the end to forcing matter from the stomach."*

The condition of saccular dilatation of the gullet will be best understood by a reference to the annexed illustration (Fig. 91). The gullet, at its entrance to the stomach, has suffered laceration of its coats, by which a pouch or diverticulum has been formed, and into this the folds of mucous membrane are disposed by internal pressure from food, thus leaving the passage of the gullet free and open to the entrance of food during contractions of the stomach.



FIG. 91.—*Saccular Dilatation of the Cardiac Portion of the Gullet* (Colin).

* Author's paper previously quoted: *Edinburgh Veterinary Review*, vol. vi. p. 645.

This state favours the repeated practice of vomition ; it also explains why horses may vomit frequently, and obtain relief, after unusual distension of the stomach.

The *treatment* of habitual vomition in the horse will be anticipated by the reader. In such dilatations of the œsophagus as that shown in the illustration, no operation can of course be adopted, and the owner must fall back upon the only remedy for prevention—viz., careful feeding. The animal should receive frequent and small quantities of food, and he must not be allowed to slake intense thirst with large draughts of cold water. It is much better to allow all animals free access of water, by which they drink less, and thereby avoid the risk which ensues when the stomach is full.

Dyspepsia—Chronic Indigestion.

From various causes the horse is liable to derangements of the digestive organs, which, although unattended with structural lesion, nevertheless prove inconvenient after existing some time, and lead to the establishment of incurable states. In young animals the process of dentition greatly interferes with the natural and healthy functions, and in older ones diseases and irregularities of the teeth, which prevent proper reduction of the food ; long fasts are a prolific source of the evil, as the animal becomes very hungry, and, contemporaneous with exhaustion succeeding a long day, the stomach is weakened, and less able to contend with the large quantity of food greedily swallowed. Lastly, we may name the practice, which some persons habitually follow, of constantly dosing the horse with all kinds of remedies.

Symptoms.—The condition is at first denoted by an uncertain and irregular appetite, and as the disease advances good food is refused, the sufferer resorting to licking the walls, or even manifests an inordinate desire for filthy water

soil, and rubbish generally. The mouth is slimy and sour, and on these signs supervene general want of condition, as shown by tucked-up belly (Fig. 92), harsh-looking skin, which is fast on the body, and defies one to grasp a handful as in the healthy horse ; it is in addition scurfy and intolerably dirty ; the bowels are irregular and full of wind, and a constant discharge of fœtid flatus takes place from the rectum ; the fæces are composed of imperfectly-masticated food, and griping pains are periodically present. While at work the sufferer is weak and unwilling to encounter stiff exertion ; diarrhœa invariably alternates with constipation, and the colour of the fæces is generally that of the food on which the animal subsists, indicating the absence of digestive action, and solvent fluids necessary to it. In some cases there is an attendant cough, sometimes dry, but usually short and moist or rattling, a sign of imperfect action of the liver, by which the lungs are excited to secretion. A moderate purgative, repeated if necessary, usually proves sufficient to remove it. Although the urine may not be altered in colour, nor contain any abnormal ingredient in any quantity sufficient to stamp it as a diseased product, it will become such if the signs we have enumerated are not mitigated. Indigestion in the horse is fertile in producing diseases of the urinary organs and their secretions, some of which will be found in the section devoted to a consideration of that class.

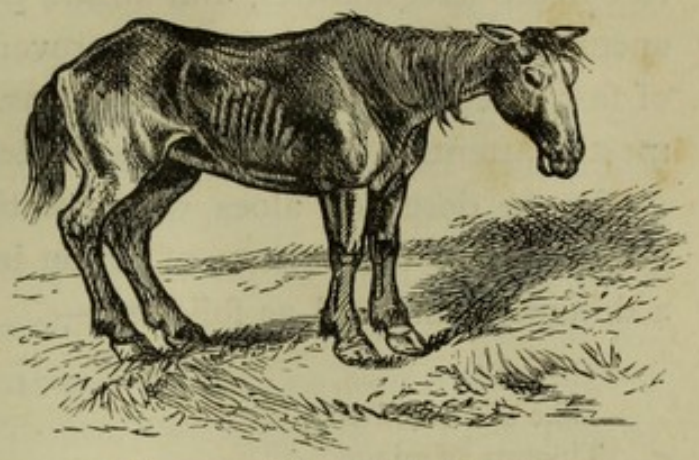


FIG. 92.—*Chronic Indigestion.*

Treatment.—Remove all loose, diseased, and supernumerary teeth which militate against proper grinding of the

food ; institute special inquiry into the plan of feeding, and carefully note the kind and quality of food allowed in order to correct irregularities, and insure proper and timely allowances of good and wholesome provender ; avoid long hours of fast, over-work, unnecessary exposure, and neglect of domestic attention in the stable. Regulate the bowels by moderate doses of aloes when costiveness is present, and gently restore the balance of action in diarrhœa by means of a draught composed as follows :—

RECIPE NO. 74.

Take of linseed oil	½ pint.
Tincture of opium	½ fl. oz.
Carbonate of potash	2 drs.
Water	2 fl. oz.

Dissolve the potash in the water, and shake it up with the oil in a bottle, after which add the laudanum, and administer in the usual way.

Having obtained a more regular action of the bowels, make up powders after the following formula :—

RECIPE NO. 75.

Take of carbonate of soda	2 drs.
Powdered gentian	2 „
Nux vomica	½ „

Mix. A powder containing the above doses to be given in the food, morning and night, for six or eight days, and during the succeeding week make the following change :—

RECIPE NO. 76.

Common salt	2 drs.
Powdered gentian	2 „
„ ginger	1 „
„ locust bean	4 „

Mix. A powder containing these doses to be given as No. 75. If, however, the appetite is not sufficiently good to warrant the mixing of the powders with the food, make up the active ingredients into a bolus, and administer, morning

and evening, until the appetite returns, when the powders may be substituted.

We would caution the reader against giving many medicines, and their constant use, as indescribable harm results. Avoid the salts of iron, for, notwithstanding they are tonics, they act more like poisons in dyspepsia, the horse especially being strangely susceptible of their effects during the prevalence of the disorder. Provide roots, green food, and even fruit and vegetables, as soon as possible, turning the animal into a loose box, and allow him the run of a yard or paddock if he cannot be indulged with a run at grass. In the absence of the latter give regular light exercise, and if the animal possesses a long coat, the attack seizing him in the winter, let him be speedily clipped, and undergo a daily thorough cleaning and damp wisping, providing suitable artificial clothing.

Cases of indigestion are liable to assume a chronic state, and cause an endless amount of trouble, if not combated early; and when a disordered appetite degenerates farther into a ravenous one, or the use of boiled and sloppy or bulky and indigestible food is unsparingly allowed, conjointly with long fasts and irregular work, the stomach enlarges to unnatural proportions, the muscular fibres are weakened and degenerated, paralysis more or less ensues, the ability to vomit becomes general, and, sooner or later, in one of the repeated attacks of colic which then frequently happen, rupture of the stomach takes place, speedily ending in death.

Acute Indigestion—Impaction of the Stomach.

This form of indigestion is sometimes witnessed in a number of animals in a district at the same time, in consequence of some change in diet, as, for instance, during the hay-making season, animals are apt to feed voraciously on the

new fodder, others gain access to the growing wheat, or at other times they indulge at a heap of grain when the barn-door has been inadvertently left open. In isolated instances, horses break loose and find the corn chest invitingly open, and, as in each preceding case, fill the stomach to repletion. Horses returning hungry, after long fasts and equally long and tiring journeys, are apt to devour their food greedily and in large quantities, without due mastication and admixture with the salivary secretion. In those establishments in the North of England, and likewise in Scotland, where boiled or cooked food is given, cases of acute indigestion are common; impaction arising in an organ already enlarged and weakened from continual chronic indigestion, perhaps, and in each instance to which we have alluded great risk of death from rupture of the stomach is always to be apprehended.

With regard to the nature of certain kinds of food, particularly those which stand high in the scale of nutritive value, it is usual to condemn them as hurtful on that account, and hence we find men of decided genius falling into the error of advocating entirely the avoidance of barley and wheat, urging their specific tendencies to produce indigestion, laminitis, or death, &c. What is to be said then to the fact, that during the past year (1876) we have been assured by numbers of farmers in the Home Counties, that, as wheat was making such a fearfully low price, they have given it largely to their horses, and sold their oats and beans, &c.; and that year does not stand alone, for we have experience of the fact having been practised in other years, and some farmers have adopted it with safety and success, because, as in other agricultural matters—

"It was my father's custom,
And so it shall be mine."

It is remarkable, also, that in reply to our numerous inquiries, we have not learned that such general consumption

of wheat has induced an enzoötic visitation of acute indigestion in the farm horses to which it has been supplied. Besides, we can assert that for years we have used barley for working horses, and in many instances it has formed the bulk of their food ; and yet, again, we have made sudden changes from oats to beans or peas, to barley and back to oats, yet none of these fearful states have resulted. In large studs of horses it becomes a necessary study which articles of food shall be supplied, which affording the greatest amount of nutrition shall at the same time be supplied at the smallest rate of expenditure. With the constant fluctuations of the markets, such changes are absolutely necessary to insure economy ; and we can confidently assert, that when these principles of science are unfettered by a directorate or the red-tape of grandeeism, the health and stamina of the horses are unquestionable, and acute indigestion is never known. Why, then, these apparent discrepancies ? They arise from a total misapprehension of facts. Wheat and barley are not essentially dangerous because they are nutritious, but because they are devoured in unnatural quantities, in an unnatural way. If we but tax our memories, we shall find that the whole train of symptoms and consequences from too large and too hasty feeding on oats, green food, &c., which form the constant article of diet, are due to an excess of food, and not the quality. The rational use of a nutritious food must not be condemned because it is capable of producing harm in excess. The reader is referred to the author's manual, " How to Feed the Horse," * for further information on this subject.

Symptoms.—The first signs of impaction of the stomach are—constipation, uneasiness, staring eyes, suspension of the appetite, hot mouth, slightly accelerated pulse, colicky pains

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* London and New York : Frederick Warne & Co.

scraping with the fore-feet, constant lifting of the hind-legs, crouching, curling the tail, lying down, rolling, &c.

The disease is liable to be confounded with two other distinct affections, in consequence of the similarity of the signs which are developed during later stages : these are phrenitis, or inflammation of the brain, sometimes called mad-staggers; and coma, or sleepy-staggers, a chronic disease of the brain. An experienced practitioner, however, readily distinguishes between each, one particular feature in the history of the case being almost sufficient—viz., the violence and coma of impaction are recent, and rapidly brought on ; while in each of the other diseases they are gradual, extending over days.

As the disease advances, signs of nausea are evident, eructation of wind takes place, and attempts to vomit are made ; tremors of the superficial muscles, with partial sweats, are peculiarly marked, and at this stage we may expect some form of aggravation to the symptoms.

Impaction with Frenzy.—The muscular tremors increase, the pulse is full, hard, and bounding, but becomes smaller and wiry ; breathing hurried and oppressed ; visible mucous membranes are inflamed, and occasionally tinged with yellow; periods of calmness alternate with acts of violence ; the animal thrusts his head against the wall, kicks out with the hind-legs, scrapes madly with the fore-legs, looks about wildly, stamps, rears and drops with his fore-feet in the manger, rushes back and breaks loose ; a short period of quiescence takes place, and the fits are resumed with former severity, rendering the administration of remedies a difficult and dangerous process. If he rolls he throws himself down violently, uttering a loud sigh, and prefers to lie on the back, the legs being doubled on the abdomen ; shortly he strikes out and rises to resume his former acts of violence, in which he eventually falls exhausted by convulsions, or the stomach ruptures, and death speedily follows.

Impaction with Unconsciousness.—The comatose form of indigestion is equally rapid in development. The full and bounding pulse becomes soft and slower; the animal is listless and indifferent to all around; the legs are stiff and placed widely apart (Fig. 93); breathing slow and rather

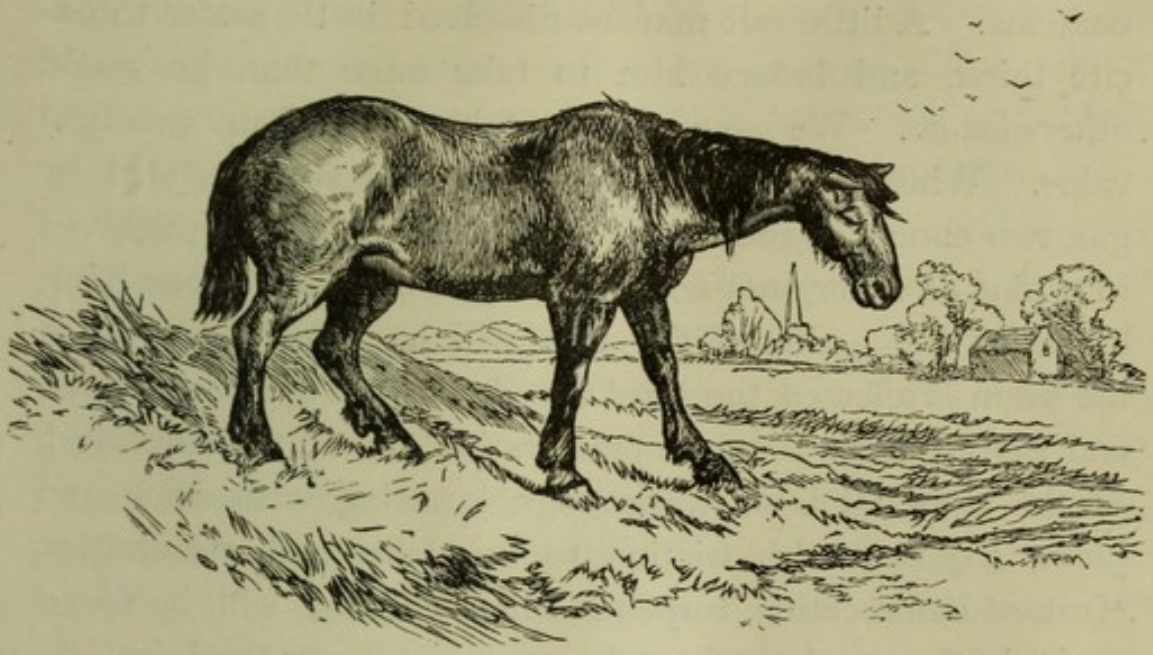


FIG. 93.—*Impaction of the Stomach.*

difficult, gradually becoming stertorous; the head is held low, eyes closed, and sight is impaired; finally he becomes blind, even deaf and delirious, and, falling in convulsions, dies. Some animals recover, even after blindness has set in; but they do not regain the power of vision.

Impaction succeeded by Paralysis.—This is another form in which acute indigestion may terminate. The animal exhibits a loose, straggling kind of walk, reels when turned or put back, and sometimes falls; on this account the disease has been known as vertigo, megrims, &c., but erroneously. The animal is sometimes unable to rise after dropping in pain from colic, when the symptoms become aggravated; and he dies after suffering from tremors, delirium, and convulsions.

Treatment.—The principle of action must be laid out for unloading the stomach as soon as possible, as no hope of

success can be entertained without that being accomplished. A large dose of aloes should be given, and a drop or two of croton oil may be judiciously added ; enemas should be thrown up constantly, and, if the animal will take water, there may be some probability of softening and moving the contents. A little salt may be dissolved in the water to excite thirst, and induce him to take more than he would otherwise do. We have not found bleeding of any practical value. When the stomach and intestines are distended by gas, two ounces of the hyposulphite of soda may be dissolved in a pint of water, and administered at intervals of one hour, by which the action of the aloes will be expedited. When the brain is affected, the head may be bathed with cold water, and every means to cause perspiration should be employed, as the application of warm rugs, covering with straw and sacks, together with friction to the loins and extremities. Mustard embrocation, turpentine liniment, &c., will be found useful in the paralytic form, being applied over the loins.

Rupture of the Stomach.

It will be sufficiently apparent to the reader from what has already been written, that rupture of the stomach can only be regarded as a result of a prior affection, inordinate distension by food being the chief cause, hastened by the formation of gas as a result of fermentation of the contents, as well as the violent acts to which the sufferer gives way under a sense of acute pain. The symptoms are—tremors of the superficial muscles and fore-extremities, profuse perspiration, heavy breathing, staggering gait, anxious countenance, and at length vomition, sudden prostration of strength, running-down fluttering pulse, continued nausea, convulsions and retching, even in the agony of death.

It has been contended that vomition, as a sign of ruptured

stomach, is not so valuable and unerring as supposed by some, because the act has been accomplished by animals suffering from rupture of one or other of the intestines, and is common, as we have seen, in cases of saccular dilatation of the œsophagus. We, however, maintain that its diagnostic value is not in the least lessened, because in dilatation of the œsophagus, unassociated with other diseases, there are no signs of speedy dissolution, death immediately succeeding the act, as in rupture of the stomach ; and in rupture of the colon, or presence of calculi, there are generally special signs or information of a negative character, which deny the existence of stomach affection ; besides which, the act is never so complete as in rupture of that organ ; nausea and *incomplete attempts* to vomit are common in strangulated hernia and most severe affections of the bowels ; and therefore, bearing this in mind, we feel strengthened in holding up the complete act, associated with dissolution, as a valuable aid to

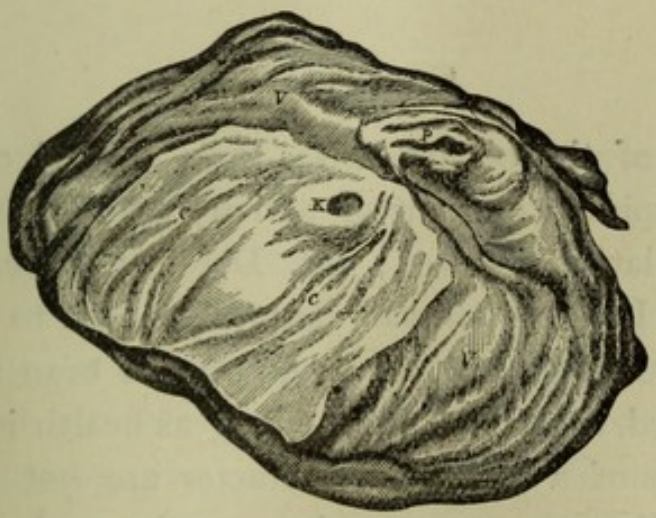


FIG. 94.—*The Stomach of the Horse, laid open.*

C, C. The cuticular portion of the lining mucous membrane.
V, V. The villous portion of the membrane.
K. The cardiac opening to the stomach, with the œsophagus.
P. The pyloric opening from the stomach.

the identification of rupture of the stomach from other diseases. But vomition may take place apart from rupture, and when no saccular dilatation of the gullet is present, when it is not associated with dissolution, or any of the foregoing

symptoms. We have already pointed out that a paralysed condition of the muscular coat is followed by enlargement of the viscus, which, drawing the mucous membrane with it, obliterates the folds which block up the entrance of the gullet. These conditions may be attended with severe signs (Fig. 93); but the pulse continues strong, the vital powers are not prostrated, nor are the ears, extremities, or surface of the body reduced in temperature, as in rupture.

In aged animals, rupture may arise from weakness, attenuation, and degeneration of the walls of the stomach, and, in some few instances, the work of ulceration may facilitate its occurrence. In both instances there is the inability to endure the strain arising from an inordinate quantity of food, and distension consequent on its fermentation and swelling.

Treatment is of no service. The means of prevention consist in the exercise of judicious management in feeding and work, which reduce the liability to this and all other diseases.

Constipation.

Inaction of the bowels arises from several causes:—1st. Natural torpidity, or want of activity; 2nd. As a result of serious and latent diseases; 3rd. Debility or weakness; 4th. Paralysis. In those animals naturally prone to constipation, nothing is required beyond an occasional bran mash, or the use of linseed, roots, &c., and, as long as health is maintained, all remedies of a medicinal character are not to be recommended. Enemas may supplement the action of bran or linseed, and a change of diet should be made when the present form is known to give rise to the disorder.

When debility is the cause, prescribe a course of tonics, particularly the vegetable bitters, and give the animal gentle exercise only for a time. Nux vomica proves highly useful.

As a symptom of other diseases, constipation must be

dealt with accordingly. It is advisable to remove it as soon as possible in all cases, the original disease being more or less influenced ; but care is particularly required when it occurs in connexion with influenza (so called) and catarrhal diseases generally—a caution which is repeated under all the various affections throughout the work.

Paralysis of the bowels causing constipation ensues after violent colic, &c., and is known by the absence of *intestinal murmurs*, with an open, dry, and flaccid condition of the rectum in some cases ; depression and listlessness, small and frequent pulse, gradual prostration and death. Medicines, in the shape of purgatives, then act as so much poison, and enemas are retained almost definitely, excess of fluid only being discharged in a passive or spontaneous stream, without any anal disturbance. The best remedies are—vegetable tonics and bitters, nux vomica being included, and occasional enemas containing ammonia or turpentine.

Colic.

This is a common cause of severe and extensive mortality among the working horses of the country. Colic is the term used by veterinary practitioners to denote the pain and disturbance arising in the bowels from a variety of conditions. Each locality almost has its various synonyms or equivalents, and hence it is known as gripes, inflammation, bellyache, stoppage, spasms, wind, fret, &c. The veterinarian recognises two kinds—viz., spasmodic colic and flatulent colic.

Nature.—Intestinal indigestion, arising from the presence of a quantity of food, sometimes amounting to impaction, causing spasm of the muscular coat of the intestines, forming the first kind ; and irritation due to similar causes, as well as the presence of large quantities of gases evolved from the food undergoing fermentation. Colic, of both kinds, is, *per se*,

a spasmodic affection, due to some influence which disturbs the natural peristaltic action of the intestines, and also arrests the secretions necessary for the proper digestion of the food. In the former, the intestines forcibly contract around the irritant at various points, which gives rise to pain ; in the latter, they are distended by gases almost entirely throughout a particular part, the loss of the secretion as an agent capable of arresting fermentation being the direct cause, and muscular spasm is thus greatly extended.

Colic is not an inflammatory disease, and, as far as we know, never runs on to inflammation, notwithstanding the many assertions that have been made from high quarters to the contrary. Some of the *post-mortem* appearances generally set down to inflammation supervening on colic we shall have occasion to notice hereafter.

Causes.—As an original affection, colic is due to improper systems of feeding ; long fasts, and indulgence of a morbid appetite afterwards ; constipation, neglected and aggravated by the consumption of large quantities of food ; sudden changes of diet without due caution in the supply ; food swallowed without necessary mastication and insalivation, the most familiar example of which is the trashy boiled or cooked food of the North, which kills sometimes to the extent of 50 per cent. ; inferior food or highly nutritious food in large quantity, and more especially when, in addition, exhaustion is added. These induce what has been termed the *true* form of colic, being purely intestinal disturbance. Besides these there are other causes, such as disorders of the liver, the presence of calculi, parasites, invagination of the bowels, herniæ, abscesses in the mesentery, diseases of the kidneys, liver, pleura, peritoneum, &c. These give rise to what is termed *false colic.* Amongst the general causes of colic cold water is set down, and doubtless, under certain conditions, it has a baneful effect. When the animal is

heated by exercise, and large draughts are allowed, particularly of an unusual kind, such as hard or mineral waters, as already illustrated by the case cited at page 294, violent colic is produced ; indeed, as resident for some time on the borders of Derbyshire, where such water prevails, we can testify to the number of cases and deaths arising from it, more particularly to those animals from a distance not accustomed to it, and having, in addition to other susceptibilities, a full stomach or intestines. Apart from these we do not know of cold water producing colic, even when taken in unusually large quantities ; where there are already diseased conditions of the bowels, &c., such have been known to aggravate and give rise to colicky pains. Intestinal calculi, mesenteric abscesses, certain diseases of the bowels, &c., give rise to relapsing colic ; while irritant poisons produce not only colic, but inflammation. (*See* Enteritis—Poisons.)

Symptoms of Spasmodic Colic.—These are indicative of abdominal pain. The animal scrapes with the fore-feet, kicks at the belly, shifts about, turns round, smells the floor, crouches, puts the nose to the flanks, lies down, rolls, remains for a time on the back, and breathes heavily throughout ; gradually he slips over on the side, stretches out the legs, when the signs abate as suddenly as they began ; he then rises, shakes himself, and the termination of the paroxysm is known by his looking about for food. In the ordinarily severe cases the paroxysms follow each other rapidly, between each of which the pulse acquires its natural fulness and frequency, being only accelerated during the suffering and excitement, when are added fulness of the eyes, which confer a look of staring, and sometimes of anguish. At times the animal assumes a listless state. During ease at the commencement or termination of each paroxysm a discharge of fæces takes place, sometimes of a semifluid nature, or they are composed of hard pellets accompanied with

fluid, but never in a large amount at once. The sufferer attempts to urinate frequently, discharging only a small quantity, although by passing the hand up the rectum the bladder is found to be full, retained there in consequence of sympathetic spasm of the neck. A full and copious discharge of urine indicates removal of spasm, and is therefore regarded as a critical and favourable sign. Previous supplies of grass, potatoes, roots generally, wheat or barley, especially when these are diseased, unripe, or given suddenly and in too large quantities, usually give rise to looseness or diarrhœa, when considerable discharges of flatus also take place. In addition to intestinal derangement, the stomach may be also overloaded, when signs of vomition are produced, and occasionally the act is effectually accomplished, as already described at page 295. In slight cases the paroxysms do not recur very rapidly, or continue long, and a favourable sign consists of their gradual decline both in frequency and intensity. In aggravated forms the attacks are frequent, and increase in severity ; the pulse becomes hard and frequent ; the pain is continuous and agonising, causing the sufferer to dash himself wildly about. Intense anguish is depicted in the countenance ; the eyes are staring and bloodshot, nostrils dilated, breathing loud and heavy ; he rolls violently, turns on the back, and drops or doubles the limbs, finding ease thereby ; when he walks the motion is unsteady and reeling, owing to sympathetic disorder of the brain ; cold sweats bedew the body, and the ears and extremities are also cold ; the muscles of the body quiver and twitch violently, and nausea is signified by curling upwards of the top lip, exposing the teeth (Fig. 95). Under the violence



FIG. 95.—*Nausea.*

of these continued signs the animal is exhausted ; the pulse becomes small, weak, and imperceptible ; paralysis of the bowels occasionally sets in, the brain participates strongly, and the animal dies.

Flatulent Colic.—When tympanitis is superadded to spasmodic colic, it becomes a most dangerous complication. It is not necessary that engorgement of the stomach or intestines be present to cause windy or flatulent colic. Small quantities of unsuitable food, as brewer's grains, especially if old and sour, diseased roots and tubers, rank grasses, changes of food even of nutritious kinds, &c., besides the incidental causes already named under spasmodic colic, are amongst the principal agencies which give rise to it. There is this especial difference in the manifestation of pain—it is continuous, although it may not be so violent, and the abdomen is distended, sometimes so tightly that percussion produces a loud resonant sound, the bowels are constipated, but occasionally discharge flatus. The brain is apt to participate early in this form, and signs of weakness and exhaustion rapidly develop, when the acute symptoms detailed under spasmodic colic appear, and death arises from rupture of some portion of the intestines, or absorption of the gases give rise to blood poisoning ; or the extreme pressure from the distended bowels so effectually arrest the portal circulation by which the flow of blood from the intestines is completely stopped, resulting in wide-spread extravasation of blood throughout their walls, a condition sometimes mistaken for strangulation and inflammation.

Post-mortem Appearances.—Rupture of any part of the digestive track is sufficiently obvious on opening the abdomen from the abundant distribution of food, and, on turning the intestines aside, the stomach or colon is found to be lacerated. Local stricture of one or more portions of intestine, calculi or parasites, may be present ; worms also in

large quanties are found, pointing a cause for derangement ; and in the flatulent form the extensive extravasation already alluded to is a common condition.

Treatment.—As the cause of spasmodic colic is due to the presence of some irritant in the shape of aliment within the stomach, or small or large intestines, it appears most reasonable that such should be removed as soon as possible, and for this purpose a dose of aloes is generally prescribed, 4, 6, 8, or even 10 drams being administered to large and powerful horses. More generally, however, the majority of practitioners prefer fluid forms known as colic draughts, some of which are useful on account of their cathartic qualities, and others for their antispasmodic properties. Illustrations of each are subjoined.

PURGATIVE COLIC DRAUGHTS.

RECIPE NO. 77.

Take of solution of aloes	6 to 10 fl. oz.
Aromatic spirits of ammonia	1 fl. oz.

Mix. The addition of half a pint of water is useful in order to mitigate the local action of the ammonia.

RECIPE NO. 78.

Take of solution of aloes	6 to 10 fl. oz.
Sulphuric ether	1 fl. oz.

Mix.

RECIPE NO. 79.

Take of solution of aloes	6 to 10 fl. oz.
Chloric ether	2 fl. oz.

Mix.

RECIPE NO. 80.

Take of linseed oil	1 pint.
Nitric, sulphuric, or chloric ether	1 oz.
Croton oil	2 to 5 drops.

Mix.

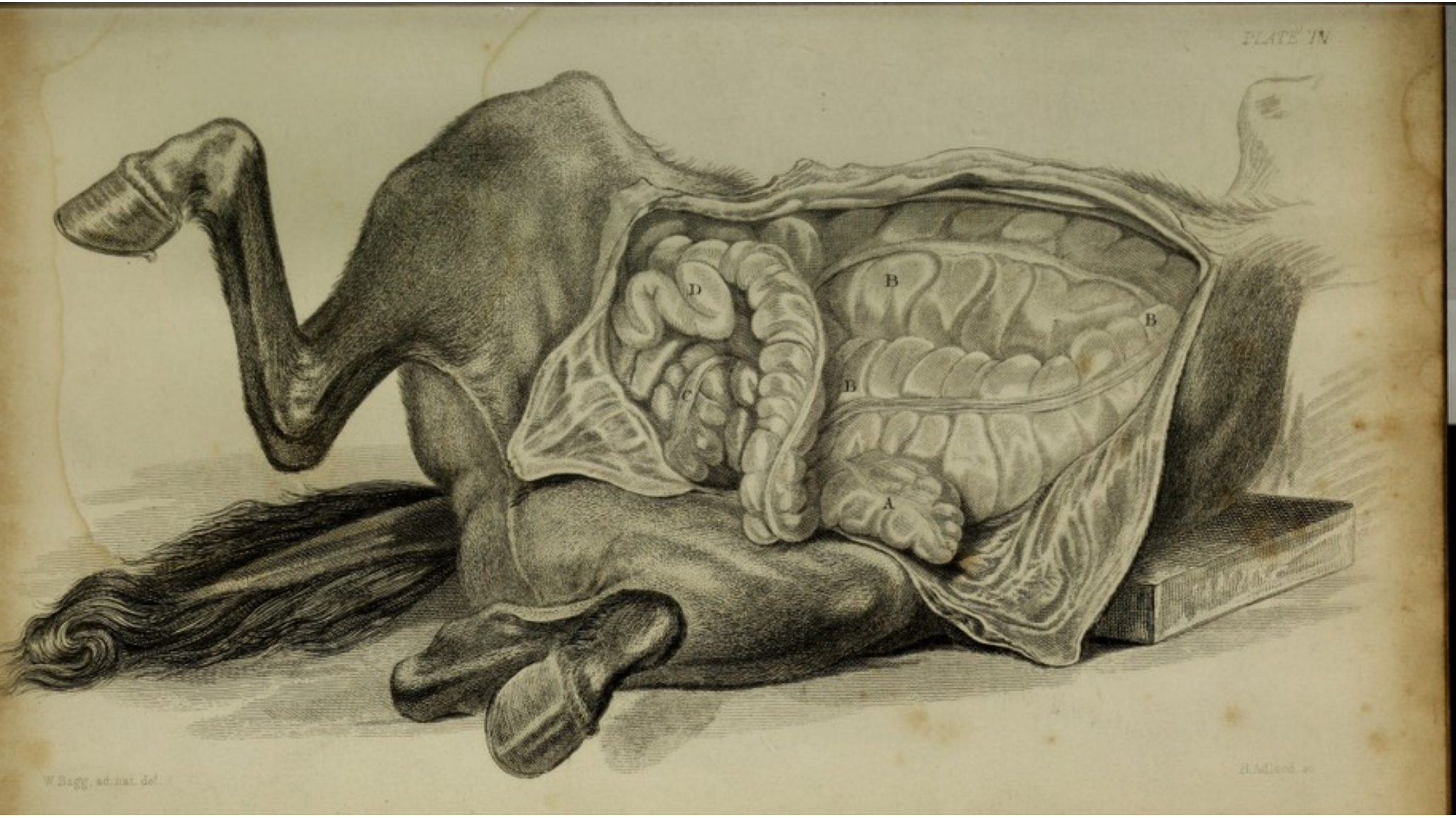
The draughts No. 78, 79, and 80 need no admixture.

DESCRIPTION OF PLATE IV.

"THE ABDOMEN LAID OPEN.

"An incision has been made through the linea alba and the walls of the cavity reflected back; thereby affording a full view of the intestines. Of course this proceeding has slightly changed their exact relative situations; but they are still sufficiently true to enable the reader to form a tolerably accurate idea of their positions when undisturbed.

A, The cæcum, having its blind extremity pointing downward; *B*, the colon originating and terminating in the right hypochondriac region; *C*, the rectum, showing one of its two muscular bands, and the cell-like structure of this intestine also being prominently exhibited; *D*, the small intestines, occupying the upper and posterior portion of the cavity. Only a few of these last come into this view."


PLATE IV
D
B
B
B
C
A
W. Bagg, ad. nat. del.
H. Adlard, sc.

ANTISPASMODIC COLIC DRAUGHTS.

RECIPE NO. 81.

Take of linseed oil	½ pint.
Tincture of opium	2 fl. oz.

Mix.

RECIPE NO. 82.

Take of tincture of opium	1 fl. oz.
Sulphuric ether	1 „
Water	½ pint.

Mix.

RECIPE NO. 83.

Take of extract of henbane, hyoscyamus, or belladonna	1 dr.
Sulphuric ether	1 fl. oz.
Water	½ pint.

Reduce the extract to an emulsion by means of a portion of the water; afterwards add the remainder with the ether.

RECIPE NO. 84.

Take of linseed oil	½ pint.
Oil of turpentine	1 fl. oz.
Tincture of opium	1 „

Mix.

RECIPE NO. 85.

Take of linseed oil	½ pint.
Sulphuric ether	1 fl. oz.
Camphor	2 drs.
Essence of ginger	2 fl. drs.

Dissolve the camphor in the ether, then add the oil and shake; afterwards add the essence. It may also be advisable to dilute with a cupful of cold water, to reduce the local effects of the camphor and essence.

RECIPE NO. 86.

Take of tincture of opium	1 fl. oz.
Oil of turpentine	1 „

Mix, and give in gruel or oatmeal and water.

When purgatives are employed, they should be given in sufficient doses according to the state of the bowels at the first, as it is unwise to give repeated doses which have the

effect of nauseating and depressing the animal; and if the pain continues, subsequent medicines should be those of an antispasmodic character.

Enemas should be constantly employed until a cessation of pain takes place and the action of the bowels is established, as betokened by the discharge of fæces or audible evidence of intestinal murmurs. The animal should be made as comfortable as possible by means of straw, and when he rolls large trusses may in tied with cords so as to keep them together, and placed singly or in numbers between him and the wall to prevent injury; hay-tea or tepid water may be allowed if he will drink. The bladder should be examined at the outset, and if found to be filled with urine, the catheter is to be passed without delay, in order to draw off the fluid, as rupture of the organ may result from the rolling and violent acts during spasms.

The question of using cathartics only as opposed to antispasmodics has been debated for some time, and likewise the use of aloes in the solid as against the fluid form. We cannot enter into a minute examination of these at the present, but may be allowed to state that, as a rule, we have found the administration of aloes to be the safest plan, and that the solid form has certain advantages over the fluid, especially in impaction of the stomach. The practitioner, however, finds occasionally the need of departing from fixed rules, and accordingly adopts at the time such forms and remedies as he conceives suitable.

Treatment of Flatulent Colic.—The dose of aloes will be especially needful here, as an irritant requires removal. In addition, the enemas are to be used persistently, and some practitioners prefer gaseous ones (*see* Enemas), to the value of which we can abundantly testify. Following the aloes, other remedies for arresting, dissipating, or neutralising the gases are to be given. Usually, however, if the actions and

secretions of the intestines are restored, which ensues on the reduction of spasm, the further formation of gases also ceases. Under these circumstances, we have found the following draught very useful :—

RECIPE NO. 87.

Take of solution of aloes	6 to 10 fl. oz.
Aromatic spirits of ammonia.....	2 fl. oz.
Water	½ pint.

Mix, and administer. If the pain continues, at the end of an hour, repeat the ammonia and water only.

When the distension by gases appears to be very great, and danger threatened, the following draught may succeed the aloes :—

RECIPE NO. 88.

Take of hyposulphite of soda	2 or 3 oz.
Water	1 pint.

Mix, and dissolve. If it is desirable also to add a stimulant, the aromatic spirits of ammonia may be used without fear of decomposing the hyposulphite.

As the colon is the usual seat of flatulence in this form of colic, continental veterinarians have recommended that it should be punctured by means of a trocar and canula through the floor of the abdomen. The operation has not been favourably received and adopted in this country, the ordinary course of internal treatment being found to be more generally successful.

The question of working horses immediately after attacks of colic has had much to do with varying the plan of treatment. Many persons ignorantly suppose that after such the animal is as well as ever, forgetting that violent spasm produces soreness, stiffness, and weakness, and these alone are sometimes sufficient to pave the way to subsequent attacks, or lay the foundation of other diseases, when aggravated by too early return to work. In addition, the animal has so

much medicine within his digestive organs; and if it be aloes, severe work or exercise may induce superpurgation and death. On this account, in the treatment of colic practitioners have descended to the use of opiates and antispasmodics alone; and we question very much the practice of owners sending their horses to work even after this method has been adopted. Although there may be no fear of superpurgation, the non-removal of the original cause, we have found, is productive of equally awkward results, as impaction, relapsing colic, and even rupture. When the practitioner has to deal with the patients of those who cannot, or will not, allow due rest after such illness, we would advise him to give but a moderate dose only of aloes, with more frequent stimulants, as ammonia or the ethers, and to utter a word of caution to the owner against the risk of working horses after such active treatment.

Treatment of Impacted Colon and Cæcum.—In addition to the signs of abdominal pain, as already given, colic, arising from impaction of the large intestines (*see* Plate IV.), the colon and cæcum, the animal exhibits a tendency to go backwards, and apparently experiences relief by pressing the hind-quarters against the wall, sometimes even sitting down on the manger, or other convenient object. Besides this, we find there is some difficulty in passing the hand up the rectum, and the lining membrane is somewhat injected; the abdomen is distended and hard, and the engorged intestine may be felt in some cases, when exploring through the rectum. When these conditions are clearly identified, the propriety of using aloes—and more particularly if the stomach is known to be filled—becomes a question of importance. To force on an additional mass to the already engorged intestines, it would seem, is a proceeding which cannot fail to make matters worse. But writers on Veterinary Materia Medica urge that aloes need only to be absorbed,

and their effects are produced only upon the posterior intestines—the rectum. Similar action is reported of croton oil; and in order to avoid the consequences of administration of such remedies by the mouth during impaction of the rectum, we have injected the oil beneath the skin, but have failed to observe the action referred to. The most rational plan we believe to consist of the incessant use of medicated enemas, as aloes in solution, and even admixtures of croton oil; while as internal agents, given by the mouth, nothing answers so well as stimulants and antispasmodics, with which strychnia is usefully combined.

RECIPE NO. 89.

Take of aromatic spirits of ammonia	2 fl. oz.
Nux vomica	½ dr.
Water	1 pint.

Mix.

After the foregoing draught has been given, sufficient time should be allowed to elapse before it is repeated, and the nux vomica must be omitted. If pain continues, it may be advisable to repeat the stimulant each hour, alternating with, or substituting for, the ammonia one of the ethers.

Rupture of the colon and cæcum may arise from the presence of calculi, one or more of which block up the passage at the narrowest part. In other cases a liability to rupture exists in the degeneration of the muscular walls, arising from repeated previous impaction in aged animals. The untoward event is known by the sudden decline of spasm, and, of course, also of pain; relaxation of the rectum, by which enemata are retained; an anxious expression of the countenance (Fig. 59); running-down pulse; and rapid sinking and exhaustion. Sometimes death is instantaneous, but it has been known to be delayed for hours, or a day or two, when peritonitis is set up, which speedily ends the case.

Enteritis — Inflammation of the Intestines; Gastro-enteritis—Inflammation of the Stomach and Intestines.

Inflammation of the bowels in the horse is a rare disease, and, as usually witnessed, is due to some irritant posion, as large doses of active medicines, or caustic and corrosive fluids, &c., accidentally swallowed by the animal; substances purposely administered, the action of which may not be generally known, or for malicious purposes. Horses have obtained access to arsenical solutions, or grooms give the solid form of arsenic in powder, as a remedy for producing a fine coat; calomel and tartar-emetic are also used for similar purposes, and occasionally poisoning is seen. Chemical solutions of various kinds, as caustic soda, black ashes, caustic potash, various acids in which brass goods have been cleaned, oxalic acid, &c., are often left carelessly about in the yards of manufacturers, and thirsty horses snatch a drink. Ordinary medicines, as purgatives, &c., in large doses, do not produce the enteritis we are about to describe; they may irritate the mucous surfaces, but an effect really of a curative nature is produced—the unloading of distended bloodvessels, and exciting a free and copious secretion. True enteritis consists of an inflammation of the muscular, vascular, and mucous coats of the bowels, accompanied with thickening due to the presence of plastic exudation. It is scarcely possible to distinguish gastritis or inflammation of the stomach in the horse from enteritis, as when one part of the digestive tube is inflamed the other is generally affected. Medicines or poisons producing the disease in the bowels must first pass the stomach, and there set up their effects; besides which, the mouth and gullet may exhibit traces of them.

Symptoms.—We remember in our student days being

crammed with supposed valuable diagnostic symptoms of enteritis in the horse, such as aggravated, intense, and continuous colic, and a particular desire of the horse to roll and remain upon his back, while fury and absolute madness characterises his movements when on his legs. We remember too, very vividly, how we had to discard these signs as misleading, when carcass after carcass, said to exhibit the morbid appearances of enteritis, was examined, that we could detect nothing of the kind; that congestion and extravasation of blood from an arrest of circulation, producing deep red, almost black, patches over the bowels, *did* exist; and seeing this, it is but a perversion of the truth, we feel, to call it inflammation.

In fact, abdominal pain in enteritis or gastro-enteritis is not the prominent or early symptom. As will be expected from the fact that, a large tract of tissue engaged in one of the most important functions necessary to life being inflamed, not contracted by spasm or distended by gas, a great amount of severe constitutional disturbance will be produced. The urine is scanty, and of a deep colour. Colicky pains do not appear until later, and they are by no means severe. The pulse is small, frequent, hard, and strong from the first, and, as the vital processes are more interfered with, it becomes irregular, weak, and indistinct, running-down, and imperceptible. The temperature is increased at once, and suffers such diurnal variations as are not or cannot be seen in colic. The visible mucous membranes are deeply congested, that of the rectum probably protruding from straining due to internal irritation, especially if diarrhœa is present. The mouth is hot and clammy, skin tight. The appetite is entirely absent, but thirst is intolerable. The animal stands dejected, with anxious countenance, short and rapid breathing. Usually constipation is present, owing to the stoppage of secretion and peristaltic action. The abdomen is tender

upon pressure, flanks tucked up, and colicky pains present themselves from time to time. The sufferer moves stiffly, avoiding all motion in the abdomen and loins; he gradually



FIG. 96.—*Enteritis—Gastro-enteritis.*

becomes listless and exhausted, and at length lies down, half rising, and looking towards the flanks (Fig. 96); he now sinks rapidly, and is incapable of rising; the brain sympathises, convulsions ensue, and the animal dies in periods varying from one day to six, or even seven, depending upon the nature of the cause and severity of the symptoms. Favourable progress is betokened by gradual decline of the constitutional symptoms, restoration of the action of the bowels, absence of pain, animated countenance, fulness and strength of pulse, decline of temperature, equal warmth of surface and limbs, cool mouth, soft and moist skin, &c.

Post-mortem Appearances.—The general tumefaction prevails over a large extent of surface. Redness first seen through the peritoneum is continuous throughout all the coats of the bowels to the mucous surfaces, which are dark, turgid, and tumefied, having solid particles of the poison adhering if such have been used, while in places removal of the epithelium or erosion may be seen. Within the muscular coats plastic exudation exists, and the substance of the whole is considerably thickened.

Treatment.—When substances of a poisonous nature have been administered, it is clear the first attempts should be directed towards neutralising their effects, appropriate antidotes being used (*see* Poisons). The propriety of using a purgative in inflammation of the stomach and bowels has been very much questioned. We, however, contend that, as the action of purgatives is curative by promoting secretion, and thereby affording relief, that it is advisable to open the bowels, after which the systemic disturbance should be met by aconite, belladonna, hyoscyamus, &c., and large quantities of mucilage, linseed-tea, &c., being allowed the animal to drink. Bleeding may be advisable if the strength and condition will warrant it, but, as a rule, aconite may be caused to accomplish all that is needed. Hot fomentations to the abdomen, or active counter-irritants, are used by some; the latter, however, we think often do more harm than good.

Peritonitis.

Inflammation of the membrane lining the cavity of the abdomen, and investing the organs within it (Fig. 97).

Causes.—These are chiefly injuries, or operations by which the membrane is wounded. In the horse a great susceptibility to this form of inflammation exists. Such constitutes what is known as *traumatic* peritonitis, and arises occasionally from castration, abdominal wounds, &c. Among the latter we have seen it follow punctures by a stable fork, or the horns of infuriated cattle. As an independent affection, it may succeed undue exposure to cold and wet, and it may be involved in inflammation with other organs.

Symptoms.—Signs of severe constitutional disturbance are exhibited. The pulse is frequent, hard, quick, and wiry; the breathing hurried, ears and extremities cold, the nostrils are dilated, and the countenance anxious and dejected; the animal turns the nose to the flank (Fig. 96), and further

indicates the presence of abdominal pain by pawing, crouching, and slight colicky symptoms. The bowels are usually constipated, and the abdomen tucked up and tense; the discharge of urine small, and it has a high colour; exhaustion and sinking is rapid, and death follows at variable periods, the animal being sometimes insensible, racked by convulsions, or paralytic.

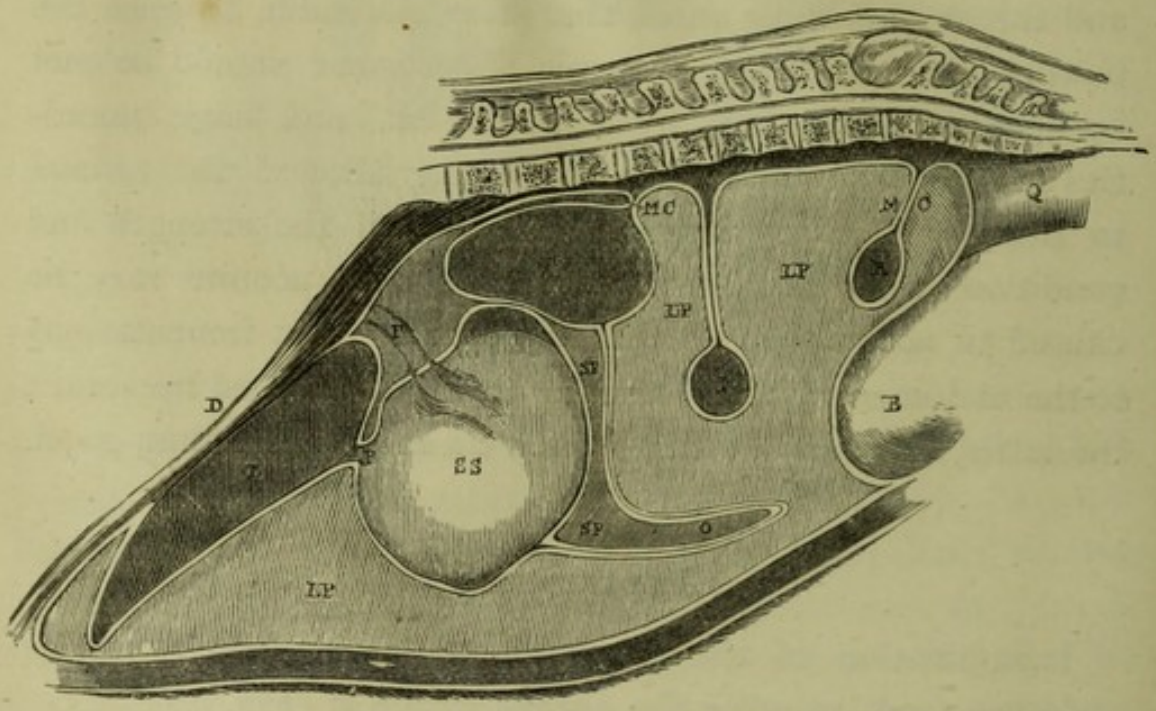


FIG. 97.—*The Reflections of Peritoneum.*

By tracing the white lines the student may learn the reflections of peritoneum, and ascertain the existence and precise situations of the lesser and larger cavity.

LP. The larger cavity of the peritoneum.
SP. The smaller cavity of the peritoneum.
D. The diaphragm.
L. The liver.
SS. The stomach and spleen.
C. The colon, supported by MC, the mesocolon.
I. The ilium, supported by the mesentery, formed of two layers of peritoneum.
R. The rectum, supported by the mesocolon.
Q. That portion of the rectum which is covered only by condensed cellular tissue.
B. The bladder.
O. The omentum, formed by the union of the two peritoneums.
P. The œsophagus indicated. The lower P represents the investiture of the hepatic duct, which goes to the duodenum.

Post-mortem Appearances.—Passive hæmorrhages within the bowels and stomach often occur shortly before death, giving rise to the presence of a fluid resembling coffee-grounds. The surface of the peritoneum exhibits a spotted appearance—ecchymosis, more or less blood-poisoning having taken place; at other parts the bowels are united by plastic exudation, and bands of lymph stretch from one bowel to

others at a little distance. Sometimes a straw-coloured, but more commonly a reddish-coloured, thin serum is present, containing flakes of lymph, the quantity of the former varying in accordance with the duration of the disease, from a few quarts to as many gallons. The seat of injury is characterised by a diffused red or dark red colour, which spreads away from it on all sides, involving the parts in acute inflammation and plastic exudation, causing union with the walls of the abdomen and adjacent organs.

Treatment.—In some cases there is no time for this, the disease terminating fatally in a few hours. On the other hand, we have seen a horse suffering from a wound in the side of the abdomen, caused by a puncture by the horn of a bull, live on for a week, and apparently pass the critical stage, and then sink and die in twelve hours. Although something has been said denouncing purgatives in this disease, yet we think they are useful if carefully exhibited. Strong doses of nitre or the acetate of ammonia and aconite draughts, No. 13, p. 70, and 34, p. 120, properly succeed such measures. Enemas may be used, and if the animal will take food, it must be soft and laxative, as bran, linseed-tea, &c. &c.

Volvulus or Ileus, and Intussusception or Invagination of the Bowels.

The intestines of the horse are liable to displacement, by which pressure or strangulation ensues, resulting in a fatal termination.

Volvulus or *Ileus* denotes a twisting or turning round of a portion of the intestine on itself; usually a part of the ileum or small bowel, but the colon has been known to be affected. At the part where the twist occurs the circulation is arrested, pain is evinced by colic often of the severest kind, violent straining of the rectum is seen, enemas are not retained, and

no relief is afforded by treatment, the animal often dyiug under twenty-four hours.

Intussusception, or *Invagination* of the bowels, consists of the passage of one portion within another, as shown in the figure annexed (Fig. 98). By this process pressure is induced, the outer gut contracting forcibly upon the inner, giving rise to strangulation, and equally fatal results with the above.

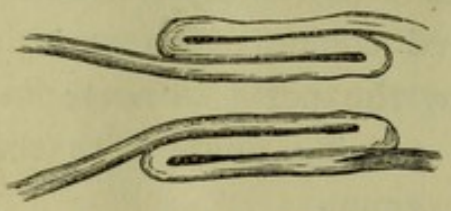


FIG. 98.—*Invagination, or passage of one part of the Intestines within another.*

The causes of volvulus are generally attributed to the rolling of the animal, when one loaded portion of the intestine moves more rapidly than another which is empty, and slips between others, and subsequent movements fail to restore, but rather prevent, its return. Invagination is often due to the action of violent medicines, and even poisons, and occasionally the true form is seen after death in horses slaughtered for dissection ; in dogs, on account of the greater muscular power, it is a common occurrence as a *post-mortem* condition. In these latter cases there is the total absence of strangulation and blackening from blood extravasation. Sometimes gangrene and sphacelus may mark the true cases of strangulation. Invagination chiefly takes place in the small intestines, but rarely the ileum may pass into the cæcum. In occasional instances the portion of small intestine, having intruded within another, is strangulated, dies, and by the process of ulceration is thrown off. The dead portion passes away by the intestines ; adhesion at the point of strangulation takes place, and the animal recovers.—GAMGEE—WILLIAMS.

Treatment.—Continental veterinarians recommend the opening of the abdomen, replacing the intestine, and closing the outer wound in the usual way ; but the remedy is so for-

midable that it does not appear to have been tried in this country. As both these conditions appear likely to occur on an attack of colic, it is clear that means intended to relieve spasm will be most likely to prevent their occurrence. For this reason the treatment of colic should be prompt and energetic.

These conditions are not readily defined during life; we may, however, conjecture, assuming one or other to be present, as the severe and continuous colic is generally associated with violent retching and attempts to vomit, together with violent spasm of the rectum, and non-retention of enemas.

Another form of strangulation of the small intestines occasionally arises from constriction derived from a portion of the mesentery becoming elongated, at the end of which a fatty or other kind of tumour has formed. During the movements of the intestines, the tumour slips and passes, or is drawn between them, while the cord becomes tightly fixed over and around a portion. Strangulation, inflammation, together with all the symptoms of incurable colic, present themselves, as already cited, as peculiar to these forms of disease; and the animal dies without any mitigation of pain or relief from treatment. (*See* Frontispiece.)

Calculi—Intestinal Concretions, or Stones in the Intestines.

Obstructions in the form of calculi, or stones, are found in the several parts of the digestive canal. In the majority of instances they are met with in the large intestines, sometimes in the small, and occasionally, but rarely, in the stomach. When they have been found in the stomach, the supposition is that at one time they belonged to the small intestines, and may have been carried thither by antiperistaltic action.

We have found as many as seven in the large intestines, weighing in all upwards of twenty pounds; at other times three or four are distributed over as many parts of the canal. A professional friend showed us a single stone, which he took from the cæcum of a miller's horse, which died from colic, having the enormous weight of twenty-four pounds; and in another instance we saw in the cæcum of a horse at least a gallon of small triangular-shaped stones, each of which had four faces and four points, so that wherever they fell a point was uppermost (Fig. 99). This shape was given by the motion of the bowels, causing them to rub and wear against each other; and when found among the semi-fluid ingesta they appeared to fit very conveniently with each other. After removal, and being washed free from dirt, they were put into a glass jar, where they also fell remarkably into place, each presenting their flat sides fitting

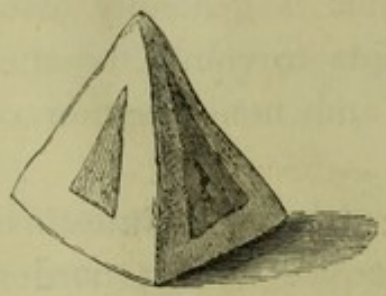


FIG. 99.—*Small Intestinal Calculus.*



FIG. 100.—*Section of a Spherical Calculus from the intestines, showing the concentric layers of deposit.*

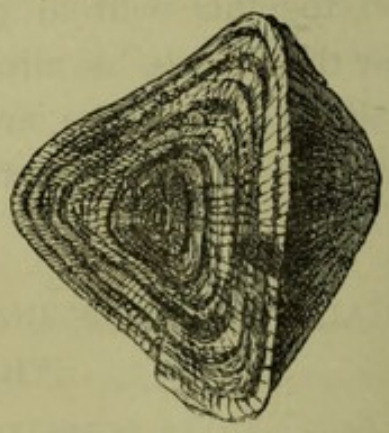


FIG. 101.—*Intestinal Calculus, showing mode of wear by contact with others. Internal structure laminated in circular layers, as in No.* 100.

very closely together. The same is noticed among larger stones when more than one are found; by constant attrition against each other flat surfaces are produced; but single

stones are generally spherical. Outwardly they are covered by an encrustation of carbonate of lime, but internally they are composed of the phosphate and ammonio-phosphate of lime in large proportion, exhibiting a concentric or ring-like arrangement, as shown in the annexed figures (Figs. 100 and 101).

The centre of these calculi or stones is generally formed of a piece of granite, stone, a nail, piece of wood, &c., any one of which being taken with the food is detained in the bowels. Owing to derangement of the digestive process, the ordinary constituents of the food—the phosphates—are not dissolved and appropriated, and the presence of such a foreign body as one of the above-named articles proves a useful nucleus, around which the phosphates accumulate. Another variety (Fig. 102), but much lighter, is made up of the beard or hair of the oat, barley, &c., and an admixture of phosphates and carbonates. It is known as the oat-hair calculus.

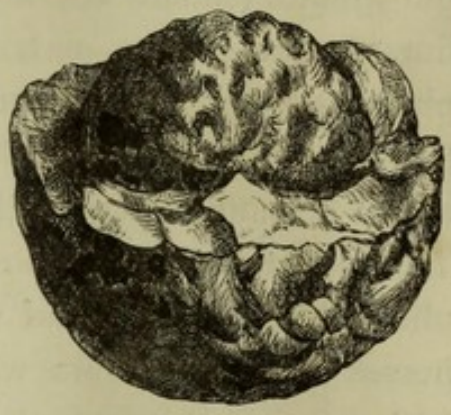
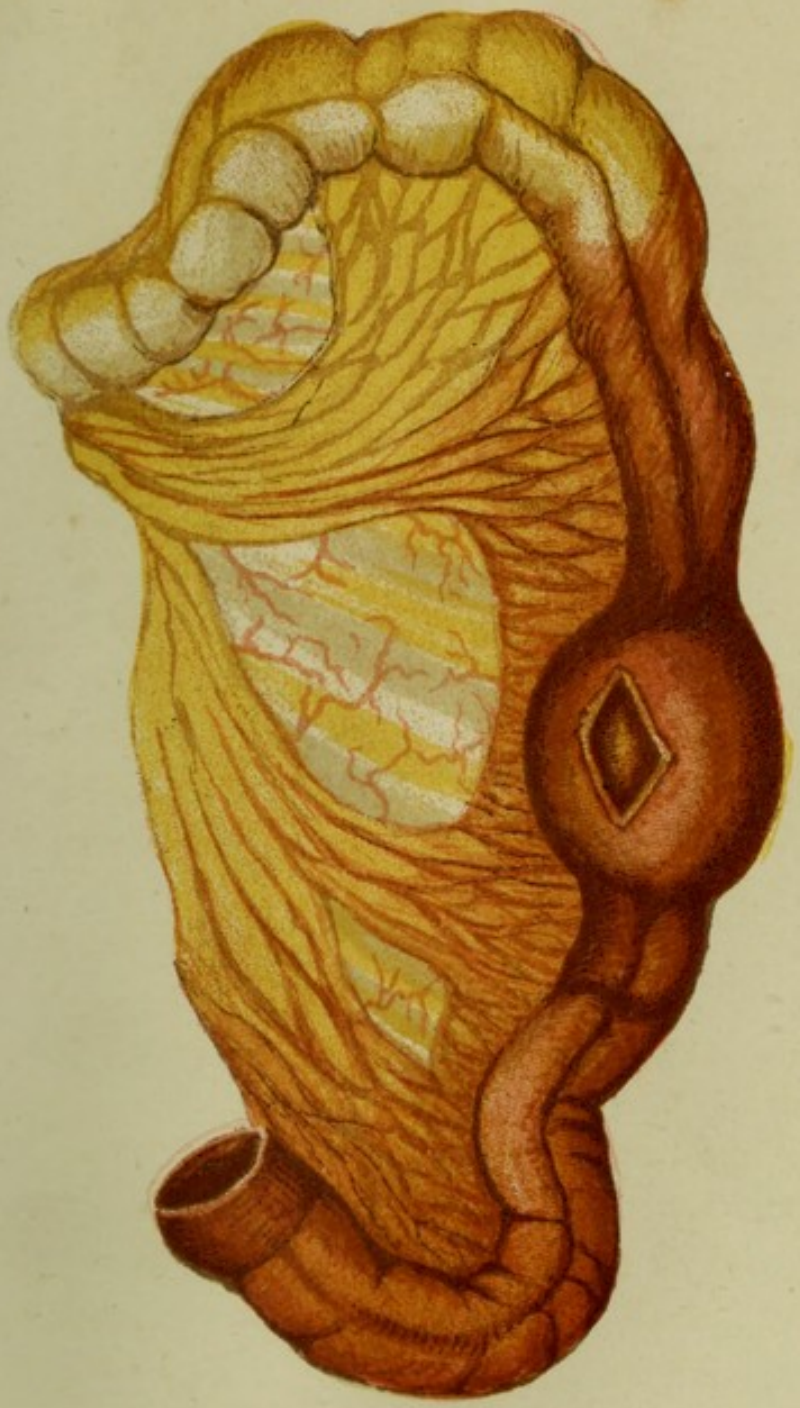


FIG. 102.—*Oat-hair Calculus.*

Mixed calculi are sometimes known as dust-balls, as containing a large amount of small dusty material when dried, as fæcal matters, with a small proportion of phosphates and carbonates. Occasionally this kind of calculus assumes the form of a ring, the fæcal matters first adhering to the interior of the bowel by means of some unusual secretion of mucus, eventually extending all round, a hole being left in the middle through which the fæces pass. Among the horses and ponies employed in coal-mines, where long fasts are observed, the presence of dust-balls are very common, some attaining large dimensions, but weighing very light. The cause we found to exist in the fact that severe hunger was

induced in the animals, and in place of food they devoured the coals to appease it. When this was pointed out, we remember having received a severe rebuke for daring to profess any knowledge of such matters in the presence of a chief viewer, and were informed that the composition of such stones was due to the drinking of water containing lime. How lime-water could be metamorphosed into coals was a mystery to us, or that water containing but a small portion of lime inevitably produced calculi of any kind. Long residence in lime districts had furnished the experience, that phosphatic calculi are not even as common as among the horses and ponies of coal-mines; and, further, that both phosphatic calculi, and more generally mixed or the dust-ball kind, are very prevalent in those pits, and even districts above ground, where no lime-water whatever can be obtained. The food furnishes ample material under disordered states for phosphatic calculi; and when gross mismanagement keeps horses so many hours without food, the swallowing of dirt and rubbish is acquired as a result of diseased conditions of the stomach being previously brought about.

Indications of the presence of these stones are merely conjectural. Severe or relapsing colic, and at length irremediable, takes place, and kills the animal; but we know of no special sign by which their presence is insured. We give an illustration of one of the dust-balls which was found imbedded within a mass of tissue in the small intestines of a pony, which died in one of the coal-mines of the county of Durham, belonging to the Marchioness of Londonderry, already referred to at page 298. This creature continued for two days in great agony; medicines gave no relief. The rectum was occasionally affected with severe spasm, but he did not roll much after the first few hours of the attack; gradual listnessness came on, and he sank exhausted and delirious, dying in convulsions and severe retchings. (*See* Plate VI.)



Occasionally one or more calculi are passed from the rectum during life with the fæces; several of these have occurred in the practice of the writer, as well as among horses of his own.

Diarrhœa.

In the majority of instances diarrhœa is to be regarded as an indication or a result of the existence of other diseases. Its appearance during health is not infrequent, being then Nature's process for carrying away irritant or obnoxious substances, and consists of increased action of the bowels, with discharge of liquid fæces, independent of any inflammatory action whatever. Indigestible food, sudden changes of diet, particularly from dry grain and forage to grass, roots, &c., are common causes; work and copious draughts of water often aggravate these states. Medicines of various kinds will sometimes suddenly produce it, contrary to expectation, owing to some obscure cause acting in unison. The presence of worms is occasionally indicated by diarrhœa; derangement of the liver gives rise to it; and many badly-formed animals—generally known as "washy horses"—being long and loosely coupled, having flat sides, hollow flanks, narrow loins, and besides having an excitable temperament, are peculiarly liable to looseness of the bowels, which suddenly comes on during a journey, and by it they never acquire any degree of what is known as high condition, but, on the contrary, are predisposed to other states of disorder as well as disease.

Diarrhœa appears as a sequel of many diseases, as blood poisoning, pleuro-pneumonia, affections of the liver, intestines, &c., being the means by which life at the last is rapidly dissipated.

Symptoms.—Simple diarrhœa consists of frequent evacuation of fluid excrement, which usually partakes of the colour

of the food that gives rise to it, and particles of irritating substances will be found among it; thus grass, &c., will impart a green colour; new wheat and other grain will be found among the ejections; and iron, given as medicines, will cause them to become black. As a rule, simple diarrhœa is unattended with fœtor. There is always more or less straining, and occasionally colicky pains are present, the appetite is impaired, and the secretion of urine diminished. Diarrhœa attendant upon diseases, as influenza and fevers generally, exhibits an amount of fœtor; and that of blood poisoning, as well as the form which terminates many diseases in which "breaking up of the system" is very conspicuous, the odour of the evacuations is simply unbearable.

Simple diarrhœa seldom kills the animal. In such rare instances local irritation may be indicated in places by a slight turgid condition of the bloodvessels, and these are confined solely to the spot where an irritant has adhered; otherwise no signs of inflammation exist, but, on the contrary, the pallor of the membranes point to a powerful draining effect. Thickening, together with exudation, as results of inflammation, are not observed. Fatal diarrhœa, as a result of disease, exhibits no difference in these respects, but the cause is distinctly traced to organic and structural changes which lead to a degeneration of blood, and inability to support life.

Treatment.—In simple states little is called for beyond keeping the animal perfectly quiet, warm, and comfortable, removing the cause, whether food, water, medicines, &c. Professor Gamgee recommends clysters of warm water to aid in removing irritants; and we can recommend his plan from successful experience. It is also advisable to restrict the allowance of drinking-water for a short time. When any known irritant exists, and is keeping up the morbid

action of the bowels, a mild aperient may be given, such as the following:—

RECIPE NO. 90.

Take of linseed oil	½ pint
Laudanum	1 fl. oz.

Mix. Or the following:—

RECIPE NO. 91.

Take of sulphuric or nitric ether	1 fl. oz.
Laudanum	1 „
Solution of aloes	4 „

Mix.

It is rare that anything beyond these are required if the changes of diet have been properly carried out; but in the other forms astringents will be called for. We allude to those attacks of diarrhœa which from neglect may assume a chronic condition, the secreting follicles of the intestines having been so long under excitement that their tendency to secrete abundantly is not easily arrested, particularly when an amount of debility is present. The following preparations may be found necessary:—

RECIPE NO. 92.

Take of laudanum	1 fl. oz.
Sulphuric ether	1 „

Mix.

RECIPE NO. 93.

Take of tannic acid	½ dr.
Powdered ginger	½ oz.
Water or gruel	4 fl. oz.

Mix.

When the ejections are offensive, chlorinated lime, or the hyposulphite of soda, may be given in small and repeated doses, as well as being used as enemata; and if the foregoing remedies are proved to be non-successful, recourse must be had to more powerful astringents, as catechu, kino, tannic acid in larger doses, mineral acids, &c. (*See* Dispensatory.)

Superpurgation.—This is a form of diarrhœa resulting from either an excessive dose of purgative medicine, or the operation of conditions unnoticed or beyond control at the time. Some animals are peculiarly susceptible of the action of aloes, and on receiving only a moderate dose will purge violently; if, in addition, the weather be cold, and sufficient care is not taken in order to protect the animal from its effects, or copious draughts of cold water are allowed; if the animal is taken to work or exercise too soon, the consequences are alarming. Similar results follow the administration of moderate or full doses of aloes in cases of catarrh, influenza, and indeed in all instances where any excitement of the mucous surfaces exist. We have also seen superpurgation follow a draught of ice-cold water, given to animals heated during work, and even after an ordinary dose of linseed oil in catarrh. Care is therefore always required in judging of the state of the animal before a purgative is administered.

The *symptoms* of superpurgation are—forcible and frequent evacuations of fluid fæces, accompanied with straining, un-

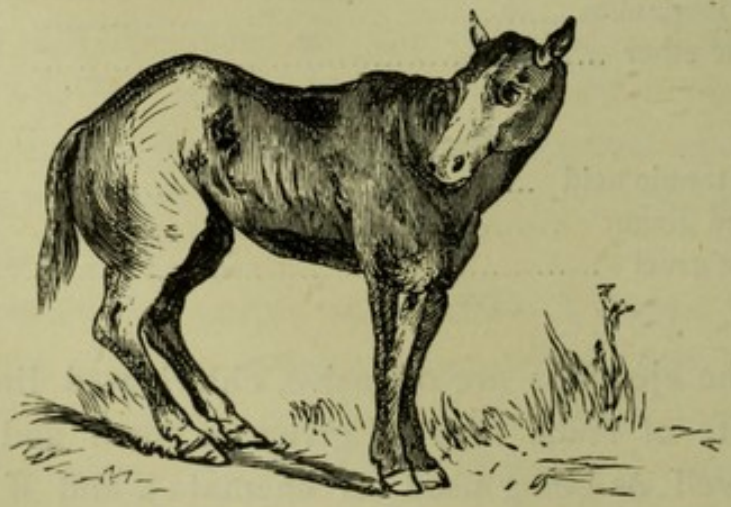


FIG. 103.—*Superpurgation.*

easiness, colicky pains, accelerated respiration and circulation, loss of appetite, nausea, unequal surface temperature, weakness, complication with disease of the feet, known as

founder, laminitis, and fever in the feet, or with pneumonia, or congestion of the lungs, sinking, and death.

Superpurgation must *not* be suddenly arrested. The consequences of such are the complications referred to, doubtless owing to degeneration of the blood, by which circulation is impaired, and local engorgement the inevitable result. The remedies in the first instance should be cautiously introduced, as recommended for diarrhœa; food and water restricted; gruel, composed of starch, allowed for drink, as well as being used as enemas. Before resorting to powerful astringents trial should be given of the opium and ether draught, No. 92, page 339, by which the pain and uneasiness will be allayed, while no obstacle is thrown in the way of the efforts to discharge the irritants from the intestinal canal, the ether contributing to support the system against the inroads which rapidly ensuing weakness may make.

Violent purgation often follows the use of certain compounds of aloes, &c., without setting up that condition we have been considering. As long as the circulation and respiration are not disturbed, and the appetite remains good, nothing need be feared, as an early return to ordinary food, scarcity of water, warmth, and general comfort will speedily restore the normal action of the bowels.

Dysentery—Colitis—Bloody Flux.

This is, fortunately, a rare disease in the horse. Dysentery consists of an inflammation of the mucous membrane of the intestines, principally the large; hence the term colitis, from colon, which constitute the greater portion. Ulceration and hæmorrhage form a prominent feature. Cattle are more disposed to this disease, and we find the causes which induce it among them give rise to superpurgation and an acute form of diarrhœa in the horse. Again, while

diarrhœa in the horse forms the last stage in most wasting diseases, blood poisons, &c., the same in cattle are closed by dysentery.

Causes.—Bad food, especially the grasses of marshy and other land which does not receive a proper share of cultivation. As this is not so common as formerly, a great cause of dysentery has been removed. Want of drainage, giving rise to a manurial poisoning of land and herbage, once a prolific cause, has also to some extent undergone modification. Impure or putrid water from ponds receiving all the filth from manure heaps, cesspools, house drains, &c., which first set up a state of blood poisoning, is a powerful agent; and, we may add, all the principles of defective management which induce low condition, debility, blood derangement, &c., especially when exposure to cold and wet weather, &c., are combined. The form usually seen in the horse is the acute, or that which supervenes on the entrance of some poison or ferment by means of food or water.

Symptoms.—Signs of constitutional disturbance, such as shivering, variable temperature of the body, dulness, insatiable thirst, increased frequency of circulation and respiration, stiffness in movement, particularly in turning; the back is arched (Fig. 103), the coat stares, the skin is tight on the body, and in horses coming from grass it is also generally full of vermin, and emaciation rapidly proceeds; the bowels are inordinately excited, and violent straining takes place at intervals, in which a thin and offensive fluid excrement containing a large quantity of mucus, and also blood, is discharged in variable quantity. During the paroxysms the rectum is everted, and the lining membrane is observed to be inflamed and sore. Colicky pains are sometimes severe, and the abdomen is tender under pressure; tympanitis also affects the bowels more or less, and adds to the distress of breathing. The mouth is clammy, the tongue furred, and in

a day or two the epithelium peels off, leaving unhealthy sores or ulcers, a condition which indicates pretty clearly what is going on inside. Unless relief is afforded very soon the disease increases in severity, and death puts an end to the sufferings about the end of three or four days, or at the most a week, after the discharges of blood are established.

Post-mortem Appearances.—The substance of the intestinal walls of the cæcum, colon, and rectum is infiltrated with fluid, and in places a lymph exudation is present, which gives the appearance of jelly. The lining membrane is inflamed, red, and marked in places with ulcers of variable size, in some instances having caused perforation of the walls. Abscesses occur here and there beneath the membrane, and the peritoneal surface exhibits the characteristic ecchymoses or spots of blood extravasation, indicating the existence of blood poisoning during life. The small intestines are distended, and the lining membrane is reddened. When punctured an escape of extremely fœtid gas takes place ; the bladder contains a small quantity of highly-coloured urine, rich in urea, the representative principle of tissues undergoing rapid decay.

Treatment.—Bleeding has been recommended by Percivall and others when the state of the system will admit of it. Great good will be derived from the use of an oleaginous purge, in order to carry off any local irritant.

RECIPE NO. 94.

Take of linseed oil	½ pint.
Tincture of opium	1 fl. oz.
Chloroform	½ fl. dr.

Mix.

The action of the bowels being mitigated by the above, moderate doses of opium with potash will be found serviceable.

RECIPE NO. 95.

Take of powdered opium	20 grs.
Carbonate of potash	2 drs.
Tincture of cantharides	2 fl. drs.

Mix, and give in half a pint of gruel.

The thirst may be allayed by allowing thick starch water to drink.

When these measures do not appear to produce an abatement of the symptoms, an attempt to mitigate and finally arrest the blood discharges may be made by one or other of the following :—

RECIPE NO. 96.

Take of oil of turpentine	2 fl. oz.
Milk	1 pint.

Mix.

RECIPE NO. 97.

Take of tannic acid	½ dr.
Powdered gentian	4 drs.

Mix, and give in half a pint of gruel.

RECIPE NO. 98.

Take of terchloride of iron	2 drs.
Water	½ pint

Mix.

When debility is great, the above form may be modified as follows :—

RECIPE NO. 99.

Take of terchloride of iron	2 fl. drs.
Nitric ether	1 fl. oz.
Infusion of quassia or gentian	½ pint.

Mix.

RECIPE NO. 100.

Take of powdered alum	2 drs.
Sulphuric acid	10 to 15 drops.
Infusion of quassia or gentian	½ pint.

Mix.

RECIPE NO. 101.

Take of solution of chloralum	2 fl. drs.
Infusion of quassia	½ pint.

Mix.

One or other of the foregoing may be given every four, six, or eight hours, according to the urgency of the case and symptoms. When the fæces prove so intolerably offensive, they should be dredged over with McDougall's disinfecting powder, chlorinated lime, or solution of chloralum may be sprinkled on the top, and afterwards swept clean away; and, in order to correct the fœtor of the secretions within the bowels, the following draughts may be given at proper intervals :—

RECIPE NO. 102. (GAMGEE.)

"Take of chlorinated lime	2 drs.
Tincture of arnica	2 „
Nitric ether	1 oz."

This may be given in cold water twice or thrice a day.

RECIPE NO. 103.

Take of hyposulphite of soda	1 oz.
Infusion of quassia or gentian	½ pint

Dissolve, and give as the above.

Besides the use of the foregoing as draughts, they may be advantageously employed as enemas, and thus an additional antiseptic effect will be produced.

The reader must bear in mind the directions already given in the treatment of diarrhœa, which relate to the sudden arrestment of the intestinal flux. As long as the signs suffer a gradual decline, the pulse gaining power and volume, &c., the treatment may be steadily pursued; but if, on the other hand, the pain and flux suddenly cease, while the pulse becomes weaker, smaller, and more frequent, together with an increase of animal temperature, the worst results may be expected. Large doses of medicine are to be avoided, and, while the utmost watchfulness is needed in order to keep the system under the constant influence of ordinary remedies, given in moderate or small and repeated doses, every care must also be exercised by which to provide the

greatest amount of comfort, warmth, nourishment, &c.; and although the animal may not have lost the appetite, nevertheless the desire for food must not be satisfied with anything or everything. Flour, starch, and oatmeal gruel made by boiling may be allowed for drink. Boiled oats and malt mash, as food, in small quantities at once. Use gentle friction to the skin, which may be first moistened with a wet sponge, and afterwards rubbed dry; clothe the body, and apply bandages to the legs.

Imperforate Anus and Rectum.

Occasional instances are met with in foals wherein severe abdominal pains arise, in consequence of the absence of an outlet for the fæces. At the usual place for the anal opening a small depression is present at birth, and as the fæces accumulate in the rectum a bulging is noticed beneath the tail, the covering being a thin reflection of skin. Simple division of this leads to a discharge of fæces and suppression of pain.

Another form of imperforate condition occasionally met with occurs in the rectum. At some distance within the intestine a membrane is thrown across, completely cutting off the communication, and arresting all fæcal matters, giving rise to abdominal pain and irritation. Clysters are not retained, and purgatives aggravate the malady. The absence of intestinal discharges, together with the colicky symptoms in young foals, indicates some abnormal condition of the rectum. The remedy consists in dividing the septum by means of a proper surgical knife, by which the inconvenience is removed.

A third variety consists of a well-formed anal opening, but the rectum does not extend to the other bowels. Other conditions are met with in rare instances, but admit of no relief by operation.

Ruptured Rectum.

This lesion occurs in two forms: one near the anus, and therefore within the pelvis, the other in the abdomen.

We have met with the first named in mares, arising at the time of parturition, in consequence of the passage of a foot or feet of the foal through the walls of the vagina, and protruding through the anus. Sometimes the walls are lacerated without being divided. The second variety arises from abscess, cancer, melanosis, &c., and is fatal; for as soon as the walls are pierced, the contents escape into the abdomen and cause death by peritonitis.

The *treatment* of rupture within the pelvis consists of uniting the wounds by means of metallic sutures, applying healing fluids to the vaginal side, and by means of the hand keeping the rectum clear of fæces until the parts have united. The animal should be allowed easily-digested food of a sloppy nature only. When the walls have been lacerated without division, we have merely used injections of tincture of arnica lotion, observing to keep the rectum clear of fæces, and to supply the kind of food as directed, and the animals have done well.

Hæmorrhoids or Piles.

In consequence of habitual constipation arising from a torpid state of the liver and intestines, an accumulation of hardened fæces takes place within the rectum, and during severe straining to expel them injury to the rectum and hæmorrhoidal vessels is the result. Dilatations with varicosities at first commence, and at length these form large vascular tumours within the rectum, which are lacerated with every expulsion of fæces, and bleeding is sometimes severe. The animal strains violently, switches the tail and stamps, and suffers from some amount of constitutional

disturbance. The disease is somewhat rare in the horse, but nevertheless occurs now and then in the course of a life-long practice.

Treatment consists in keeping the bowels free and open by means of soft and laxative food, with occasional purgative doses of medicines. Aloes must be avoided, and oil used instead. Local treatment is comprised in crushing the internal tumours when they are not large, and applying ointments containing opium and astringents; solutions of "Sanitas" in glycerine or linseed oil are of great value; the rectum must be unloaded regularly by means of clysters, or by the hand if necessary, as sometimes the animal cannot effect this unaided in consequence of the thickening of the coats of the rectum and loss of muscular tissue from inflammation long continued.

Inversion of the Rectum,

Variously known as *prolapsus ani* and *exania*, occurs from several causes. The rectum is forced outwards, exposing the mucous membrane, which soon becomes red and swollen, and, if not liberated, strangulation and gangrene result. Constipation, parturition long delayed, diarrhœa, and worms, are fruitful causes, as giving rise to severe straining. Professor Gamgee, quoting Hertwig, says there are three forms—viz., "1stly, the rectum protrudes through the sphincter, and hangs behind the anus; 2ndly, the anus drops forward, and there is eversion of its mucous membrane; 3rdly, there may be only a portion of mucous membrane on one side protruding. In the first form there is a decided eversion, and a red swollen intestine is observed to hang through the anus to the extent of an inch, five or six inches, or even a foot and a half. There is great difficulty in replacing it, or pushing the finger through the

opening. In the second form the eversion is deeper; and in the third, there is a chance of confusion with rectal polypi."

Treatment.—Whatever may be the cause of prolapsus it must be first overcome, otherwise if the return be affected it will not be permanent; and as soon as straining again commences, the inversion becomes as bad as before. In parturition the fœtus must be removed: in diarrhœa, constipation, irritation from worms, &c., the excitement in the bowels must be first quelled by the appropriate remedies. A strong dose of opium is usually given to allay spasm, and the protruded organ is lubricated with a mixture of oil and laudanum; and by gentle pressure exerted on all sides, gradually curling the membrane inwards towards the centre, in which the thumbs are particularly active, the mass recedes within the abdomen. In order to maintain the rectum within its place metallic sutures are sometimes passed through the anus, or a truss is worn; but these are not always successful, as there is a great tendency to become displaced. The difficulty of returning the gut is always great, but it is not exceeded by that which attends the efforts to prevent its protrusion. In some instances strangulation has proceeded so far, by contraction of the sphincter ani, that hope of success can only be gained by an operation, in which the sphacelated mass is amputated completely, and the divided edges are sewn to the borders of the anus by means of a metallic wire.

Parasites of the Stomach—Bots.

The only parasite which occupies the stomach as its natural habitat or dwelling-place is the common horse-bot, or *Œstrus equi*. There are doubtless others which undergo a process of development within the contents of the

stomach, and we know also that many are carried into it by a reverse or antiperistaltic action of the intestines ; besides, others occupy positions within the tissue forming the walls of the stomach, but beyond this they will not occupy our attention under this head. The history of the horse-bot has been fully studied in this country by Bracy Clark, Professor Gamgee, sen., and Professor Cobbold, and as a result of their researches we are enabled to lay before the reader the following brief account of it.

Two or three varieties of the gadfly, or family of *Œstridæ*, attach their eggs to the hairs on the knees, breast, nose, sides, mane, &c., of the horse, where they give rise to an amount of irritation which causes the animal to lick the parts. The moisture thus derived, together with the external temperature of the summer season, are sufficient to hatch the eggs, from which a small maggot escapes in

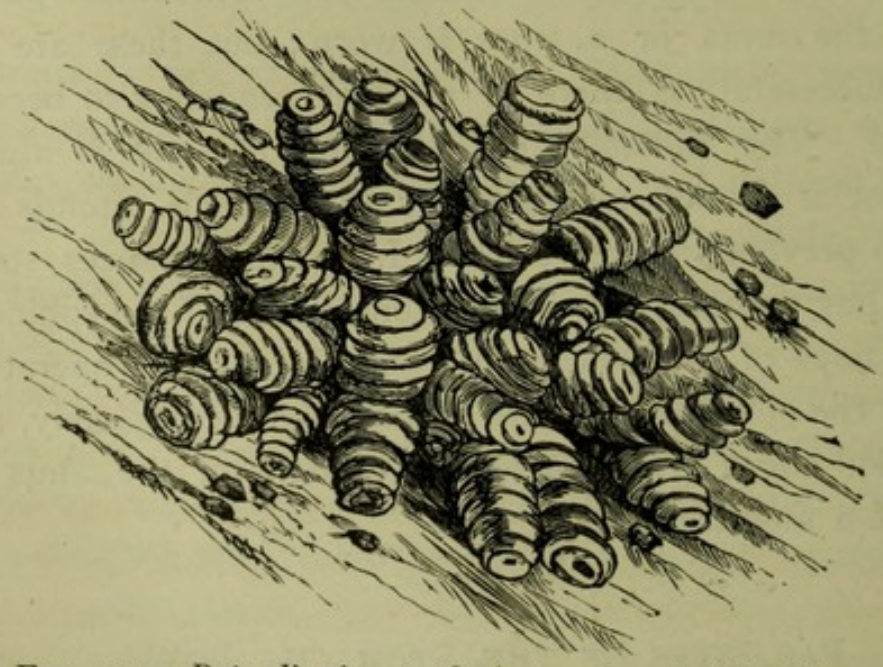


FIG. 104.—*Bots clinging to the internal coat of the Stomach.*

about three weeks from the time of their being first deposited. Some of these fall to the ground and perish ; a few are carried by the tongue, by which they are detached, to the mouth, and eventually to the stomach, to the mucous

membrane of which they attach themselves by means of a pair of hooklets, and others are destroyed between the teeth during mastication. Notwithstanding the loss of so many, we sometimes find the internal coat of the horse covered by a number of the larvæ, known as "bots" (Fig. 104), crowding together to a degree most astonishing. In this situation they remain for a period of eight months or thereabouts, when they leave their hold, and dropping off, pass along the alimentary canal, and are voided with the fæces. The larva or grub then makes its way to the soil, where it undergoes further changes of development, and finally in the hot summer months becomes a gadfly, having comparatively an ephemeral existence, living only to mature and lay its eggs, and afterwards die. In the passage of the bot through the bowels, one variety attaches itself to the mucous membrane of the rectum, and gives rise to no little pain and irritation.

The presence of bots within the stomach has been a subject of grave consideration for many years, some authorities asserting they prove of great service in promoting the animal's appetite and condition generally; but later investigation has shown unmistakably that their absence would prove an incalculable boon to the horse. Cases are on record, by which it is apparent that tetanus has resulted from their presence, and the duodenum has been perforated by them. We have seen, in several instances, irritation and weakening of the stomach as a result of their attachment to its walls; in one particular case, the hooklets penetrated very deeply, a number of semi-transparent pinholes in appearance being exhibited when the affected portion of the stomach was held up to the light. In this case rupture of the stomach had taken place, the laceration following the direction of the perforations.

Many attempts have been made to dislodge the "bot"

from its dwelling-place, but every remedy made use of has proved far more injurious to the horse. Their presence in great numbers doubtless give rise to an amount of dyspepsia, loss of condition, emaciation, and hide-bound appearance, and no relief appears to be possible until their discharge has taken place. The only way in which we can hope to escape their introduction to the stomach of the horse is by avoiding the occasional turning to grass, which some proprietors deem of so much importance.

Intestinal Parasites.

Three forms of intestinal worms are found in the horse: 1st, the common round worm, or, technically, *Ascaris megalocephala;* 2nd, the common needle or whip-worm, the *Strongylus armatus;* and, 3rd, the tape-worm.

The *Ascaris megalocephala* is most frequently known as the *lumbrici*, on account of its resemblance to the common earth-worm in both size and form. They are generally found in the small intestines, rarely in the stomach, but may also migrate to the large intestines, where we have found them in large numbers; occasionally they are seen in the rectum, on their way to be expelled. The male is not so long as the female worm, which sometimes attains the length of twelve or even fifteen inches. The presence of a few does not appear to produce any inconvenience, but when large numbers accumulate the process of digestion is interrupted. After death these creatures are observed to form large balls, numbers being coiled up and interlaced with each other, a condition probably due to the suspension of the processes which furnish the secretions from which they derive their sustenance.

The *Strongylus armatus*, generally but erroneously known as *ascarides*, and called also *oxyuris* (?), is a small, white, semi-transparent worm, about an inch in length, inhabiting the

flexures, the cæcum, and colon, often congregating in large numbers within the blind pouch of the former. They likewise migrate to the rectum, where they occasion great irritation, causing the animal to set his hind-parts against the wall or other stationary object and violently rub, greatly disfiguring them, as well as the tail, in the act. Occasionally they are voided largely with the excrement.

The tape-worm occurs in three forms—viz., *Tænia plicata*, *Tænia perfoliata*, and *Tænia mamillana*—though so rarely in the horse that their presence is not denoted by specific signs.

Symptoms of Worms in the Intestines.—It is only when large numbers of intestinal worms are congregated that signs of disturbance are exhibited. The appetite becomes capricious or voracious, the skin is dull, the hair being harsh or erect, besides being full of dirt and scurf in old-standing cases, accompanied also with irregularity of the bowels, griping or colicky pains, and loss of condition. A common sign consists of an impaired or morbid appetite, which causes the animal to lick the walls, eat lime or rubbish, and frequently rub the nose against the wall. When *Strongyli* are present, the animal rubs his tail violently against the nearest object, to allay the irritation of the anus and rectum, and to whisk it about in an excitable manner, often in the form of a circle. On the outer part of the anus, and along the perinæum beneath, a number of small, yellowish-white-looking bodies will be found attached to the skin and fine hair of the locality. These are the eggs of the parasite, undergoing the process of incubation.

The rubbing of the tail from worms must not be confounded with a similar act which arises from an accumulation of dirt among the hairs at the upper part. Under all circumstances, the presence of the parasites in the fæces is the only safe means of judging of their presence, and when the symptoms

which we have enumerated are observed, the attention should be directed to the fæces before a system of drug administration is commenced.

Treatment.—A brisk purge, composed of aloes, to which one or two drops of croton oil have been added, will sometimes answer by clearing out the intestines, and removing a large quantity of worms. The aloes may be given in the form of bolus, or in solution, as follows :—

RECIPE NO. 104.

Take of solution of aloes	4 to 10 fl. oz.
Croton oil	1 or 2 drops.

Mix, and agitate before giving.

Turpentine is a powerful and valuable remedy in destroying worms, and may be given in one of the subjoined forms :—

RECIPE NO. 105.

Take of linseed oil.....	1 pint.
Oil of turpentine.....	2 fl. oz.
Aromatic spirits of ammonia	½ „

Mix the oil and ammonia first, and agitate ; afterwards add the turpentine, and agitate until a uniform mixture is obtained.

RECIPE NO. 106.

Oil of turpentine	2 fl. oz.
Strong linseed mucilage	½ pint.

Mix, and agitate ; afterwards add sufficient water to render the mixture sufficiently fluid for easy passage down the throat. An aloetic purge should follow this draught at the expiration of a few hours.

When the presence of worms is accompanied with an amount of low condition and debility, a course of tonics will be advisable after the operation of the turpentine draught, No. 105. Experience seems to point out that low condition is not always dependent upon the presence of worms, but rather, on the contrary, that worms are retained because of

the production of morbid secretions which low condition gives rise to; and, further, that as soon as the digestion and tone of the system are improved, worms cease to be nourished by the body. The course of treatment, therefore, is obvious. We give the draught constituted as directed, the oil of turpentine acting as a direct poison to the parasites, the linseed oil expelling them in the act of purgation with less depression than results from other purgatives. On the following day, the tonic powders may be commenced :—

RECIPE NO. 107.

Take of sulphate of iron	4 drs.
Carbonate of soda	1 „
Powdered gentian	1 „
„ ginger	1 „

Make up twelve powders, each containing the above quantities, and give one each morning and night in the food.

Professor Gamgee recommends the following :—

RECIPE NO. 108.

"Take of sulphur	12 oz.
Arsenic	1 dr.
Bruised coriander seed	6 oz.

"Divide into twelve powders, and give one daily for twelve days. This is a very sure remedy in cases in which the *Ascaris megalocephala* is abundant."

The feeding of the patient must be carefully conducted, the allowances of food being moderate and timely, in order to avoid overloading the organs; while the quality should also be good, that proper nourishment be derived from it. Bran and linseed should be freely allowed, and regular exercise given, in order to overcome the tendency to constipation, which arises when iron tonics are used. Fresh water should also be at hand continually. The skin must be attended to; the use of a brush, together with the application

of a wet sponge, and subsequent dry wisping, will be found highly conducive towards a cure.

Hernia or Rupture.

The term *hernia* is commonly used to denote the displacement of any part of the bowels, or other internal organ of the abdomen, and its passage by means of an unnatural opening, or rupture, into a cavity distinct from its natural position. In medical language an extended use is made of the term, as it is applied to the displacement of other organs, or parts of them, from their proper locality; here, however, we apply it to protruding organs of the abdomen only.

Herniæ are recognised as being of different kinds, in accordance with their situation or the organs which form them, as will be understood from the following details. They are also further separated and recognised as *reducible* and *irreducible*. Reducible herniæ are those which admit of the protruding organ being returned to its proper position; they do not always acquire any great size, or produce inconvenience, and therefore seldom call for interference. Irreducible herniæ, on the other hand, are those kinds of protrusion which present obstacles against the return of the organ except by a special operation or interference. Reducible herniæ may by continuance or aggravation of the causes assume the irreducible form, and incur the serious liability to *strangulation*, a condition which arises in the following manner:—A portion of intestine passes through an unnatural opening, and may be accompanied by the omentum or caul. In some instances another portion of intestine also descends with it, facilitated by the natural vermicular action with which these organs are endowed, as well as by the weight of their contents. In other cases the

rupture or opening is small, and by inflammation set up the edges are thickened, making the orifice much less, and union by false membrane probably takes place with the bowel, and thus its movements are limited. As the animal moves under severe exertion further portions are pressed in, and the accumulation of fæcal matters within the confined bowel is almost a certainty. It must be understood that a fold, loop, or double portion of intestine forms the hernial tumour, so that fæcal matters within the bowel must first pass through the ruptured opening in the abdominal walls into the outer cavity by a stream which doubtless completely fills the opening (Fig. 105). Accumulation inevitably takes place in the loop of intestine as the outward stream is arrested, the result being distension, pressure, stoppage of circulation, intense pain and agony, inflammation, and, if not relieved, gangrene and death.

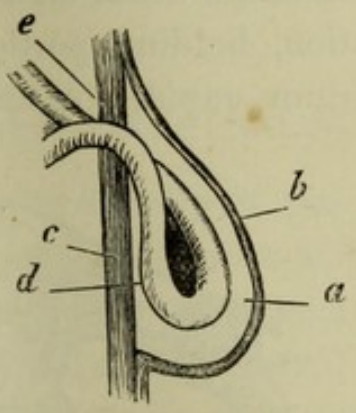


FIG. 105.—*Diagram illustrating the process by which a knuckle of Intestine becomes strangulated when forming a Hernia.*

a. The hernial sac, formed by
b. The skin outwardly, and
c. The internal or muscular walls of the abdomen.
d. The imprisoned bowel becoming black from pressure at the opening, *c*.

Strangulation of the bowels produces very acute signs of suffering in the form of colicky pains, an anxious, dejected look (Fig. 106), partial then general and profuse perspiration, scraping with the fore-feet, accelerated circulation and respiration, violent rolling, *straining and protrusion of the anus, which will not admit of the introduction of the hand or retention of clysters, and no relief is experienced* from the administration of the most powerful



FIG. 106.—*The Countenance expressive of pain and serious internal states.*

drugs. The pulse is at first full, hard, and frequent, but on aggravation of the conditions it becomes small and wiry, at length being imperceptible towards the close; the mouth is hot, and the visible mucous membranes are injected. After suffering for a number of hours the pain suddenly ceases, respiration is calm, but the pulse cannot now be felt, and the animal seeks food; he takes a little, and ceases mastication, holding portions between the teeth; dulness and delirium rapidly ensue; he staggers (Fig. 107), the legs

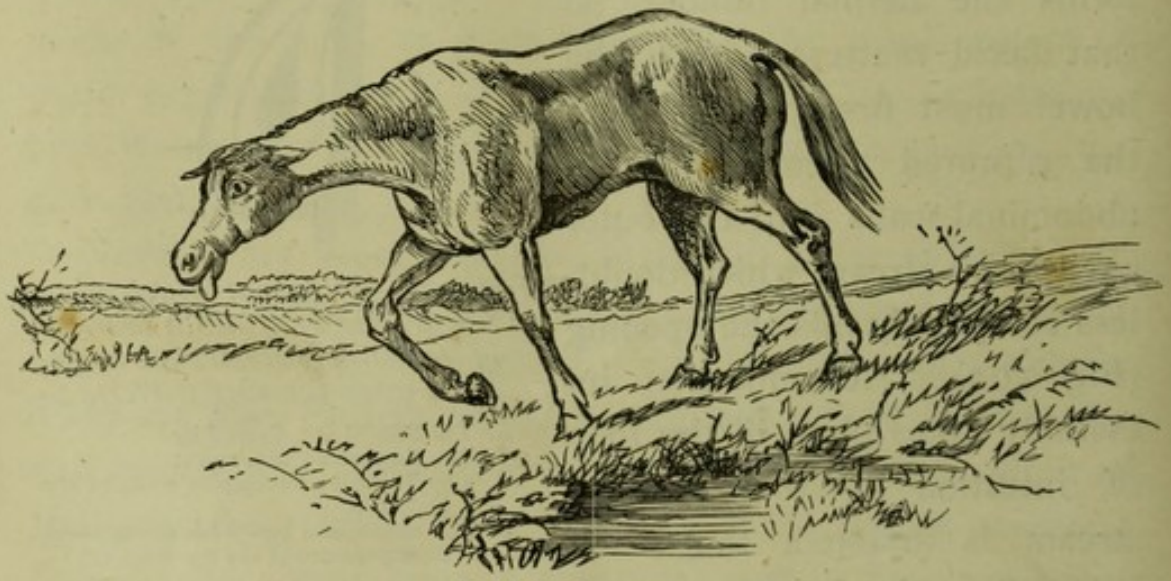


FIG. 107.—*He falls.*

double, and he drops, violent retchings take place, and he dies in convulsions. A typical case of strangulation has been given at page 298. After death a tumour upon some part of the abdominal walls is discovered, having escaped observation before, and on being opened the cause is fully apparent. A portion of intestine, and it may be also of other viscera, have protruded through a rent in the muscles, being confined outwardly by the skin; by compression they have become purple or black in colour, and probably portions are preparing for removal by sloughing.

In all cases of colic or abdominal pains in the horse a careful examination should be made, in order to be satisfied

of the non-existence of hernia, before medicines are administered. When drugs—especially those of a purgative nature—are given, and hernia remains undiscovered, the causes are considerably aggravated, the animal endures more intense agony, and probably suffers in addition from a species of poisoning.

The various kinds of herniæ are as hereafter described.

Umbilical or Navel Hernia—Exomphalus.

Hernia at the navel or umbilicus is usually of the most simple kind, and in the majority of instances exists at birth, when it is distinguished as *congenital* hernia. As such it is often the result of hereditary defects, and is transmitted from parent to offspring with great certainty. Some years ago we observed an entire horse travelling the district having a tolerably-sized hernia of this kind. He was a great favourite with the farmers, and numerous foals were produced by him; but in every instance they were born with the hernia at the navel, for which an operation had to be performed. In those animals suffered to go too long they were disfigured by the usual tumour, and rendered unsaleable as sound animals. In later life this form of hernia does not occur, as the orifice at the navel closes a few months after birth. Accidental rupture, or reopening of the navel, is therefore of very rare occurrence.

The *symptoms* consist of a soft, fluctuating tumour, of variable size, at that part of the abdomen known as the navel. When pressure is applied upon all sides by the fingers as the animal stands, or when he is turned on his back, the tumour disappears, and an opening is detected in the walls. A significant test of the nature of the tumour, when irreducible, consists of grasping it in the hand, while an assistant "coughs" the animal; this has the effect

of causing the tumour to enlarge suddenly, and as quickly to decrease.

This form rarely becomes strangulated. In most cases the omentum forms the major portion of the contents, particularly if the opening is small. In some animals it produces no inconvenience throughout some time; and as the growth of the omentum is not progressive with that of the animal generally, the abdomen descends, and the orifice recedes, the omentum being really too short to reach the opening.

Treatment.—Young animals only are treated, except when the hernia becomes strangulated, and the proper measures should be instituted as early as possible. In simple cases the most appropriate remedy is a kind of truss or bandage in the form of harness, which provides a compress at the proper part. Ordinary pressure appears to be all that is required, for when the skin is held constantly

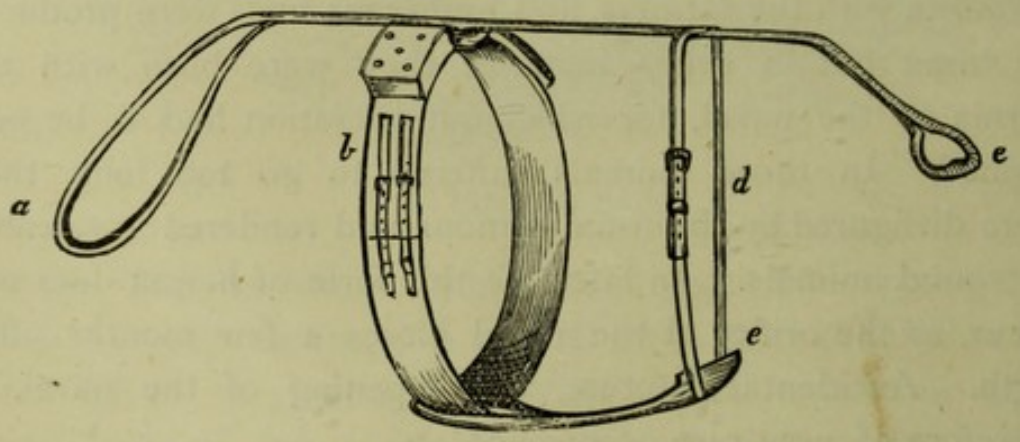


FIG. 108.—*Harness or Truss for Navel Hernia.*

a. The collar.
b. Body strap or surcingle.
c. Loop for the tail.
d. Loin straps.
e. Pad for the hernia.

up to the orifice the omentum or viscera are not allowed to fall through, and by their weight keep open and make it wider; besides, the skin unites to the subjacent tissues, and acts as a natural bandage, and these combined means admit of the effectual closing of the orifice in the usual manner. The contrivance already named is shown in Fig. 108. It

is particularly suitable in this form of hernia affecting valuable animals, in which it is not desirable to resort to the risk of casting for operations about to be described. We have treated young blood stock thus on many occasions, and the results have been all that could be desired. The arrangement consists of a light strap for a collar, and a surcingle to pass round the chest in the usual manner, these being connected at the top by a strap, which passes along the spine to the tail, where it forms the usual loop or crupper. A narrow strap, having a runner which receives the top or back strap, passes round the abdomen, and at the situation of the navel a circular pad is stitched on, which is to be applied. A strap connects the pad underneath with the surcingle and the collar, and one on each side passes from above downwards, and these having buckles, can be tightened when placed in the required position.

Animals thus treated should not be turned to grass, as the bowels are apt to become distended and overloaded, and thus operate against the cure. Light food and the run of a yard or paddock should be allowed in preference, where the eye of the owner, stud-groom, &c., will be frequently available in directing alteration, removal, or readjustment of the truss when required.

Among animals of inferior breeds, the common method of treatment, and one of a summary character, is that of operation. Two kinds are pursued, which are as follow:—The first consists of placing the animal on his back by means of a rope, as in castration, and attaching an instrument called a clamp or clams, which, taking up a fold of the skin, excites adhesive inflammation beneath and union to the edges of the opening, and thus prevents the return of the bowel, &c., while the same action tends also to hasten the closure of the opening itself. The clamp in use is of two kinds—one of

wood, suitable on account of its lightness, is shown in Fig. 109, but objectionable because the nature of the joint does not admit of equal pressure throughout. For small tumours they may answer, being closed at the opposite end by several turns of fine cord, finally secured by being drawn through the slit. The iron clamp is more effectual, as pressure may be regulated by means of the screws with which it is provided. As shown in Fig. 110, one half is grooved throughout, and on the corresponding side a piece of wire is riveted on, somewhat smaller than the groove which receives it ; by this agency the grip is more complete, and loss or displacement by slipping off avoided. The clamp is applied in the following manner :— As the animal lies on the back the contents of the hernial tumour slip back into the abdominal cavity ; but in order to remove all doubt on this head, the operator takes up a fold of skin over the orifice and manipulates it in different ways, afterwards exploring the parts by means of the fore-finger to ascertain that the opening is free. The skin is next raised in a longitudinal flat fold—*i.e.*, from before backwards, and the clamp is then put on, as near the abdomen as possible, and the screws tightened to the required extent. The pressure must not be too severe, or the part thus compressed will separate too early and drop off with the clamp—a most undesirable condition, and which might be attended with escape of the intestines. The object

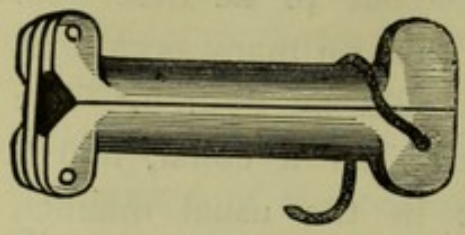


FIG. 109.—*Wooden Clams.*

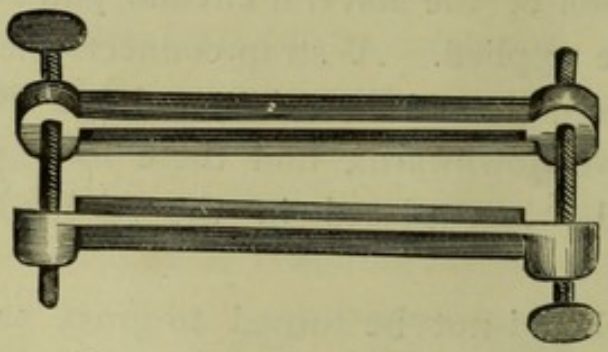


FIG. 110.—*Iron Screw Clams.*

is to apply only such pressure as will result in setting up an adhesive inflammation and thickening by deposit of the usual products in the skin and around the navel ; and if this is carefully accomplished, the clamp drops off in about a week or ten days, the tumour having disappeared never to return.

The second operation is chiefly resorted to by empirics, castrators, and others. The animal is cast, and the skin over the orifice of the navel is grasped in the left hand, and two needles, skewers, or large carpet pins are inserted, crossing each other, and close to the abdomen ; a piece of strong twine is then wound round above the needles and caused to compress the skin. The operation is modified in some districts by inserting two skewers parallel with each other, one on each side of the opening, afterwards putting on the ligature as described, a greater advantage being attained by inclosing a larger fold of skin than can be accomplished by inserting them in a crucial manner. Some practitioners grasp the skin over the hernia as the animal stands, then press the contents into the abdomen, and pass the ligature round the mass above the hand. Care is especially required in these operations in order to avoid including the intestines —an event which has taken place on several occasions when skewers have been used by those ignorant of the anatomy of the parts. Whether ligature or clams are used the pressure at first must be moderate, and the operator should see the animal almost each day in order to insure the operation proceeding satisfactorily, and to regulate and increase the pressure as the shrinking of the parts require. When the parts are not sufficiently compressed they are hot and tender to the touch ; and when, on the contrary, the circulation has been sufficiently arrested, the incarcerated skin is cold and damp. Clams and ligatures should be allowed to drop off ; any interference in their removal may be hurtful. In all cases

before the operation is performed the animal should be kept short of food and water for twelve hours at least.

Inguinal Hernia.



Fig. 111.—*Inguinal Hernia.*—Girard.

a', *a'*, Portion of the colon continuous with *b*, *b*, which is fixed in the inguinal canal; *c*, *c*, the neck of the peritoneal sheath, which is enlarged from the passage into it of the intestine; *d*, *d*, tumefied portion of the spermatic cord.—Gamgee.

This is a form more common to stallions and young uncastrated animals than to the mare or gelding, and therefore is not so commonly seen in Britain as in India, and other countries where entire horses are generally employed. To this there are occasional exceptions, as the case cited at page 298 fully shows, the passage called the inguinal canal having but partially and imperfectly closed after castration.

The inguinal canal is a passage or opening connecting the abdomen with the scrotum or purse, and it is along this the testicle is directed in its journey from the abdomen to its proper locality in the pouch-shaped cavity, the scrotum, which hangs between the hind-legs in males. At birth the testicles are within the abdomen, and afterwards they may be found in the scrotum, their return

being prevented by closure of the canal through which they descended ; but, as we have seen, the natural course is not always carried out, and when that is the case hernia may take place. Castration may sometimes assist in closing the canal by the amount of inflammatory deposit and thickening which is the result, the covered operation being devised purposely to secure this end by uniting the peritoneum with the cord, which in subsequent retraction within the abdomen effectually shuts up the internal abdominal ring, or entrance to the canal. Inguinal hernia usually consists of a descent of the small intestines, or sometimes also of the omentum, the nature of which will be understood by a reference to Fig. 111.

Symptoms.—The presence of inguinal hernia is seldom observed until the intestines are compressed in strangulation, when the animal is affected with colicky pains of an increasing and severe character, the animal obtaining relief by lying on the back, the hind-legs being doubled and relaxed forwards —a position favourable to the descent of the bowel into the abdomen. Entire horses thus affected should be carefully examined, and, as the presence of a tumour cannot be insured, the hand must be passed up the rectum after being cleared by enemas, and on reaching the internal abdominal ring the imprisoned bowel will be felt. For this purpose the finger-nails must be cut short, to avoid scratching the membranes. Special signs of this form of hernia are—frequent retraction and descent of the testicle on the affected side ; parts of the body are bathed in cold perspiration, particularly around the scrotum and on the inner sides of the thighs ; violent straining of the rectum, which opposes the introduction of the hand, as well as the throwing up of enemas ; and the animal looks anxiously round to the flanks. The pulse is full and hard, and frequent at first ; but as strangulation proceeds it becomes small, wiry, and at last imperceptible, and if unrelieved the animal dies.

Treatment.—A recent hernia not far advanced in strangulation may be reduced as the animal stands; the operator having one hand up the rectum, gently draws the intestine upwards, while an assistant manipulates the locality of the canal below the abdomen in the groin. When this is not successful, the attempt must be made as the animal lies on his back, having been cast and secured for the purpose, when there is greater probability of the intestine slipping by its own weight, assisted by gentle manipulation, within the abdomen. In the event of return of the bowel being impossible by these means, the practitioner will have recourse to an operation, which consists of opening the inguinal canal by the knife, and dividing the stricture; when it is usual also to castrate the stallion by means of the covered operation, and thus prevent a recurrence of the hernia.

A full dose of opium or chloroform should be given early in the case to overcome the powerful spasms which oppose the efforts to afford relief.

Scrotal Hernia.

This form is confined to stallions, as a rule, and consists of a descent of intestine to the scrotum or purse, which is swollen considerably. It may but rarely happen in a gelding, when, as in entire horses, closure of the inguinal canal has not been effected, and enlargement has been secured by constant passage of the intestines or omentum into it.

The *symptoms* are analogous to those of inguinal hernia, having the addition of the swollen scrotum during strangulation; but in young colts the condition may not be observed until castration has to be performed, when the covered operation is imperatively called for. Fig. 112 shows the relative position of the objects in this form of hernia.

Treatment.—The return of the imprisoned bowel must

first be attempted in the ways directed for inguinal hernia, or by surgical means, after which castration is to be performed by means of the covered operation.

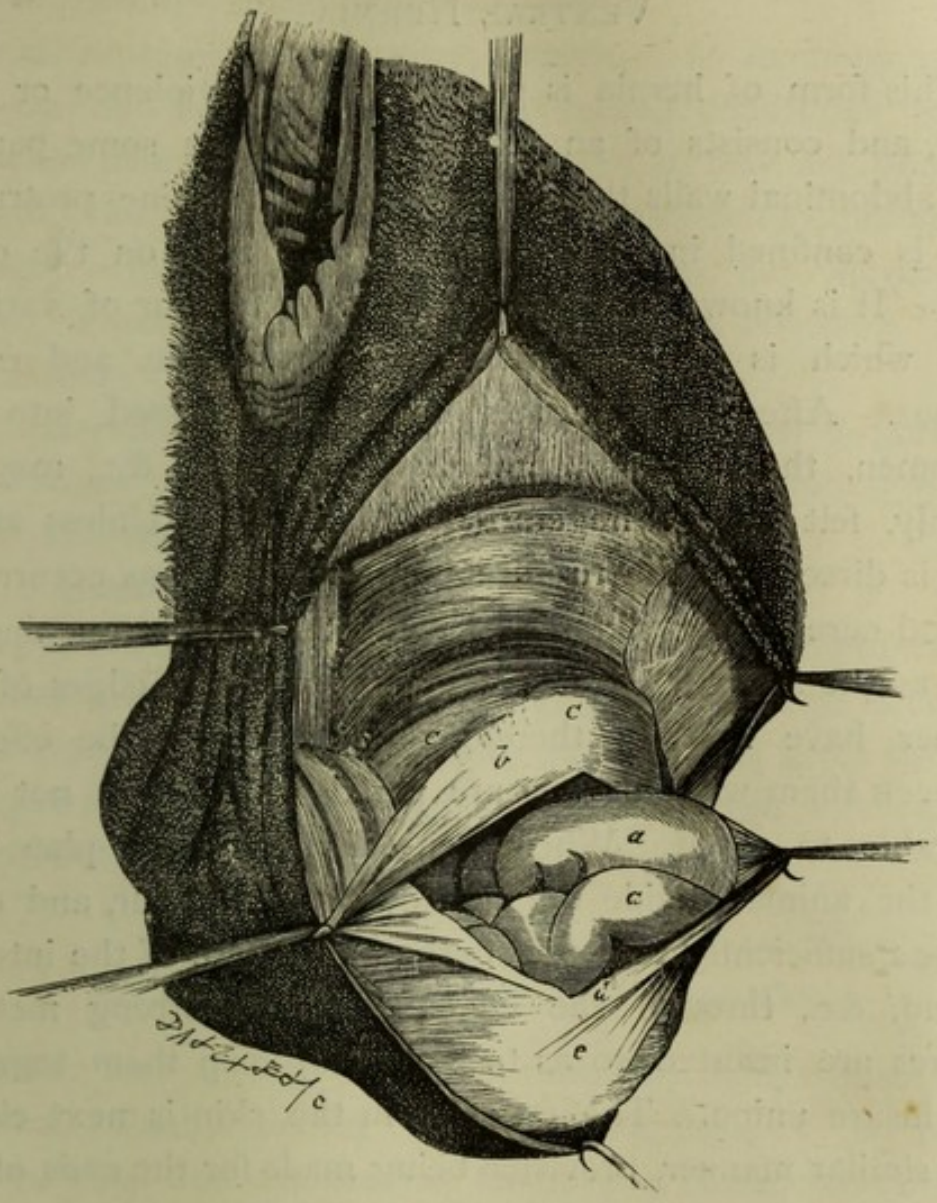


FIG. 112.—*Scrotal Hernia.*—GIRARD.

a, a. Fold of intestine in the scrotum; *c, c,* is the wall of the hernial sac; *e,* represents the elevation of the tunica vaginalis produced by the testicle.—GAMGEE.

Professor Gamgee* describes a case in which a gelding was attacked by colic, and gaining no relief under the administration of drugs by a practitioner, his advice was sought. On examination a large scrotal hernia was found, and it was

* Our Domestic Animals in Health and Disease.

not until after the animal was relieved by a return of the intestine that it was discovered he was castrated.

Ventral Hernia.

This form of hernia is generally due to violence or accident, and consists of an artificial opening in some part of the abdominal walls through which the intestine protrudes, and is confined in a sac formed by the skin on the outer side. It is known by the presence of a tumour of variable size, which is soft and fluctuating, reducible, and rarely serious. After the contents have been pressed into the abdomen, the opening through the muscles, &c., may be plainly felt by the fingers (*see* Fig. 105). Unless attention is directed to the rupture immediately it has occurred a radical cure is not likely to be effected, as the opening as well as the sac have become enlarged, and the edges of the former have healed; therefore union cannot be effected between them without they are pared, which it is not very desirable to adopt. When seen early, the usual plan is to cast the animal, divide the skin over the tumour, and open the sac sufficiently to ascertain the exact state of the internal wound, &c., through the edges of which strong metallic sutures are inserted, so as to draw and keep them together and insure union. The opening in the skin is next closed in a similar manner, provision being made for the ends of the internal sutures to hang outside, in order that they may be withdrawn when perfect adhesion has been secured. We have seen, as well as having been informed by practitioners, even extensive lacerations of the abdominal walls producing large herniæ treated in this way, and recover satisfactorily. After the operation the bowels should be kept open by soft and easily-digested food, the animal being kept exceedingly quiet, under watchful care, to guard against sudden fright, &c.,

which might result in reopening the wound, and allow of the escape of the intestines.

One of the adverse results of wounds of the abdominal walls is peritonitis, with effusion—ascites.

Small ruptures require no interference, as in many cases they do not enlarge or assume serious conditions when situate on the sides of the abdomen ; if they are present beneath, the risk of enlargement and strangulation is increased : but even then the worst does not inevitably follow. Three other kinds of herniæ are observed, and known as—

A. *Phrenic or diaphragmatic hernia*, in which a portion of intestines slip through a rupture in the diaphragm or midriff into the chest ;

B. *Omental hernia ;* and

C. *Mesenteric hernia ;* which are respectively ruptures of the omentum and mesentery, through which a fold or knuckle of intestine passes, and, becoming strangulated, gives rise to the signs already described under volvulus, from which they are not distinguished during life.

Ascites, or Dropsy of the Abdomen.

Nature and Causes.—A collection of fluid within the abdomen, usually arising from inflammation of the peritoneum, when that disease has assumed a chronic condition. It is, however, a rare disease in that form, and is seen more frequently as a result of injuries to the abdominal walls when the peritoneum has been subjected to violence, and associated with local inflammation of the muscular tissues, from which effusion cannot be directed outwards. We have seen it arise from obstruction of the portal circulation caused by disease of the liver, lungs, or heart, in which the blood-vessels of the abdomen, whose office is to convey the blood

direct to the liver, are enormously distended and their walls stretched, admitting the fluid portions of the blood to exude, probably facilitated by a poor state due to exhausting diseases, or deficient food and subsistence on badly drained moor or marshy land containing scanty and innutritious food. The character of the fluid varies in the different states of disease. Ascites, the result of peritonitis, furnishes a simply pale straw-coloured fluid ; in some cases it is turbid, containing flakes of lymph, and may be confined to particular parts by means of a large formation of false membranes. When local injuries are the cause, the fluid is reddened by admixture with blood, and in more advanced cases pus also is found. When it arises from interruption of the circulation the effused fluid is clear, but after death the colouring matter of the blood is soon imparted to it.

Symptoms.—Gradual enlargement of the abdomen, together with local dropsy or swellings of the sheath, legs, breast, belly, &c., and interference with the process of respiration (Fig. 113). In the chronic states the progress is slow, gradually passing from the original disease into com-

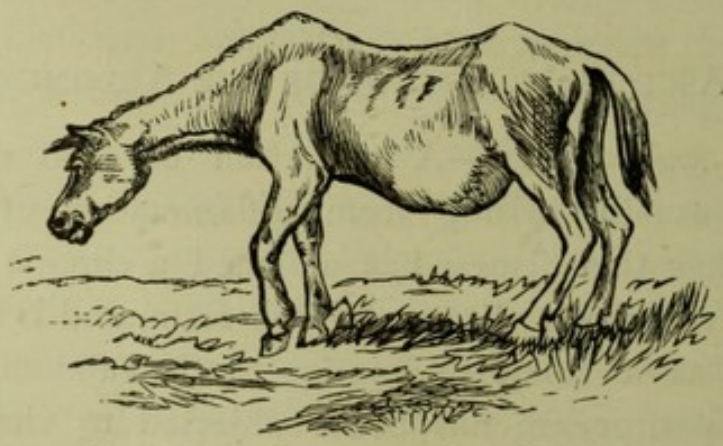


FIG. 113.—*Dropsy of the Abdomen.*

plete obstruction to the general functions of life. When local injuries are the cause, the enlargement may not proceed far, as internal hæmorrhage, shock to the system, &c., greatly add to the serious conditions, and cause exhaustion,

sinking, and rapid death, after which the fluid doubtless increases rapidly.

Treatment.—For ascites following diseases of the organs essential to life there is no cure, neither for that form dependent on local injuries. When it is known to depend on bad food or deficiency of plastic material within the blood, then we may prescribe the salts of iron with vegetable bitters, and allow good food, as boiled barley, &c., using occasional laxatives and diuretics.

An operation termed *paracentesis abdominis*, or tapping the abdomen, is recommended and performed by some practitioners, which in some instances affords a temporary relief. It is almost needless to state that, unless the original disease is removed, the mere drawing off of the fluid will not have a permanent curative effect.

DISEASES OF THE LIVER.

CONGESTION.

Nature.—Congestion, or hyperæmia, of the liver consists of an overloaded condition of the venous bloodvessels, amounting to more or less of complete stagnation, extending to the veins of the digestive system, and, as a natural consequence, interfering with the ordinary functions of the whole.

Causes.—Obstructions to the venous circulation, such as functional disorders of the heart, or diseases of that organ, the lungs, &c., all of which prevent a due flow of blood from the liver; highly-stimulating food and too little exercise, from which the liver becomes charged with foreign material as well as excess of substances, the separation of which improperly falls to the action of this organ, just as takes place in the human subject from too luxurious living,

as well as indulgence in intoxicating liquors ; the presence of parasites, concretions, &c., inflammation and thickening of the mucous membranes of the bile-ducts, which prevent the natural flow of the biliary secretion. Hot weather has a powerful effect, especially in conjunction with other causes, in producing congestion of the liver.

Symptoms.—These are rarely well-marked during life, consisting only of slight dulness, with occasional languor, and capriciousness or temporary loss of appetite. Congestion of the liver, depending upon repeated or continued presence of the exciting causes producing an active form, may proceed for months, and, as in some of the heavier breeds of horses doing only very slow work, and consuming a large quantity of highly-stimulating food, attract no special attention ; the animal appears in the best of condition, as some people imagine ; at length, however, a few signs of internal disturbance are exhibited, and he drops down dead.

Occasionally during ordinary congestion of the liver the following signs are apparent :—Slight colicky pains, which cause the animal to look round to the right side ; constipation of the bowels, the fæces being small, hard, thickly coated with mucus, fœtid, and probably of a light or clay colour ; the urine has also a brown colour and strong odour ; the mouth is slimy, sour, and offensive ; a disordered state of the digestive process is shown by the desire to lick the walls and consume dirt and rubbish ; and sometimes we may more directly conclude the liver is at fault from the yellowness of the visible mucous membranes. In several cases we have noticed decided lameness of the right shoulder, which, however, subsided and reappeared with the varying intensity of the disorder.

Treatment.—Brisk purgation is necessary, and even bleeding when the pulse exhibits volume and strength ; these should be followed by the administration of the

sulphate or nitrate of potash, sulphate of magnesia, &c., and, which is of paramount importance, total amelioration of the system of feeding. It is delusive to rest on the belief that large, unwieldy, and obese animals are the examples of health and condition, and it is high time that the results of the feeding which produces such states are better understood. Health and endurance are the inevitable qualifications and endowments of a proper system of feeding and management; that system which produces a large development and an abundance of fat is undoubtedly an erroneous one, and a prolific source of unmanageable and fatal disease.

The purgative which will be found of service in congestion of the liver may be compounded as follows:—

RECIPE NO. 109.

Take of Barbadoes aloes	3 to 7 drs.
Carbonate of potash	2 drs.
Soft soap	Sufficient.

Reduce the aloes and potash to fine powder, then add the soap in successive quantities during trituration, until a semi-solid mass is formed, which roll into bolus shape and administer. During the operation of the medicine the usual restrictions as to dry food and cold water, &c., must be observed (*see* Cathartics); and comfort and warmth, with every needful attention, must be supplied. When the action of the purgative has subsided, the following powders may be given, morning and evening, for a week:—

RECIPE NO. 110.

Take of sulphate of potash, powdered.....	½ oz.
Powdered gentian	½ ..

Mix.

INFLAMMATION OF THE LIVER—HEPATITIS.

True inflammation of the liver is undoubtedly a rare disease in the horse, the signs of derangement observed in

connexion with this organ, and pronounced as hepatitis, being most probably congestion only. However, in opening the carcases of aged animals especially, there are at times evidences of the work of inflammation in the form of abscesses, plastic effusion, and organisation or ossification of the same. The most common form in which inflammation is met with involves the capsule of the liver, giving rise to thickening and union with the diaphragm or other organs by means of false membranes, and, distinguished by the term *perihepatitis*, in all probability forms one of the complications of enzoötic typhoid catarrh, enzoötic pleurisy, &c., to which the horse is peculiarly liable. The inflammatory action may be confined to a small portion, when it is said to be circumscribed ; or it may be diffuse—*i.e.* involving the whole or greater portion of the glandular structure. In the first form the tendency to abscess is great, or otherwise the spots are marked by the formation of white fibrous tissue, which invade the substance of the organ ; in the diffuse form, softening or degeneration of the glandular structure may arise with atrophy or wasting, or it becomes indurated, a condition in which hard and non-secreting tissue takes the place of that which performs the functions of the organ, when it may assume the enormous weight of 40 or 50 pounds.—GAMGEE.

Symptoms.— Inflammation of the liver is not readily distinguished, as the chief tendency is to assume the chronic form. The animal becomes dull, refuses his food, and hangs the head ; the eye has none of the usual brilliancy, but is half-closed and appears to lack the usual moisture. Although there are no signs of acute pain, yet there are evidences of internal disturbance, for the sufferer looks round to the side and is uneasy. The bowels are constipated, the fæces hard and covered with a thick slime, and in proportion to the arrest of the secretion of bile they assume a clay-yellow

colour, and are very offensive. An arrest of the secretion usually occurs in the earlier stages, when the visible mucous membranes are of a deep yellow; and indeed the skin, urine, and serum of the blood assume the same tinge. The animal will not lie down; fever runs high, the mouth being offensive and dry; the tongue furred and dirty; the pulse small, frequent, and irregular, and from the retention of bile and waste material it becomes slow. The pain is more distinguishable as the outer covering and peritoneum are implicated. Tenderness is evident on pressure being exerted, or when the animal is caused to turn round he winces and grunts. Relief is gained by effusion, when the abdomen swells, wasting of the body rapidly ensues, and the animal dies in six or eight days. Mr. Percivall* lays particular stress on the appearance of lameness in one fore-leg as a result of hepatitis. Professor Williams† concludes that it "is more particularly symptomatic of the existence of abscesses, or foreign bodies in the gland." We have observed it in connexion with phlebitis or inflammation of the portal vein, leading to obstruction of the liver.

Treatment.—Acute symptoms are to be met by purgatives with aconite in the first instance. For the former aloes are preferred, and may be given in either fluid or solid forms, as follow:—

RECIPE NO. III.

Take of Barbadoes aloes	3 to 8 drs.
Nitrate of potash	½ oz.
Aconite	10 drops.
Soft soap	Sufficient.

Rub the aloes and nitre to fine powder, add the aconite, and triturate with the soap to make up a mass.

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* Hippo-pathology, vol. ii. † Practice of Veterinary Medicine.

RECIPE NO. 112.

Take of solution of aloes	3 to 10 fl. oz.
Nitrate of potash	1 oz.
Tincture of aconite	10 or 15 drops.

Mix, and give as a drench.

Frequent enemas should be thrown into the rectum to assist the action of the purgative, and when that subsides frequent doses of salines should follow.

RECIPE NO. 113.

Take of nitrate of potash, powdered	½ oz.
Gentian, powdered	½ „
Treacle	Sufficient.

Make up into a bolus, and give one each morning and night. If preferred, the following electuary may be used instead :—

RECIPE NO. 114.

Take of nitrate of potash, powdered	4 oz.
Gentian, powdered	4 „
Treacle	Sufficient.

Mix so as to form a thin paste, a tablespoonful of which is to be placed on the tongue every six hours, until the symptoms of urgency are abated. The usual precautions as to diet are to be observed, avoiding all stimulating kinds, and supplying those of a laxative tendency, while the comfort of the animal is to be secured by every means. Friction to the skin, especially damp wisping, or the Roman bath, will be of immense service.

Hepatitis assuming the chronic form may run on to induration or scirrhus, in which the true secreting portion is replaced by white fibrous tissue. The gland is covered on the outside by a thick and opaque membrane, which is roughened by the results of inflammation, while the interior is hard, tough, and unyielding. Such a state resembles the condition observed in the human subject as a result of the use of ardent spirits, and like it leads, sooner or later, to a fatal termination.

Softening and Rupture of the Liver.

This untoward condition is a result of repeated or long-continued congestion of the liver. Softening does not inevitably give rise to marked symptoms during life, and therefore fatal terminations from rupture and hæmorrhage may suddenly take place. At other times the signs of hyperæmia arise and subside, leaving the animal in apparent health between the repeated attacks, when at length a return of the congestion takes place, more severe than formerly, and terminates fatally. Degeneration of the gland structure proceeds throughout each attack, and finally gives way to the pressure of blood, when hæmorrhage, partial or general, follows. In the partial states the blood may be confined within small spaces of degenerated tissue, or may escape through small openings in the capsule of the organ, and later a larger rent in the membrane takes place, and a discharge of several gallons of blood within the abdomen puts an end to the sufferings of the animal.

Symptoms.—The animal breathes heavily, abdominal pains are severe, and he looks round to the side ; the membranes

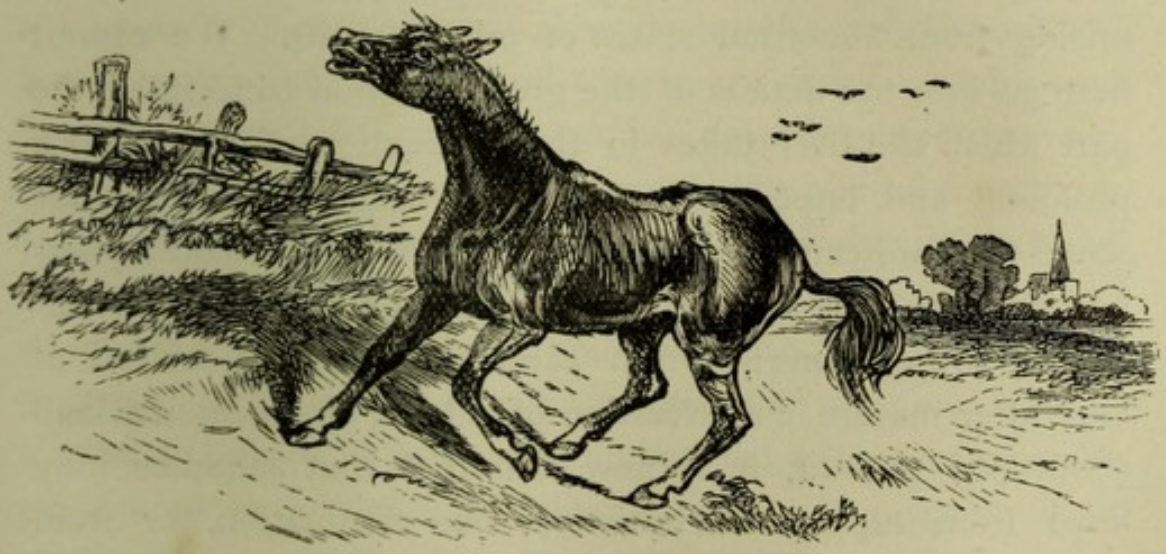


Fig. 114.—*The Fainting Fit.*

suddenly become pale, and the pulse is running-down ; the mouth and body generally are cold, and the pupils are widely

dilated. Increasing weakness is shown by the animal seeking support by leaning on the nearest fixed object, the legs are wide apart, and the head mostly pushed against the wall. If attempts are made to move him, and especially when the head is raised, he falls backward in a fainting condition (Fig. 114), and speedily dies when the rupture and hæmorrhage are great. Such symptoms supervening on jaundice, together with urine loaded with bile, and offensive fæces of a clay-yellow colour, can scarcely be mistaken in rupture of the liver leading to fatal hæmorrhage.

There is no *treatment* for the disease. The only useful measures are those which relate to diet, &c., and by which it may be avoided.

Jaundice—Icterus, or the Yellows.

Although this affection may and does often exist in combination with diseases of the liver, it nevertheless very frequently is present independently of disease altogether, and therefore, in the majority of instances, it is to be regarded as a symptom only of other conditions of disorder of the liver, arising from abnormal states of other organs. We cannot here go into the details of the great question concerning the part which the liver takes in the production of bile; it is a profound and important subject, and would require greater scope than we can give to it, and more than would answer our purpose; let it suffice, therefore, to enumerate the following propositions:—From careful conclusions, arrived at only after mature consideration of all the circumstances and conditions present, it is now admitted that jaundice may arise from suppressed secretion, non-elimination, or from reabsorption.

Jaundice consists of a yellowness of the visible mucous membranes and the skin, and may be observed to such an

extent that all the tissues of the body, as well as the excretions, are deeply dyed and impregnated by the presence of the colouring matter of the bile. Whether the cause lies with non-secretion, non-elimination, or reabsorption, the colour is the same, although the causes producing the state may be various, thus:—When the secretion is suppressed, the colouring matter only is present, which is due to the failure of organs to send the bile out of the body, it therefore remains and impregnates the system; owing to other causes, as obstruction to the passage of bile from the liver to the duodenum, it is then reabsorbed or taken direct into the system, producing the characteristic colour within the tissues. The presence of the bile acids within the urine must be looked for, in order to decide which of the conditions we have named are existing, before any useful plan of treatment can be adopted.

Symptoms.—The visible mucous membranes, together with the skin, are tinged a deep yellow; the bowels are constipated, fæces hard, small, and invested in slimy mucus; the urine contains the colouring matter of bile, and paper dipped into it and afterwards dried is permanently stained; the appetite is capricious or absent, and the digestive organs are irregular; the mouth and tongue are slimy, furred, dirty, and offensive, and if these signs are not relieved, or by constant reappearance at variable periods the animal eventually loses his appetite, the temperature of the body declines and is very low, the blood is impoverished, and anæmic and dropsical conditions are established. Such attacks result in disorganisation of the liver and incurable disease.

Treatment.—The principles of medical treatment must be considered in accordance with the cause. If suppression of the secretion of bile depend on congestion or inflammation of the liver, the removal of those conditions by the appropriate measures, as already detailed, will effect a dissipation

of the jaundice. When, however, the secretion is suppressed or arrested, as a result of deficient nervous power or sympathetic disturbance with other organs, acknowledged liver stimulants, as aloes, with calomel, iodide of potassium muriate of ammonia, podophyllin, &c., with the mineral acids, particularly the nitro-muriatic, and even ox-gall are called for In long-standing cases the suppression may depend on scirrhus, when removal is impossible.

The absorption of bile and consequent dyeing of the mucous membranes, &c., is often present in the so-called influenza, constituting the bilious form, and depends upon catarrhal inflammation of the walls of the bile-ducts, by which their calibre is diminished ; indeed, the walls may be thus caused to approximate and retard, diminish, or arrest the flow of bile which is retained by, and absorbed from, the liver. In such cases the animal cannot withstand the purgation which is so effective at other times in the removal of jaundice (*see* Enzoötic Typhoid Catarrh) ; and therefore those measures must be modified to suit the existing states. Linseed oil or the neutral purgative salts will be found to answer best in small daily doses, especially as having a direct effect on the original disease, the decline of which of course removes the cause of jaundice. Suppression or non-secretion from deficient nervous power, alternating with sudden excessive secretion, giving rise to unexpected looseness, or diarrhœa, in which the evacuations are dark, or coffee-coloured, as distinguished from the former, in which they are highly offensive, and of a light or clay-yellow colour, are common conditions in enzoötic typhoid catarrh, only to be overcome by restoring the tone of the whole system, for which quinine, cinchona, bark, gentian, taraxacum, the mineral acids, and especially the phosphate or sulphate of iron, are the needful remedies, some of which may be given in combination, or alternated with each other ; while additional assistance is to be derived

from a carefully selected, well-regulated, and generous system of diet.

Jaundice is also observed in connexion with dyspepsia, bulimia, non-secretion, &c., being due to the sympathetic disorder of the stomach, and should be met by alkalies, as the carbonates of potash, soda, or magnesia, and even lime-water, the system of diet being carefully attended to in order to mitigate the causes of the original disease. Besides these, jaundice may be due to the presence of concretions, as gall-stones, flukes, abscess, tubercle, cancer, &c., for which no special system of treatment can be usefully adopted, as in the majority of instances their presence have not been distinctly made out during life.

Diseases of the Spleen and Pancreas.

It is somewhat unfortunate that thus far the science of veterinary medicine has not furnished any code of signs by which diseases of these organs are readily made out. The effect of this confession is, however, greatly counterbalanced by the fact that disease in either the spleen or pancreas is very rare, and chiefly consists of cancer, enlargement or wasting tubercle, ossification, the presence of hydatids, &c. Professor Williams names also a disease called lymphadenoma, as occurring to the spleen. Increase in the number of white globules in the blood is an evidence usually accepted of disease of the spleen, and the presence of large quantities of fatty matters in the fæces is indicative of the absence of secretion of the pancreas, the principal office of which is to emulsify those substances, and thus prepare them for passing direct to the blood.

Crib-biting and Wind-sucking.

These are vices which are acknowledged as unsoundness, because such animals are supposed to be continually liable

to colic and recurrent indigestion. The *crib-biter* is guilty of seizing the manger or other fixed and suitable object with the incisor teeth, which, in consequence, become very much worn (Fig. 115); then arching the neck, performs a kind of belching, during which, according to some, air is swallowed in large quantities, so as to distend the stomach and produce enlargement of the abdomen generally. The *wind-sucker*, likewise, is said to swallow air in large quantity, as supported by the following signs:—He smacks the lips in the attempt to confine air within the mouth, which is then closed, and with the lower jaw, probably placed upon some fixed object, he arches the neck, places the feet near together, and with a belching action inflates the stomach. Indigestion is said to arise in this instance more frequently, and from certain complications is pronounced to be worse than from crib-biting.

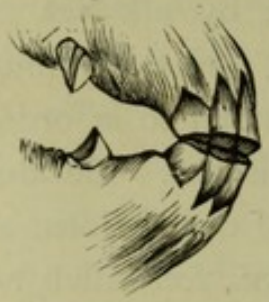


FIG. 115.
Incisor Teeth of the Crib-biter.

The earlier editions of Blaine's "Veterinary Art"* contain the following, in reference to these vices:—

"This peculiar action is very generally, but, in my opinion, erroneously, supposed to arise from a small quantity of air drawn into the stomach; and is hence called *sucking the wind*. But I believe this idea of it to be very incorrect; and that, on the contrary, it consists in a simple eructation or forcing out of a small quantity of gas let loose from the morbid combinations within the stomach, which, as it proves a source of irritation, to aid its expulsion the horse applies his teeth to a fixed point, by which he gains the help of some of the muscles of the fauces to open and straighten the œsophagus, while, at the same time, by means of the abdominal muscles, he presses on the stomach and forces out a

* Fifth Edition. London: 1841.

little of the irritating air. To prevent the action, it is common to place a tight strap around the throat, which prevents the horse from attempting the dilatation of the pharynx. Exactly the same process takes place in ourselves, except that we have no occasion, from the peculiar shape of our pharyngeal opening, to gain a fixed point for the teeth; but in every other respect human eructation in dyspepsia is conducted in the same manner.

"It is considered a vice, a habit acquired, &c.; but I believe that it always commences in dyspepsia, the consequence of long living on dry food, &c. I never knew an instance of its being contracted at grass; but turning out to indifferent keep in a straw-yard is a very common cause. It may be traced to a course of chaff-feeding, bad hay, musty oats, and long confinement during frosts. Crib-biters rarely carry much flesh; but it can never be supposed that the mere action of crib-biting, were it either a vice or an amusement, could deprive them of flesh. The faulty digestion at once keeps them thin, and makes them prone to assume this dyspeptic condition, which, once acquired, is lasting from habit, even although we could remove the original cause. Under this view, we recommend that the habit be attended to only as far as regards the consequences which are likely to ensue from the wear of his teeth; to say nothing of mangers, &c. To suppose that the stopping of the action will do more, is fallacious; for, however we may succeed in this, the horse remains as he was in flesh. To prevent the crib-biting, nothing more is necessary than to place a strap two and a half inches broad around the throat, tightened only to the degree necessary to prevent the action, which it does by rendering it painful to distend the neck and straighten the pharynx, confining the auxiliary muscles."

We are much inclined to believe that Blaine was in the

major part perfectly right when he wrote the foregoing. The symptoms described as crib-biting and wind-sucking at the commencement of our remarks, are certainly more of the character of retching and "belching out," or expelling air by encouraging antiperistaltic action of the œsophagus, than of swallowing it. The *post-mortem* conditions described by Mr. Steele, the editor of the last edition of Blaine,* as results of crib-biting, appear to us the very causes which facilitate the action. Since we have learned so much of the nature and causes of vomiting in the horse, we may now regard wind-sucking and crib-biting as efforts to vomit air rather than to swallow it, the tympanitis favouring the conditions for effecting an escape at the cardiac entrance of the stomach. As Mayhew, the editor of the fifth edition of Blaine,† justly observes :—

"The first symptom of crib-biting is usually the licking of the manger, which habit the horse will indulge in for hours together. If taken at this point, and a piece of rock-salt placed before him, the animal will apply his tongue to it; this usually prevents him from becoming a cribber, by giving him employment and strengthening his stomach."

In our belief, very few hard-working horses ever become wind-suckers or cribbers ; indeed, we have never known an instance ; but among pampered, idle animals, confined to heated stables and stereotyped rules which interfere with Nature's laws, the vice is common. Professor Morton says it arises from the presence of calculi in the stomach, in certain instances ;‡ thus showing its origin in dyspepsia—the cause of the concretions.

Although it may not be possible to reduce all the phenomena observed in the process of so-called wind-sucking to a state of harmony with the conclusions to which we have arrived,

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* Seventh Edition, 1865. † 1854. ‡ Calculous Concretions.

we do not conceive that they are the less tenable. Further observation is required, and when due care and attention is bestowed, we shall doubtless be able to add to our symptomatology of gastric disorders that of "eructation," by which we seek to convey an idea of confirmed dyspepsia, giving rise to constant rapid fermentation within the stomach and bowels, banishing the terms now in use as misleading and incorrect.

SECTION VI.

DISEASES OF THE URINARY ORGANS.

DISEASES OF THE URINARY ORGANS.

NEXT to affections of the digestive organs, those of the urinary apparatus may be taken as an example of an important class. The organs of both systems are so closely allied in function, that it becomes a question for consideration why certain diseases known to be dependent upon functional derangement of these organs should not be viewed as belonging to, and even classed among, the disorders of the alimentary track, seeing that the cause is undoubtedly concentrated in the process of digestion or assimilation. Diseases of the urinary system in the horse are not so numerous as in the higher animal. He is not the subject of mental emotions, nor is he called upon by surrounding circumstances to cope with conditions which in man so greatly disturb the control of nervous power; nor is he the victim of such baneful practices as indulgence in alcoholic stimulants, or gluttony—the first he would never like from choice, nor commit the latter while strictly healthy functions are carried out. Having these important facts before us, we are at once supplied with grave reasons by which to account for the comparatively short list; but were we to follow, what we believe would be the most proper course of classification, the category might be further reduced. As it is, we have only slightly attempted that here, believing that the non-

professional reader will be more assisted by the arrangement generally of diseases according to the organs they affect, rather than taking the cause as the guide.

The kidneys, which form the principal organs of the urinary apparatus, are unlike many others of the body. They are not engaged in the formation or elaboration of any fluid or material which plays some important part in the building up of the body, but, on the contrary, are exclusively engaged in the separation of compounds from the blood, which, if retained, would prove highly injurious. Their office is entirely one of secernation, or purifying, by separating the deleterious, waste, and worn-out portions of the body from the blood.

The constitution of urine in health is one of the subjects that afford to the pathologist great assistance in his estimate of disease or disorder of the urinary organs. When the functions of digestion and assimilation are active and properly performed, the urine exhibits a tolerably uniform condition both in colour and constitution ; but as soon as the stomach and intestines allow of the passage of compounds into the blood which are unsuited to the wants of the body, the kidneys are rapidly called into action to separate and eliminate them. In this way the urine is caused to contain foreign or unnatural ingredients ; and if the manufacture of such by the stomach, or their presence by other means within the blood is constant, the kidneys become unduly exercised, and disorder or disease may result. Apart from either, however, the condition of urine thus charged, being carefully examined, affords a valuable means of arriving at important conclusions as to the cause of disease. By the process just pointed out, substances which under ordinary conditions maintain a perfect solubility in the blood are brought into contact with unlike bodies in the urine, and, entering into chemical combination, form a

third and totally different one, probably altogether insoluble. The kidneys or bladder thus become charged with sabulous matter, portions of which are voided in urination ; or these small particles may aggregate around some other insoluble crystal, &c., and form a hard mass or concretion, known as a urinary calculus, the presence of which in the bladder, kidney, urethra, &c., may cause not only awkward symptoms but even death.

The *density* of urine is one of the means by which its nature and constitution are arrived at. By density we mean relative weight ; thus, a given measure of water, we will suppose, weighs thirty grains, while another fluid taken in exactly the same quantity will weigh thirty-five grains. The density of fluids and solids is known as *specific gravity*, and as such is spoken of generally when investigating the nature of urine. The comparison of the fluid is made with water as the standard of fluids, and for the purpose a graduated and very delicate, as well as fragile instrument of glass, called the urinometer or urogravimeter, is employed, such as is shown in Fig. 116. It consists of two bulbs and a stem. In the lower bulb a counterpoise of quicksilver is placed, in order that the vertical position may be preserved when in use. The second or larger and elongated bulb contains air only, and is the means of keeping the instrument buoyant in the fluid to be tested. Inside the stem is a scale, graduated from 0 to 60, and by this the exact density of fluids heavier than water can be ascertained. If the instrument is plunged into water it will sink to 0 on the scale, a point which

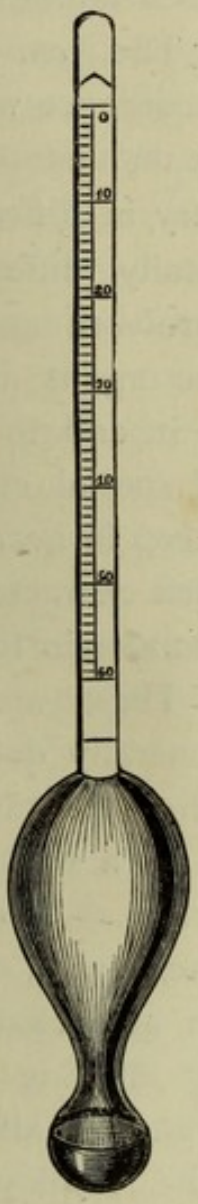


FIG. 116.—*The Urinometer or Urogravimeter.*

is understood to mean 1000; but when put into other fluids it does not sink so low, therefore a different reading of the scale would be observed; thus, if the top of the fluid is level with the figure 10 on the scale, we should then state the density to be 1010; if in a line with 25, then the density would be 1025, and so on.

The *temperature* of the urine has a tendency to influence the readings of the scale of the urinometer; the practitioner therefore takes care to secure that the fluid to be examined has a uniform heat—that of 60° F. being the most proper.

The *constitution* of urine, we have said, alters in accordance with the function of digestion; it will therefore be understood that in ordinary conditions the secretion will vary in different animals. Food of different kinds possess totally different properties, and when animals, as the carnivora and herbivora, subsist entirely upon one variety, the organs and functions of digestion are specially adapted to it, and the secretion of healthy urine therefore partakes of special characters. The urine of the horse, cattle, and sheep in health is alkaline, that of the dog and man is acid; such characters being the result of peculiar and appropriate changes in the special kinds of food within the system.

These are known as the *reactions* of urine, and are generally detected by the use of coloured papers, which, when saturated by the fluid, change the colour or reduce it to a different shade, according to the intensity of the action. Two kinds of paper, specially prepared, are in use; one, litmus, or *blue*, which on being dipped in urine having an acid character instantly becomes red, but is unaffected by alkaline urine. The second, *yellow*, is changed to a *brown* by alkaline urine, but is unaffected by an acid fluid.* The employment of papers dyed by vegetable fugitive colours, which are altered by acids or alkalies, are the tests

* Mr. L. Cassella, 147, Holborn, London, has supplied me with a very suitable case, containing urinometer, thermometer, test-papers, &c. &c.

by which the reactions are known, and by these we are enabled to recognise both natural conditions or chemical changes of importance, and the urinometer points out the density, two important points to be learned relative to decisions on abnormal urine.

In health, the urine of the horse has a density ranging from 1030 to 1050. Urine constantly exhibiting a density above or below these registrations is said to be morbid. When the density is great, it contains an excess of substances which are foreign to a state of health ; and when it is below the standard the quantity of water is increased. Such changes, however, may be observed only as a temporary effect of diet, &c., without being in themselves positive signs of disease.

An increase of water in the urine may arise from some cause of irritation within the kidneys, but previously derived from the food ; certain salts, as nitre, and plants in herbage, are also productive of a profuse watery secretion. Among the constituents which increase the density of the urine are certain compounds derived from the system, consisting of salts and organic products. In the healthy urine of the horse, the proportion of water in 1000 parts is found to range from 880 to 930 parts, and of the solid constituents 76 to 87 parts. More minutely the analysis, as given by Von Bibra, is as follows :—

	I.	II.
Water	885·09	912·84
Solid constituents	114·91	87·16
Urea	12·44	8·36
Hippuric acid	12·60	1·23
Mucus	0·05	0·06
Alcoholic extract	25·50	18·26
Watery „	21·32	19·25
Soluble salts	23·40	40·00
Insoluble „	18·80	

We have said the density of the urine is liable to increase in disease, or as a result of some alteration in diet, such a change being decided by the presence of a greater quantity of the solid constituents named in the analysis, as urea, soluble and insoluble salts, &c. The practitioner, when called to minister to the diseases of animals, derives much information by inquiries into the nature of the urinary secretion. Scanty urine is mostly of a deep colour, in consequence of its holding more salts and colouring matter in solution. The water here is deficient, but the solid constituents may not be increased, if the urine voided during twenty-four hours is estimated. Acute diseases, inflammation of important organs, &c., limit the quantity of the urinary secretion by diverting the blood in another direction from the kidneys.

The presence of other compounds also gives rise to peculiar characters of the urine, and from these also important facts are gleaned. The colour may be considerably deepened by the presence of blood in various forms; a degree of viscidity is conferred by a quantity of albumen, or rapid decomposition is the result of an abnormal quantity of urea; the bladder may secrete pus, mucus, &c., in large quantities, and thus facilitate decomposition as well as aggravate disease. Various plants consumed in food confer characteristic colour and odour; the colouring matter of the bile finds its way sometimes in large quantities into the urine, and permanently stains paper when dipped into it. Many medicines are voided by the kidneys, even some of the most insoluble kinds, as mercury, arsenic, &c., and may be detected in it. Soluble salts are readily passed.

The foregoing outline, although brief, will at least afford some assistance in arriving at the conclusion—viz., that the functions of the kidneys bear a close relation to that of digestion, and prepare the way to the fact, that whatever

influences or interferes with the latter, will produce a corresponding alteration in the quantity and constitution of the urine, and, in addition, may possibly give rise to functional disorders, or structural diseases of the kidneys, or other of the urinary organs. We shall have occasion to refer to the more precise condition of the urine as we proceed in our consideration of the various diseases to which the organs of this system are liable.

FUNCTIONAL DISORDERS.

These are entirely dependent upon remote causes, and consist of a morbid action or excess of functional activity; but in cases of long continuance, aggravation of causes, &c., they may degenerate into such chronic states that lead to structural changes and incurable conditions.

Profuse Urination, or Diabetes Insipidus.

Nature and Causes.—This affection is variously known as *diuresis, polyuria, diabetes insipidus, profuse staling*, &c. It is characterised by excessive thirst, with a corresponding discharge of urine, and is associated with unusual and rapid decline of strength, and wasting of the whole of the body. In a simple form it arises from some defect in the quality or quantity of food, causing derangement of the assimilative functions; and, as a complicated form, it depends upon wasting diseases, and often ushers in those terrible scourges, farcy and glanders, being indicative of the general decay of tissues, or, in other words, a breaking-up of the system. Diabetes may be sometimes observed as an enzoötic, when the same causes which produce the sporadic form are largely present; it therefore may be traced to a bad time of harvest, when grain has been imperfectly gathered and dried. Hay and corn thus deteriorated become musty, and besides undergo such changes that they prove hurtful, from their

irritating effects upon the kidneys; or from their inability to contribute necessary materials to the blood that fluid is impoverished; and by more or less interference with the assimilative functions the nutritive principles of food are not sufficiently elaborated for the purposes of the system. Irregular feeding, particularly when associated with peculiarity of constitution, will produce this disease. We have seen it prevail largely among Iceland ponies used in coal-mines, doubtless caused by the long fasts inducing indigestion.

Symptoms.—The prominent sign is excessive thirst, the animal being capable of consuming several pails of water in succession, and in a short time discharging large quantities of pale and watery urine. The appetite is capricious and depraved; the animal will lick the walls, floor, &c., and pick up the very excrement he has voided; the mouth is clammy and has a sour smell; an amount of debility and stiffness is present; the coat stares, and is harsh, dry, dirty, and unhealthy in appearance; the visible mucous membranes are pale, or sometimes of a rusty yellow colour; the bowels are costive, and fæces scanty; the pulse slower than natural, but with increasing debility is accelerated, and in both instances lacks strength and firmness. The urine contains free acetic acid, and the density is lowered to that of water, or is so slightly in excess that the difference can only be detected by a delicate instrument; water being taken at 1000, the urine of this disorder only registers 1003. Lassaigne has studied this subject, and found the urine to contain water 98·0; urea, benzoate of soda, acetate of potash, acetate of lime, chloride of sodium, and free acetic acid, altogether amounting to only 1·5, mucus and sulphate of lime, 0·5. There are no earthy carbonates in this kind of urine, and it is further remarkable by the total absence of sugar, which characterises the disease in the human subject.

The duration of the affection varies in accordance with the amount of debility and emaciation which is going on, death taking place from exhaustion and failure of nutrition in a week or two, or it may be delayed to several months. When it assumes the chronic form the discharge of urine is much diminished, and the thirst is not so excessive.

Post-mortem Appearances. — Mucous membranes, the various organs and system generally, are pale, bloodless, soft, and flabby.

Treatment.—Rouse the bowels to energetic action by a moderate dose of aloes, allowing a bran diet during the operation of the aperient. Carefully investigate the quality of food and system of feeding, and institute a total change if found defective; allow the animal water to appease his thirst, at frequent intervals, having always dissolved in it some carbonate of soda or potash. In this some care is required, in order *not* to supply the nitrate or nitre, which will prove highly injurious. The following ball may be given daily :—

RECIPE NO. 115.

Take of iodide of potassium	2 drs.
Common mass	Sufficient.

Reduce the first to powder, and afterwards add the mass in such proportions needful to make up into a ball. Or,

RECIPE NO. 116.

Take of iodine	2 drs.
Common mass	Sufficient.

Make into a bolus as directed for No. 115. Creasote, iron, tincture of cantharides, &c., are likewise variously employed, and linseed mucilage offers as a suitable drink.

When the disease arises as a complication with farcy or glanders, the wisest course is to put the animal out of existence, for as long as he lives he remains a source of extreme danger to every human being and to other horses in contact with him.

Obstructions to the Flow of Urine.

Various technical terms are applied to the forms of obstructed urinary discharge. When the secretion and flow are suppressed, the affection is known as *ischury;* a limited discharge, attended with painful attempts, is termed *dysury;* and lastly, when but a few drops can be passed, the condition is known as *strangury.* These states are recognised as signs of importance, and indicative of even serious disorder, which in many instances become very urgent. Examples which immediately follow will illustrate these points more clearly.

In nephritis, and probably also in other diseases, the secretion of urine is arrested by the progress of disease within the kidneys, or by febrile action generally; the quantity is then small, and it becomes very acrid, producing irritation upon the mucous membrane of the bladder and urinary passages, which leads to its being discharged in drops. The effects of certain medicines, as cantharides and strong diuretics, given by the mouth, or absorbed through the skin, may not only cause an increased secretion, but also limit the flow by producing spasm at the neck of the bladder. The presence of a calculus or stone in the bladder, or the urethra, its canal, may also induce similar symptoms; and want of muscular tone in the bladder, giving rise to an accumulation of urine, and passive flow in small quantities or mere drops, in the absence of a correct knowledge of the parts, are frequently confounded with each other, and under the effects of a false line of treatment suggested under the circumstances terminate fatally. The causes are frequently remote, and it should be the duty of all who wait upon animals to afford every information calculated to throw any light upon them. The practitioner values many simple facts as important, and none should be withheld,

however insignificant they may appear, if they have any connexion whatever with the malady or its production. When suppression of the urine occurs, a state of blood poisoning—already described at page 73 as Uræmia—immediately follows, and if relief is not afforded death is rapid.

Retention of Urine.

The affection known under this head consists of an accumulation of urine within the bladder without any means of discharge. The functions of the kidneys may be properly performed; but if they are excited to undue action and secretion, the case becomes very urgent. The *causes* are various, and may be enumerated as follows:—Medicines acting mainly on the kidneys and neck of the bladder at the same time, thus creating an abnormal secretion as well as arresting the discharge from the bladder by spasmodically closing its outlet; inflammation of the neck of the bladder, or at any part of the urethral canal, which also closes the passage; paralysis or want of muscular tone in the bladder itself; calculi blocking up some part of the canal; inversion of the rectum or impaction from fæces within it, inducing local pressure and constriction; and in mares inversion of the vagina or uterus, or when unable to rise from pressure of the contents of the abdomen, especially during pregnancy. Retention of urine is seen in males more commonly than in females, doubtless owing to the more complicated arrangement in the former of the discharging apparatus. This affection, as a rule, is to be regarded rather as a symptom of other diseases than constituting disease itself; it is always urgent in its nature, and calls for immediate attention. During its continuance the bladder is endangered by probable rupture, or in apparently less severe cases the kidneys may participate, leading to suppression of urine, and

uræmia, from the non-elimination of the waste products of the body.

Symptoms.—Retention of urine is denoted by repeated but abortive attempts to urinate. The animal is uneasy ; he paws and stamps with the fore and hind feet respectively, whisks the tail impatiently ; the countenance is expressive of pain and anxiety, the nose is repeatedly turned to the flank, he moves stiffly and crouches, and as the disease advances is disinclined to move ; the pulse is accelerated, and becomes hard and wiry ; and if the disease proceeds under slight mitigation of the symptoms, the wasting of flesh is rapid. When cantharides or croton oil have been used, the results vary in accordance with the mode of introduction to the system. If they have passed by the mouth, irritation of the tongue, throat, &c., will be observed, as shown by frequent attempts to swallow and vomit. When these agents have been absorbed from the skin, as in blistering, then the urino-genital organs alone are affected, causing the symptoms already given, with an apparent sexual excitement. In acute cases death takes place speedily, from rupture of the bladder, if treatment is not successful and prompt. We have seen animals suffering from disease of the urethra, in which a partial discharge of urine was permitted, live on for a week, emitting a most offensive odour from the skin and breath from the blood-poisoning of uræmia, and at length becoming unconscious. The distended bladder may be felt in males by passing the hand up the rectum, and in females through the vagina.

Retention of the urine is often confounded with colic or spasm of the intestines, as in the latter disease removal of the spasm, in which the neck of the bladder always participates more or less, is denoted by a full discharge of urine ; it, however, is distinguished from retention by the ability to discharge even small quantities of urine throughout the attack.

Treatment.—First ascertain the exact cause, and proceed to its removal. If the rectum is impacted with fæces, throw up enemas of warm water to soften and remove them; solutions of opium, belladonna, hyoscyamus, injected into the rectum or vagina, will allay spasm at the neck of the bladder, or they may be passed beneath the skin. Sometimes the prostate glands cause pressure on the urethra by enlargement, in which case the urine must be removed daily, and iodine prescribed externally as well as internally. When the bladder is distended the contents should be removed artificially, especially when eversion of organs has taken place, as delay may be dangerous, and no hope of effectually returning them can be entertained as long as the irritation from a distended bladder exists.

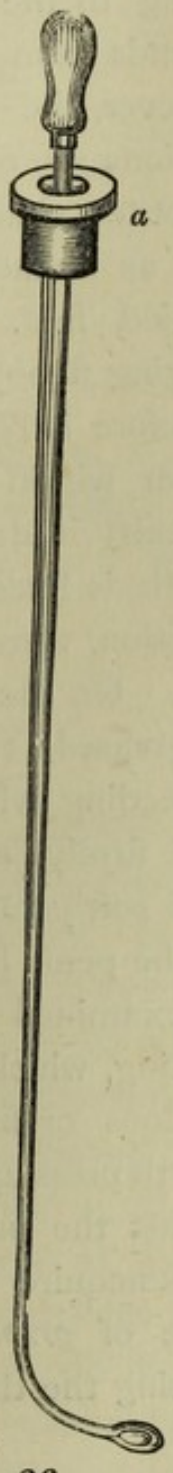


FIG. 117.—*The Male or flexible Catheter, with Stilette.*
The brass mount shown at *a* is intended for screwing on the Reid's syringe when fluids are to be injected into the bladder.

The removal of the urine is effected by means of an instrument termed the catheter; one is a flexible tube, about two feet six inches long, provided with a stilette (Fig. 117), and is specially adapted for the horse; the other is a curved hollow tube of German silver, about thirteen inches long, bulbous, and closed at one extremity, but pierced at the sides for the escape of urine, and about five sixteenths of an inch in diameter (Fig. 118). This is the *female catheter*, and when

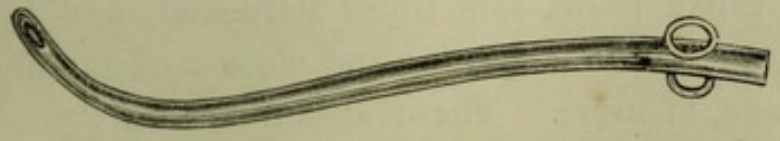


FIG. 118.—*Catheter for removing the Urine.*

retention occurs it is passed along the floor of the vagina in mares, preceded by the index

finger of the left hand, which carefully raises the thin delicate valve guarding the urethral opening ; it then enters the bladder, and urine at once flows readily. This precaution should be observed in all animals confined to a recumbent position, as untoward results may arise from pressure of the abdominal contents obstructing the flow of urine.

The *male catheter* is not so readily passed into the bladder, owing to the greater length of the urethral canal, which extends from the bladder to the end of the penis. Usually, however, the operation is not difficult if the ordinary precautions are observed, and spasm of the neck of the bladder is not too violent. When that occurs, the injection of opium, &c., as already named, may induce a partial relaxation if applied first. In most cases the penis is relaxed, and hanging flabby and pendulous from nervous exhaustion, and therefore is readily seized ; when it is contracted by strong spasm within the sheath, as sometimes happens, there is difficulty in drawing it down, especially if the interior of the sheath is lined by an accumulation of black and offensive secretion, when washing by soap and water will be necessary. On the hand being passed up, the back only should be greased, the fingers being previously dried, a simple proceeding which will enable the operator to hold the penis more firmly, and maintain gentle traction, while the other hand softly rubs down the perinæum to hasten relaxation.

The penis being withdrawn from the sheath, the end must be examined for mechanical obstructions at the preputial opening, which often exist in the form of accumulations of sabulous or fine gritty paste, sometimes hardened, and by growth press upon the urethral opening and close it effectually against the passage of urine. These accumulations sometimes acquire such proportions and hardness as to merit the name of *preputial calculi.* They are readily removed by pressing the thumb-nail beneath from one side.

These preliminaries being arranged, the flexible catheter is passed in the following manner:—An assistant having rubbed it over with oil, and placed the stilette inside, the end is put within the urethra, and the whole tube follows in a straight line until it reaches the notch or turn at the ischium (Fig. 119), when the stilette is withdrawn; the tube is then

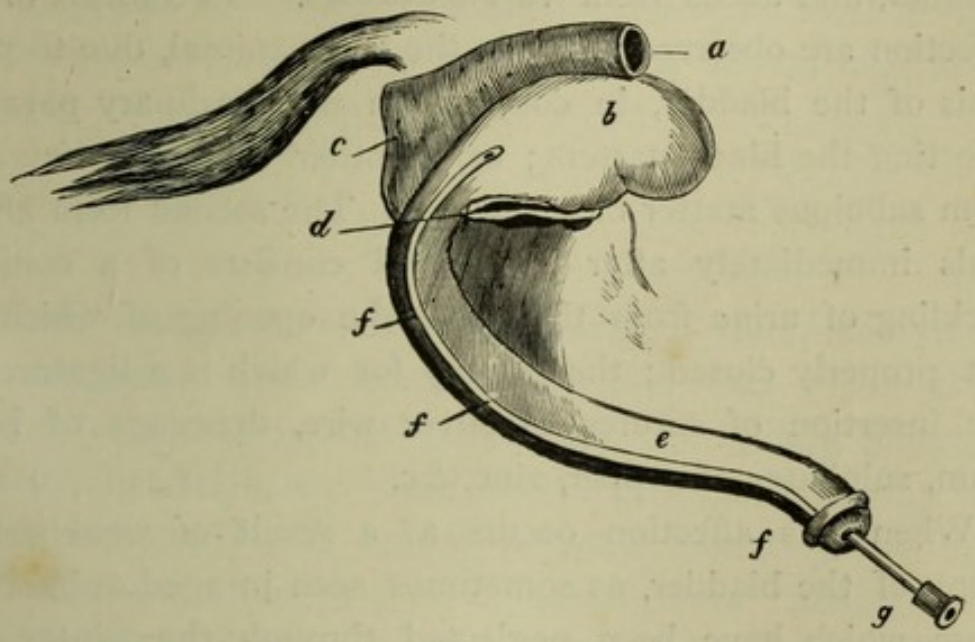


FIG. 119.—*The Male Urethra.*

a. Rectum.
b. Bladder.
c. Sphincter ani or muscle of the fundament.
d. Ischiatic notch.
e. Penis.
f, f, f. Urethral canal.
g. Flexible catheter passed into the bladder.

pushed gently on as it rounds the bone, the operator using the left hand to direct it forwards, when it readily enters the bladder, and urine follows with a gurgling sound. In some instances it may be needful to allow the catheter to remain, as in paralysis or atony of the muscular coat of the bladder, induced by long-continued distension, an occurrence not altogether rare, as following a long journey, during which the animal has not had an opportunity of urinating.

In some rare instances we have been required to open the urethra in the horse at the ischiatic notch, and from thence pass the female catheter. The urine is discharged for some days through the artificial opening, but eventually the

wound closes, and the flow passes through the natural channel.

Incontinence of Urine.

This disease, usually known as enuresis in medical language, consists of an inability to retain the urine within the bladder, and arises from various causes. Two forms of the affection are observed: one in the adult animal, due to paralysis of the bladder, in conjunction with ordinary paralysis affecting the hind-quarters; or, in other cases, it may arise from sabulous matter or a calculus. The second form affects foals immediately after birth, and consists of a constant trickling of urine from the navel, the opening of which has not properly closed; the remedy for which is a ligature, or the insertion of sutures of silver wire, dressings of burnt alum, sulphates of copper, zinc, &c.

When this affection occurs as a result of weakness or atony of the bladder, as sometimes seen in aged animals, or those which have been neglected through the winter, &c., iron tonics, with carefully regulated doses of cantharides, are the most useful remedies. Various other forms may also be compounded, in which nux vomica, strychnine, gentian, quassia, columbo, &c., may enter. Galvanism may be tried. In those cases resulting from general paralysis, treatment must be directed for that disease alone. Some years ago we were called upon to treat a colt for incontinence of urine, which proved altogether incurable. He had been out all the winter at a distance from home, and nothing decisive could be learned of the history of the case; we concluded therefore that cold in all probability had been the chief cause. The animal came up in low condition in the month of April, and was being broken for farm work, when the continual dropping and spurting of urine from the pendulous penis proved a great nuisance. We found the tail was paralysed,

the penis could be only partially retracted, and a pustular fluid came away from the bladder by means of the catheter after the urine had been drawn off. This occurred on each occasion for several days, when it gradually stopped. The usual treatment was continued for some time, and at length abandoned, for neither bladder, tail, nor penis recovered their muscular power, and the animal remained what he was —a disagreeable nuisance—unsaleable as he was unsightly; at length he was lost sight of.

Oxaluria.

Nature and Causes.—A derangement of the renal secretion dependent upon defective digestion and assimilation of food, resulting in the production of dulness, languor, debility, emaciation, and urine loaded with oxalates. It is a disease commonly seen among horses subjected to an irregular and defective system of feeding and management generally, when food supplied is not always of a sufficiently nutritious quality, neither given at regular intervals; especially when, combined with this, they are also compelled to undergo protracted and fatiguing exertion, after long intervals of inactivity, when the animal is not in proper condition. Similar conditions of dyspepsia, however, will arise from other causes—*e.g.*, food unusually rich in saccharine matters, supplied after a diet of inferior kinds; perverted conditions of the mucous membrane of the digestive track consequent upon catarrhal conditions, especially those of a typhoid or debilitating character; from a superabundance of food during inactivity, and all causes which combine towards weakening the process of digestion. It is common among the horses and ponies of coal-mines, where work is hard, long-continued, and feeding times occur at long intervals. Hunters are said to be also liable to it. Owing to the fact

that greater attention is paid to the feeding and working of horses now than heretofore, there are probably not so many cases witnessed, except in certain localities and establishments; for, like other diseases due to mal-assimilation and digestion, it has disappeared where good management has been introduced.

Symptoms.—The animal first attracts attention by signs of dyspepsia, a capricious appetite, irregular bowels, alternated with constipation; he licks the walls, is dull, stiff in his movements, and disinclined for exertion; the skin is dry, harsh, and fast, commonly called hide-bound, and the hair is loaded with a bran-coloured scurf; the mouth is sour, offensive, and tongue furred, and the discharge of urine is frequent, giving rise to uneasiness or irritation of the passages during the act, such as crouching, turning round, whisking the tail, &c.

The quantity of urine discharged in each attempt is not large, having a deep straw or amber colour, and to test-paper it generally manifests an acid reaction, and to this latter property is most probably due the irritation already mentioned as being productive of so much uneasiness. This, however, is not always the case, as the urine is sometimes neutral—that is, it shows neither acid nor alkaline reaction. A drop of the urine examined beneath the micro-

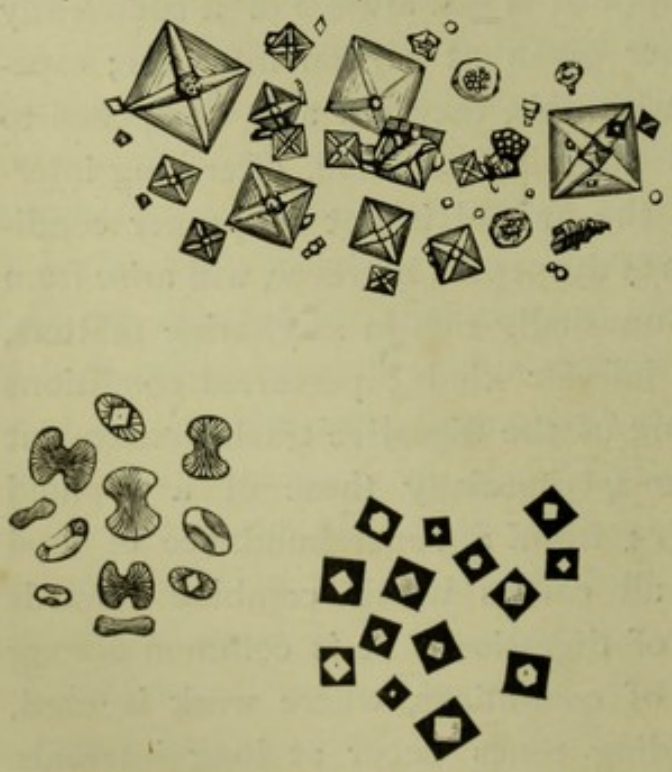


FIG. 120.—*Crystals of Oxalate of Lime, as seen under the microscope.*

scope generally exhibits, when recent, crystals of the oxalates; but occasionally, when the oxalic acid is discharged in a free state, its combination forms are not recognised until after the lapse of a day or two. The usual presence of lime in the diet of the horse at once furnishes a ready means for the formation of a peculiar salt—the oxalate of lime, the crystals of which, as seen under the microscope, are exhibited in Fig. 120.

Treatment.—The processes of digestion and assimilation being at fault, the obvious course will be to attempt to remove the state of derangement by the action of a purgative, especially when constipation of the bowels exists, the dose of which must, of course, be regulated to suit the condition in which they are found. The system of diet must undergo a change, every article of a stimulating kind, and especially those containing sugar or large quantities of nitrogenous elements, being scrupulously withdrawn; therefore the roots, peas, beans, &c., will be excluded, together with condimental foods, as locust beans, and the various ingredients which are united with them to make up those wonder-working properties which farmers and others will persist in paying so enormously for. Good oats with bran, and sweet clover chaff, will form a suitable diet, the quantities allowed being moderate, and at regular times. Care must be observed also in enforcing a daily amount of exercise, proportionate to the ability of the patient, for, without this, it will be impossible to work the desired change in the digestive action. The skin must be thoroughly cleaned, the brush being freely used for the combined purposes of removing the scurf, and by friction stimulating the skin. Damp wisping will prove of great service, and, when convenient, the Roman bath, especially in protracted cases. As medicine, the following may be prescribed :—

RECIPE NO. 117.

Take of nitro-hydrochloric acid	1 fl. dr.
Infusion of quassia, gentian, or columbo	1 pint.

Mix, and administer morning and evening.

When the debility and loss of flesh is great, one ounce of nitric ether may be added to the above draught.

If the alleviation of the symptoms does not take place in a reasonable time, a change of medicine may be necessary, and in place of the above iron tonics, as the sulphate of iron combined with gentian, as follows :—

RECIPE NO. 118.

Take of sulphate of iron, powdered	3 ozs.
Powdered gentian	3 „

Mix, and divide into twelve powders ; one to be mixed with the manger food morning and evening. If further changes are needed, let the phosphate of iron, phosphate of soda, ammonio-citrate, or ammonio-tartrate of iron be tried.

SIMPLE OR IDIOPATHIC ALBUMINURIA.

Nature and Causes.—The presence of albumen, more or less, in the urine, is the result of acute or chronic indigestion, overwork, or irritation of the spinal cord, and it may exist in combination with a diuresis. As a rule, it is symptomatic of other diseases.

Symptoms.—Dulness ; languor ; incapacity for ordinary exertion, as shown in the animal flagging when at work ; the appetite and condition suffer, and there is a tendency to constipation of the bowels. In ordinary cases the disease will terminate with a removal of the common causes by appropriate treatment ; but there are instances in which some amount of irritation of the bladder, and the muscle at its neck, may exist, producing strangury.

Treatment.—Administer a brisk purge in all cases where

the disease appears without appreciable cause, and follow this up by the use of mineral acids, No. 19 and 117, for a few days ; afterwards give iron tonics, No. 107 ; and from the first let the diet be simple, of easy digestion, and supplied in moderate quantities, while every attention is paid to the amount of daily exercise and grooming.

This affection may assume a persistent condition, when structural changes of the kidneys will be present ; as such it will again be referred to.

STRUCTURAL DERANGEMENT OF THE KIDNEYS.

Traumatic Albuminuria.

This disease is variously known as *Albuminous Nephritis; Bright's Disease; Albuminuria; Granular Degeneration of the Kidneys,* &c.

Nature and Causes.—The urine sometimes copious, at others scanty, but always loaded with albumen, giving it the consistence of a thick mucilage. Morbid irritation of the kidneys, attended with enlargement, softening, or atrophy of some portion of the secreting substance, generally traceable to an injury from carrying or drawing too heavy weights, severe galloping or jumping ; the absorption of cantharides when largely used as a blister in other acute diseases ; and, lastly, such causes, when long continued, as produce the simple form of albuminuria.

Symptoms.—When an injury has been inflicted on the loins, spinal column, or the kidneys are affected by action of cantharides, the animal usually stands with the back arched, back and feet drawn together ; being very much disinclined to move, and, when caused to do so, exhibiting great stiffness and even signs of pain (Fig. 121) ; the respiration is disturbed, and the pulse accelerated ; the bowels are consti-

pated, and surface heat is irregular ; all of which may suffer extreme aggravation when the absorption of the cantharides principle has been extensive ; added to which, strangury causes further torture.

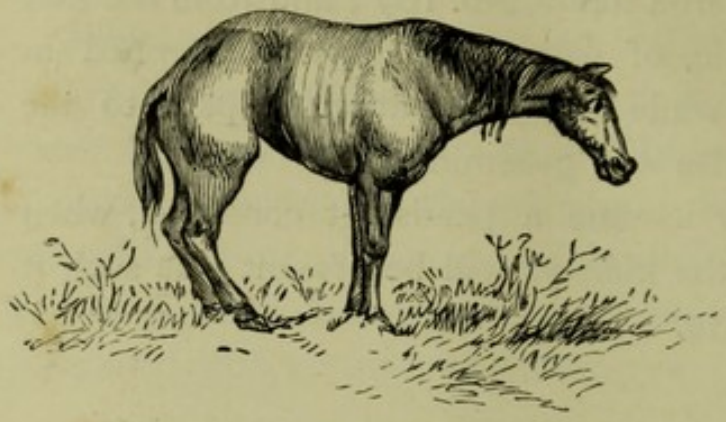


FIG. 121.—*Acute Albuminuria.*

In those instances where the disease makes slow and quiet progress, the animal lacks vigour, and is not capable of severe work, or, if pushed, becomes rapidly worse, and loses condition. As a rule, however, the subjects of this form, which arises from continued indigestion, brought on by an abundance of food and inactivity, do not exhibit much loss of condition or general health, beyond what we have already detailed (Fig. 122). A constant sign consists of standing with the back hollowed or arched downwards, the forelegs in advance and the hinder ones stretched backwards, as if preparing to urinate. We remember a carriage-horse, thus affected, which continued a number of years to do light work, while the disease made no apparent progress. On the death of the owner he, with two others, were destroyed and buried, according to the wishes of the deceased, without any *post-mortem* examination. Had the animal passed into other hands, where different treatment and heavier work were inflicted, it is very probable he would have readily succumbed. This animal never lay down, and, after

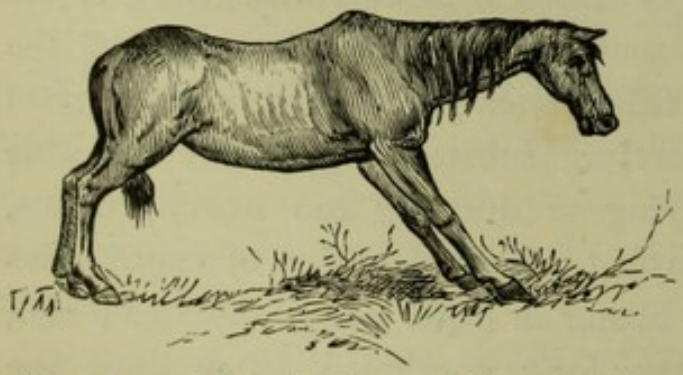


FIG. 122.—*Chronic form of Albuminuria.*

standing some time, appeared stiff in the preliminary movements—signs which we have seen confirmed by subsequent cases.

The kidneys are found to be variously affected. In some cases the organs are large, pale, and flabby, the interior showing an increase of the cortical substance, the central being softened; in others the kidney is smaller than natural, but firm and of a deep red colour, outwardly rough, and the capsule firmly united to the glandular structures by interstitial deposit. The urine is generally copious with this condition of kidney, and, doubtless, arising from the irritation caused by numerous cysts which are present in the interior. In the former state, the secretion of urine is small.

Treatment.—In the acute form the bowels should be rapidly moved, and the urine drawn away. (*See* Strangury.) Blistered surfaces, to which cantharides have been applied, should be poulticed, or dressings applied to promote discharge. The catheter perhaps should not be removed, as strangury may recur. Antispasmodic injections may be used to the rectum, or passed beneath the skin. (*See* Endermic Method.) The spasm may likewise be treated by opium given by the mouth, and the animal should be allowed plenty of linseed-tea for drink, or portions may be given as draughts, in which opium and carbonate of potash or soda have been mixed.

When the acute signs have been allayed, treat by mineral acids, No. 19 and 117, and mineral tonics, No. 118, as already recommended for oxaluria, paying strict attention to the diet, exercise, and comfort of the animal. In those cases not traceable to an injury, &c., but of recent origin, commence by regulating the bowels by means of a purgative, check excessive urination by opium or tannic acid, and follow with the order of treatment by acids, &c., as detailed above. When albuminuria appears as a direct result of other diseases, the attention must be devoted entirely to their re-

moval, the decline of this affection being alone dependent upon that course of action.

Examination of the Urine.—In advanced cases, minute granulated cylinders, or casts of the uriniferous tubes of the kidney, are found in the urine, when examined under the microscope, the fluid being pale, and probably of low density. In the more recent stages the presence of albumen is greater, and may be detected by the following chemical tests:—The urine is thick and mucilaginous, and, with the ordinary reagents, certain differences are met with which may mislead and perplex the inquirer. It must be remembered, the albumen here found is often of a very low form, and behaves rather differently with the usual tests. Heat frequently fails to coagulate it; strong mineral acids produce a clear, thin fluid; but white precipitates are obtained with tincture of galls, solution of bichloride of mercury, and alcohol; solution of ferro-cyanide of potassium acidulated with acetic acid throws down a white precipitate after being heated; and solution of sub-nitrate of mercury yields a flesh-coloured precipitate.

Nephritis—Inflammation of the Kidneys.

Inflammation is not usually confined to one part or structure of the kidneys, as takes place in the human subject. Originating at one spot, generally the mucous membrane of the uriniferous tubes, it spreads in every direction, involving the parenchyma and cortical substance alike, at length, and according to the cause, terminating either in resolution, throwing off—desquamation of the epithelial lining of the tubes, softening and degeneration of the secreting portions, and occasionally, when calculus is present, in suppuration. Gangrene is seldom observed.

Causes.—Too long-continued use of powerful diuretic medicines; absorption of cantharides from blistered surfaces;

acrid plants; application of continued cold to the loins; croton oil when used injudiciously; and probably from the indirect effects of local injuries.

Symptoms.—There is always an amount of attendant fever, associated with disturbance of the digestive organs, manifested in sharp colicky pains, the bowels being constipated. The pulse is frequent, hard, and unyielding, and respiration is short and hurried; the mouth is hot and clammy, and the animal endures a constant thirst. In some instances the animal is disinclined to move, or walks with the hind-legs widely apart (Fig. 123), and there may be stiffness and tenderness of the loins, with arched back. We may rely more certainly on a very scanty, or indeed a total suppression, of the secretion of urine, with frequent and painful but vain attempts to urinate, as shown in the animal repeatedly stretching himself as in the natural act. The nature of the case is in a measure decided by the empty bladder, and when urine can be obtained, by the presence of albumen, as indicated by its coagulation under the effects of heat, and nitric acid.



FIG. 123.—*Nephritis.*

Three points are prominently brought out in this list of signs, and by them nephritis is clearly identified. Fever and colic are associated. An empty bladder, very little, or more frequently, no urine is passed, and the desire and attempts to urinate are very frequent. The urine is highly albuminous, and by the usual tests readily discovered. Besides this, casts of the uriniferous tubes, blood globules, epithelial and even pus cells, may be found.

Usually only one kidney is affected, and the hind-leg of

the side sometimes indicates paralysis or lameness ; occasionally both organs may be inflamed. If suppression of urine continues, symptoms of blood poisoning (*see* Uræmia) arise. The fæces and skin give off an offensive ammoniacal or uriniferous odour, the breath is likewise fœtid, and the bowels constipated ; during this stage the bowels also become tympanitic, or full of gases, and, as colic is present, the animal perspires, rendering the uriniferous odour even more powerful and offensive.

Post-mortem Appearances.—The diseased organ is generally enlarged, and upon its surface an amount of plastic exudation is thrown out. Internally it is of a dark-red colour, or variously marked in spots or wavy lines, indicating the congested state of the cortical part in which are the Malpighian tufts. In some instances only one part of the organ is involved, when it is softened, easily lacerated, and when cut open a dark-coloured fluid escapes, which will be found to contain the products of inflammation and even pus cells.

Treatment.—Although there is much to be said in favour of clearing out the bowels by means of purgatives, yet there is need of some caution in their use, as violent purgation may aggravate the disorder. If, however, it is desired to give aloes, let warm water injections be used frequently in order to render a moderate dose of that drug more effective. The propriety of abstracting blood must be determined by the state of the pulse and stage of the malady ; if the pulse is full and strong and case recent, depletion will retard the possibility of uræmia setting in. The next step will consist of administering sedatives to counteract the inflammation, for which the following form is recommended :—

RECIPE NO. 119.

Take of solution of the acetate of ammonia	3 fl. ozs.
Fleming's tincture of aconite	20 drops.
Linseed mucilage	½ pint.

Mix, and administer at once. The succeeding draughts may follow at the end of eight, twelve, and twenty-four hours, observing to reduce the aconite five drops each time. The loins may be stimulated by simple mustard embrocations, all and every other kind of blistering agent being avoided.

Instead of the above draught, opium may be substituted, if the pain continues.

RECIPE NO. 120.

Take of powdered opium	½ dr.
Linseed mucilage	½ pint.

Mix, and administer every eight hours. Professor Williams recommends a poultice or decoction of digitalis to the loins, which must be removed as soon as the kidneys begin to act.

Linseed-tea should be supplied liberally as a drink throughout the case; and as recovery goes on care must be observed not to allow the bowels to become overloaded, or anything to be taken by which the kidneys would be excited; roots and stimulating condiments, salines, &c., must therefore be excluded from the dietary.

The result of inflammation of the kidney may be degeneration and atrophy, or wasting of the gland. The condition is very marked when one only has been affected: it becomes small and flabby, being little more than a bag of areolar tissue, its substance being removed, and the tube which conveyed the urine entirely closed. The opposite organ is hypertrophied, enlarged to near twice its original size, rarely exhibiting any structural alteration, although it has had the work of two organs to perform. The condition of these glands may sometimes be detected by the practitioner during life, the hand being passed up the rectum in exploration.

Hæmaturia—Blood in the Urine.

The presence of blood in the urine may be due to several circumstances—*e.g.*, congestion, softening, and degeneration of the kidney, succeeding to nephritis, calculi within the pelvis, cancer, &c. A traumatic form of hæmaturia is recognised as being caused by severe strains and unusual efforts required in drawing heavy loads, extraordinary jumping, &c.

Symptoms.—Traumatic hæmaturia is indicated by pain and stiffness in movement, severe febrile excitement, occasional paralysis, and the separation of blood clots from the urine after discharge. Such conditions are not always removed, as the affected kidney may take on inflammation, or be involved in degeneration, softening, and change of structure.

Treatment.—The sufferer must be kept as still as possible, and cold water may be thrown up the rectum, in order to constringe the bleeding vessels. Internal remedies consist of powerful astringents and styptics, which exert their effects through the medium of the blood. Various forms of administration are as follow :—

Recipe No. 121.

Take of tincture of perchloride of iron	2 fl. drs.
Water	1 pint.

Mix.

Recipe No. 122.

Take of tannic acid	½ dr.
Powdered catechu or kino	2 drs.

Mix, and make up a bolus with treacle.

Recipe No. 123.

Take of solution of chloralum	1 fl. dr.
Water	1 pint.

Mix.

RECIPE NO. 124.

Take of tannic acid	½ dr.
Powdered catechu	2 drs.
„ opium	1 dr.

Mix, and make up a bolus with common mass or treacle.

The boluses may be administered morning and evening, or, like the draughts, two, three, or four times at intervals of eight, ten, or twelve hours, as the urgency of the case may require.

When calculi are present in the kidney the urine will contain a large proportion of earthy matters, and the discharge of blood may be intermittent, occasioned by work and exercise, and accompanied by colic. In these cases hard water should be avoided for drinking, unless it has been treated with carbonate of potash or soda, to precipitate the earthy salts. The diet should consist of oats principally, with linseed-tea frequently supplied for drinking, and muriatic acid may be given internally, as a means of dissolving the sediment in the urine, and probably also reducing the stone itself. Calculi lead to suppuration or abscess, degeneration of the kidney, and death. When there are several smaller ones, partial passage along the ureters may take place, and there being obstructed entirely stop the passage, giving rise to great agony, probably rupture of the tube, and death from irritation, due to the escape of the contents within the peritoneal cavity. Stones in the ureters are termed *ureteral calculi;* their presence may be detected by the hand in the rectum, the tube being distended with urine, forming a soft, fluctuating tumour.

CYSTITIS—INFLAMMATION OF THE BLADDER.

This is by no means a common disease in the horse, and when it has taken place the cause has been traced to the absorption of cantharides or croton oil, which have been

used externally as blisters, or to cantharides administered internally by persons ignorant of their effects.

Symptoms.—Excitement and great uneasiness, attended by prostration of strength and much febrile disturbance, colicky pains, efforts to vomit, frequent and painful attempts to pass urine, fæces covered with mucus and blood. When strangury accompanies the disease the signs are intensified, and there is danger of the bladder bursting. When cantharides have been given in solution by the mouth the buccal membrane will be reddened and excoriated, and swallowing performed with difficulty, while an apparent sexual excitement will be produced. If no relief is afforded by treatment, death takes place in two or three days.

Post-mortem Appearances.—The whole course of the alimentary canal, from the mouth to the fauces, gullet, stomach, and intestines, is actively congested or inflamed, as indicated by effusion and thickening between the coats. Sometimes the kidneys are also inflamed; but in all cases the lining membrane of the bladder is acutely affected, and ulceration or erosions are found upon the mucous membrane of the intestinal canal.

Treatment.—Purge the animal, but avoid oil, which, by dissolving the active principle of cantharides, would produce greater destruction. Give large quantities of linseed mucilage with the medicines; throw up enemas, and evacuate the contents of the bladder if distended; apply mustard embrocations to the loins, and combat the inflammation by draught No. 119, and proceed generally as for nephritis.

Inversion of the Bladder.

Prolapsus vesicæ, or inversion of the bladder, is seen only in female animals; it is always an untoward occurrence, and not unfrequently ends in a fatal manner. Usually it

attends difficult labour, or arises from the effects of violent straining afterwards. We have seen it in adult animals, which, when affected with colic, have been dosed with large quantities of saltpetre; also as a result of pressure when mares being put into slings hang heavily, "and will not find their legs." On one occasion it occurred in a yearling filly, which for a fractured leg was put into slings. The animal was very excitable, and after reduction the bladder repeatedly returned, which at length was injured, and the creature was destroyed. It is during violent straining that the vagina is lacerated, and the bladder appears at the opening as a bright red, fluctuating tumour, containing fluid. From the direction which the bladder is compelled to take under these circumstances—viz., the upper part of the body being forced upwards, backwards, and outwards—pressure being exerted at its fundus, the natural outlet to the vagina is closed, and evacuation of the contents impossible without being first reduced or put back to its proper position; therefore, if the organ is not relieved, and the original causes neutralised, the constant accumulation of urine leads to inevitable rupture. The bladder should be returned as quickly as possible—an operation which requires some tact and further skill to maintain it there. The original wound in the vagina must be closed by metallic sutures, and some practitioners pass one or two others across the lips of the vagina as well; others put on a truss, or improvise an apparatus as well as they are able by means of the harness or leather straps which are at hand. Powerful antispasmodics and opiates are required to overcome the disposition to straining.

Lithiasis—Gravel—Calculus.

Owing to peculiar normal changes in the constitution of the urine, often mainly dependent upon perverted function of

digestion and assimilation, and assisted by local aberrations of the functions of the urinary organs themselves, the solid or insoluble constituents are greatly increased, and they are deposited in various forms. Sometimes a large quantity of sediment, in the form of fine powder or coarse crystalline grains, passes with the urine, large quantities being retained in the kidneys, bladder, or urinary passages; in other cases these solid constituents are aggregated in the form of stones or hard concretions, termed calculi. In the form of fine powder, known as sabulous deposit, the disease known as lithiasis is not uncommon among equine animals—more frequently perhaps in mares; while male animals exhibit a liability to the hard form of calculus or stone. Gravel, as understood in the above distinction, is not so common, being seen more frequently in bovine and ovine animals.

The origin of the constituents of such deposits or calculi is the food, which is rich in the elements necessary for their formation, as the following analysis will show :*—

	Oats.	Peas.	Hay.	Red Clover.
Potash	12·3	35·20	30·09	16·10
Soda	—	10·32	—	40·71
Magnesia	7·7	6·91	4·08	8·28
Lime	3·7	2·70	9·12	21·91
Phosphoric acid	14·9	34·01	12·03	4·12
Sulphuric acid	1·0	4·28	3·79	1·06
Silica	53·3	0·29	24·17	2.60
Peroxide of iron	1·3	1·94	1·55	0·46
Chloride of sodium	—	2·56	5·70	4·73
Chloride of potassium	1·0	—	9·48	—

We may further trace these solid constituents first in the blood, and separated from thence by the kidneys, a great proportion is found in the urine, the rest being conveyed

* Liebig's Chemistry of Agriculture.

away by the fæces. Von Bibra found in 100 parts of the solid residue of the urine of the horse :—

Carbonate of lime . . .	12·50 . .	31·00
Carbonate of magnesia .	9·46 . .	13·07
Carbonate of potash . .	46·09	40·33
Carbonate of soda . .	10·33	
Sulphate of potash . .	13·04 . .	9·02
Chloride of sodium . .	6·94 . .	5·60
Silica	0·55	0·93
Loss	1·09	

The preponderance of earthy carbonates in the urine of herbivora is remarkable. Although we may find a proportion in the blood, yet we search in vain for them in the food, at least in anything like appreciable quantity ; but their origin we are able to conclude is in the decomposition of vegetable acids—as the oxalic, citric, racemic—all of which contain the elements of carbonic acid, and which under the process of assimilation or secondary digestion enter into chemical union, not only to form carbonic acid, but also carbonates, by taking up the alkaline and earthy salts as potash, soda, lime, and magnesia, and these in healthy urine are more or less in solution, rendering the fluid alkaline.

To insure the formation of a sabulous deposit or calculi, we must have certain conditions present :—first, perverted digestion and assimilation, by which the earthy salts are not sufficiently elaborated for the purposes of the economy—viz., the building up of the system ; second, they may be in excess of healthy requirements ; and lastly, from some morbid condition of the mucous membrane of the urinary passages or organs, the secretion from the surfaces, acting as a kind of ferment, may cause the deposition of these salts from solution. The locality of these concretions may be

the kidneys, ureters, bladder, or urethra, where irritation and inconvenience will result proportionate with growth and interference with functions. In most cases a central nucleus or point is present in each stone, such as mucus and epithelial scales from the lining membrane, a crystal of insoluble phosphate of lime, &c. In some instances foreign substances have been found in calculi extracted from the bladder of mares, such as a piece of straw, wood, or iron wire, doubtless having been passed thither by malicious

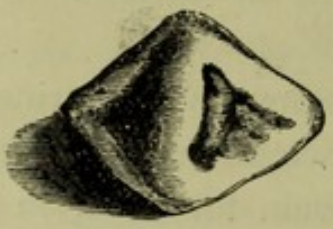


FIG. 124.

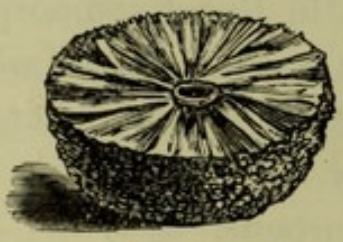


FIG. 125.

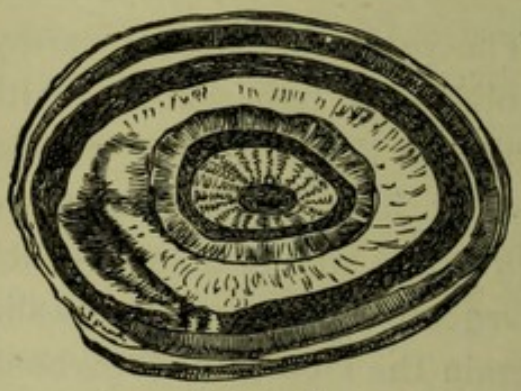


FIG. 126.

Calculi from the Urinary Passages.

Various forms in which the Ammonio-magnesian Phosphatic Calculi are found. Fig. 124 is whole; 125 and 126 are sections showing the internal concentric and radiating lamellar structures.

persons, and around this the earthy matters are laminated, often exhibiting internally a beautiful concentric arrangement, as well as variety of colour (Figs. 124, 125, and 126).

Symptoms of Cystic Calculi.—The animal is constantly evincing a desire to urinate, by the usual acts of stretching and wide separation of the fore and hind limbs, descent of the penis, &c., without any discharge. Stiffness in movement may exist to some extent, and uneasiness with switching of the tail are usually combined. In a subsequent attempt the urine flows at once and with ease, but suddenly stops: the calculus has been carried to the outlet, where it

blocks up the passage. The animal remains for some time in the attitude described, making further attempts to evacuate the bladder, but at length gives way under pain; he kicks at the belly, groans, sighs, and lies down in a careful manner. Occasionally the urine drops away (*see* Incontinence of Urine), and as the animal moves about the thighs and legs are wet, and, eventually, the skin suffers from irritation, becoming sore and emitting a most unpleasant odour. This condition is common in the mare, and when sabulous matter is present in either males or females, incontinence is said to be more generally observed. The urine has mostly a light colour, being white, or whitey brown, and within a few minutes after being collected in a glass vessel a thick sediment falls to the bottom. Besides this, such urine is ammoniacal in many instances, and soon enters into rapid decomposition.

To confirm an opinion formed by a consideration of these symptoms, an examination *per rectum* must be made after it has been emptied by means of enemas. If the bladder is full, it may be emptied by moderate pressure of the hand, or, in the event of failure, by the catheter, a proceeding which must always be observed, otherwise the presence of either a stone or sabulous matter may be undiscovered. The bladder, now contracted and empty, is retracted within the pelvis, and is there within easy reach of the exploring hand of the operator.

Treatment.—The presence of a calculus being no longer a matter of doubt, steps may now be taken for its removal, the details being as follows :—

In the Mare the affair assumes no aspect of difficulty, as a rule, and is easily accomplished if the stone has not acquired very large dimensions. The hand, first lubricated with oil, is passed along the floor of the vagina (Fig. 127) and by means of a finger the valve of the urethra is raised.

The closed forceps are then carried under the hand, which serves to guide them towards the orifice—*meatus urinarius*—finally entering with care to avoid wounding. The operator

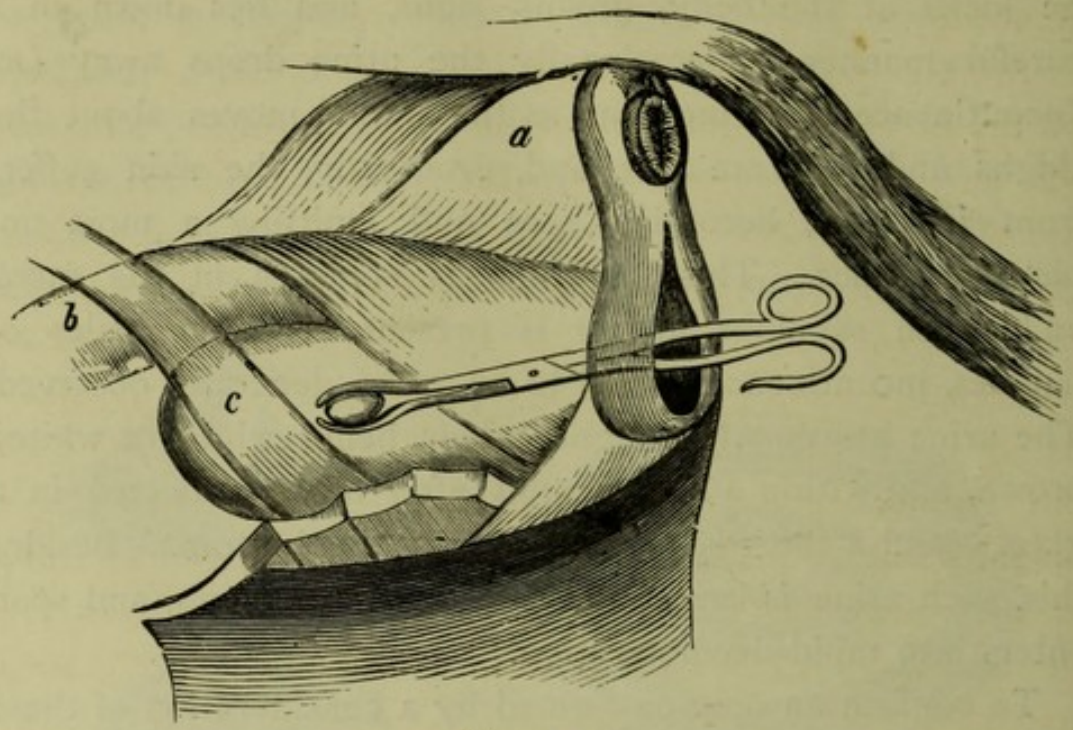


FIG. 127.

a. Rectum. *b*. Womb. *c*. Bladder.

then proceeds to dilate the opening by frequent separation of the blades of the forceps, the hand being still retained to govern the attempts. Having sufficiently widened the orifice, the instrument may be carried further and caused to strike the stone. The hand is now removed from the vagina and transferred to the rectum, in order to direct the stone into the blades of the forceps, which when fully accomplished, and a firm hold be obtained with a longitudinal direction if possible, by means of gentle traction, rotatory movement, and assisted by the second hand, now removed from the rectum, the stone may be withdrawn. Although the urethra in the mare will admit of great dilatation and thus allow of the extraction of a large calculus, there are instances where the stone must be effectually broken and extracted piecemeal.

It will be gleaned from the preceding observations that the removal of the calculus in the mare is accomplished with the animal standing, of course being properly secured if necessary.

In the Horse.—The removal of a stone from the bladder of the horse is often a matter of some difficulty and calls for an operation, which is performed as follows :—The animal must be cast, and for greater convenience he should lie on the off or right side (*see* Casting). The penis is then to be seized and withdrawn by an assistant, as already described at page 402 ; after which he will pass the catheter as far as the ischiatic notch (Figs. 119 and 238), and without removing the instrument withdraw the stilette ; the operator, by means of one hand in the rectum and the other at the notch, will direct the catheter along the urethra to the bladder. An incision is then made along the *raphæ* or raised line of the perinæum over the urethra at the ischiatic notch, exposing the catheter, and sufficiently large to admit

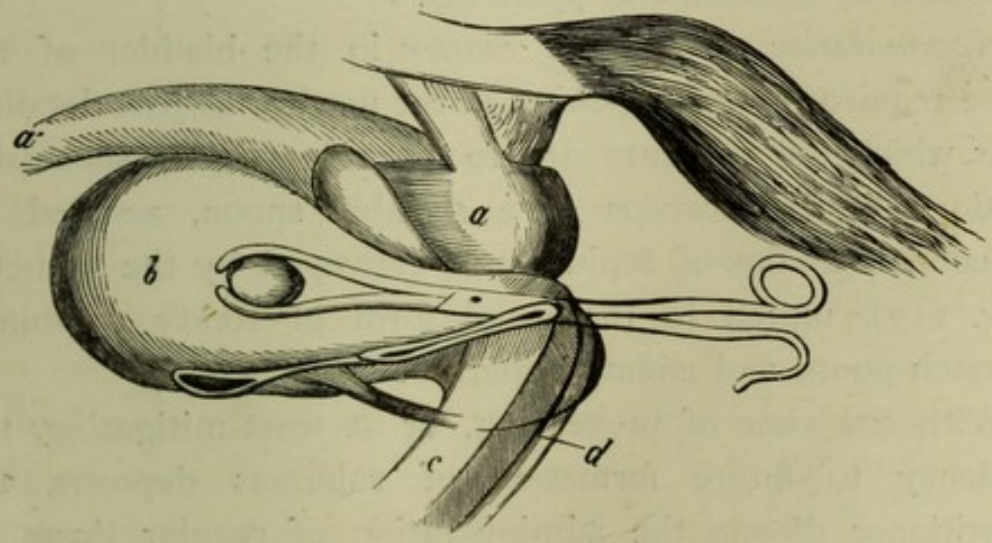


FIG. 128.

a. Rectum.
b. Bladder.
c. Penis.
d. Urethral canal.

the forceps to be employed ; the catheter may then be withdrawn. The forceps, being first warmed and oiled, are passed carefully along the urethra, gently but firmly opposing

the contractions of the sphincter muscle of the bladder, and having entered that organ, the hand is again put into the rectum, as already described for the mare, in order to guide the stone into the forceps for withdrawal (Fig. 128). This operation is termed *lithotomy*, or cutting for the stone. When the calculus is too large for withdrawal, it must be broken by means of appropriate instruments and removed piece by piece ; and to facilitate the removal of these or the whole calculus, it may be necessary to turn the animal on his back, after which the bladder must be washed out thoroughly with tepid water, as any fragments remaining will form nuclei for the formation of other stones.

The treatment of the wound is simple. The insertion of metallic or the twisted suture to close the lips, and application of tincture of myrrh, benzoin, compound tincture of aloes, or the healing fluids given in Nos. 70, 71, and 72 will be necessary. Any remaining spasm or fever must be treated by appropriate measures, and the bowels are to be regulated by enemas and aperients.

Accumulation of sabulous matter in the bladder of the horse requires first an opening in the urethra as just detailed, after which the contents are to be removed in successive portions by the forceps or a suitable spoon, assisted by occasional streams of tepid water conveyed by the catheter (Fig. 117), united to the usual form of Reid's combined stomach-pump and enema apparatus (*see* Enemas).

With the view of preventing, or at least mitigating, the tendency to future formation of sabulous deposits, the practitioner directs the administration of regular doses of hydrochloric acid, which may be given in the drinking-water daily ; this is a valuable remedy, not only as an agent for dissolving the earthy carbonates, but as promoting the action of the liver and digestion generally (*see* Hydrochloric Acid).

SECTION VII.

DISEASES OF THE ORGANS OF GENERATION.

DISEASES OF THE ORGANS OF GENERATION.

THE abnormal conditions to be included in this section are somewhat numerous, more especially in the mare, on which the propagation of the species so much depends. The diseases will be subdivided as follows:—I. Diseases incidental to the generative organs of the male; and II. Those common to the mare.

I. DISEASES OF THE MALE ORGANS OF GENERATION.

INFLAMMATION OF THE URETHRA—URETHRITIS.

Nature.—Common to the gelding and entire horse, and consists of a catarrhal state of the lining mucous membrane.

Causes.—Considerable diligence has been exercised in searching for the causes of this affection in the action of cantharides or croton oil, when employed in excess or otherwise as medicines. In the stallion it is thought to arise from too frequent copulation, when the system is out of order and susceptible of the effects of local irritation. It is not improbable that local injuries received during the act, or, as sometimes seen in geldings, mischievous or malicious tampering with the organ, are the more frequent causes.

Symptoms.—Frequent and difficult or vain efforts to pass

urine ; pustular discharge from the canal of the penis, with almost constant erection, sometimes swelling of the glans (Fig. 119, p. 403), and ulceration of the surfaces surrounding the opening. Swelling and thickening of the lining membrane approximate the walls of the tube, and spasms of the accelerator urinæ muscles, which completes the closure, are usual morbid conditions.

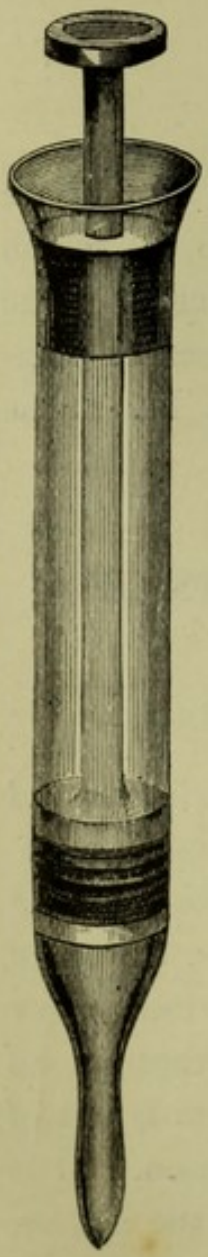


FIG. 129.

Treatment.—Allay any febrile excitement by the use of sedative medicines, or the treatment may properly commence by giving a dose of aperient medicine. Inject mild astringent lotions into the urethra by means of a glass syringe (Fig. 129).

RECIPE NO. 125.

Take of sulphate of zinc	100 grs.
Water	1 pint.

Mix, and when dissolved it is ready for use.

RECIPE NO. 126.

Take of the solution of chloralum	1 fl. dr.
Water	1 pint.

Mix.

Allow linseed-tea for drinking, and a light diet with bran, in which the carbonates of soda or potash may be given daily.

In chronic stages the animal may need to be cast, and the penis examined for ulcerated sores, which should be stimulated by nitrate of silver.

PHIMOSIS.

Nature.—A constriction of the prepuce or sheath at its extremity, which may not only confine the penis within it entirely, but



FIG. 130.

also may greatly interfere with, or totally obstruct the passage of, urine (Fig. 130).

Causes.—Blows, wounds, &c., inflicted on the sheath, irritation from accumulation of the sebaceous secretion, or whatever cause inducing inflammation, which results in permanent thickening and contraction. It is also occasioned by swelling of the sheath by reason of neighbouring inflammation, as in castration; we have seen it arise from the œdema occasioned by heart disease, influenza, want of exercise, ventral hernia when the descent of the bowels took place within the sheath, and it may be occasioned by the sting of venomous insects.

Treatment.—An operation is rarely required, as scarifications, purgatives, &c., are usually productive of reduction: if, however, it is needful to relieve by the knife, all that is called for is the division of the constricting prepuce, just so far only as to allow of the escape of the penis and free urination. When simple œdema is the cause, use exercise, fomentations, hand friction, diuretics; and when debility is present combine tonics with the latter, and allow good food.

Paraphimosis.

Nature.—Percivall laconically says this disease "is the opposite to phimosis." The penis is protruded from the sheath, hanging a large, swollen, and pendulous mass, which, from constriction of the prepuce, the animal is unable to retract. The swelling of the penis may not be the primary cause, as in some instances the prepuce is inflamed and thickened, aud this by the pressure induced may not only prevent the return of the organ, but also insure its tumefaction.

Causes.—D'Arboval, quoted by Percivall, says: "In the horse paraphymosis may be the result of accident, or of an

operation or of castration. In the stallion it may have its rise from excessive venereal action ; from long-continued friction, before coitus, against the female ; from strokes with a whip or stick upon the yard while in a state of erection ; from kicks upon the part, which the male renders himself subject to in attempts to cover a vicious mare ; from the introduction of the penis into the anus of the mare ; from negligence or *mal-addresse* of the groom in directing the penis into the vagina ; from vain attempts to cover a ringed mare (*jumet bouclée*) ; from introduction of irritating substances into the prepuce with a view of inducing staling ; from the penis becoming loaded with warts, or scirrhous or other excrescences. Chabert saw a stallion with an enormous paraphymosis, and having involuntary discharges of semen occasioned by fretting and harassing himself during the night after other horses.

"The penis (Fig. 131) paraphymosed appears with its glans evolved out of its sheath to the extent of about half a foot, swollen to the size, perhaps, of a man's thigh, evidently the consequence of effusion into the cellular tissue of its envelopes, curved in the form of an arc, and knotted from partial circular contractions, which when excessive are productive of coldness of the organ. Its glandular extremity, the part most tumefied, turns of a red brown. Violent inflammation accompanies all this, and the pain consequent on this is extreme. For all there is so much swelling, however, in general the urine works a passage. Still, should the inflammation run very high, and spread over the body of the penis, gangrene is not unlikely to be the result."



FIG. 131.

We have seen it in geldings, being caused by acts of

mischief and malice. In one instance, a boy in charge of a horse in a coal-mine deliberately plunged a pointed stick into the organ as it was retracted after the act of urinating ; and in another, a boy tied a sharp cord tightly round the penis, left the animal in the stable after the horsekeeper had retired for the night, where the creature remained in great agony until the morning.

In this country the disease is principally confined to geldings, and is by no means a common affection ; this arises from obvious reasons. We do not use entire horses to the same extent as on the Continent, and in geldings the organ has suffered great diminution since castration. Old and debilitated animals are mostly the subjects of the disease in a spontaneous form, which arises from constitutional debility and œdema or paralysis. Some of the Yorkshire low horse-dealers have been known to disguise paralysis of the penis by placing it within the sheath, and prevent its descent by stitches passed across the opening, a deception which can hardly fail to attract an efficient observer's attention.

Treatment.—When it is known to arise from debility, iron tonics with diuretics are the best remedies. Should the swelling of the sheath be great and produce a tight constriction over the penis, it may be desirable to make a few incisions across the detaining band by means of a sharp-pointed bistoury ; and when the penis is much tumefied and inflamed, it may be scarified on the top and lateral surfaces, and suspensory bandages applied to support the organ, or to favour the application of poultices. In these cases fomentations will be found serviceable if applied previous to the poultice, and purgatives, sedatives, &c., as internal remedies. When possible the animal should have exercise, which will greatly assist in the reduction of the swelling.

Amputation of the Penis.

This operation does not prove so formidable as is generally supposed. Various practitioners in this country have removed large portions after having applied a ligature above the part, subsequently cauterising or putting ligatures on the principal arteries. In order to prevent closure of the urethra in the general cicatrix a tube or catheter is first passed, and allowed to remain for some time after the amputation. In other cases this has not been done, the urine itself keeping the canal open. Subsequent hæmorrhage may be expected, especially in stallions or half-castrated animals, in consequence of erection which proceeds from irritation of the wound; it may, however, be controlled by cold water, or, what is better, pledgets of cotton-wool steeped in solution of chloralum.

Castration and its Results.

The propriety of castrating our horses has been a settled question from remote periods. The greater uses to which they are put, together with the number of animals required in Britain, are, doubtless, important reasons for the operation: it is more desirable that the horse should be rendered docile, softer and milder in his character, qualities only to be obtained at the expense of his bold and determined masculine peculiarities.

The great question in reference to the matter is, at what age should the operation be performed? The reply must be regulated by the operation of certain circumstances. For instance, the testicles, the organs which are removed in the operation, observe a period of early but temporary occupation of the scrotum, and are again drawn away for a time. The first descent occurs soon after birth, remaining merely as structural parts only, having no influence on the form or

desires of the creature. At a variable period, extending from the fourth to the sixth month, or even later, the glands are taken up into the inguinal canal, where they may be found as late as the tenth or eleventh month, after which time, or thereabouts, they again descend to the scrotum, and take up their permanent location. The operation therefore cannot be performed during four months of the first year of the animal's life, and it is a matter for consideration whether it shall take place during the first or second period of descent. The question is decided by means of keeping in view the present character of the foal, and what is desired of him. When the testicles have descended the second time, they have become possessed of higher powers—they are endowed with the function of secretion, by which propagation of the species may be effected, and as such are capable of influencing the body through the sensorium, by which the form may be determined. These facts being well known, have led many breeders to defer the operation until two years or later, by which time the colt assumes a more masculine development, particularly as regards the neck and fore-quarters. Colts light in this respect are therefore thought to improve by the delay, while operations performed at earlier periods have a tendency to prevent this development. The temperament also is materially influenced by late castration, as is shown in the fire and animation often displayed by animals thus treated. As a common rule, farmers prefer to castrate about the latter end of April or beginning of May, the weather being favourable, and the time when the colt is about a year old, this season usually being propitious by the absence of flies, and a mild, genial temperature. Some persons scruple to operate in hot weather solely on account of the flies, and we had observed this precaution for a number of years; but being called to reside in a border town of Oxon and Bucks, were surprised on being requested

to perform on numbers of colts during the leisure time between hay and corn harvest, the proprietors alleging that the irritation of the flies kept the colts moving, and promoted the success of the operation. For the moment we felt puzzled, but with consideration came the knowledge that we had always enjoined an amount of exercise after the operation, and it became a matter of little moment whether it was effected by human aid or in the manner described. The farmer took the affair into consideration entirely as a question of cost, and sought to utilise the industry of the flies in one direction and that of his labourers in another. We yielded to what appeared to be a general custom, and had no occasion to regret it. There may, however, be an exception to this rule, and one which we as practitioners should never fail to point out to our clients—viz., when typhoid or contagious diseases are prevailing in the neighbourhood, as flies are known to carry from one animal to another the products of secretion, and may effect irreparable mischief.

The usual precautions to be observed are as follow :—

1. Avoid seasons of cold and wet, especially when easterly winds prevail.

2. Delay the operation when colts are weak, sickly, debilitated, labouring under any disease, when the old coat has not been shed, or is not undergoing the healthy process of removal ; also, when they are just brought from poor pastures, or overcrowded and ill-ventilated, and otherwise defective buildings.

3. Recommend an allowance of good corn for some weeks before the operation, with outdoor liberty.

4. Avoid the operation if contagious or septic diseases have been or are prevailing on the farm, or in the immediate neighbourhood, particularly if flies are prevailing.

5. All instruments must be perfectly clean.

6. An examination should be made, in order to learn whether hernia already exists, and decide accordingly.

7th and last. The animal should be prepared by being allowed only light food, and not too much water the evening previous. Allow no hay, grass or straw, chaff, &c., only corn, as the stomach and intestines need to be free from the pressure of food when the animal is under restraint. An old animal should receive a dose of purgative medicine, and be taken off work, but suffer no withdrawal of proper allowance of corn. Serious mistakes arise on this head, and animals have been lost from a want of stamina to withstand the shock of the operation.

The common subjects for castration are young and unbroken colts, which have never yet been haltered or handled, and a difficulty is sometimes experienced in bringing them under the necessary subjection. Some may be enticed by a feed of corn, and the halter cunningly passed over his head; but this is rarely effected. The most common plan is—turn loose with the colt a steady old horse, and drive both into a stable or shed, when the colt is certain to protect himself by rushing to the farther side of his companion. Being thus confined, a halter is taken, having a long rope attached to the shank, the slipping or jaw-noose being relaxed or opened very wide, and standing on the outer side of the older horse, the operator or assistant quickly commences to carry the halter towards the withers of the colt, playing there some time, and gradually advancing upwards over the neck, the jaw-noose being foremost. At length the colt suffers it to approach his ears, and submits to be rubbed by the rope; he has now lost all fear of its presence, and by a quick movement of the hand the loop is passed over the ears, which being large falls over the nose, the top resting on the front, the lower falling below the lips, and the headpiece retained by the ears. The shank is then to be drawn, and

the halter secures the animal effectually. Two or three men now hold the long rope or shank of the halter, while the older horse is led or driven outside, the young one also following; but finding himself under restraint, commences to rear and knock himself about; this he may be allowed to do for some time, by which his strength will be exhausted, and the subsequent proceedings facilitated.

Being led to the place for operating, he is now to be cast, which is accomplished in the following manner:—Some practitioners, but very few we believe, use the ordinary hobbles; generally, a simple rope is the most suitable for young animals, owing to the great difficulty of approaching them. A cart-rope is commonly selected, but we always preferred our own rope, specially made, thick and soft, and which never caused sores in slipping or tightening, as is the case sometimes with a hard and small cart-rope. Such a rope

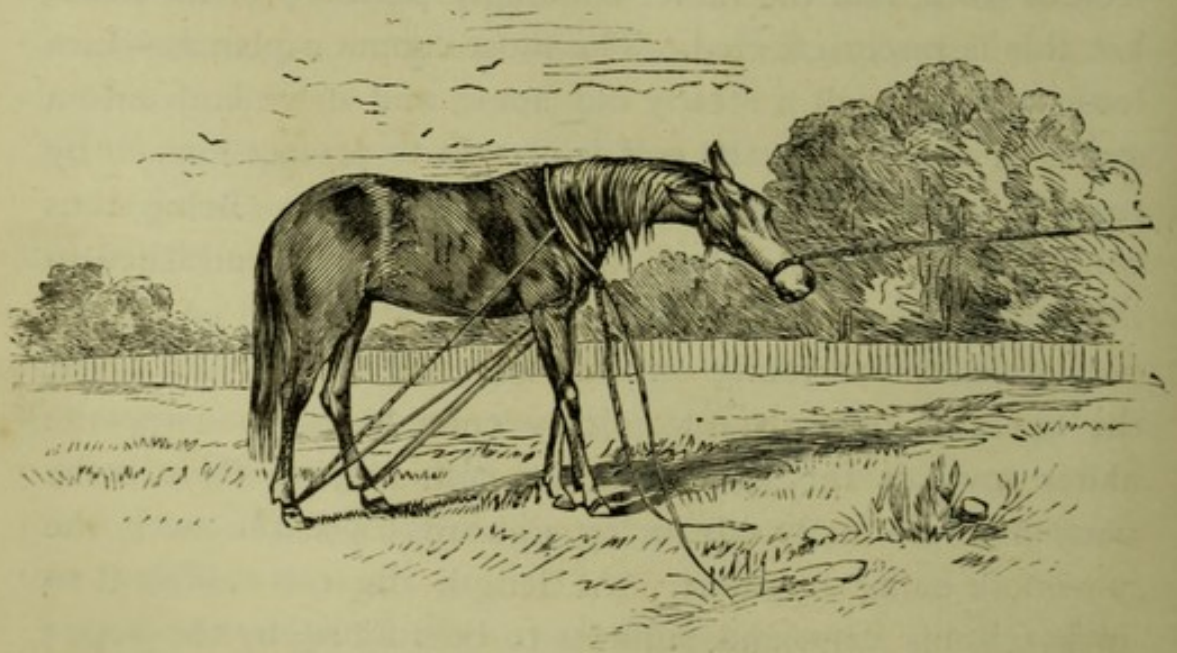


FIG. 132.—*The Colt secured for Castration.*

then is first doubled, and a noose tied at the closed end, large enough to slip over the head to the bottom of the neck, the knot resting in front of the breast, and the long ends carried backwards between the fore and hind legs;

next, each is carried round over the hock outside, forward to the collar and passed through. The men stand firm at the halter-rope, at which the animal pulls strongly; two or three men take one of the ends of the rope from the collar and stand at some distance away from the *side* of the colt, the other rope being carried *behind* (Fig. 132), and in a line with his body. By means of a hooked stick the operator drops the rope, which is slackened for the purpose, from the hocks to the fetlocks, when, all pulling in concert, the animal is brought to the ground on his side. This being effected, the ropes are tightened singly, and hitched two or three times round the hind fetlocks, the colt being turned to secure the lower leg.

The practitioner operates on the animal as he lies on the side, or otherwise turns him on the back, and props up the sides with trusses of straw. Having made choice of the position, and the operator satisfied as to the non-existence of hernia, he now proceeds to the removal of the testicles, which is effected in several ways, each of which will be briefly described.

Cauterisation.—The testicle of one side is gathered by means of both hands, and firmly secured by the left, the wrist curved, and points of the thumb and fingers turned towards the operator, as he is placed behind the animal. By means of the scalpel or a hot iron, such as is used for the purpose of firing, only thinner and sharper on the edge, an incision is carried from the front of the scrotum to the hinder part, in a line with the central mark or raphæ, at least three inches long; when usually the testicle escapes, and with it a small quantity of fluid, the secretion of the scrotum. When adhesions are present, they must be dissected out or ruptured by the handle of the scalpel or finger.

The testicle being liberated, the animal often struggles violently, at the same time an incredible force is exerted by

the cremaster muscle in drawing the gland towards the abdomen; for this the operator must be prepared, and while retaining a firm hold he must refrain from pulling at the testicle. Suitable clams are now put on the cord above the

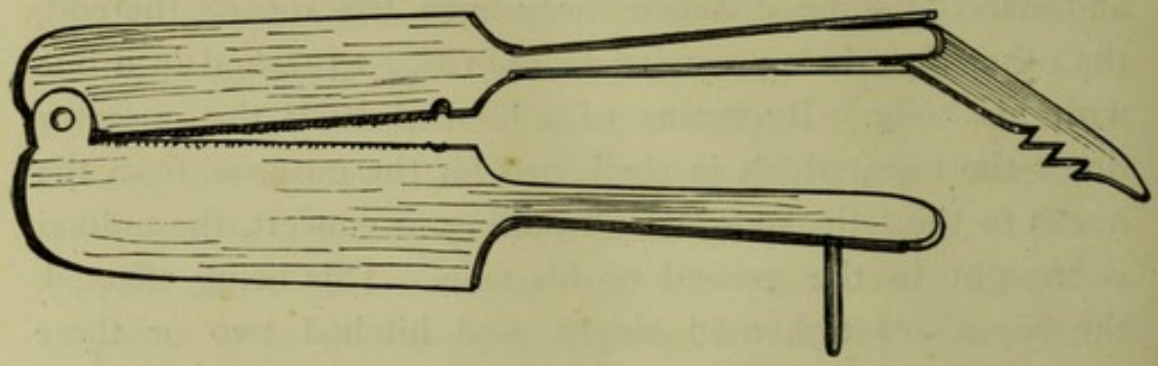


FIG. 133.—*The Castrating Clams of Messrs. Burgess, Willows, & Co.*

testicle, which is then turned to hang over the right plate or blade, and by means of a highly-heated iron the cord is severed three-quarters of an inch above the clams, and freely

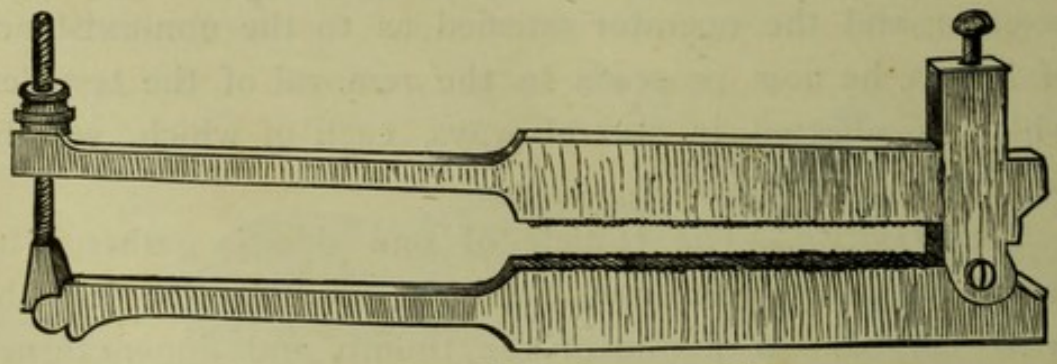


FIG. 134.—*Parallel Adjustment Clams.*

cauterised by applying the flat side of the iron, which has previously been cleared of scales, &c. After this the clams are gently relaxed, in order to see whether blood flows from the divided cord, and the end may be rubbed by the fingers to test the condition more effectually, when if the arrest is certain the cord may be liberated and allowed to enter the scrotum. The second testicle is removed in the same manner, and a little resin ointment, being warmed, is usually poured inside each cavity.

Torsion.—The testicle is first liberated, as already de-

scribed, and clams are put on the cord close to the abdomen as before. By means of a knife the cord is divided, except at that part where the bloodvessels are situate, and close to the clams ; torsion forceps are now applied above the incision in the cord, and these are slowly turned, twisting the bloodvessels round and round until they are structurally destroyed, which renders bleeding impossible.

Ligature.—This consists in placing a sharp cord tightly round the artery of the cord, the testicle being either removed at the time by means of the scalpel, or allowed to drop off when death has taken place. We cannot recommend this variety of operation, as experience proves it is not so safe as others.

The Covered Operation.—This is the form of emasculation practised in France, and known there as "à testicule couvert," as the gland is not exposed, but covered by the expansion of muscle known as the dartos, lining the scrotum, as well as a covering derived from the peritoneum, called the tunica vaginalis.

The operator holds the scrotum and testicle in the left hand, and by means of a sharp scalpel divides only the skin of the scrotum, and this at once exposes a yellowish-white substratum of tissue—the dartos. As the testicle is still firmly held in the left hand, dissection is effected on both sides, the pressure exerted gradually forcing the testicle and its coverings upwards through the orifice in the skin, at length entirely freeing it, as well as a portion of the cord. The caustic clams (Fig. 135) are now put on the cord close to the abdomen, avoiding to include any part of the

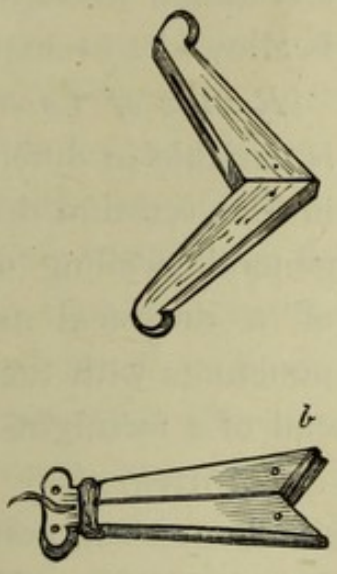


FIG. 135.—*Caustic Clams.*

a. Open, showing groove for caustic.
b. Closed by a few turns of twine.

scrotum. Both testicles being exposed and treated in this way, the animal is allowed to rise, the clams being retained until they drop off, or are removed when the testicles are dead, dry, and withered.

The object of this operation is to unite the dartos, tunica vaginalis, and spermatic cord together in the subsequent healing process, and thus effectually close up the orifice against the descent of intestines. When hernia of the scrotum or inguinal canal is present before castration, this variety of operation must be adopted for safety, the bowels being returned previously. As to the superiority of one form of operation over another we have not much to say. In a practice of over a quarter of a century we have operated upon some hundreds of animals by cauterisation, ligature, torsion, covered operation, and scraping, without having lost a single animal ; the success of which we believe to be due to the previous as well as subsequent treatment.

Professor Williams recommends, instead of the covered operation for hernia, that the whole scrotum be included in a common wooden clam, without any caustic whatever, which is allowed to remain until it drops off.

Results of Castration.—In *favourable* cases the swelling is variable in different subjects ; but as long as the orifices in the scrotum discharge pus and the animal eats well, any general swelling of the abdomen, sheath, &c., will be mostly of a dropsical nature, which will be removed by a few punctures with the lancet, and the animal is quite well at the end of a fortnight or three weeks.

Unfavourable results comprise hæmorrhage, abscess, scirrhous cord, peritonitis, tetanus, gangrene, glanders, farcy, amaurosis, &c. Hæmorrhage ought never to take place if the parts are healthy, and cauterisation of the cord is properly performed. There will be a considerable quantity sometimes fall from the scrotum when the animal rises, but

it need occasion no alarm. It is merely that which has escaped from the incised scrotum, and will cease to flow in a short time. Arterial hæmorrhage flows in a pulsating or spurting stream ; and when it proceeds from the artery of the cord, the animal must be recast, the cord taken up and artery secured, which sometimes is a very difficult affair ; in consequence of which another incision may have to be made higher up towards the groin, so as to seize the cord there.

Abscess.—This sometimes is located in the scrotum, at other times in the groin, and may extend downwards on the inner side of one thigh, forming a very large and hard tumour, interfering greatly with locomotion, and producing much irritative fever. The colt stands by himself in some remote part of the pasture with sunken head, back somewhat arched, and as if he were fixed to the spot ; the flanks are hollow, breathing quickened, and pulse full and hard; mouth hot, bowels constipated, and the countenance is indicative of much suffering ; the urine is scanty, sheath swollen, and probably the breast, abdomen, and hind-legs are involved in a dropsical condition. This untoward state may arise from being turned alone too soon in the pasture, when the weather suddenly becomes wet and cold, or when the animal was previously not in sufficiently good health or condition. Occasionally the disease assumes a chronic condition ; the hardness and swelling continue, and after a time a succession of small abscesses form, which keep up much weakness, cause a straddling gait, and prove a great hindrance to growth and development. Usually, however, the swelling *points* at one particular part, fluctuation is present, and then is the time for making a free incision, and evacuating the fluid, which not unfrequently amounts to several pints. When there is a disposition to swell in the manner described, and maturation goes on slowly, the animal should receive

some good oats, be placed in comfortable quarters, and fomentations, poultices, or blisters applied, so as to hasten the formation of pus. As soon as the abscess is opened and fluid evacuated, the animal becomes cheerful, and resumes his appetite with vigour.

Scirrhous Cord.—This is the *champignon* of the French, and is also known as *sarcocele*, or a fleshy enlargement. This condition is evident by the presence of a discharge, generally of a sero-purulent kind, constantly issuing from the open scrotum ; and in addition a tumour, which by gradual enlargement at length hangs from the orifice, raw, bleeding, and discharging pus or a sanious fluid. The cord above is thickened, hard and tender, being adherent to the scrotum, which is also swollen, hot, and painful. The tumour has formed at the end of the cord, and gives rise to general symptoms similar to those enumerated under abscess, excepting urgent irritative fever.

Scirrhous cord occasionally arises when the cord has been left too long ; when scales from the hot iron have become adherent to the cord in cauterisation ; when the caustic clams used in the covered operation have not been removed at the proper period, or when diseased portions of flesh have been allowed to remain, all of which induce morbid irritation and inflammation.

Treatment consists in casting the animal, and after dissecting away the adhesions existing between the scrotum and cord, to place the clams moderately tight on the cord above the diseased mass, and removing it by torsion or excision and subsequent cauterisation, the caustic clams or ligature. The second is, we believe, preferable to the other plan in every degree. After the mass has been removed, observe proper care and attention in avoiding exposure to wind, wet, and cold ; rather enjoin hand exercise than subject the colt to the uncertain conditions of a distant

pasture. Conjointly with the decrease of untoward signs, let the food be improved in quality, and continue the allowance even when sent to grass, at least for some time.

Peritonitis has already been described at page 329; tetanus will be found in the section devoted to diseases of the nervous system; glanders and farcy have been treated under blood diseases, page 141; amaurosis will be described in Section IX., devoted to affections of the eyes; and gangrene has been alluded to at page 38, as one of the terminations of inflammation.

II. DISEASES OF THE FEMALE ORGANS OF GENERATION.

Abortion and Premature Labour.

The signification of these terms has hitherto been more frequently represented under that of abortion alone, and further confusion has arisen in consequence of the employment of other names, more or less useless or deceptive, coined in various districts, and caused to stand for abortion, premature labour, or for both. Such vernacular titles are variously——miscarriage, slipping or picking the foal, slinking, sauntering, &c.

The limitations of the terms are of importance, and are determined by periods in the time of gestation; thus, the mare goes with foal eleven calendar months, or 334 days, or, what amounts to the same thing, twelve lunar months, or 336 days,* and at any part of that time she is greatly

* This is further explained as follows:—"Calculating the mare foals in April, and spends a month barren with the foal, taking the horse again in May, there are intervening four months—June, September, November, and April—which have thirty days each, or a total of 120; six having thirty-one—July, August, October, December, January, and March—giving a total of 186; and one—February—having only twenty-eight; a cast of the whole being 334. Twelve lunar months

susceptible of influences which may cause an expulsion of the contents of the uterus or womb. When the usual process of gestation is interrupted by an expulsion of the ovum, or fœtus itself, before it is endowed with the powers of a separate and independent existence, being incomplete, unfinished, untimely, or fruitless, the act is known as abortion. The period during which this condition is acknowledged to belong, ranges from the time of conception to about the 300th day—that is, a few days under ten months; after that time the power of life and locomotion, &c., being given to the fœtus, and, on the part of the mother, greater preparation being made for the approaching parturition, or natural delivery, expulsion will partake more of the characters of that proceeding, and it is therefore termed premature labour. The mare is very liable to both forms of disease, more especially abortion, which generally happens during the early period of pregnancy, when little or no appreciable signs of disturbance take place. During later periods it becomes a more serious affair, for not only is the loss of the young certain, but the life of the mother may be imperilled or sacrificed. In abortion the young creature is usually dead when expelled, or survives but a very short time; and in premature labour the animal may prove to be sickly, weak, and unprofitable; or, although immature, it may thrive tolerably well; but in some instances the case assumes grave aspects from malpresentation of the fœtus, which renders delivery difficult and protracted, or, in addition, it may be impossible, when both mother and young are sacrificed.

Abortion and premature labour may be either *sporadic* or

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of only twenty-eight days each gives the total 336."—*See* Author's Prize Essay on "Abortion and Premature Labour," published in the Transactions of the Highland and Agricultural Society of Scotland. Vol. iv. Fourth Series. 1872. Also reprinted by permission in Armatage's Cattle Doctor. London: F. Warne & Co.

enzoötic. When of the first kind, only a case here and there is heard of, being probably due to accident or simple causes; but when they assume enzoötic characters, the animals scattered over a wide extent of country are affected, which entail severe losses, and greatly interrupt the ordinary course of breeding operations, as well as paralyse the agricultural interest. In certain cases abortion has been confined to one farm, on which for several years the mares have aborted regularly, the cause being one doubtless due to some local influences, and which disappear on the establishment of rigorous principles of management.

Causes.—These are numerous. Exposure to cold and wet, particularly when there are alternate periods of heat; indigestible and inferior food, producing first disorder of the digestive organs, pressure on the uterus by fermentation and collection of gases, and congestion or inflammation of the uterus or placental connexions, whereby loss of nutrition ensues; colic arising from the previous causes, and inducing the mare to roll; irritation of the skin, giving rise to the same; putrid or frozen water; certain plants, as savin and rue; cantharides; poisonous effects of medicines, as opium, digitalis, large quantities of the various salts; ergotised plants, especially rye-grass in this condition; purgatives in powerful doses; severe exertion in harness or under the saddle; fright and excitement in operations, or from being cast for such, and when accidentally thrown in the stable; blows on the abdomen; being gored by oxen; access of the male, particularly if continued; diseases attacking the mother, more especially with reference to blood diseases; a violent cough has frequently proved a mischievous source; disease of the ovaries, uterus, &c.; and lastly, congestion or inflammation of the fœtus itself, together with local aberrations of form, as a result of special structural changes, &c. &c.

When the disease assumes the enzoötic form, which, however, is somewhat rare among equine animals in this country,* we find the causes are the same principally which produce the sporadic form—viz., changes of temperature with excess of dryness, humidity, &c., together with all influences which produce an ergotism of grasses or plants, &c., over a wide area of country; likewise affecting the character of food generally in relation to its digestibility and nutrition. According to the *Veterinary Journal* (vol. i. p. 422), an outbreak of this kind occurred in New Zealand in 1875. Prior to the introduction of rye-grass, the disease had been exceedingly rare, but since then it has proved very common from the ergotism to which the plant is often liable. In the same journal (vol. ii. p. 51), records are given of the prevalence of abortion among mares in Germany, caused by the red rust (*Trichobasis rubigo*) of straw used for fodder.

Symptoms.—These are variable, and depend greatly upon the period of gestation at which abortion takes place; sometimes the evidences are so slight as to attract no notice whatever, and in others they are of a very serious character. In the early periods of pregnancy, the expulsion of the fœtus, together with the membranes, is accomplished with little effort, and without any previous indications of disturbance; in many instances the animal, being apparently well and hearty at night, is found to have aborted when the attendants arrive in the morning, the fœtus, invested by its membranes, lying at a distance, and the mother evincing no regard for it whatever. In somewhat later stages the membranes are ruptured first, birth partially takes place, and the fœtus recedes, no further effort being made for some hours,

* A mass of valuable information on this subject, as it has been noticed on the Continent, will be found in "Animal Plagues," by George Fleming. London. Chapman & Hall.

when the act is accomplished, but the membranes are retained, occasioning some disturbance probably.

In still later stages, when the fœtus has attained a considerable degree of growth, the symptoms are generally more pronounced, particularly when, added to other conditions, the position of the fœtus is not favourable for delivery. Even when such is not the case abortion is not so readily performed, from the simple fact that the necessary relaxation of the hips, together with the harmony of function so necessary at this time, have not taken place: there is, indeed, nothing ready but the uterus itself, acting in obedience to an unnatural nervous stimulus. Under these circumstances also birth may be partial, but owing to debility of the mother the act is not accomplished; the efforts cease and the animal becomes tranquil, but in a few hours they are resumed, and the fœtus is expelled with or without the membranes. At times human aid is required to bring away the young. Such instances are generally due to external injuries, which have produced a separation of womb and membranes, and probably also death of the fœtus.

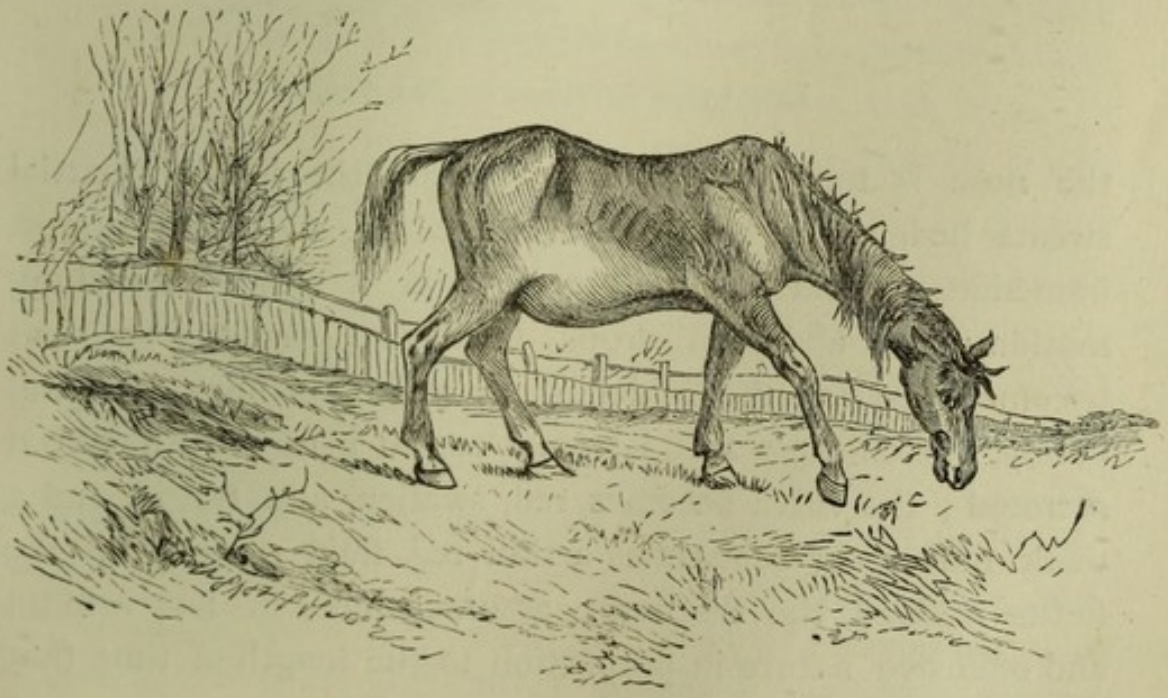


FIG. 136.—*The Mare uneasy.*

The animal appears dull, dejected, and is constantly moving about, and the efforts of the fœtus are likewise active, gradually being enfeebled as it ceases to exist. The mare exhibits her distress (Fig. 136) by plaintively neighing, scraping with the fore-feet, and exhibiting colicky pains; the pulse as well as respiration are hurried, the former becoming small and weak; the countenance is haggard (Fig. 137);



FIG. 137.—*Previous to Abortion.*

the nose is turned frequently towards the flanks; partial sweats bedew the body; she lies down and rises almost immediately, and the tail is kept in a violent switching motion; the abdomen drops, losing its round form, and becomes deeper; the udder, if in milk, becomes soft and flabby, but enlarges and becomes turgid if no milk has been secreted; the vulva becomes red, swollen, and turgid, and a thick mucus, or sometimes a thin red, fluid escapes; if the fœtus is dead, the discharge assumes more or less a fœtid and offensive nature in proportion to the length of time that has elapsed since it succumbed.

There are instances in which the act of abortion assumes sudden and acute characters. The condition of the mother is, as already described, in no way prepared for the calamity, and the fœtus is likewise unfit for delivery; the mother then becomes exhausted by continual and ineffectual straining, and soon passes into a critical or hopeless state. The chief source of difficulty exists in the state of the neck of the uterus, which has not assumed the form and condition incidental to normal parturition. As the uterus enlarges with the fœtus, the neck is shortened and less contractile; in abortion it is long, muscular power is great, and therefore it is contracted, forming a long passage for the fœtus. All this must be overcome in order to produce successful parturition, and the process of relaxation is slow, much behind the symptoms in progress; if to this is added false position of the fœtus, the difficulties are often great, and even insurmountable.

Results of Abortion and Premature Labour.—In whatever aspect we view these untoward states, they are always serious, the least being probably the loss only of the fœtus. Although as a rule the mare suffers but little, there is nevertheless loss on her part—loss of time, loss of condition—both of which mean money, and there is always that to be dreaded which may seal the tendency to abort in future seasons; the animal remains in an excited condition, œstrum is frequent, and it interferes with condition and gentleness at work; indeed, a form of hysteria may follow, which for ever makes the animal insecure; she is a positive nuisance. (*See* Hysteria.)

Hæmorrhage is an occasional incident of abortion. (*See* Flooding.) Rupture of the uterus is another serious termination; or there may be prolapsus of the uterus, vagina, and even rectum, and retention of the placental membranes also is not the least of the various complications which render abortion a serious obstruction to the breeder's profits.

Treatment.—This is obviously of two kinds—viz., *preventive* and *remedial.* To comprehend and carry out the first, a complete study of the causes must be made with a view to their removal. Avoid the evils of indigestion by proper diet; the tendency to anæmia, by good food; that of plethora, by proper exercise and a less stimulating diet; constipation, by the occasional use of laxative food and medicines; and irritation of the generative organs, by appropriate treatment.

When abortion has become almost a matter of certainty, but the fœtus is not dead or presented, or membranes ruptured, the process of delivery may be delayed until the usual time of parturition by the use of anodynes, antispasmodics, &c.—such as opium, chloroform, chloral hydrate, camphor and opium combined, &c. If the womb is thus caused to retain its contents, the mother is to be made comfortable with good litter in a proper-sized stable or box, and supplied with easily-digested food—gruel, hay, or linseed-tea for drink; these, with perfect quiet for a few days, are essentially necessary towards a successful issue.

If abortion has unmistakably commenced, as shown by the rupture and passage of the membranes, the object of interference, if any be required, must be that of aiding the delivery by all means possible. In many instances the animal goes through progressive throes and stages, and the act is accomplished independently of human aid; and we would caution the reader against premature meddling, preferring—if the fœtus is properly situated and progress made—to allow the mare to effect delivery quietly and alone. Should the labour become protracted, or cease after the membranes have been rejected, and the mare is exhausted, a proper examination should be made. Clear out the rectum by enemas, and, with the hand well oiled, nails well pared, the os uteri must be gently dilated by gradual insertion of

the fingers, until the hand can be passed into the womb; after which, the position of the fœtus being ascertained and arranged, if needed, it is removed in the usual manner. Sometimes the os uteri remains obstinately closed, firmly resisting the entrance of even the fingers, in which case the parts internally may be smeared with an ointment of opium or belladonna, or a sponge saturated with a solution of either may be left in contact with the os uteri until relaxation occurs. We have found the internal administration of chloroform exceedingly useful for this purpose. Belladonna, opium, chloral hydrate, &c., may be likewise used for the same; and when the animal is exhausted, strong stimulants, as ammonia, will be required, in conjunction with gruel, milk, and even beef-tea, &c.

Retention of the Membranes.—When the water-bags or membranes are retained after abortion or parturition of the normal kind, the occurrence is due to debility on the part of the animal; and if they remain any length of time, the process of decomposition being set up may give rise to absorption and blood poisoning. The hand may be passed into the uterus, and, without any pulling or tearing, but with gentle force, the attachments should be broken through; as, however, it often happens in abortion the placental connexions are very firm, and will not admit of rupture without extreme pain to the animal, the operation must be abandoned for a time, and, after twisting the band of membranes, all outside the uterus may be cut off. In the meantime, stimulants and vegetable tonics may be given to the mare, and, after the lapse of twelve or twenty-four hours, the attempt to remove the membranes must be again made, at which time success is generally obtained; indeed, on the second or third day they will generally fall away spontaneously, from rupture of the placental adhesions.

The mare that has suffered from abortion should be well

attended to. The food requires to be nutritious, highly digestible, and supplied at regular intervals in suitably small quantities. Every facility for rest, warmth, and comfort should be given for some time ; and the owner will take into his serious consideration the propriety of not allowing the mare to conceive again.

Before we leave this subject, we must caution the reader with regard to the disposal of the dead fœtus and membranes. It is not a safe measure merely to throw these products on a dunghill, and there leave them. Such are only effectually dealt with by being burned in a fire, or buried somewhat deeply. We have a fear that this procedure is too frequently disregarded, and occasionally evidences are subsequently offered by the appearance of certain forms of blood disease, which for a time are not traced to any satisfactory source.

Difficult Parturition arising from Malpresentation of the Fœtus.

We have now to deal with the act of parturition as it takes place at the usual expiration of gestation, and modified or rendered difficult by peculiar false presentations of the fœtus. The subject has occupied the attention of many scientific veterinarians on the Continent, who have written ably and copiously upon it ; and it has likewise attracted considerable notice in this country, by reason of the great destruction of profits and hindrance to agricultural pursuits which have arisen in consequence.

Before going into the subject of difficult parturition, we will devote a short space to a description of the act and position of the fœtus as observed under normal conditions. The approach of labour in the mare is revealed by rapid enlargement of the mammæ or milk gland, more

generally known as the udder or bag: blood no longer required for the *fœtus in utero* is transmitted thither for the formation of milk, and in some instances the enlargement resembles œdema, as it results from an injury, extending forward along the abdomen, and backwards between the thighs as far as the vulva. Somewhat later a thin transparent fluid may be obtained from the teat by pressure, portions of which have previously oozed from the orifice, and closed it by forming a concretion or crust; at a still later stage the contained fluid has assumed a higher degree of development and elaboration, and the first that appears is known as the "colostrum," the subsequent secretion being familiarly known as milk.

Contemporaneous with the mammary engorgement the vulva becomes tumefied, the opening is enlarged, the lining membrane is reddened, the lips of the vagina are enlarged, soft, and flaccid, and a thick viscid mucus is secreted from within, which is Nature's plan for lubricating the surfaces over which the fœtus is shortly to glide. The hips fall, the croup and flanks become hollow, owing to relaxation of the broad ligaments; the abdomen falls or sinks nearer the ground, the haunches are separated to a wider extent than is usual, and the spine appears to droop; the animal prefers to be isolated, and walks loosely and sluggishly away to seek rest and quiet alone, and occasionally the hind-legs become œdematous. As the hour of delivery draws near the mare becomes restless; when eating or grazing she suddenly stops, and appears to look round for something, and is startled by peculiar internal sensations, which eventually ripen into essential uterine action for the expulsion of the fœtus; she switches the tail, appears uneasy, or suffering from abdominal pain, lies down, quickly rises again, and, if at liberty, seeks retirement in some remote place to effect delivery. The os uteri, or mouth to the womb, is gradually opening, and at length

the cavity of the vagina and womb are continuous as one; uneasiness increases, and abdominal pain becomes more intense; the skin, at first hot, is covered by a profuse perspiration; the countenance indicates anxiety and suffering; the pulse increases in frequency, and is hard; the abdomen becomes tense and hard from muscular contraction, and urine or fæces are passed. A short time of rest ensues, say ten or fifteen minutes, and the uterine contractions again commence, and follow at shorter intervals until they appear almost continuous, during which the membranes or water-bags appear between the lips of the vulva, gradually protruding, and shortly bursting from pressure; and the fœtus, a short way behind, occupies the neck and opening of the uterus—the fore-limbs (Fig. 138), between which are the

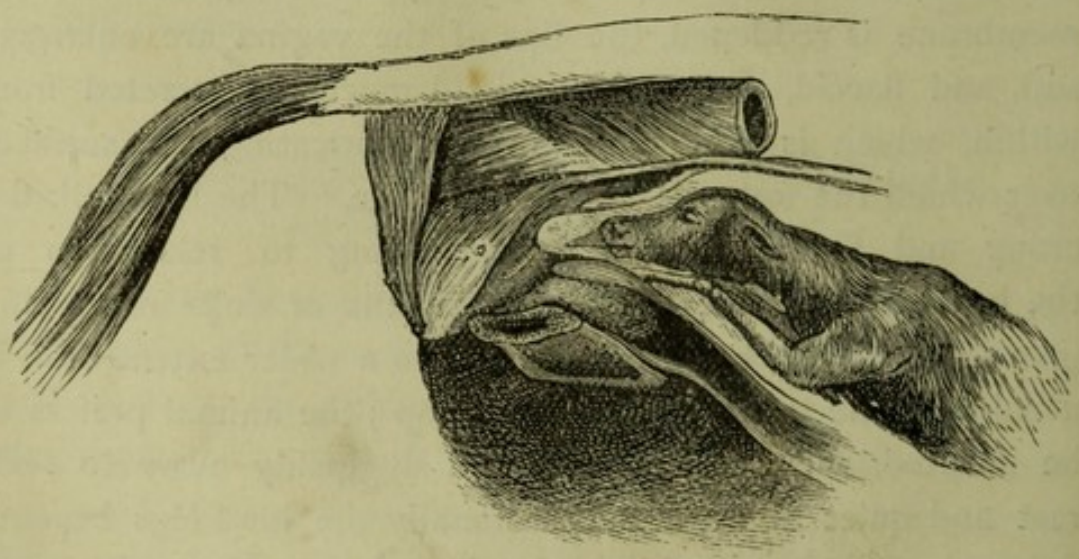


FIG. 138.—*Natural Presentation.*

nose and head, being presented, causing the os uteri to dilate to its fullest extent, thus forming a complete and continuous passage from the vulva outwardly to the womb internally.

The efforts are now frequent, more vigorous and constant, while the aid of powerful auxiliary muscles, as those of the abdomen, the diaphragm, &c., are brought into requisition to

supplement contractions of the uterus (Fig. 139). If the animal is standing, the fore and hind feet are brought together beneath the body ; the back is arched, tail elevated and

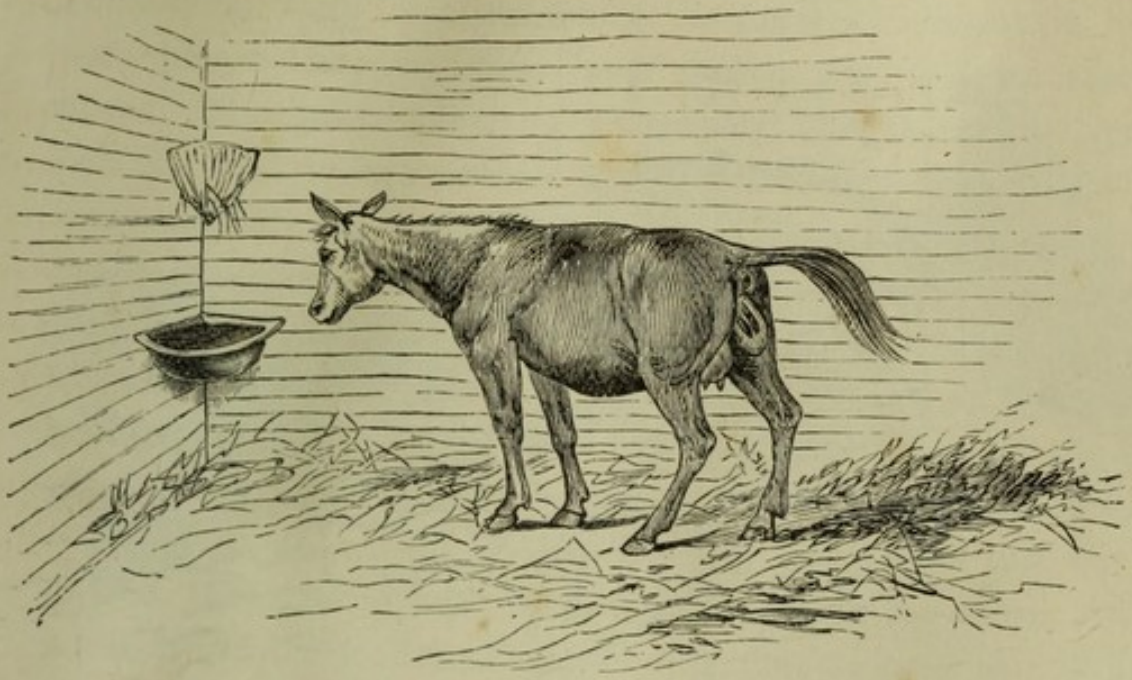


FIG. 139.—*Approaching Delivery.*

waving ; the chest is expanded by a deep inspiration, and by successive actions of this kind, which are termed *throes*, the fœtus is gradually forced onwards from the uterus, through the os uteri, vagina, and at length, falling on the hocks of the mare, reaches the ground, followed by membranes loaded with fluid. The standing position is by no means constant, for the mare may be exhausted by previous effort, or even independent of this she may assume the recumbent position from the first, and rise only when delivery has been completed (Fig. 140). In this position the fore-legs are doubled or flexed under the sides of the chest, the weight of the animal's fore-part resting on the sternum ; the hind-legs are beneath the abdomen, or one is more outwardly than the other, and the mare rests on the opposite quarter. As each throe comes on she arches the back, the hind-quarters are raised upwards and forwards with the contractions, falling again at the termination. Among young animals—primi-

paræ, or those which are giving birth the first time—the act of delivery occasions greater pain than older animals experience ; and not unfrequently, as the convulsive efforts are

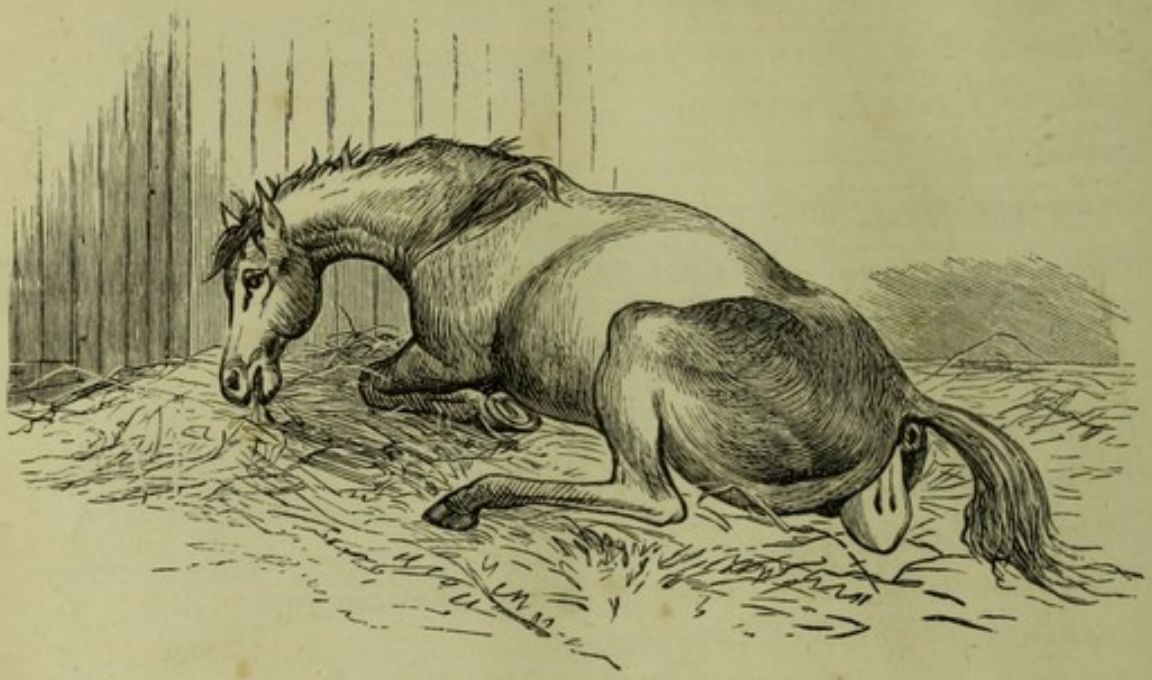


FIG. 140.—*Delivery in the Recumbent Position.*

made, a plaintive cry or subdued scream is emitted, the eye is suddenly animated, and the facial muscles being drawn into sharp outline, a peculiar expression of anguish is produced, which can only be understood when witnessed in the suffering animal.

From this hasty review of the principal characteristics of normal parturition, we will now turn to consider those differences or aberrations from natural conditions which occasionally are met with, together with the means usually employed to overcome them in the endeavour to promote successful delivery.

The mare, among all quadrupeds, probably gives birth to the young most readily under natural circumstances ; but, on the other hand, when mal-presentation takes place the case is marked by peculiar urgency, absolute danger, and in

numerous cases with very little prospect of being able to afford the necessary relief. The vitality of the foal is readily lost in mal-presentation, and the mare withstands injury or exhaustion very badly; hence in these conditions it not unfrequently happens that both mother and foal are sacrificed. The practitioner is frequently placed under very peculiar and trying circumstances, and when exercising the most careful and unremitting attention, as well as bringing the best tact and surgical skill to bear upon the case before him, he is unsuccessful. This is sufficient, one would think, even to render him more thoughtful, if it be possible, to say nothing of the anxiety which he endures, but in by far too many instances he receives unmerited blame and calumny. Difficulties, and even impossible delivery, may exist from the first; indeed, they are mostly of this character in the mare, and, while it is of the utmost importance that animals should be attended to early, or much earlier than they are usually, it is also useful to bear in mind that it is unfair to expect the veterinarian can cope with the same difficulties during the prostration stage as readily as when the animal was in a better condition to help herself. While we deprecate unwarranted interference, we nevertheless consider it would be far more advantageous to breeders to employ the professional man to watch at least the case, and assist Nature. The custom of selecting those having no physiological or anatomical knowledge for the treatment of valuable animals in this country is very baneful in its tendencies; an extension of the contract system to whole districts would prove a great boon to the breeder and agriculturist generally, affording at the same time valuable opportunities for observation, improvement in skill, as well as progress in scientific knowledge.

In pursuing the subject of difficult or abnormal parturition, we shall place the various positions of the fœtus under

three heads—viz., anterior presentations, posterior, and transverse ; these will admit of further subdivision, which will be dealt with as we proceed.

Anterior Presentation.

In this form several varieties are met with :—

1. *The fore-limbs are not in advance of the head as they should be.*—The head is too low, and between the limbs, which are separated too widely at the elbows to admit of easy birth. Being a slight departure only from natural delivery, the normal position is quickly obtained (Fig. 141). First cord the protruding feet ; next push back the head into the inlet of the pelvis, and apply moderate traction to both cords, which will have the effect of approximating the elbows to the sides of the chest ; then bring up the nose within the pelvis, and, waiting the throes of the mother, employ traction at the cords, still directing the course of the head, and delivery will be speedily effected.

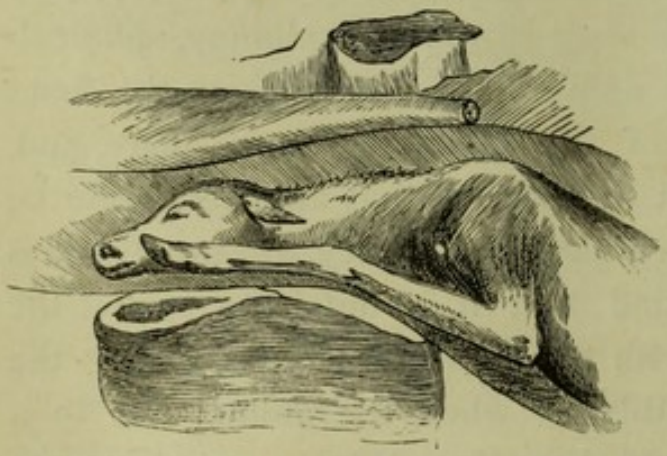


Fig. 141.

The cords most useful in these cases are the ordinary plough-lines, gradually tapering from one end to the other, and having a loop at the smaller worked in by the maker. The loop is put over the pastern, and the opposite thicker end affords ample substance to the large hands of labourers for the purpose of traction.

2. *Presentation of head and one foot only.*—In this position the head must be pushed back to the inlet of the pelvis, the

protruding foot being corded as before (Fig. 142). The absent limb must be sought for beneath the fœtus, first bringing up the fore-arm, and passing the hand down the shank bone the foot may be reached ; this must be carefully covered by the hand to avoid wounding the uterus, and, by gradually raising it, the limb is flexed sufficiently to admit of it being brought into the passage, and a cord placed upon it. The head is then brought into position, and directed in its course as gentle traction is exerted on the limbs during uterine contractions.

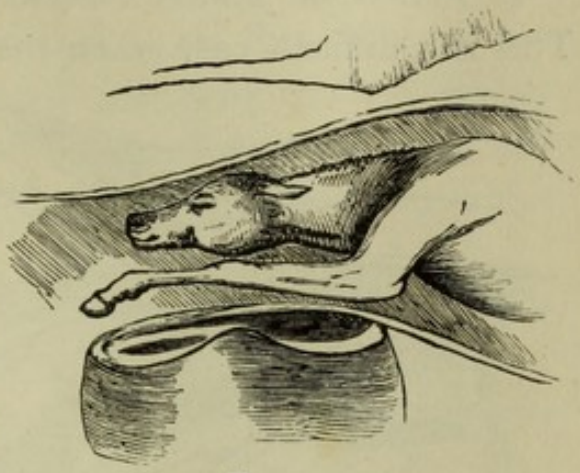


FIG. 142.

3. *One or both fore-limbs may be crossed over the neck* (Fig. 143).—If only one leg is thus fixed the difficulty is not great. All that is required is to seize the limb at or above the fetlock joint, raise and push it backwards, at the same time passing it over to its proper side. This is readily accomplished even when the nose has entered the pelvis, and delivery proceeds either naturally or by force if required. When both legs are crossed and with the head block the pelvis, first cord the legs, push the head back, cross the ropes and pull gently to the proper sides, at the same time guiding the nose towards the passage. Traction

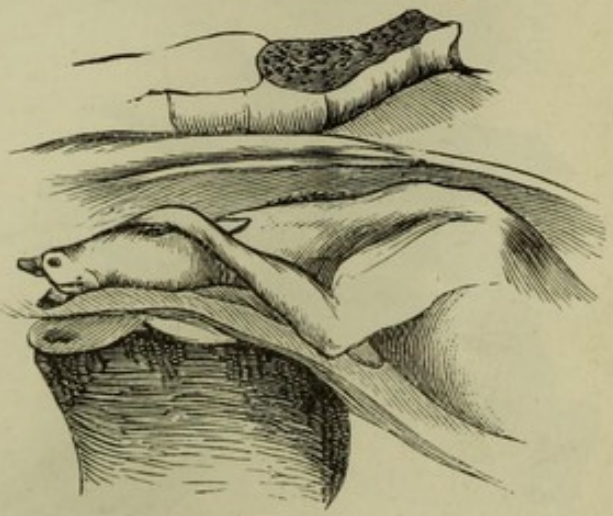


FIG. 143.

will adjust the limbs, and delivery will follow naturally or by assistance.

4. *Fore-limbs flexed; knees and head presented* (Fig. 144).—This is a difficult case when the head has advanced far into the pelvis. The feet are to be sought after separately as directed under No. 2, and the limb is to be raised altogether, the knee passing upwards on the side of the neck, when the foot will be brought to a level of the pelvic brim and thence into the birth-passage. Both hands must be employed, the right for the left leg of the fœtus, and the left hand for the right leg. After adjustment cords may be applied, and traction employed, or Nature may effect delivery unaided.

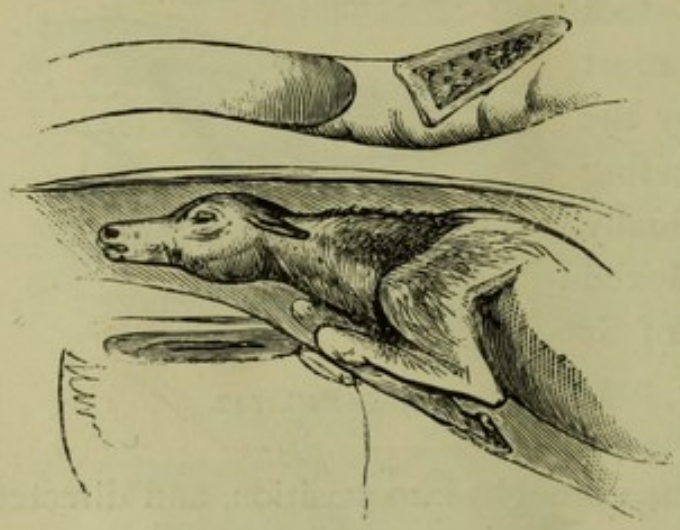


FIG. 144.

5. *Both fore-legs retained or stretched backwards.*—In this form of presentation the head only appears. The first object is to reach the feet, but the head is in the way (Fig. 145), and in order not to lose it, a head collar should be improvised by means of flat webbing or small cord, and carefully

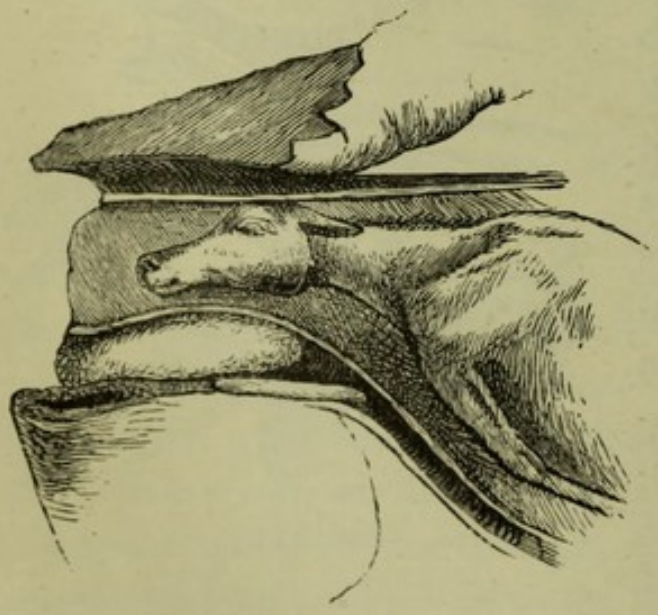


FIG. 145.

adjusted ; the head may then be pushed back into the uterine cavity. Bring up the legs as already detailed, using a long blunt hook, or hook on a cord to aid in reaching the fore-arm or shank, &c. If the mare is not exhausted, an expert operator will generally effect a speedy adjustment and delivery. If only one leg is retained, the presented limb may be used for pushing back the fœtus while the absent limb is being sought for.

6. *Fore-limbs presented ; head downwards.*—The head is liable to several forms of deviation in this presentation. A. The nose of the fœtus is pressed in front of the pubis or pelvic bones ; B, the forehead may occupy that position, and during the violent throes of the animal ; C, the head falls entirely below the pelvis ; D, one foot only presented, the head is downwards and one leg flexed backwards (Fig. 146).

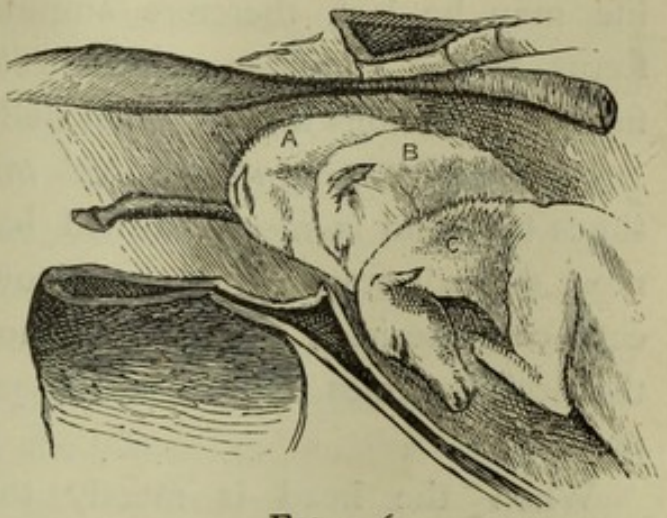


FIG. 146.

When limbs are presented they form admirable levers by which the body can be pushed back and space obtained to adjust the head. The retained foot is to be seized according to instructions given under No. 2, and the head may be turned in the proper direction by hooking the fingers in the angle of the mouth or using blunt hooks to raise it, after which it can be directed into the pelvis while traction is employed, or, when the animal is strong enough, she may be able to expel the fœtus alone.

When delay in seeking assistance has arisen, the contractions of the uterus often very materially alter the position of the fœtus, and increase the difficulty of delivery by causing it

to be forced tightly within the pelvis, the nape of the neck occupying the space above the limbs. It will materially assist the operation if the fore-legs are used to push back the fœtus in order to admit the hand, which must be passed under the head and neck, now between the fore-arms and under the chest ; the nose must be seized and drawn towards the pelvis, and then, using the thumb and fingers as hooks in the nostrils, the head is directed into the birth-passage, while by traction or natural throes of the mother delivery is completed. If the state of the mother becomes critical, no hesitation should be made, as by attempting reduction her life may be lost, therefore amputate the fore-legs of the fœtus at the shoulder, which will allow ample room for further operations and eventual delivery.

7. *Fore-feet presented; head turned backwards.*—Sometimes the head is merely turned back on the shoulder ; in more difficult states it is turned towards the abdomen. In each case the issue is rendered more doubtful by delay, as the neck becomes wedged in the pelvic inlet as the throes proceed.

When the head is merely turned back towards the shoulder, the operator passes the hand along the vagina into the uterus (Fig. 147), downwards below the head of the fœtus, and seizing the nose in the palm, brings it upwards into the pelvic inlet. Should any difficulty arise, the fore-legs must be used as levers, by which to push back the fœtus in order to give room for turning the head as directed. When the nose is brought into the birth-passage, it may be held by

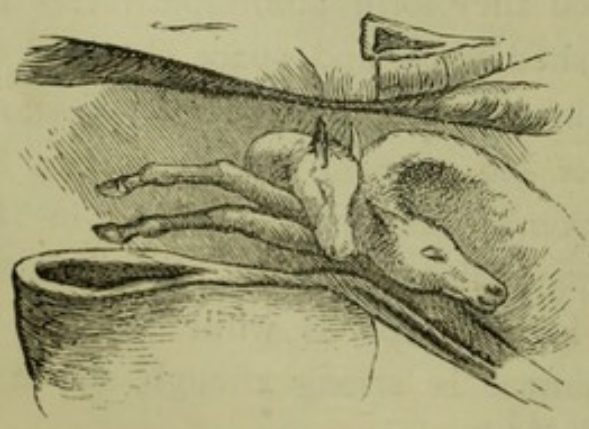


FIG. 147.

the thumb and index finger hooked in the nostrils, and as delivery proceeds or traction is employed, the head is directed in progress.

After delay has taken place the head is pressed farther backwards towards the abdomen, and the neck doubled on itself is presented, indeed fairly wedged in the pelvis by the violent throes of the mother, so that no room exists for readjustment. Nevertheless delivery has been effected, but the foal is always sacrificed, and not unfrequently the mother also. This has often been our experience when called too late. In a typical case of this kind, which occurred in 1862, parturition had been going on through the night, and assistance was not sought before noon next day. Ten miles had to be traversed, first by the messenger on a slow farm horse, and the same distance by the writer. On arrival the two fore-limbs were presented as far as the arms, and a large mass which proved to be the doubled neck ; owing to the violent contractions of the uterus and agony of the mare, readjustment was impossible, and no time was to be lost, for strength was evidently on the wane. Stimulants were given at once, and we proceeded to amputate the neck, which allowed of the removal of the head ; the limbs were corded, and hooks inserted in the flap of skin, which was doubled for strength, and delivery was accomplished in about twenty minutes. The mare died next day from injuries to the vaginal passage, caused by the long retention of the fœtus in false position.

In some cases, although the hand may reach the nose, it is impossible to bring it up in position, as probably the bones of the neck are deformed and contraction has resulted, due to some cause inducing mal-position prior to parturition. The foal is usually dead, which will be ascertained by looseness of the hair ; but be this as it may, in such a difficulty the nose must be reached and brought up by a hook and

cord, or long blunt hook and handle, either of which may be first inserted in the nostrils or angle of the mouth, traction being employed to pull the head into position as the hand of the operator guides it towards the pelvic inlet and birth-passage. As a rule, the long neck of the foal admits of the nose being too far to be reached by the hand, therefore, traction with a view to readjustment by means of the blunt hook, or even a cord round the neck, will be of great service. Nevertheless, readjustment may not be effected by these means, and owing to the condition of the animal it is perhaps considered unwise to submit to farther delay; amputation of one of the limbs must be proceeded with, the removal of which will give greater space for action. In some cases time may be saved by removing both, using the flaps of skin for traction, that the hand may reach the nose and raise it to position, where it should be held until farther secured, as it is liable to slip rapidly back again owing to the contraction of the neck.

8. *Fore-legs presented; head turned upwards and backwards* (Fig. 148).—This is a very rare complication. We have seen only one case, that of a mare pony, in which the mal-position caused very violent action, and finally rupture of the womb. When a *post-mortem* examination was made the dead fœtus was found in the cavity of the abdomen, the rent in the uterus being large. Deformity and permanent contraction of the neck had evidently existed some time, but death of the fœtus was recent.

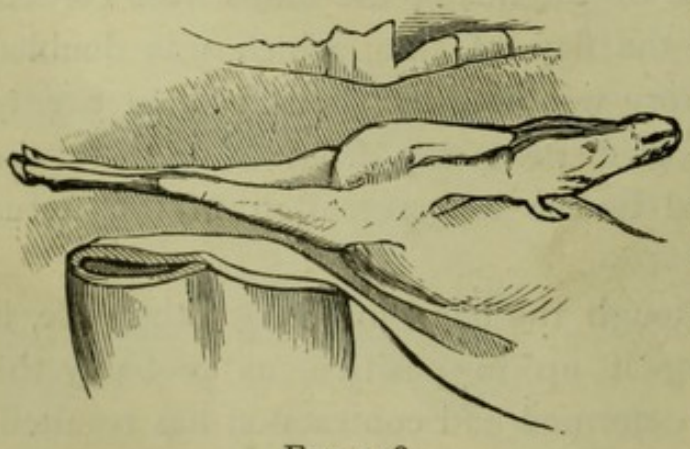


FIG. 148.

The difficulty of the case arises from the fœtus being

packed tightly towards the pelvic inlet, the breast opposing the entrance of the hand, while the neck being curved upwards and backwards approximates the lower jaw of the fœtus with the sacrum of the mother, the nose being too far to be reached by the hand. The legs may be used for pushing back the fœtus, or a suitable rod planted in the breast can be used for this purpose with greater advantage during the quietness of the mare. The fœtus being lowered in position, the head may drop into place, if no permanent deformity has arisen; otherwise hooks or cords may be employed—as already pointed out; and having accomplished turning, delivery will be effected very shortly. If deformity is suspected, amputation of the fore-limbs will allow the animal to drop in the uterus, when the head may be seized, and adjustment effected in the manner already described.

9. *Head and fore-limbs presented; hind-feet also advanced* (Fig. 149).—In this position the fœtus makes no progress; the delay is for some time unaccounted for; violent action of the mother wedges the fœtus tightly within the pelvis; the mare suffers from exhaustion, and probably succumbs from rupture of the womb, vagina, or rectum. Usually the foal perishes early, and the efforts must be directed towards saving the mare.

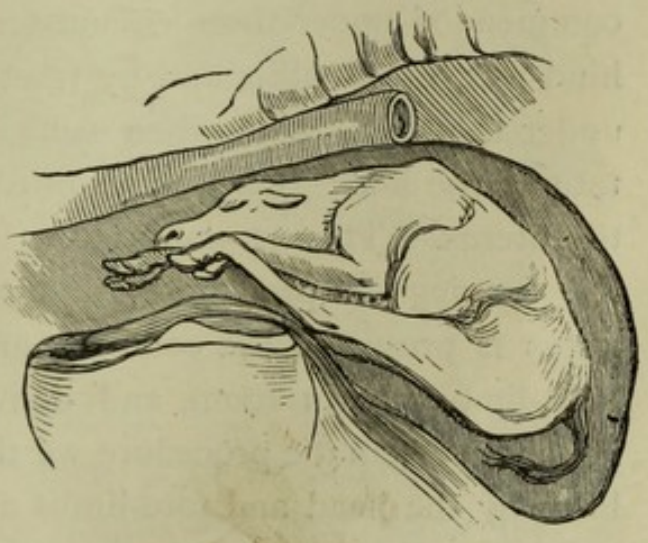


FIG. 149.

Delivery is effected in various ways.

The exact position of the limbs being ascertained, the hind-feet are to be returned to the uterus as soon as pos-

sible, and in order to effect this quickly the fore-limbs may be employed to push the fœtus into the womb, or the rod-repeller may be used to the breast at the same time that the hands guard the hoofs in their passage. Once fairly in the uterus the hind-limbs will fall into suitable position, and birth may be secured while the foal lives, in numerous cases, if the operator is called early.

The difficulties of this form of presentation are increased by the positions assumed by the hind-feet. Sometimes one or both may be found under the neck or head; at others, one is outside the fore-legs or head, or one or both may be pointing upwards on each side, and above the head. The success of delivery, even of a dead foal, depends greatly upon the progress made by the hind-limbs; sometimes they are advanced so far that the hocks are fairly in the birth-passage, and to push the limbs back is simply impossible; added to which, the vagina is so blocked up that the hand cannot be introduced without extreme difficulty. The method recommended under these circumstances consists of cording the hind-feet, if possible, and by traction pulling them straight under the body, and when sufficiently advanced to amputate at the hocks, when the fœtus may be pushed back into the uterus. This is not always effected. Others draw at the fore-legs in preference, and when the abdomen of the fœtus is presented the contents are removed, by which the hind-limbs obtain room, and delivery is speedily obtained. A more systematic procedure we think consists of facilitating birth by the head and fore-limbs as far as possible, and then making a circular incision through the skin over the withers downwards on each side of the chest behind the shoulders, taking care to dissect this back as near the loins as possible. Next amputate the spine, cutting through the abdomen at the point to which the integuments have been reflected, and cover the parts by the skin, to prevent injury. Cords having

been put on the hind pasterns at the commencement, are held by assistants, while the operator pushes the hind-quarters back into the uterus, and traction employed at the cords then causes the parts so treated to roll over themselves backwards within the womb, and to follow the hind-limbs in subsequent delivery.

In this mode of practice the operator needs time and great patience; the efforts are most fatiguing, and whatever may be done in the way of saving the mare, it must not be forgotten that she may sustain great injury mainly by the violence of her own actions, which mightily aggravate the already unfavourable conditions prevailing at the time she was discovered.

10. *Head and ears only presenting* (Fig. 150).—The fœtus will be found lying on its back, the back of the head—occiput—with the ears only to be felt. By further exploration, the nose is discovered to be turned upwards towards the loins of the mother, and the fore and hind legs are flexed upon the abdomen. This position is somewhat rare in equine females, but nevertheless now and then occurs, and in order to secure delivery the fœtus must be turned, which is to be attempted as follows:—The fore-limbs are sought for, and cords put on the pasterns; the loop of another cord is put into the mouth over the upper jaw, and after pushing at the head to lower the fœtus in the womb, further action is to be taken as now to be directed. The cords attached to the fore-limbs must pass on the left side of the fœtus—that is, between the

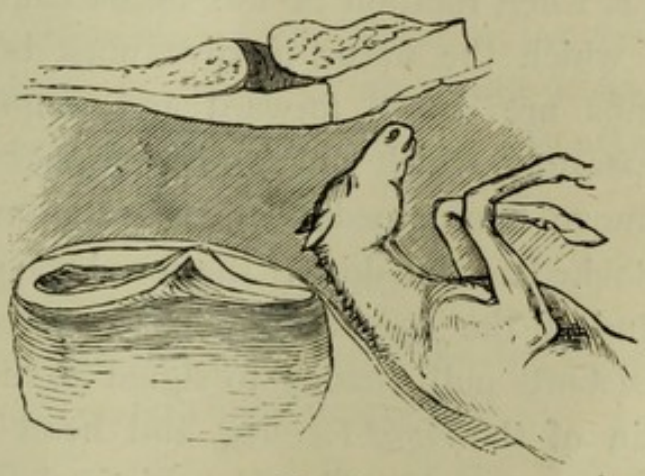


FIG. 150.

left wall of the birth-passage and the head of the foal—one going to the left pastern, the other to the right in front of the chest; they are now to be drawn parallel and twisted, or that applied to the right foot may be first used alone. The operator inserts the hand beneath the fœtus as far as the withers, which are seized; then all the ropes are to be pulled steadily, the operator lifting the fœtus at the same time upwards towards the right flank of the mare. The effect of this concerted action generally is to turn or rotate the fœtus until the back is uppermost, while the fore-limbs and head are at the same time brought into direct natural position, delivery being then easily accomplished. As in all the various presentations of the fœtus in the mare, the operator has to contend against muscular action, which is often most violent, rendering the best efforts entirely fruitless; it is thus when rotation of the fœtus cannot be effected, in place of which the fœtus, if alive, must be sacrificed. The fore-limbs are drawn forward and amputated at the shoulder separately, which will furnish greater space for working, and remove two impediments to rotation. Cords may now be attached to the skin of the fore-legs and jaw as before. The hand of the operator again is passed to the withers, while assistants pull steadily to signal at the ropes attached to the skin of the *right* fore-leg and head only, and in this way turning may be effected. If the head can be brought into the vaginal canal, lower jaw uppermost, before the preceding movements are made, an iron hook, having a T handle (Fig. 151), may be passed to the back of the throat and fixed

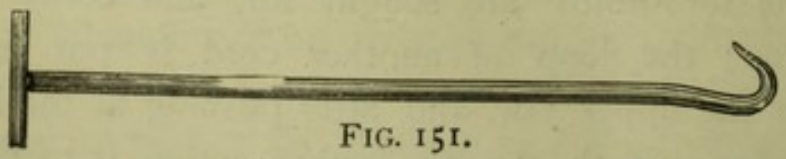


FIG. 151.

there, when the operator will possess one of the most useful and powerful means of turning the fœtus into the required posi-

tion, observing first to push back the whole body into the uterus, and to gradually turn it as the assistants pull at the ropes. Another form of instrument, known as the double hook, is very useful for seizing the orbits (Fig. 152), and

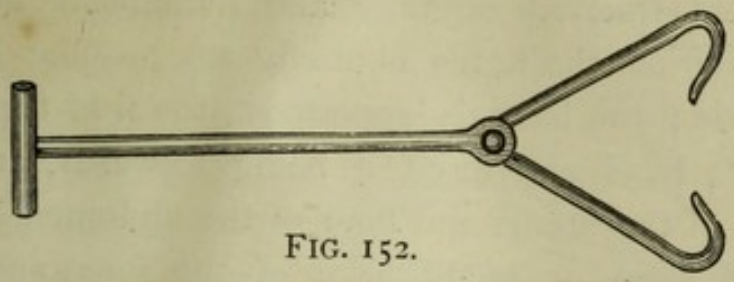


FIG. 152.

directing the head into the passage; besides, the form of handle confers great power in the many required movements for speedy delivery.

All attempts at turning having failed, the fœtus may be extracted as it lies. It must, however, be remembered that this is a most unfavourable position, as being exactly the reverse of natural, the direction of the spine of the fœtus not conforming to that of the curve of the birth-passage. The process will be slow and tedious, but the life of the mare may be saved.

POSTERIOR PRESENTATIONS.

These comprise the hind-feet and legs, the hocks, the breech, the loins, &c. with certain modifications.

1. *Hind-feet presented* (Fig. 153).—Delivery may occasionally be accomplished by the mare without any assistance, but, under all circumstances, the process is slow, and the foal frequently perishes. Delay may in a

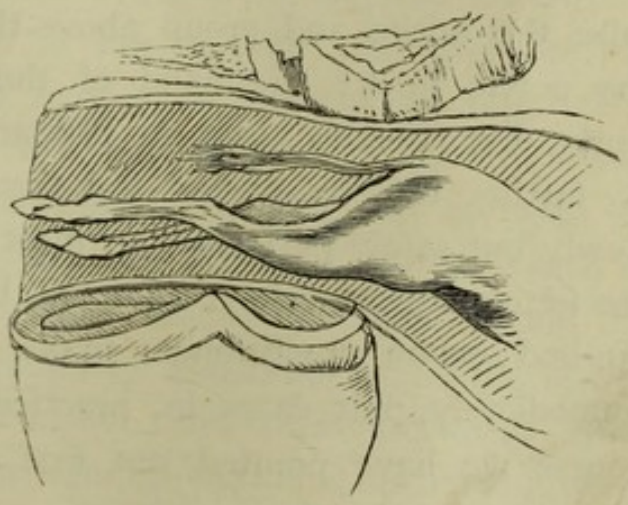


FIG. 153.

measure arise from the obstruction caused by the direction of the hair as it lies on the fœtus. The process of delivery should be hastened in the mare as soon as it appears to be delayed from actual causes, cords being placed on the hind pasterns, and traction carefully and judiciously employed. The position of the fœtus is briefly this:—The hind-feet first protrude; the back is uppermost, towards the loins of the mother; head and fore-feet being forwards, and at the lowest part of the uterus and floor of the abdomen.

A second form or modification of the foregoing is met with, which is exactly the reverse. The fœtus lies on the back and loins, which approximate the floor of the abdomen, the croup sometimes blocking up the inlet to the pelvis, the abdomen and feet being turned towards the spine and loins of the mother. Occasionally the foal lies with the feet in the pelvis or protruding at the vulva, and its back towards the ilium or hipbone of the opposite side, the breech presenting at the inlet of the pelvis.

In each instance the procedure consists of drawing the hind-feet into the passage, and carefully guarding the hoofs by the hand, to prevent injury to the mare; for it must be borne in mind such positions are unfavourable to the curve of the pelvic and vaginal passages. Cords are then placed on the pasterns, and traction must be upwards, in order to raise the hocks and croup above the brim of the pelvis at the pelvic inlet; the hand of the operator being in the vagina may greatly assist in primary entrance of the hocks. By further traction, during the throes of the mare, birth is slowly but safely performed in most instances. Occasionally the fœtus will rotate or turn itself, back upwards, as force is applied; some practitioners make the attempt to rotate immediately, but cases in practice appear to decide the course we have pointed out first as preferable, and more advantageous in every respect.

2. *Hocks presented* (Fig. 154).—The fœtus occupies a position nearly like that described under No. 1, with this exception—the hind-limbs are not extended, the feet being under the abdomen, while the hocks rest on the pelvic inlet, and the croup is pressed upwards against the sacrum of the mother. In subsequent contractions of the uterus the foal descends, and at length the breech and hocks are wedged tightly in the birth-passage. In order to insure successful delivery, assistance should be afforded before this stage is reached, as the foal quickly perishes under the extreme pressure. Delivery is sometimes accomplished even while the fœtus remains in this position, but we would not recommend the attempt, as serious injury to the mare is almost certain to arise.

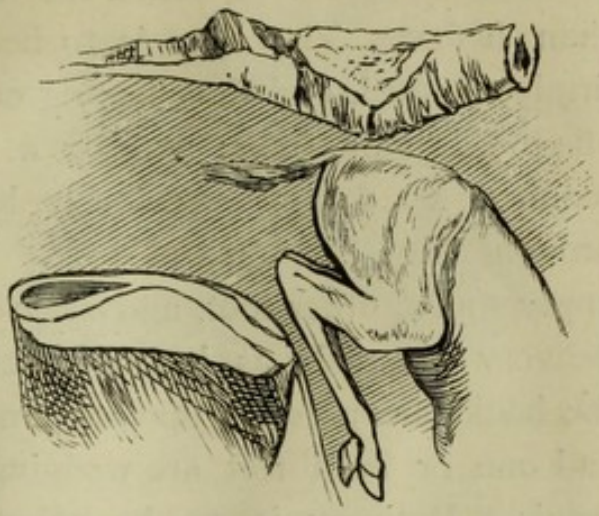


FIG. 154.

The method of procedure is as follows :—The fœtus must be pushed as far into the uterus as possible, at the same time efforts are to be made towards raising the hind-quarters towards the sacrum of the mother ; the hind-feet are then to be seized by the hand and brought up separately, the hoofs being covered by the palm ; and when both are properly within the birth-passage, traction can be used by means of cords. If the feet are too far from the reach of the hand, a blunt hook or cord should be passed round the hocks, which are to be pulled by assistants, while the operator directs, and at the same time raises upwards, and pushes forwards into the uterus, the hind-quarters ; when sufficiently advanced, the hock is to be grasped by the

hand, and the leg is to be pressed close up to the thigh ; the hand glides along the cannon-bone to the fetlock, and finally the front of the foot, which has been brought much nearer than before. The hoof is to be covered by the palm and firmly grasped, and then flexing or doubling the fetlock back on the cannon-bone ; and by a powerful effort, assisted if required by a cord previously looped upon it, the foot is brought into the birth-passage. The same directions also apply to the other foot, and when both are properly adjusted delivery proceeds as before described. In some instances the hocks are pressing upwards on the sacrum of the mother, and one or both feet are wedging against the brim of the pelvis. Delivery is to be effected by first bringing up the absent foot, cording both pasterns, and applying gentle traction while the operator pushes the hocks farther into the womb. It may also happen that during the efforts to improve the position of the fœtus that it may fall over in the uterus, by which the fore-limbs and head will be reached, and delivery effected as in the anterior presentation, adjustment of the limbs, &c., being of course required.

After some delay in these presentations, we find the fœtus firmly wedged in the birth-passage with the hocks beneath the abdomen, and all attempts to readjust the position are vain. It must therefore be presumed, at least, that the creature is dead, and if not, it is very doubtful if it can survive delivery ; amputation may be resorted to in order to expedite the process, and relieve the mother. The removal of the limbs will neutralise the greatest obstructions to the passage of the fœtus, as most likely they are not situated conveniently, the stifles probably being more or less twisted or bulging outwardly against the sides of the birth-passage. The hocks, stifle, or hip-joints may be disarticulated when drawn into the birth-passage by means of a cord, or as it is sometimes done when they are caused to protrude outside the vulva.

3. *The breech or croup and thighs presented* (Fig. 155).—This a modification of the foregoing, the croup being fairly in the birth-passage, with more or less of the thighs, the hind-legs being extended under the abdomen, and feet too far forwards to be reached by the hand. The fœtus is, as it may be described to be, sitting on the brim of the pelvis—a position not unfrequently occurring in mares having a large and deep abdomen. Further modifications of this position are sometimes met with—*e.g.*, the fœtus is on its back, the loins being on the brim of the pelvis, and the hind-legs extended *over* the abdomen, and in contact with the sacrum of the mother; occasionally the foal lies upon one side, the limbs being towards the flank of the mare. All who have had anything to do with veterinary obstetricy agree that this position is the most unmanageable, and not only does the foal succumb, but in the majority of cases the mother dies also before delivery can be effected; or if the birth of a foal is accomplished by means of surgical assistance, the strain and shock are more than the system can bear. It not unfrequently happens, as we have found in the majority of cases, that this untoward presentation of the fœtus is witnessed among mares having their first foal; otherwise, also, when the birth-passage is preternaturally small, or the fœtus is inordinately large. Under all circumstances delay renders the chance of delivery less hopeful, when in addition, as is often the case, futile attempts have been made, and the genital organs maltreated and injured thereby. The fœtus after a time becomes immovable, and by the violent contractions of

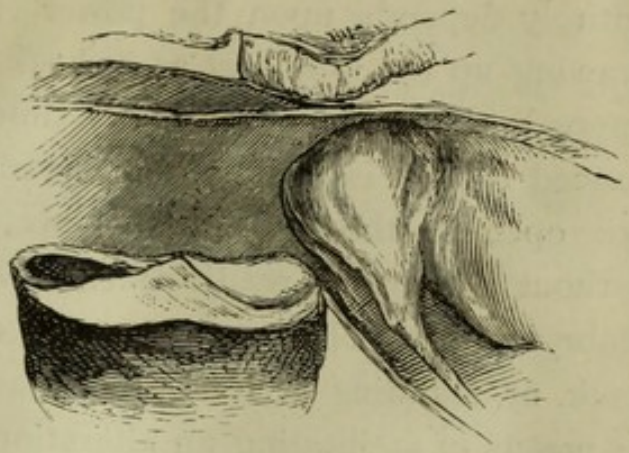


FIG. 155.

the uterus it is wedged into the pelvis, from whence it defies all attempts to push it forwards. Delivery in early stages entirely depends upon the power of moving the fœtus and drawing up the hind-feet as in hock presentations, but this is impossible after even a short time, as the fœtus has advanced too far into the pelvis already ; therefore two courses are open to the practitioner—viz., removal as it remains without attempting readjustment, or cutting up the fœtus—embryotomy. The mare may be cast and turned on the back, or, standing or lying, may have the hind-parts raised, as means of facilitating an alteration of position and removal of the foal. After having tried all these methods with a view of obtaining room only for using the knife, we have been disappointed ; hours occupied in unwearied exertion have passed, and the mother, exhausted, as well as all who have taken part, gradually sinks, and humanity suggests the most proper course of putting her out of farther suffering. A careful *post-mortem* examination reveals the unmistakable fact that, even if life were prolonged indefinitely, the extraction of the fœtus entire could not be accomplished. In order to attempt removal, cords may be passed round each thigh ; sometimes one only is used, but it is safer to have one upon each, as traction thus aids in keeping the fœtus in a more direct line, especially if both cords are twisted round each other, and the whole manual force exerted upon them ; the operator while superintending these movements directs the passage of the limbs, and prevents the rolling-up of the membranes and vaginal walls, which sometimes prove powerfully obstructive. At the best, this often is a dangerous course for the mother, although there are instances on record where the foal has been extracted alive.

The difficulty in dismembering or eviscerating the body is often equally as great as the preceding. We have succeeded in removing the fœtus by cutting and tearing the muscles

over the hip-joint, bringing away one leg piecemeal ; afterwards the other, and finally the fœtus by means of hooks inserted in the front of the pelvis, a most tedious process even when successful. It is a great assistance also at this stage to remove the contents of the abdomen ; the fœtus being partially delivered may still resist total extraction. If this can be accomplished as the fœtus lies in the uterus, so much the better.

In the modifications of this form of presentation the methods to be adopted are of a similar character. The joints may be divided probably with a little less difficulty when the fœtus is on its back, but otherwise the operator will find he has to cope with the same hindrances, as want of room to work efficiently, power of moving the fœtus, &c., and therefore he must rely upon the general rules here laid down, modifying them as circumstances require. Great care will be needed in order to avoid wounds and injuries to the birth-passage, &c., of the mare by the instruments, broken bones, &c. Hooks are liable to slip from insecure hold, and commit severe lacerations ; bones that are exposed, and especially when broken, should be protected by the hand as much as possible, and knives when used internally should be only those of an improved kind ; the concealed knife (Fig. 156) being very safe and useful.



FIG. 156.—*Concealed Knife.*

TRANSVERSE OR CROSS PRESENTATIONS.

We have now to notice a few forms of fœtal presentations, which fortunately are of rare occurrence, but nevertheless from different circumstances occur now and then in the lifetime of the veterinary practitioner. These are the so-called transverse positions, in which the fœtus lies on one side, the

back, or otherwise, the abdomen and feet being presented. Four positions of this kind are observed, depending upon which side the creature is lying. A fifth form is also recognised, in which the back is presented, the head or neck is upwards, near the sacrum of the mother, and the fœtus is sitting on his haunches above the udder of the mother. This is strictly a vertical position, but across the inlet of the pelvis. In a sixth form, the fœtus lying partially or wholly on one side, presents the head and all four feet; and in the seventh variety the head is forward in the uterus, but all the feet are back in the pelvic inlet, or birth-passage. The removal of the fœtus is to be accomplished according to the special details now to be enumerated.

1. *Back presentation.*—This form is of three kinds, and is determined in two of them by the position of the head, as

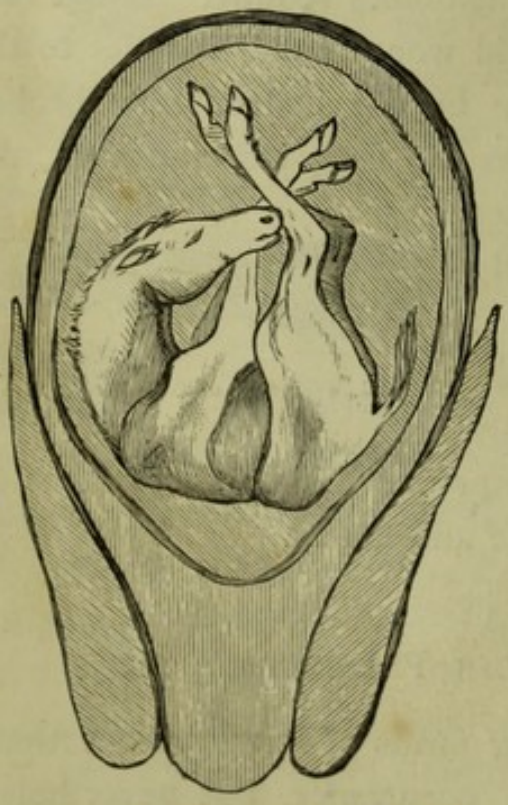


FIG. 157.—*As seen from above.*



FIG. 158.

being in the right or left flank of the mother (Fig. 157), the legs and feet being directed towards the chest; the third form being

that in which the head approximates the spine of the mare—the vertical position. In each of these the hand of the operator meets with nothing but the back, which blocks up the opening to the pelvis (Fig. 158), while severe muscular contractions maintain the fœtus almost, if not altogether, immovably, causing delivery to be very prolonged, fatal to the mare, or impossible (Fig. 159).

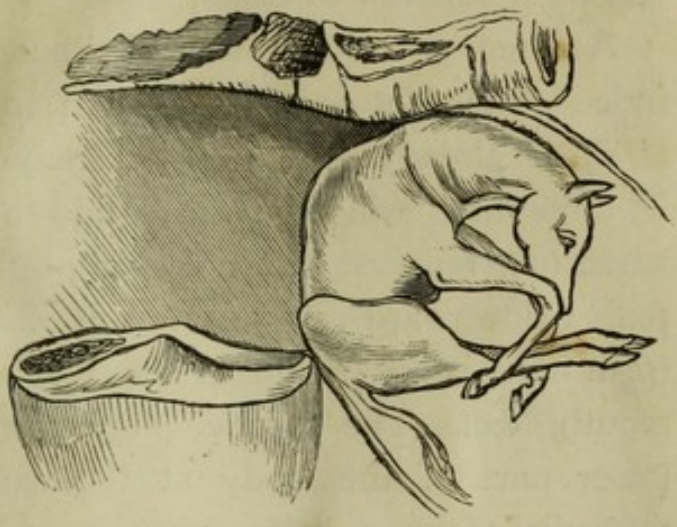


FIG. 159.

The obvious procedure is to attempt an alteration of position: the fœtus must be turned, and an easier presentation induced, some practitioners converting it into the anterior, and others the posterior position. We are of the opinion, that instead of working for one special form it is best to obtain the most favourable under existing circumstances. If the hind-quarters are nearest, let us have them. Are the fore-legs most favourable? then we will secure them with the head. If these can be obtained delivery will soon be complete; the difficulty, as before remarked, lies in altering the first position of the fœtus. The hand or the repeller—a smooth broom-handle has often done good service—may be used to push the fœtus forwards, while the operator lifts or moves the creature. All the attempts must be made between the throes of the mother, and much time and patience will be required. Old practitioners tell of instances such as these we are alluding to, as well as other difficult forms of presentation, in which the fœtus under manipulation suddenly makes vigorous efforts, during which the position is favourably altered, and birth speedily follows with slight

assistance. More frequently, however, the fœtus needs turning, and often delivery is impossible from the time that has been suffered to elapse.

As there is seldom any likelihood of saving the foal—indeed, the only conclusion often to be arrived at is that it is dead already—the position may be altered by traction. The operator will sometimes find a sharp hook of service when inserted first into the neck, by which the fœtus can be pulled downwards, or to one side, &c., as may be needed, a fresh hole being made in the cheek, orbit, or angle of the mouth, &c. The repeller may also be used to push the lower part of the body at the same time, and thus the difficulty of an existing position may be reduced by converting it into one available for delivery; or at the least such alteration may be effected as will enable the operator to perform embryotomy, amputation, &c. &c., as the circumstances of the case may call for or admit.



FIG. 160.—*As seen from above.*

2. *Abdomen and feet presenting* (Fig, 160).—In this form many varieties occur. The fœtus lying on one side, the head approaches the anterior or front part of the womb, the fore-limbs are extended backwards in company with the hind, and when the hand of the operator enters the womb in exploration it encounters the four feet almost together. The conclusion may be drawn that two foals are present, but the question is readily decided if the hands are passed along the limbs. Occasionally only two feet are presented,



UTERUS, ETC., OF THE MARE.

A. A. Cornuæ, or horns, of the uterus, laid open.
B. The body.
C. C. The ovaries.
D. D. Fallopian tubes.
E. E. Pavilion of the tube.
F. F. Broad ligament.
G. G. Ligament of the ovary.
H. The os uteri, or entrance to the womb.
J. The vagina, or birth-passage.
K. Remains of the hymen, with the valve of the meatus urinarius below.
L. The clitoris.
M. Inferior commissure.
N. N. Labia, or lips of the vulva.

a hind and fore, and these must be carefully identified before operations are commenced for extraction. The first steps are to seek the missing hind-foot, and have it brought up into the birth-passage, the fore-limb being pushed back to make room for it, and thus reduce the presentation to one of the simple posterior kind, in preference to the anterior, as the difficulty is much less, and the absence of the head is looked upon as an advantage. The hind-feet being brought together they are to be corded, and traction employed cautiously, along with such means as are likely to cause the head and fore-limbs to occupy a more forward position. To secure this the fore-legs may be used as levers, or a repeller may be employed under careful direction. If, however, the throes of the mother are too violent to admit of this procedure, and particularly if all the limbs are becoming wedged more closely in the vagina, or when the head also accompanies them, cords should be put on the fore-pasterns also, and by force the limbs may be brought out one by one, and amputated at the elbow or shoulder. This will allow of room for more efficient working, when the head and fore-quarters can be pushed forwards, and delivery effected by the hind-legs alone.

Multiple Conception.

The presence of twin fœtuses within the womb of the mare, although such may not come within the category of mal-presentation, nevertheless sometimes prove harassing to the practitioner ; and, ere we close that part of our subject which specially belongs to difficult parturition, that of multiparity of fœtuses must be briefly considered.

Almost the first obstacle which presents itself to the operator, supposing the birth to be somewhat delayed, is the presentation of several different parts, and these prove very likely to mislead, if not highly perplexing. Under

favourable circumstances, when two foals are present, they may occupy each cornua or horn, or one may be in one of the cornua, and the other in the body of the uterus (Plate VII.); and with regard to position, one may be in the anterior presentation, the second in the posterior, or both may be in the anterior form; but under whatever conditions, it is clear that both cannot pass outwards at the same time, notwithstanding the surprising amount of muscular force exercised by the mother upon them. Space for one only exists in the birth-passage at the same time, and when each is favourably situated delivery is easy, and accomplished by the animal alone. With regard to this question, some practitioners assert, from ample experience, that birth is very frequently easier in double than in single births, seeing that the period of gestation may not be prolonged to the full time, and therefore the fœtuses are not fully developed; usually twins are not so large in proportion, and it may likewise happen that one is prepared for birth some hours

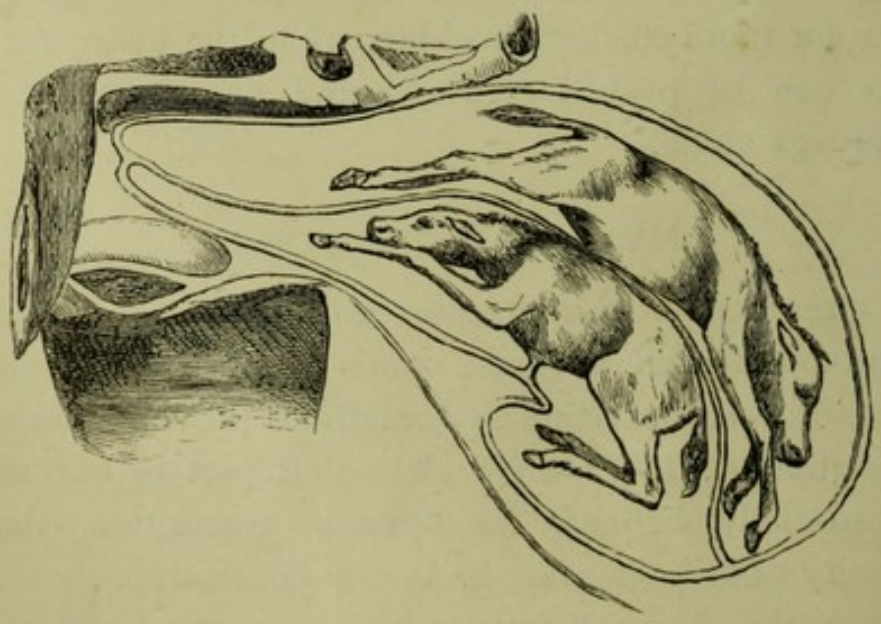


FIG. 161.

before the other. In the mare, the birth of the second foal is not usually delayed long when circumstances are favourable; therefore we are justified in being acquainted with any

of these, which may be the precursor of abnormal conditions. Delay in the second birth occurs from mal-presentation, as a rule, the fœtus rarely being alive after the second day. In such cases, one foal having been born in the usual favourable manner, the delivery of the second must be proceeded with in accordance with the directions already given for the particular form, just as if but one fœtus only had been present from the first. The question now before us is the delivery of twin foals, when difficulty arises from an equally advanced state of both; or, in other words, when the contractions of the uterus have carried both fœtuses together within the pelvic inlet or birth-passage (Fig. 161).

The hand of the operator being passed into the vagina, &c., in exploration, he discovers one of the following forms of presentation:—A. Four feet, all belonging to the hind-limbs; B. Four feet, but connected with the anterior or front legs; C. Two hind and two fore legs; D. The head of one fœtus and fore-limbs of the other; E. The head of one and hind-limbs of the second; F. Probably only two feet, sometimes four, or even six; G. The head of one and tail of the second. The causes of such diversity are the same that produce malposition of the single fœtus—viz., vigorous action on the part of the fœtuses, and violent exercise or rolling, &c., on the part of the mare.

Under these circumstances the operator will find himself face to face with stupendous difficulties, and be required to regard the aspect before him calmly and soundly before manual exertion is employed or any action decided upon. He is first to satisfy himself as to the actual presence of twin foals, and having done this he must be further satisfied of the position of each, and able to distinguish the limbs or parts presented which belong to them; and having mastered these details he will proceed to deliver the first

and most favourably situated, whether it be a front or hind presentation, having first carefully rejected the presenting members of the second for subsequent treatment.

Occasionally, not a slight difficulty arises when the fore-limbs of one foal are presented with the head of the other; such positions are apt to mislead any one who sees the case after some time has elapsed, and the foals are forced some way into the birth-passage. However, let the operator carefully weigh the various conditions in his mind as he minutely explores the interior, and when he can clearly make out the existence of twins, the sooner he can separate them the better, that birth of one may be effected before active contractions wedge them more tightly in the pelvis. It is advisable to cord the pasterns of the fœtus most favourably situated, and, if possible, pass a loop or halter round the head also, the long ends of which may be twisted and held by assistants, who are to pull according to directions, or to hold with moderate firmness while the operator pushes forwards into the uterus the second foal, and when fully clear, traction is employed to the first and the operation is soon completed. If the hind-limbs are presented, they are to be corded in like manner before the other foal is returned to the womb; and it may be worth remembering that some times *small* cords may be usefully placed on the presenting limbs of the second fœtus, by which they can be brought readily forward after the first birth, and save trouble in subsequent exploration. If the cords are less in thickness than a cedar pencil, their presence in the vagina during the extraction of the first foal may not give rise to any inconvenience, but rather prove a mighty advantage in recovering the limbs of the second, which often suffers a great or even unfavourable position after the withdrawal of its fellow.

We need only add, that after one birth has been effected, the position of the second foal must be carefully considered,

as not unlikely it has been from the first unfavourably situated. This being fully ascertained, the usual appliances at hand, and willing workers ready, the proceedings must be regulated by the principles already enumerated for the form, of whatever kind it may be.

General Considerations.

In addition to the brief details which have been given under the various special forms of malposition of the fœtus, there are yet a few general principles which the operator will recognise as worthy of being remembered, for at no time in the practice of the veterinarian are his energies and skill put to such a severe test as when brought in contact with the difficulties attending wrong presentations of the fœtus in domestic animals. As each case appears by the representations and descriptive detail given in this section of the work, it is apparently deprived of its terrors ; its difficulties, it may be, are described away, and the young aspirant may allow himself to be lured into the belief that his part is very smooth sailing, and, in the practice of veterinary obstetricy, honour and glory are readily won. It is very easy to write what has already been expressed, but those who enter the lists against the conditions for which the various plans and principles are pointed out, will find, as all our respected veterans have to their cost, that no other part of their practice takes up so much of their time, taxes their patience, and offers so little opportunity for success, proportionate to the number of cases or the efforts called forth. It is true that men are very clever in this line, and they have acquired just and honourable fame by their method of procedure, yet, nevertheless, the success which might be attained as a mutual benefit to both owner and practitioner is too frequently rendered impossible by unwarrantable delay, as well as aggravated by officious inter-

ference from those who are incompetent in such matters. Efficiency in this department, as in every other, comes only after repeated trial and with absolute patience, guided by a careful estimate of all the conditions—anatomical, physiological, mechanical, &c.—which are known to bear upon it. As skill and mature judgment are readily supplied in the veterinary operator, the owner should be disposed to furnish timely information of his need of both, and the mutual results would be more highly valued and enjoyed. These remarks apply most particularly to the mare. As a rule, the fœtus soon dies under severe muscular pressure and malposition, and very frequently death of the foal means loss of the mother as well.

Those who are constantly engaged in practice among breeding animals, find it to their advantage to possess a number of portable instruments collected in a case, that, whenever called upon, so far, the means are at hand. We shall have occasion to refer somewhat in brief detail to these appliances subsequently. Whatever may be the advantage of instruments, we cannot overlook certain essential qualifications which belong to the efficient obstetrical practitioner,—the length of arm, which requires to be powerful, having a small hand, and fingers long enough to grasp a foot or pastern, and maintain a firm hold, even under continued pressure from the organs. These are available in many instances where the best instruments fail to be of the least service ; and we can abundantly testify to their wonderful adaptability and power in reducing some of those peculiar adverse conditions which appear almost insurmountable. Instruments and all other appliances are only intended to supplement the operations by the hands of the practitioner, or second the muscular efforts of the mother ; they cannot take the place or assume the functions of which the trained hands are capable, therefore their use is subordinate and limited. It is of great importance that the

finger-nails be short and pared round, that wounds may not be inflicted on the mucous membrane of the maternal genital organs. For the same reason, rings should be removed from the fingers. As it invariably happens that the membranes have appeared, or become ruptured, and discharged their fluid contents outwardly, the various surfaces become dry or covered with a tenacious secretion, sometimes heated and swollen by officious interference, the use of emollient and lubricating fluids—as soap and water, oil, glycerine, linseed, mucilage, flour and water, or simple water—will prove very serviceable, being, however, warmed before they are applied. In the correction of false positions, one, or some of these, cannot be dispensed with, the movement of the fœtus over almost dry surfaces being a matter of absolute impossibility. They may be applied in various ways. When it is desirable to convey them into the uterus, a piece of india-rubber tubing will answer very well, the fluid being poured through a funnel fitted on the free end ; the common syringe or stomach-pump will prove more efficient instruments, or, in their absence, the hand alone may answer.

In some instances the violent efforts to strain when the hand is exploring the parts proves obstructive and embarrassing, and the proper adjustment of the fœtus for delivery is impossible ; we have then found a dose of chloroform highly useful, or, what is perhaps more readily dispensed from home, chloric ether, which may be given in linseed-tea or a little flour and water. To obtain at least a mitigation of those mighty muscular contractions which call for superhuman efforts to withstand, is a welcome relief, during which the energies should be exerted to the utmost in order to obtain a favourable position for delivery. When exhaustion is evident after protracted labour, and the throes of the mother are declining in strength and frequency, diffusible stimulants, as ammonia, are particularly valuable.

In the use of cords the operator will find powerful means

of action. Not only are they applicable to the traction of the fœtus through the genital canal, but they may be largely employed in modifying or correcting the position of the fœtus within the uterus. When the feet of two foals are presented, or all the feet of one, as described at pp. 467 and 480, they are eminently useful in being applied to those parts to be pushed forwards into the uterus, and by which the limbs are readily found and brought again into position after other parts are delivered. We have preferred a hempen rope, made exactly after the pattern of the ploughman's driving-line, having an eye or loop worked in at the small end, where in diameter it is not more than three-eighths of an inch, from which it gradually thickens until, having acquired the length of about twelve feet, it assumes the thickness of nearly one inch. Such a cord carried on the fingers is readily passed over a foot, and holds tightly, while the opposite ends afford ample substance for being grasped (Fig. 162), especially as

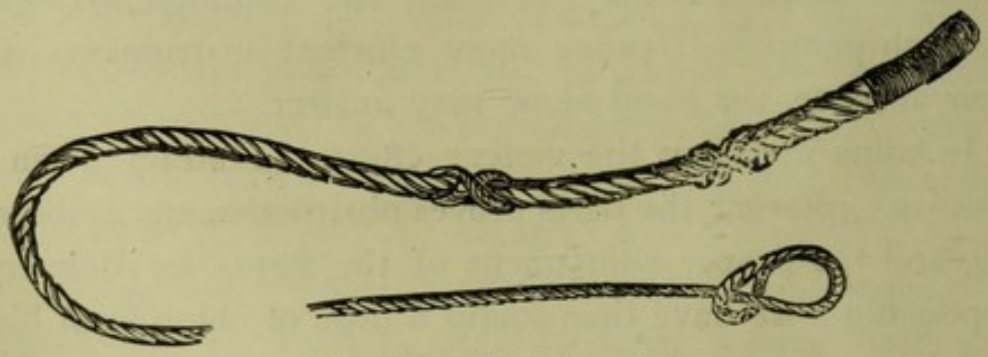


FIG. 162.—*Traction Rope.*

it suitably increases in thickness in the direction calculated to resist slipping through the hands.* It is advisable always to lubricate about three feet of the cord as well as the hand before carrying it into the vagina, and the process is facilitated by passing one or two fingers through the loop,

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* The usefulness of the rope in this particular may be considerably increased if an extra strand is worked in throughout six feet of the end used for pulling, and at intervals forms a knot.

using the whole formed like a cone by uniting the ends, the free hand meanwhile holding up the outer portion of the rope to prevent dragging along the passage and irritation to the membrane. An additional rope may sometimes be useful, having a loop at one end, the other being worked upon a piece of hard wood, by which a firm hold is given during traction.

Cords may be applied to the pasterns, knees, or hocks, and when limbs have been amputated the skin may be secured in a loop and used as effectively for traction as the limb itself. The head also may be secured, by which a great advantage will be gained in delivery. For this purpose the rope should not be large and cumbersome, three-eighths or half an inch in thickness being ample. To secure the head the rope is doubled, and a small leather ring is passed along over the shut end, through which a smaller cord is passed, also double (Fig. 163); the free or open ends of these

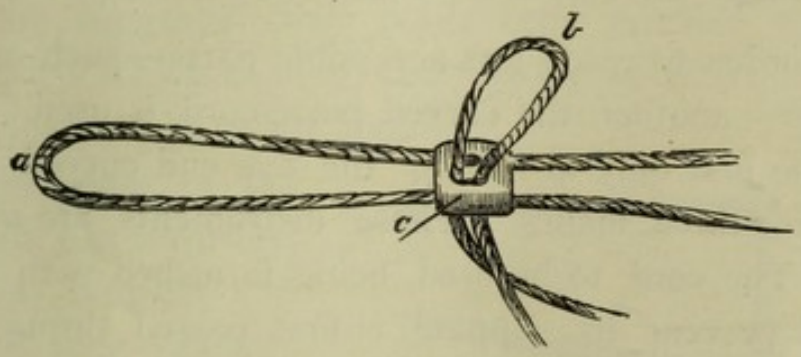


FIG. 163.—*The Head Cord.*

a. Loop for the head. *b*. Loop for the nose.
c. Ring of leather to move at will.

are to be used for traction when the others are in position. The operator carries the thickest rope over his fingers, as already explained, into the cavity, and passes the loop, *a*, over the head behind the ears, the rope passing down each side of the jaw to meet that from the other side beneath ; the small loop, *b*, is then passed over the nose, and the leather ring pushed beneath the lower jaw, and the whole are then tightened before the hand is withdrawn. By this

arrangement the head is kept in the straight line, and, with additional help at the legs, delivery is often very greatly accelerated.

The carrying of a rope to any part of the fœtus within the uterus is not always a rapid or easy task by means of the hand alone, and human ingenuity has designed an instrument, known as a porte-cord, or cord carrier, which has the advantage of doing the work very efficiently. It consists of a simple rod of iron, about three-eighths of an inch in diameter, having an eye at one end, and mounted with a handle at the other ; such is the straight porte-cord (Fig. 164);

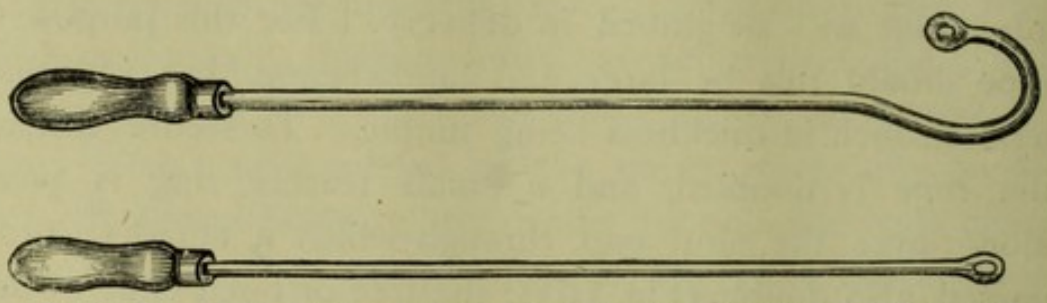


FIG. 164.—*The Porte-cord, or Cord Carrier, straight and curved.*

but in order to reach less accessible parts—such as the neck or thigh—another, the curved porte-cord, is used. It differs from the first only in having the eye end curved in a circle of about three inches. These instruments are used as follow :—The cord to be used being furnished with a knot or ring to prevent its slipping, is first passed through the eye of the porte-cord, and when drawn up to the ring or knot, lies parallel with the rod. The operator having smeared both with some lubricating material, holds them in the left hand, the right taking the eye within the palm (Fig. 165), and, with fingers in advance as a cone, pursues the way to the desired part ; the right hand then passes to the other side of the limb, &c., and seizes the ring or knot, drawing it



FIG. 165.—*Manner of arranging the Fingers when advancing to the Uterus.*

along, and, finally bringing it out of the vagina, places both ends together, the opposite end encircling the part to which traction is to be applied. Another use to which the straight porte-cord is put is equally valuable. Suppose it is desired to put a noose upon the lower jaw, over a foot, or upon the head, the loop is first formed on the rope, and the free end drawn through the eye of the carrier until the noose only remains in advance of it. This is carried by means of the right hand, as before described, to the precise spot, and the loop passed over it; the hand only is then withdrawn and takes the handle of the instrument, the rope being held by the left hand, and, by a few thrusts of the instrument, the noose is effectualiy tightened.

Hooks of various kinds are suggested, and doubtless may be very effectual. As a rule, we have found such as given in Figs. 151 and 152 sufficiently ample with cords, porte-cords, and a repeller. Forceps also of every conceivable pattern are suggested, and prove very valuable agents in holding parts which cannot otherwise be secured; and here the previous remark again applies.

Mr. Mackinder, of Peterborough, has furnished to Messrs. Burgess and Willows a very valuable and yet simple instrument, shown in Fig. 166—small traction hooks, for use in adjusting the fœtus, and also in delivery. When properly fixed the power exerted on the cord increases the hold, and effectually prevents slipping or danger therefrom.

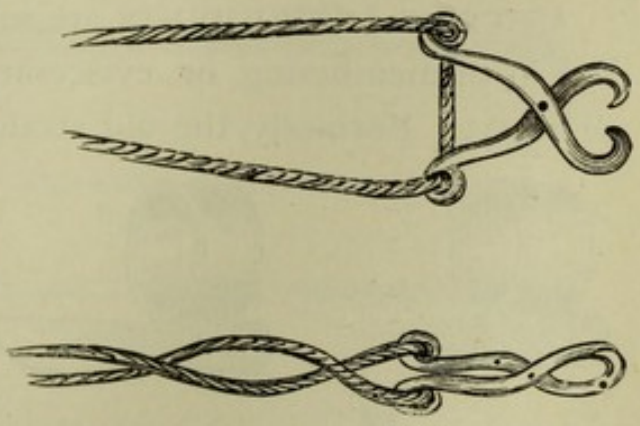


FIG. 166.—*Mackinder's Traction Hooks.*

The *repeller* (Fig. 167) consists of a straight rod of round iron, furnished with a handle for more efficient use, the oppo-

site end being formed like a rose or chisel-head, for pressing against the breast, buttocks, &c., in pushing the fœtus into

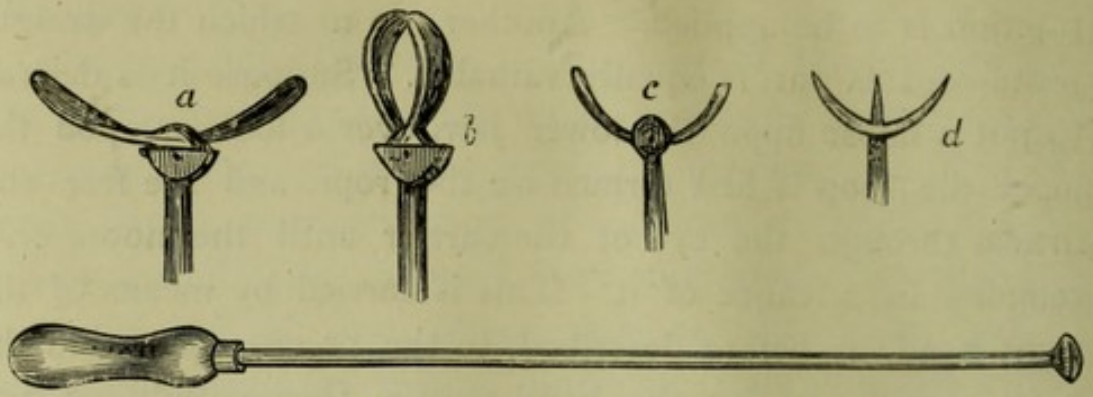


FIG. 167.—*The Repeller or Crutch, with handle.*
a, *b*, *c* and *d*, are the forms of different kinds in use ; *a*, open ; *b*, closed.

the uterus. Other varieties of the free end are used, having for their object the prevention of slipping ; in some the end is sharp, and a collar is fitted on about half an inch from the point, intended to enter and hold by the skin ; in others, a pair of arms are jointed on, and so arranged as to close together while being carried to the spot, when they are opened and applied. In cases of emergency, we have found a small brush-handle answer every purpose under careful management.

CUTTING INSTRUMENTS are sometimes imperatively called for in dismembering or eviscerating the fœtus to expedite delivery. Formerly, the old straight scalpel was the only instrument available ; but modern inventions have admirably superseded so dangerous an agent. The ring scalpel, or embryotom of Gunther* (Fig. 168), is one of the most valuable. Fitted to the middle finger, the blade rests securely below, while the outside fingers are brought parallel with it

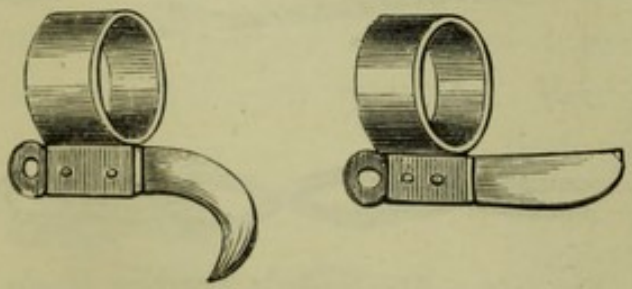


FIG. 168.—*Ring Scalpel, or Embryotom.*

* Lerbuch der Practischen Veterinar-Gerburtshülfe. Hanover : 1830.

upon each side, and thus it is carried to the required spot where the skin is to be divided. Two forms of blade are in use—one almost straight, and the other curved (Fig. 168), at the heel of which an eye is formed to receive a small cord, by which an assistant pulls as the operator directs the blade along the skin. This method often proves very helpful when the operator's hands are becoming tired and paralysed from the excessive contractions of the uterus. Another form of scalpel knife or embryotom, useful for opening the abdomen, chest, &c., is shown at Fig. 156, page 477; but an improved form may now be had (Fig. 169), the blade

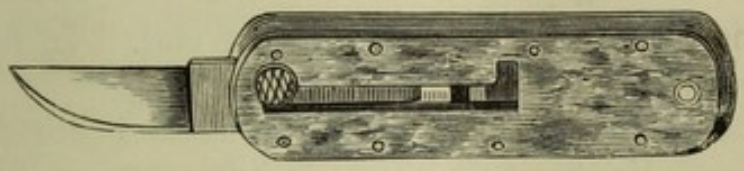


FIG. 169.—*Concealed Embryotom.*

having only one cutting edge, and being less likely to be broken. When such parts as the hips are to be cut up, or the bones of the chest, head, &c., separated, the knife takes the form of a long hook (Fig. 170), and is then capable of

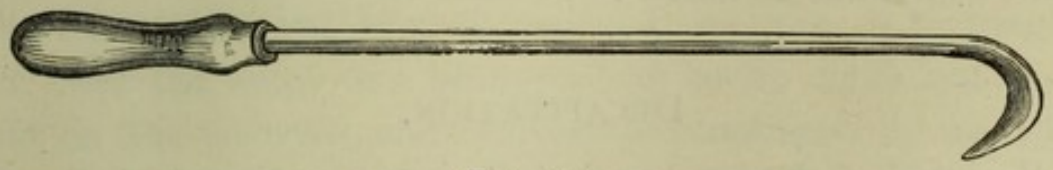


FIG. 170.

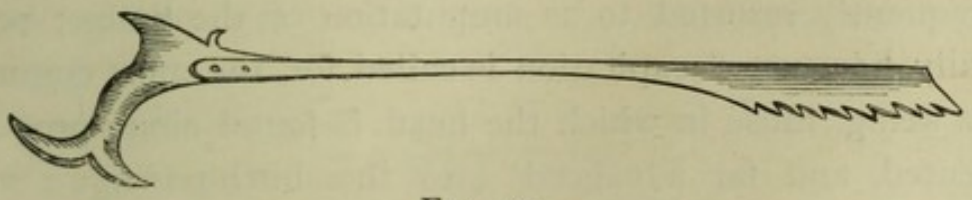


FIG. 171.

very efficient work, division being performed by a pulling action. When bones of some size and solidity have to be divided, a saw (Fig. 171) will be of great service.

In amputating a limb, the skin requires to be separated from the tissues and bones beneath, and this is usually

effected by pushing the fingers between and rupturing the attachments—an operation which often inflicts considerable pain, and even lacerations, besides being slowly and badly performed when the hands are weak and tired from incessant pressure and work. To perform this more efficiently and rapidly, an instrument is used named a *spatula* (Fig. 172),

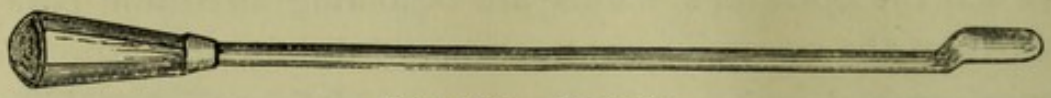


FIG. 172.—*Spatula.*

being simply a shovel-shaped blade, one side of which is hollowed in a longitudinal direction, at the extremity of a shaft having a handle at the opposite end. In full length it is about two feet.

The operator having satisfied himself that the removal of the fœtus cannot be accomplished entire with safety to the mare, proceeds at once to effect a reduction by such operations as decapitation, amputation, evisceration, &c.; and, having the necessary instruments at hand, carries out his plans somewhat as follow :—

DECAPITATION.

Removal of the head entirely is an operation which is not so frequently resorted to as amputation of the limbs; occasionally, however, decapitation is called for, the most common cases being those in which the head is found alone properly presented, and far advanced into the birth-passage; and, again, when doubled back on the shoulder the neck protrudes at the vulva. To remove the head, in the first instance, the operator thus proceeds :—Cords, hooks, or other appliances are fixed on the lower jaw, and assistants pull the head free of the vulva; the skin is then divided by a knife in a circular incision, made either round the forehead and jaws, or,

farther back, immediately behind the ears. The next process consists of separating the skin from the tissues backwards, as far as possible, all round the neck, by means of the fingers or spatula; afterwards, by free use of a large knife, the muscles are divided entirely to the bones, the occipito-atloidal articulation being selected; the assistants then twist their ropes several times round, which action severs the ligamentous connexions of the joint, and the head falls off.

In the second form the operation is not so easily accomplished. If a cord can be passed round the neck to draw it out farther, it may be done carefully. The operator then makes an incision from above downwards on the side of the neck, first through the skin, which must be dissected backwards as before; then by means of the knife the muscles are to be divided as far back as possible down to the bones, which must be sawn through or broken up. Next, by further careful cutting the remaining half of the neck and skin are to be divided, when the head can be pulled away by hooks inserted into it.

In each of these cases the fore-legs are not presented, therefore, when the head is removed, they are to be sought for after the fœtus has been pushed back; cords are then put on the pasterns, and delivery accomplished by traction, the operator's hand being placed over the divided bones to guard against injury, and guide the neck into the proper passage.

Amputation.

This operation is called for when the head lies back and the fore-limbs are presented, and the former cannot by any means be reached, or brought into the birth-passage. Sometimes the hind-limbs require removal also.

To *remove the fore-limbs* the following course is adopted:— The operator puts on the ring scalpel, having the cord

attached, and pursues his way to the side of the shoulder as far as the withers, if possible, assistants employing traction if necessary. The point of the blade is caused to pierce the skin, and at a given signal the assistant steadily pulls the knife-cord while the operator judiciously maintains a direct line along the limb to the hocks, knees, or pasterns, where a circular incision is to be made. The spatula is now called into requisition, to divide the attachments of the skin all the way up to the shoulder and breast, which is only the work of a few minutes. Some practitioners also divide the sternal muscles at the elbow as well by means of the concealed knife, but this is not absolutely necessary, although we must state our belief in the wisdom of the procedure. At this stage the operator directs the assistants to pull at the limb, when a crackling sound announces the giving way of the muscles which unite the scapula to the sides of the chest, and finally the limb comes away entire. The long incision may be confined to the inside of the leg only, by which less danger to the mother is thought to be likely, but for more effective purposes we have always preferred the outer method. The opposite limb is removed in like manner, the only difference to be observed being the employment of the other hand of the operator, as in one position of the fœtus both hands are not equally effective in a cutting operation.

Amputation of the hind-limbs.—When removal of the hind-legs from the trunk is called for, the operator finds himself engaged in a long and fatiguing process. The skin is thick and strong over the croup where the incision is required, and the muscles are large and numerous, besides which ligamentous attachments are present here which do not obtain in the shoulder. More frequently amputation at the hocks only will answer the required ends. However, as removal of the limbs by the more difficult process is sometimes abso-

lutely necessary, we give the outline of procedure. Such is called for in those cases where the hind-quarters are unusually large, the pelvis of the mare contracted, or when deformity of the fœtus occurs; sometimes the hind-quarters are double. The hind-feet being presented, cords are attached, and traction employed to expose the hips. A half-circular incision is carried round the haunch over the hip-joint, dividing the muscles entirely to the head of the femur; a longitudinal incision is then carried down the leg to the hock, terminated by a circular cut, and the skin is next separated by the spatula, after which powerful traction tears away the limb. The other limb being removed in like manner, hooks can be inserted in the pelvic bones and the fœtus extracted. An additional advantage will be gained by sawing through the pelvis at the symphysis, when the divided bones will overlap each other, and reduce the size of the fœtal hind-quarters.

In hock presentations, when the croup is wedged immovably in the pelvis, or at least so firmly as to resist all power to deliver the fœtus, the usual plan is to amputate at the hock-joints, which is performed as follows: — Cords are fixed on the hocks, by which they are drawn outside the vulva, when, by means of a running noose, each bone above the hock is to be secured. The tendons—hamstring—of the gastrocnemii muscles are then divided, together with the skin and ligaments proper of the hock, the lower part of the leg being then removed. The opposite limb being similarly operated upon, and traction exerted on the leg bones by the ropes, delivery may be effected.

Detruncation.

In consequence of the deformity of the hind-quarters, partial delivery being effected, further progress is impossible

without reduction of the fœtus, and division of the body is called for. Even when birth has not progressed so far, and such deformity is suspected or proved, it is advisable to procure partial delivery, by means of cords and traction, to the desired point. The operator then proceeds to make a circular incision three or four inches in front of the vulva of the mare, first through the skin, and next through the muscles of the fœtus; he next dissects back the skin as far as possible, and then the ligaments of the vertebra, muscles of the ribs, sternum, &c., as the case may be, are divided, when a few twists of the ropes ruptures the attachments, the head, fore-limbs, and part of the trunk falling to the ground. The contents of the abdomen are thus got rid of, and the flap of skin being turned over the exposed bones, pressure is applied to return the mass into the uterus, when the hind-limbs are to be sought for and corded, and delivery will be obtained. Division of the symphysis may be performed previously, as a means of reducing the difficulty of delivery after the hind-legs are corded.

In some instances the hind-feet are presented under the body, and delivery is obstructed by the hips of the fœtus blocking against the sides of the pelvis of the mare. When this is the case, cords should be placed on the hind-pasterns before detruncation is performed, and after that operation the hind-quarters are to be pushed forwards into the uterus, and delivery effected by traction applied to the cords.

Evisceration.

From preternatural enlargement, deformity, disease, or monstrosity, the chest or abdomen may prevent the delivery of the fœtus; we therefore proceed to enumerate the usual means for reducing their bulk, and remove the obstacle to the relief of the mare.

The Thorax.—In order to enter the chest, one of the

fore-limbs, and even the head, may be first removed, those parts, it is presumed, having already been delivered. A deep incision is then made in front of the chest, so as to expose the opening between the two first ribs, when the hand is passed inside, by which the heart, lungs, &c., are torn from their attachments and brought away; the chest then collapses, but if not in sufficient degree the diaphragm should be divided, and the contents of the abdomen removed through the opening.

The Abdomen.—It is not always possible to remove the contents of the abdomen in the way just described; for instance, in those cases where only the limbs are presented, and the fœtus lies wholly within the uterus. Having decided that the enlarged condition of the abdomen will not admit of easy and safe delivery, removal of the contents must be obtained within the uterus. For this purpose the operator makes use of the concealed knife (Figs. 156 and 169), which is carried to the farthest point of the abdomen, when the blade is exposed, plunged through the skin and muscles, and caused to divide the walls along the floor from the symphysis pubis to the sternum. The hand is next employed to tear away the organs from their points of attachment, and, if needs be, those of the chest may be removed through an incision made in the diaphragm. It is scarcely necessary to state that, as the operation of evisceration proceeds, the organs, &c., are to be carefully removed from the uterus and disposed of by subsequent burial.

Thus far we have briefly considered the various sources of difficulty arising from peculiar conditions or positions of the fœtus, which are met with during parturition in the mare. It is now required that the reader should be informed that other difficulties also arise on the part of the mare, which sometimes equally retard or render the process of delivery

impossible; such are malformations of the pelvic bones, congenital, or due to injury, fracture, &c.; the first produce contraction and deformity of the genital canal, while fractures are sometimes attended with large bony deposits over the seat of injury. Still more rarely diseases of the soft parts interfere, as tumours, malignant and non-malignant, which call for special surgical treatment; or when the value of the foal is great, and delivery is precluded in the natural method by any of the above-named conditions being irremovable or irremediable, it may be removed from the uterus by an opening made in the flank of the mother; an operation known as gastro-hysterotomy, or the Cæsarian operation—a most formidable course to adopt in such a large animal, and which has yet been only partially successful.

Diseases, &c., incidental to Parturition.

Although parturition may have apparently terminated successfully in some instances, yet subsequently the well-being of mare and foal are seriously jeopardised by certain morbid states arising in the former; occasionally, also, certain of these may occur before parturition, and lead to a fatal result. Under this head we have to notice:—*Flooding; Inversion and Rupture of the Uterus; Inflammation of the Womb*; *Dropsy of the Womb; Hernia of the Womb; Vaginitis.*

Flooding.

Flooding or hæmorrhage from the womb, known also as post-partum hæmorrhage, metrorrhagy, &c., occasionally is seen in the mare, and is always to be regarded as a serious result of parturition.

The *causes* are—rapid removal of the fœtus without necessary contraction of the uterus when the fœtal membranes are hastily severed from their connexions; removal of the

placenta from the mare too soon when retained after parturition ; inversion of the uterus, &c.

Symptoms.—When no escape of blood from the external genital organs is noticed, the possibility of hæmorrhage within is not always suspected at once. In some instances the fact is apparent by periodical straining, and evacuation of large quantities of partially coagulated blood ; these are, however, more rare. In the absence of either of the above patent signs the observer will detect a running-down pulse, blanched mucous membranes, staggering gait, accompanied by rapid increase of weakness and general prostration of strength ; throbbing action of the heart, general coldness of the skin and extremities, peculiar haggard expression of countenance, followed by partial sweats, to which succeeds inability to stand, convulsions, insensibility, and death.

Treatment.—If the membranes have not been removed, it may be advisable to effect their separation as carefully and as soon as possible. Should the membranes be already removed, the hand and arm may be passed far into the uterus, and carefully brought into contact with the sides of the organ, which is often sufficient to cause contraction, and of course the bleeding also. Injections of cold water, weak solutions of perchloride of iron, or chloralum, are valuable ; or a long cloth, the end of which has been steeped in one of these solutions, may be carried into the uterus, being drawn out and renewed from time to time. If these means are insufficient, tannic acid, acetate of lead, perchloride of iron, chloralum, and tincture of the ergot of rye may be given internally, and mustard embrocations applied to the loins. It must be remarked that no time is to be lost in these cases, as the mare quickly succumbs under the loss of blood.

If the uterus has been everted it must be returned quickly, and the treatment already directed must be carried out.

Inversion of the Uterus—Prolapsus Uteri.

This most untoward sequel to parturition is observed in two forms, *partial* and *complete.* It is said to be partial when the inverted fundus protrudes through the os uteri and vagina, appearing as a reddened tumour of variable dimensions outside the vulva ; and complete when it hangs, turned inside out, as low perhaps as the thighs, or even the hocks, forming a prodigious tumour. In the partial form prolapsus may not be discovered without exploration, the inverted portion having passed a slight distance through the os into the vagina. The complete form also varies in the appearance or shape of the tumour, depending upon the parts inverted, whether they be the body, one or both cornuæ, or the whole. Inversion of one cornua gives the appearance of a cone-shaped bag, pointing to one side, the right or left, as the case may be ; and when both are inverted two cones are observed. When the cornuæ are only partially inverted they present a cylindrical shape, the lower end of which terminates in a blind pouch. *Prolapsus uteri* may be *simple* or *complicated.*

Causes.—Many suggestions as to the real cause of inversion have been made, yet on this point some doubt still exists. Fortunately, it does not take place so frequently in the mare as in the cow and other animals, anatomical conformation, in all probability, interfering in the absence of powerful causes. As the accident nearly always succeeds parturition, attempts have been made to establish its connexion with, and dependence upon, the effects of malposition, difficult and assisted labour ; although it may, and even does follow such, yet we have the experience that many vigorous animals, in whom birth has been quite natural and easy throughout, have without any previous indication of mischief suddenly exhibited the worst form of inversion. Doubtless also there are many—quite as many, if not more—

cases in which delivery has been very difficult and laborious, and attended with much violent human action, yet inversion has not taken place; and, keeping this and many other circumstances in view, the best minds have concluded that certain predisposing conditions are necessary—such as a placid non-contracting uterus, relaxation of the broad ligaments, flaccidity, weakness and dilatation of the os uteri—conditions which are immensely aggravated by want of tone generally in the system, as the result of previous exposure, hardships, bad food, various debilitating diseases, &c. The pressure of the abdominal muscles being brought to bear upon an organ in the passive state described, naturally carries it towards the outlet; and judging that antiperistaltic motion is set up from irritation induced internally, it is not difficult to perceive how easily one portion is inverted, and quickly succeeded by others.

The retention of the fœtal membranes is often a cause of irritation, and congestion of the mucous internal surface, as a result of debility, may likewise act as an exciting cause.

Symptoms.—Whatever may be the cause of inversion in the mare, we find that usually the body of the uterus is first to protrude in the vagina, and being associated with much pain and uneasiness, other parts are quickly involved in the nervous excitement, particularly the abdominal muscles, inducing involuntary and spasmodic contractions, which end at length in the organ being turned inside out, and expelled from the interior of the body, finally by its own weight falling a considerable length, and forming an immense tumour, sometimes pear-shaped, or variably having one or two cone-shaped terminations. In this condition the mucous lining has become the outer covering; at first it is simply reddened, but by exposure to the air, by its own gravity and infiltration of fluids, it becomes larger, tumefied, and thickened; the colour assumes a violet, and eventually a

mahogany-brown ; circulation is impeded, and the engorgement induces even a darker colour, so that, under these combined conditions, the organ cannot be replaced. Ulceration or gangrene sets in, and the end of the animal quickly succeeds. Even before external signs of displacement are visible the animal evinces great uneasiness by frequent pawing with the fore-feet, stamping with the hind, and repeatedly changing position, lying down, quickly rising and switching the tail, going backwards, all the time straining, and gradually forcing the organ outwards : the tumour, at first small, slightly protrudes ; then, by repeated advances, a larger portion, until the parts gaining weight suddenly fall, and the animal, exasperated, endeavours to apply the teeth to it, or kicks at it with the hind-legs. From the simple form the case, under such acts, passes to the complicated—injuries arise from violence, dragging on the ground, &c., and the engorgement leads to strangulation.

During the earlier stages of the malady the animal experiences variable periods of relief or cessation from pain, and signs of fever are not associated. She seeks after food, and ministers to the wants of her offspring ; but recurring spasm speedily develops a powerful obstruction to the circulation as well as excitant to the nervous system, and the pulse is frequent and somewhat hard, gradually becoming small, wiry, and, finally, *running-down ;* the breathing is hurried, and accompanied with sighing ; the temperature is elevated, and the body is at length bedewed with perspiration ; the straining proceeds violently, and the organ is fully inverted; prostration quickly follows, and the animal prefers to lie, when from the influence of the combined causes she becomes insensible, and probably dies in convulsions. Sometimes before death the mare is giddy, and reels to and fro, owing to the assumed position of the uterus accommodating a larger quantity of blood, and limiting the supply to the

brain ; the effect is sometimes such as to cause the animal to drop as if shot.

The event is always to be viewed as alarming, calling for active, prompt, and efficient measures, and even then death is most likely to result ; for notwithstanding the uterus may have escaped outward violence, there are nevertheless internal lesions to be suspected, such as rupture of the lateral ligaments, or rupture of the bladder from inability to evacuate it. In some rare instances eversion of the rectum or bladder may be associated with prolapsus, that of the vagina nearly always being present more or less.

Treatment.—The first care is to have the uterus cleansed from all adhering substances by careful washing in tepid water, or milk and water ; or it may be advisable to use cold water, astringent or opiate lotions to reduce congestion, and relieve nervous excitement. The flagging powers of the sufferer should be recruited by stimulants, as ammonia ; and violent straining opposed by chloroform, belladonna, opium, &c.

In order to restore the organ to the abdomen, the animal must be caused to stand ; but when debility is too great to admit of this, the hind-quarters may be raised by bundles of straw, or, as practised by some veterinarians, by cords attached to the hind-pasterns, and drawn over a beam. If the mare stands, the twitch, and probably the hobbles and side lines, may be required, and pinching the back will form another means of attracting the attention. A moistened sheet having been placed beneath the uterus, the ends of which are held by assistants, the whole is to be raised to a level with the vulva, and, supposing the organ to be neither wholly inverted nor swollen to any great extent, the closed fist is to be placed against the central portion, and steady, careful pressure exerted in carrying the mass through the vaginal passage, and eventually into the abdomen. If

much straining occurs, the operator must remain merely passive during the throes, advancing only during the moments of cessation ; neglect of this precaution has caused rupture of the organ. If, on the other hand, the organ is wholly everted, and probably swollen, the return must be attempted by pressure on the sides near the vulva, the use of the closed fist being withheld until the major part of the organ has been returned, when the operator proceeds as first described. Reduction of the swelling in the uterus may be greatly accomplished by the use of cold water, more particularly if the organ is held somewhat higher than the level of the vulva ; while Continental veterinarians enhance the process by applying also compression by means of long towels or pieces of linen passed round and gradually tightened, after which the return of the uterus is accomplished with considerable less difficulty.

The next step is to avoid the expulsion of the organ, and one of the most common yet effectual means consists of retaining the hand within it for some time, in order to stimulate the walls to contract, after which the straining gradually ceases ; in addition, ether, chloroform, chloral, &c., may be employed to combat the tendency, and very robust animals may sustain a moderate blood-letting. Tincture of opium or belladonna may be injected into the womb ; enemas of opium or chloral hydrate can be thrown into the rectum, or morphia may be administered by the endemic method. The hind-quarters should be raised in the stall by litter, and a strap or surcingle should be tightly buckled round the middle of the body. The bowels should receive attention, and the food allowed be sloppy and nutritious.

The after-retention of the womb is often a matter of much concern to the practitioner, and for this purpose all manner of straps, harness, &c., have been adopted. Continental veterinarians are partial to the use of pads or pessaries,

which are held in contact with the os uteri, and so constructed that the animal may urinate without difficulty, and, as the accident of inversion of the uterus is often unlooked-for and sudden, when preparations have not been thought of, various extemporaneous plans have from time to time been adopted, and often proved successful.

Of the many forms of truss we have generally selected the most simple that could be devised at the time, and from the materials available. For this purpose we have cut up an old breech-band, giving the leather a form as shown in Fig. 173; and, in order to secure it to the proper place, ropes are passed through the holes on each side, top and

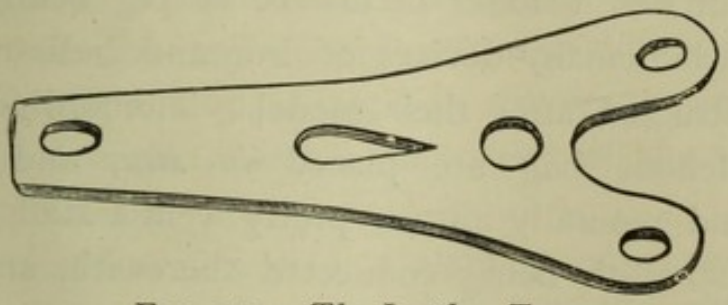


FIG. 173.—*The Leather Truss.*

bottom, and secured to a surcingle and neck collar. Occasionally the rope alone is used, as first practised by Continental veterinarians, forming a noose and knot (Fig. 174),

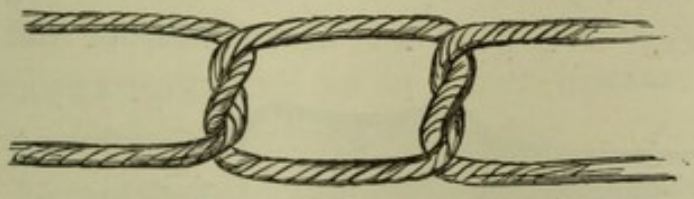


FIG. 174.—*The Rope Truss.*

which is placed on the vulva, the loose ends being carried over the back and beneath the abdomen to be secured to the neck collar. An iron ring of three inches diameter will sometimes answer the same purpose, and on this many improvements have been made, in which iron frames of different shapes are made use of, all taking the

place of the leather plate already described. In securing these appliances by means of ropes the practitioner will pack them at all prominent parts by means of rags, towels, wisps of hay, &c., and thus avoid chafing.

Stitches are sometimes used by veterinarians, being passed from the lips of the vulva of one side to the other; but these are apt to cause irritation, and are now wisely discarded in favour of the truss plate of leather or iron.

Besides the truss, a contrivance, termed a plug or pessary, is used to prevent the return of the uterus, being placed inside the vagina, and in close contact with the os uteri. Many are the kinds also of this contrivance, a glass bottle and the inflated bladder of an ox or pig being the most common, while many devices of iron and india-rubber have been constructed after their model. The ordinary bladder and caoutchouc bag are placed *in situ*, and afterwards inflated, and generally answer pretty well, a staff of wood of moderate strength being connected therewith, and which is secured to the truss on the outside; the glass bottle has the disadvantage of being liable to fracture, and in place of this, the common wooden potato mash, of similar shape and small size, having a handle which comes in very usefully as an agent whereby it may be secured, has frequently done good service. We give an illustration of the instrument (Fig. 175), and do not see why an inexpensive article of this kind, turned in various sizes out of hard wood, is not kept ready for use. This, with a leather or metallic truss plate for the vulva, should be comprised in the list of surgical instruments of every practitioner who resides in a breeding district.

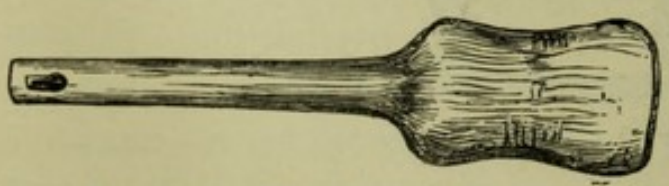


FIG. 175.—*The Wooden Pessary.*

Rupture of the Uterus.

Rupture of the womb may occur during parturition, when the animal is straining violently to expel the fœtus. It may arise spontaneously from the weight and action of twin fœtuses before parturition, and when attempts are being made to return the organ after inversion following parturition.

Symptoms.—When animals during parturition are excited to violent straining, and the acts suddenly cease, especially when are added an indifference to surrounding things, exhaustion, and peculiar haggard expression of countenance, the reasonable inference is that rupture has taken place. The mare speedily lies down, if already standing, and no inducements succeed in making her rise ; the fœtus, which may have been making fair progress, now slips back into the uterus, and, if the rent is large, as the organ contracts the foal is found entirely within the cavity of the abdomen—among the bowels.

The animal becomes cold, a clammy perspiration settles over the body, she sighs distressingly, breathes with difficulty and gasps ; the pulse runs down, and under extreme prostration she lies at full length on the side, and often quietly expires. We have remarked a number of such cases among animals subjected to empirical means for delivery, which have not first secured a proper adjustment of the fœtus under malposition, as well as in other instances where no interference whatever has been attempted.

Profuse hæmorrhage is frequently associated with rupture of the uterus during pregnancy, the escape of blood within the abdomen giving rise to peritonitis. When the rent in the uterus is small, as sometimes happens along with eversion, the wound may be closed by the continuous suture, the ends being left on the inner side, when the organ may be returned. Such cases sometimes do well.

Treatment.—Although the prospects of saving the life of the mother are so shadowy as to be considered absent, yet it may be desirable to attempt to save the fœtus. The course is to remove it from the uterus by means of the Cæsarian operation, previous to which the mare is destroyed by "pithing;" or, first being cast with hobbles, the abdomen is opened, next the uterus, and the foal removed; the mare is then killed by severing the abdominal aorta (Plate III.), which is readily reached after the cavity has been opened and foal extracted.

Rupture of the Abdominal Muscles.

This untoward event may occur as a result of the extreme weight of twin foals during the violent throes of parturition. In our experience it took place in Clementina, dam of Bay Middleton, the property of the (fifth) Earl of Jersey, and in connexion with dropsy of the womb, about ten gallons of fluid occupying the interior, together with two fine colt foals by Orlando. The enormous weight of these caused the abdominal walls to give way, and the intestines fell to the ground, upon which the unfortunate creature was destroyed.

Other practitioners refer to hernia of the womb, in which the skin alone remains uninjured after rupture of the abdominal walls, and forming a monstrous tumour, which proves equally fatal.

Vaginitis.

Inflammation of the vagina is generally a subordinate affection to ordinary metritis and metro-peritonitis, by which it ceases to call for special notice and treatment; but it occurs independent of those diseases, and chiefly from the effects of bruises, lacerations, &c., inflicted during difficult parturition by instruments, or the passage of an unusually large fœtus, and from other causes which give rise to prolonged irritation.

Symptoms.—The vulva is swollen and the labia are pendulous. The mucous membrane is dry, reddened deeply, or perhaps studded with a few patches of vesicles clustered closely, and an adhesive but scanty discharge glues the surfaces together. There may be also abrasions of the membrane, patches of congestion, and the general hue turning to a brown or dark purple. As the animal urinates pain is evident, and she whisks the tail, stamps the hind-feet, and endeavours to rub the parts against the stall or some other object. The walls of the canal are hot and painful, the thermometer indicating a local elevation of temperature, and in some instances also constitutionally, together with collateral signs of fever, constipation, &c. At first the discharge is thin, being simply an increased mucous secretion, but as the inflammation proceeds pus is mingled together with streaks of blood, and as the fluid drops on the hocks and thighs its irritating effects are productive of the loss of hair on the surfaces over which it flows.

Vaginitis *per se* is a simple disease of short duration, often subsiding within a few days, especially under appropriate treatment. When under certain aggravated or complicated conditions it is associated with extensive congestions, gangrene, sloughing, &c., special treatment is called for, which will be alluded to under metro-peritonitis.

Treatment.—The passage should first be well cleaned by means of warm solutions of carbolic acid, and a dose of saline administered internally.

RECIPE NO. 127.

Take of solution of acetate of ammonia.....	2 fl. oz.
Nitrate of potash	2 drs.
Infusion of quassia	1 pint.

Mix, and administer three such doses at intervals of twelve hours.

The vagina may then be syringed daily, the following forms of solution being used :—

RECIPE NO. 128.

Take of sulphate of zinc	60 grs.
Carbolic acid	1 dr.
Glycerine	½ oz.
Water	1 pint.

Mix ; when the salt is dissolved the solution is ready for use. Inject twice daily.

RECIPE NO. 129.

Take of solution of chloralum	1 dr.
Glycerine	½ oz.
Laudanum	½ ,,
Water	1 pint.

Mix, and inject twice daily.

When febrile signs run high, and are evidently persistent or increasing, the attention of the practitioner will be particularly needed to be on the alert for putrid infection, when the grave conditions of metritis or metro-peritonitis may supervene.

LEUCORRHŒA.

Leucorrhœa, or the whites, consists of a discharge of a white, glutinous fluid, having no odour, which takes place from the lining membrane of the vagina, as a result of a chronic condition following neglected vaginitis, the acute signs of which have disappeared, and the surfaces are under some morbid excitement to excessive secretion. The fluid is generally nothing more than mucus, sometimes regular, at others intermittent, appearing only when the animal lies down, moves, or urinates ; more rarely it assumes an acid odour, and may become purulent and dark-coloured. If the disease proceeds without treatment or mitigation the os uteri may participate, and with it the whole generative organs are roused to an unusual excitement, which takes

the form of œstrum, but recurs so frequently that the animal may not become pregnant by sexual intercourse; or, if she conceives, the full time is not reached. It is highly necessary then to remove these signs of disturbance in order to secure successful gestation.

When the affection involves the os uteri it will be found dilated, and the uterus also not sufficiently contracted, while the discharge may become thinner than when the vagina alone is affected. To detect these conditions the practitioner will make an exploration with the hand passed through the vagina.

Treatment.—As there is seldom any attendant fever, but rather debility of constitution, the necessary course is to bring about a healthy state of organs and secretions. For this purpose the bowels may be opened by means of enemas and the following draught:—

RECIPE NO. 130.

Take of linseed oil	8 oz.
Solution of aloes	3 „
Tincture of gentian	2 „

Mix, and administer after a fast of several hours.

Allow good and easily digested food, of which oats, the roots, &c., form the bulk, and give the following powders in the food morning and night:—

RECIPE NO. 131.

Take of sulphate of iron	3 oz.
Carbonate of soda	1 „
Ground gentian	3 „
„ ginger	3 „

Mix, and form twelve powders.

As a dressing for the vagina make up the following:—

RECIPE NO. 132.

Take of tannic acid	2 drs.
Spirits of wine	1 oz.
Laudanum	½ „
Water	1 pint.

This may be used by means of the ordinary syringe, an india-rubber tube, or, if the os uteri is affected, by means of a small sponge carried to the part by the hand. It may also be quite necessary to wash out the uterus thoroughly, using tepid solutions of the mixture already given, and pumping the organ full as indicated by a return of the fluid from the vagina. Twice or even thrice daily this may be required, when the disease has existed for some time. The animal should receive regular gentle exercise, and occupy a well-ventilated building, every means being adopted to confer quiet and comfort.

Inflammation of the Womb.

As a result of parturition in the mare the womb is liable to inflammation, partaking of several characters by reason of the particular tissues or layers involved. Where the substance of the womb itself only is affected, the disease is known as *metritis* and *endometritis;* and when in addition the peritoneal investment is involved, the term *metro-peritonitis* is given to it. It is also remarkable that, during the development of this malady, a great tendency exists for the animal to contract a septic or poisoned condition of the blood, either as a result of the inflammation itself, or from the absorption of putrid fluids in contact with abraded or wounded surfaces of the genital organs. From this characteristic feature of the complaint it is likely to prove serious and frequently fatal. The forms are acute, subacute, and chronic.

Symptoms.—Among the several females of domestic animals there appears a variable period in which the disease is developed; in the mare it is delayed often longer than in other females, and in proportion as it may be retarded after parturition, it is usually estimated to assume less severity and liability to fatal termination.

The mare after delivery, even when unassisted, for a time apparently progresses favourably; the young is nourished by a plentiful supply of milk, the functions of nature are performed properly, and there is no disturbance to create suspicion of non-recovery from the effects of the act of parturition. In a day or two the animal temperature has risen considerably, and the external genital organs are swollen. Occasional shivering fits are observed, and the hair is erect on the skin; the pulse is accelerated, small and hard, numbering from 90 to 100 per minute; the legs and ears are cold; the appetite is diminished, and shortly absent altogether; the secretion of milk is lessened, and at length ceases, the udder becoming soft, small, and flaccid; the mouth is hot and dry, or the membrane is covered with a thick secretion; the visible mucous membranes are injected, and the respiration becomes hurried and short; colicky pains appear, and cause the animal to scrape, stamp, and kick at the abdomen, occasionally lying down, but quickly rising again, whisking the tail, and turning the nose to the flank. Sometimes lameness accompanies the disease, and from this cause, as well as the original disease, the animal refuses to lie down after a time, remaining in a standing posture, with back arched and legs fixed in a manner opposed to all movement. The vulva appears now much more swollen, and the lips are separated, from between which issues a fluid, first thin, yellow, and transparent, then reddish or chocolate, or ultimately thick, pustular, grumous, or fœtid. The internal cavity is hot and tender, and sometimes ulcers, together with a copious inflammatory exudate of a croupous nature, cover the surface of the membrane. If the peritoneum is involved, the cavity of the abdomen enlarges from the accumulation of serum, and the symptoms acquire greater intensity, death terminating the sufferings in three, four, five, or six days, proportionate to the severity of the attack, and

usually in violent convulsions or a profound coma, which have appeared somewhat rapidly.

In some instances the signs, probably intimating the worst, suddenly disappear, and the attendants find the animal bright and cheerful some hours after being left in apparently a hopeless condition. When this happens, careful domestic treatment hastens recovery in a marked manner. On the other hand, the disease may assume chronic states; the uterus has contracted at the neck, but the secretion of copious fluids is by no means diminished, and these accumulating sometimes cause an enlargement of the abdomen, but at long intervals are discharged in large quantities, either when the animal lies down, during the passage of fæces, or in straining in the occasional fits of colic which are now present. The external conditions are also remarkable, as the animal becomes poor, weak, and unhealthy-looking; the skin is dirty and clings to the bones, and she is constantly desiring access to the male; emaciation proceeds, febrile conditions are frequent, and death follows from pyæmia.

Post-mortem Appearances. — These partake of essential characters, depending upon the presence or absence of putrid blood poisoning, in conjunction with the disease, a combination known as *septicæmia.* In true metro-peritonitis the evidences of disease are confined to the organs of generation and peritoneum; but when blood infection has taken place the body swells from generation of gases within the abdomen—meteorism—and decomposition ensues at an early period. The surfaces of membranes are marked by blood spots—ecchymosis—and the natural colour of all the organs and tissues is destroyed, being replaced by a dark green, merging into dark or mahogany-brown, and even black patches; a fœtid gas escaping, not only when cut into, but also from their surface when intact. The mucous mem-

brane of the vagina and uterus is studded with ulcers of a dark or dirty-green hue, the membrane itself being swollen, of a dark-red colour, and covered by a series of exudative layers, other parts being swollen and thickened from subtratal infiltration. The internal cavity of the uterus contains a large quantity of fluid, grey or chocolate, being a combination of disintegrated blood elements, mucous secretions, and retained portions of fœtal membranes, all of which are undergoing rapid decomposition, as betokened by the offensive odour given off. This fluid often amounts to many gallons, and contains, besides the above-named component parts, bacteria, the usual low organisation of animalcules attendant on septic conditions, epithelial débris, fat globules, &c.—characters which render it at once a dangerous agent to be exposed to the air in the neighbourhood of animal life. When the peritoneum has become inflamed, the abdominal cavity contains a large quantity of serum of a reddish colour and turbid consistence, in which flakes of lymph are often somewhat abundant. Throughout the cavity, but particularly over the uterus, the membrane is inflamed, and false membranes having formed, they become the means of union between the various organs thus involved. Occasionally this inflammation may be localised over the uterus and pelvic viscera, which may be involved in a general state of substratal phlegmonous inflammation, from which proceeds extensive infiltration, and even abscess. In some closely observed cases, inflammation of the veins of the womb (uterine phlebitis) appears, resulting from damage done to the vessels during difficult and protracted parturition ; indeed, such may be the nature of the lesion that numerous thrombi form, and this may lead to purulent infection, and by the passage of fluids within the circulation lead to serious and fatal consequences.

When the disease becomes chronic, and apart from septic

infection, or peritoneal inflammation, the uterus contains a large quantity of fluid of a grey colour, opaque, muco-purulent, and often highly offensive. The lining membrane has become thickened or indurated, and of a grey colour; sometimes portions have become spongy, softened, and infiltrated—states which are occasionally continued throughout the vagina also.

Treatment.—This must be prompt and decisive to be successful, even when commenced early; but, as is too often the case, delay in seeking assistance renders the probability of any good from the use of remedies very doubtful. The bowels should be immediately cleared by a brisk purgative; as bleeding cannot be well withstood in this disease, the bowels may be usefully converted into a valuable channel by which the poisonous ingredients are exhausted from the blood under septic conditions, while the action will prove equally serviceable under the ordinary forms of inflammation. In the first, where there is great tendency to depression, the following mixture may be given:—

RECIPE NO. 133.

Take of solution of aloes	6 to 10 fl. oz.
Tincture of aconite.....	10 to 20 drops.
Nitric ether, or	2 fl. oz.
Aromatic spirits of ammonia	1 „

Mix. If the ammonia is selected in preference to the ether, a pint of cold water must be added.

When the case is believed to be free from blood poisoning, the ether and ammonia are to be omitted.

The next course is to wash out the vagina, and examine the membrane for ulcers, to which a free dressing of solutions of "Sanitas," or Condy's fluid, are to be applied; indeed, these fluids require to be injected periodically, in order to destroy the action of decomposing fluids in contact with the membranes.

The bowels having shown signs of action, the neutral salts may be given, at the same time great attention must be paid to the state of the pulse and temperature. As antiseptic salts, the sulphites of soda and potash may be given, alternated with the carbonate or nitrate.

RECIPE NO. 134.

Take of sulphite of soda or potash	2 oz.
Aromatic spirits of ammonia	1 fl. oz.
Water	1 pint.

Dissolve the salt in the water and add the ammonia, and give morning and night.

Sulphurous, carbolic, and cresyllic acids are variously employed as constitutional remedies for destroying the effects of septic matters in the blood, and when these fail to accomplish the desired action sufficiently early in critical cases, it has been recommended to pass these agents, together with iodine or ammonia as required, at once into the general circulation. For this purpose the jugular vein is opened, and the fluids are introduced by means of appropriate funnel-shaped instruments, provided with a stilette or stopcock, in order to regulate the flow.

The precautions necessary are—the small ivory mount which terminates the india-rubber tube is inserted *downwards* in the vein after the funnel is charged with the medicine; the fluid must be a perfect solution, of the temperature of the blood in health (99° F.), dilute, and administered in *small* quantities.

In chronic states, evacuate the uterus by means of a suitable tube or the syringe, promote contraction by doses of ergot of rye, and attend to the general condition of the patient by supporting with stimulants and tonics.

RECIPE NO. 135.

Take of sulphate of iron, powdered.....	3 oz.
Nitrate of potash „	3 „
Ground gentian	6 „

Mix, and make up twelve powders, to be given morning and night.

RECIPE NO. 136.

Take of nitric ether	2 fl. oz.
Gentian, powdered	4 drs.
Water	1 pint.

Mix, and give daily at noon.

To the uterus and vagina apply dilute solutions of carbolic acid and the various antiseptics, and proceed as stated under Leucorrhœa.

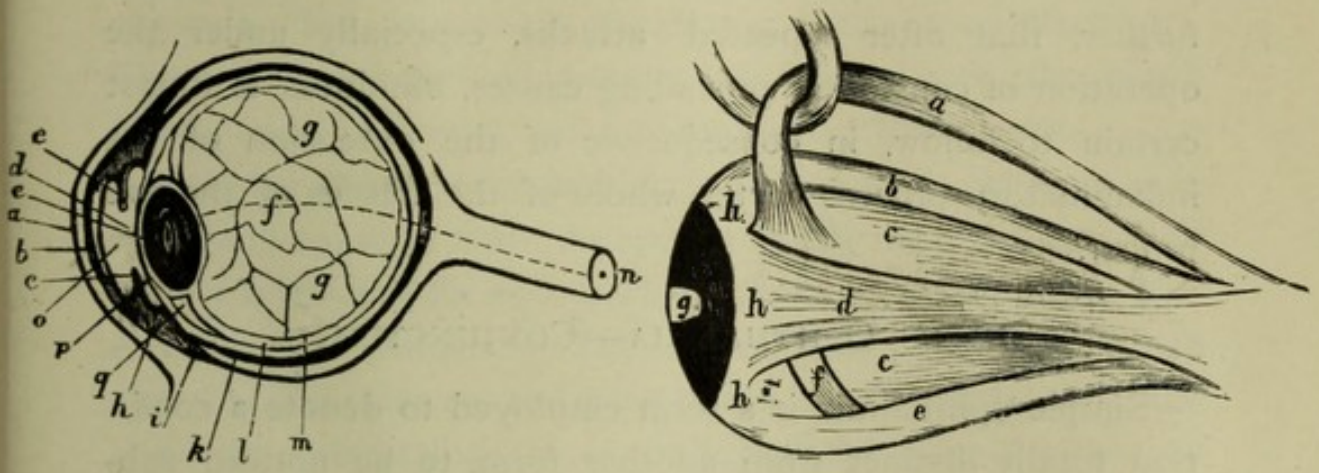
Prevention.—The prevention of this disease consists of disposing carefully by prompt and effectual interment of all parts of animals dying of putrid or other diseases on the premises where pregnant mares are confined. Men who have assisted at the delivery of cows or mares, or have removed the retained membranes, and otherwise assisted animals under difficult parturition, should not go direct to others in labour without first washing and disinfecting. Instruments, ropes, &c., should always be well cleansed and disinfected also before being employed on a second case, strong and hot solutions of carbolic acid and soap being made up for the purpose. When an animal dies of this disease, all others pregnant should be removed to a separate building as soon as possible, as the danger of putrid infection is great.

The reader who is desirous of studying the subject of difficult parturition, with its attendant consequences, more fully, will do well to consult the work entitled "A Text-book on Veterinary Obstetrics," by George Fleming, M.R.C.V.S., containing much valuable matter compiled from Continental and other sources, which will form a useful reference for the practitioner, and handy book on a subject so intimately connected with the welfare of all our domesticated animals.

SECTION VIII.

DISEASES OF THE EYES AND THEIR APPENDAGES.

DISEASES OF THE EYES AND THEIR APPENDAGES.



FIGS. 176 AND 177.—*Sections of the Eyeball.*

a. Conjunctiva or outer membrane.
b. Cornea.
c, Iris.
d. The opening called the pupil.
e. Crystalline lens.
f. Central artery.
g. Vitreous humour.
h. Ciliary muscle, the agent which regulates or adjusts the eye in vision.
i. Sclerotic or outer coat.
k. Choroid or vascular coat.
l. The retina—nervous membrane—an expansion of the optic nerve, on the soundness of which sight depends.
m. Hyaloid membrane investing the vitreous humour.
n. Optic nerve communicating with brain.
o. Anterior chamber.
p. Posterior ,,
q. Canal of Petit, or space surrounding the crystalline lens.

a. Superior oblique muscle.
b. ,, straight
c. Retractor muscle, which draws the eyeball backwards.
d. External straight muscle.
e. Inferior ,, ,,
f. ,, oblique ,,
g. Cornea, showing the iris and pupillary opening.
h. The sclerotic or outer coat.

OPHTHALMIA.

BY this term is implied inflammation of those structures of the eye which are essential to vision; but in order to convey a more distinct idea of the exact seat of the various forms of disease affecting special parts or single structures, the generic term is laid aside, and subordinate ones are made use of. Thus, we have simple ophthalmia; periodic ophthalmia;

retinitis ; iritis, &c. The several structures of which the eye is composed, together with their situation, will be best understood by a reference to Figs. 176 and 177, which are placed at the head of this chapter. Although by making this anatomical distinction, and recognising special functions in each part, it is possible to trace the existence of disease localised in any one of them, yet it is not uncommonly found that few cases are observed in which the whole, or greater part of the structures, are not involved more or less ; and, further, that after repeated attacks, especially under the operation of constantly prevailing causes, blindness is almost certain to follow, in consequence of the extension of the inflammatory process to the whole of the tissues of the eye proper.

Simple Ophthalmia—Conjunctivitis.

Simple ophthalmia is a term employed to denote a condition totally distinct from another form, to be noticed subsequently—viz., *specific ophthalmia ;* it is likewise known as *superficial ophthalmia*, by way of further distinction ; as conjunctivitis, inflammation of the conjunctiva ; as corneitis, or inflammation of the cornea ; and, in consequence of the frequency with which it is known to arise from external causes, it is called *traumatic ophthalmia.*

The *causes* are—external violence, as blows, the stroke of a whip ; effects of cold, insinuation of foreign bodies, as the eyelashes being turned inwards, grit, oat-flyers, &c. The parts generally implicated in the disease are the cornea, or convex portion of the eyeball, which forms the most prominent visible portion, and is covered externally by a fine, delicate membrane—the conjunctiva—a reflection of that which lines the eyelids, and an elaborated form of the skin itself ; these being involved in inflammation, give rise to the terms corneitis and conjunctivitis. Their approximation

will scarcely admit of any freedom from participation in morbid action affecting one of them: when one is attacked the other is attacked also, as the conjunctiva acts as one of the means of nutrition by its bloodvessels, which pass to the cornea beneath.

Symptoms.—Constitutional disturbance always accompanies derangement of the structures of the eye, but varies in intensity with the amount of inflammation present and extent of tissue involved. Injurious effects are usually confined to one eye only; but, as a result of cold, the disease may affect both. The pulse is accelerated, more or less full and hard; the mouth is hot, and the animal has sometimes lost his appetite. The eyelids are closed, occasionally swollen, and as they are seen to twitch, copious tears escape from the commissures, and shortly a track is formed down the face, along which the hair is eventually removed. The animal resists an attempt to examine the interior, and presses the eyelids together, at the same time retracting the eyeball, and throwing the haw, or membrana nictitans, completely over the front. The eye must be exposed, which is done by placing the finger and thumb respectively upon the upper and lower lids, separating and everting them, when the cornea will be observed to possess a bluish-grey colour, from the infiltration of inflammatory products among the several layers of its composition; and the conjunctiva lining the eyelids is red and injected, exhibiting a number of red streaks, commonly expressed as being bloodshot. Occasionally, over the white portion of the eyeball—sclerotic coat—also will be seen the same red streaky condition.

The results of external violence may sometimes be detected in an intense opaque spot on the cornea, or patch of extravasation—ecchymosis—upon the inner surface of the eyelids. The presence of foreign bodies is usually apparent upon examination in the manner pointed out.

Treatment.—Remove foreign bodies at once by means of forceps (Fig. 178)—an operation which will often call for the restraint of the nose-twitch and holding up a fore-leg. We have even been compelled to cast the patient before succeeding. The power which the animal possesses over the membrana nictitans often proves very obstructive to the efforts of the operator in seizing the foreign body. It may therefore be necessary to transfix the haw by means of a proper hook—tenaculum (Fig. 179)—or needle and thread,



FIG. 178.—*Forceps for seizing foreign bodies in the Eye.*



FIG. 179.—*The Tenaculum.*

and thus draw it away from the foreign object. When that is removed but little more is required beyond placing the animal in a dark but well-ventilated stable, using frequent hot fomentations by means of a decoction of poppy-heads, or water containing laudanum, tincture of belladonna, &c. Afterwards the eye may be covered by a light cloth fixed to the head-stall, and saturated with one or other of the following lotions :—

RECIPE NO. 137.

Take of solution of acetate of ammonia.....	6 fl. oz.
Spirits of wine	2 „
Water	1 pint.

Mix, and keep in a tightly corked bottle for use as required.

RECIPE NO. 138.

Take of tincture of opium	4 fl. oz.
Water	1 quart.

Mix.

RECIPE NO. 139.

Take of tincture of opium	4 fl. oz.
Solution of Goulard's extract of lead.....	2 „
Water	1 quart.

Mix.

Internally, the administration of a mild laxative will be of service; or a powder composed of the following may be given, morning and night, in the food:—

RECIPE NO. 140

Take of nitrate of potash, powdered	4 drs.
Coriander seeds, powdered	2 „

Mix.

The employment of belladonna or hyoscyamus in the form of extract to the outer parts, as the eyebrows, &c., will be found invaluable, especially when, by reason of the iris becoming involved in the process of inflammation, adhesions are probable. Such remedies have the power of causing the iris to contract, and thus break down any attachments that may have already formed by that process. Some practitioners use a solution of atropine instead.

RECIPE NO. 141.

Take of solution of the sulphate of atropia	3 or 4 grs.
Distilled water	1 fl. oz.

Mix and dissolve. A few drops to be placed within the eyelids, morning and evening.

Adhesions, by the formation of false membranes, &c., within the iris, prevent its contraction, by which the pupil is

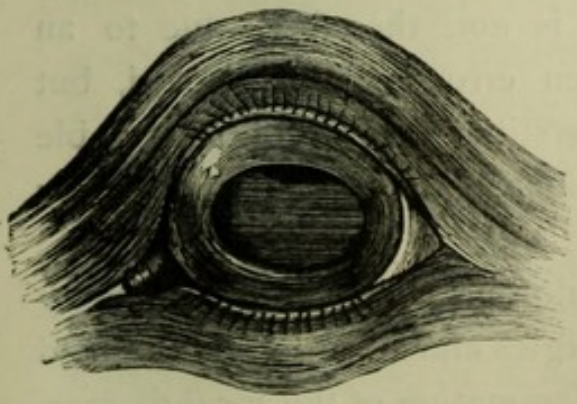


FIG. 180.

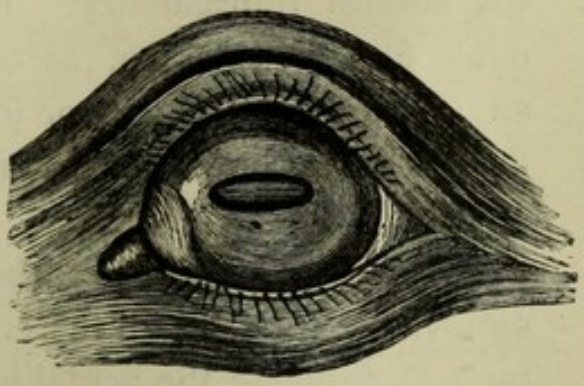


FIG. 181.—*The Pupil contracted.*

diminished. A stationary iris (Fig. 180) is known by the wide and open pupil, and inability to contract as in health (Fig. 181).

Opacity of the Cornea.

One of the attendant signs of simple ophthalmia is the spreading of a white opaque film over the cornea, which gives rise to partial or total blindness as long as it remains. This opacity arises in two ways (Fig. 182); if the inflammatory action is due to a blow, the effects of which are localised in a particular spot on the cornea, the opacity spreads or radiates from that point, eventually covering the whole of the cornea; but when the ophthalmia is the result of cold or constitutional causes the film then commences from the outer side, and continues to spread and close in until the whole surface is involved. The reason of the opacity is simply this: the process of inflammation insures the infiltration of dense fluid within the layers or scales of which the cornea is composed, and by this they are swollen and thickened, an effect which at once destroys the natural transparency. It is not, therefore, due to an outer film or covering, as often erroneously supposed, but an internal adventitious or interstitial deposit of coagulable fluid, which even of itself is sufficient to cause blindness by opacity.

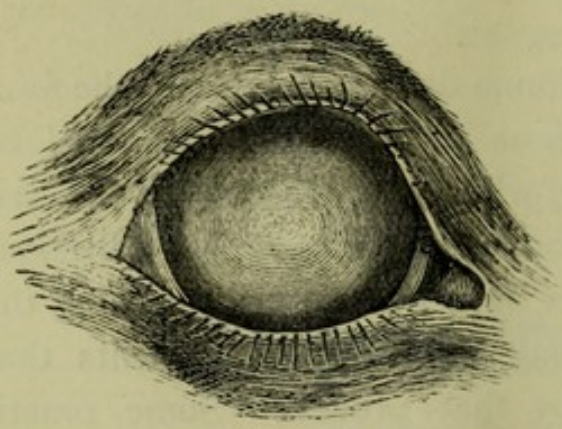


Fig. 182.—*Opacity of the Cornea.*

Treatment.—There need be no hurry to have this opacity removed. First, let all the energies and attention be directed towards reducing the actual inflammation of the local disease, as already directed; when that is decidedly accomplished, and fears of returning febrile symptoms are no longer entertained, one of the following preparations may be made use of:—

RECIPE NO. 142.

Take of solution of chloralum	1 fl. dr.
Water	1 pint.

Mix.

RECIPE NO. 143.

Take of sulphate of zinc, powdered	1 dr.
Water	1 pint.

Mix, and dissolve. Either of the above may be used to wet the outer part of the eyes several times a day, a piece of soft rag or a sponge being a useful agent ; a few drops of the solution may be allowed to enter the eyelids also.

RECIPE NO. 144.

Take of iodide of potassium	4 grs.
Water, distilled	1 fl. oz.

Mix ; a few drops to be placed upon the opaque surfaces by means of a feather or camel-hair pencil, while the eyelids are separated for the purpose.

NEBULA—ALBUGO—LEUCOMA.

Sometimes, after the subsidence of all other signs of simple ophthalmia, the general opacity or milky-looking cloud gradually contracts towards one particular spot, and there gives indications of remaining. One or more of these spots may be present, having a bluish colour, and as such are known as *nebulæ ;* during later stages the blue cast disappears, and the speck assumes a pearly-white colour, the edges being sharp and more accurately defined, and is then termed *albugo.* Under some circumstances a further condition is observed : there is loss of substance in the centre of a patch of opacity, or a small ulcer has formed, generally traceable to malnutrition, debility, and weakness of the patient. Such a state, fortunately not so commonly seen in the horse as in the dog, is distinguished by the term *leucoma.*

Treatment.—The white or bluish-white specks are cicatrices—spots of healing and contraction of the effused material—and often become permanent blemishes; therefore are an unsoundness in proportion as they are large, and interfere with vision. When they are small, situate at the outer edge of the cornea, and away from the pupillary opening, and known to be old-standing, they need not form an objection to purchase. When recent, they may be stimulated by a solution of nitrate of silver, or the iodide of potassium, No. 144, page 529.

Specific or Periodic Ophthalmia.

This disease has been variously styled specific ophthalmia, from the peculiar constitutional conditions which give rise to, or are associated with, it; and periodic, from the certainty with which it recurs in the same individual after the first attack. It has also been termed "moon blindness," in consequence of an original and erroneous belief that it was influenced by the changes of the moon.

Nature.—Periodic ophthalmia consists of inflammation of the whole of the structures of the eye, intermittent in character, due to some constitutional peculiarity, known as diathesis or cachexia (*see* Glossary), and terminating in an opacity of the crystalline lens, called cataract.

Symptoms.—One eye only is, as a rule, affected, and the attack frequently comes on during the night, so that in the morning the animal is seen with lids closed, and scalding tears profusely coursing down the cheeks. The eye altogether is smaller than the sound one, being drawn within the orbit, and covered by the haw, to shield it from the painful effects of light. The sufferer is very averse to an examination, but by care this may be effected, when the cornea will be found to possess a hazy appearance, with a

tinge of amber, probably due to the general inflammation of internal structures; the dulness proceeding from the outside towards the centre of the cornea, until the whole assumes a grey hue, and entirely obscures the vision, as well as prevents the iris, pupil, &c., being seen from without. The internal humours become turbid, the pupil contracts, and as the conjunctiva becomes turgid with blood, vessels are observed to come into sight over the surface of the cornea; the formation of pus may take place in the anterior chamber, and in rare instances be discharged along with the contents of the eyeball through an ulcerated opening in the cornea. The more common termination, as already said, is cataract or opacity of the crystalline lens.

Under ordinary circumstances the inflammation subsides in a few days; the haziness gradually passing off permits the observer to notice the lens being altered, and having a deposit on its surface; or the pupil may be dilated and fixed by adhesions from inflammatory deposit, the iris also being changed in colour from the same cause; and the eye has considerably diminished in size, while wrinkles are seen in the skin on the brows. Sometimes, when the signs have been gradually subsiding, they reappear, and continue in great intensity for several days; or having disappeared entirely, the animal is left free for weeks, or perhaps months, when subsequent attacks terminate in absolute blindness. Then the other may be attacked, eventually becoming perfectly useless; but a common course is for one eye to partially recover when the opposite becomes affected, followed by an apparent restoration of the first, after which they are alternately attacked, and at length both become permanently blind. In some severe cases one attack will terminate in perfect blindness, and, in addition, complete disorganisation of the entire structures of the eyeball, which are afterwards liable to recurring inflammation, and giving rise to a constant

sanious discharge from the orbit. Dislocation of the lens is not an uncommon occurrence, being discovered after the eye regains its transparency, and in severe cases ossification of the structures and contents of the globe.

Treatment.—We can suggest or recommend nothing beyond that prescribed for the simple form of ophthalmia. All the measures hitherto adopted have proved useless in the way of successful treatment. At one time, many years ago, when the subject of ventilation was not considered of so much importance, periodic ophthalmia, farcy, and glanders strode side by side, and in their march through the stables where large studs were confined, carried off many victims; those which escaped death from the second and third, lived to go blind from the first. These diseases were formerly the bane of the British army, and until the results of crowding great numbers of animals together were more closely studied, the public exchequer had to record thousands of losses which a simple change might have totally averted. Similar states existed among private studs; mares and entire horses alike were continually "going stone blind," and the inevitable results were the breeding of animals either strongly predisposed to the disease, or in some rare cases they entered the world already blind. Thus for a long period the equine stock of Britain was sadly reduced in value, and until attention was directed to the necessity for a change, by introducing sound animals, the disease suffered no mitigation. In the present day breeders rightly reject animals having small eyes, especially when they are "odd eyes," and the skin above is wrinkled or corrugated; and the result is, specific ophthalmia is under all circumstances a rare disease in comparison with its former prevalence. In examining the eyes of horses with a view to purchase, there are a few additional cautions to bear in mind if we would avoid taking into possession one which may have either

already suffered from an attack, or possessing a strong predisposition towards contracting it. Besides the wrinkled and furrowed state of the eyebrow, there is an unusual prominence of the membrana nictitans ; the eye is altogether sunken and not so brilliant as the other ; the pupil is generally smaller (Fig. 183), the cornea hazy, with a cloud or milky wreath on the outer margin ; the iris is discoloured by streaks or spots of inflammatory deposit, and its edges are sometimes ragged and uneven ; the conjunctiva is vascular, and a constant watery state of the eye is present ; sometimes a speck of white is already seen in the centre of the pupil, which decides the presence of incipient cataract.

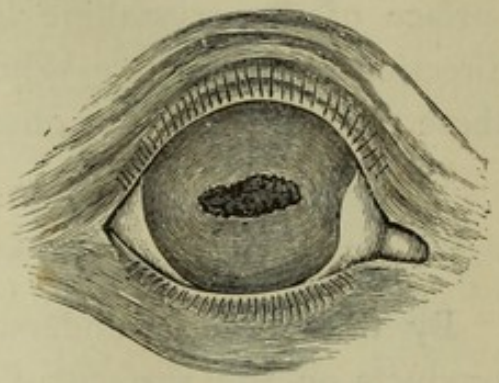


FIG. 183.—*The Eye predisposed to Specific Ophthalmia.*

The reader, in making an examination, will be careful to observe that a white shirt-front or necktie has often led persons astray by the reflection produced, and in order to obviate such an occurrence, the animal should be examined within the stable or other suitable building, the head being towards the door, and the coat of the examiner buttoned over any white article of dress. The safest method consists of placing a lighted candle behind the eye, the examiner using an instrument known as the ophthalmoscope, the examination being conducted in a dark building. Another method is also practised : if the pupil is small, and sensitive to light, the animal is put into a dark stable and the skin around the eye dressed with belladonna, which dilates the pupil for the needful examination. A lighted candle is then held in front of the eye, and when free from cataract the organ reflects three images of the flame—two perpendicular or erect, and one, a smaller, inverted ; one, erect, is seen on

the surface of the cornea ; and the second, also erect, will be produced on the anterior surface of the crystalline lens, both of which move in the same direction as the candle. The third is an inverted image reflected from the posterior surface of the crystalline lens, and moves in the contrary direction to the light. When cataract is present the last of these phenomena is not observed.

Cataract.

By this term is understood a deposit of inflammatory products on the surface of the crystalline lens, its capsule, or upon both, by which the transmission of light through the pupil is obstructed in proportion to the size of the deposit. A cataract may exist as a mere bluish-white speck (Fig. 184) ; when larger it partially occludes the

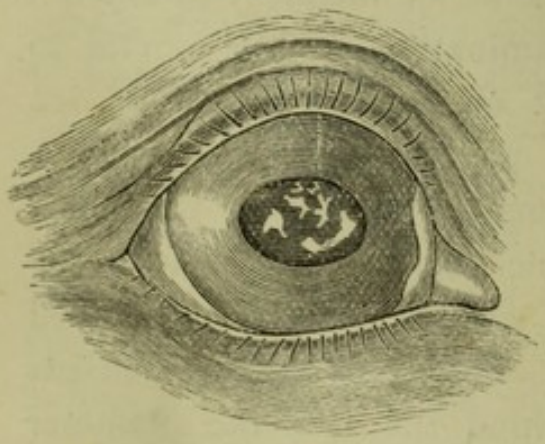


Fig. 184.—*Partial Cataract.*

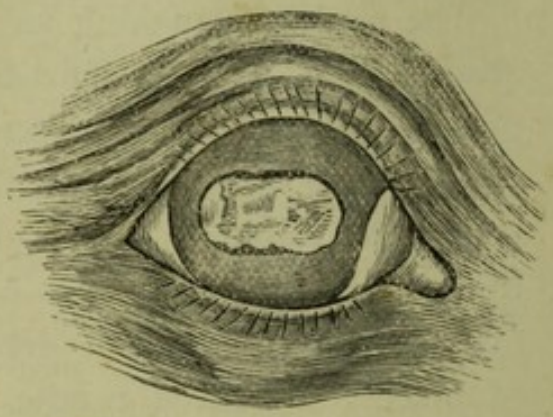


Fig. 185.—*Complete Cataract.*

pupillary opening, and, when complete (Fig. 185), appears as a pearly, glistening, and opaque surface behind the pupil, which is larger than natural, and totally insensible to the action of the strongest light.

Removal of cataract is frequently practised by the human surgeon, but the operation is inadmissible in the horse, for obvious reasons.

Staphyloma.

In this disease a whitish or bluish-white opaque tumour forms on the cornea, and from its resemblance to a grape the term staphyloma has been given to it.

Nature.—After repeated attacks of ophthalmia, especially when associated with debilitating diseases, ulceration of the cornea may follow, when the external surface, being weakened at that part, the pressure of internal fluids cause the inner and more elastic portion to bulge forwards (Fig. 186). It is a rare disease in the horse, only one case having come before us, and perfect blindness existed.



Fig. 186.—*Staphyloma or bulging of the Cornea.*

Treatment.—Astringent lotions are the best applications, but there are few recommendations for pursuing lengthened treatment in confirmed cases. It will be obvious that remedial measures are most likely to be successful during the stage of ulceration, when local applications of nitrate of silver and iron tonics internally are of benefit.

Glaucoma.

Nature.—A disease of the vitreous humour in which the hyaloid membrane is said to be absent from absorption, allowing the contents to become intermingled, giving rise to blue or bluish-green colour. Blindness is always the result ; and not unfrequently the disease is associated with cataract or amaurosis. Professor Williams states he has met with cases in which the vitreous humour had lost its fluidity, and totally altered into a semi-cartilaginous or calcareous, and of course a solid mass. Although the affection may be said to depend upon previously existing disease, yet there

are undoubted instances in which it has taken place without such having been observed.

Treatment has not been found of any service.

AMAUROSIS.

Nature.—Amaurosis, sometimes called *gutta-serena, glass-eye*, &c., is observed in two forms—one as a result of disease of the digestive or other organs, poisoning, &c., inducing serious brain disturbance, and is of course symptomatic; and the second as a direct disease of the optic nerve and its expansion—the retina—over the inner and posterior surface of the eyeball. In the first condition recovery sometimes takes place; in the second never.

Symptoms.—The pupil is extremely dilated, rounded, and perfectly motionless under the stimulus of strong light, and the interior presents a similar appearance to that observed in looking into a mass of crystal when partially surrounded by a dark covering (Fig. 187). The eyelids are drawn wide apart, and the aspect of a broad stare is given, while the evidence of total blindness is complete in the high-stepping and feeling or cautious kind of gait, together with the rapid motion of the ears.

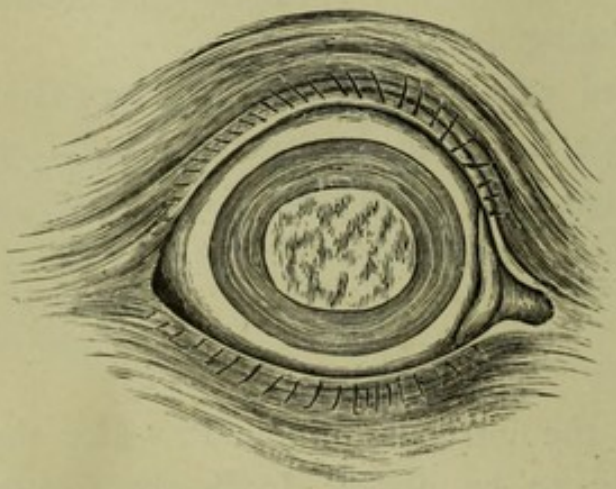


FIG. 187.—*Amaurosis.*

Sometimes only one eye is diseased, and it is then not difficult to decide that disease of one portion of a hemisphere of the brain is present; but it more commonly follows ophthalmia of the periodic kind. As a symptom of other

diseases it will be found under the various subjects, and the proper treatment for which is also given ; as a disease *per se* it is incurable.

Squinting—Strabismus.

Among the lower animals this condition is never observed but as a result of disease. The irregular action of the muscles of the eyes, inducing an inward direction of the pupils—that is, one or both are turned towards the nose—is always due to some serious state of the brain, such as that caused by blood poisoning, lead poisoning, acute indigestion, inflammation of the brain, softening, tetanus, &c.

Diseases of the Appendages of the Eyes.

These are confined to the eyelids, brows, &c.

Ectropium.

This consists of eversion or turning outwards of the edges of the eyelids or eyelashes, by which the lining membrane is exposed, and the cornea (Fig. 188) is subject to irritation from atmospheric stimulation, giving rise to a copious flow of tears, conjunctivitis, and even specks and ulceration, a rare disease in the horse ; we do not remember having seen a case. Professor Williams saw one

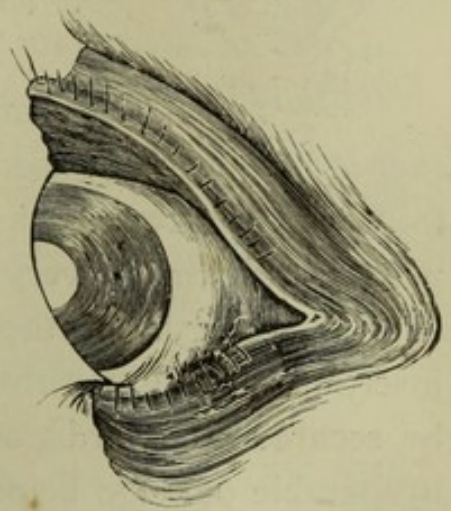


Fig. 188.—*Ectropium.*

Treatment.—The affected lid is to be withdrawn as far as practicable, and everted completely, when nitrate of silver is to be applied along the conjunctival membrane parallel with the eyelash ; the parts being carefully wiped afterwards,

to prevent any action on the eyeball. If the surface to which the caustic was applied is touched with a feather or pencil dipped in olive-oil, the possibility of danger will be lessened, if not entirely arrested. If this treatment, repeated at intervals of four or five days, does not succeed, it may be necessary to excise an elliptical portion from the conjunctival surface of sufficient size to cause the requisite contraction.

Entropium.

This is the opposite condition to ectropium, the edges of the eyelids being turned inwards, rubbing against the eyeball (Fig. 189), and producing a great amount of irritation and profuse lachrymation. The condition of the eyelids may be said to consist of the inner surface being too short, by which the outer skin is caused to bulge outwards, and the edges to be drawn inwards. It is occasionally seen in horses; more commonly in dogs of certain breeds.

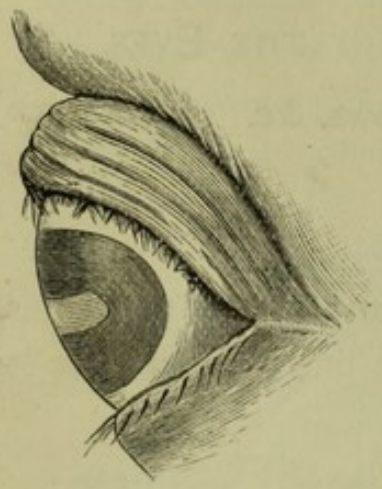


Fig. 189.—*Entropium.*

Treatment.—We have operated in several cases as follows:—The usual precautions being observed, an elliptical portion is excised from the relaxed portion of the lid, which is at that part where the skin is very thin, and should be executed as near the margin of the lid as consistent with safety, and insertion of sutures subsequently. The animal's head must be secured afterwards, or he may rub the parts, and commit irreparable damage before the parts are healed. A solution of pure carbolic acid will be found the best application, applied with a feather, or dropped upon a small piece of lint held by the sutures over the wound.

Occasionally the eyelashes only are observed to grow in-

wards, and create much irritation, the remedy for which is the treatment just given.

Laceration of the Eyelids.

These should be seen to at once, as by delay the portion hanging down may lose its vitality, and healing or union thus rendered quite impossible. Recent wounds may be readily closed by using fine pins, wire, or silk ; after which heal the wound, and secure the animal as directed under the preceding paragraph.

Warts occasionally are present, sometimes diffused over the surface entirely, giving the animal an unpleasant appearance. As such they are difficult to remove ; but when single and pedunculated, they are easily got rid of by ligatures placed round the neck or stalk, excision by the knife or actual cautery. Nitrate of silver, strong caustics, or the mineral acids, are used in dispersing the former kind.

Removing the Haw—Cutting out the Hacks.

After repeated attacks of inflammation the membrana nictitans or haw becomes enlarged and thickened, but beyond being somewhat limited in extent of its movements nothing worse is likely to ensue. It is, however, remarkable that in this enlightened nineteenth century there are owners of horses who are so considerate for the welfare of their animals, and men so eager to perform operations for supposed diseases, that considerable practice is done in some districts by men who hardly ever allow an animal to escape them.

It is commonly supposed by those not conversant with anatomy that the membrana nictitans, or haw, is at least a useless piece of mechanism, if not a morbid growth. In addition, being observed to participate more or less in inflammation of the eye, and mistaking its use in passing over the

front to wipe away foreign bodies in the absence of fingers, it is considered to be a cause of the disease, and is therefore doomed to removal by the knife.

The reader who happens to be ignorant of the absurdity of this practice is hereby informed that the haw is a cartilaginous or gristly body, placed in the inner angle of the eye in a bed of fat, which is continued to the back of the orbit. A muscle, called the "retractor" (Fig. 177, *c*), pulls the eyeball backwards when required, and this pressing on the mass of fat pushes it forwards on the inner side, and carries before it the haw (Fig. 190). By its peculiarity of shape, being triangular and concave on one side, it fits the eyeball accurately, while the other conforms by its convexity to the concavity of the lids, which guide it easily over the surface of the cornea. No one ever saw the lower animals attempt to remove foreign bodies from the eye as the human subject does, and, in the absence of the higher ability and intelligence, such a contrivance as we have described is at once the most unique and applicable. When men propose to remove such a necessary appendage on the strength of excuses that have no reasonable foundation, the proceeding is an imposture, and deserves to be treated in a summary manner; and when they have tortured an animal by the performance of the operation, those cognisant of it should immediately acquaint the Secretary of the Royal Society for the Prevention of Cruelty to Animals, Jermyn Street, St. James's, W., who would at once put a stop to any future attempts.

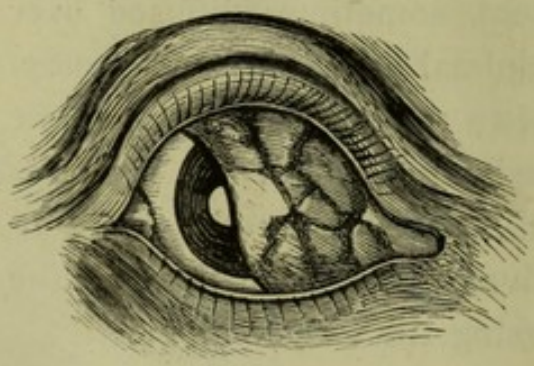


FIG. 190.—*The Eyeball partially covered by the Membrana Nictitans, or Haw.*

Fungus Hæmatodes.

Blood fungus or *bleeding cancer* consists of a dark-coloured, bloody-looking, or vascular fungoid tumour protruding from any part of the body, growing with a rapidity most surprising, and bleeding profusely, even to the great danger of the animal, upon the slightest disturbance. Although somewhat rare in the horse, it occasionally makes its appearance in the orbit, first as a small vascular tumour (Fig, 191), and by gradual enlargement pushes aside the eyeball, which, together with the bones around, are included in the morbid process. Death results in delayed cases from emaciation and hectic, the result of interference with natural functions as well as blood poisoning.



Fig. 191.—*Fungus Hæmatodes.*

Treatment.—In order to get rid of the malignant mass everything contained within the orbit must be removed by the knife, the raw surfaces being freely cauterised by the heated iron, a proceeding not only called for on account of the profuse hæmorrhage, but also to destroy the chances of the future development of the tumour. Constitutional remedies will be called for on account of the attendant fever, and must be prescribed as the symptoms indicate.

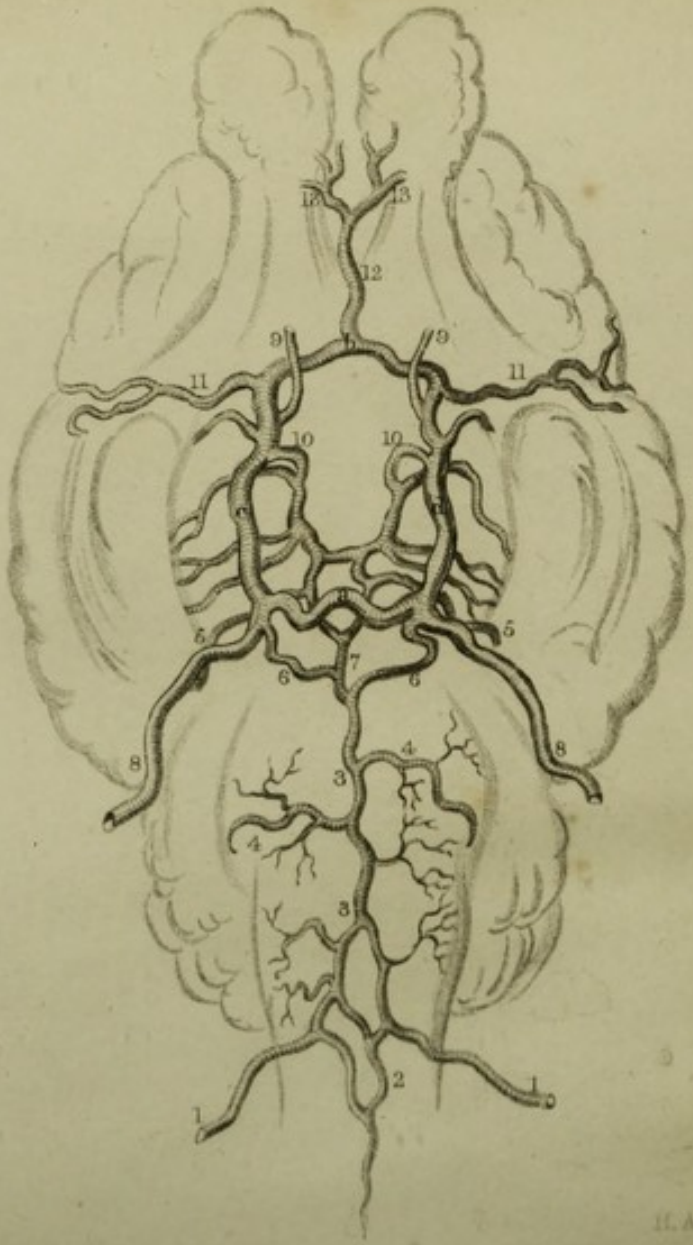
SECTION IX.

DISEASES OF THE NERVOUS SYSTEM.

Fig 1.



Fig 2.



DESCRIPTION OF PLATE VIII.

"THE BASE OF THE BRAIN, SHOWING ITS NERVES AND ARTERIES.

"FIG. 1.—*The Brain, showing the origin of the nerves.*—*A*, *A*, the hemispheres of the cerebrum; 1, 1, the first pair, or olfactory nerves, which confer the faculty of smell; *a*, the sinus, or cavity within the olfactory nerve, exposed; 2, the second pair, or optic nerves, upon the healthy state of which vision is dependent; *b*, the decussation, or rather junction, of the optic nerves; *c*, the corpus albicantium, or pituitary gland; *d*, the infundibulum, leading to and joining the corpus albicantium at the base of the brain; *e*, *e*, the crura cerebri; 3, the third pair, or motores oculorum, which go exclusively to the eye for motion; 4, the fourth pair, or pathetic nerves, which chiefly proceed to the superior oblique of the eye for motion; *f*, the pons Varolii; 5, 5, 5, 5, the fifth pair of nerves, or the first pair of mixed nerves, being distributed principally about the head for motion and sensation; although from these spring the gustatory nerves, or nerves of special sense. The subject from which this brain was taken had the fifth pair of nerves unusually developed; 6, 6, the sixth pair, or abducens, proceeding principally to the abductor muscle of the eye for motion; 7, 7, 7, 7, the seventh pair, or auditory nerves; being the second nerves of a mixed character which have originated from the base of the brain. This pair, however, are only motor and special; and do not include the sentient, as did the fifth

pair. They consist of two distinct branches. The portio mollis goes to the internal ear, for the special sense of hearing; the portio dura supplies the muscles of the face with motion; and hence is spoken of as the facial nerve. 8, 8, a third nerve of a mixed character, named the pneumogastric, principally connecting the brain with the functions of organic life, presided over by a distinct set of nerves, called the sympathetic. It divides into three branches:—(1) the glosso-pharyngeus, proceeding to the tongue and pharynx; (2) the pneumogastric, distributed to the larynx, thorax, and abdomen; and (3) the spinal accessory (the small nerve seen to join it coming from the spinal marrow), which ramifies upon the neck; 9, 9, the lingual, conferring motion upon the tongue; 10, 10, those which are called the tenth pair do not belong to the cranial nerves, but really are the first spinal; *g*, the medulla oblongata; *h*, *h*, the anterior lobes of the cerebrum; *i*, *i*, the posterior lobes of the cerebrum; *j*, *j*, the small middle lobes of the cerebrum; *k*, *k*, the cerebellum.

FIG. 2.—*The Arteries of the Brain.*—1, 1, the vertebrals; 2, the inferior spinal about to become a single vessel; 3, 3, the basilar, giving off transverse branches on either side; 4, 4, the posterior cerebellar; 5, 5, the anterior cerebellar; 6, 6, right and left communicating arteries, connecting the basilar with the circulus arteriosis; 7, the middle communicating artery, connecting the basilar with the posterior transverse artery; 8, 8, internal carotids; 9, 9, the ophthalmics; 10, 10, the posterior cerebral; 11, 11, the middle cerebral; 12, the anterior cerebral, dividing into, 13, 13, the right and left anterior cerebral; *a*, *b*, *c*, *d*, represents the circulus arteriosis, or circle of Willis; formed by the carotids, which divide into, *a*, the posterior transverse; *b*, the anterior transverse; *c*, the left lateral; and *d*, the right lateral communicating arteries."

DISEASES OF THE NERVOUS SYSTEM.

THE category of diseases which can be included under the above title is by no means an extended one. As far as the horse is concerned they are few, and for the most part not easily defined. Although he is gifted with mental powers of a high order as compared with some animals, yet he possesses not the least of those which operate with such potency in mankind; and on this account he is doubtless spared much suffering. Nervous affections are also as a rule few, probably the most frequent being tetanus and inflammation of the spine.

PHRENITIS—INFLAMMATION OF THE BRAIN.

Synonyms.— Mad-staggers, frenzy, cerebro-meningitis, encephalitis, inflammation of the brain and its coverings.

We have already referred to this as a symptomatic affection in conjunction with impaction of the stomach, at page 307; it will now be considered as it arises from other causes.

Nature.—Phrenitis consists of an inflamed condition of the brain and its membranous envelopes, giving rise to effusion within the ventricles and spaces between the brain and membranes, together with exudation of lymph upon the brain itself. Phrenitis in its most common form is witnessed

occasionally as an enzoötic disease, resulting from overfeeding upon particular kinds of green food, of which rye-grass appears to be the most baneful.

Symptoms.—The attack is usually commenced by stupor and listnessness. As the animal slowly eats his food he becomes drowsy, nods, and sleeps with portions of his meal within the lips or teeth, the breathing being slower and louder, or snoring, than natural (Fig. 192.) The circulation is also slow, the pulse rarely numbering more than twenty-five or thirty beats; but it possesses volume. If during this stage of somnolence the animal is roused by loud or strange sounds, he stares round about him affrighted, but soon resumes the sleepy condition if left to himself, and seeks to thrust his head against the wall or manger. Occasionally such attacks are succeeded by rearing up, hanging back, breaking loose, tearing with the fore-feet at the rack and manger. Somewhat later the visible mucous membranes are injected, and at times of a yellow colour; temperature of the body is variable, at one time cold, and shortly the skin is bathed in perspiration; the superficial muscles are observed to twitch violently, and general convulsions seize the frame, giving rise to peculiar and hard breathing, the animal exhibiting the characters of tetanus or lock-jaw; the eyes are wide and staring, but he is now quite blind; urine is discharged voluntarily, and the pulse assumes a hard and wiry sensation under the finger. Debility succeeds each attack, from which the sufferer totters, falls, and struggles

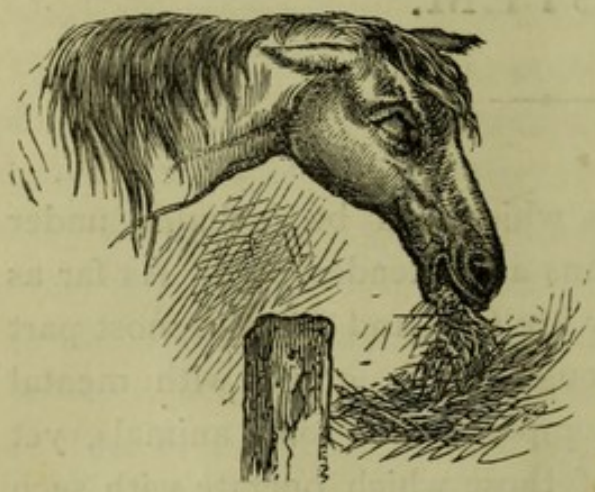


FIG. 192.
Phrenitis—The sleepy stage.

in convulsive action for some time; after which quiescence and consciousness partially return, and upon rising he seeks for food, but from his movements and liability to run against everything it is plain that blindness has become quite developed. In some instances the eyelids droop and cover the organ, the lips and tongue are paralysed, and hang flaccid and useless, and the animal is more or less dull and unconscious from first to last; while other cases are marked by a series of alternate fits of madness and stupor. When the attack seizes the animal at grass, he is generally found thrusting his head firmly against some stationary object for support, the limbs being subject to peculiar contortions.

The bowels are obstinately constipated; the urine is very scanty, having a deep brown colour; and, in consequence of arrestment being placed on the function of the liver, absorption of bile is shown by the yellow colour of all the tissues.

As the end approaches the attacks of frenzy are more frequent, but violent and short; while intervening stages of coma are likewise prolonged and intensified. Each attack of convulsions gives rise to greater weakness; the pulse becomes small, frequent, and wiry; the breathing difficult and snoring; the legs tremble and bend; the animal falls, and he dies sometimes in distressing convulsions, or quietly passes away in utter insensibility.

Causes.—While experience appears to point to the fact that isolated cases may depend upon impaction of the stomach with ordinary food, it is nevertheless highly probable that other causes exist, and operate largely in the production of the enzoötic form. The disease prevails perhaps more extensively in Scotland than in any other part of Great Britain, and is traced to the effects of rye-grass, which by some authorities is believed to possess narcotic or toxic properties; while others trace to the grass the

existence of peculiar irritant effects in the beard or hair-like processes growing on the ear. During seasons of scarcity and unusual dryness we have observed this affection to prevail; an occurrence believed to be due to the animals being compelled to consume the harder and coarser kinds of grass, particularly rye-grass in seed. Besides, it is known that darnel-grass (the *Lolium temulentum*, or "sturdy") gives rise to it, numerous instances being on record of extensive enzoötic attacks among horses being observed on the Continent, as well as in Britain among other animals. Musty hay and rusty straw (red-rag, or red-robin, caused by the fungus *Uredo rubigo*) have been included among the number of causes, when, from scarcity of other food and character of season, animals have little besides for food.

Post-mortem Appearances.—Viewing the origin of phrenitis as being in some toxic principle of food, the event of impaction of the stomach must not be regarded as material to the case; the condition of the mucous lining being reddened and congested has greater significance, and points to the action of some local irritant. The organ may be empty, or only partially filled. The lungs are congested, dark-coloured, and heavier than natural; the brain with its coverings are also congested, and readily lacerated, the substance of the former being darker than in health; and when divided by the knife exhibits the characteristic red points. The lateral ventricles are filled with a thin fluid, and the network of vessels—plexus choroides—swollen, engorged with blood, and may be covered with a film of plastic exudation. When paralysis has attended the seizure, the spinal cord and membranes at the loins exhibit states similar to those common to the brain, to which softening of the substance may be added. Severe and protracted cases, especially in aged animals, do not terminate favourably; those that are young and vigorous, and in which the symptoms are but

slight, usually recover even when paralysis has been present. When the latter complication exists the animal is liable to struggle, hurt, and exhaust himself, and by these untoward conditions retard or prevent recovery.

Treatment.—Full and copious bleeding has a marked beneficial effect when adopted early, and while the pulse is full and strong; beyond this stage it is positively hurtful. The next course is to administer a strong purgative, at least ten drams of aloes for a large dray-horse, smaller doses in proportion. Some practitioners substitute one dram of calomel for two drams of the aloes, thus reducing the latter to eight drams. The animal must have ample allowances of drinking-water; the head kept cool by cold ablutions, wet rags or evaporating lotions; and enemas of warm soap and water thrown up several times daily, in order to expedite the action of the purgative. In addition, give him perfect quiet and solitude; and should attacks of violence ensue, the excitement may be combated by the subcutaneous injection of solution of atropine, or a mixture of tincture of belladonna and prussic acid. The purgative will not act probably under sixty hours, but as long as signs are abating, and return of consciousness is evident, however slow, we must forbid active interference. In case no response is made after three days, an additional dose of two or three drams may be given. Ammonia as a stimulant may be used under depression or exhaustion, but it will be best to use only small doses, and so avoid any tendency to excitement. The iodide and bromide of potassium, with alternate doses of strychnine, are valuable agents for subsequent use; the first to induce reabsorption of exudation and effusion, the latter to increase nervous tone and power.

Great care must be exercised in the allowance of food, both as to quantity and quality, throughout the attack; and as convalescence proceeds, the caution should also be ob-

served, particularly avoiding such kinds as were known to give rise to the disorder.

Inflammation of the Substance of the Brain.

Cerebritis or inflammation of the substance of the brain only is not a common disease, and although its presence may be suspected, it is not always identified until after death. The disease is usually associated with strangles in young horses, or suppurative catarrh in older ones, and occasionally arises without any evidence of such diseases.

The *symptoms* are by no means constant or uniform in every case, the original disease having a tendency to lead the observer somewhat away from the advent of brain disorder; but at length drowsiness, dragging of the feet and legs, paralysis of the ear, eyelid, jaw, or lip of one or both sides, unconsciousness, hard and loud breathing, total blindness, paralysis of portions of the body, one or more limbs, and eventually death. In some cases, particular or special signs are present; the sufferer maintains an obstinate practice of going backwards, forwards, round in a circle, or, if standing, to keep up some continual movement with one or more limbs—pawing uneasily with one, stamping with another, see-sawing with the head, &c. During this time the pulse is somewhat full and very slow, and for a time the appetite is good; and even when paralysis of the lips, &c., has commenced, he will persevere in the attempt to eat. At length he becomes weak and exhausted, and falls to the ground; and if paralysed before that takes place, he struggles and dies in occasional convulsions, or otherwise in perfect coma. Urine and fæces are often passed involuntarily during the disease, or the bowels may be obstinately constipated until near the termination.

Post-mortem Appearances.—One or more abscesses are

found within the substance of the brain—the medullary matter—around which the characteristic red points are visible. The situation of the abscesses vary, but generally are found near the anterior or front portions. We have found them occupying entirely the anterior lobes and destroying the olfactory bulbs, and a single abscess we have noticed situate between these in the *corpus callosum.*

Treatment.—Success is very doubtful, and the only measures needed to be observed are those which insure a regular state of the bowels at the outset, such as cathartics, &c. In those cases not accompanied by paralysis, it may be possible to avert the extension of abscess, and promote resolution. Professor Williams cites an important case which appears to justify this view, and encourage trial even when abscess is suspected. On the whole, however, the prospects are very shadowy.

Epilepsy.

We have already referred to an epileptic form of disease common to the horse, and described at page 244, as megrims or vertigo, being the result of an excess of blood in the brain from an interrupted flow by reason of the pressure of a tight collar. We have now to notice an affection named epilepsy—a disease of the brain in some instances, in others showing no disease whatever of that organ, and probably owing to some peculiar condition of the blood, or remote cause producing a diminished supply of blood and nutrition to the brain. Apart from the presence of abscess, ossification, or tumours, &c., affecting the brain, pathologists are of the opinion that some lesion of that organ always exists in true epilepsy, and that apparent health is no proof to the contrary—degeneration of nerve tissue or other occult states being the cause.

Symptoms.—Epilepsy is apt to be confounded with other diseases of the nervous system. The prominent and diagnostic sign, however, may be accepted to be the suddenness of attack; an animal in apparent health stands still in his stall or during a walk, stares wildly, shakes and throws up the head, and falls on the ground insensible; the eyes are closed, and the whole frame thrown into a succession of violent convulsive spasms, contractions, and contortions. If the eyelids are raised the eye itself is observed to be equally convulsed, and turned inwards—towards the nose—constituting the appearance of squinting; occasionally it is fixed. The urine and fæces are voided without effort, and during the convulsions the pulse is frequent and hard, or intermittent; sudden partial sweats break out over the body, and owing to the absence of controlling power the breathing becomes what is known as stertorous. Epilepsy, as distinct from megrims or vertigo, may take place in the stable, at pasture, when at rest under any condition, as well as during work; but moving the collar forward, or doing away with it altogether, does not cause the disease to disappear. Some horses habitually shake the head, being irritated by ill-fitting or heavy bridles and head-stalls, but the cause of such will be so readily apparent that the movement can hardly be confounded with the first signs of epilepsy. Recovery from the attack is speedy.

Treatment.—If worms are suspected to be present, or any other irritant known to be lodged in the bowels, the appropriate remedies (*see* Worms) are to be administered. If young animals are affected, let the mouth be examined, shell-teeth removed, and swollen gums lanced to hasten the eruption of permanent teeth. When congestion of the brain or medulla oblongata is believed to be present, repeated doses of the extracts of belladonna or hyoscyamus with nitrate of potash will be useful. A moderate purgative is

always beneficial, and after some time iron tonics may be prescribed.

Chorea.

The most common and harmless form of this affection in the horse is known as "stringhalt," characterised by a remarkably quick movement of the hind-limbs during progression, the fetlock being suddenly jerked upwards, almost, nay often, touching the abdomen. In extended and aggravated forms it may be seen to affect the muscles of the face, neck, or fore-limbs. The affection of the hind-limb is not always constant, but variable during movement. In turning round, the limb is suddenly caught up and returned to the ground with violence ; sometimes this may not be noticed. In starting, the twitching may be violent for some distance, or it comes on only after a few steps ; sometimes it may be uniform and constant, but not violent, throughout work.

The *causes* are various. Rheumatism of the locality, affections of the nerve going to the part, as inflammation, or congestion ; sometimes these arise from irritation as the result of bone spavin. Melanotic tumours have been known to cause stringhalt, when involving the crural nerve.

Other forms of chorea are known—as *coma*, *shivering*, &c.—which we proceed to notice.

Coma,

More generally known as *sleepy staggers*, *coma somnolentum*—*immobilité* of the French.

Symptoms.—The animal is particularly dull and sluggish at work and rest. As he eats he appears to fall asleep with food between the teeth ; the breathing is heavy, slow, and deep ; the pulse full, and rarely numbering more than twenty-four beats in the minute. In later stages of the disease the animal

becomes acutely sensitive to loud sharp noises, the crack of a whip causing him to start and fall upon his knees. When caused to turn round suddenly, he drops on the ground; or he proves so ungainly by the hind-limbs being singly raised an unusual height, thrown round, and planted awkwardly at a long distance from each other, in which position the animal becomes for a time fixed and immovable. Sometimes the legs are crossed, or otherwise far in advance of or behind the body, and the position is maintained for some time; the hind-quarters swing from side to side, indicating a great want of nervous controlling power. Animals thus affected are known amongst grooms and horse-dealers as being "kinked in the back," "jerked," &c.; they are also called "kidney-droppers." The cause is probably degeneration of nervous tissue—that of the spinal cord most likely; but the brain is sometimes likewise affected, and these lead to irregular muscular action; it may be disease of the muscles also.

Shivering.

Shivering or trembling is a remarkable condition. The animal, when suddenly frightened or caused to go backwards, immediately falls into a violent paroxysm of nervous contortions. The hind-legs are alternately raised high and rapidly spread widely apart, and returned to the ground with force. The feet are brought under the abdomen, almost close to the fore ones, which are much in advance of the body; this causes the hocks to approximate the ground and give the animal the appearance of sitting on his haunches, the whole body and limbs being convulsed; the head is also raised, the nose pointing upwards, the eyeball retracted as in tetanus (Fig. 193), while the lips, ears, and neck are correspondingly convulsed. The tail moves rapidly upwards and downwards during the paroxysm, which gradually subsides

if the animal be not disturbed. The writer has a vivid recollection of a mare thus affected, which exhibited these signs most intensely when undergoing the operation of being shod. When but a youth, but having formed a desire to understand the ailments of domestic animals, he was doubt-



FIG. 193.—*The Shiverer.*

less often, though unintentionally, wearisome to the shoeing-smiths by his numerous questions and observations. One day the mare under notice was in the forge, standing quietly enough, when one of the men suggested something wrong in one of the fore-feet which would be worth observing. As soon as the leg was touched all the limbs shot out violently, and together with the whole frame was alarmingly convulsed, the inquirer being thrown to the ground by a severe blow of the hind-foot. This mare it was proved came from stock similarly affected; and a foal she bred, although the sire was sound, exhibited corresponding signs at four years old. Another case was accidentally brought under the writer's notice in 1852. The signs had perplexed several persons,

and the owner, far from being satisfied, determined to have the mare shot. For this purpose she was being led away, and as we saw her an attack had commenced, at the termination of which we expressed an opinion as to the cause. After death the head was obtained and we took out the brain, in the lateral ventricles of which two pyriform tumours existed, attached to the choroid plexuses, exactly confirming the conjecture made when consulted by the owner. Since that time at least half a dozen cases have come before us, and we have in each discovered the presence of similar tumours. We have reason, however, to believe that some peculiar form of nerve tissue degeneration may equally give rise to the phenomena of the disease.

Treatment.—Nothing of efficacy has been suggested beyond avoiding the known causes of excitement.

Softening of the Brain.

When, from disease of the nutrient vessels of the brain, the blood supply is limited, inflammation of the substance assumes a chronic form, or congestion is protracted and more or less constant, softening sometimes follows. The brain in some particular part loses its firmness and white colour, becomes dark, soft, and gelatinous.

The *symptoms* are shown in the loss of power, generally of one side of the head and face, and extending to the larynx produces roaring and difficulty of breathing. Thus it is confined to one half of the brain ; when both are affected, corresponding organs of both sides are then paralysed, and perhaps, in addition, some part of the body also. An aged horse, the subject of previous attacks of acute indigestion—impaction of the stomach—with cerebral complications, became affected with suspected softening of the brain. He constantly waved the head from side to side ; the eyelids

sunk and the ears drooped, but for some time nothing further was noticed. At length he was seized with indigestion again, which gave way to convulsions, in which he died. The brain was softened anteriorly at the olfactory bulbs, involving a considerable portion of the substance.

It is remarked that, in most cases of chronic disease of the cerebral substance, there is an accompanying ravenous appetite; and enlargement of the heart too is observed, with atrophy of the walls and valvular insufficiency, which lead to œdema of the legs, sheath, and abdomen, and blood changes, as seen in the spots of ecchymosis after death. (*See* the illustrative case described hereafter under "Spinitis.")

Cerebral Apoplexy.

In consequence, it may be, of some peculiar and occult disease of brain tissue or of the nutrient vessels, pressure arising from sudden determination of blood cannot be endured without seriously affecting the nervous functions. Occasionally the bloodvessels are so degenerated that rupture takes place under an increased supply and pressure of blood, and extravasation ensues with more or less fatal consequences.

Symptoms.—There are, in some few cases only, such premonitory signs as dulness, want of co-ordinate power, reeling gait, restlessness, &c., but under ordinary circumstances the attacks are sudden and without any warning: a horse, apparently well and consuming his daily allowance of food, falls helpless, insensible, and paralysed; there is no sensation in the skin, or power of motion; the heart and lungs only continue to perform their functions; the eyes are wide open and staring, but the animal is blind—amaurosis. The breathing is long, loud, and deep—stertorous; and owing to the obstruction thus placed on the circulation the pulse is

usually small, and inclined to be thready; the mouth is open and contains much frothy saliva, and from the relaxed condition of the sphincter muscles urine and fæces pass away without effort on the part of the animal; the legs are not rigid but mobile, and the muscles are flaccid. When consciousness is partially retained the animal is likely to do himself much damage from severe struggling and fighting in the convulsive attacks, during which the head and croup are drawn backwards, causing the spine to form an arch in that direction—opisthotonos—the hind-limbs being extended backwards as far as possible; the eyeballs are spasmodically affected, pupils alternately contracted or dilated, sometimes fixed in one of these conditions; or one only may be affected, and sometimes they may not be otherwise than natural in appearance. The respiratory movements are likewise affected spasmodically, alternately loud, or sighing as if in pain. These signs continue to be alternate with periods of quiescence, when from renewed pressure or extravasation the disease becomes augmented, the animal is exhausted, and he dies in a state of unconsciousness—coma.

Treatment is usually hopeless. Bleeding during the comatose state has proved beneficial in some cases by relieving brain pressure, but must not be practised in any other stage. The timely use of purgatives proves highly serviceable as derivatives, especially when supplemented by strong liniment applied to the loins and spine; internally, belladonna, to overcome the brain congestion, and afterwards nux vomica or strychnine, to give tone to the nervous tissue. Recovery under these means is rarely more than partial and delusive; the animal regains apparently his former state, when a second attack lays him prostrate, from which he never recovers or gains consciousness.

DISEASES, &c., OF THE SPINAL CORD AND ITS COVERINGS.

Paralysis.

We have had occasion to refer to paralysis or loss of motor power in connexion with other diseases, and depending upon functional or structural derangement of the brain. We have now to consider it as an affection due to some lesion of the spinal cord or nerves given off from it. Loss of the power of motion is but a sign of some disease or injury, and as the form of paralysis varies with the locality of the injury and parts involved, various terms are employed by which the nature of the disease is more directly alluded to; thus, when one-half of the body, including both sides, such as the hind-quarters, are incapable of motion, the disease is known as *paraplegia;* if one-half or one side of the body is affected, it is then called *hemiplegia.* The term paralysis is one of general character, and often is applied to the loss of motor power in a particular part from injury to a single nerve, as to any member or series of members of the body.

Paralysis generally arises from disease or injury to the spinal cord, and the loss of power is observed in those parts to which these nerves are distributed, which are given off from the cord posterior or behind the seat of disease; thus blows, &c., inflicting injury over the sacrum, would produce paralysis of the tail; fracture of the spinal column in the loins would deprive the hind-quarters of motion; and when a horse breaks his neck, then the whole body and limbs are affected; when an injury occurs to the spinal column close to the head, and sometimes when pressure arises from too much blood, that part of the cord known as the *medulla oblongata* (*see* Plate IX.) suffers, and the result is stertorous, or loud and deep breathing, or perhaps death from suffocation, involving

the phrenic nerve, which goes to the diaphragm and regulates the act of respiration, and is given off at this part.

Occasionally the bones of the vertebræ are displaced without fracture, and paralysis may arise from pressure. Sometimes both fracture and displacement are present, yet the animal may not then suffer from loss of power; but later the consequences of inflammation, which are set up as the reparative process, induce pressure and paralysis, but as a rule the disease quickly follows any serious injury of the vertebral column; paralysis, as usually observed, then results from disease in, or injury to, or a combination of both, in the spinal cord and its coverings, the various forms in which loss of motor power, and sensation probably, being distinguished by the terms already given.

Spinitis — Myelitis — Acute Paralysis — Spinal Meningitis—Inflammation of the Spinal Cord and its Membranes.

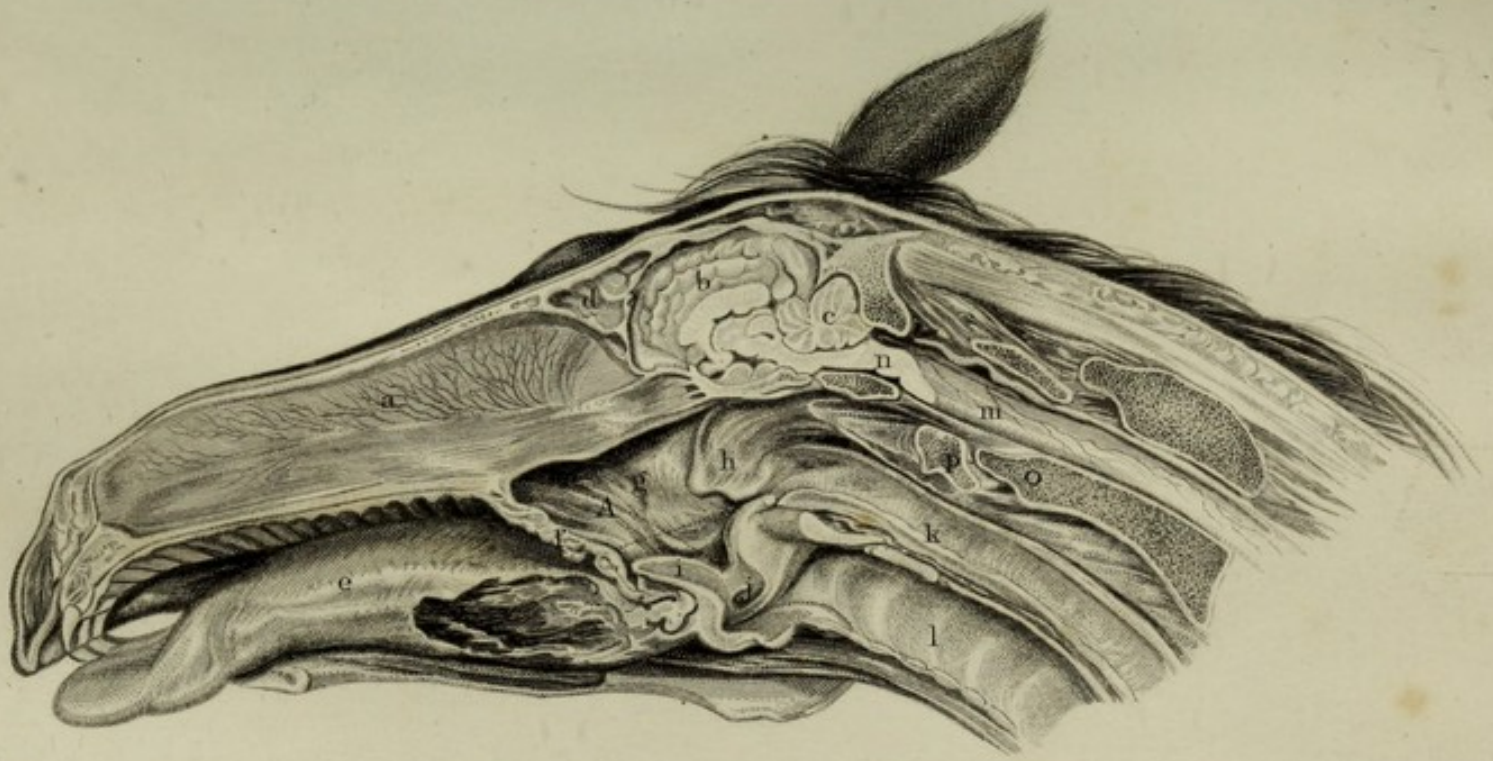
Under these terms we now proceed to offer a few observations on disease of the spinal cord, as it occurs in the idiopathic form.

Symptoms.—These are by no means uniform. Paralysis approaches gradually in some cases, in others it is preceded by cramps, spasms, or convulsions; and it may arise suddenly without having given rise to any signs of previous ill-health. In the latter form of spinitis there is a possibility of mistaking the cause for fracture or displacement of some portion of the vertebræ, thus when the hind-quarters are paralysed—paraplegia—injury of the lumbar vertebræ is suspected; subsequent study of the case, however, will lead to the correct conclusion. There is attendant fever, constipation of the bowels, the secretion of urine diminished, with general signs of systemic disturbance.

DESCRIPTION OF PLATE IX.

"THE RIGHT DIVISION OF THE HEAD A LITTLE TO THE LEFT OF THE MEDIAN LINE.

"*a*, The septum nasi, or cartilaginous wall which separates the nostrils. The Schneiderian membrane is still upon the cartilage, consequently the ramifications of the vessels are faithfully delineated; *b*, the cerebrum; *c*, the cerebellum; *d*, the frontal and facial sinuses; *e*, the tongue; *f*, the soft palate, showing its pendulous condition as well as its inclination backwards; *g*, the fauces. The lines crossing this part denote the courses taken by the food and air as they enter the stomach or lungs to nourish the body; showing, likewise, that these cross each other; *h*, the bag of the pharynx; *A*, the opening of the nostrils; *i*, the epiglottis; *j*, the larynx; *k*, the œsophagus, or gullet; *l*, the trachea; *m*, the spinal marrow, covered by the arachnoid: part of the dura mater, or outer covering of the spinal cord, may be seen immediately above, in a line which waves anteriorly; *n*, the spinal marrow, in its passage through the foramen magnum, divested of its coverings; *o*, the tooth-like process, whence the second cervical vertebra is called the dentata; *p*, the cup of the atlas, into which the process of the dentata fits."



W. Bagg ad.nat. del.

E. Adlard sc.

The following record, from the writer's collection of cases, as it appeared in the journal of the day,* will afford the reader a general idea of the character and course of the malady, as it appears in the more gradual and chronic forms :—

"My attention was directed to a young mare, on Sunday, the 16th of April last, by a friend to whom the animal had been submitted for an examination and opinion, as the case possessed remarkable features. It may add to the interest of the reader by entering into the particulars of the history of the animal from the first.

"The earliest accounts we have of her are, that while yet only a little over a year old she was in the hands of a butcher at Framwellgate, near Durham, who stated he bred her from a half-bred mare of the Cleveland stamp, by a horse of similar make with a degree of blood on his side. There was every indication of the development of great strength in the animal, being possessed of well-formed parts; in fact, unusually so for one of her age, the only apparent defect in conformation being in the heavy head and jaws.

"At the time above named, the owner was frequently observed driving from Newcastle market to his home, a distance of twelve miles, at a most unwarrantable speed; in fact, the young creature was looked upon as a prodigy; and the owner, like too many of his class, was often found stopping a length of time at a public-house on the way, leaving the mare, covered with perspiration, standing harnessed to the vehicle at the door.

"About December last signs of dulness came on, with tendency to hang the head, &c., and for which Mr. G. Farrow, M.R.C.V.S., Durham, prescribed. These symptoms shortly disappeared, but for a short time only, when dropping

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* *Edinburgh Veterinary Review*, vol. i. New Series, p. 569. 1865.

of one ear and eyelid, with hanging of the lip, was observed. Blisters on the poll and laxative medicines were prescribed in this instance, and produced slight relief.

"Matters went on thus, and the owner began to feel disconcerted, and at the usual March fair at Durham she was exposed for sale.

"Another butcher, living near me, who had entertained a great desire to possess the mare—but knowing nothing of her ailment—proceeded to Durham on the information that the owner had her for sale. The animal, however, had been disposed of to a horse-coper, and from him my neighbour purchased her. A few days after the symptoms made their appearance, and a friend was consulted. Little satisfaction was gained by the purchase of an animal which had once appeared so promising; treatment afforded no relief. When used in the cart great danger was apprehended, and at length she was turned aside loose in the stable.

"At the time I first saw her, on the date named above, and a little more than a fortnight after the purchase, the symptoms were aggravated, and somewhat as follows:—

"The mare was standing reversed in the stall, exhibiting signs of great uneasiness; loins arched, and stiffness of all the extremities; flanks tucked up, and covered with perspiration; pulse 96, and oppressed; mucous membranes injected; respiration regular, but long and louder than normal. Urine and fæces had been passed without difficulty during the day and preceding night. As she stands she trembles much, and scrapes with alternate fore-feet, and afterwards turns round repeatedly in the stall, but with very great difficulty, as nearly in a circle as circumstances will admit, exhibiting every likelihood of a fall to the ground. The breathing becomes excited and stertorous, but is described as not being so bad during these paroxysms as it occurred a few days ago. The eyes are bright and glistening, and

the ears appear to be active ; but when examined carefully, and especially when she stands a few seconds, the eyelid, ear, and lip of the left side hang pendulous, the former giving the appearance of sleep. As soon, however, as the usual gyrations are again commenced muscular action takes place, and they are moved spasmodically, but not freely. The attendant excitement is evidently increasing, together with the great tendency to fall ; the feet are raised inordinately high when she moves—there is no proper control over their action, and she reels very much. A small quantity of dung was passed in my presence, and I noticed the tail was scarcely raised, and the fæcal matter was evacuated in almost a passive manner. On pinching or pricking the the skin there was only slight evidence of pain ; the insensibility in the hind-quarters was even more intense.

"In an hour she had fallen, and was unable to rise. I destroyed her by taking up the carotid artery of the right side.

"*Post-mortem* examination, Monday, 17th April, at five P.M. —The animal had bled well, as evinced by the pale condition of the muscles of the trunk, limbs, &c.

"The liver was the only diseased portion within the abdomen. It was of a pale drab colour, easily torn, and contained no secretion or blood. Upon the posterior surface of the lobus Spigelii was an emphysematous swelling, about the size of a crown-piece in area, and raised in the form of a half sphere, to the extent of one and a half inches. The substance of the gland was soft and pasty, and of the same colour as the outside. Structure throughout irrecognisable. The heart weighed nearly eight pounds. The auricles, especially that on the right side, were extremely thin and membranous in several places ; the finger inserted beneath could be plainly seen from the upper side. The right ventricle was greatly dilated, and flabby. Water poured down the pul-

monary artery entered the right ventricle without the least opposition. Water poured down the aorta did not descend into the left ventricle without obstruction, but eventually did so, although very slowly. The auriculo-ventricular and semi-lunar valves were dark-coloured, thickened, and semi-opaque. Small shreds of reddened fibrine were scattered over the inner surfaces of the ventricles, adhering to the *chordæ tendinæ* and valves. Symptoms of blood changes were present in the shape of black patches beneath the endocardium, within and outside the organ. In other respects the animal appeared beautifully healthy.

"The spinal cord was exposed throughout its entire length, the whole chain of bones being softened, infiltrated, and of a deep red colour from the presence of blood within the cancellated structure. In almost every part the cord was surrounded by fat, some portions of which were of a bright yellow colour, and in others darker, with a tinge of red. Over the points of origin of the first and second dorsal nerves was a great accumulation of fat, the nerves themselves being of a dirty violet colour for some distance. From this part towards the head the cord was enlarged in places, the dura mater being united to it by adventitious matter thrown out by the arachnoid membrane. In no portion, however, did the cord fill the canal; it exhibited enlargements here and there, with constrictions, as if a sharp thread had been tightly tied round it, and altogether atrophied, the membranes surrounding it being filled by a thin reddish-looking fluid, particularly in the mid-cervical and lumbar regions. Bloodvessels throughout congested. The brain was congested on the supra-lateral parts of each hemisphere, and also over the base. The lateral ventricles were normal. The third ventricle contained a moderate quantity of transparent, colourless fluid; the fourth was nearly filled.

"A stiff, creamy-looking matter was deposited thickly on

the upper surface of the *medulla oblongata*, covering the posterior surface of the cerebellum to the extent of three-eighths of an inch forwards and upwards, and extending downwards on each side along the base of the brain, as far as the origin of the optic nerves. The depressions (sulc" which separate the various objects recognised in this locality were completely filled by it, particularly the *tuber cinereum* and posterior perforated space, and also round the origin of the second, third, fourth, and fifth pairs of nerves. It also extended backwards on the medulla to the extent of two inches ; here it was thick and creamy.

"The substance of the brain proper, and also cerebellum, appeared perfectly well developed and healthy.

"*General Remarks.*—We need not be at any loss how to account for the disease in the subject of the above notice. Work, irregular in its imposition and uncertain in its duration, produces effects of the most pernicious nature, even in seasoned animals, and will recur with double effect on the young and immature. At times the animal was employed in carting work—drawing stones, &c., for builders, material for the repair of roads, or coals from the neighbouring collieries ; and at others, as we have seen, doing her fourteen miles an hour, with three or four roystering fellows in a heavy vehicle, which is erroneously called a 'light cart.' At twelve months old the bit was put into her mouth, and in three weeks, or thereabouts, she was put to work as we have described, being considered fully broken in, and possessing a very docile spirit, soon was denominated 'a favourite ;' but taking into account the treatment inflicted, I cannot for my part understand the term.

"Throughout the succeeding twelve or fourteen months this treatment was regularly imposed, and the young creature was considered to be a promising specimen of great speed and bodily strength. From the mode of usage several

attacks of influenza supervened, which in each, save one, domestic treatment was allowed to suffice. There may have existed an inherent predisposition towards the cerebral and meningeal affection by natural capacity and other causes, depending upon unusual heaviness and unsymmetrical form of the head and upper part of the neck, which would favour the existence or prolong the action of disease in the locality. The appetite was stated to be always 'first rate,' and, taking into account the ignorance which prevails as to the recognition of a healthy consumption and a ravenous craving, we may not inaptly conclude that evidences are not wanting to establish the fact that the desire for food was inordinate. The last owner stated she was always ready for food, and would 'eat anything.' The attacks of influenza are also stated to have generally affected the head, the prevailing symptoms being dulness, prostration, and tendency to coma, with sore throat, &c. The rational conclusions to be arrived at in the case are also materially assisted by the knowledge that the creature was only a little over two years old when an end was put to her existence."

In addition to the category of signs which have been detailed in connexion with the foregoing record, it not uncommonly happens that the animal crosses the legs very awkwardly in walking, and, notwithstanding the extreme loss of motor power, the skin sometimes is affected with hyperæsthesia, or unusual sensitiveness, so much so that the animal dreads being touched, or even the movement of a hair. Such indications point to the inflamed state of the coverings of the spinal cord.

Further *post-mortem* revelations exist in softening of the substance of the cord, thickening of the membranes from interstitial deposit, and presence of an exudate or sero-purulent or reddish-coloured serum in the subarachnoid spaces. In idiopathic spinitis the membranes do not adhere to the bones by adventitious tissue, thus furnishing a distinctive

feature between this form and that arising from fracture and injury to the bones. The disease may be associated with rheumatism, and Professor Williams produces forcible testimony in favour of the hereditary tendency of the disease.*

Treatment.—The acute form of the affection should be treated by bloodletting, purgatives, and the neutral salts, aconite, &c., Nos. 13, 14, 43, 44, 51, 52, 110. The extracts of hyoscyamus or belladonna may be advantageously combined with the purgative medicine, as calculated to afford a soothing effect on the already excited and congested state of the spinal cord and membranes. After the subsidence of the active signs, the object will be to reduce the cause of irritation which maintains the spasms, &c., that cause being the exuded and effused fluids within the spaces. The iodide and bromide of potassium, with nitrate of potash, and later with gentian, will be appropriate remedies. As the tendency to weakness and prostration is very great, the practitioner will avoid the excess of depletion at the outset. The bladder must be evacuated regularly by means of the catheter, the rectum by enemas, and the comfort of the animal promoted by frequent turning and alteration of position, clean bedding, clothing, easily digested food, roots, &c.

TETANUS—TRISMUS—LOCKED-JAW.

The horse is singularly liable to this peculiar nervous disease, two forms of which are observed—traumatic and idiopathic—each differing in the mode of origin.

Traumatic tetanus, as the word implies, arises from wounds received accidentally, or which have been specially produced, as in surgical operations; when docking and nicking were practised more extensively than at the present tetanus was

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* Principles and Practice of Veterinary Surgery, p. 232. First Edition.

much more common; it follows wounds, punctures, &c. of the feet, joints, and tendons; fractures of bones; various diseases, as strangles; operations, as firing, blistering, and castration; and a common cause exists in the insinuation of particles of dirt in a wound, or use of rusty knives, punctures by rusty nails, or presence of broken portions of iron points or steel instruments.

Idiopathic tetanus arises from no obvious cause; that is, we cannot detect the origin or first impulse, and thus bring it clearly to the account of any one cause in particular. The effects of cold on newly-clipped horses are often seen in the production of tetanus; it is seen also in aged animals exposed to severe weather, and it follows acute derangement of the bowels in many others. Professor Williams has observed this disease prevail as an enzoötic.*

On account of the prolonged character of the spasms observed in tetanus they are termed tonic, in contradistinction to those common to various forms of spasm or clonic convulsive contractions which depend upon disease of the brain, spinal cord, &c. When the affection is confined to the jaws, it is known as *trismus;* sometimes another form is witnessed, characterised by the spine being arched downwards, the head and tail being directed upwards, as occurs in poisoning from strychnine, which is termed *opisthotonos;* an exactly opposite condition may, though rarely, occur, which is defined as *emprosthotonos;* and another equally rare form may sometimes be seen, in which the spine is curved to one side, which is distinguished as *tetanus lateralis* or *pleurosthotonos.* The term tetanus is general, and may be employed to denote one or all the foregoing.

Symptoms.—Stiffness in the part originally the seat of injury, which gradually develops into difficulty of motion,

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* Principles and Practice of Veterinary Surgery, p. 450. First Edition.

successively extending to other parts until the whole system is involved. In the idiopathic form (Fig. 194) the stiffness commences usually in that part which ultimately is most powerfully affected. The jaws are generally spasmodically contracted from the first, the animal grinds his teeth, champs and discharges saliva from an inability to swallow;

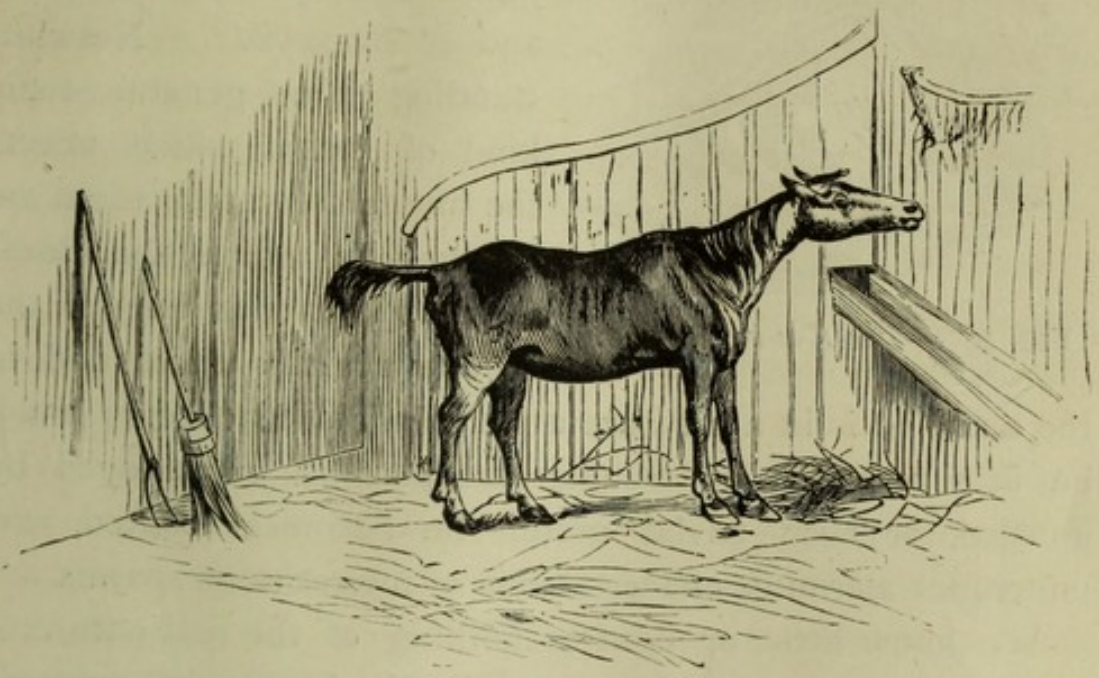


FIG. 194.—*Tetanus.*

the muscles of the face and neck twitch; the pulse is frequent, hard, and incompressible; respiration accelerated, nostrils dilated; the head gradualiy becomes more and more erect, and the nose protrudes; the muscles of the legs cause them to become fixed and rigid; the tail is drawn upwards, and continually quivers; the anus is tightly contracted, and appears smaller than usual. The jaws become gradually fixed, and when the lips are separated saliva flows abundantly; the eyes are firmly drawn backwards by the retractor muscle, and through this agency and the fatty pad behind, the haw, or membrana nictitans, is brought over the greater surface of the eyeball (Fig. 195); the animal swallows with great difficulty; the bowels are inactive from

the spasm which likewise seizes them, inducing the most obstinate constipation; the bladder is similarly involved, the abdomen is drawn up, and the walls of the chest are rigid from the same general muscular spasm. The form of the neck, as induced by contraction, gave rise in previous years to the terms "ewe-neck" and "stag-evil." Notwithstanding the general tonic kind of spasm which affects the muscular system, there are intervals in which the clonic form appears: as long as the sufferer remains quiet and in the dark, he is in a measure under diminished effects; but if he is surrounded by troublesome persons, or annoyed by unusual, or even trivial noises, he becomes excited, and undergoes alarming exacerbations of intermittent spasms.

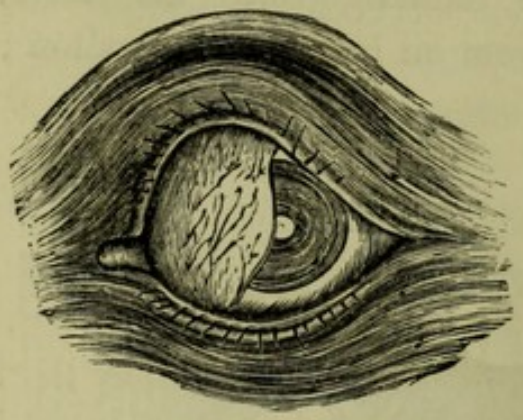


FIG. 195.—*The Eye in Tetanus.*

We know little, or next to nothing, of the real nature or pathology of tetanus. Occasionally the healing of a wound may be found to involve thickening of some divided nerve, or a small portion of dirt or foreign substance may be discovered within the granulations; but when tetanus arises from no obvious cause, it has been thought there exists an increased exaltation of nervous force or polarity. While the effects of cold are supposed to produce tetanus in a marked degree, it has been observed that in warm, unhealthy climates the disease is seen much more frequently, thus favouring the supposition that the condition of the blood has something to do with its production. Animals occupying crowded and ill-ventilated buildings, particularly if exposed to unusually severe and irregular work, &c., are predisposed to the affection.

Treatment.—The obscurity which hangs over the real

nature or pathology of tetanus is no greater than the mystery which belongs to the treatment. Practitioners have found, after repeated trials, that bitter disappointment has opposed them on every side, and successful issues have been permitted even from the most opposite kinds of medical treatment. The intrinsic powers of nature are the most undoubted authors of good in all the recoveries from tetanus; what man can do is but to alleviate or mitigate, and even these are frequently denied to him. Perfect quietude, a dark stable, or loose box, freedom from noises, nutritious drinks, free ventilation without draughty currents of air, and comfortable clothing, are the required means. Professor Dick, as we have repeatedly heard in his lectures, recommended the stable door to be locked, and the key to be kept by the veterinary surgeon.

It is now generally admitted, that if the jaws are not too far closed a strong dose of cathartic medicine should be given at the outset, and it is useful to combine with it a full dose of the extract of hyoscyamus, belladonna, stramonium, cannabis indica, &c. Existing wounds should be poulticed or fomented; sometimes it may be necessary to remove dead or destroyed portions of tissue from them, and the poultice should be medicated with one of the extracts already named. The injection beneath the skin, or within the rectum, of prussic acid, in combination with solution of atropine, &c., has proved useful in relaxing the jaws, permitting the administration of purgative medicine; or the extracts may be used in the form of electuary for the mouth.

Successful results have followed the subcutaneous injection of amyl-nitrite. Chloral hydrate and potassium bromide, with the extracts, are also valuable, being used alternately by the mouth or beneath the skin. If the signs are developed in their intensity at an early period, the case is likely to terminate rapidly and fatally; if, however, the animal be not of an

excitable temperament, and the course of the disease is slow, paroxysms not severe or frequent, and, living over the ninth or tenth day, he may be expected to recover.

It not unfrequently happens that when the animal makes rapid progress in amendment, the appetite being satisfied by the anxious attendant, much harm arises. Nothing is easier than to reproduce tetanus, and nothing more likely than by allowing the sufferer to consume much dry food. The first beneficial effects usually date from a certain lax state of the bowels, and if this is arrested by large quantities of hay, the effects are fatal. We have seen this in many instances, and desire to utter our protest against the fault. The animal may have a liberal allowance of good food, but it should be specially prepared with a view to being easily digested, and promoting the open state of the bowels—linseed-tea, gruel, boiled corn, grass, roots, &c., being variously allowed as the case progresses. The owner must resign the case entirely to the practitioner, and be content if in successful cases he may be allowed to use his animal in two months after the commencement of the attack.

Post-mortem Appearances.—These are by no means satisfactory in accounting for the long train and intensity of the symptoms. The brain and spinal cord are sometimes congested, a wound may include some dirt, or other foreign substance, or an inflamed and wounded nerve may be hypertrophied at the seat of injury; but tetanus arises without any of these being present—a fact which confirms what has already been stated regarding the pathology of the disease.

Rabies.

Rabies, erroneously styled hydrophobia, in the horse, arises from inoculation with the poison of the disease, as occurs in bites by dogs or cats affected.

The *symptoms* are somewhat variable in their commencement and progress ; sometimes the animal is very restless, afterwards suffers from great distress, perspiration, frantic pawing and stamping, seizing everything with the teeth ; exhibition of strong sexual feelings in entire animals ; the vision is impaired, and he sees small objects as being much magnified, a piece of flying paper is always regarded with great fear ; the pupils become dilated, and the eyes eventually are amaurotic ; cramps and convulsions appear in paroxysms ; the animal savagely bites the cicatrix of the original wound ; the power of swallowing is very much interfered with, and he neighs in a tone of voice altogether unlike the usual kind. The hind-quarters gradually lose their power, paralysis supervenes, convulsions recur from time to time, and the animal dies from exhaustion. In some instances the cases are marked by an absence of frenzy ; the animal seems to be mainly actuated to bite the part originally wounded, and then to subside into a partial comatose condition, and at somewhat later stages to suffer from paralysis, in which he dies.

Treatment is of no avail.

Hysteria.

This affection is common to some females of equine animals, partaking of remarkable characters, and in many cases rendering the creatures absolutely useless and dangerous. The common subjects of the disease are those of a highly nervous temperament, and which even under ordinary circumstances often exhibit signs of extreme irritability of temper, being apt to kick, strike, bite, and otherwise assume an unmanageable state. These animals, concurrent with the period of œstrum, become strangely excited when the hands or any portions of harness are laid upon them : the back is suddenly arched, limbs contracted, the weight of the hind-

quarters being sustained on the toes of the posterior extremities ; the tail is erect, and the vulva being rapidly dilated and contracted, eventually projects a quantity of viscid fluid. These signs are also supplemented by others in some animals. The whole muscular system is violently contracted and rigid, and shortly this gives way to a fit of convulsive spasms, in which the creature stamps, scrapes, rears, and strikes or kicks so violently that all efforts fail to control her. We have seen many of these animals baffle every attempt to put on new shoes, when at any other time they were tractable and gentle ; indeed the violence has been such that the attacks have at length ended in complete prostration, the discharges of fluid from the vagina being copious, spasmodic, always actuated by the sensation of touch, and attended with a cry or scream of irritability, in some cases the whole system becoming rigid and convulsed. These attacks subside gradually if the animal is not disturbed ; but the same phenomena are suddenly developed by the touch of another animal or human being.

The cause appears to be existing in an extreme sensitiveness and excitability consequent upon the period of œstrum, for the removal of which the only remedy is to allow the animal to have access to the male.

SECTION X.

DISEASES OF THE SKIN AND ITS APPENDAGES.

DISEASES OF THE SKIN AND ITS APPENDAGES.

UNTIL within recent years skin diseases in the lower animals have been somewhat neglected, and the available works on veterinary subjects have been either silent as to any useful form of classification, or the diseases have been grouped under various unmeaning or useless terms; or, even worse, all have been included under the general one—"mange."

The category may indeed be rendered a lengthy one, but having the desire to place before the reader the list under the most simple arrangement, we shall adopt the idea that a close relationship exists between each; that fundamentally diseases of the tissues of the skin consist of the usual form of simple inflammation, which by reason of certain conditions is modified; and according to these, whether they be idiosyncrasy, nature of causes, &c., such is convertible into one or other of the various kinds as hereafter described. The arrangement we shall pursue will be the following:—

I. ERYTHEMA (*redness or efflorescence*). Simple vascular engorgement, or congestion.

II. LICHEN (*roughness*). Tumefaction of the follicles, &c., constituting papulæ, or pimples.

III. ECZEMA, A. (*boiling or seething*). Inflammation attended with the formation of small vesicles, or blisters.

B. BULLOUS ERUPTIONS. Larger vesicles—blebs, or blisters.

IV. IMPETIGO. Inflammation, succeeded by pustules.

V. FURUNCULUS (*a boil*). Inflammation of a local or circumscribed nature, accompanied by a loss of vitality in some part of the diseased structures.

VI. DISEASES OF THE APPENDAGES.

I. ERYTHEMA.

Under the head of *erythema*, or *exanthema*, we have several diseases characterised by inflammation and redness of the skin, circumscribed or diffuse, produced by local or constitutional causes. The *local causes* are wet, cold, dirt, pressure, or friction, as seen when animals are recklessly exposed after the coat has been removed ; when the skin is not properly cleansed, or by the use of ill-fitting and dirty harness. Plethora and poverty are examples of *constitutional causes*.

In the lower animals redness of the skin is a sign not well observed, the presence of hair and pigmentary hue of the cuticle often counteracting the vascular blush which is so apparent in man. Those parts covered with white hair are the only situations where the condition is satisfactorily observed.

SIMPLE ERYTHEMA, or *erythema intertrigo*, is the most common form of dermatitis or inflammation of the skin, and consists of an increased redness of the superficial parts of the corium or true skin, due to local irritation. It is acute, and usually appears as a bright and uniform redness in the skin, but at other times is irregular, presenting various outlines of shape or extent and variety in colour ; this, of course, can only be well observed in the skin of white animals, white parts, or those having very fine or thin coats of hair. Pressure applied to the parts causes the red colour to disappear for a short time, gradually returning as the pressure is removed. The outer margin or limit of the inflammation

is not well marked, the blush or efflorescence gradually diminishing and disappearing in the hue of health. Swelling is not excessive, but may usually be detected by passing the hand flat over the part; or a raised surface is indicated by the hair, which is in a partially erect condition. Exudation is sometimes apparent in a gelatinous fluid which glues the hair together, or small vesicles may form which are confluent or scattered. Extension or continuance of the process results in a deeper colour being established, with exudation of a purulent fluid, ulceration, or sloughing. We have seen this form very frequently in pit animals, arising from the practice of the drivers as they sit behind the animal always beating on the same part with the whip or stick. Resolution is marked by peeling of the epithelium in the form of scales of greater or less fineness, the skin beneath gradually assuming the original degree of evenness and healthy colour, After death the redness and inflammation are confined to the outer layer of the skin (corium), as seen in transverse sections, the deeper portions being pale, and infiltrated only when the process has been intensely acute. The cellular tissue is also unaffected, or slightly infiltrated. This form of disease is seen as a result of chafing when one part of the skin rubs against another; of friction, arising from loose or ill-fitting parts of harness; of blows, when the swelling takes the form of weals or shape of the instrument by which they were inflicted; of wounds in clipping; irritation due to discharges flowing over the skin, as tears, urine, pus, &c.

A common example of erythema as it appears in an acute form is observed in the legs of horses, particularly hunters, during seasons of wet weather. At one time it was thought to be confined to this class only, but repeated observation has discovered the fallacy of such a conclusion; it was also considered to be due to the lime or clay soils

over which the horses travelled; hence it was called "mud fever," and accordingly greater efforts in the way of cleanliness were adopted when the animal reached home. Not only are the legs, particularly the hind, involved, but the hair is often removed from the whole of the inferior surface of the abdomen, breast, &c. We have seen whole studs of town horses in this state, having swollen legs, much stiffness in the gait, unwillingness to lie down, and even suffering from some degree of constitutional disturbance. In every instance it was traced to washing, and when that process was discontinued "mud fever" disappeared. The value of cleanliness is too great to be treated derisively, but in all earnestness we would certainly utter our belief that under rather excessive rules the efforts to secure it are often pushed too far. We know that animals rest better when clean, but we would ask, "Is there no other plan by which a tired horse can be freed of dirt and made comfortable without submitting him to a long and tedious process of washing?" Any other may not be welcomed or even listened to, but the fact remains the same; valuable horses are suffering, and, be it remembered, from what may be termed an excessive amount of attention, and this should encourage inquiry into the matter. The necessity for washing dirty horses is not equally urgent in all cases; for instance, when they reach the stable warm and dry, why should they be douched with water, when by a good brushing all the dirt may be removed, or at least so much as will render the animal free from discomfort, and enable him to obtain rest sooner? Then when washing is called for by reason of the legs being wet and muddy, why extend the washing to the abdomen, chest, &c.? Repeated observation teaches that water should never pass higher than a bandage can be safely kept on—viz., the knees and hocks; and further, that "mud fever" is not known where, as we have pointed out, the brush and that

peculiar honest principle "elbow-grease" are combined and judiciously exerted.

Erythema Paratrimma.

When the ill-fitting harness produces great local pressure rather than friction, the results are somewhat different. Examples are observed when horses are confined to slings for any length of time; in what are known as saddle-galls or shoulder-galls. The skin becomes hot, swollen, and tender, and in some instances an abscess forms, or the skin assumes a hard or indurated condition; in a third form the skin is loose and flabby, having a smooth, leathery appearance, hanging upon each shoulder like bags partially distended with gelatinous fluid. The last form is common to coal-mines, where the animal is worked with any collar that may be seized, which consequently does not fit, and induces extreme pressure and irritation, giving rise to a hideous deformity proportionate to the size, which sometimes is so very great as to involve the whole of the collar space on each shoulder.

Chronic Erythema.

Owing to the long-continued and combined effects of wet and cold with dirt, a form of chronic erythema is observed in the heels of horses, in which the swelling and inflammation degenerate into cracks and fissures, or sloughing ulcers. A common cause is clipping the legs, the effects of which are considerably intensified when is added washing with cold water, and when the animal after being in the wet at work is allowed to stand in a draught of cold air. If the legs are to be washed, they should be protected by bandages until dry; it is useless to expect they will be always rubbed dry, and such a covering amply obviates the inconvenience arising from this troublesome complaint.

Treatment of Erythema.

Hot water fomentations, poultices, and even cold water applications are effectual in all recent cases of erythema. Evaporating, arnica or astringent lotions, also are variously employed; and when there are accompanying signs of fever, purgatives, the neutral salts, or bloodletting may be required. Glycerine forms a useful remedy, and may be improved by adding laudanum, carbolic acid, or solutions of lead; oil also serves to mitigate friction, but rest should be given if possible, and the causes removed before putting the animal to work.

Erysipelas.

Nature.—Erysipelas, as seen in the horse, consists of a diffused inflammation of the true skin, sometimes also involving the cellular tissue beneath, and attended with great pain and irritative fever. Erysipelas is sometimes termed "the rose," and "Saint Anthony's Fire" (*Ignis sacer*), &c., and appears in two forms—the *œdematous* and *phlegmonous*.

Œdematous Erysipelas.—This is the milder and more common form, and is generally the result of wounds and injuries inflicted on the legs, &c., of young and immature, or hard-worked and badly-fed horses; and it appears at times in those in which the system is devitalised by animal poisons—as those of farcy, glanders, &c.

Symptoms.—In several days after the infliction of an injury—probably on about the fourth—the disease manifests itself by swelling of the skin, which also becomes tense, hot, extremely sensitive, and glistening or shining on the affected surface. These signs are more readily developed if the injury happens to be in a dependent part—that is, one below the body—as in the legs, beneath the breast, abdomen, &c. The tumefaction of the skin first commences at the point of

injury, and is gradually spread or diffused outwards and away from the wound, until, as happens in some instances, a whole part or limb is involved in the morbid action; at those parts where the cellular tissue is abundant, pitting is observed—in other words, the impress of the fingers is left after they have been applied with moderate firmness; but when the parts are covered by little besides the skin, very slight or no pitting occurs, but the parts are firm, hard, hot, and very tender. Occasionally a crop of vesicles appears, but by no means must this be recognised as a regular indication; after such have developed, desquamation, or peeling off in scales, marks the decline of the disease, particularly at the back of the joints. When the leg is affected considerable lameness is present, and the constitutional disturbance is great, not unfrequently running on to rigors or shivering fits, accelerated respiration, circulation, &c. &c., as described under Symptomatic Fever, page 27.

Phlegmonous Erysipelas.—This is the more severe form of the disease, and is attended with violent rigors and irritative fever; the subjacent tissues—as muscles and the fascia covering them, together with ligament, tendon, subcutaneous tissue—are involved, as well as the skin throughout a large area, eventually assuming the pustular form; and when discharges take place the fluid is watery, and often contains a number of shreds or strings obtained from the various tissues which are involved in a process of disintegration. The tendency to invade surrounding parts is so great that neighbouring articulations are often penetrated, combining open joint with the already alarming state of the case; and in debilitated animals the affair may assume a still worse aspect by the development of farcy or glanders, or both.

Treatment of Erysipelas.

The attendant constipation of the bowels must at once be overcome by a brisk cathartic, proportionate to the animal and nature of the attack. The essential character of the treatment is the same for both forms, the only difference requisite to be observed is the necessity for more energetic measures in the phlegmonous kind. Active fever should be treated by the neutral salts, Nos. 43, 44, and 110; or the draughts, Nos. 13, 34, and 50; or boluses, Nos. 14, 33, and 43. Fomentations of hot water, applied as directed at page 39, are almost indispensable, and care must be observed in either applying a hot poultice immediately afterwards, or covering the parts with suitable bandages, &c., as convenient. The tendency to extreme debility which follows must be counteracted by repeated doses of iron and ether, as given in No. 55, page 181, the tincture of iron being increased to half-ounce doses if necessary, and given once every four hours, until the pulse indicates the effect by gaining strength and volume.

The following lotion is useful for diminishing the local pain and irritation :—

Recipe No. 145.

Take of Goulard's extract	2 fl. oz.
Carbonate of ammonia	1 dr.
Laudanum	2 fl. oz.

Mix, and apply by means of a piece of soft rag or sponge.

An application of lard alone, or extract of belladonna, may be substituted.

Abscesses should be opened only when sufficiently matured, as the early use of the knife may aggravate the erysipelas.

The prevention of erysipelas is insured by the treatment of surgical and other wounds by the antiseptic method when

applicable, combating attendant fever by means of the neutral salts.

Urticaria—Nettle Rash.

This disease is manifested by a sudden appearance of elevations of the skin, varying in size from a sixpence to several inches in extent, accompanied by heat, intolerable itching, but not always affecting the general health. The most common subjects are plethoric animals, which are affected chiefly in hot weather, probably as a result of checked perspiration, change of diet, colic, diarrhœa, and disorders generally of the digestive organs. This disease constitutes the true "surfeit" when it assumes a general form. Sometimes the swellings are localised, in others diffused over the body, and may terminate in abscess, with subsequent incrustation, attended with more or less fever. Animals badly fed in winter, or put upon rich food in the summer, are apt to engender the disease, and in them the general form is more likely to be present.

Treatment.—The bowels should be opened by a moderate purge, after which neutral salts, Nos. 44, 46, and 110.

The local swellings may be dressed several times daily with the following lotion :—

Recipe No. 146.

Take of laudanum	2 fl. oz.
Glycerine	1 „
Carbonate of soda	½ oz.
Water	1 quart.

Mix.

II. Lichen, or Papulous Erythema.

Under the above name we observe a form of inflammation of the skin, giving rise to the formation of numerous papulæ, or pimples, which are enlargements of the hair follicles, attended with considerable irritation; and as the disease

declines the cuticle peels off, leaving the parts denuded of hair. The form commonly seen in horses is known as

Prurigo.

This disease is sometimes termed "pruritus," from the continued itching which attends it. The skin is also hot, and occasionally becomes thickened and indurated, rough and scaly; the system is frequently involved in some amount of febrile disturbance, and the animal cannot be put to work on account of the uneasiness as well as irritable state of the skin. The term "surfeit" has also been given to this affection, owing to the fact that it originates in animals that are well fed—*i.e.*, pampered, and worked but little. The surfaces likely to be affected are those covered by the hot lining of the harness, where patches of pimples arise, and to allay the irritation which follows the animal bites himself in a violent manner, occasionally inflicting wounds with the teeth. An unwelcome feature of the affection is the tendency to recur frequently, or become constant and defy ordinary measures for its suppression. The causes are generally to be ascribed to a liberal use of the most nutritious kinds of food—as beans and oats, and other forms of injudicious feeding; together with heated and ill-ventilated stables, and want of due exercise or work.

Treatment.—In this, as in other skin affections, the use of the hot-air bath is of great importance. As internal remedies, purgatives and the neutral salts are required; and the animal may be benefited by a moderate bloodletting, especially if he be fat.

Notwithstanding the efficacy of the foregoing remedies, and the assiduity of the practitioner, he is not unfrequently disappointed in finding his patient "not one whit the better." The next course which remains to him is, if pos-

sible, to get the horse into his own stable, where he can be certain his orders as to food, &c., are strictly carried out, and the administration of arsenic (No. 108), in doses of from three to five grains daily, conjointly carried out with the sweating-bath and regularly enforced exercise.

III. A.—Eczema.

Under the above term veterinarians recognise a form of erythema or skin inflammation, characterised by vesicles or small bladders, containing a thin fluid forming or clustering in patches, giving rise to much irritation, and bursting on the application of slight force, leaving behind a raw surface. Two forms are observed—the *simple* and *chronic*.

Simple Eczema.

Simple Eczema (*Eczema simplex*), or "humid tetter," has frequently been mistaken for mange. It is attended with intolerable itching, the parts usually affected being the shoulders, back, thighs, &c., rarely associated with febrile disturbance, but always with the formation of a luxuriant crop of vesicles, which succeed each other at different parts and moisten the skin and hairs with their contents, apparently creating fresh irritation thereby. As the animal rubs or bites himself, the hairs are removed together with the eruption, and the skin is exposed raw, reddened, and irritable. Patches of vesicles form and succeed each other for some days, thus maintaining a degree of irritation which prevents the animal from obtaining rest. As the disease declines the vesicles burst and dry up, the hair being agglutinated by the discharge over the surface, and when this covering is removed the cuticle peels off like so many scales.

Chronic Eczema—Psoriasis—Rat-tails.

This form of inflammation is due to neglect of simple eczema, by which that disease is liable to degenerate into an obstinate condition, manifested by permanent thickening of the skin and formation of ugly cracks or chasms, from which flows an abundant half-purulent, half-ichorous fluid. Upon the thickened portions of the skin is found a great increase of the epidermic scales, shooting up in almost perpendicular strata, the hairs growing from the parts being glued together by the secretion. Vulgarly these are called "rat-tails," from the great resemblance they bear (Fig. 196). The parts thus affected are the legs chiefly, one, two, or all of which are included. We have seen horses turned to grass after being fired and blistered, others exposed to wet ground, clay or chalky soils, sorely afflicted with this disease.

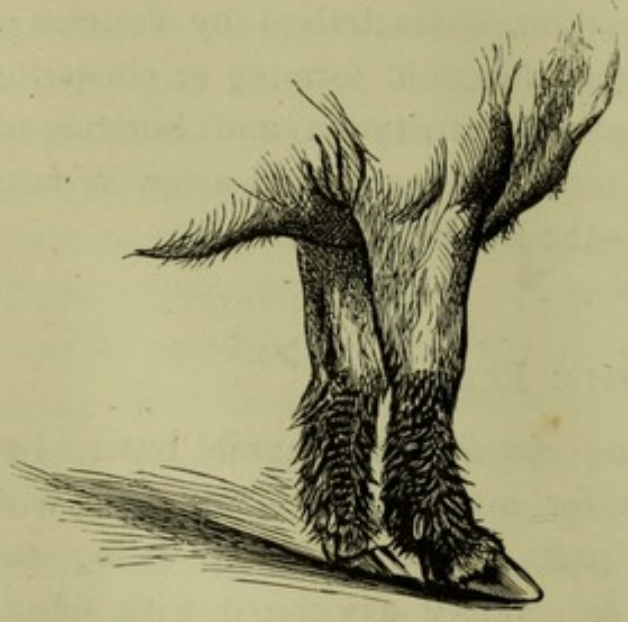


Fig. 196.—*Psoriasis or "Rat-tails."*

Treatment.—The bowels should be opened at once, and afterwards the neutral salts (Nos. 44, 46, and 110) may be employed internally. Fomentations and even poultices will be useful to localised forms of the disease, and such applications, as already given (Nos. 145, 146), must be used. It will generally be found that arsenic (No. 108) internally will be required. In some instances, the disease is confined to the back of the knees and front of the hocks, when it is known as "mallenders" and "sallenders" respec-

tively. In addition to the treatment already given, the ointments of lead, zinc, creasote, or iodine, solution of carbolic acid in glycerine, &c., will be found to answer.

III. B.—Bullous Eruptions.

Herpes.

Herpes is another form of vesicular erythema, in which the bladders or vesicles are larger than in eczema, and sometimes differently arranged. Two forms of herpes will be described. A third is also known, but rarely seen among horses, which consists of still larger vesicles, distinguished by the term "bullæ"—blebs or blisters. The herpetic forms of eruption are *herpes phlyctenodes* and *herpes circinatus.*

Herpes Phlyctenodes.

The more common term for this disease is phlyctenoid tetter, the characteristic features of it being the formation of agglomerate vesicles within a circumscribed area on the skin, which speedily disappear. Among the mass will be found one or more much larger than the rest, usually attaining the size of a pea, and somewhat elongated. These may be seen on the lips (crusta labialis), face, and other parts of the body, the Schneiderian membrane occasionally being the seat, and giving rise to suspicions of the existence of glanders. When it is located on the upper margin of the hoofs round the coronet, it is then known as "crown scab"—herpes coronalis. Owing to the presence of hair, the disease may be overlooked in the first stage, the attention being directed to erect patches which will not be caused to lie in the usual manner. In those parts where the hair is fine and in small quantity, the eruption may be more readily detected; otherwise there is nothing for a time to account

for the irritation ; but subsequently the hairs over the parts are observed to be held by scabs, both of which fall off together, exposing raw, red, and irritable surfaces, which, however, generally heal readily, but sometimes are liable to ulceration.

Herpes Circinatus—Vesicular Ringworm..

Herpes circinatus (a creeping circle)—*vesicular* or *false ringworm*—is common among horses, and on this account must not be confused with *favus* or true ringworm of contagious properties. *Herpes circinatus* is a benignant form of vesicular or bullous erythema, in which the bullæ agglomerate in a circle, and gradually spread outwards for a time, running their course in a week or ten days, declining into brownish scales, the redness of the skin beneath also fading gradually. A chronic form is occasionally observed, in which the patches may be numerous, producing constitutional disturbance, with, however, but slight irritation, which is soothed by gentle friction. The form in which the bullæ are arranged will be best understood by a reference to Fig. 197, which represents them in the characteristic circular

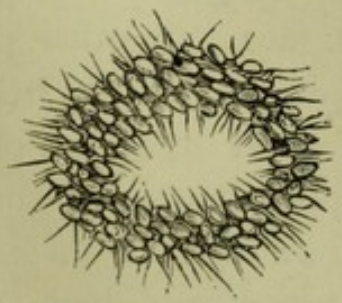


Fig. 197.

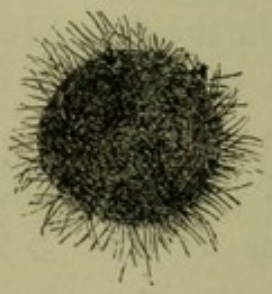


Fig. 198.

agglomeration, gradually enlarging and invading fresh portions of skin and hair. Fig. 198 shows the denuded surface, and as it appears after the vesicles have burst or evaporated, leaving the crust or scab.

Irish horses are said to be affected when brought over to this country as a result of the sea-voyage. (WILLIAMS.)

Treatment.—When the constitutional symptoms are slight, nothing more need be done than merely dressing the affected parts with the applications already given (No. 146, p. 585), or the following:—

RECIPE No. 147.

Take of olive oil	8 fl. oz.
Goulard's extract of lead	1 „
Laudanum	½ „

Mix, and shake until thoroughly incorporated. One or two doses of the neutral salts may also be given in the food, as directed for Nos. 44, 46, 110. When the vesicles are large, and the skin inflamed round their base, with much irritation and constitutional disturbance, the bowels should be first moved, and the salts be given regularly afterwards for some days; should the denuded parts indicate a tendency to ulceration, they may be touched with the pencil of nitrate of silver, or a lotion or ointment may be made up, containing ten grains to the ounce. If there is any tendency to debility, which may occur in young animals, or others previously subjected to injudicious management, good and easily-digested food, with tonic medicines, will be required.

IV. IMPETIGO, OR PUSTULAR INFLAMMATION OF THE SKIN.

We have, under the above name, another form of inflammation of the skin, which is characterised by intense inflammation and the formation of pustules on the surface, but beneath the epidermis or cuticle. These are of two kinds—one, small, not unfrequently irregularly circumscribed, slightly raising the epidermis, and after being matured drying up, leaving a flat or laminated scab; the other is larger, surrounded by intense inflammation, forming a vivid red circular base, and

which at its termination is characterised by a thick, hard, dark brown, or red-coloured scab. These are respectively *impetigo* and *ecthyma*. The latter is rarely seen or imperfectly observed in the horse; of the former, the following are the more common:—

Impetigo of the Face and Lips.

This affection is said to be peculiar to animals having white faces and legs, but Professor Williams asserts—and we can support the opinion—that it is not confined to these, as he has witnessed it in others having no white hairs upon them. When it is confined to the lips, it is known as *crusta labialis*. The causes appear to be due to the irritating effects of certain kinds of clovers upon which the animals are allowed to graze, and not upon any constitutional disorder, as it only appears on those parts with which the plants have contact.

The parts affected are covered with an eruption of small pustules, which are speedily converted into yellow crusts or scales, under which the skin is thickened and inflamed.

Treatment.—First remove the animals from the pasture on which they have contracted the disease, and dress the parts with the applications Nos. 145, 146, or 147; administer a dose or two of the neutral salts, Nos. 44, 46, or 110; or if there be much irritation and constitutional disturbance, first purge, and apply lotions containing laudanum, belladonna, prussic acid, &c.

Impetigo of the Neck—Impetigo Colli.

This form is characterised by the appearance of pustules, isolated and large, upon either side of the neck, at the junction with the mane, accompanied with inflammation round their base, and eventually, on exposure to the air, drying up

into yellow or yellowish-brown scabs, including the hairs within them. Such are the result of tightly fitting collars, irritation from dirt, &c. Occasionally also similar pustules and incrustations appear on the root of the tail in consequence of imperfect cleaning, and which never appear where the animals receive proper attention. The use of soap and warm water is a sure preventive; and a speedy cure is also obtained by the treatment recommended under the preceding form of impetigo.

Impetigo of the Legs—Inflamed Heels.

This disease has been wholly attributed to neglect of cleanliness, and while we are not inclined to deny the part that dirt may take in its production, yet we feel certain that it also largely occurs where animals are scrupulously attended to in the way of mistaken management or kindness. It is a common practice to closely clip the legs of working horses, and thus remove Nature's well-designed protection; and when the parts are dirty soap and water are used *ad libitum*, the legs in all probability being only half dried, or not dried at all, and left to the influences of cold air. All these are bad in their effects. If horses' legs are to be liberally washed they should be covered by suitable bandages; but the better plan is to avoid washing if the legs are warm and dry, using a brush to remove the uppermost dirt, and finishing next morning, when the surface stains can be taken off by means of a damp sponge. (*See* Erythema—Mud Fever.)

In consequence of the causes named the heels are observed to swell, become hot and tender; the skin shortly exhibits a deep red colour, and here and there large pustules form, burst, and do not heal, but expose angry-looking sores, which grow larger and deeper by ulceration. As such

they are readily cured by poultices during a day or two, which reduce the soreness and lameness; and succeeding these a mild dose of physic, or the neutral salts. After the poultice or hot fomentations, the limb should be covered with powdered oxide of zinc, flour, or starch; and in later stages lead or mild astringent lotions used.

A horse thus affected walks stiffly, with the hind-legs somewhat wide apart; and if the latter are to be examined, those who attempt it must be aware that as the animal raises the foot in the experience of pain he throws the limb outwards and jerks it upwards, often sufficiently sudden to throw any one down if not on the alert.

In wet seasons the disease proves very troublesome, especially among horses working in public conveyances; and when permitted to continue, or only partially treated while the animal continues at work, it is likely to assume a chronic and obstinate form, in which large fissures or chasms are developed, having hard scaly edges, while sloughing goes on at the bottom, and a discharge of ichorous fluid takes place. Grease is a common termination.

Impetigo Erysipelatodes—Grease.

Pustular erysipelas of the heels, commonly called grease, is a troublesome, and at length becomes a loathsome, complaint. It consists of an inflammation of the skin of the heels, pastern, and fetlock-joints at their back parts, on which pustules form, the discharge from which is purulent and offensive, and with it is often associated a high state of fever. The pustules at first contain a limpid fluid, which shortly becomes turbid, and after discharge irritates the parts over which it is allowed to flow. The hind-legs are most commonly affected, generally on the back parts, from the heels upwards some considerable distance, in a primary

tumefaction, or swelling, which causes much pain, stiffness, and lameness, the hocks being sometimes involved. The lymph of the pustules in their earlier stage has been proved to be capable of preventing attacks of small-pox in those who have not previously been subject to its effects on the system. As the discharge flows the hair is denuded, and fresh clusters of pustules form and burst, and the parts lose their usual pliancy, becoming hard, rigid, and œdematous ; the skin cracks and forms deep and large fissures, from which issue a fœtid ichorous discharge ; while ulceration goes on beneath, and fungoid granulations sprout up in all directions upon the surface, or are intermingled with large prominences —enlarged papillæ—having incrustations of hardened cuticle upon their summits (Fig. 199). These are the so-called "grapes" of the farriers. The limb is no longer hot and painful, but swollen and constantly moist with the fœtid exudation which flows over it, and by exposure becomes dry, mats the hairs together, and forms large solid scabs. Slight irritation will remove these incrustations, when a raw, bleeding, fungus-looking surface is exposed, and in this state the disease may go on for some time, until the constitution is tainted by it ; the lymphatics take up the absorption of the matter, swell, inflame, and give rise to abscesses in various parts of the legs and thighs ; and it may terminate in farcy. In occasional instances the internal structures of the frog and sole are involved ; and in addition to the original malady the case is one of complication with *canker*. Professor Hering has discovered the presence of acari in

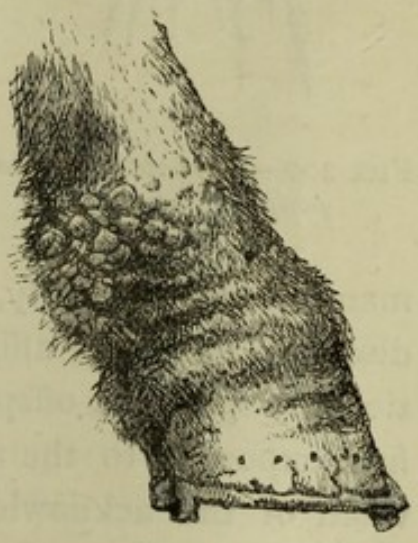


FIG. 199.
Confirmed Grease, showing grapes and fissures.

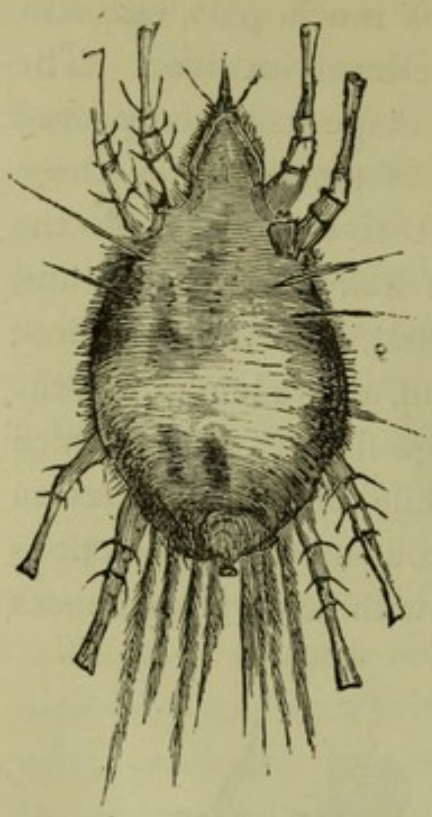


FIG. 200.—*Sarcoptes Hippopodus* (HERING).

the legs of horses affected with chronic grease (Fig. 200), which he has named sarcoptes hippopodus. Professor Williams has also witnessed the same.

Causes of Grease.—Breeding has undoubtedly much to do with the origin of this disease, as it is much more common and more readily produced in coarse, low-bred animals than in any other. White legs, or those having white hair upon them, are more susceptible than those having dark or black hair; and the combined effects of wet and dirt—especially the wet and dirt of the stable—are powerful causes. Bad feeding, and defective management generally, greatly predispose the animal to the disease; and those affected, when used for breeding, unquestionably produce offspring very liable to contract it on the first exposure to the actual causes. The lymph of grease, when of the acknowledged specific kind, will produce the disease in healthy animals (GAMGEE); therefore, under certain conditions, the malady may be estimated as contagious—a characteristic which, carrying weight, should cause every proprietor to exercise the greatest caution when the disease is present. Either from this cause more or less, or from the wide-spread nature of others known to produce it, grease sometimes appears as an enzoötic disease, and gives rise to great inconvenience by the number of animals incapacitated for work.

Treatment.—Poultices are valuable agents at the outset, or for the removal of the scales, to soften the skin and

stimulate a healthy discharge; after which, solutions of carbolic acid, the sulphate or chloride of zinc, sulphate of copper, &c., may be variously applied. Greater advantage is obtained by the *alternate* use of external remedies than by the continued application of one; for, however good it may be, it cannot be dignified with the name of a "specific" for this disease. Of the applications which may be used for grease we give the following:—

RECIPE NO. 148.

Take of sulphate of zinc	4 oz.
Tincture of myrrh	1 fl. oz.
Glycerine	2 „
Water	1 quart.

Mix sulphate of zinc and water together, and when dissolved add the remainder.

RECIPE NO. 149.

Take of sulphate of zinc	4 oz.
Acetate of lead	4 „
Water	2 quarts.

Mix, and dissolve.

RECIPE NO. 150.

Take of sulphate of copper, powdered	4 oz.
Sulphuric acid	2 fl. oz.
Water	2 quarts.

Mix the copper with the water, and add the acid. The mixture is ready for use when a clear solution is obtained

RECIPE NO. 151.

Take of carbolic acid, brown solution	1 pint.
Glycerine	½ pint.
Water	1 gallon.

Mix.

RECIPE NO. 152.

Take of chloride of zinc	1 oz.
Glycerine	2 „
Water	1 quart.

Mix, and dissolve.

These remedies must be assiduously applied at regular times—say twice or thrice during the day, after poultices have been used—a piece of rag tied upon the end of a short stick being useful. When the grapes are large and abundant they may be touched with caustic potash, strong solution or solid form of chloride of zinc, mineral acids; or what perhaps is better than any, the hot iron, the animal being secured standing, or properly cast, while the grapes are literally shorn off.

By this method the disease is more quickly arrested, a healthy healing action induced, and much trouble and annoyance saved; as the parts dry and heal, zinc ointment may be substituted for the astringent lotions.

Internal remedies are of vital importance. Upon no account whatever can they be dispensed with, and they require watchful care. If outward applications alone are used, especially those which have the tendency to reduce the discharge and promote the healing process, just at a time when the animal appears to be making decided progress, he succumbs suddenly to blood poisoning, farcy, or glanders. Chronic grease is attended with more or less debility of the system, and while the outward discharge is being reduced the various excretory organs should be roused to carry off the morbid elements which find their way into the blood; therefore occasional purgatives will be required, and in the intervals the following powders should be given:—

RECIPE NO. 153.

Take of sulphate of iron, powdered	3 oz.
Carbonate of soda, powdered	12 drs.
Powdered resin	6 oz.
Gentian, powdered	3 „
Ginger „	3 „

Mix, and divide into twelve powders, one to be given every morning or night; or, if necessary, each morning and

evening. The animal should be kept scrupulously clean, the process of grooming being carried out each day with regularity and effectiveness; and as a change of medicine may be made with benefit after the powders are finished, it will be advisable to give arsenic for a few weeks before returning again to them. Fowler's solution of arsenic is the most available form, which may be sprinkled over the food in half-ounce doses twice a day, or given in the drinking-water. The solid form (No. 108) also may be employed—white arsenic—in doses of three grains, morning and evening, along with iron and soda, but it is not so certain or controllable in this form.

V. Furuncule—Boils—Carbuncles.

A form of local and circumscribed inflammation of the skin known by the above term, and from its similarity to a condition which arises from anthrax poison, being in fact included in the same category, we proceed to give the physical characters of each.

Furunculoid inflammation—boils or carbuncles—consists of inflammation located in the deepest layer of the corium, as well as cellular tissue beneath, the interspaces of which are filled by it. Externally at first appears a circumscribed swelling, probably not larger than a pea, around which a wide halo of inflammation exists, and is attended with great tension and pain. Within the interspaces of the corium accumulate the plastic exudation, the products of inflammation, from which a reactionary inflammation ensues; pus is formed, the central part dies and is thrown out, forming what is vulgarly known as the "core."

In simple furuncule only one core is formed, but in anthrax furuncule there are several, which are in close contiguity. When the diseased mass of anthrax is cut

across, the fresh surfaces exhibit a uniformly red, spongy, and reticulated tissue, the interspaces of which are filled with the products of inflammation, each of which forms a core. At the period when suppuration is being established each core is surrounded by a jelly-like substance, and when the process is fully complete they are detached from the surrounding tissues, which are eventually destroyed. Cavities of variable size are thus formed, containing the purulent fluids of suppuration, and in which the cores are sometimes able to float ; and lastly, the surface of the skin exhibits a number of openings, each of which communicates with one of the cavities already named, the whole involving a deeper and greater extent of skin than simple furunculoid, and the pain is more intense and excruciating.

The *treatment* of furuncule consists of the application of fomentations or poultices, and general attention to the diet. As it depends upon a morbid condition of the blood, the use of mild purgatives may be called for, followed by stimulants and tonics, with the use of the knife and resin ointment externally.

Sitfasts.

A sitfast is understood to be a portion of the tissue of skin which has become devitalised by pressure—*i.e.*, gangrenous—and undergoing a slow and tedious separation from the healthy and living. Originally an inflamed part is produced and a tumour forms, which receives more direct pressure than the surrounding skin, the result being that nourishment is more or less cut off from the central part, which dries up, becomes hard and horny, and is surrounded by an inflammatory circle, and an angry-looking wound which discharges a sero-purulent fluid. At the lower part this horny mass is firmly connected with the subcutaneous tissue, from which it derives a small amount of nourishment,

and, on account of the difficulty which attends its removal or detachment, the above name has been given to it.

Treatment.—Careful dissection of the horny mass is the most certain method of removal; but occasionally caustics are employed, which char, blacken, and destroy it, but occupy a long time in its entire removal, giving rise to continual punishment. An old plan consists of dressing the wound with resin or verdigris ointment, by which further suppuration is induced, and at the end of a period—we know not how long—the "sitfast" is removed. By the knife as much can be done in one minute, and with one ten-thousandth part of the pain, as will be effected in twelve months by the other methods.

Other conditions which induce diseases of the skin—as purpura hæmorrhagica, scarlatina, &c.—will be found referred to under the respective forms of blood disease at pp. 77 and 122 respectively.

VI. Diseases of the Appendages of the Skin.

Under this head we propose to consider the following diseases of the feet and horn-secreting structures, reserving others, the result of direct injury, for their proper place under the head of Local Injuries.

Laminitis.	Canker.
Coronitis.	Seedy Toe.
Sandcrack.	Keratoma.
Thrush.	Corns.

Laminitis—Inflammation of the Feet.

Nature.—Laminitis—variously termed *Founder*, *Fever*, or *Inflammation in the Feet*—consists, as the name implies,

of an inflamed condition of the sensitive laminæ (Fig. 4, *b*, Plate X.) which surround the coffin bone and effect a union between it and the hoof; in addition, the sensitive sole (Fig. 3, Plate X.) is implicated, and in an extended form of the malady the *os pedis* (Plate X., Fig. 1, *d*), or coffin bone, is also included.

The disease of the first, or simple form, is characterised, as we have said, by inflammation of the sensitive laminæ and sensitive sole, and from the fact of these structures being covered by an unyielding horny case the usual attendant swelling and relief by free exudation are not permitted, and therefore the pain from pressure is agonising and extreme. Exudation occurs upon the external surfaces of the sensitive laminæ, and in consequence of the front or toe being the most vascular part the greatest accumulation is found there. This favours destruction of the attachments between the horny and sensitive laminæ, producing the characteristic phenomena of laminitis, convexity of horny sole, and interference with natural gait or persistent lameness. The results are even more marked when the bone is involved, as exudation is then thrown out beneath the sensitive laminæ and periosteum, or covering of the bone, severing their connexions, as well as pervading the substance of the osseous structure, obstructing blood circulation, and favouring such changes as necrosis, sloughing, &c. Laminitis of the simple form frequently passes off without leaving many indications of structural change; such happens when the exudation has been slight and rapidly absorbed after early subsidence of the inflammatory action. This is resolution. In other cases the disease appears to have been principally confined to one part of the foot, probably the toe or one quarter, as examination after a time discloses an empty cavity occupying a perpendicular position; or it may be filled with a quantity of powdery meal or seedy-looking horn, which crumbles

away on the slightest touch. This state will receive further attention under the term "Seedy Toe."

The most serious states are dependent on prolonged severe inflammation, which provides a copious exudation, and as it gradually invades the connecting structures and breaks down the attachments, favours the descent of the point of the coffin bone, at the same time affording greater space between it and the hoof (Fig. 201, *a*), where the exudation occupies the space, accumulates, hardens, and adds to the deformity by further displacement of bone and horn, the first being pushed downwards at the toe, the latter upwards, producing, as already alluded to, the appearance of convex sole, or "pumice foot."

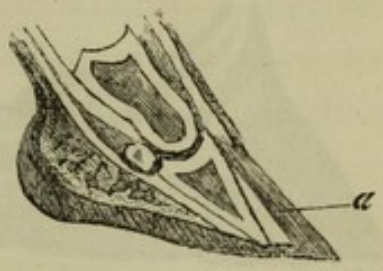


FIG. 201.—*Descent of the Pedal or Coffin Bone, and production of Pumice Foot.*

Further changes are also produced. Inflammation having invaded the secreting structures of the sole, the power of horn formation is greatly reduced, and for ever afterwards the horny sole is thin and weak, partaking of a spongy or even cheesy nature, incapable of sustaining weight or affording protection as before. Although the coronary cushion (Fig. 1, *k*, and Fig. 4, *a*, Plate X.) is not actually participating in the inflammatory process, yet by repeated or intermittent stimulus from the adjacent disordered conditions it is urged to irregular, and probably inordinate, action, results which are evident in the irregularly wrinkled, furrowed, or ribbed appearance of the hoof, as exhibited in the engraving (Fig. 202).



FIG. 202.
The Hoof ribbed or wrinkled by disease.

The coffin bone—*os pedis*—also undergoes a remarkable change. This will be better understood by a comparison of

Figs. 203 and 204 ; the first being a drawing of the healthy bone, the second the subject of diseased alteration from



FIG. 203.—*The Coffin Bone.*

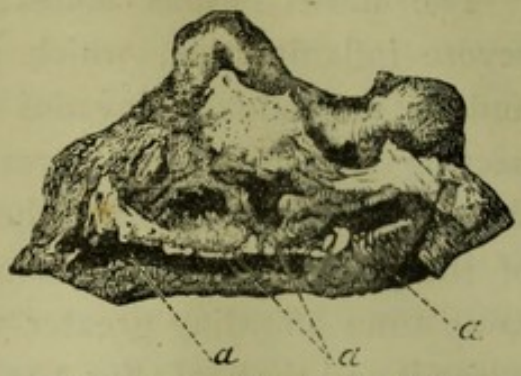


FIG. 204.—*The Coffin Bone after Laminitis.*

laminitis. The nutrient canals having been blocked up by deposit of ossific matter, nourishment is no longer carried except in very insufficient quantity, and removal by absorption of the substance (Fig. 204, *a a a*) goes on at almost every point. Besides these, suppuration may exist and detach the upper part of the wall at the coronet, or between the horny sole and frog and their respective secreting structures, and produce a separation there also.

Causes of Laminitis.—One of the principal, and probably most frequent, causes of this disease is concussion, derived directly from the hard nature of our roads, or greatly assisted by the maltreatment to which horses are regularly submitted in what some people erroneously denominate "the art of shoeing." We are serious when we state that, more properly in many quarters it should be called "the intent of ruin," as so many ignorant men still persist in believing horses' feet are intended to be reduced at every shoeing, while they never acquire the art of moulding the shoe to the foot. What if the human bootmaker were to adopt the screw and press in order to alter the shape of the purchasers' feet to the covering and defence he provides ? The result we will leave for the reader to imagine. Laminitis from concussion is, as a rule, confined to the fore-feet ; but laminitis from metastasis

so called—or, more properly, from sympathy—arises from disease or disorder of analogous structures of the body Probably in no other disease is this peculiar condition so well marked as in connexion with laminitis; indeed, the occurrence forms an interesting study to the scientific veterinarian. In this affection the hair of the mane and tail are readily thrown off; wounds of the jugular vein often refuse to heal in the ordinary way, but go on to suppuration—phlebitis. Similar phenomena are observed in certain other diseases, thus: when the mucous surfaces of the intestines, air-passages, or uterus, are inflamed or disordered, it is not rare to witness eruptions of the skin—erythema; or of the buccal membrane—eczema. These facts establish an intimate connexion between the different structures, and show that such diseases are prone to spread to similarly constituted tissues, however distant. In the minute nature of the tissues of the feet there are analogous characteristics to those of the skin, mucous membranes, &c., and these are admirably united in sympathy by an appropriate and special nervous system—the sympathetic—which insures that when one of them is prostrate under serious morbid states, the rest in the category are liable to sympathise or become associated in the same disease and suffering. By this brief illustration we hope the reader will perceive with what readiness this disease follows an attack of pneumonia, influenza, superpurgation, &c., engorgement of the stomach by wheat, barley, or even ordinary food,

Symptoms.—One, two, or all four feet may be affected If one is diseased, it generally arises from continued pressure in taking the weight of the body in order to relieve the opposite limb, which has been injured or diseased. In this case the animal is seen to transfer his weight to the originally diseased leg, and rest that which is thought to be sound, holding it up, and enduring much febrile disturbance.

When both fore-feet are diseased lameness is severe and distressing, so much that the horse can scarcely be induced to move from the spot. He stands with the hind-legs drawn forwards beneath the body, which take the weight; while the fore are advanced, and he uses the hind-feet as a pivot, on which he turns or swings his body round from one spot to another, touching the ground with the heels only of the fore-feet. Movement causes great pain, and he groans and perspires in the attempt. The pulse is full, strong, and frequent, characters which are maintained far into late periods of the case. Sometimes the animal will lie on his broad side, and in this condition greatly facilitate the crisis and recovery; but when he stands obstinately, he thus adds intensity to the disease. The nature of the case is clearly made out by pushing the animal backwards, when the peculiar swinging pivot motion and approximation of the heels of the fore-feet to the ground will be seen.

Laminitis of the Hind-feet.—The animal now stands with all the feet under the body, the fore supporting the greater part of the weight, and in this position he is quite immovable, enduring great distress and pain, while he literally blows; the nostrils are dilated; flanks heaving, pulse full and bounding, strong, and frequent; countenance indicative of anxiety, and he is sweating profusely. The affected feet are alternately raised in a nervous, irritable manner, and when he changes his position the toes of the hind-feet are brought to the ground, and he makes a kind of leap, after which he trembles and blows more violently. The suffering animal is often compelled, from pain and exhaustion, to lie down, and when in that position he experiences great mitigation of all the signs.

Sometimes all the feet are affected, when the pain and distress, together with other manifestations of the disease, are greatly intensified. The difficulty of standing is much

greater; he is of course more uneasy, and appears ready to fall; is constantly lifting the feet, endeavouring to seek a more favourable position; he blows, groans, and perspires, and at length lies or falls down from extreme pain and exhaustion.

In all cases the feet are hot, the plantar arteries throb; a single foot cannot be raised, and the taps of a hammer are productive of agony. From this cause the shoes often cannot be removed while the animal stands.

Treatment.—The usual plan is to remove the shoes as soon as possible, which may be readily accomplished in the very early stages of the disease; otherwise, if the animal lies down, the hobbles should be put on that he may be confined to the recumbent position on a good bed, being frequently turned; then the shoes may be removed, and poultices, hot or cold, as the practitioner may select, can be applied. If a plentiful supply of hot water can be obtained, fomentations may be used; but in the absence of that, it may be wiser to remain content with the simple moisture of a poultice. Some practitioners bleed generally—*i.e.*, from the jugular; others prefer the local plan of scarifying the coronet, from which the congestion is often quickly relieved. The next step is to open the bowels; but as there is some liability during the disease of unduly exciting their action, the dose is recommended to be a moderate one; and as the circulation needs controlling, and fever generally reducing rapidly, it is a good practice to use aloes in solution and in combination with aconite in the following form:—

RECIPE NO. 154.

Take of solution of aloes	5 to 8 fl. oz.
Tincture of aconite	20 drops.
Water	5 to 8 fl. oz.

Mix.

After the above has been given, warm water enemas may be thrown up, and the animal left to the care of an at-

tendant, who will keep the bedding beneath him, and otherwise see to the necessary wants. If he does not urinate, the catheter must be passed from time to time, as some animals object to evacuate the bladder when lying.

Instead of casting the patient if he is found standing, he may be put into slings: but should he prove fretful and uneasy, it will be advisable to remove them after a time, and trust to his lying down, when the hobbles may be put on. Some animals do not even require these, as they will lie persistently throughout the severity of the attack; but these are rare.

In four hours fifteen drops of aconite may be given with the acetate of ammonia, as in No. 34, page 120; at the end of eight, ten drops; at the end of twelve hours, five; at or even before which the pulse will have suffered a great reduction, and the febrile symptoms generally much relieved; but the above rules may require some modification, which must be based on the condition of the patient, to be determined by the mature judgment of the practitioner. As we are prescribing in all cases for strong, large, and vigorous animals, he will perceive the absolute necessity for cutting down the doses as required.

The bowels being opened, pulse reduced, and other signs relieved, the hobbles may be removed if the patient is quiet, and the medicine may be changed for the neutral salts, combined with hyoscyamus or belladonna; and after a few days the doses should be reduced one half.

Mr. Broad, M.R.C.V.S., Bath, recommends a bar-shoe, deeply seated, having a broad web and thin heels, to be applied as soon as possible, and as long as the congestive stage lasts to compel the animal to take exercise during half an hour or more three times a day. He uses purgatives internally, and states he has seen the most surprising and satisfactory results. We have not tried the method, but from

DESCRIPTION OF PLATE X.

"THE VARIOUS STRUCTURES OF THE FOOT.

"FIG. 1.—*The Pastern and Foot divided through the centre.* —*a*, The cannon bone ; *b*, the large pastern bone ; *c*, the small pastern bone ; *d*, the pedal bone ; *e*, the navicular bone ; *f*, the insertion of the extensor pedis tendon into the coronary process of the pedal bone ; *g*, the insertion of the flexor pedis perforans, passing under the navicular bone, to gain insertion into the sole of the pedal bone ; *h*, the elastic frog ; *i*, the horny frog ; *j*, the hoof ; *k*, the coronet.

FIG. 2.—*The Hoof sawn off below the coronet.*—*a*, The elastic frog ; *b*, *b*, the posterior portion of the lateral cartilages ; *c*, *c*, the anterior portion of the lateral cartilages cut through ; *d*, the flexor pedis perforans tendon, running under the navicular bone, but above the elastic frog ; *e*, the navicular bone, the anterior portion of which has been divided ; *f*, the superior surface of the pedal bone, showing the indentations for the reception of the prominences at the inferior extremity of the small pastern bone ; *g*, in the separation of the hoof a removal has taken place of the coronary process, which consequently projects above the horny box in the living subject ; *h*, the interweaving of the sensitive and of the horny or insensitive laminæ ; the dark lines representing the sensitive laminæ, and the white the horny laminæ, which form the inner wall of the crust ; *i*, the outer wall of the crust, consisting of dark horn.

FIG. 3.—*The Sensitive Parts exposed—the sole of the foot*

shown after the horn has been removed.—*a*, The sensitive frog ; *b*, the sensitive bars ; the white line between the bars and frog representing the part of the foot which secretes the horny commissure that unites the bars and frog ; *c*, the sensitive sole ; *d*, the heels ; *e*, the fissure of the frog ; *f*, *f*, the reflection of the sensitive laminæ forming the bars ; *g*, the reflection of the coronet forming the frog. The spongy substance, represented to the left of the spectator, between $\frac{e}{a}$ and *b*, show that the subject whence this drawing was taken was only saved by death from an attack of canker.

FIG. 4.—*The Sensitive Laminæ exposed by removal of the horny box.*—*a*, The secreting coronet ; *b*, the sensitive laminæ ; *c*, the reflection of the coronet going to form the sensitive frog ; *d*, the reflection of the sensitive laminæ going to form the sensitive bars ; *e*, the toe ; *f*, the quarters ; *g*, the heels."

Fig1.



Fig.3.

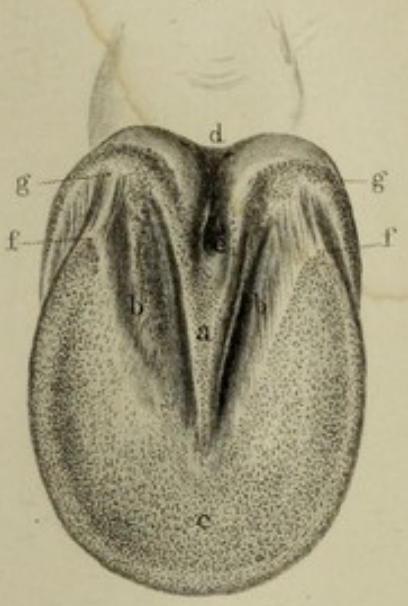


Fig.2.

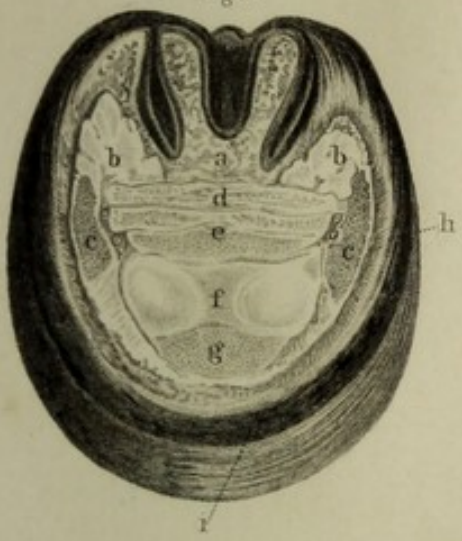


Fig4.



W. Bagg. ad. nat. del.

H. Adlard sc.

the earnest, well-known truthful character of Mr. Broad, have confidence in his statements. The method we have detailed has yielded satisfactory results in our hands, in most instances having enabled the animal to resume slow work in a few weeks, the feet being shod with strong and seated shoes when any amount of convexity has taken place, pressure being generally applied as the feet are able to bear it.

There are other remedies, variously employed—as blisters, setons, &c.; but as we have not witnessed the good expected from them, the more successful treatment only has been detailed.

Coronitis.

Coronitis, villitis, or inflammation of the coronet or coronary substance (Figs. 1 and 4, Plate X.), is a disease common to heavy town horses, but is sometimes observed in those of lighter and better breeds.

Symptoms. — Augmented heat and tenderness of the coronet, with evident increase of size in some cases. The animal exhibits a peculiar gait—shuffling or advancing the feet in a gingerly manner when both fore ones are affected, the heels being put as gently on the ground as possible. Scales are seen on the coronary substance, and a separation is effected between it and the hoof, while the latter becomes thin, harsh, and brittle from diminished secretion; and stripes are seen along the external surface. The bulging of the coronet is often a remarkable indication, which then forms a safe distinction between this disease and laminitis.

Treatment.—Remove the shoes in all cases, but more particularly those having calkins, and apply lead lotions, as No. 139, page 526; astringents, as Nos. 125, 126, 128, and 129; or those containing laudanum, No. 139, by means of wet rags tied over the pasterns. A few doses of neutral salts, No. 44, the ball, No. 14, or draught, No. 13, will be useful in

allaying fever, and reducing the heat and tenderness of the coronet. After a few days put on old flat shoes, turn the horse into a level loose box, and supply a laxative diet. When the inflammation has fully subsided, use the following liniment twice daily :—

RECIPE NO. 155.

Take of camphorated soap liniment (opodeldoc)	6 fl. oz.
Aromatic spirits of ammonia	1 „
Laudanum	2 „

Mix, and apply with friction to the coronet.

Mild blisters are sometimes used to promote more rapid growth of hoof. Use a little tar ointment externally, and when the animal is shod in future, forbid the unnecessary use of the rasp above the clenches, and knife to the frog and sole.

FURUNCULE, OR CARBUNCLE OF THE CORONET.

Having already described the pathological characters of carbuncle, we need only refer here to its special location in the coronary substance. Generally it occurs of the simple kind ; but there are instances when it appears to be of the anthracoid form, being doubtless due to some poisonous influence, probably punctures from dirty stable-forks, knives, &c., when some animal virus is present. Animals of gross constitutions, kept in ill-drained, dirty, and ill-ventilated buildings, are common subjects, and our experience goes to show that more cases arise in Scotland than elsewhere among horses of the heavier breeds (*see* Quittor, page 651).

Symptoms.—The coronet is affected at one spot, which assumes a circumscribed oval swelling, hard and painful, gradually extending until other parts exhibit the same characters, when great lameness, pain, and fever are manifested. After a few days, suppuration is established, and the discharge brings away detached portions—cores—when several openings are established in the same spot, or tumour, which

form angry-looking sores, from which escape pus, ichor, and blood ; these enlarge by ulceration, and often destroy much of the substance of the coronet, and endanger the hoof secretion at that part. The leg is sometimes involved as high as the pastern, and occasionally to the knee or hock—abscesses forming, succeeded by extensive sloughing and exposure of ligament, tendon, and even bone—producing such severe constitutional symptoms, and even blood poisoning, that death may result.

Treatment.—Poultice freely, using resin or turpentine to promote free discharge. Stimulate the wounds with nitrate of silver or caustic potash, and occasional dressings of carbolic acid. When a healthy action has been established, use lotions Nos. 70, 71, and 72 (*see* "Sanitas").

Fever medicines, laxatives, &c., may also be required ; and during stages of debility, stimulants and iron tonics.

Destruction of the coronary secreting substance produces the state known as

False Quarter,

Which consists of a hollow, flattened, or shelly state of hoof, having vertical ribs and furrows (Fig. 205), being much thinner than at any other part, extending from above downwards, and generally incapable of supporting weight. As the coronary substance secretes the horn, it therefore follows that injury or destruction of that organ insures little or no formation of hoof—hence the state known as false quarter. Treads, injuries of various kinds, quittor, abscesses, &c., are the usual causes, besides carbuncle, the rapid cure of which proves the preventive of false quarter.

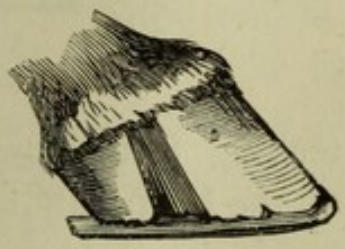


Fig. 205.
False Quarter.

When the state is fully developed, the animal should wear

a bar-shoe, by which the pressure may be removed from the weak part, and distributed to the frog and sounder portions.

Horse-dealers of a questionable reputation seek to cover these defects by plugs of soap, gutta-percha, &c., and afterwards tramping the animal through mud and dirt. The way to avoid such fraud is obvious: never purchase of unknown or untried horse-dealers, nor even of any one without first having the animal, and particularly the feet, examined by a competent veterinary surgeon.

Sandcrack.

Sandcrack consists of a fissure, crack, or division in the substance of the wall of the foot, commencing at the secretory substance—the coronet (Fig. 206)—and ultimately ex-



Fig. 206.—*Sandcrack at the Quarter.*



Fig. 207.—*Sandcrack at the Toe.*

tending to the lower or ground surface. Although no part of the hoof wall is exempt from sandcrack, yet generally it is found to be located at the inner quarters of the fore, and toes of the hind, feet (Fig. 207).

Causes.—Defect in the secretion of the elements of horn structure, due generally to external causes. Sandcrack, therefore, is of slow formation; but as it may arise from some unnatural strain, in consequence of a false step, &c., then we may presume it occurs at once. Even here we

may assume that defective secretion has something to do with its formation, as strong and perfectly healthy hoofs do not contract the disease ; although it may arise during severe strains and unnatural exertion, these must not be accounted as the true, but only an exciting cause, operating on a condition already favourable to the development of the disease.

Horn, or hoof, consists of a series of hair-like fibres or tubes, arranged in a longitudinal direction, and firmly held together by an intertubular or interfibrous substance. The first are secreted by a corresponding number of small eminences or papillæ, and the latter is provided by the surface of the coronary substance between the papillæ (Fig. 4, *a*, Plate X.). The natural function of the coronary substance being the secretion or formation of the horn fibres, and the intertubular cell-like substance to unite and bind them together in a firm common substance, called horn, it is necessary that the coronary secretory organ be in perfect health and order if true horn is to be secreted, and anything which interrupts or arrests this process prevents the formation of hoof material ; hence injuries of various kinds and causes, even of an occult character, which lead to a perverted secretion, are prolific sources of sandcrack. One fertile cause is the absurd paring of the sole and rasping the outer wall, by which the hoof is weakened in its integrity, and unfitted to bear jar or concussion : it becomes hard, brittle, and weak—no longer the elastic, strong, weight-bearing, and protecting substance originally designed by Nature ; and from this alone the secretory organ at the top is disturbed and disarranged. Hence defective secretion occurs, and an unnatural strain—indeed, any strain becomes so when the foot is unable to perform its functions—severs the connexion between the fibres at the weakest part. It is not a disease of the hoof, as that substance cannot take upon itself disease ; it is rather a diseased secretion. Hoof is secreted—formed—a result of

organic action, but possesses no life or organic action of its own.

Symptoms.—Gradually increasing lameness as the crack develops and tissues at the top inflame. At first the crack is small, almost invisible, existing on the outer surface only, but at length extends throughout the substance of the wall to the internal laminated structures; and, finally, in the motions of the animal the hoof gives way at this part, which admits of the crack opening and closing, the sensitive parts being included, which gives rise to hæmorrhage, pain, and lameness; and with further irritation from the insinuation of dirt, grit, moisture, &c., the disease is aggravated, the animal dreading to put the foot to the ground and bear any weight upon it. The conditions are intensified when the fissure exists at the toe. The coronary substance swells, and inflammation seizes the soft parts in contact with the crack, and often much irritative fever prevails.

Treatment.—Reduce local pain by poultices, the shoe being first removed, and allay febrile disturbance by appropriate internal remedies, as draught No. 13, or bolus No. 14; laxatives, No. 56; neutral salts, No. 44.

When these have been fulfilled, there are several plans adopted with the view of insuring a growth of sound horn, which, briefly, are as follows:—

1. Put on a bar-shoe, having relieved the affected part from all pressure, causing the weight to be distributed upon the frog, sole, and sound parts of the wall. Widen the crack from top to bottom by means of the knife, and also separate the top of the hoof from the coronet at the junction with the crack, removing the horn upon each side at least one inch, the space produced being required for the new growth of horn. A mild blister may now be applied over the part, and repeated in a week or ten days, and at suitable intervals afterwards, to promote a quicker and stronger secretion.

2. Prepare the foot for the bar-shoe as recommended in the first plan; then pass the heated firing-iron *across* the crack (Fig. 208), about half an inch below the junction with the coronet, rubbing it freely into the horn until the animal winces from pain; this will divide the upper portion from the lower, and allow of new horn growing without interference, as a rule; but if the latter should accumulate so fast as to press upon the old horn at a later stage, the knife may be employed to cut so much away as will make room for its descent. A mild blister should be put on the coronet, and the animal's head tied up, rest being given until lameness has passed off. As a means of conferring a necessary amount of elasticity, keeping out moisture, and promoting the growth of horn, a strap should be put upon the foot to hold tow dipped in Stockholm tar in application to the top of the crack. In five or six weeks the crack will grow down soundly, and care must be exercised in shoeing.

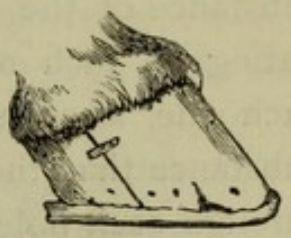


FIG. 208.—*Cross firing for Sandcrack.*

3. *Clasping.*—This is performed in several ways. A. Before the shoe is replaced a nail is driven through the toe, and caused to pass out on one side of the crack, about an inch above the ground surface. A hole is punched in the shoe corresponding to a similar position on the other side of the crack, and when the shoe is put on a nail is driven so as to emerge about the same height; a piece of wire is then twisted round both nails, their points turned down, and the wire finally tightened, so as to bring the edges of the hoof close together. The whole of the nails are then driven to secure the shoe, and, as preferred, either of plans Nos. 1 and 2 may be adopted in addition. This method is specially adopted for toe sandcrack.

B. *General clasping* is thus performed:—The outer dense glazed surface of the hoof is first rasped slightly away about

the middle of the crack, and upon each side; afterwards, by means of a suitable boring instrument, a hole is made in the substance of the hoof, commencing at the crack and terminating an inch or thereabouts from it. This is done on each side, when a piece of tough iron, of somewhat smaller substance than the shank of an ordinary horse-nail, is passed through each hole, or rather from one to the other, the ends being turned towards each other, and by subsequent pressure derived from a proper pair of pincers the crack is closed, and the clip or clasp tightened.

4. Strong waxed twine is wound round the foot near the coronet several times, and at length fixed by a firm knot, the crack being filled with gutta-percha or shoemaker's wax.

5. An effective closing of the crack is performed in the following manner:—By means of an instrument, having two points sufficiently far apart to include the crack, and previously heated, depressions are made, one on each side (Fig. 209). A clamp (Fig. 210, *a*) of tough iron, having

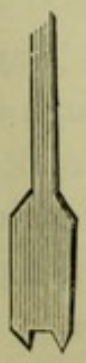


FIG. 209.—*The Clamping Iron.*

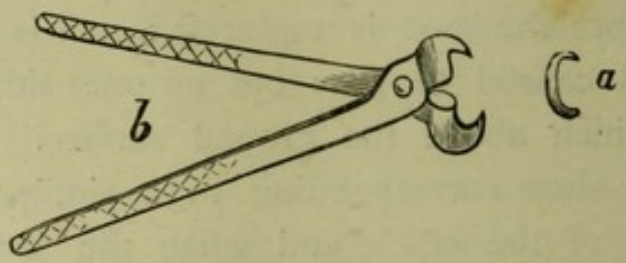


FIG. 210.—*The Clamp, a, and Sandcrack Farceps, b.*

each end turned down in the form of hooks, is inserted into the depressions by means of forceps (Fig. 210, *b*), and by subsequent pressure caused to penetrate the hoof and draw the sides of the crack together. One or more of these can be inserted with far less trouble than the clasps named in No. 3, B.

In all cases, we believe, the cure is hastened by a blister to the coronet, and in order not to encourage the subsequent tendency to sandcrack, we would counsel the reader against the absurd and injurious practice of rasping the outside of the hoof, paring of the sole and frog, &c., and all means which lessen the integrity and natural strength of the hoof, and combine to pervert the secretion of horn.

6. *Stripping.*—In this operation the heated iron is employed to make two incisions in the horn, commencing at the crack about two inches below the coronet, each going upwards and spreading outwards in the shape of the letter **V**. The burning is carried through the horn to the sensitive parts, so as to cut off the portion included between the fissures thus formed. The horse is then cast, and, by means of appropriate instruments, the portion of hoof is dissected or torn off, and the parts treated as an ordinary wound, while the growth of new horn is promoted by blisters or stimulating liniment, &c.

7. *Other forms of Firing.*—One plan, which originally was practised by Mr. Read, V.S., of Crediton, many years ago, consists of making a half-circle from one point of the coronet, including the crack, and returning to the coronet on the opposite side (*see* Fig. 211).

We have already named the simple cross line of firing (Fig. 208), and it only requires that we should state that a compound form has been adopted—that is, the **V** shape (Fig. 211) with Mr. Read's plan. The simple cross line of firing has been very successful in our hands, and recommends itself as ready and effective.

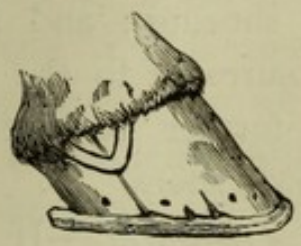


FIG. 211.—*Showing the methods of circular and triangular firing for Sandcrack.*

Thrush.

This consists of the discharge of a fœtid inky fluid from the cleft or fissure of the frog, sometimes associated with burrowing under the whole surface, and detachment of the horn in ragged, spongy, and half-decomposed portions. Horses which stand in their excrement in the stable are very prone to them. The use of cowdung as stopping to the fore-feet is a common cause; and when horses are turned upon damp pastures, or into wet strawyards, they are certain to contract thrush. The disease depends upon contact with filth and decomposing material, and the prevention is fully effected by avoiding these. The horny frog, by constant maceration and reduction—effects which are mainly due to the presence of potash salts in the dung and urine—becomes softened and reduced; it is no longer the protecting cushion which Nature originally designed it—the sensitive parts are exposed and irritated, inflamed, and a discharge arises, being impregnated with horn pigment and decomposing material, which confer the characteristic colour and odour. In some instances we have found thrush associated with a small shrivelled frog and hollow foot, or sole, and high heels, due to the pernicious effects of paring away in shoeing; and in these we have usually attributed the occurrence to the loss of function, especially when the frog is further removed from the ground by high calkins or thick shoes.

Treatment.—If the animal is at rest take off the shoes, lower the heels, and bring the frogs to the ground, which should be kept as dry as possible. The fissure of the frog may be packed daily with a small quantity of tow, first moistened in dilute hydrochloric acid, and afterwards charged with the following powder:—

RECIPE No. 156.

Take of common alum	1 dr.
Calomel	1 „

Mix.

Or the following mixtures may be employed :—

RECIPE No. 157.

Take of sulphate of zinc	2 drs.
Acetate of lead	2 „
Nitric acid	2 „

Mix, and stir with a glass rod.

RECIPE No. 158.

Take of sulphate of copper	2 drs.
Stockholm tar	2 „
Sulphuric acid	2 „

Dissolve the copper in the acid, and add the tar.

RECIPE No. 159.

Take of strong solution of chloralum	½ oz.
Tincture of myrrh	½ „

Mix.

The three foregoing mixtures to be applied by means of tow, packed in the fissures by means of a knife or flat stick, and repeated on alternate days.

If the animal is at work, pressure should be put on the frog, as soon as it can be borne, by means of a bar-shoe, or leather soles and packing. When the frog is much shrivelled, and far from pressure by the bar-shoe, even when the heels have been lowered, it may be readily effected by securing several thicknesses of leather to the bar of the shoe by means of a nail, for which a hole has been punched in it.

To prevent thrush, avoid paring the frog and sole in shoeing, and there will be no call for cowdung or other kind of stopping, as the feet, when not reduced, preserve their own moisture. If the hind-feet are the seat of the malady, the

horse should wear movable leather soles in the stable, to prevent contact with the dung and urine. When horses are turned to grass, high and dry pastures should be selected in preference to others; and strawyards that are low and wet rejected as positively ruinous to the feet in a variety of ways.

Canker.

This disease sometimes follows neglected thrush, and is seen as an acute affection conjointly with an attack of grease. Occasionally it commences in other parts of the foot, following pricks of nails and various injuries; but as a rule it commences at the frog, and rapidly extends until the whole of the ground surface of the foot is involved. Canker is an intractable disease simulating grease, and is common to the same class of animals, often existing a long time, making variable progress—sometimes not at all—and at length becoming doubly aggravated, the system being charged with blood poison.

Symptoms.—The affected surfaces assume a spongy fungoid form of excrescence, the horn being degenerated and gradually removed by the enlargement from beneath. Thus constituted, the frog and sole are sometimes indistinguishable from each other; while the fungoid surface bleeds on the slightest touch, and discharges ordinarily a most offensive fluid, among which are masses of a cheesy consistence, composed of the débris of horn-cells undergoing degeneration, the smell arising from the chemical alteration, which changes the contained sulphur into sulphuretted hydrogen. The hind-feet are most commonly affected, but only one or two may be seized; sometimes the whole are affected. When only one or two feet are implicated the rest possess an intensely offensive odour, and the general conclusion is warranted that the disease is constitutional; indeed, it mostly appears

that this is the case, local causes thereby operating with greater power, and producing in heavy coarse animals a disease almost unknown in the lighter and improved breeds.

Treatment.—All kinds of treatment have been known to fail; that which has proved successful in one case has had no effect in another of similar nature. The usual plan consists of clearing away the horn of both frog and sole effectually, either by paring or stripping, and afterwards applying the various dressings (Nos. 156, 157, and 158), as recommended for thrush.

Tar and the various acids, burnt alum, sulphate of copper, chloride and sulphate of zinc, corrosive sublimate, &c., have likewise been used alone, or in combination with tar, as an excipient; also the mineral acids, perchloride of iron, &c., alone. But the greatest success has been derived from a constant change of these, keeping the feet dry, packing up with dry tow, and causing pressure to the whole of the diseased surface.

During the application of these remedies, laxatives and diuretics, with tonics, are called for, and should be given regularly, as the state of the system seems to indicate.

In long-standing cases the bones of the feet become diseased; swelling of the legs, and even intractable grease, farcy, or glanders may ensue.

Horn Tumours—Keratoma.

In consequence of pressure—derived it may be from the clip of the shoe being hammered too tightly by the smith in shoeing, and also from abscess and injury inflicted at other parts of the foot—an accumulation of horn takes place at the junction of the sole and wall of the hoof on the internal surface (Fig. 212); and as it grows, invasion of the coffin bone occurs (Fig. 213); and the accommodation

thus afforded in many instances prevents the appearance of lameness. Keratoma arises at the toe and sides of the feet, in consequence of the pressure of clips at those points; but



FIG. 212.—*Section of Hoof, showing Horn Tumours at the Toe and Quarters.*



FIG. 213.—*Invasion of the Coffin Bone by Horn Tumours of the Hoof.*

occasionally it is seen as a result of long-standing corns, pricks, and other injuries.

Treatment.—Stripping the crust or wall of the hoof is sometimes recommended, but as the operation is attended with some danger, it is now rarely adopted. If there is no lameness treatment is, obviously, not required; but as lameness is often a characteristic of their presence, and treatment is called for, it has been equally decided that a system of shoeing should be adopted to suit the case; avoiding clips at the diseased points, and being careful not to produce pressure and strain, giving the sole and frog their due share of weight.

SEEDY TOE.

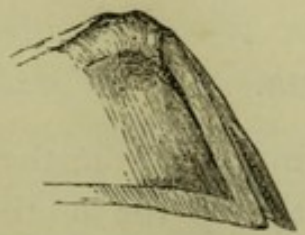


FIG. 214.—*Section of Hoof, showing separation at the Toe.*

Seedy toe consists of a separation of the horny wall from the horny laminæ at the lower border of the os pedis, the cavity (Fig. 214) being filled with a grey, mealy powder, the result of a perverted secretion of horn at that point.

The *causes* are attributed to inflammation—laminitis—or injury from pressure of a clip. If the wall over the part is tapped with a hammer a hollow sound is emitted, and after the case has existed some time the wall

bulges outwards. Although the term may mislead one to suppose the disease is located at the toe, it will be found at various parts ; and when not associated with the causes named, it will be obvious that pressure from defective shoeing, especially paring—producing weakness, and alteration of the weight-bearing surfaces—have much, if not all, to do with its origin.

Seedy toe is liable to spread, and to cause lameness from the insinuation of sand, gravel, dirt, &c.

Treatment.—Remove the affected part from pressure by the application of the bar-shoe ; avoid the paring of sole and frog ; remove clips to other parts, and let them be only slightly hammered down. The veterinary surgeon will remove all the diseased parts before the shoe is applied, and at stated periods promote a new growth of horn by means of blisters to the coronet, &c.

Corns.

There is no analogy whatever between corns in the feet of horses and the condition known by the same name in the human subject. Corns in horses are the result of a bruise or injury to the sensitive sole, and are exhibited in the form of blood extravasation in the horny structures situated at the heels in the angle formed by the wall or outer crust of the hoof, and its inflexions—the bars. As a rule, corns appear in the fore-feet and on the inner sides, but they are also seen on the outer sides, and sometimes, but rarely, in the hind-feet. The *rationale of the causes* of corns will be best understood by referring their existence first to those causes which weaken and destroy the integrity of the hoof, pervert the secretion of horn, and reduce its substance. Thus, paring of the sole destroys its office as a weight-bearer ; rasping of the wall first weakens it, causes it to become dry and brittle from evaporation, and the two con-

jointly produce an inefficient hoof, liable to bend, and strain, and incapable of resisting local pressure, as from a stone or particular part of an unequal shoe. Such a hoof, compared with the natural healthy horny box, is as tissue-paper—a condition which the mischief of man has mainly been active in producing. When the art of shoeing is practised more in accordance with the laws of anatomy and physiology, the diseases of the feet will be reduced to a minimum.

A corn originally is a simple bruise of the sensitive sole, arising from local pressure derived from the coffin bone above and the horny sole below, attended with blood extravasation, the result of rupture of bloodvessels in the injured part. Slight cases are readily dispersed, but more serious ones are liable to run on to suppuration; and in long-continued or neglected cases, especially those accompanied by maltreatment and constant exposure to the exciting causes, much lameness exists, and the animal is comparatively useless. Further changes of structure have taken place; the coffin bone—os pedis—has become involved in inflammation and absorption, formation of ossific points—spiculæ—on the under surface (Fig. 215), or necrosis; and sometimes ossification of the processes, called alæ, or wings, goes on conjointly with absorption of animal matter, which renders the part brittle from excess of calcareous substance, and fracture arises; in other cases a horn tumour (Fig. 212)—keratoma—forms at the lower margin of the coffin bone, and this acts as a similar cause of persistent lameness. Corns, like all other diseases, are unsoundness; but temporary ones are readily got rid of by proper treatment and shoeing.

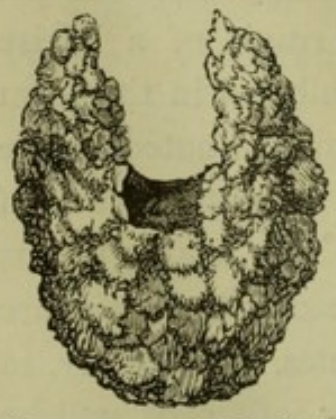


FIG. 215.—*Coffin Bone (under surface) diseased, as the result of Corns.*

Treatment.—The first procedure is to remove the shoe,

and by poultices and general treatment reduce the existing inflammation. If pus has formed, it must be evacuated through the sole; and if portions of bone are detached from the edges of the coffin bone, they are to be removed. If the animal can be spared after lameness has disappeared, let him run barefoot on a dry floor, the outer edges of the hoof being rasped round to prevent fracture; blister the coronets at intervals to promote sound horn in weak feet, and avoid the use of the knife to the frog and sole. Put on a bar-shoe for a time after going to work, but eventually return to a plain one which bears equally on sole and wall. Discard "stoppings" of all kinds; avoid moisture whenever practicable—that is, forced moisture— as the foot is best preserved by all means which render it strong, thick, and apparently hard and unyielding, under which conditions it is the most elastic and the best—the natural protection.

Parasitic Diseases of the Skin.

These consist of—I. Animal Parasites, and II. Vegetable Parasites, viz.:—

I. Animal Parasites.
- Scabies or Mange.
- Poultry Lousiness.
- Ticks and Maggots.

II. Vegetable Parasites.
- Favus.
- Tinea Tonsurans—True Ringworm.

I. Diseases arising from Animal Parasites.

Scabies or Mange.

This disease is known under various names, as it affects the different species of animal. It is contagious, depending

upon the presence of animal parasites which burrow beneath the epidermis, or pierce it in search of their natural subsistence. As it affects mankind it is called itch ; in sheep it is known as scab ; and in the horse and cattle it is called simply mange ; medically, in all these cases, it is termed scabies.

According to various observers, it has been demonstrated that the parasites which specially belong to each animal producing mange, are capable of being transferred to man, and in certain cases to other animals of different species, and in each produce the identical forms of mange ; but that their period of devastation is exerted only as long as they live, but are incapable of propagating their species when so removed.

There are several kinds of mange insect, or acarus, common to the horse, which we shall briefly describe.

1. *Sarcoptes Equi.*—This insect (shown in Fig. 216) is visible to the naked eye. The body is marked by alternate furrows and lines, running in a semi-circular manner across the body. The back is studded with small tubercles and stiff hairs. The females are longer than the males, and far more numerous ; and both are provided by several pairs of sucking discs, with which they pierce the epidermis, under which the female deposits her eggs. At these points a small elevation is produced, in which a passage is formed, the acarus occupying the farther extremity, giving rise to an exudation and softening of the epidermis, and this afterwards dries up, together with the cuticle, forming a series of scales, which gradually fall off.

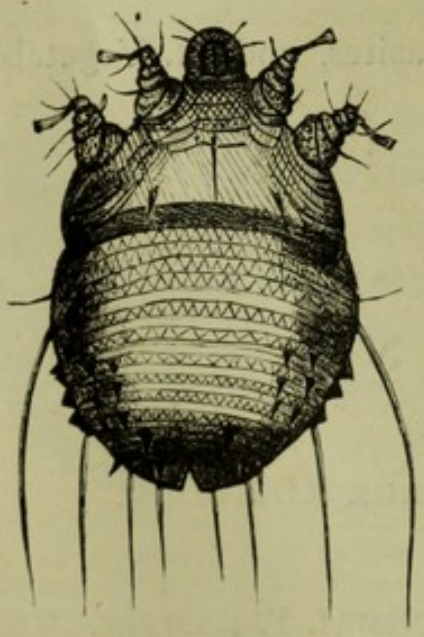


FIG. 216.—*Sarcoptes Equi* (GERLACH).

2. *Dermatodectes Equi.*—This variety of acarus does not live, like the Sarcoptes Equi, on the skin of man and other animals ; if removed thither its term of existence is speedily determined, without producing the characteristic disturbance common to the horse, in which it is the true mange insect (Fig. 217).

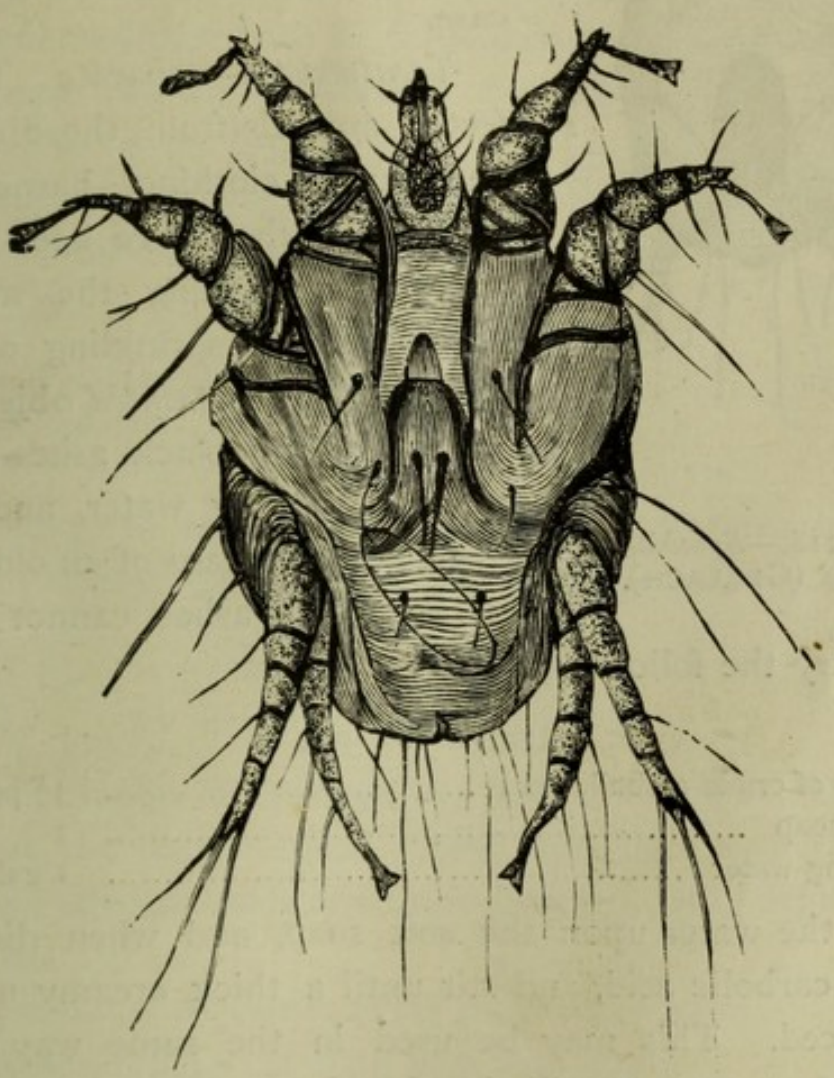


FIG. 217.—*Dermatodectes Equi* (GERLACH).

3. *Symbiotes Equi.*—Like the latter insect, it is specially confined to the horse, being readily found beneath the scales (Fig. 218).

Symptoms of Mange.—Great uneasiness of the animal and desire to rub against fixed objects, arising from an intolerable itching of the skin, which is most severe at night. The

skin is affected by unusual scaliness, hair is rubbed off in places, and the epidermis exhibits an elevated, as well as hollow or detached appearance. The presence of the acarus, together with the transmission of the disease to other animals, determines the case.

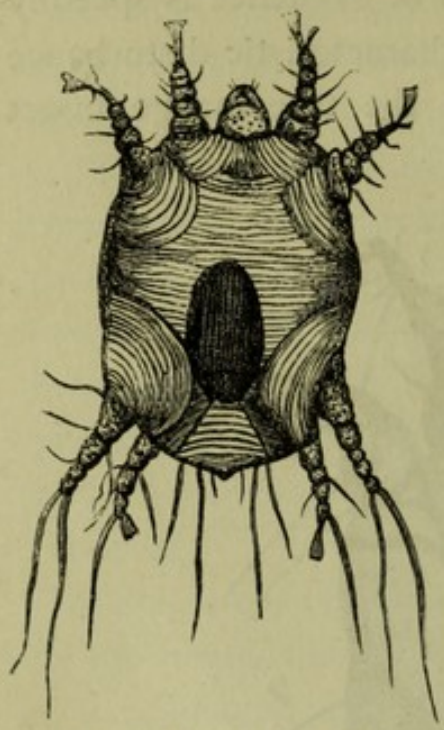


FIG. 218.—*Symbiotes Equi* (GERLACH).

Treatment.—Separate the affected animals from those healthy, and purify clothing, harness, &c., with which they have been in contact. For washing the mangers, stall-posts, and sprinkling over the floors, and *all unpainted* objects, use one pound of black ashes with a gallon of boiling water, and apply when hot by means of an old brush. If the black ashes cannot be obtained, try the following :—

RECIPE NO. 160.

Take of crude carbolic acid	1½ pound.
Soft soap	1 „
Boiling water	1 gallon.

Pour the water upon the soft soap, and when dissolved add the carbolic acid, and stir until a thick creamy mixture is produced. This may be used in the same way as the black ashes, and it will be found exceedingly useful for washing the rugs, rollers, bandages, and harness. Those articles which are of a woollen or cotton fabric may be steeped in the fluid for an hour or two. The residue should be liberally sprinkled over the floors, and thrown down the channels, drains, &c. The same solution, used when tepid, will also answer remarkably well for destroying the acari on the skin. It may be applied by means of a

brush. In ordinary cases the following ointment may be used :—

RECIPE NO. 161.

Take of flowers of sulphur	2 oz.
Hog's lard, pure	8 „

Rub these together by successive additions of the sulphur, until a perfect mixture is obtained, and apply with friction to the affected parts two or three days ; then wash with soap and water, or the "Sanitas" mixture, and apply again when the parts are dry.

An effectual remedy is found in the ointment of stavesacre, which is constituted as follows :—

RECIPE NO. 162.

Take of stavesacre seeds, finely powdered	2 oz.
Hog's lard, pure	8 „
Olive oil	1 „

The whole to be mixed and digested in a water bath for an hour ; afterwards strain and set aside to cool, when it is fit for use.

LICE.

These parasites differ from the last, as they do not burrow, but infest the outer surface, giving rise to much irritation, and affect aged animals and those suffering from debility and starvation.

The course of treatment to be pursued consists of isolating the animal, clipping off long hair, and applying the carbolic acid mixture, sulphur ointment, or a decoction of stavesacre. The latter is made as follows :—

RECIPE NO. 163.

Take of stavesacre seeds, powdered	4 oz.
Boiling water	4 pints.

Let the mixture stand until cool, when it may be applied by means of a brush to the affected surfaces ; after which, tie

up the animal's head until the skin has become perfectly dry. In addition to the local treatment, the animal will require good food, with tonic medicines.

Poultry Lousiness

This form of parasitic disease, denominated *Phthiriasis Equi*, is common to horses when stabled with fowls, or when their roosting-places adjoin the stables. It is due to the ravages of a species of mite, described by Alt as the Dermanyssus Avium, common to the ordinary fowl and caged birds generally (Figs. 219 and 220). The affection was first described in 1851 by Professor Bouley, whose observations have been since confirmed by veterinarians at home.

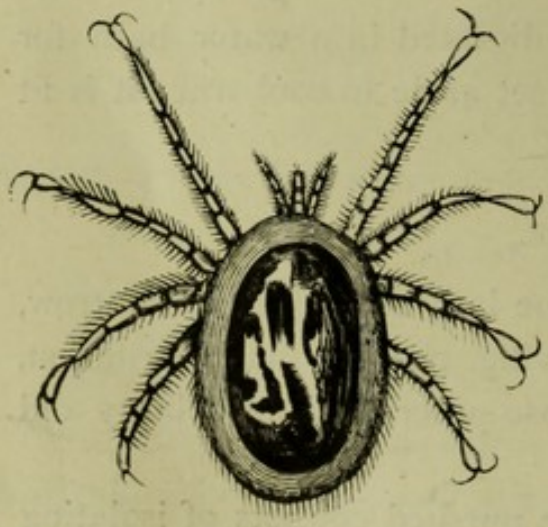


Fig. 219.—*Dermanyssus Avium. Fowl Louse (Female).*

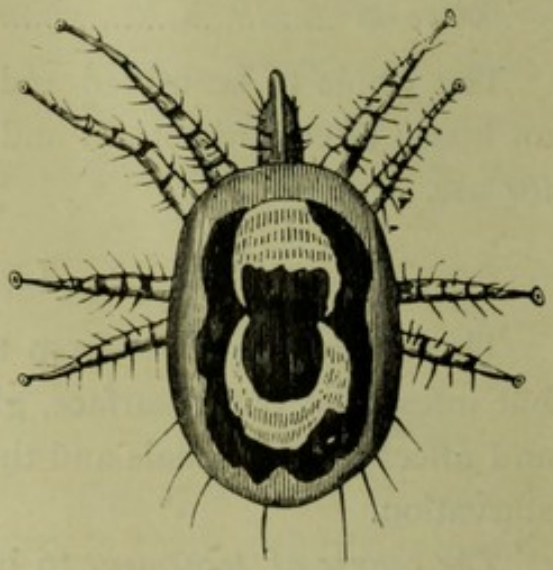


Fig. 220.—*Dermanyssus Avium. Fowl Louse (Male).*

Symptoms.—The attack is very sudden. Without any previous signs of uneasiness the animal begins to rub and scratch himself, moving from side to side, stamping violently, striking his belly, and continues for hours in this unusual state of excitement; night only adding to his torment by increased irritation, which causes him even to tear the skin with his teeth. An eruption of very small vesicles arises, solitary

or agglomerate, the latter sometimes covering a large extent of surface, succeeded by peeling of the cuticle, which is accompanied by the hair also, leaving a bare patch varying from the size of a small pea to a threepenny-piece. In a few days after the attack the skin will be covered by such patches, and later the animal may be partially denuded of hair.

The attack seems to confine itself generally to the local manifestations, the system rarely suffering constitutionally unless the irritation is continued, when loss of appetite, condition, and natural power is observed.

Treatment.—Remove the animal to temporary quarters, and dress with the stavesacre decoction, No. 163, page 629; next do away with the hen-house, and prevent fowls roosting near the horses; after thorough cleansing by "Sanitas" solution, and whitewashing of the stables, throw open to the air for a week before the animals are taken back again.

Ticks and Maggots.

Ticks are occasionally found imbedding themselves in the skin of horses, giving rise to much irritation. By means of special suckers, or other appliances, they fasten so firmly that force applied will either tear the animalcule in two, leaving the head in the skin; or a portion of the skin is drawn away if the tick comes off entire (Fig. 221). The best way of exterminating them is to divide the body by means of scissors, or drop olive oil or "Sanitas" oil upon them by means of a feather.

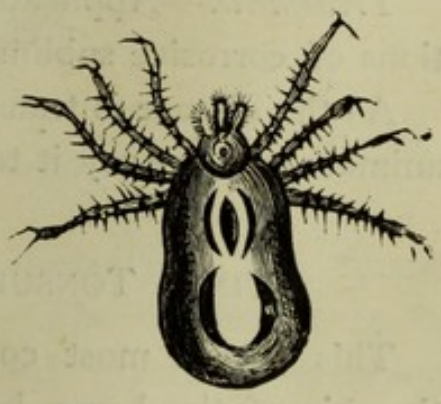


Fig. 221.—*Ixodes Ricinus. The common Tick.*

Maggots are found in large numbers in the various kinds of wounds during very hot weather. They are the larvæ of

the common blow-fly, hatched from the eggs which have been deposited in the raw surfaces, and by burrowing add to the soreness and irritation. Wounds of the feet are very liable to this parasite; to destroy which oil and turpentine, in the proportion of one of the latter to three of the former, will be found effective.

II. Vegetable Parasites.

Two varieties of vegetable parasites are observed among horses—*Favus* and *Tinea tonsurans*.

Favus—Honeycomb Ringworm—

Depends upon a cryptogamous fungus, which has its primary seat in the hair follicles, giving rise to itching and an eruption, which subsequently dry up, leaving a crust or scab of a circular form, and having a yellow appearance. Such patches are numerous, and by age become lighter in colour, soft, and friable, being easily reduced to a state of powder, and a peculiar smell of mice is said to be generated. It is a common disease among children, in whom it is known as "scald-head." Among horses it is rare.

Treatment.—Applications of iodine ointment, or preparations of corrosive sublimate, are the most useful.

As the disease is transmitted from mice to cats, the latter animals may convey it to horses.

Tinea Tonsurans—True Ringworm.

This is the most common form of parasitic fungus in the skin of the horse, being seen among animals of every condition. Like favus, it is a disease of the hair follicles, involving a variable extent of surface in a circular form, within which a fungoid crust forms, causing the hairs to break off and become stumpy, the crust assuming a whitish

appearance, and eventually breaking down into a bran powdery condition. Erythematous inflammation, with itching and irritation, are accompaniments. There are no vesicles, as in *Herpes circinatus*, in which there is no scurf or scales; and hairs which may be plucked out by the roots in vesicular ringworm, break off in this disease, sometimes close to the skin or within the follicle itself. The particular fungus giving rise to this affection has been named *Tricophytes tonsurans*, and is readily transferred to mankind and the ox tribe, being highly contagious.

The parts affected are those covered, or partially covered, with hair; and in horses it is found on the face, sides of the neck, back, and quarters—parts that are most likely to be brought into contact with the means by which the disease is propagated (Fig. 222).

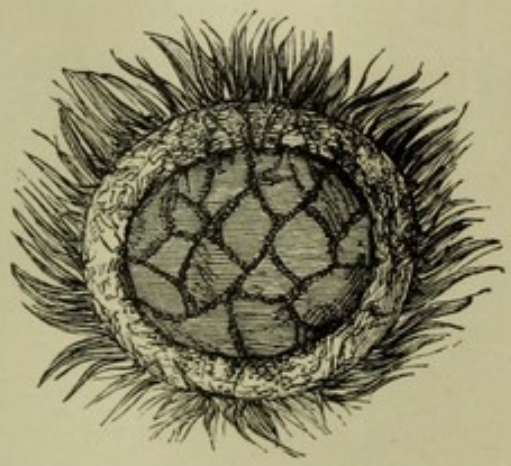


FIG. 222.—*True Ringworm* (*Herpes Tonsurans*).

Treatment.—This consists of destroying the fungus which forms beneath the cuticle. The crusts are to be softened by the application of lard, glycerine, or warm water, when they may be removed; and to the surfaces beneath the ointment of iodine is to be applied. The mineral acids diluted, perchloride of iron, solution of corrosive sublimate, are all very efficacious.

The clothing of the animal should be boiled or soaked in

the carbolic solution, No. 160, page 628, several hours; the padding of collars and harness need thorough cleansing and dressing with soap and warm water, or carbolic acid solution, and when dry treated with a solution of corrosive sublimate, to destroy any traces of the adhering fungus. The building likewise should be thoroughly cleansed.

As a safe and efficacious remedy for the foregoing diseases of the skin, as well as a general antiseptic and disinfectant, "Sanitas" is the most preferable.

SECTION XI.

LOCAL INJURIES, LAMENESS, ETC.

LOCAL INJURIES, LAMENESS, ETC.

LOCAL injuries comprise wounds and bruises of the skin, and deeper-seated tissues; fractures of bones, sprains of ligament and tendon, dislocations, and certain diseases of the articulations. This class of affections is somewhat large and varied, and, in a work like the present, we can scarcely do more than give a brief notice of them; their importance is such that an entire volume might be devoted to each department of the subject.

In this Section will be included a number of states which scarcely merit a place under any of the foregoing divisions.

WOUNDS.

Four different kinds are recognised in veterinary practice: these are the *incised*, *lacerated*, *contused*, and *punctured*. Their nature, and the treatment required, we give as follows:—

INCISED WOUNDS.—These are produced by some cutting instrument, which divides the skin evenly and smoothly, and without loss of any part of its substance. Surgical wounds are of this class. A great difference exists in the subsequent healing of a wound as decided by its extent; thus, if small, it unites by what is known as the first intention, or adhesive inflammation; but large wounds are sometimes attended by extensive suppuration. It does not appear, however, that suppuration is necessary to the proper healing of a wound,

as the researches of Dr. Hervieux, in 1850, and Professor Lister, within more recent years, have conclusively shown. We shall refer to this subsequently (*see* Antiseptic Treatment). Profuse hæmorrhage is not an infrequent accompaniment of wounds of this character when accidentally inflicted.

Treatment.—When hæmorrhage (which see) is profuse, the first attention should be devoted to arresting it; if small, simple closure of the wound is sufficient.

Incised wounds, excepting when they occur in the extremities from falling upon sharp broken stones, &c., are usually free from dirt and foreign matters; but if such are present, or blood-clots, &c., they should be carefully removed by the forceps, the fingers, or handle of a scalpel; if they are firmly imbedded in the wound, poultices or fomentations may be required. With this exception, *never allow an incised wound to be washed, poulticed, or fomented;* as Nature's coagulum, which is thrown out for the proper union of the parts, is removed, and often an unsightly wound, and subsequent extensive blemish, are produced. The lips are to be approximated and held by sutures, of which several kinds are employed. The first is the *twisted suture,* which consists of passing a pin through the lips of the wound, and drawing them together with soft twine, twisted in the form of the figure 8, and shown in the engraving (Fig. 223).



FIG. 223.—*Twisted Suture.*

The interrupted suture consists in passing thread, silk, or silver wire, &c., through the lips of the wound—*i. e.*, from one to the other—when the two ends are brought together and tied; or in the case of wire being used, the ends are twisted round each other. The latter is also called the *metallic suture* (Fig. 224)

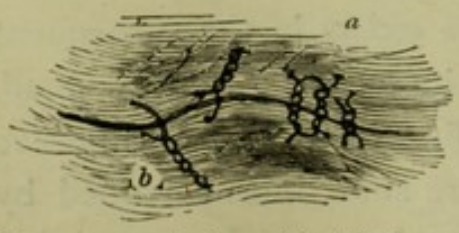


FIG. 224.—*Interrupted Sutures*
a. Thread or silk. *b.* Metallic wire.

The *uninterrupted suture* is formed by passing the thread or silk continuously from one side to the opposite, until the lips from one end of the wound to the other are brought into close and even approximation. It is only suitable for small wounds (Fig. 225).



FIG. 225.—*Uninterrupted Suture.*

The *quilled suture.*—This is particularly adapted for large wounds, and those where internal pressure is likely to prove antagonistic to the process of healing, as in the abdomen, flank, &c. A cylindrical piece of wood, of suitable length, is selected—say three-quarters of an inch in diameter, or thicker if required—and a number of slits are cut round it, corresponding to the number of stitches that are to be inserted, which may be about an inch apart. This being done, the wood is split up the middle, producing identical halves, and all sharp edges are slightly rounded off. The whole of the stitches are next inserted—thread, twine, or wire being used—by means of a suitable needle, having a triangular point, and more or less curve (Fig. 226), sufficient length for tying being left upon each side after being cut off. The sticks are next placed flat side downwards, upon each lip of



FIG. 226.—*Suture Needle.*

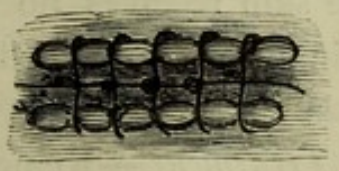


FIG. 227.—*Quilled Suture.*

the wound within the line of threads, &c., which are brought together over the slits in the sticks, and tied together or twisted (Fig. 227). Suitable dressings, for after use, are cold water, lotions of lead, zinc, arnica, spirits and water, tincture of benzoin, tincture of myrrh, &c. (*See* Dispensatory.)

In some instances, where large wounds have been inflicted, signs of severe constitutional disturbance arise (*see* Irritative

Fever, page 27), when the various sedative preparations—as acetate of ammonia, aconite, neutral salts, opium, belladonna, calomel, &c.—will be required, various forms of which are given in Nos. 13, 14, 33, 34, 44; and further particulars of the remedies themselves will be found in the Dispensatory, at the conclusion of the work. Perfect rest also may be required, particularly when the wounds are situate in movable and important parts; and the slings may be called into requisition, in order to prevent the animal lying down.

LACERATED WOUNDS.—In this variety separation of the integument is effected in an uneven and irregular manner. The causes are violent blows with rough and knotty sticks, or by being torn with hooks, nails, and projecting ironwork; kicks, bites, and attacks in which the horns of cattle are used. There is seldom danger from bleeding, as arteries, when torn, usually contract sufficiently to prevent the flow of blood.

Wounds of the abdomen, when the muscles are divided, are frequently fatal, not only from the collection of serum, blood, pus, &c., within the abdomen, but also from the great liability which exists in the horse to become complicated with peritonitis. Sometimes permanent ventral hernia ensues from tearing of the muscles beneath, but in which the skin receives no injury; these are mostly the result of being gored by cattle, and seldom call for other treatment than simple pressure, if observed at the time.

Treatment.—Remove all foreign bodies by the forceps, or gentle fomentations, poultices, &c., as required; afterwards, and particularly in all clean wounds, draw the edges together by means of sutures. This, however, cannot always be done, as the vitality of the parts is too much destroyed, in which case the many-tailed bandage, as shown in Fig. 228, will prove the most serviceable. This consists of two parts, each being of stout canvas or pack-sheet, one side of which is *glued* upon the skin and hair, the other being

slit up into an equal number of tails. One half of the bandage is glued upon one side of the wound, to correspond

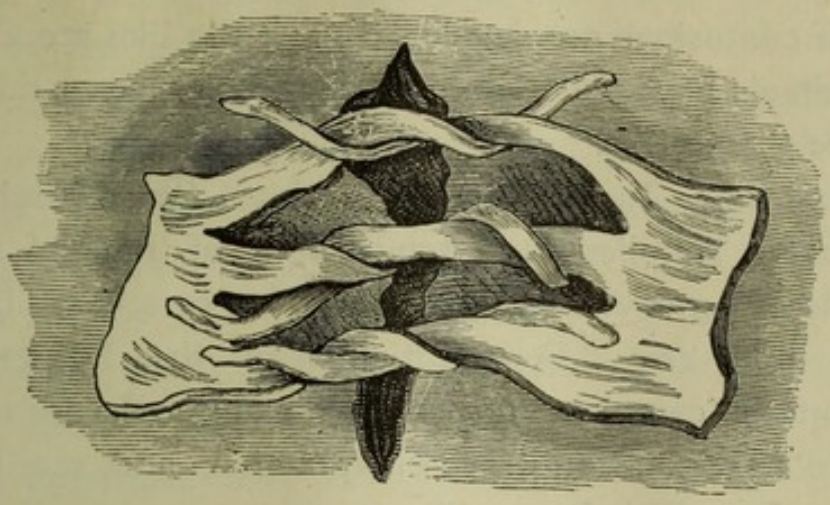


FIG. 228.—*Many-tailed Bandage for large Lacerated and other Open Wounds.*

to the similar situation of the other; and when the glue is firmly dried, the tails are brought together over the wound and tied. This has the effect of bringing the edges together; and a further improvement consists in placing "flat quills" beneath, in order to press down the parts as desired. The spaces between the tails readily permit the application of suitable dressings from time to time.

The animal must be kept very quiet, and food of a laxative nature should be given; scarifications may be needed to reduce local tumefaction, and probably stimulating applications to prevent gangrene. If the system affords evidence of shock, stimulants will be necessary, as well as close attention generally.

CONTUSED WOUNDS.—These exhibit a wide difference from either of the preceding. Division of surface or subjacent tissues may have occurred; and, in addition, there is frequently a considerable loss of vitality in the parts implicated, which becomes a special feature, particularly as sloughing generally follows, and recovery is slow. Kicks, blows, and falls are common causes, and they are frequently

seen as a result of paralysis or other inability to rise, when the animal bruises himself in the attempts to regain his feet. When partial hanging has occurred, sometimes the worst forms of contusions are developed ; and the like are also seen after animals have fallen into ditches, holes, &c., and cannot extricate themselves.

Treatment. — Incessant fomentations for several hours, water being supplied at a temperature of 115° to 120° F., the parts being covered by *spongio-piline*, or several layers of woollen rags (*see* "Fomentations" in the Dispensatory). Liniments of camphor, turpentine, or ammonia are useful to expedite a restoration of vascular action, and scarifications also may be called for to liberate turgescence and give exit to subcellular effusion. Internally, sedatives may be required, as acetate of ammonia, aconite, the neutral salts, &c., as indicated by the force and fulness of the pulse ; but when contrary states are present, as shown by the decrease of strength and volume of the circulatory current, sloughing of the parts may be expected, particularly if they are cold and insensible. Stimulants must then be diligently employed, as ammonia ; and tonics, as iron or quinine ; the external parts are to be dressed with stimulative embrocations, and, as the appetite returns, good food in ample variety must be allowed.

Contused wounds are often associated with laceration, and hence assume a compound form. Under these circumstances, the injury to parts may be very extensive, and the consequences fatal. Horses are thrown down when drawing heavy loads down hill, working coal-waggons on metals, or fall from a height, &c., and are dragged, pushed, or roll over a great extent of rough ground, when the prominent parts of the body are torn and bruised to a frightful extent ; again, horses are kicked, and the blow is inflicted in the neighbourhood of a joint, and much pain is produced, but in

neither case probably is the swelling very great. The bones, in addition, may be inflamed, and because there is the destruction of much tissue, sloughing frequently goes on to a greater extent than can at first be detected, and important joints are opened, or abscesses form throughout the length of a bone largely covered by muscles; all of which tend to complicate the case and perplex the attendant, the animal growing worse, and at length dying from blood poison.

PUNCTURED WOUNDS.—These are frequently dangerous. Nails, the point of a fork or similar sharp instrument, are the general causes; and by the ease with which they penetrate viscera, important bloodvessels, joints, &c., conditions arise which sometimes cannot always be estimated, or even anticipated. Considerable skill is required in their treatment, but often death arises from implication of the lungs.

PRICKS IN SHOEING, AND GATHERED NAILS.—These are common examples of punctured wounds, and require notice here. Pricks or punctures in shoeing arise from two causes—one, in which the nail penetrates and passes through a portion of the sensitive structures, eventually appearing at the usual point on the outside of the wall; the other consists of simple puncture, when the smith, discovering the nail is taking the wrong course, withdraws it, having wounded the sensitive parts. This is known as a "drawn nail" by the farrier. Another source of injury exists in the nail being driven too close to the sensitive parts, and by causing pressure upon them, pain and inflammation result. This is called a "bind" in farriers' language.

"Gathered nails" are generally picked up on the road, and are mostly found imbedded in the foot, having entered one of the commissures of the frog, sometimes penetrating the navicular joint. Lameness of an increasing character always identifies injuries of this kind, except, probably, in very cold weather; and by tapping round the hoof with a hammer, or

exerting pressure by pincers, the locality is generally quickly discovered.

Treatment.—In all cases the wound should be carefully examined, in order to discover the presence of foreign bodies, which should at once be withdrawn. A cool and spare diet is required, and signs of symptomatic fever should receive prompt attention. In *flesh wounds* incision may be required, together with injection of appropriate remedies, that the burrowing of matter between fascia may be avoided. In *punctures of the joints*, when only small wounds have been made, the actual cautery, nitrate of silver, chloride of zinc, generally succeed in closing them; even larger wounds are effectually treated in this manner. In using the actual cautery care must be exercised, so that tissues may be excited only to healthy healing action—not to char and destroy them. The caustics named are employed merely to coagulate and form a plug of synovia, and thus block up the orifice. Rest and fixing of the limb is often necessary (*see* Open Joint).

Punctures of the Feet.—During dry weather, simple removal of the nail in recent cases is often sufficient; but when the animal has endured pain for a day or two, or perhaps for a week or more, suppuration is established, and no cure will be perfect until the pus is "let out at the bottom." Simple percussion or pressure, as already described, quickly detects the locality of the disease, and the hole of the offending nail should be widened at once, taking care not to cause hæmorrhage by wounding other parts. Pus having been discharged, horn under which pus has burrowed should also be removed, and the foot placed in a poultice for a few days, after which the shoe may be "tacked" on; a movable leather sole being slipped beneath after the surfaces have been dressed with some healing application, and covered lightly with fine tow. When the removal of the horny sole has been great, the bar-shoe

and a leather sole may be necessary to enable the animal to work safely and comfortably after due rest, at least until the next time of being shod.

After simple puncture at the time of shoeing the nail must be left out, and a drop or two of tincture of myrrh poured down the orifice. If the prick is not violent, no further treatment is necessary. We do not advise paring away of the hoof for the so-called purpose of "bottoming" the wound, unless pus is actually present, or suspected. When, however, pain and lameness is great, and rapidly increasing from pricks and binds, pus may be suspected, when we should act on conservative principles as much as possible, as so much horn pared away means so much required to grow again, besides the probable production of an ugly fungus and persistent lameness. Having therefore removed as little as possible to ascertain the real state of things, pus not being present, place a few drops of carbolic acid solution in the wound, cover with dry tow, give fever medicine, and the case will probably cause no further trouble (*see* Antiseptic Treatment).

Punctures of the Coffin or Navicular Joint, from gathered nails, are common in some places. We remember numerous cases occurring during many years' sojourn in the town of Sheffield, arising from horses treading on heaps of steel scraps lying about the yards of steel manufactories, among which broken files are present; the handle end, or "tang," which is drawn to a sharp point, being readily "picked up" by the hoof. The horse is suddenly lame, goes on three legs, holding up the affected foot, in which the object is found deeply imbedded. Among such common occurrences we were at first somewhat puzzled how to act: the animal was suffering from acute fever, exhausted by constant standing, and further irritated by the discharge of synovia, all of which, particularly the latter, were aggravated by paring of the hoof and poul-

tices, but at length succeeded admirably by the following very simple measures:—As soon as the offending object was removed, the edge of the heated firing-iron was freely rubbed into the wound until the animal exhibited signs of slight pain; this proceeding sealed the orifice, and excited healing action in the sensitive parts beneath. Fever medicine was given as required, and in all cases a successful issue was the result. In two cases, to which we were called in consultation, having defied the action of plugs, caustics, injections, plasters, &c., to stop the flow of synovia, the animals being in slings and suffering acutely for over ten days, we at once used the iron, which had such a remarkable effect that the sufferers resumed their appetite, the slings were removed, they lay down to rest, and in a fortnight were at work again.

Bruising or Contusion, with Abscess.

There are several forms in which this combination takes place: these are—*Poll Evil; Fistula of the Withers; Speedy-cut; ordinary Cutting*, and *Quittor*.

Poll Evil.

This disease was formerly more common than in the present day, owing to the faulty state of stables, the roof and doorways being so low that the animals were continually striking the poll. In some agricultural districts it is still very prevalent, remaining as a proof of the non-improvement of farm buildings; and in other places, where that cause cannot be said to exist, it is clearly traced to malicious blows, or tight reining, which injure the muscles by overstretching or laceration.

Symptoms.—The animal carries the head and neck "as if they were one piece" (Fig. 229); he resists being turned by

the bridle, rushing away in a wild manner when the state of acute abscess is being matured. In slight cases of bruise a serous abscess only may be present—a sac—the outer walls of which are formed by the skin, and containing a bloody serum. In more severe states there is an enlargement, with pain, surrounding inflammation, and enlargement of the lymphatics; at a later stage the swelling becomes more circumscribed, soft, and fluctuating, pus having formed, constituting phlegmonous abscess.



FIG. 229.—*Stiffness previous to external enlargement in Poll Evil.*

Treatment.—While enlargement only exists and without severe pain, attempts should be made to disperse it by letting the animal go free in a roomy box, using purgatives, diuretics, &c., and cold applications to the poll; after the pain and inflammation have subsided, repeated dressings of iodine ointment will be required.

When pus has formed, it should be evacuated immediately by a free incision, the cavity being effectually cleared out by means of injections of tepid water, &c., having the animal cast for the purpose; after which it may be plugged with tow, and saturated in "Sanitas" solution, as directed under antiseptic treatment. In former years we resorted to the use of setons of broad tape, passed from the abscess beneath the muscles, and brought out upon each side of the neck, injections of solution of bichloride of mercury, &c., being regularly employed.

In old-standing cases, disease of the bones, *ligamentum nuchæ*, &c., produce a fistulous wound of very obstinate character. Pieces of bone are detached from time to time, or may be removed by instruments, while sloughing of the ligament adds to the fœtor of the sore. In such cases permanent stiffness of the occipito-atloidean joint ensues, or death arises

from the ulcerative process opening out the spinal canal, and inducing pressure on the medulla.

After the abscess of poll evil has been induced to heal, the bearing-rein must be discontinued; in fact, to prevent the disease the absurd appendage should not be tolerated.

Wound of the Scalp.

The portion of skin situate between the ears, and from which the forelock hangs, is frequently cut, bruised, and turned backwards, forming a large flap, and exposing an ugly wound, which makes the animal shy and uneasy when the head is touched. The causes rest with low stable-doors and careless persons, who lead out the horse in such a manner that the animal is not able to protect himself; being pulled at, he throws up his head and strikes the sharp edge of the lintel, the consequence being the form of wound we have described. In coal-mines this is a very common occurrence, many animals being laid off work from it; the low roofs of the waggon and byways, coupled with the brutal treatment of the boys who drive the animals, being the prolific causes.

Treatment.—Simple union by sutures is all that is required, if the case is attended to at once, followed by rest and the use of cold lotions, until the animal can bear the bridle being put on. When the skin has become thickened, often standing erect as a tumefied mass, the best plan is to abscise it at once, removing the whole level with the nape of the neck; otherwise, by attempting to heal it, the projecting part forms a source of constant irritation and injury—the bridle, halter, &c., chafe, and it receives many blows from stationary objects, which cause great pain and inconvenience (*see* Fracture of the Occiput).

Fistula of the Withers.

What has been said of poll evil applies for the most part to this affection. Pressure from ill-fitting saddles, falls, bruises, &c., especially in horses having high withers, is apt to induce inflammation of the points of the spinous processes, eventually slowly ripening to abscess, and degenerating into a pus-secreting cavity at some depth, giving exit to the fluid by means of several sinuses or canals having indurated walls. The bones are likewise liable to disease from

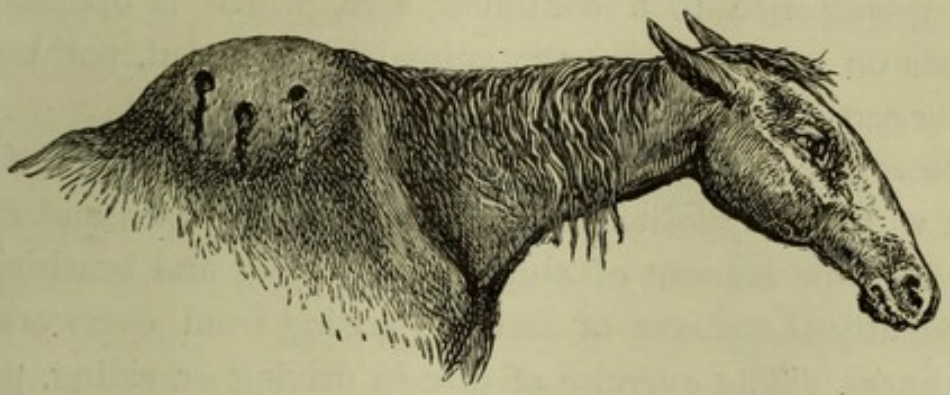


Fig. 230.—*Fistula of the Withers.*

softening and participation in the continued inflammation, when portions need removal. The abscesses should be opened early, in order to obtain successful treatment; and old-standing cases require free incisions with the knife, destruction of the sinuses, and repeated injections of solutions of zinc or bichloride of mercury, the butyr of antimony, &c. In some instances hypertrophy of the cellular tissue arises, causing the animal to appear as if he had a natural hump (Fig. 230).

Speedy-cut, &c.

This term is understood to refer to a bruise inflicted on the inner side of the leg—in some instances above the knee, and in others immediately below it—by striking with the foot

of the opposite leg. High-stepping horses are most liable to it; but others, having no defect of conformation, may be caused to injure themselves thus—by being pushed to the extent of their speed in galloping. Horses having calf-knees and turned-in toes, are exceedingly liable to this defect if their action is high. In all cases speedy-cutting is dangerous to the rider, as when the blow is struck on the tender part the horse falls as if shot.

Ordinary Cutting is confined to the fetlock-joints, when abrasion and division of the skin is produced without abscess, but giving rise to a continual sore, which is opened and bleeds on each occasion the animal is taken out, particularly under certain defective formations.

Brushing is understood to imply close contact of one foot with the opposite fetlock, removing the hair, and giving rise to some amount of abrasion. Cutting and brushing are frequently the effects of fatigue, arising from overwork and weakness. The exercise of care in driving or riding, proper rest, and a judicious allowance of peas or beans, often cure both these defects; otherwise the animal should wear boots, and the shoeing must be modified to suit the gait of the animal; as raising the inside of the foot by means of a thick-heeled shoe, which throws the fetlock outwards as he stands, and thus removes it from the line of motion pursued by the opposite.

Banging.—This is another term for injury to one of the limbs by the opposite foot, from which considerable swelling ensues, chiefly on the inside and above the fetlock-joint, usually ending in *serous abscess*—a soft, fluctuating swelling immediately beneath the skin, and containing a reddish-coloured, thin serum, or watery fluid.

Treatment.—Collections of pus or serum are to be evacuated as soon as possible, and the wounds treated as wounds generally, or by the antiseptic treatment. Give rest

until the parts are properly restored, and avoid pushing the animal too far and too fast when at work; if signs of habitual weakness are present, allow a more liberal diet, and otherwise promote the general health and condition. Subsequent thickening of the skin or subjacent tissues must be treated by the iodine ointment, or that of the biniodide of mercury.

QUITTOR.

Quittor is a disease of the coronet and foot of a fistulous character—*i.e.*, consisting of one or more sinuses, having indurated walls, leading to some deep or internal source of abscess (Fig. 231). It is often caused by pricks and binds in shoeing, corns aggravated to suppuration, and by treads on the coronet. Under the latter it forms a good illustration of a bruise or contusion, with abscess.

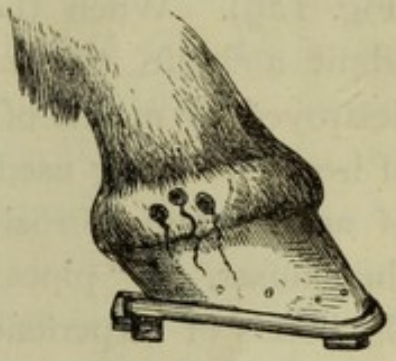


FIG. 231.—*Quittor.*

Symptoms.—Lameness often of a halting nature, and swelling of the coronet, in which are the openings of one or more sinuses communicating with the internal part of the foot, and discharging curdled pus, or a sero-purulent fluid. The surrounding tumefaction is chronic in character, hard and tender, but possesses a feeble power of restoration. When quittor depends upon injury from below, the formation of abscess at the coronet is due to the accumulation and working upwards of the matter; when caused by treads on the coronet, the pus burrows downwards.

Treatment.—If caused by nails or festered corns, remove the offending agent, and establish a dependent opening at the point as soon as possible to evacuate the pus, and put on poultices after persistent fomentation for an hour or two

at least. Reduce fever by the appropriate remedies (page 27), and after a few days put on a bar-shoe, to relieve the distressed parts from pressure. A mild blister may be applied to the coronet, or the sinuses may be injected with chloride or sulphate of zinc solutions until healed. When quittor results from treads or bruises of the coronet from other causes, in which case no communication exists with the bottom of the foot, the probe is to be inserted to ascertain the direction which the sinus takes ; after which the knife is to be inserted, in order to divide the walls from one end to the other ; after which a solution of bichloride of mercury is to be injected by means of a glass syringe (Fig. 129). When the orifice and tube are too small to admit a knife, the hardened walls may be conveniently destroyed by means of the actual cautery, a pointed piece of iron wire being used for the purpose. Occasionally plugs of arsenic and corrosive sublimate are used to "core out" the sinuses, or "pipes ;" but this proceeding must be left to the hands of experienced men, as very serious results may arise when least expected, and the animal rendered completely worthless. In simple treads of the coronet, attended with laceration of the skin aud slight separation from the hoof before the formation of abscess, the antiseptic treatment answers very well, internal remedies being also employed to reduce associated febrile conditions.

Whenever the coronet swells from the causes already considered, it is necessary to remove the hoof from beneath the part, and thus avoid irritation and pressure. Horses suffering from quittor and conjoint lameness should not be worked ; but when the inflammatory action has subsided, and the parts are healing satisfactorily, movement may be permitted.

Broken Knees.

Injuries to the knees partake of almost every variety of damage to the parts, from a simple abrasion of the skin to severe contusion, with serous or even purulent abscess ; or they are merely incised, and at others frightfully lacerated with contusions and exposure of tendons, articulations, or both. In the simple forms the treatment for ordinary wounds only is required, but in the latter open joint is associated, rendering the conditions severe and serious. When the skin is simply abraded—*i.e.*, bruised and shorn of hair, the surface appearing partially raw, having blood spots oozing through the surface—the animal should not be allowed to lie down for a day or two, the parts in the meantime being dressed with astringent lotions, as Nos. 125, 126, 128, and 129, a purgative or neutral salts being given if the limb swells. The liability to blemish is not great if this treatment is followed. When simple incised wounds are inflicted, union of the divided edges should be as speedily effected as possible ; and for this purpose we have found it exceedingly useful to put on a hollow wooden splint, fitting the back of the knee, and by this means fix the limb for a few days, the wound being closed by means of a pledget or two saturated in carbolic acid solution, and maintained by bandages, all foreign bodies being first removed with care. Small linen straps are also useful, being dipped in styptic colloid or shellac paste, and passed across from side to side, leaving spaces for the usual dressings, and removal of such parts of dead tissue as may appear from time to time.

If the tendon is exposed, synovia escapes from the injured bursa ; the wound is probably large, much tissue being destroyed, and altogether the prospects appear not to be very encouraging ; it is, however, very much worse when the tendon is injured, for in a few days sloughing takes place,

and the bruised parts come away together with other portions of tissue, exposing the articulations (Fig. 232) of the knee-joint, and giving rise to a great amount of febrile disturbance, from which many animals soon die. Indeed, under such circumstances the animal is quite worthless for work, as if we



FIG. 232.
Bones and Ligaments of the Knee-joint (Front View).



FIG. 233.
Knee-joint (Back View).



FIG. 234.
Knee-joint Anchylosed.

succeed in healing up the wound, the knee-joint is anchylosed (Fig. 234), or rendered immovable ; and unless the horse be entire and of great value as such, no good can result from treatment. Simple opening of the bursa of the tendon is often managed successfully. The splint should be put upon the back of the leg, the animal being reversed in his stall ; and the wound being always exposed, it may be dressed with solutions of zinc, &c., Nos. 125, 126, 128, 129 ; the usual internal remedies for combating fever should also be given as required. The antiseptic treatment is eminently useful. If

necessary, also, the animal may be assisted by the use of slings.

Wounds of Arteries and Veins—Hæmorrhage.

Injuries to the bloodvessels are not of very common occurrence, if we except that form of phlebitis already described at page 238, and the instances in which they are implicated with the various kinds of wounds. It is the latter form which we now propose to take under consideration.

Division of the skin, together with the deeper-seated tissues forming the kind of incised wounds, are the most common instances in which arteries and veins are divided or opened, from which hæmorrhage, or *bleeding*, more or less violent and serious, results. The colour of arterial blood is a bright scarlet, and that from a vein is a dark or Modena-red colour. The blood from an artery is further distinguished by the larger volume, which is thrown out by successive spurts, having a relation to the pulsations of the heart; while the flow from a vein is smaller and continuous, having less force.

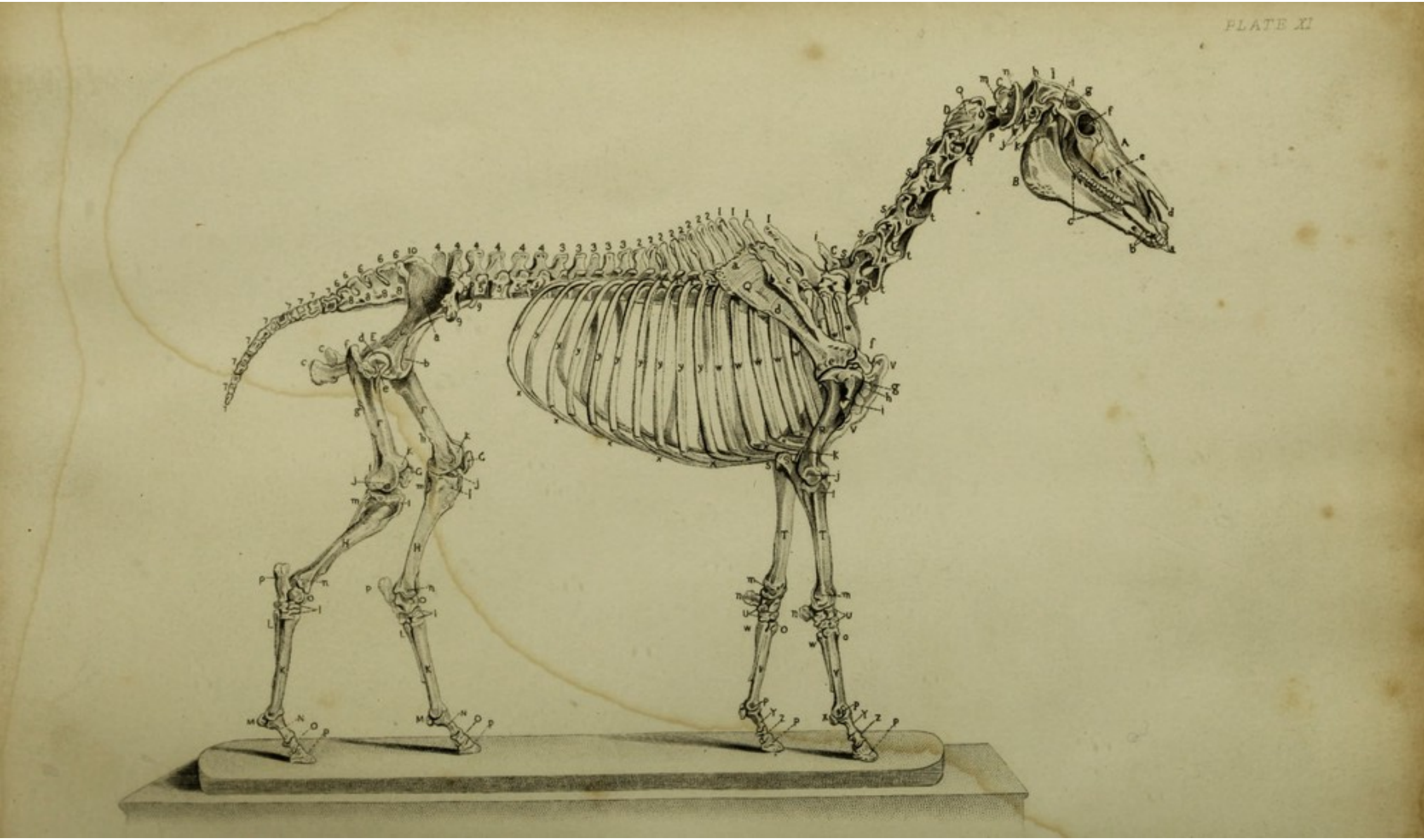
Hæmorrhage is arrested in various ways. Certain substances, known as "styptics" (*see* Dispensatory), possess the power of contracting the artery and altering the nature of the blood, by which a plug is formed, either in the artery itself or at its open mouth. Mechanical agents, as cotton wool, tow, German-tinder, &c., also are effective; the actual cautery, nitrate of silver, and chemical caustics generally, are among the best.

Surgical appliances, as the forceps, ligature, &c., are ready means often employed by the practitioner. An artery is seized by the forceps (Fig. 178, p. 526), and twisted, or it is drawn out and secured by a ligature at once near the free extremity. In some instances an artery requires to be taken up at a different point some distance from the seat of injury. It is

then cut down upon by means of a scalpel, and exposed by further dissection, when a needle, armed by suitable thread, silk, &c., is passed beneath, and both ends are tightly tied together, being left long enough to hang from the external orifice. The edges of the skin are subsequently secured by sutures, and treated as an ordinary wound.

Bleeding from an artery is always attended with danger, particularly when the incision is made longitudinally. In such cases the vessel may be divided across, when it is more likely to arrest hæmorrhage by retraction within its sheath, and subsequent closure by contraction. The external wound may then be closed and pressure applied, or false aneurism occurs. In the event of this proceeding being unsuccessful, the artery may be taken up by ligature.

Bleeding from a vein is not always of a serious nature, unless a large vessel be the seat. Simple pressure or a styptic is generally all that is necessary. The colour of venous blood is generally present in some extensive hæmorrhages during operations. As arterial blood flows from the bottom of deep incisions or wounds after extensive sloughing, its dark colour, with constant pulsating flow, bewilders the beholder. The characters of venous and arterial blood are here combined, but sometimes cannot immediately be accounted for; and if the hæmorrhage is viewed as from a vein or veins, and therefore not at all serious, the animal may be lost in consequence of the belief that spontaneous arrest will take place. Bleeding *always* requires attention, and, in the absence of surgical aid, should be arrested by applying lumps of tow, cotton-wool, &c. &c., whether it be venous or arterial in character. It is not always possible for the non-professional person to distinguish between the two, as, in the case referred to, arterial blood passing over raw surfaces absorbs their moisture and impurities, and thus is caused to assume the colour of venous blood.



DESCRIPTION OF PLATE XI.
THE SKELETON.

"THE HEAD.

"*A*, The skull, face, and upper jaw, in one piece; *B*, the lower jaw; *a*, the incisor teeth; *b*, the tushes; *c*, the molares, or grinders; *d*, the peak formed by the extremities of the nasal bones; *e*, the zygomatic spine, to the bottom of which the masseter externus takes its origin; *f*, the orbit; *g*, the cavity above the orbital arch; *h*, occipital crest; *i*, the zygomatic arch; *j*, *j*, the styloid processes for the attachment of the muscles; *k*, the joint formed by the upper and lower jaws; *l*, the meatus auditorius, or opening to the internal ear.

THE NECK.

C, *C*, marks the extent of the cervical vertebræ; *D*, the dentata; *m*, the atlas; *n*, the wing of the atlas; *o*, the large superior spine of the dentata; *p*, the body of the dentata; *q*, the inferior spine of the dentata; *s*, *s*, *s*, *s*, *s*, the superior spines of the five remaining cervical vertebræ; *r*, *r*, *r*, *r*, *r*, the oblique processes of the five last cervical vertebræ; *u*, *u*, *u*, *u*, *u*, the transverse processes of the same bones; *t*, *t*, *t*, *t*, *t*, the inferior spines of the five last cervical vertebræ.

THE THORAX.

v, *v*, the cariniform process of the sternum; *w*, *w*, *w*, *w*, *w*, *w*, *w*, the costæ, or true ribs; *y*, *y*, *y*, *y*, *y*, *y*, *y*, *y*, *y*, *y*, the ribs as distinguished from the costæ; *x*, *x*, *x*, *x*, *x*, *x*, *x*, *x*, *x*,

the cartilages by means of which the ribs are attached to the sternum ; *z, z, z, z, z, z, z*, the heads of the ribs ; 1, 1, 1, 1, 1, the superior spines of the first five dorsal vertebræ, the fifth being generally the longest spine in the body ; 2, 2, 2, 2, 2, 2, 2, 2, the superior spines from the sixth to the thirteenth, towards which they slope downwards ; the thirteenth is generally the most upright spine in the dorsal region ; 3, 3, 3, 3, 3, the last five of the superior of the back spines, which have an inclination forwards.

THE LOINS, OR LUMBAR REGION.

4, 4, 4, 4, 4, 4, the superior spines of the lumbar region, thicker than the dorsal spines, and having a decided inclination forwards ; 5, 5, 5, 5, the projecting transverse processes of the loins.

THE SACRUM.

6, 6, 6, 6, 6, the superior spines of the sacrum leaning decidedly backward, thus leaving a large space between the points of the last lumbar and the first sacral spine, at which place occurs the great hinge of the back ; 8, 8, 8, 8, the bodies of the sacral vertebræ.

THE TAIL.

7, 7, 7, 7, 7, 7, 7, 7, 7, the coccygeal bones.

THE PELVIS.

E, the ossa innominata, consisting of three bones upon each side ; *a*, the ilium ; *b*, the pubis ; *c*, the ischium : the three bones unite at the cavity which receives the head of the thigh bone ; 9, 9, the inferior spines of the ilium ; 10, the superior spine, which partly covers the first sacral spine ; *c, c*, the ischiatic spines.

Description of Plate XI.

THE THIGH AND STIFLE-JOINT.

F, *F*, the femurs ; *d*, the round head of the bone ; *e*, the short neck of the femur ; *f*, the great trochanter ; *g*, the small external trochanter ; *h*, the small internal trochanter ; *i*, *i*, the sulcus whence the gastrocnemii muscles originate ; *J*, *J*, the posterior condyles of the femur ; *k*, *k*, the anterior trochlea over which the patella glides ; *G*, *G*, the patellas : the interarticular cartilages of the stifle-joint, as well as the cartilages tipping the dorsal lumbar sacral spines, and the superior margin of the blade-bone or scapula, are necessarily omitted in this delineation, which is admirably drawn from a macerated skeleton.

THE TIBIA AND FIBULA, OR LEG BONES, AND THE HOCK-JOINT.

H, *H*, the tibias ; *l*, *l*, the heads of the bones ; *m*, *m*, the fibulas ; *n*, *n*, the inferior head of the tibia ; *I*, *I*, the hock-joint ; *o*, *o*, the astragalus ; *p*, *p*, the calcis forming the point of the hock.

THE POSTERIOR SHANK BONES.

K, *K*, the cannons, metatarsals, or shank bones ; *L*, *L*, the splint bones.

THE BONES OF THE PASTERNS, AND FEET, OF THE POSTERIOR LIMBS.

M, *M*, the sesamoids ; *N*, *N*, the large pastern bone ; *O*, *O*, the smaller pastern bone ; *p*, *p*, the pedal bones.

BONES OF THE ANTERIOR EXTREMITY.

Q, the scapula, or blade-bone ; *a*, the superior margin whence the cartilage has been removed ; *b*, the spine of the

scapula ; *c*, the anterior fossa of the scapula ; *d*, the posterior fossa ; *e*, the shallow cup which receives the head of the humerus : the cartilage, which is situated around the margin of this cup, and which serves to deepen it, has been destroyed by maceration ; *f*, the tuberosity terminating the spine of the scapula, when the flexor brachii originates.

R, the humerus, or arm-bone ; *g*, the head of the bone ; *h*, the smooth cartilaginous and synovial pulley over which the tendon of the flexor brachii plays ; *i*, the external trochanter of the humerus ; *j*, the inferior head of the humerus ; *k*, the pit into which the ulna is received ; *S*, *S*, the ulna, the top of which is termed the olecranon.

T, *T*, the radius ; *l*, the head of the bone ; *m*, the inferior head of the bone.

U, *U*, the carpus, or knee-joint, consisting of two rows of bones ; *n*, the trapezium, which gives security to the great flexors, and attachment to several of the lesser flexors of the fore-leg.

V, *V*, the cannon or shank bone ; *o*, *o*, the head of the bone receiving the lower row of the bones of the knee ; *W*, *W*, the splint bones ; *p*, the inferior head of the cannon bone.

X, *X*, the sesamoid bones ; *Y*, *Y*, the large pastern bones ; *Z*, *Z*, the small pastern bones ; *P*, the pedal or coffin bone."

Another method of arresting hæmorrhage, particularly in the limbs, consists of tying a soft rope, towel, or handkerchief loosely round the members at a point above the injury; a stick is then passed half way through, and by twisting it round pressure is applied, and the current of blood arrested. This may be rendered still more effective if a bundle of tow, a small pocket-pincushion or pad, &c., is first placed over the course of the artery.

Fractures.

Bones frequently suffer from injuries in such a manner that their continuity is destroyed, or—as is expressed in technical language—they are fractured; and, in the vernacular, broken.

A fracture is said to be *transverse* when the broken surfaces are at right angles with the bone (Figs. 235 and 236).

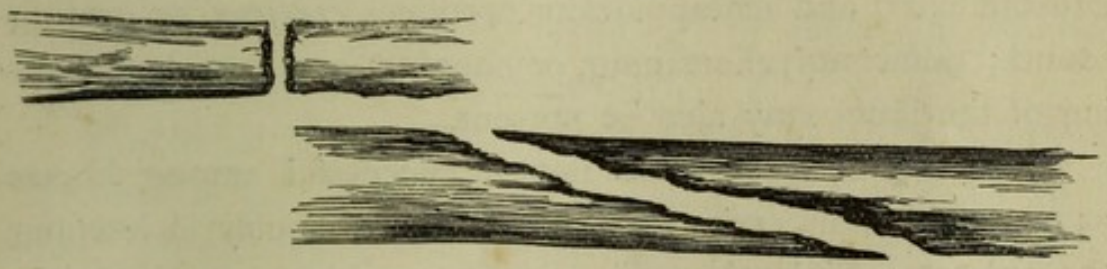


Fig. 235.—*Transverse Fracture of Bone.* Fig. 236.—*Oblique Fracture.*

It is *oblique* when the surfaces are caused to observe a parallel direction from one side to the opposite, terminating at a point considerably above or below that at which it originally commenced; *comminuted*, when the bone is reduced to many small pieces; and *compound*, when the ends of the bone protrude through wounds in the flesh and skin.

The only manageable kinds of fracture among the lower animals are the first and second; although, under certain circumstances, a compound fracture may sometimes be reduced, and ultimately recover. Fractures occurring in the long bones of the extremities below the elbow and stifle

may be treated successfully at times ; and when the animal is valuable for certain purposes, the attempt to reduce them and set the bones should always be attempted. In other situations there is not much hope of success, the large mass of muscle being in the way of useful applications, and powerful opponents in maintaining proper apposition of the bones. Sometimes bones in such localities do not become displaced, or so slightly, that if the animal is at rest union takes place ; but some deformity—shortening of the limb, or lameness, with weakness and inability for quick or heavy work—is certain to be present.

Symptoms.—Fractures are denoted by great lameness, inability to rest on the limb, intense pain, and tucked-up appearance, all of which have arisen very suddenly, and which can be traced to some recent and unusual act of the animal. Sometimes considerable swelling is seen over the affected part, and manipulation produces *crepitus*, or grating sound ; deformity, shortening, or hanging, and even lengthening of the limb, may also be present.

Treatment of fractures is not so successful among horses as we could wish, owing to the extreme difficulty in keeping the animal sufficiently still, and from which continual displacement occurs. By the aid of stout sheets of gutta-percha, and starch bandages, &c., a tolerable recovery frequently takes place ; their mode of application being as follows :—

Gutta-percha Splints.—Strips are first cut from a sheet of proper substance, corresponding in length to the fractured bone—say one of the legs. In width they answer to half the circumference, allowance being made for the wider and thicker parts above ; they are then placed in hot water, and when thoroughly softened are bound upon the front and back respectively of the *sound* limb, by which a sufficiently near shape is acquired as they cool. In the meantime all

preparations are being made with the affected limb, the fracture being reduced, and the bones placed in proper position; a thin bandage is bound over the parts, and the gutta-percha splints—which have again been warmed—are placed over the top, and covered by another roll of bandage. Constant attention will be required in order to replace them, as by motion they will be removed from time to time.

Starch bandages consist of the usual strips of cotton, canvas, &c., about three inches wide, and from two to five yards long; these are thoroughly saturated with a stiff solution of starch, and bound repeatedly over the limb after being properly set. In a few hours they acquire an amount of firmness which effectually provides sufficient support in keeping the parts together; care is, however, required in their application, in order not to put them on too tightly, as by drying they contract, and are liable to produce much discomfort and pressure, resulting in pain and swelling, which necessitates their removal.

Plaster of Paris is sometimes used, the parts being well greased before it is applied. There are objections to its use. Melted pitch, with tow, are also resorted to occasionally, but the practitioner of skill will seldom go beyond the first and second, as being easy and simple in application and removal, admitting of alteration when chafing or fretting of the skin, or other sources of discomfort, arise.

After treatment requires to be of a most careful character. The animal should not be allowed to roam about in search of food or water, and great attention should be given in the way of regular and proper feeding. If swelling ensues attended with uneasiness, which increases, the bandages may require to be loosened, or even removed, when a careful examination should follow in order to ascertain the exact condition of parts; if displacement of the fractured bones has occurred, they must be readjusted, and the appliances again

put on. In most cases the animal will need the use of slings; and with these and the foregoing means, together with a comfortable box, after a few days he will generally be found to appreciate his position, and also taking very great care of the affected limb.

False Joints.—This, as a rule, is the result of inability to keep the animal sufficiently quiet during the necessary time for union to take place. By constant motion the parts are displaced, the opposing surfaces rub together and become smooth, inflammation subsides, and the uniting material being no longer thrown out, union is impossible, and a false joint is established, which gives rise to a degree of lameness, and renders the animal useless. Oblique fractures are most likely to result in this condition, and others may do so when portions of tissue become interposed between the fractured ends. In comminuted fractures, death of one of the fragments is the cause; while constitutional causes, as abscess, want of vitality, &c., may prove powerful obstacles. Under all cases food of good quality should be supplied, including oats, peas, and green food, or the roots in liberal quantity, as the healing of a fractured bone is very materially determined by it. Close and overcrowded buildings should be avoided, as nothing tends to retard progress, by acting through the constitution, more than an impure atmosphere and the presence of decomposing animal matter.

Fractures of certain Bones.

As already explained, fractures of bones in the horse are for the most part unmanageable; therefore, in the following observations, we shall direct attention more particularly to the manifestation of injury, by which the reader will be enabled to form an opinion as to the cause, referring only to treatment specially necessary, it being understood the general principles already laid down are mainly applicable.

Bones of the Cranium.

The bones of the cranium, or skull, forming as they do a peculiarly constructed box or cavity, in which the brain is safely lodged, are occasionally the seat of fracture by reason of falls or heavy blows; when a horse rears and falls backwards, striking the poll or occipital bone, the crest of which stands prominently upwards between the ears, and the effects of the fall are transmitted through this part over the various bones which form the skull. Blows may more immediately affect the plates of bone which form the anterior or front portion; but falls more frequently fracture the occiput (Plate XI., *h*), or the basilar process beneath.

Of the various kinds of fractures none are so immediately serious or fatal as those which happen to the cranial region (*see* Plates I. and IX.). Disturbance of the functions of the brain is a common result, and this is evident in various ways. Fracture of bone gives rise to compression of the brain, from loose portions which are pressed or forced upon the brain itself; the brain suffers from concussion or shock; and when neither of the foregoing are present, as a result local inflammation arising from the blow simply, or, conjointly with fracture, secondary compression ensues, from the formation of pus or extravasation of blood on the surface or base of the brain. With the first and second symptoms of coma, with insensibility, paralysis of motion and sensation are present; in the third, such states only arise afterwards; extravasation of blood may not affect the animal for some hours, and pus may require a day or two for its formation. In some instances the animal regains consciousness after concussion and fracture, only to become affected with inflammation of the brain.

The *treatment* of fracture of the cranial plates consists of opening the wound in the skin, and raising the depressed

plates, and in some instances removing a portion by the trephine (Fig. 55); but when there is no external wound, although depression may be evident and the brain unaffected, the practitioner will refrain from an operation. There is no cure for fracture of the base of the skull if the bones are comminuted or displaced; when they are simply fractured, but without displacement, such cases unattended with brain disturbance may get well, the exact amount of damage done being found out only after death.

Fracture of the Occipital Crest.

This injury arises from the same causes that give rise to scalp wounds—which see, at page 648. From continual bruising the ridge or crest of this bone is devitalised and broken off in small portions, a process in which the constant soaking in the products of inflammation may act a powerful part; and these ensure a large gaping and ugly wound, over which hangs the swollen flap of skin, having no tendency or power to heal properly.

Treatment.—Nothing can be done without rest. While the animal works the wound is irritated, and his sufferings often bring down upon him the worst form of brutal treatment his driver can invent. We have repeatedly witnessed this among pit animals; the driver seems to enjoy a kind of fiendish glee in striking his horse or pony on an affected part, and thus many simple injuries are aggravated into severe and fatal ones. The sufferer should be removed to the surface at once and placed in a loose box, where he is to remain until the parts are recovered. He may require to be cast, the wound examined in order to detect and remove all loose fragments of bone, the injured surface being also divested of all dead or devitalised portions, and afterwards stimulated by an application of dilute acid or solution of

nitrate of silver. If the flap is not swollen or the edges hardened by healing, it may be returned to its place and held by sutures, cooling lotions being frequently applied, or the antiseptic treatment may be adopted. In closing the edges of the wound, sufficient space must be allowed between the sutures to allow the escape of pus, especially when the antiseptic treatment is not practised.

In order to prevent this accident, wherever it occurs, the animal should wear a leather skull-cap beneath the bridle; but in order to avoid the effects of accumulating dust and perspiration, horsekeepers should be warned of the danger and consequences of neglect in keeping such articles soft and clean.

Fracture of the Vertebræ.

Bones of the Neck.—Fractures of the cervical vertebræ (Plate XI., *c c*) are of various kinds, according to the nature of the cause, producing results also variable. The following cases, briefly stated, having been witnessed by the writer, will form suitable illustrations of each:—

1. A large black waggon-horse, employed in "tipping" the ballast raised from a large quarry, had to cross a temporary bridge carried over a road in the course of his repeated journeys, previous to which he was expected to start the truck and go at full trot. The bridge was not provided with rail or parapet, and in the journey which proved his last he was called by his driver to return before reaching the bridge, the effect of which was to bewilder the animal by fresh or unusual associations; he suddenly stopped, but being on the side where there was no room for turning, he was caught by the laden truck and thrown head foremost over the bridge, falling a distance of ten feet to the ground below. He fell unconscious, and scarcely moved afterwards. We saw him within ten minutes quite dead, and from the statement

received conjectured fracture of the bones of the neck, giving rise to pressure on the spinal cord, and probably injury also, which cut off communication with the lungs and heart. The bones were found to be broken into fragments, the membranes of the cord lacerated, and the cord itself "smashed."

2. A heavy mare of the Flanders breed, used by a farmer in Buckinghamshire, fell on the road while drawing a moderate load. After severe struggles she was liberated and assisted to rise, when the neck was found to be twisted towards the left side, and exhibited a stiffness in it, so that when she turned round she moved as if the head and neck were one rigid mass. As nothing serious appeared to follow this deformity, the parts were simply rubbed on the rounded or off-side of the neck, a stimulating embrocation being used, and the mare continued to work and eat almost as usual. We estimated the case as one of luxation, with probable fracture of the transverse processes of the neck bones, and afterwards for two or three months forgot all about the case; but on being again called to the same farm, we inquired for the mare, and was told she became gradually paralysed, and finally dropped, being unable to rise; and the owner, remembering that he had been apprised of such a liability, had her slaughtered. The neck bones were found to be fractured, in the union of which pus had formed in the vertebral canal, and, by pressure on the spine, had caused the paralysis from which she could not have recovered.

The Bones of the Back (Plate XI., 1, 2, 3).—Fracture of the dorsal vertebræ usually arises from an animal being thrown down with a load, either in a cart or when "shunting" railway waggons; hunters sustain this injury by dropping with the hind-legs in a ditch; and any kind of animal may break his back by struggling when cast in his stall, or during operations.

The issue of the case is entirely dependent upon the

nature of the injury. The fracture may not be attended with displacement, and, if so, by rest and quiet the animal recovers. At first there are symptoms of partial paralysis, such as staggering gait, plaiting or crossing of the legs in walking, knuckling over of the fetlock-joints when standing, but an examination reveals nothing definite ; when broken back occurs in the hunter, or during the struggles when cast, a sharp cracking sound may be heard, followed by paralysis, more or less. If the animal can rise, he should be led away quietly to a box, where he must be kept perfectly undisturbed ; a dose of laxative medicine may be given at suitable intervals, and fomentations or stimulating embrocations be applied to the loins and back. Upon no account must he be put into slings, as displacement is safe to occur ; and he will hang, eventually falling helplessly out of them, and unable to rise, when the humane course will be to put him out of further misery.

Fracture of the Sacral Bone.

This bone—*os sacrum*—forms the central prominence of the hind-quarters (Plate XI., 6), and is situate between the posterior spinous processes of the ilium (Plate XI., *a*), to which it is firmly united by interosseous ligaments. In consequence of severe falls, or during violent struggles, when the horse is "cast in the stall," the side to which the ilium is attached may be broken off, which gives a flattened appearance to the side affected ; the prominence near the spine is absent, and deformity of the quarter is the result, which is apparent by observing it in comparison with the other quarter in standing behind the animal.

Treatment.—Absolute rest ; slinging the patient, if he is a quiet, tractable animal ; a blister, or stimulating embrocations, applied periodically to the upper surface; and good food,

of a laxative and easily-digested nature. Such cases generally do well, but the flatness of the quarter always remains, without, however, proving an impediment to ordinary work.

The Bones of the Tail.

The coccygeal bones (Plate XI., 7) are liable to fracture, particularly in draught horses. We have noticed that such accidents arise among those used in carts, when, by the carelessness of the driver, the tail is allowed to get under the blades of the body of the cart as it descends upon the shafts, or beneath the front door or coke board, and in railway horses, by the tail being crushed between buffers. When simply fractured, the only *treatment* required is careful binding up by means of leather, drawn moderately firm by lacing on a padding of tow. If the bones are broken into small fragments some amount of irritation will ensue, and eventually abscess with sinuses, which will call for the use of the knife in the removal of necrosed portions, and probably amputation, as gangrene is not an unlikely complication, which in turn may give rise to a great amount of irritative fever, blood poisoning, or tetanus.

The Bones of the Pelvis.

The peculiar shape of these bones (Plate XI., E.), together with the large mass of muscle attached to them, render them liable during falls, leaping, rearing, &c. &c., to fracture in several different parts, as follows :—

Anterior Spinous Process.—This prominent portion (Fig. 237, *a*) is frequently broken off by a fall, or when singly or in company with others the horse passes quickly through a gate or doorway, and violently strikes the pillar, wall, or jamb. The appearance of the haunch is then considerably deformed at the front part, the prominence is gone, being

drawn inwards and downwards by the muscles of the abdominal walls attached to it, by which union is prevented, as much motion exists. The horse is said to have "a quarter or a 'huggen' down," but is rarely unfitted thereby for ordinary work. Occasionally the bone is bruised at the point, and small portions broken off, when abscess forms, and if neglected sinuses also.

Other Fractures.—The pelvic bones are also fractured :—1, through the acetabulum or cup-joint (Fig. 237, *b b*) ; 2, the

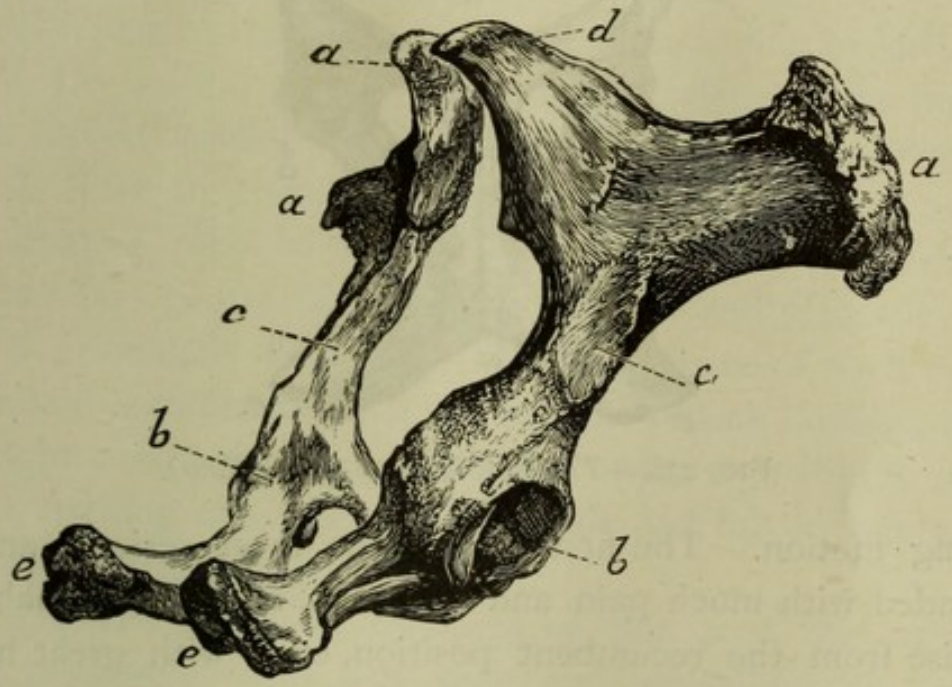


FIG. 237.—*The Pelvis (Side View).*

shaft of the ilium (Fig. 237, *c c*) ; 3, the posterior spinous process (*d d*) ; 4, the symphysis pubis (Fig. 238, *a a*) ; 5, the large oval foramen or opening—foramen ovale (Fig. 238, *b b*) ; and 6, the tuberosity of the ischium (Figs. 237 and 238, *e e*). In the first, second, third, and fifth forms of fracture (Fig. 238), the haunch is flattened and lower on the surface than that of the opposite side, besides which lameness is present, proportionate with the amount of displacement. Dragging of the toe along the ground is a prominent sign. In order to arrive at a determination of the exact seat of injury, the

ear may be placed on the side of the haunch as the animal is made to move gently forwards, when crepitus may be generally detected; in addition, the hand is to be passed up the rectum, by which the exact seat will be discovered

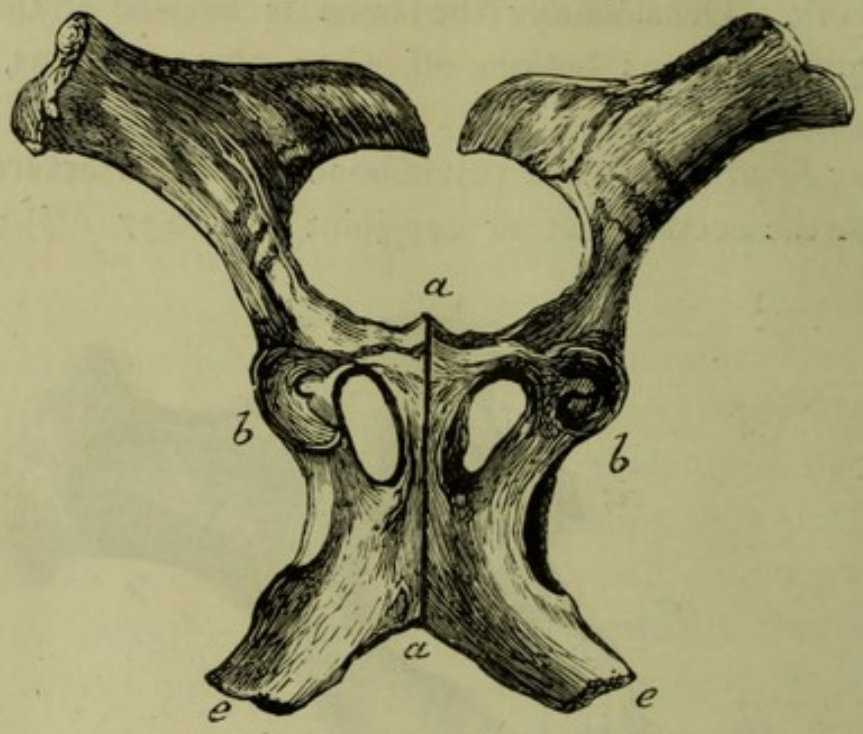


FIG. 238.—*The Pelvis (seen from below).*

during motion. The first form is the most serious, and is attended with much pain and lameness, and almost inability to rise from the recumbent position, even with great help; and in standing he bears no weight upon the leg. It is considerably shorter than the other, and often hangs or swings; the foot is turned, toe inwards, towards the opposite, and he occasionally rests upon it. The whole limb is drawn up by the powerful muscles of the haunch—the gluteal—(Plate XII., *m*), as will be discovered by the situation of the prominence called the trochanter. This form of fracture is incurable. If the horse lives, the amount of osseous deposit accumulating around the joint fixes it, and renders him perfectly useless. In the other forms named, unless great displacement and deformity exist, restoration is generally very complete by rest, use of an occasional blister, or strong pitch-plasters.

Blisters, as advocated here, it must be understood, are not advanced as specific means of cure. They have undoubtedly a good effect in causing an increased determination of blood to the part, but their main use is that of producing such an amount of tenderness which will prompt the animal to avoid motion, and thus hasten union of the fractured ends. From three to four months will be required to effect a permanent cure, and for some time after the animal must only be put to light work. The owner will thus be able to decide on the propriety of keeping or slaughtering him.

In alluding to the great tendency to dragging or striking of the toe on the ground, as seen in fractures of the bones of the pelvis, Professor Williams* recommends, when affected animals have to travel a distance from the scene of accident, that a rope be looped round the fetlock, by which the attendant gently lifts forward the limb and places it *flat* on the ground at each step. In the absence of such help, the animal is liable to catch the toe, the fetlock doubles, and as weight comes down on the limb, which is unable to support it, nothing can avert a serious fall, and further aggravation of the already existing injury.

Symphysis Pubis.—In fractures of this part the animal walks insecurely, with legs wide and straddling, the toes successively dragging along the ground, and turned outwards. Lameness is often very great, and lying down, rising, &c., attended with pain and difficulty. The causes are sudden separation of the hind-feet, slipping away or outwards from each other, as on ice and frozen surfaces, &c., when violent muscular exertion immediately ensues, and doubtless assists in the injury. Young and valuable horses only should be treated, as from three to four or more months will be required to effect a proper union, after which

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* Principles of Veterinary Surgery.

much caution will be needed. The seat of injury will be made known by exploration *per rectum.*

Tuberosities of Ischium.—When a horse rears and falls on his haunches behind, or by "backing" with heavy loads he slips, the feet suddenly shooting forwards, and he falls heavily on the buttocks, the prominences of the ischium (Figs. 237 and 238, *e e*) may be broken off. If the observer stands on one side of the animal so as to see the prominences of each buttock, one will be well-defined, while that fractured will be absent or flattened. Manipulation will elicit crepitation and pain, and a variable amount of lameness will be present. Union of the broken parts will take place by rest, and a strong charge laid upon the outside may help to keep them still; a blister may be used with the same view. Sometimes swelling obscures the flattening from displacement, but by handling the part all doubt about the matter will be dispelled.

Fractures of the Bones of the Fore Extremities.

The *scapula*, or blade bone (Fig. 239), is probably fractured more frequently than has been admitted. It is in our recollection that during some years' residence in various northern towns of England, especially where hills abound and heavy loads are moved, the number of fractures of the scapula were as three to one of any other bone. Animals with laden carts, falling when descending heavy gradients, generally fractured this bone. The neck, *a a*, is the most common seat of fracture, but instances now and then occur in which the bone is split across the body. Muscular contraction plays an important part in these accidents. The spine, *b*, may be broken by blows, and requires removal. In the foregoing injuries, although union will take place if there is not displacement, a long time must elapse before

the horse can be of any service ; usually, however, there is very great deformity of the limb, displacement, sloughing, and little hope of success by treatment.

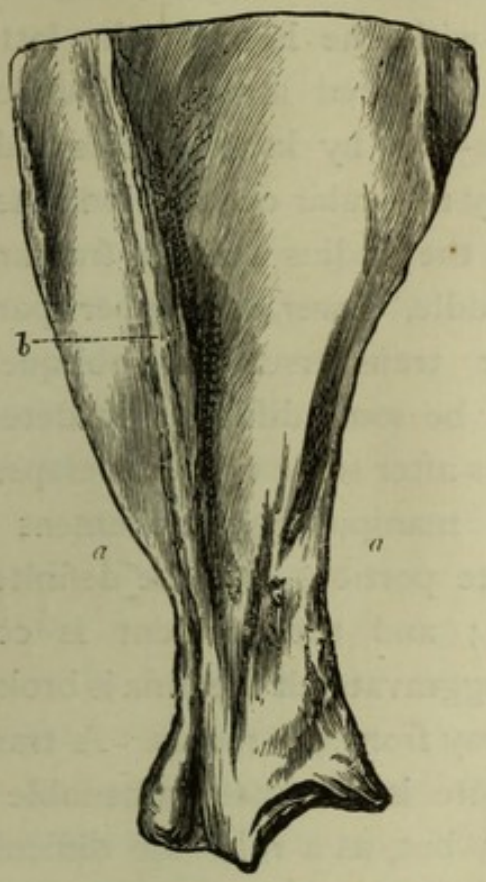


FIG. 239.—*The Scapula, or Blade Bone.*



FIG. 240.—*The Humerus.*

The Humerus.—This bone (Fig. 240) is fractured in falls, or by extreme muscular action in the efforts of the animal in slipping, falling, or when "cast" in the stable. From the oblique position of the bone, together with a large amount of muscular tissue in connexion with it, the limb is considerably shortened, and the animal cannot rest upon it, the fractured portion being drawn upwards, giving rise to great deformity. In addition, also, there is often much swelling, caused by infiltration of blood derived from ruptured blood-vessels—as the humeral artery (Fig. 36) or its branches, which may altogether prevent the sound of crepitus being heard. Occasionally, one of the condyles or tubercles are

broken ; but, as in case of fracture of the shaft or body of the bone, reunion cannot take place, owing to the action of such a mass of muscle keeping the fractured ends separated some distance, and the inability to secure complete rest.

The *Radius, a*, and *Ulna, b*, with the head of the latter, the *Olecranon, c* (Fig. 241), are fractured under various circumstances—as by kicks, blows, falls, and also by muscular contraction. As a long bone the radius may be fractured at the middle, lower, or upper parts, and either transversely or obliquely. There may be some difficulty in detecting crepitus after some time has elapsed, but under manipulation movement of the separate portions may be definitely made out ; and the accident is considerably aggravated if the ulna is broken or torn away from the radius. A transverse fracture is the most amenable to treatment ; but, as a rule, the difficulty of maintaining a proper position and necessary rest is very great, and even insurmountable. Fractures at the upper part are liable to involve the articulation ; the olecranon, also, at this portion—the beak, *d*—when broken off, not only involves the joint, but in recovery it is set fast by the ossific matter thrown out, and we have the condition known as anchylosis, or stiff joint, from which the animal cannot lie down or execute any kind of work. Brood mares and stallions only are eligible for treatment, which comprises the use of bandages, splints, charges, &c. &c., and rest in the slings. In fracture of the olecranon, *c*, the detached portion,

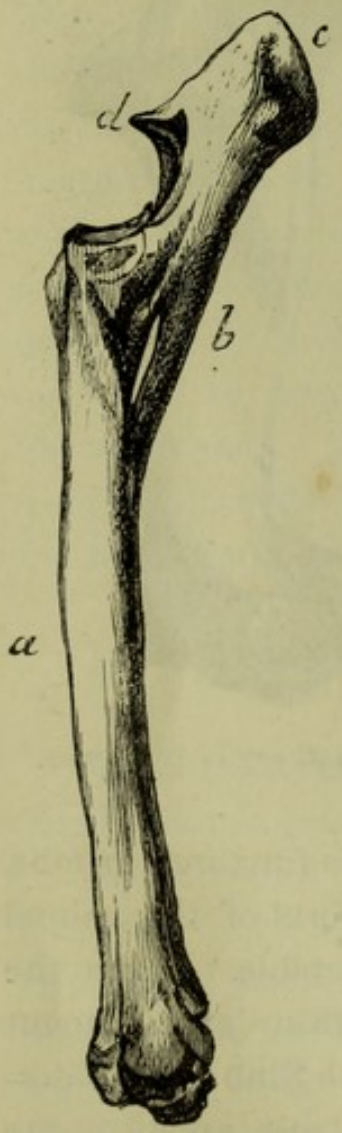


FIG. 241.
The Radius and Ulna.

being the point of insertion of the triceps muscles, is at once drawn upwards, and may be sometimes felt several inches above the original point of the elbow. In young animals, injury at this part arising from kicks or blows may give rise to much inflammation; and the epiphysis, or extreme point, *c*, which has not then become united to the bone by ossific matter, is separated after a day or two—a condition equal to fracture, and equally as unmanageable and incurable. There is extensive swelling from infiltration, and inability to stand; the foot can be carried forward, but there is no power to draw it backward. In addition to the difficulties already named, there is a great tendency to the burrowing of pus, which forms as a result of injury, irritation from fragments of bone, &c., the joint being invaded and causing awkward complications. The muscles of this region (*see* Fig. 258, also Plate XII.), having much severe strain to encounter, are strongly bound down by a covering of dense fascia, or strong fibrous membrane, and when pus forms beneath this it can only go in certain directions, not through the fascia; and this circumstance explains why such abscesses prove so tedious and unmanageable, while so much tissue of the softer kind is destroyed.

The *Bones of the knee* (Figs. 232, 233) are fractured by kicks, but more frequently by falls, when the knees are broken, with more or less violence to other parts. Such implication of the joint will render the case at once incurable—*i.e.*, the freedom of the joint will be lost; and an animal with a perfectly stiff knee is, or can be, of no service for work of any kind (*see* Fig. 234).

The *Metacarpal, cannon,* or *shank bones* (Plate XI., V V., and Fig. 242) are fractured during a gallop on soft ground, particularly the sandy beach. When a student at Edinburgh, I remember a number of cases occurring to horses hired for a ride on Portobello sands. The fractures are often trans-

verse, and may involve the fetlock-joint; yet by careful adjustment of splints, bandages, freedom from motion and weight, together with rest in the slings, recovery may be so far effected as to enable the animal to do slow work. Fractures of this bone are very readily detected, as the absence of muscles enables the practitioner to handle it thoroughly; the inability to stand, with evidence of a joint in an unusual part of the bone, with probable crepitus, pain, and lameness, being reliable signs. It may happen that the fracture may be oblique and compound, or comminuted, in either of which the difficulties in the way of cure are of course much greater; nevertheless, by the use of splints, starch bandages, and the antiseptic treatment, for the compound state, animals have been so far restored as to be useful for breeding, &c.



FIG. 242.
The Metacarpal, or Shank Bone.

The *Ossa suffragines*, or *pastern bones* (Fig. 243, Y, Plate XI.), together with the *Ossa coronæ—coronet* or *small pastern bones* (Plate XI., Z.)—are common subjects of fracture during hard and severe gallops on stones or heavy ground, the seashore, &c. The former are sometimes split vertically down the middle, the latter obliquely; but generally, when the accident arises from running away with or without a load in the streets, the fracture is comminuted. The animal is suddenly and intensely lame; he cannot bear any weight upon the affected limb, and carries it when he moves, leaping on the three sound legs, the toe of the foot only approaching the ground. Crepitus will be most plainly

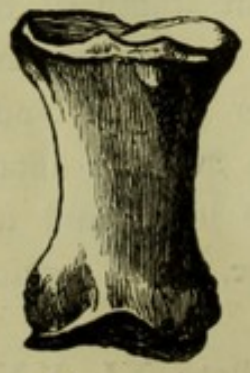


FIG. 243.
Os Suffraginis, or large Pastern Bone.

felt in comminuted fractures soon after the accident, when a similar sensation of handling a bag tightly filled with broken fragments will be imparted to the hands ; but in simple splitting of the bone, the periosteum, together with the surrounding ligaments, by their firm binding often prevent this ; in addition, the quickly succeeding swelling obscures the nature and extent of the accident. If one bone is broken, and the fracture is simple or split, and although the division may implicate one or both joints, the usual result of proper treatment is that of union and restoration to partial usefulness, with or without permanent swelling or deformity. Little more is required than keeping the animal quiet, and the limb fixed by means of splints and simple bandages put on with only moderate tightness, so as to be easily removed ; gutta-percha moulded to the sides is perhaps the best, which can be softened and readjusted if required. The shoe, if possessed of turned-up heels and calkins, should be removed carefully at the outset ; but if worn flat, it may remain. As a rule, however, it is best always to take it off, and let the animal stand upon a thick layer of tan or sawdust, in which he will eventually find the most suitable position for rest. The recovery may be effected in about a month ; but when the corresponding bones of the hind-limbs are fractured, the time required will probably be longer, the slings being indispensable until the patient can bear his weight fairly.



FIG. 244.—*The Sessamoides (Back View).*

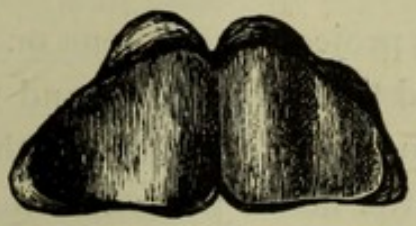


FIG. 245.—*The Sessamoides (Articular Surface).*

The *Sessamoid bones* (Fig. 244, 245), having the attachment of the suspensory ligament (Figs. 265, 266), are liable

to a great degree of strain, and sometimes under severe exertion they give way, a portion separating in connexion with the ligament.

The effect of such fracture is to allow the back or pad of the fetlock to come to the ground, and to cause the toe to point upwards and forwards, as in case of rupture of the suspensory ligament, commonly called "break-down." The possibility of securing a union of the fractured bones is believed to be impossible, without at the same time incurring anchylosis of the fetlock-joint. Besides the usual appliances of splints and bandages, the greatest attention is needed, as parts involved in the injury are liable to great disturbance and displacement ; nevertheless, in cases of valuable brood mares or entire horses, attempts should always be made when one leg only is affected. Should both be involved, recovery is hopeless, especially in the hind-limbs.

The *Navicular bone* (Fig. 246) lies across the space existing between



FIG. 246.—*The Navicular Bone*

the projecting portions or wings behind the coffin bones, and there acts as a pulley over which the tendon of the flexor pedis muscle plays in drawing the foot upwards and backwards (Fig. 247). Here it is subject to much strain and pressure, and under certain circumstances is

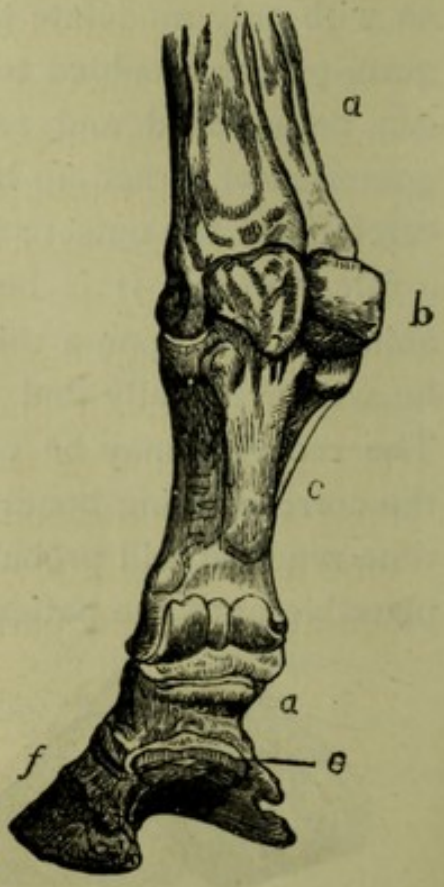


FIG. 247.—*Lower Bones of the Extremity.*

a. Metacarpal.
b. Sessamoides.
c. Large pastern.
d. Small ,,
e. Navicular.
f. Coffin bone

fractured. One of the most common forms of fracture occurs in horses which have previously suffered from navicular arthritis, in which the bone becomes diseased, and, being unable to bear the strain, it cracks across or in several places. When a horse has been unnerved for this disease, the removal of pain induces the animal to make more free use of the lame foot, which in turn aggravates the disease, and therefore increases the liability to fracture; in addition, the tendon becomes involved and weakened at this part, where, besides fracture of the bone, there is rupture of the tendon, accompanied by great lameness, dropping of the fetlock behind, and turning upwards and forwards of the sole and toe. Pressure by the thumb in the hollow of the heel will be a sure test of the locality of pain.

Another origin of fracture of the navicular bone is in puncture by treading upon nails or other sharp-pointed bodies, which first penetrate the frog, and, besides injuring the bone, open the synovial joint. It is important to distinguish between simple open navicular joint and fracture, when combined with it. In both cases the attendant fever is very severe, pain and lameness also being correspondingly great. The character of the discharge is the principal guide. In simple puncture of the articulation the fluid oozing from the orifice is odourless, thin, straw-coloured, and transparent, containing a small portion of pus; but when fracture is present, although, as just described, for a day or two, it afterwards becomes mixed with blood and pus, forming a dirty red or coffee-coloured discharge having an offensive odour, due to the decay of the bone, which has already commenced. As the animal lives, further complications arise. Swelling occurs round the coronet, and eventually abscesses form, while the attendant fever is unmitigated; and other signs are aggravated until the animal falls exhausted, and probably dies from further violence inflicted during vain struggles.

The *treatment* of simple open navicular joint has already been given at p. 645 ; but when that condition is certified to exist in connexion with fracture of the bone, the most humane course is to have the animal destroyed, and thus save him from days of violent suffering and exhaustion.

The *Coffin bone—os pedis* (Figs. 203 and 247, *f*). Although securely enclosed within a strong horny case, this bone is liable to fracture from several causes. We have already alluded to the tendency of inflammation (*see* Laminitis) to extend, involving the coffin bone, and leave it porous, brittle, and no longer fit for its offices. Concussion then generally gives rise to fracture. Horses employed about railway stations sometimes fall, from the heels or toes of their shoes becoming fast in the grooves of the metals, when from severe muscular action the horn or hoof is partially torn off, and the bone fractured in several directions. Heavy weights, as bars of iron, &c., falling upon the feet, also smash the bone ; and nails in shoeing may be driven through the edge, or, by being too near, exert pressure, from which disease and secondary fracture result.

Mere stripping of the hoof is often recoverable ; but when associated with fracture or smashing of the bone, the animal is of no further use. When the accident has arisen in shoeing, the usual signs attendant upon "pricks or binds" will be present, probably attended with suppuration, not only below, but also round the coronet, and severe irritative fever. As soon as the presence of pus is ascertained, the sole must be opened at the place ; and this failing to give relief, will point to the existence of further complications, such as separation of the sensitive sole with fracture of a portion from the edge of the bone. No rest or ease will be given until the portion detached is removed, and this being effected, poultices, together with the usual means of reducing fever, should be actively pursued. If the treatment be adopted

early, the animal may be restored to his former usefulness in two or three weeks, but with only the delay of a few hours his fate may be sealed.

Fractures of the Bones of the Hind Extremities.

The *Femur* or *thigh bone* (Fig. 248, and Plate XI., F F), being situated under very similar circumstances to the humerus—*i.e.*, having a large mass of muscle surrounding it, and having an oblique direction—fracture is certain to be attended with much displacement and complications which render recovery impossible. The neck of the bone is one of the seats of fracture, and sometimes happens at the same time as fracture of the acetabulum (*see* p. 667); another form is seen in fracture, either transverse or oblique, in the shaft or body of the bone, both of which cause the limb to appear shorter, and produce a turning inwards of the toe. When in addition the head of the bone is pushed into the large opening in the pelvic bones—foramen ovale (Fig. 238, *b b*)—the toe is then turned outwards, and the limb will have a longer appearance than that of the opposite side. The causes are falls, kicks, and violent muscular action in the efforts of the animal when being accidentally cast in the stable, or when bound for operations. We have seen it occur during severe abdominal pain when the feet have struck the walls of the building. Fracture of the *trochanters* are rare, giving rise to very complicated lameness, in which extension of the pelvis is effected with extreme difficulty. Motion gives great pain, the leg is raised easily, but in being carried forwards it is dropped suddenly. Pressure of the region of the trochanter readily demonstrates the existence of pain, and even presence of the detached bone. When the large trochanter (Fig. 248, *a*) is fractured, the haunch is deformed; if the small one (Plate XI., *g*) is broken off, the

side below the haunch will be flattened, the usual protuberances in each case being of course absent and displaced.

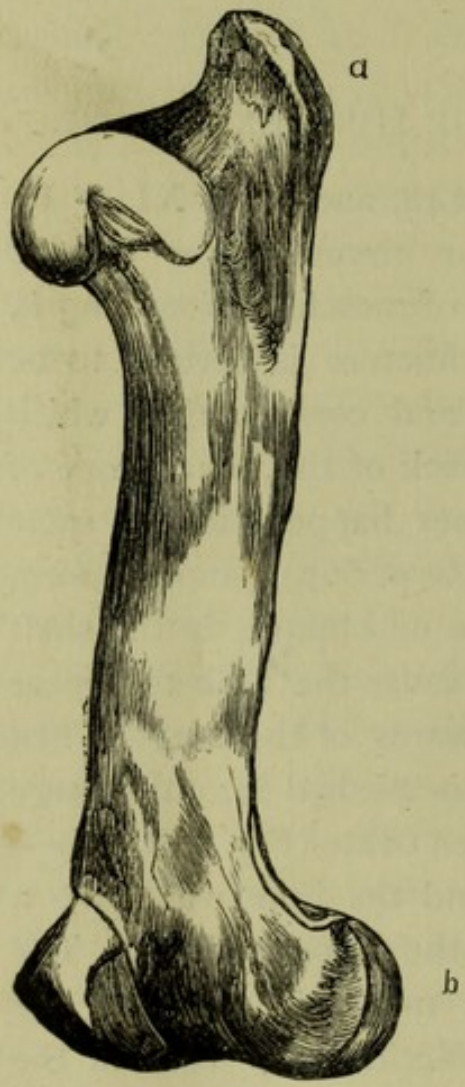


FIG. 248.—*The Femur, or Thigh Bone.*

One of the *Condyles* (Fig. 248, *b*) may be fractured, which will be discovered by pain on pressure, crepitus before swelling arises, great lameness, and distension of the synovial capsule.

The *Patella*, or knee-cap (Plate XI., G G), is liable to fracture from kicks, blows, and violent muscular action. It is split into halves vertically or horizontally, and sometimes smashed into fragments. From the severe strain always exerted upon it, the broken parts are liable to be easily separated, rendering reunion impossible ; but if it can be ascertained that only simple splitting has occurred, and without displacement or separation, an attempt to unite the portions of bone should be at least attempted. As fracture of this bone must involve a large and important synovial articulation, anchylosis of the joint is the certain result of treatment of the smashed condition ; inflammation runs very high, and involves the secreting structure readily. The usual plan of *treatment* consists of using the slings, giving the parts absolute rest by fixing them in a relaxed condition, and putting on a shoe having heels and toe several inches long. The external parts are to be dressed with cooling lotions, and fever medicine employed internally until the heat and pain are subdued, when a blister may be applied

with benefit to rouse the absorbents to action, and reduce the swelling.

The *Tibia* or *upper leg bone* (Fig. 249, Plate XI., H H), of all the bones of the limbs, is most liable to fracture, the usual cause being a kick from another horse taking effect upon the inner side of the leg, at which place the bone is not covered by muscle. There is, however, a dense covering of periosteum and fascia, together with the skin outwardly ; and these serve an important office in the prevention of displacement when fracture has taken place. Usually a small skin wound only is present, but the evidence of great pain and lameness must be a warning that absolute rest must be given ; and indeed slinging should be resorted to if the animal will endure the restraint. When this course has been disregarded, owing to fracture not being suspected, sudden displacement has arisen, either during work or in rising from the recumbent position, and the animal in many instances has been rendered hopelessly incurable. Let the reader bear in mind that a kick on the inside of the tibia is very liable to be associated with fracture, and the safest plan is *always* to treat the animal as if one were known to be decidedly present. After a short time the course of the fracture, which is mostly of the oblique kind, will be rendered conspicuous by the presence of the usual provision of Nature—the swelling of callus—which leaves no doubt of the wisdom displayed in creation. Subsequent displacement is often attended with protrusion of the points of the bones through the skin, thus rendering the case one of great diffi-



FIG. 249.—*The Tibia, or upper Leg Bone.*

culty in treatment. Reduction of such conditions is not always possible except in very young animals, and the extreme difficulty of maintaining the position of the broken bones very discouraging. Suspected fracture should be treated by splints, bandages, &c., and all means of procuring freedom from motion, the animal not being suffered to lie down or walk about in the least.

Os Calcis.—This bone forms the prominence of the hock behind (Fig. 250, *a*, and Plate XI., P P), acting as a powerful lever in propelling the body forward. Transverse fracture is the most common form of injury, due to excessive muscular action, as in rearing, jumping, or when the limb slips, or is carried too far beneath the body, the weight of which is suddenly thrown upon the muscles attached to the head or point of the bone. In young horses the accident is likely to arise before the epiphysis or point, which is developed separately from the rest of the bone, is completely united to it.

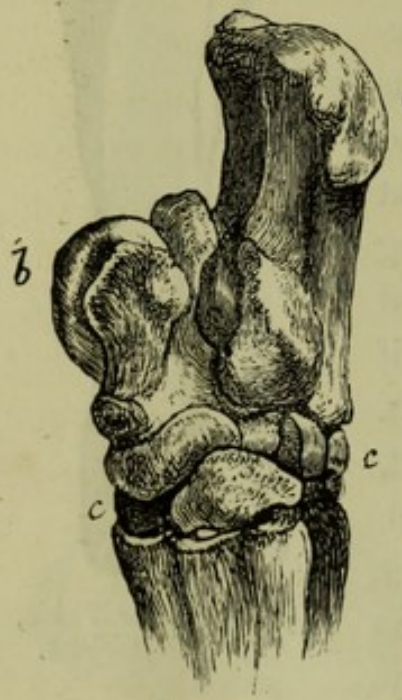


FIG. 250.
Bones of the Hock.

The accident is known by comparison of the hocks, the injured one, having lost the angular outline, being rounded; the tendon passing upwards from it—the hamstring, or *tendo-Achillis*, being relaxed, and the fragment of bone detached from the os calcis still connected with its extremity, lying in the hollow formed by the upper leg bone in front, and os calcis behind. The animal is very lame, and exhibits very great pain and difficulty in extending the foot and placing it upon the ground.

Treatment.—Successful issues from these kinds of injury

are rare, owing to the extreme difficulty in keeping the fractured portions of bone in direct apposition. Even when union is effected some deformity must be expected, and likewise odd action. The plan consists of forming pads or moulds to fit the hollow upon each side, so as to bolster-up the broken bone, and keep it in contact with the main part, and thus secure union. These being first bound in the required position are covered by starch bandages, carried from the foot upwards as high as can be safely accomplished, which, when dry, will keep the limb firm and rigid, and greatly prevent disturbance of the injured parts. We should, however, state that a high-heeled shoe will be required, and the animal placed in slings before the bandaging is commenced ; and after being thus treated for two months or upwards, in successful cases, he may be allowed to go free in a loose box. Very satisfactory results have followed this plan.

The rest of the bones forming the true hock-joint (Fig. 250, *b*, &c. and *c*) are occasionally the seat of fracture, usually due to direct violence, as kicks from other horses ; but owing to the great tendency to rapid swelling, and the fact that they are strongly bound down by powerful ligaments, crepitus in movement of the fragment is not readily made out, and it is not always possible to state decidedly that fracture has occurred. Such may be present in the smaller bones, as the cuneiform and cuboid ; and when unassociated with external wounds, recovery is uniform and complete. If, however, the astragalus, *b*, is broken, the process of recovery terminates in a stiff joint ; and when fracture is present with open joint, the animal, excepting under rare conditions, is scarcely worth treating.

Fractures of the Ribs.—Although the number of known instances of fracture of the ribs is small, yet we have reason to believe that many cases occur ; but owing to the absence

of external wounds, and the extraordinary reparative powers of the system, they are not discovered until after death, when evidence of the union and enlargement are seen. This fact is important and valuable to the practitioner, who will gather from it the advisability in all cases to which he may be called of reducing all compound fractures of the ribs to the simple form, giving the required support by means of belts or bandages, charges or plasters.

The causes are—falls, blows, and kicks from other horses. The farrier's shop has been known to be prolific in these injuries, when irritable shoeing-smiths brutally strike with the instruments which they are using. An old Yorkshire story forcibly illustrates what was once a too common occurrence, and which now has happily almost died out:—A quaint old horseman had frequently noticed on the sides of his horse, on returning from the village smithy, certain marks, at first of an unintelligible character, but after frequent repetition he was eventually led to doubt the identity of his animal, by his being literally covered with raised swellings, rudely representing the letters T and O, caused by blows from the hammer and pincers respectively; and accordingly led the animal back to the smith, asking him if a mistake had not been made by sending the wrong horse, as his, he was quite sure, had no letters marked upon him of the character referred to.

Simple fracture of the ribs is not, as a rule, detected, as under the usual swelling displacement rarely occurs, and union is safely effected; but now and then the practitioner meets with the aggravated form—the compound—in which the ragged and pointed ends protrude from an ugly wound, or otherwise pass inwards and lacerate the lungs, giving rise to pneumonia. Air passes in and out through the wound as the organs act, and an amount of oppression ensues from the cavity being opened.

The required course is that of removing all obtainable loose fragments of bone, to replace those portions bulging inwards, to close the wound as speedily as possible, and prevent the admission of air ; and support by means of a broad belt, together with stiff plasters, the hair being first clipped closely. The action of the atmosphere upon the wound has the effect of retarding the process of bone union and healing generally: a needless amount of suppuration ensuing, occasioned by microscopical organisms, which float in the air, having a putrefactive tendency, to allay which nothing succeeds so well as the antiseptic treatment. Treatment of other complications, as pleurisy and pneumonia, will be found under the respective headings.

DISEASES OF BONES DUE TO INFLAMMATION.

OSTITIS.

Inflammation of bone—*ostitis*—assumes both the acute and chronic form, sometimes involving the whole, or only a part of a bone, and arises as a result of external injury or concussion, and in rarer cases from hereditary taint.

In the acute form the outer layer, together with the investing membrane—the periosteum—are involved, the process terminating in an exudation of material which leaves a permanent thickening or enlargement on the surface, proportionate to the extent and intensity of the inflammation. Such enlargement is known as exostosis, or bony tumour, into which the exudate is eventually converted, instances of which are seen in spavin, splint, ringbone, &c. In other but less frequent instances, the external deposit may be reabsorbed after a time, the parts being unaltered in shape, when the termination is said to be by resolution. When

bones become inflamed throughout their length and substance, a decided change of structure also takes place. The exudation upon the outer surface produces not only a permanent enlargement, by the conversion of the exudate into bony matter, but the bone is also permanently changed in size and shape, while its actual weight or density is materially altered. In one case it may become hard, dense, and heavy, assuming an ivory-like appearance from the consolidation of its substance, due to blocking up of the nutrient canals in the inflammatory process; in the other, the canals of the internal substance are enlarged by absorption, while the outer surface is thickened by deposition of new bony matter, and thereby the bone becomes light and porous. Occasionally absorption goes on contemporaneously with the deposition upon the outer surface, and this gives the bone a rough and irregular appearance, having pits or ulcers interspersed throughout at intervals; such is witnessed in the navicular bone in groggy-lameness or navicular arthritis. The articulations of joints are also liable to this condition of inflammation as a result of open joint; and the general substance of the bone, besides being converted into a porous or spongy texture, becomes very brittle; hence we find that animals having suffered from spavin, or disease of the navicular or other bones, for any length of time, are liable to sudden fracture of the diseased parts, which do not unite readily, but are more likely to form a false joint, while the animal is rendered positively useless.

In the chronic form of ostitis the changes are slowly developed, the external exudation being often more circumscribed, and occurring in isolated exostoses or small bony tumours, splints being a familiar example; while in other instances it may invest a greater portion of bone in an uninterrupted layer, sometimes becoming intimately united with it, or only loosely connected by a spongy intervening

layer, liable to frequent inflammatory action and corresponding enlargement from time to time.

Inflammation of the Cannon Bone.

Ostitis, or inflammation of the metacarpal or cannon bone with the periosteum, is more commonly seen among horses of the better breeds, in which the bones are of a closer texture and more compact nature. Race-horses, when young and immature, are called upon to perform exertion which is too severe for their limbs, the bones of which contain but little earthy, with a preponderance of animal, matter, and being necessarily more vascular at this period they are liable to severe inflammation, as a result of the strain and shock to which they are subjected (Fig. 251). The disease is more commonly known as "sore shin," being located, as a rule, at the lower end of the bone; but occasionally aggravated cases arise in which the whole of the metacarpal bone is involved, and at length to terminate in necrosis.

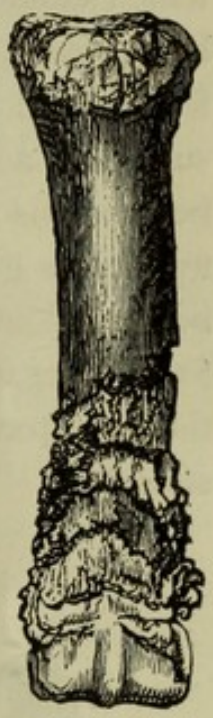


Fig. 251.
"Sore Shin."

Symptoms.—Lameness of a gradually increasing character in one fore-leg—that on which the animal leads in his paces—or both are affected, when a halting action is observed, and the animal is unable to stand upon one alone for any length of time, shifting and advancing them quickly in turn. When a single leg is affected, the foot is advanced, swelling proportionate with the extent of injury is present, and attendant fever marks the progress of severe cases. Pressure induces pain, and the parts are at first tense and elastic, gradually becoming œdematous and pitting under the finger. In rare instances death of the bone arises from change in the nature

and subsequent absorption of the exudation. The ordinary termination is that of enlargement and exostosis, in which the fluid exudation is convertible into bony material, adding considerable substance and deformity to the limb.

Treatment.—The acute form requires the free use of the knife, by which the periosteum is to be divided in order to allow the escape of the exudation from beneath, neglect of which endangers the bone by separating the nutrient membrane from it. Hot fomentations and poultices should then follow, and at later stages, when the inflammatory action has subsided, a blister may be used to hasten absorption. The bowels also should be briskly acted upon, and sedative medicines given afterwards as occasion requires, a low diet being enjoined, with absolute rest and quiet. For the chronic form, purgatives and sedatives internally, with cold applications externally, and blisters after the inflammation has subsided.

Splints.

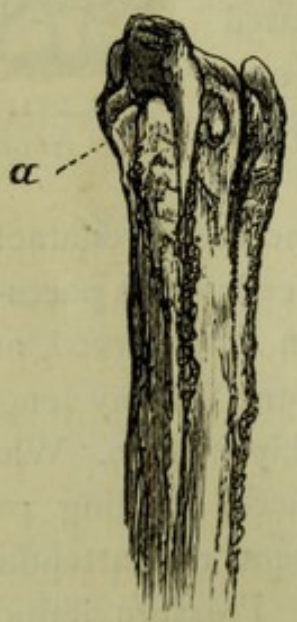


Fig. 252.—*Simple form of Splint. The Tumour as shown at a.*

Under this term the results of inflammation of bone are seen in the formation of bony excrescences, involving the large and small metacarpals (Fig. 252). The usual seat of exostosis is upon the inner side of the fore-leg, occupying a position independent of the interosseous ligament which unites the large and small metacarpal bones, destroying the motion previously admitted between them. But varying with the amount of concussion, these bony tumours form in other parts and assume a variety of shape and size, sometimes involving the outer small

metacarpal, uniting both across the back or producing deformity of them, together with the large metacarpal at both extremities, and even to the detriment of the small bones of the knee-joint (Fig. 253).



FIG. 253.—*Head of Metacarpal, showing he extent to which exostoses have proceeded.*

A simple splint when small, distant from the joint, and recent, need not occasion any alarm, as it may almost disappear by absorption, and not occasion any kind of lameness; other forms are suspicious, as they are at any time liable to produce lameness, enlargement, and deformity, by interfering with the movement of joints, position of ligaments or action of tendons. Splints are the exostoses of circumscribed inflammation, due to continued concussion in slower movements, and forms in other horses the analogues of sore shins of the racer. Cart-horses are rarely subject to this form of disease. It is generally believed that some animals have hereditary tendencies to the formation of splint, partly by reason of defective formation of limb, a weak, upright leg being more liable to concussion, as well as affording less secure attachment for ligament, &c. Defective shoeing, as causing unusual concussion and alteration of gait, is not an uncommon cause, although young horses never having been shod are liable to the disease, even while running barefoot in the pasture in an unbroken condition.

Symptoms.—Splints do not inevitably produce lameness; this is often seen both in unbroken animals as well as in those of five, six, or seven years of age, even when the exostosis is so large as to be plainly seen from a distance. Lameness arises, as a rule, during the stage of formation, when the osseous deposit beneath the periosteum by enlarge-

ment stretches that membrane beyond its capacity of adaptation ; and those animals having a display of high or good action, by reason of greater liability to concussion, are the common victims. The formation of a splint does not always appear contemporaneous with the disease, and, in the absence of local swelling, the cause may be looked for elsewhere in error ; but by bearing in mind the following leading points the error may be avoided :—A. It is not very likely that older animals will be troubled with splints—they are more liable to grogginess and other diseases ; while young animals, especially when first put to work, may show splints in contrast. B. The lameness is in the trot, and severe in comparison with the soundness of the walk. C. Work and exercise augment the lameness. D. The observer will discover that stiffness of the knee-joint is remarkable. E. When the lameness is excessive, the animal stands resting the toe on the ground, with the limb in a state of semiflexion ; while great and diffused heat, pain, and swelling, with symptomatic fever, may be manifest ; but if these signs are absent, the flat hand should be passed down the limb upon each side, when *localised* heat may be detected, and the point of the thumb in descending along the side of the metacarpal, in the groove formed by it and the small bone, will come upon a small hard swelling, which exhibits tenderness upon pressure. In some cases these exostoses are developed with rapidity.

Treatment. — Reasoning upon the assumption that the pain of splint is due to the gradual extension and stretching of an unyielding membrane like the periosteum, by the progressive growth of a deposit beneath it, a plan was recommended by the late Professor Sewell, in which division of the periosteum over the splint was the special feature. He named the operation "subcutaneous periosteotomy," and since that time it has been adopted in numerous cases with

success. It is performed as follows:—The animal being cast, and the affected limb released from the hobbles, but secured by a strap-rope on the fetlock-joint, held by assistants, an incision is made at the lower end of the exostosis, of such a size only as to admit the blade of a suitable knife (Fig. 254), which is first used flatwise, to separate the skin from the splint throughout its entire length. The blade is then turned edge downwards, and being drawn outwards, exercising a sufficient degree of pressure, the periosteum is divided. The blade may be passed a second time over the course of the splint, if any doubt exists as to the efficacy of the operation; and, lastly, a similar orifice to the first being made at the upper end of the splint, a seton is carried through, where it is to remain a week or ten days, after which it may be removed to allow the wound to heal.



FIG. 254.—*Periosteotomy Knife.*

The use of purgatives, sedatives, &c., may be warranted on account of the amount of febrile disturbance; but, in slight cases, simple cooling applications, fomentations, &c., conjointly with internal medicines, may answer the desired ends; or, failing, a blister may be applied. We have used the firing-iron, drawing a couple of lines, one upon each side, parallel with the splint, in such cases, with decided benefit after reduction of the more active inflammation.

Other means of cure for obstinate cases of splint is that of pyro-puncture, an instrument having a number of small pins projecting from a disc or oval-shaped plate at the end of an iron rod, or the sharply pointed budding-iron (Fig. 29) is heated, and applied with sufficient pressure that the spikes or point first penetrate the skin and then the deposit; an old method consisted of cutting off the splint by means of a chisel and hammer, but a more surgical remedy exists in

the bone forceps, when the deposit is large and likely to interfere with the action of tendons, or be struck by the opposite foot. In the latter case, the splint will doubtless be greatly aggravated, and a blow received in action may bring the animal to the ground; the wearing of a boot will prevent this, and the red ointment of mercury be useful in reducing the enlargement, while ease in resting may be greatly afforded by flat shoes and attention to the feet. Splints on the hind-legs rarely give rise to any inconvenience.

Open Joint.

Communication with the synovial cavities, joints, or articulations, as they are called, is established in several ways :— A. By fracture of the component bones; B. by puncture or incision; and C. by sloughing of the soft parts, arising from injury inflicted in the neighbourhood. Under all circumstances, the results are extensive pain and inflammation, and attendant irritative fever; but the period of the commencement of such is not uniform in each case—for instance, when fracture of bone has arisen the symptomatic conditions are rapidly developed, while in puncture, incision, or sloughing, the animal is rarely affected by constitutional disturbance until some hours afterwards. At first the discharge of synovia is small and trifling, but as the inflammation, which feeds the supply, progresses, it increases largely, the flow is mingled with pus, and a large clot of coagulated synovia accumulates at the opening of the wound. Swelling of the joint and bones generally proceed, the tissues being infiltrated, and the exudation goes on to organisation, more or less, forming a hard and extensive enlargement; the wound meanwhile assumes an unhealthy condition, sloughing follows, and the discharge is offensive, bloody, and

purulent, being supplied by numerous abscesses which form in the locality. Such cases, when neglected, go on daily increasing in their serious states of aggravation, and the animal finally succumbs to the combined irritation, debility, and exhaustion.

In other instances, the bones entering into the formation of the joint partake of the inflammation arising from the admission of air or foreign substance within the cavity, and shortly the articular surfaces are removed by absorption, by which the vascular layers of the bones are brought together, and, union taking place, granulations sprout up from the bloodvessels, of which an exudation occurs, and by continuance and ultimate hardening completely fixes the bones, forming masses of bony matter of variable size, and constituting the true form of anchylosis, by exostosis or osteophytes.

Treatment.—In the treatment of open joint, two important objects are desirable—viz., early closing of the orifice, and the prevention or arrestment of inflammation, if it has already attained any degree of intensity. Both local and constitutional measures are required, and of the latter often powerful remedies have to be selected. 1st. As to closing the external wound. The measures already advocated for punctured or incised wounds may be practised, in accordance as each may be applicable; but on no account must any probing or other interference be allowed, except such as may be needful for the removal of foreign bodies. In incised wounds, sutures may be employed, and some practitioners have great success by using a covering of styptic colloid, solution of shellac, or collodion afterwards. Seeing the great necessity of reducing, as far as possible, the tendency to suppuration, we have unbounded confidence in the antiseptic treatment following the insertion of sutures. When, on the other hand, the wound is the result of a kick

from another horse, small, and partaking of the characters of incision, puncture, &c., we have repeatedly arrested the flow of synovia, and succeeded in closing the wound, by the application of the budding-iron (Fig. 29); or, in its absence, the end of a heated kitchen-poker, to the orifice, and a small quantity of cantharidine ointment around. The cautery must not be applied too hot; a dull red-heat is sufficient, the object being not to destroy the tissues by charring them, but rather the setting-up of the swelling of external inflammation, which brings the edges of the wound close together, and arresting the flow by healing of them. The application of a small amount of blister, extending an inch or two round the orifice, adds also to the swelling, and thus in a few hours such cases are reduced to those of minor character.

The animal should, if possible, be put into slings, and wounds of the knee, hock, fetlock-joints, &c., may be more successfully managed by putting on a wood or tin splint behind, or in front, as the case may require. Should the application of the actual cautery and blister fail to close the wound, the antiseptic treatment may be tried; or, in preference, the joint may be covered by the leg of a worsted stocking, in which a powder of dry alum and oxide of zinc and wheat flour, in equal parts, with frequent renewals of dry portions after dressings by astringent lotions. The plan originally recommended by Mayhew, of applying a stream of solution of chloride of zinc over the wound, is successful in some cases; but additional good will result from prompt collateral internal treatment. The bowels should be opened by a laxative at once, and in a few hours aconite and neutral salts, as recommended in draught No. 13, p. 70, or the bolus, No. 14, p. 71; or, in order to save time at the outset, the sedative may be combined with the purgative, as given in No. 56, p. 186.

After the wound has been closed, evaporating or cooling

lotions may be employed for some days, but nothing succeeds so well as a continuous flow of cold water over the parts, carried by means of a tube attached to a reservoir elevated above the affected joint, and regulated by a stop-cock. At later stages, blisters, and even firing, may be required to overcome the internal inflammation and reduce the joint to its normal size.

The most troublesome cases of open joint are those caused by lacerated and contused wounds, in which there is much subsequent destruction of tissue, and consequent enlargement of the orifice. If the wound cannot be held together by sutures, or the adhesive coverings mentioned under the first form of treatment, it is a good practice to apply a smart blister over the whole of the joint, a proceeding which gives rise to swelling, approximates the edges of the wound, stiffens the joint, and limits motion, and promotes activity in the granulative or healing process. The plug of coagulated synovia, which may be observed at the orifice of the wound, must not be removed, but rather encouraged by an occasional shower of chloride of zinc solution, thrown from a bottle or spray-producer (Fig. 33).

Should these measures fail, and the formation of abscess within be apparent, together with a discharge of blood, mixed with pus, &c., it is evident the articular cartilages have been removed, and the process of anchylosis or stiffening of the joint by ossific deposit has commenced; and, depending upon the kind of animal, joint affected, work required of him, &c., the practitioner will decide as to the propriety of pursuing further treatment. If the animal is valuable, the joint not an important one, and he can be used for slow work, it may be advisable to keep him alive, and promote the healing action as much as possible.

A spare and cooling diet will be required during the existence of severe febrile disturbance, but when that has

subsided a generous allowance of nourishing food will be required, to compensate for the wasting or emaciation that has been going on. Roots, green food, &c., are highly useful throughout the disease.

Further consideration of the subject of anchylosis, exostosis, &c., will be found under appropriate heads in the following pages devoted to the general causes and nature of lameness.

DISEASES, LOCAL INJURIES, ETC., GIVING RISE TO THE ORDINARY FORMS OF LAMENESS.

Having discussed the injuries, &c., common to the limbs and feet, we now turn to a consideration of other causes of lameness, as well as the various circumstances in which diseases of the bones or joints form a prominent feature, and more particularly with reference to the more important parts or organs of locomotion, and their articulations, with which is often associated sprain or strain.

Congenital Muscular Atony.

Before taking up the subject in the order given above, the attention of the reader is directed to a condition in young animals, giving rise to much lameness of a special kind, showing how arrested development of muscular fibre may occasion great inconvenience, and also prove misleading to those who see such cases the first time.

Symptoms.—The animals are affected in many cases from birth; but in some instances the peculiar symptoms may be delayed some weeks, or even months. The question whether this affection is ever congenital is set at rest by the fact, that we have carefully examined the limbs of foals and calves taken from the womb after death of the mother, and thereby demonstrated the existence of the deformity we

have to describe, and arising from the want of development of the necessary muscular tissues.

That animals do not necessarily exhibit the signs at, or immediately after birth, is true; but we need not wait to establish that fact in order to disprove the connexion of the malady with certain conditions existing at that time: although its appearance may be delayed, further particulars are required before we can decide it is not congenital, or, more precisely, hereditary.

As the animal stands, there are evidences of great insecurity; the legs and the body shake and tremble, the former being continually shifted, as if seeking to obtain a firmer position, and each time the toe is implanted, or dug in the ground in advance, when the weight of the body descending upon the incurvated fetlock-joint brings the whole of the anterior surface of the pastern to the ground, causing the heels of the hoof to strike the pad at the back of the fetlock-joint (Fig. 255). The toe and front of the hoof are thus considerably worn, and the coronet and pastern denuded of hair, but covered with a thick scaly skin. During vigorous efforts and rapid movements occasioned by fright, &c., the symptoms are powerfully demonstrated; the whole limb is spasmodically raised from the shoulder, the knee and fetlock being arched or flexed considerably; it is also advanced by means of a jerk, and violently brought back to the ground in about half the distance comprised in a natural step, the body being thrown backwards upon the hind-limbs, while the fore-legs have the appearance of being considerably in front of the body (Fig. 256). The undue flexion of the fetlock-joint



FIG. 255.
The Foot flexed under the weight of the animal.

and phalanges, as a whole, is a frequent cause of falling, when the young creature goes head foremost, the limbs

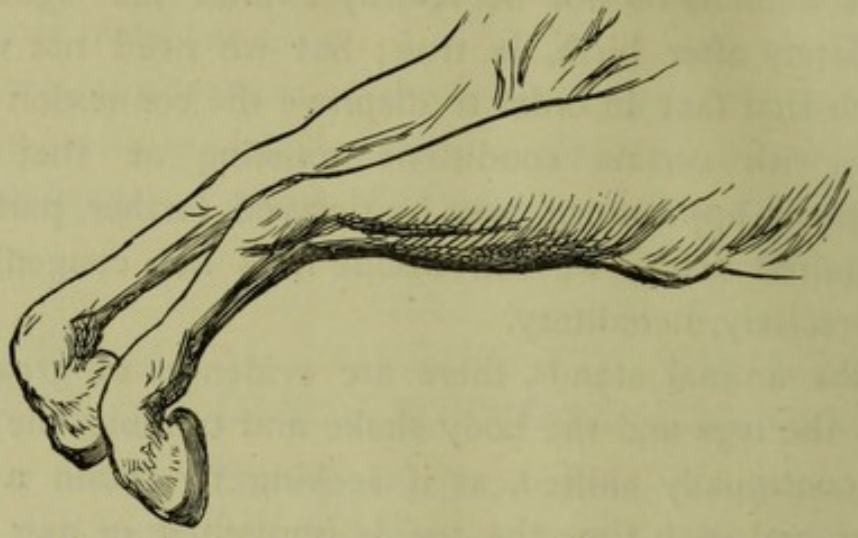


FIG. 256.—*The Fore-feet advanced in progression.*

doubling up beneath the body, and he lies often some time making ineffectual efforts to regain his feet, and, when successful, stands trembling violently from evident weakness and excitement. Throughout, the limbs are prone to undue flexion or doubling up, the weight of the body appearing too much for them ; and the malady is still worse when the hind-limbs are affected also. In such cases, the animal falls from incapacity first of the hind-limbs, and as soon as he has risen, or perhaps only partially does so, he literally tumbles head foremost from the defect in the fore extremities.

Nature of the Malady.—When first we were confronted with these cases, we felt humiliated and at a loss to account for the conditions, more particularly as in the district such cases had not been at all uncommon, and so many varied and confusing accounts of wonderful treatment having been performed, in many instances as strange and nonsensical. At first we regarded it as an evidence of weakness, and advised a liberal allowance of good food to the mare, in order to enrich the milk, of the quality of which we had some doubt. Ere long other cases were forthcoming and

further observation permitted, when in all cases we discovered the extensor muscles of the forearms, and the phalangeal extensors of the hind-limbs, were in a state of flaccidity, as well as being small and attenuated in a remarkable manner. When fulfilling the duties of Professor of Anatomy in Glasgow, we had occasion to examine a calf taken from the womb of a cow, the carcass of which was laid on the table for dissection in the college, and finding the phalanges in a state of extreme flexion, particular attention was directed to the presumed cause; and it was found that the extensor muscles of the forearm were almost absent—a few fibres only existing in connexion with the tendons. The corresponding muscles of the hind-limbs were also in the same condition. These facts fully confirm the observations frequently made upon animals affected in life, as well as being borne out by subsequent opportunities of seeing the same in others taken direct from the uterus.

Treatment.—Although a liberal allowance of good food, with rest, &c., produced a satisfactory though slow improvement, further measures were suggested by the facts derived in later examinations. The arrested development of muscle was treated by the daily application of stimulating liniment, or mild liquid blister, over the extensor muscles: recovery was at once decided and rapid. When the mare was found to be weak or sickly, a generous diet was recommended, with vegetable tonics, and, if necessary, a mild purgative given previously, she being confined to a small yard, paddock, or large box, in order to secure rest and quiet as much as possible. Gradually the limbs become straighter, the forearm increases in size and rotundity, weight is borne easily, and locomotion less and less difficult; and in periods, varying according to the extent of the defect—from a few weeks to a few months—the animal eventually recovers.

Although at the time we could not lay hands on any pub-

lished records of similar cases, we were far from believing the disease was not known or understood ; in later years, however, we came upon some extracts from Continental journals, by which we were informed that animals had been observed by Bracket walking upon their knees, being unable to extend the foot sufficiently ; and regarding the case as being due to rheumatism, consequent upon the overflowing of the Rhone, for which he performed tenotomy behind the arm, recovery following. Rossignol, another veterinary surgeon, met with a case of similar malformation at birth, but was undecided whether it arose from inordinate contraction alone of the flexors, or deficiency of tone and strength in the extensors. He divided the tendons of the leg—plantar tenotomy—and the animal recovered in two months. To the present time we have met with no instance, or heard of one, in which such a course is warranted. Having regarded the malady as simply due to want of muscular development, successful issues have always come out of the plan of treatment which has already been recommended. An account of this affection, as first observed by the writer, appeared in the *Veterinary Review*, vol. vi. p. 730, January, 1864.

Sprain or Strain.

By these terms is implied an injury to soft parts, such as muscles, ligament, or tendon, due to violent extension or contraction, sometimes amounting only to inordinate stretching of the fibres, which alters the course of nutrition and sets up an inflamed condition ; in other cases, the sheath only is affected, while the fibres may be ruptured—torn across. In the first instance, the injury may be only very slight, but probably repeated, it entails a loss of function and impairment of nutrition, leading to weakness and want of elasticity, at

length being fairly broken down by rupture; and in the last, violence being great, the whole structure may be at once broken through.

Sprains are caused by falls, slipping downwards or backwards, violent struggles when the animal is bound and cannot be relieved; thus we may have the combined effects of heavy weight suddenly imposed on the limbs, &c., unprepared to meet it, and sudden violent contraction of muscular fibre, the results of which will be a probable tearing of the fibres of either muscle, ligament, or tendon. Ligaments being attached to bones, assisting in the formation of joints, are strained or ruptured by over-extension, flexion, &c.; while tendons are attached to muscles, and by them movement is conducted in distant parts in the contraction of muscles, one of which, or both sometimes, being injured, as affected by the same cause. Swelling, heat, and pain are the general manifestations of sprain of muscles, and when under these conditions they are unable to contract—hence the parts are almost immovable, and resemble an attack of local paralysis. Such states are very undesirable, as being highly prejudicial, and even destructive to the future health of the muscle—as atrophy, or loss of substance, may follow; the fibres are replaced by fat, or the surrounding areolar tissue augments considerably, eventually predominating over the muscular tissues, which are replaced by a mass of white substance, non-contractile and useless.

Treatment of Sprain of Muscle.—Reduce the inflammatory action as quickly as possible, in order to remove or prevent the exudation of plastic material; afford perfect rest and quiet, and use diligent applications of cold and soothing lotions; internally use sedatives, purgatives, and the neutral salts; and when the violence of the action has abated, stimulate the absorbents by mild embrocations, gradually

succeeded by stronger remedies—as blisters. The diet at first should be spare, cooling, and laxative; in the later stages, generous and easily digestible.

Special outlines of treatment, suggested by particular forms of injury, will be given when needed, as the varieties of sprain are taken up.

LAMENESS ARISING FROM PARTICULAR FORMS OF SPRAIN.

Shoulder Lameness.

There are other causes of lameness in the shoulder-joint than mere sprain of muscle, tendon, or ligament. Reference has already been made under Strangles, page 129, to the liability to the formation of abscesses in the glands at the point of the shoulder. When discussing diseases of the liver we stated the tendency to lameness of the shoulder, page 372. Rheumatism and disease of the bones, or articulation, are also occasional causes, with which it is necessary to avoid confusion in deciding upon the cause. The affections we now notice are:—1st. Sprain of the capsular ligament; 2nd. Sprain of scapular and triceps muscles; and 3rd. Sprain of the flexor brachii muscle.

Sprain of the Capsular Ligament.—Sprain, or over-extension of this, the only ligament of the joint, induces inflammation, and by that process thickening as well as wasting of its structure are produced; the process is also communicated to the other structures—as the synovial fringes—giving rise to increased secretion, and the capsule is distended by synovia and the products of inflammation; the bones participate, when the articular cartilage covering the ends, which move on each other, is removed, giving rise to a deposit of calcareous matter, and stiffening of the joint by anchylosis (Fig. 257).

When rheumatism seizes the joint, although cartilaginous layers may be removed, the changes are different to the foregoing; by closing the canals in the bone beneath by osseous material, a hard and white enamel comes to the surface, which is known as eburnation, or the porcelainous deposit (Fig. 276).



FIG. 257.
Anchylosis of Shoulder Joint.

Symptoms.—The most reliable token of shoulder-joint lameness is the dragging of the toe on the ground, while the head and neck are raised, and the efforts are apparent in drawing the whole of the limb at once, and without flexion. Sometimes this action will be modified by swinging the foot round and outwards. Manipulation discloses pain in flexion, extension, or by pressure, and the capsular ligament may be found to be distended. By holding the leg from the ground, and moving it so as to flex or extend the shoulder, even in slight cases, the animal will wince, and in severe instances rear up from pain.

Sprain of the Triceps Muscles.—The situation of these muscles is the triangular space between the scapula behind, and the humerus and elbow, their upper attachments being to the posterior border of the scapula, and the lower to the point of the elbow (Fig. 258). (*See* also Plates XII. and XIII.).

Under violent extension one or more of these muscles are

sprained, giving rise to more or less pain and swelling; while the power of drawing the limb backwards is greatly interfered with. If the observer takes the bridle in his hand, and attempts to back the animal, he will find he is unable to lift the leg, and will draw it flat along the ground, while the movement and action forwards may not be much disturbed.

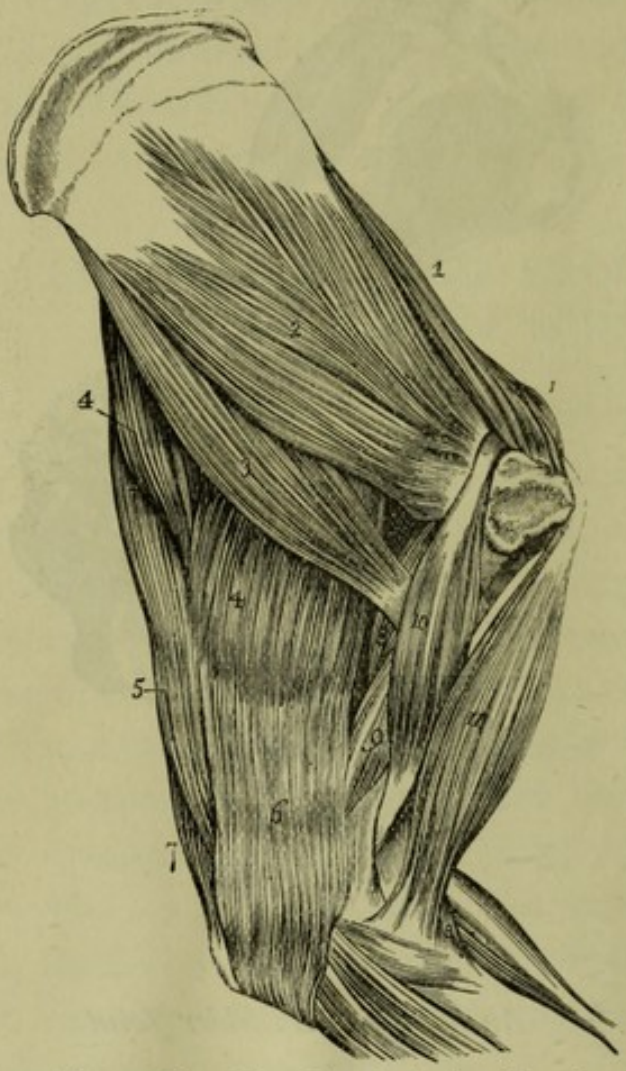


FIG. 258.—*Muscles of the inside of the Scapula.*

1, 1. The antea spinatus.
2. Subscapularis.
3. Teres internus.
4. Caput magnum of triceps extensor pedis.
5. Scapulo-ulnarius.
6. 7. Portions of the caput medium.
8, 8. Humeralis.
9. Caput parvum.
10. Coraco humeralis.
11. Flexor brachii.

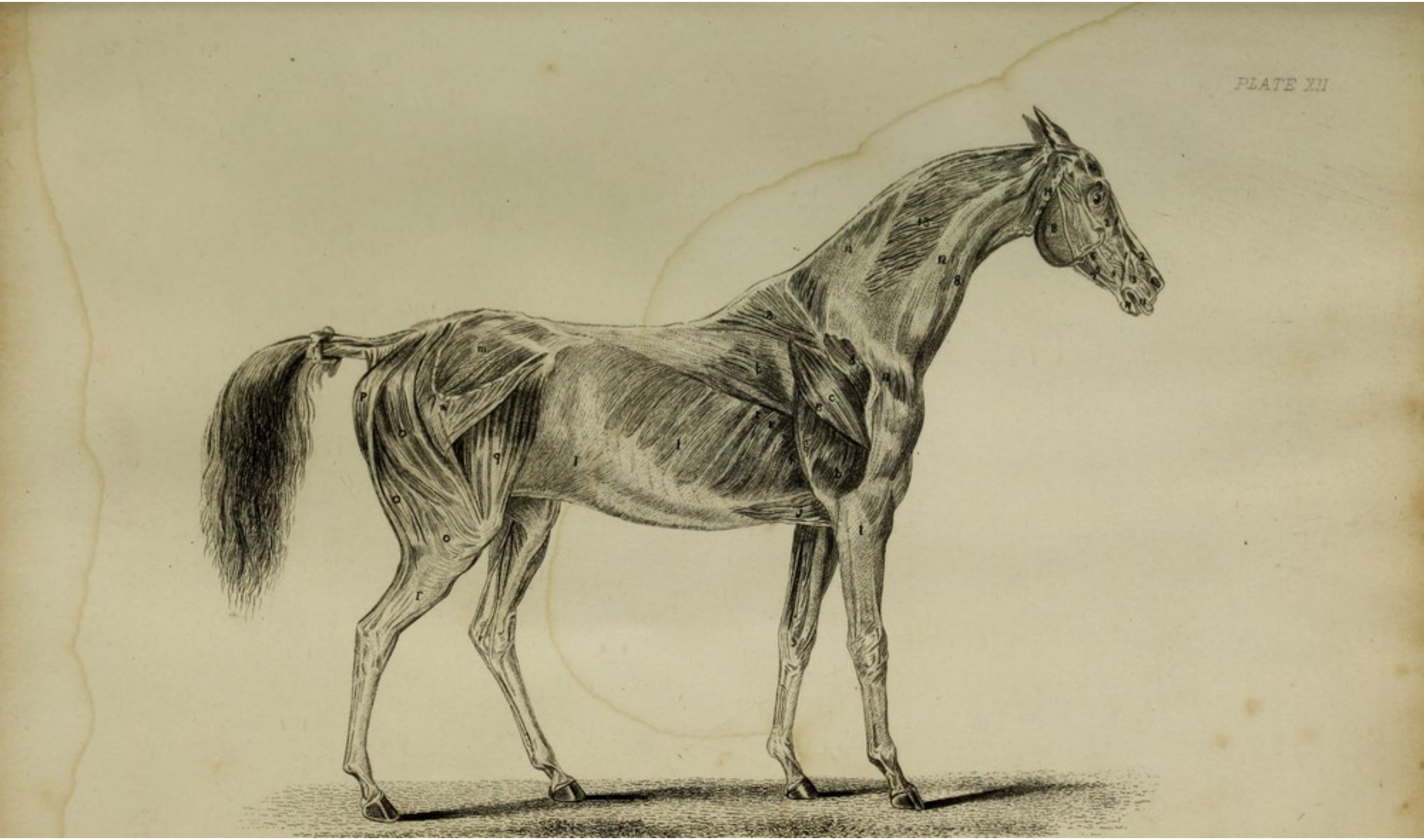
Sprain of the Scapular Muscles, commonly known as Shoulder Slip.—In the absence of ligament, and in order to accommodate the joint to more varied and extensive movements, the bones, the humerus, and scapula (Plate XI., Q and R) are bound together by muscles, the *antea* and *postea spinati*, with the *teres externus* (Fig. 259), the office of which is to maintain the position of the bones during action, as well as perform the act of lifting the leg in progression. Sprain of these muscles at once reduces their power and aptitude for work; and hence the bones roll in and out during movement, while lameness is more or less present.

DESCRIPTION OF PLATE XII.

"THE SUPERFICIAL LAYER OF MUSCLES OF THE HORSE; SHOWN BY REMOVING THE SKIN, AND THE GREATER PART OF THE PANNICULUS CARNOSUS.

"1, Levator anglioris; 2, levator labii superioris; 3, retractor labii superioris; 4, zygomaticus; 5, caninus; 6, buccinator; 7, retractor labii inferioris; 8, 8, the tracheal portion of the panniculus carnosus, which, reflected over the masseter externus muscle, ultimately extends to the mouth, and there forms the retractor anglioris; the portions turned back in the engraving denote whence the thin muscle has been dissected; 9, the orbicularis oculi; 10, the temporalis; 11, 11, the orbicularis oris; 12, 12, 12, the levator humeri, showing the manner it is associated with and acts upon *i*, the fascia covering the fore-leg; 13, the splenius, covered by fascia; 14, the parotid gland and the abductor conchæ; *a*, the trapezius; *b*, the latissimus dorsi; *c*, the postea spinatus; *d*, the antea spinatus; *e*, the teres externus; *f*, the scapula ulnarius; *g*, the caput magnum of the triceps extensor brachii; *h*, the caput medium of the triceps extensor brachii; *j*, the pectoralis magnus; *k*, *k*, *k*, *k*, *k*, the serratus magnus; *l*, *l*, the obliquus externus abdominis and its yellow elastic fascia; *m*, the gluteus maximus; *n*, the gluteus externus, deprived of its fascia, which braces the gluteus maximus; *o*, *o*, *o*, the three heads of the triceps abductor tibialis; *p*, the biceps retractor tibialis; *q*, the tensor vagina; *r*, the fascia of the hind-leg; showing how it is acted upon by the muscles of the haunch."

PLATE XII



The *causes* are due to the irregular kind of work in ploughing, the animal being compelled to walk with one foot in the furrow, and the other outside. Young animals are more commonly affected, older ones having more care of themselves.

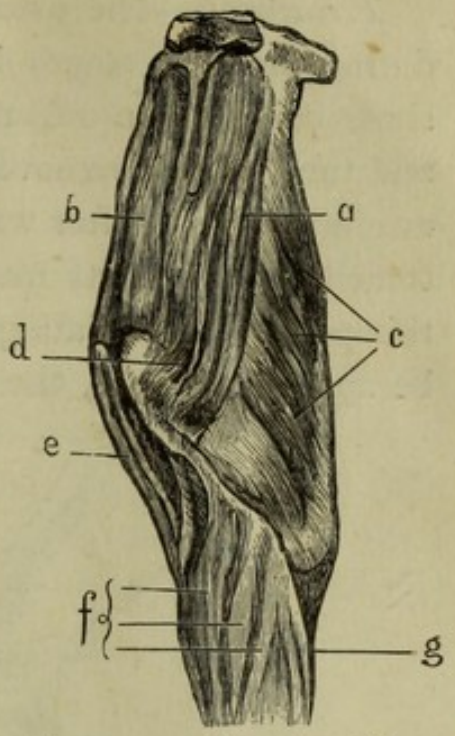


FIG. 259.—*Muscles of the outer side of the Shoulder*

a. Postea spinatus.
b. Antea spinatus.
c. Triceps.
d. Teres externus.
e. Flexor brachii.
f. Extensors of the forearm.
g. Flexors ,, ,,

Symptoms. — Heat, pain, and swelling are prominent symptoms in the early stages over the region of the joint and scapular muscles, but actual lameness may not be fully developed. In later stages the muscles are observed to be wasted, giving the shoulder a lean and sunken appearance. The spine of the scapula (Fig. 239, and Plates XI. and XIII.) is plainly indicated as a sharp ridge, running from above downwards, and from behind forwards, with a decided hollow upon each side. Comparison of the two shoulders at once decides a marked difference when only one is affected, but such a test is of little or no value when both are diseased; indeed, under such circumstances it is probable that the wasting is not confined to the scapular muscles, while those of the arm, or both arm and scapular, are implicated. During action the whole shoulder is relaxed, and the limb is carried with a swing or hanging movement, being elevated with difficulty in proportion as the arm muscles are affected; and during rest, or when the foot is implanted on the ground, and the weight of the body thrown on the limb, the head of the humerus bulges outwards considerably.

Apart from disease of the articulation, tendons of the

muscles and capsular ligament, shoulder-slip is usually manageable.

Treatment.—The usual treatment for local inflammation during the first stages is applicable, with absolute rest, the shoes being taken off, and toes properly shortened ; the heat and tumefaction removed, stimulating liniments or blisters are indicated. After wasting of the muscles has arisen the tonicity of the parts must be restored, if possible ; and for this purpose stimulating embrocations or mild blisters are to be applied at once, the animal being turned off work completely, and confined to a small yard or paddock. Gentle exercise may be given daily after a few weeks have elapsed, the applications being renewed at intervals ; and when the animal has recovered, other work should be found for him.



FIG. 260.—*Deep-seated Muscles inside of the Humerus.*

1. The coraco-humeralis.
2. Humeralis.
3. Flexor brachii.
4. Caput parvum of the triceps extensor brachii.
5. Minimus.

Sprain of the Flexor Brachii (Fig. 260, 3).—This muscle performs an important office in raising the forearm, or flexing it upon the shoulder ; and for the strength required it is greatly mixed up with a quantity of tendinous material, a large, flat, rope-like portion commencing at its insertion in the scapula, and having a cartilagi-

nous surface at the part where it plays over the head of the humerus, as well as being supplied with a synovial sac. In its fleshy part much tendinous substance is intermixed, and its inferior insertion in the radius is also tendinous. Such functions are arduous as well as important ; and the muscle is liable to over-extension or laceration of its fibres, by which it becomes hot, swollen, tender, and prominent in front of the arm. When the articulation is affected the bursa will be inflamed and distended, and the lameness characterised by difficulty in raising the foot from the ground. Sometimes the shoulder-joint is secondarily affected in this form of injury; and in simple disease of the flexor brachii, the terminations may be ossification of the fibres of the superior tendon, ulceration of the cartilage, and caries of the humerus, with probable anchylosis of the joint. The substance of the muscle is liable to degeneration, and substitution of condensed non-contractile tissue for muscular fibre, each of which renders the animal perfectly useless. Farm horses—especially young ones—are liable to this form of injury ; and pit animals are often affected as a consequence of the heavy drawing they are put to, with the necessity of raising the feet over the rails and sheaves, &c., in their way. In farm-horses it mostly appears on the off-side, but among the latter either shoulder may be affected.

Treatment.—The high-heeled shoe should be put on, absolute rest allowed, and measures adopted for the reduction of local inflammation.

Lameness in the Elbow.

Lameness having some connexion with the elbow has been already detailed under the head of fracture of the beak of the olecranon (Fig 241, p. 672), and with rupture of the triceps muscles (Fig. 258, and Plate XIII.), giving rise to a

difficulty of drawing the foot backwards, the knee being elevated, and toe resting on the ground.

The lateral ligaments (Fig. 261) are also liable to sprain, of which the internal is the most commonly affected, when the limb is held away from the body in a state of semi-flexion, the foot resting rather behind the sound one, and



FIG. 261.—*Ligaments of the Elbow-joint (Back View).*
a, a. Lateral ligament.
b, b. Ligament of the ulna.



FIG. 262.—*Anchylosis proceeding in Elbow-joint.*

upon the toe. Lameness is excessive, the limb is moved with difficulty, being literally carried as if in a piece, the animal dropping low on the sound limb. The injury is liable to extend to the joint, inducing inflammation with its train of attendant symptoms, terminating in anchylosis (Fig. 262).

Treatment, as already detailed for sprains.

Emphysema of the Elbow, &c.—Superficial wounds in the neighbourhood of the point of the elbow or point of the olecranon (Fig. 241, Plates XII. and XIII.), are frequently productive of mischief in horses used for the road or field,

consequent upon the great amount of motion of which these parts are capable, and the rapid absorption of air through the orifice, which sometimes inflates the skin, not only in the neighbourhood of the joint, but may extend even to the shoulder, neck, face, and head. We have seen horses return from a run or severe journey, having a wound inflicted by the spur on the part alluded to, and from the pumping action set up in motion the head and throat have been so swollen as to endanger respiration, for which tracheotomy had to be performed as a means of temporary relief. Rest, plugging of the wound, sutures, &c., with puncture and pressure of the skin over the nostrils, in some cases, are the means that are required, as the contained air is rapidly absorbed when all other functions of the body are promoted.

Capped Elbow.

The condition known by this term is common to the heavier breeds of horses, but occasionally others are also rendered unsightly by the gradual appearance of a large and generally spherical-shaped tumour hanging loosely from the back of the point of the elbow (Fig. 263). The causes are pressure derived from the heels of the shoe, as the animal continues to rest with those prominences beneath the elbow. It has been alleged that calkins are the entire cause, but we can affirm that many horses having no calkins on the heels, the shoes being simply flat, have been affected. When the heels are too long, the tumour will be produced equally as if calkins were present, if the animal is prone to rest as we have stated. The production of a tumour depends on the esta-

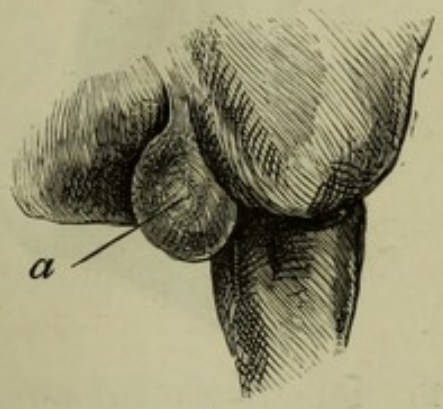


Fig. 263.—*Capped Elbow—a, the tumour.*

blishment of inflammatory action in the subcellular tissue, from which hypertrophy ensues, and to such enlargement a circumbscribed tumour is due. The treatment consists of absolute removal with the knife by simple dissection, and subsequent union of the skin by ordinary sutures. Afterwards, the shoe should be kept as short at the heels as is consistent with natural requirements, and a leather pad should be strapped over them in addition when the animal is confined to the stable.

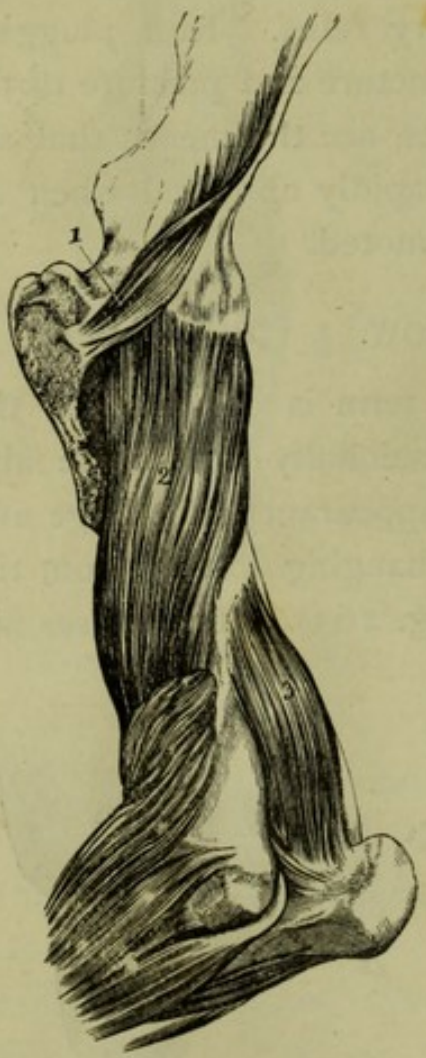


FIG. 264.—*Deepest-seated Muscles at the back of the Humerus.*

1. The scapulo-humeralis major.
2. Humeralis.
3. Anconeus.

Sprain of the Muscles of the Forearm.—Both before and behind the arm are placed powerful muscles, designed to flex or extend the metacarpal bone of the foot. The situation and origin of these will be understood by a reference to Figs. 259, 260, and 264. In front are the extensors pedis—metacarpi—and suffraginis: behind are the antagonists—flexors pedis—and metacarpus; one or all of which—that is, one or the whole of a class, flexors or extensors—may be injured, and they are detected by the loss of function, as well as the local signs of inflammation, the fingers being required to trace out the origin and course of the various muscles. In such kinds of lameness the absence of power of flexing or extending the knee, foot, &c., are the distinctive features, and call for special observation in this particular.

Repeated or excessive injury may terminate in ossification of the tendon of the muscle, or atrophy, with deposition of non-contractile tissue in the fleshy part.

KNEE-JOINT LAMENESS.—Apart from broken knees, which have already been noticed at p. 653, lameness occurs in the knee-joint from sprain of the ligaments and tendons connected with or passing over it. The *radio-carpal ligament*, which passes downwards to become inserted into the tendon of the flexor pedis perforatus, is an occasional seat of lameness, known by an inability to flex the knee, attended with a swelling above the joint, also heat, pain, and tenderness. The synovial bursa through which the tendon passes is also swollen, constituting what is known as thorough-pin of the knee ; and in addition the tendons of both the flexors of the foot are involved, when the swelling, lameness, and stiffness are very great.

Other tendons of the various muscles in their passage over the knee are liable to injury from sprain or blows, giving rise to enlargements, by which the injury is recognised in addition to the impairment of action ; the synovial sheath through which some of these pass are likewise involved in over-extension, when distension by excessive secretion of synovia, constituting at various parts about the knee and fetlock swellings, known as "windgalls," from the ancient and erroneous supposition that wind occupied the interior. Such swellings may be present without lameness, and occasion no inconvenience whatever ; but in recent cases the usual topical manifestations with lameness will be often observed, calling for active local and general treatment.

The tendon of the *extensor metacarpi magnus*, as it passes over the front of the knee, is furnished with a synovial bursa, which under injury of the tendon from sprain or blows, thorns, &c., at this part becomes greatly distended, forming a large fluctuating swelling termed "capped knee," remaining perma-

nently swollen after the lameness has disappeared. Blisters are employed to reduce the swelling, which, when not successful, may be punctured so as to allow the contained fluid to escape, after which bandages are used to produce pressure, and cause adhesion of the walls of the sac.

Sprain of the various ligaments of the knee-joint (Figs 232, 233) gives rise to much diffused swelling, stiffness, and lameness. By continuance and extension of inflammation the joint may be involved, leading to synovitis, and in the end anchylosis (Fig. 234).

In some cases inflammation of the knee may arise from concussion, and, being at first resident in the bones, gives rise to no external signs, as heat or swelling, &c.; but in action the animal proves lame as he is used, coming first out of the stable with slight difference from sound movement. The knee is not flexed extensively, and the step is shorter than usual. Exostosis appears mostly towards the inside of the joint, and affects principally the bones of the lower row with the small metacarpal, and more rarely those of the upper (Figs. 252, 253).

Treatment.—Absolute rest in a loose box, the shoes being removed, and toes shortened to a proper length; purgatives, cooling applications, as a stream of cold water, and general remedies calculated to reduce inflammation of the parts.

Sprain of the Back Sinews.

As the tendon of the flexor pedis perforans passes down the back of the cannon bone of the fore and hind legs, it receives an accessory union of ligaments from the bone itself, known as the posterior metacarpal, or metatarsal ligaments, as the fore or hind limbs respectively are indicated (Fig 265, *c*), and these acting as a check or limit to the extension of the perforans, are the subject of sprain or

rupture of their fibres, giving rise to swelling behind the leg, with heat, pain, and tenderness, while the heels are with difficulty brought to the ground, by reason of the shortening due to exudation within the substance of the ligaments. The thumb being used to press upon the ligament, as the leg is held in one hand, will readily indicate the situation of the injury; and if complicated with sprain of the flexor tendons, *e*, they will be found thickened, swollen, and painful, and in both cases producing stiffness and inability to flex the fetlock-joint, to which is added stiffness of the knee. When the injury is inflicted on the hind-limb, the animal will be observed to kick or throw his leg behind as he raises it from the ground in action, while the fetlock is carried stiffly or straight as a result of the imperfect power of flexing the joint in this form of injury.

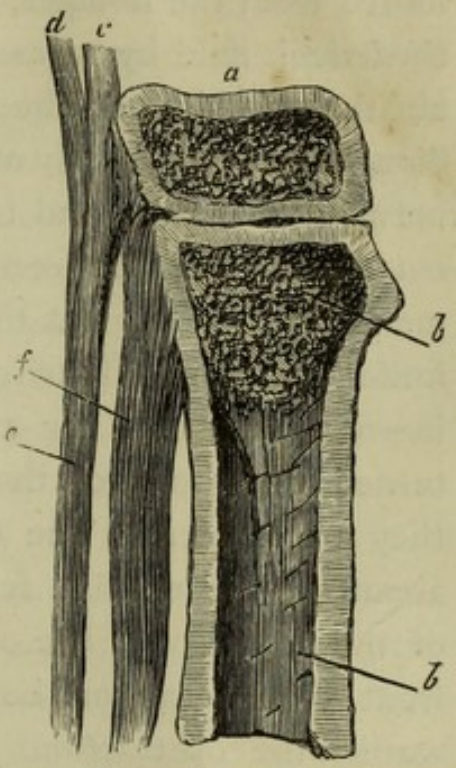


FIG. 265.—*Section of Bones and Ligaments at the Knee-joint.*

a. Os magnum.
b. Large metacarpal or cannon bone.
c. Posterior ligament of the knee, uniting with
d. To form the back sinews, *e*.
f. Suspensory ligament.

Treatment.—Rest; shortening of the toe, and application of a shoe having a high heel to occasion relaxation of the affected structures; cold applications externally, succeeded by blisters; purgatives internally, in the first instance, neutral salts, &c.

In chronic cases, sprain having probably been repeated, or the effects not removed after the first attack, permanent shortening takes place and the animal walks on the toe. In slight cases, and for slow work, the animal may go on very well, but in cases of severe contraction the tendons may be severed, and after reunion a fair or natural action produced.

Tenotomy, or division of the tendons, is thus performed :— The animal is first cast, the lame leg, being on the ground, is loosed from the hobbles, and secured by a rope-strap around the fetlock held by an assistant. A small wound is then made about the middle of the leg on the inner side in a longitudinal direction, directly over the groove or depression formed between the bone and tendons, and the attachment by subcutaneous tissue between the tendons and suspensory ligament also must be cut through as far as the skin below, the knife being used flatwise. A probe-pointed knife is then inserted flatwise as far as the skin on the lower side, then turned edge towards the tendons, when by gradual cutting they are divided. The existence of old-standing adhesions about the tendons and fetlock-joint may prevent straightening of the limb, but if the operator places his knee against the front of the cannon bone, and by pulling at the foot forwards, the obstructions will be broken down. Only one skin wound is necessary ; two orifices render the recovery tardy and awkward. Union of the lips is secured by sutures, and cold water bandages may be applied afterwards, or the antiseptic treatment followed. The animal may be placed in slings, and the head tied up, the feet being divested of shoes, and hoofs trimmed to proper proportions. By degrees the animal brings the heels to the ground and bears weight upon the foot, and union is usually effected in two months, or thereabouts, sufficiently to enable the animal to go to ordinary work. Such an operation is generally successful in the fore-leg, but there are instances where excessive contraction of the deposit thrown out between the divided ends of the tendons renders the case a failure ; in the hind-legs this disappointing issue is more common, the animal still walking on the toe with heels suspended, for which a small lever is usually welded on the toe of the shoe and to prevent knuckling over at the fetlock-joint.

Sprain of the Suspensory Ligament.

The important functions of this ligament render it an exceedingly powerful agency in maintaining the firm and erect condition of the leg when the animal is at rest upon it; it is placed in a position where it must sustain great weight and ward off shock from other parts, and under severe extension it is therefore liable to injury, varying from a simple stretching to complete rupture.

What we have just written, together with that which follows, will be more intelligible to the reader if we briefly illustrate its anatomical situation. The suspensory ligament is attached above to the upper and back part of the head of the cannon bone (Fig. 265), where it exists as a strong and broad flat band of white fibrous tissue, erroneously said by some to be elastic; and is continued downwards, lying in the hollow formed by the small cannon or metacarpal bones of each side; when at a point a little above the fetlock-joint it bifurcates, or splits into two portions, each becoming inserted into one of the sesamoid bones (Fig. 266), and,

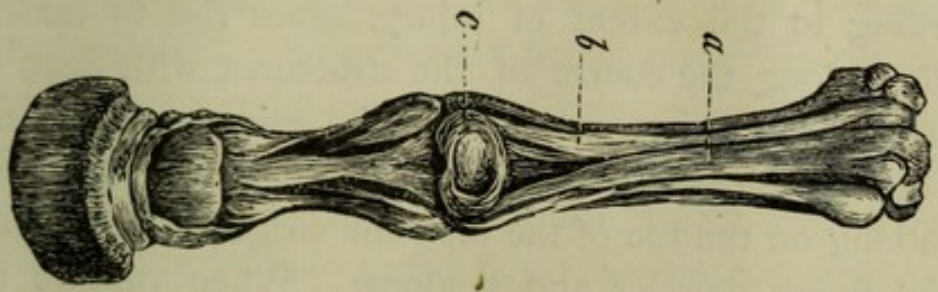


Fig. 265.—*Ligaments at the back of the Leg, from the Knee downwards.*

a. Suspensory ligament.
b. Point of bifurcation, each branch going to the sesamoid bones, *c*, covered by the pad.

passing downwards, is continued as a smaller band of fibres round to the front of the pastern bone, where it unites on each side with the tendon of the extensor pedis (Plates XII. and XIII.).

The function of this ligament is at once understood by a simple test practised on the leg of the dead animal. Let

the foot be planted in the natural position on a flat surface, the limb being kept upright and some pressure exerted upon it, and, while in this position, divide the flexor tendons about half way down the cannon bone. The effect is that of allowing the pad of the fetlock-joint behind to descend a little way only, proving their office to be decidedly apart from actual weight-bearing ; next, divide the suspensory ligament, and the fetlock comes at once to the ground, the toe turns upwards exposing the sole, accurately displaying the condition known as "break-down," and the weight-bearing office of the ligament ; it performs a function which muscles could not do for long periods together without great waste and damage ; it relieves the leg of severe strain and weight, and by supporting the fetlock in a curved position, neutralises shock and concussion, which deal out such mischief to the column of bones as well as the delicate structures of the joints ; while it affords a springing or elastic motion to the limb, giving that grace and elegance to the step of the animal, and renders the seat in the saddle easy and agreeable to the horseman.

Sprain, or simple extension of the suspensory ligament, according to the extent of injury, gives rise to lameness, swelling along the course of the structures, with heat, pain, and tenderness on pressure ; while the animal endeavours to give ease to the part by flexing the fetlock-joint, and resting or walking on the toe of the foot, the weight being sustained by the flexor muscles and tendons. When rupture takes place, it may occur at the broad part above the bifurcation, across one or both of the branches ; or it may be torn direct from one or both of its attachments at the sesamoid bones. Wherever the tendon is ruptured the effects are the same ; the fetlock descends to the ground, the toe pointing upwards and the sole forwards. As the ligament is common to fore and hind legs, any one of them may be the seat of lameness. As a rule, hunters and race-horses are most liable to it as arising in the fore-limbs, while other animals

of the heavier breeds, and especially those put to drawing heavy loads, exhibit it in the hind-legs.

Under all circumstances, the injury is to be regarded as one of a very serious nature, requiring a long and absolute rest ; but, under appropriate remedies, at length recovering so as to allow the animal to perform reasonable kinds of work for a long term of years, evidences of the injury being prominently exhibited in permanent thickening or enlargement of the course of the ligament, together with an evident weakness, for which the animal should have every consideration.

Treatment.—For simple sprain the usual measures are required—as cold applications externally, with purgatives or the neutral salts, &c., internally ; and, as an additional aid, a high-heeled shoe should be applied. In complete break-down the chief object is to fix the leg in a firm and erect position, and so far promote the apposition of the divided ends of the ligament for future union. For this purpose the practitioner must adopt one or any of the various plans by which he may have greatest hope of success. Several have been attended with like benefit. 1. Tow, rolled into pads, by which the fetlock is propped up, being placed in the hollow of the heel, and maintained by bandages. 2. Tow, saturated in starch, and packed well under the fetlock, also sustained by firm bandages, similarly treated and bound over the whole limb above the knee. 3. Gutta-percha moulds, with similar packing with soft tow, and dry bandages over the whole. These moulds are first adapted to the sound limb, by which the required shape will be nearly obtained, and after being again softened in warm water are applied to the affected leg when raised to the proper position. 4. A wooden mould, or splint, made to fit the back of the leg, and as well as filling up the hollow behind the heel, rests on the ground and gives support to the fetlock pad, packing with soft tow being largely used, and bandages bound over the whole.

It is advisable, in almost every case, to place the animal in slings, but if he be disposed to take care of the leg he may be allowed to lie. Extreme swelling must be provided for in the mode of putting on the bandages, and internal remedies given as required for the reduction of fever. When the animal can bear his weight, and the parts are becoming cool, moderate blisters may be applied at intervals.

Sprain of the Fetlock-joint.

This form of injury is usually confined at first to one of the lateral ligaments, but by continuance, aggravation, and extension the synovial membrane becomes involved, giving rise to inability to flex or bend the joint, or maintain the weight of the body. The animal hesitates to put the foot to the ground; and, after several attempts, finally carries the limb, and hops on three legs. Heat, pain, and tenderness on manipulation, in a marked degree, are characteristics of the injury.

Treatment.—Perfect rest, cooling applications externally; purgatives, sedatives, &c., internally. When the active signs are subdued, stimulating embrocations, or mild blisters may be used; afterwards, gentle work for some months.

Sesamoiditis.—This term is applied to an inflammation of the bursa, or synovial sheath, which is formed at the back of the sesamoid bones (Fig. 266, *c*), and through which the flexor tendons pass, playing over the prominence after the manner of a rope over a pulley. Sprain of the sesamoid ligaments above or at the side, or partial rupture of the branches of the suspensory at their insertions, may give rise to it by extension. The hind-legs are more commonly affected than the fore. The horse goes on the toe, and exhibits great lameness; the fetlock is often swollen considerably at the back, especially over the bursa and pad, and the synovial capsule is distended, hot, tense, and hard; a

common windgall being soft, flabby, cool, fluctuating, and having no tenderness. This form of lameness is liable to recur, especially if it has been the seat of the rheumatic form of inflammation.

The *treatment* for this is the same as given for the fetlock-joint, with the addition of the use of a high-heeled shoe, or suitable preparation of the hoof in lieu of it.

RINGBONES.

Repeated and long-continued inflammation of the ligamentous structures of the fetlock-joint, as in other similar parts, often terminates in a local or diffuse inflammation of bone, manifested by gradual but irregular form of enlargement from exostosis or osteophytes, known as ringbones, from their tendency to encircle the phalanges. Ringbones are *true* or *false*. *False ringbones* are merely exostoses of the upper and external prominences of the pastern bone—*os suffraginis*. These seldom interfere with important parts, and occasion no lameness, but when very large they may call for treatment.

True ringbone appears in two forms: one, termed the *high*, involves the pastern, and even the fetlock-joint also (Fig. 267); the other, the *low* form, affects the small pastern and coffin bone (Fig. 268). As already explained, they are the result of ostitis, or inflammation of the bones, involving the articulations, and giving rise to anchylosis. The causes are—extension of inflammation from other diseased structures, blows, concussion, &c., &c. Signs of lameness usually precede the visible formation of exostosis; and from the great peculiarity in the gait of the animal it is likely to be confounded with that produced by laminitis—sandcrack, seedy-toe, coronitis, &c.; the fore-foot is brought cautiously to the ground, the heels being the first to approximate; the hind-foot, on the contrary, being put down toe first. The charac-

teristic heat and pain above the foot will distinguish this kind of injury from those we have named.

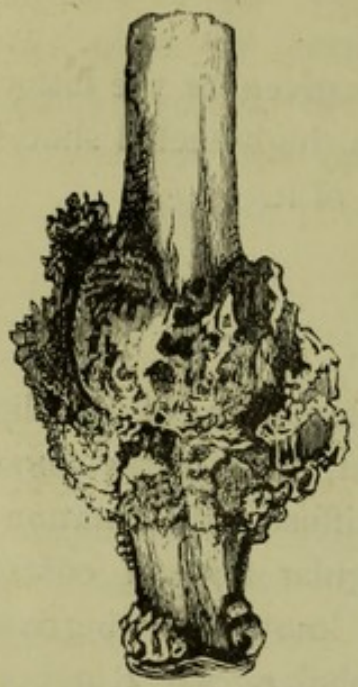


FIG. 267.—*Upper Ringbone.*



FIG. 268.—*Lower Ringbone, also showing ossification of lateral cartilages.*

The tendency to ringbone is often hereditary, and the condition may be the result of the rheumatic form of inflammation. We have before us the particulars of an illustrative case, out of many, of the hereditary nature of the disease:—A fine Suffolk mare, owned by a friend, showed signs of ringbones when quite young. She bred foals regularly for six years, by different horses, and every one have been subject to these formations before arriving at two years old. The dam of the mare had ringbones.

Peculiarity of formation of the limb may predispose animals to the disease; those having upright pasterns and stilty action being most common victims, as a result of concussion. Long pasterns and springy action are more rarely associated with ringbones; and when they arise in such formations, the causes may be sought for in sprain of ligament, &c.

Treatment.—Externally, cold water in a continued stream, cold lotions, &c. ; internally, purgatives, sedatives, neutral salts, &c. ; lower the toe of the fore-feet, and put on a thin-heeled shoe ; for the hind-feet, raise the heels of the shoe, and in all cases allow absolute rest on a floor covered with a layer of sawdust, chaff, &c Horses thus affected are rarely fit to do other than work on the land.

Lameness in the Hip-joint.

Among a variety of conditions which give rise to lameness in this region, the most common is sprain of the tendons of the large muscle of the haunch—the *gluteus maximus*—which are inserted in the large tuberosity termed the *trochanter major* (Fig. 248, *a*), and ridge immediately below. Pain, swelling, and inflammation of the tendon and synovial bursa are prominent symptoms, and are readily made out by comparing the hips. In slight cases the animal stands on the foot, but in others he holds it in a semiflexed condition ; as he walks, or trots, the toe may be dragged on the ground, and the whole haunch carried as if one rigid piece. Wasting of the muscles proceeds, after a time, giving the haunch a hollow or flattened appearance ; and disease of the great trochanter may ensue, as a result of the inflammation, or of falls, inflicting injury direct upon the part.

In the hip-joint itself the ligamentum teres, though rarely, may be lacerated, giving rise to inflammation and ulceration of the articular cartilage of both femur and acetabulum, with further extreme results, as suppuration in the cavity. Young animals are liable to a scrofulous form of disease, also producing suppuration of the joint ; and older animals are susceptible of rheumatism, giving rise to ulceration and subsequent eburnation. Anchylosis does not often occur at this joint, but, in rare and extreme cases, loss of the

ligamentum teres takes place, and the cavity is more or less filled with bony deposit.

Treatment.—Sprain of the tendons of the muscle of the haunch should be treated early, in order to avoid those structural changes we have described, and must also be of the usual kind, local and general. The foot should be dressed to natural proportions; a shoe, having high heels, put on; absolute rest allowed for some time; and blisters applied to the surface, after the active signs are reduced. As the lameness is apt to recur in horses doing heavy work, the treatment must be at first decisive; and the owner must not be in too great a hurry to put the animal to work.

Lameness in the Stifle-joint.

This is the joint immediately below the hip, and corresponds to the knee of man (Fig. 269). It is formed by the femur above and tibia below, having the patella, or knee-cap, in front; and interposed between the first and second are two fibro-cartilaginous discs, known as the semilunar cartilages—double convex bodies—which complete the articular surfaces (Fig. 270). The whole are united by several ligaments, and these, being liable to sprain, often give rise to lengthened inflammation, ulceration, and finally anchylosis of the joint. Two joints are formed by the three bones—one, the true stifle-joint, by the femur and tibia; the other, by the patella and the femur; and as disease may be confined to one of these, the signs are somewhat modified. When the true stifle-joint is affected, the leg throughout is held, when at rest, in a flexed condition, the toe resting on the ground; but as soon as the sufferer moves the limb it is quickly extended and rigid; at each step the heels first touch the ground, the body being elevated greatly, as the weight is carried over the limb. When the minor joint is

diseased, the limb, as in the preceding case, is held, during rest, in a state of semiflexion ; in movement, the toe drags



FIG. 269.—*Stifle-Joint (Back View).*

a. Patella. *c*. Fibula.
b. Femur. *d*. Tibia.

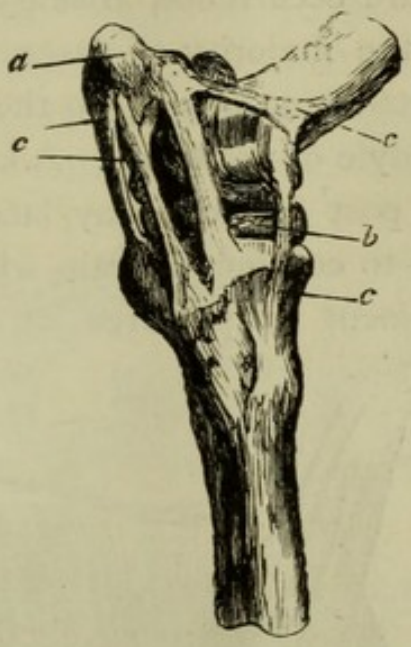


FIG. 270.—*Stifle-Joint (Front View).*

a. Patella, or knee-cap.
b. Semilunar cartilages.
c. Ligaments.

on the ground, or is carried round in a swinging form ; and in the worst cases—probably from extension of the disease—the action assumes the form last described. Swelling, acute irritative fever, and intense pain, sometimes mark these cases, from which the animal dies, or has to be destroyed ; when laceration of the ligaments, ulceration of cartilage, destruction of the cartilaginous discs, ostitis, &c., are visible on dissection, together with rapid progress towards anchylosis. In old horses it is not uncommon to find eburnation of this joint, the existence of which may have been suspected by the enlarged condition of the synovial capsule during life.

Treatment.—Cold applications and active internal re-

medies, applied early—as already detailed—and succeeded by blisters, or the actual cautery.

Luxation of the Patella.

Displacement of the patella, or knee-cap, is by no means a rare occurrence, arising from several causes. Dislocation in the majority of cases takes place outwardly, being prevented from passing to the inner side by reason of the larger condyle of the femur. A kick, or blow, as effected by striking the post of a doorway, laceration of ligament, and relaxation due to continued strain which ensues from weakness, or confinement to pastures on steep hill-sides, are the common causes. The situation of the patella, held by its proper ligaments, will be understood by a reference to Fig. 270. In addition, powerful muscles are brought into requisition, for not only are they required to assist in the varied functions of movement, progression, &c., but contribute largely towards keeping the bones in their proper position. In connexion with this joint the muscles are large, and having their superior attachment to the pelvic bones, are continued below to the femur and tibia, a large mass,



Fig. 271.—*The Inside of the Thigh.*

1. The vastus internus.
2. The sartorius.
3. The gracilis.
4. The caput magnum of the triceps adductor temoris.
5. The biceps rotator tibialis.
6. The recti, attached to the patella.
7. The femoral artery.

known as the recti, being fixed in the upper part of the patella (Fig. 271). In common therefore with ligaments, these muscles are liable to suffer from continued strain and tension, and their functions are less ably performed, and at such times very likely to become over-stretched or lacerated, when displacement of parts may follow.

Symptoms.—Inability to draw the limb forward, and complete the usual flexion of the stifle-joint. As the animal attempts to move forwards, the leg shoots straight out backwards (Fig. 272), the fetlock is unduly contracted, and in

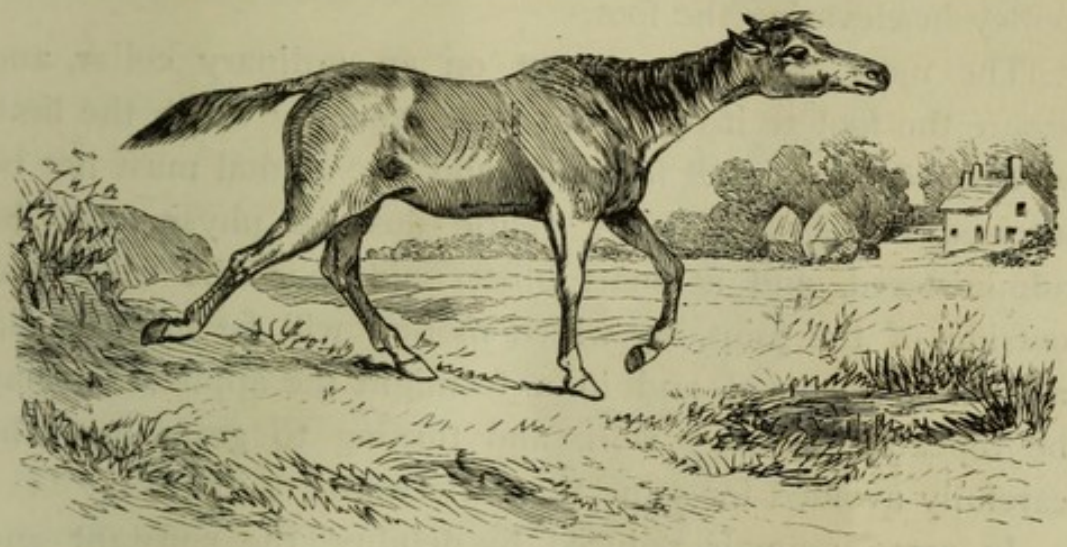


FIG. 272.—*Dislocation of Patella.*

attempting to bring the limb forwards the muscles of the haunch are brought into active co-operation, by which the side of the body is forcibly lifted up, when the patella may fly into its natural position, emitting a sharp clicking sound, and the limb is then planted. Dislocation, however, again takes place as soon as the actual weight is placed on the limb, and it flies backwards in the next act of progression. Where displacement arises from a blow, &c., repeated voluntary reduction is not so common as in those cases attended with debility or laceration of the parts, and the animal fails to bring the limb into a natural state of flexion.

Treatment.—Reduction must first be accomplished, which

is attempted as follows:—Place a trusty assistant at the head, who must not allow the animal to move from the spot. Secure the fetlock, or pastern, of the affected side by means of the loop of a rope, which is passed between the fore-legs and held by two or three strong men. The operator stations himself at the side, and, with hands on the dislocated bone, directs the men to pull steadily at the rope, to elevate the foot as high as the abdomen, when, by forcible pressure, the patella slips into place. Some practitioners find it advantageous to throw the foot-rope over a beam or pulley in elevating the foot.

The next course is to put on an ordinary collar, and secure the foot to it by means of a rope, by which the limb will be kept extended forwards, and the animal must not be allowed to lie down. A gentle dose of physic may be administered, and a smart blister laid upon the front and outside of the joint, by which motion will be limited and reparation hastened, and in a fortnight the application may be repeated. Heavy work and turning to grass must be carefully avoided for some time afterwards.

In some animals reduced by debility, the constant and alternate luxation of the patellæ is very annoying; we have noticed this frequently, recovery from the first being but scarcely effected when the bone of the opposite side has become displaced. Besides the foregoing treatment, the practitioner may deem it necessary to recommend less severe work, and the addition of peas or beans to the food.

Flexor Metatarsi.—By reference to the accompanying engraving (Fig. 273), the reader will observe this muscle has an origin by tendon with the extensor pedis (3 and 4), at the lower end of the femur, as well as to the outer side of the tibia, being inserted below in the head of the metatarsal bone. Its office is that of raising the leg upwards and forwards.

Laceration of the fibres of this muscle, or its tendon, occurs now and then, giving rise to enlargement in front of the leg—heat, pain, and soreness also being present in proportion to the extent of the injury; and a conspicuous sign is also frequently added, that of sudden drawing up of the limb in movement, throwing it backwards in a rigid state, when the skin above the point over the hock is corrugated. The loss of function in the flexor metatarsi muscle is evident in the extreme action of the antagonistic muscles—the extensors of the leg—which render it perfectly straight and immovable. Some cases are remarkable for the existence of chronic disease in the fibres of this muscle, giving way to degeneration and loss of substance, when at length in sudden action it gives way, and the consequences are as described.

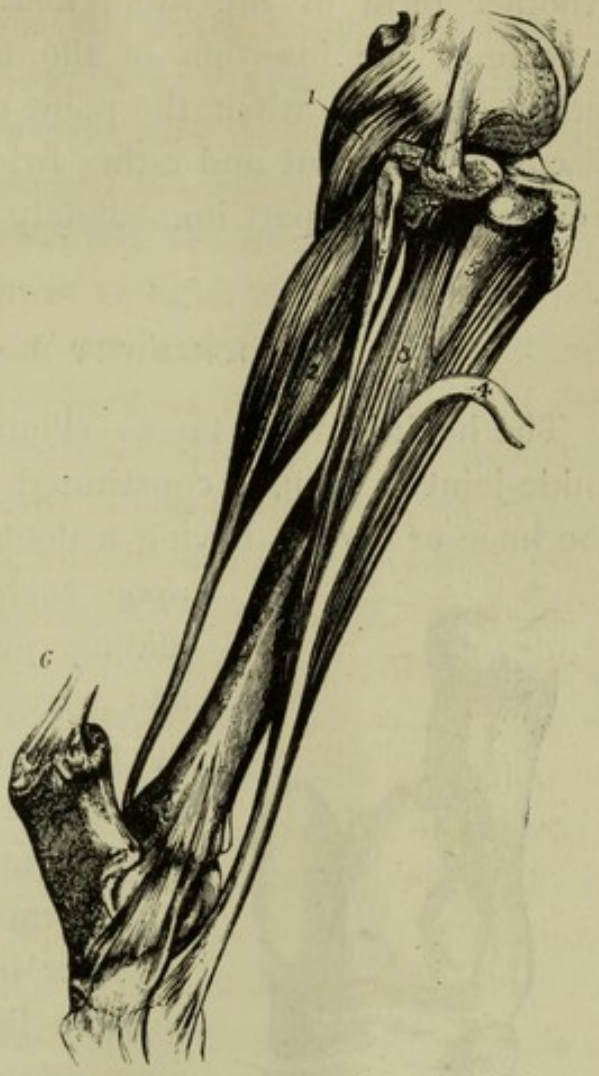


FIG. 273.—*Outside of the Hind Leg, nearly deprived of Muscles.*

The region here displayed extends from the stifle above to the hock below.

1. Popliteus.
2. Flexor pedis accessorius.
3. Flexor metatarsi magnus.
4. The tendon common both to the flexor metatarsi and extensor pedis.
5. The groove in which the extensor pedis played.
6. Tendon of the gastrocnemius, or ham-string.

Treatment.—Recent cases, in young and valuable animals, make good progress under the application of cooling remedies and internal medicines, followed by blisters, &c.;

but in old animals, in which degeneration of tissue has in all probability taken place, the prospects are very uncertain. Another form of the same kind of lameness arises from rupture of the insertion of the tendon in the head of the metatarsal bone, when the point of tumefaction, &c., will be discovered in front and rather below the hock, instead of the front and fleshy part immediately below the stifle.

Hock-joint Lameness.

The hock-joint, or tarsus (Plate XI.), the analogue of the ankle-joint in man, is constituted after the same character as the knee or carpus, having a double row of small bones, one upon each other (Fig. 274), forming gliding joints with limited motion; and a large hinge-joint above, formed by the tibia and main bone of the hock—the astragalus—in which the greatest movement of the hock-joint is performed. The whole are bound together in a remarkable manner by suitable ligaments, and supplied by appropriate lubricating apparatus, by which the most perfect mechanism and adaptability for motion are secured. Like other joints of importance, in form, position, and function the hock enjoys no immunity from strain and injury under severe displays of power; and, however perfect in symmetry, through the various arts and devices of man, the order of Nature is often egregiously opposed or interfered with, and the result is various forms of disease. The hock is liable to severe sprain

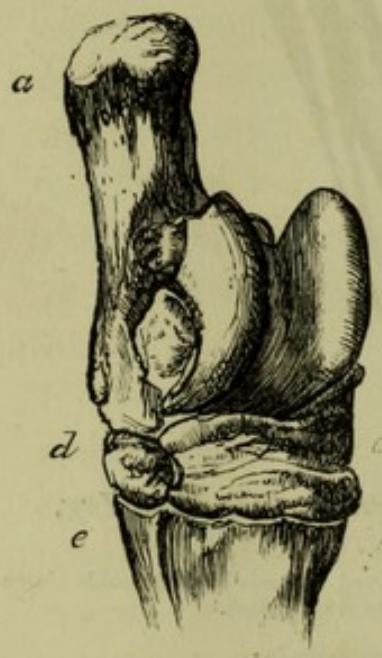


Fig. 274.
The Hock Joint.

a. Os calcis.
b. Astragalus.
c. Cuneiformis.
d. Cuboid.
e, Small metacarpal.
f. Large ,,

of its ligaments, and disease of the articulations, as well as fracture of the bones, to which reference has already been made. Severe sprain of the ligaments is apt to result in such inflammation that they are replaced by osseous material, besides the tendency to involve the whole or part of the joint in the same process ; but apart from sprain, the articulations may primarily become the seat of inflammatory action, each of these giving rise to signs of a special nature.

Simple inflammation of the hock-joint is known by great lameness, diffused swelling, heat, pain, and tenderness of the part, with more or less symptomatic fever. The synovial capsule is distended, and forms a hard, tense tumour on the inner aspect of the joint, a condition which has been long known by the name of "bog-spavin" (Fig. 277). Such may be caused by kicks, blows, or puncture of the bones by sharp instruments. Sprain of the ligaments may arise in any animal from inordinate work, no matter how good the formation of the joint may be ; but those in which defective formations exist—as "sickle hocks ;" having a short *os calcis* (Fig. 274, *a*) ; weak cannon bone below the hocks, giving the appearance of being "tied in" at that point, and causing the legs to be small and round instead of flat—are very liable to sprain. Another form of hock consists of a short os calcis, with general deficiency of surface for ligamentous accommodation, while the joint is straight, and far under the body ; the pasterns are also straight, and the action becomes stilty, by which a great amount of concussion is communicated to the bones, and from it the whole of the hock suffers greatly, being first indicated by mild or chronic inflammation of the bones and articulations, more particularly the lower, and towards the inner side, as representing the line through which weight or concussion is transmitted. At this part the disease is made known by a gradual hard swelling (Fig. 275), which proves to be an exostosis, or bony deposit, the result of

ostitis, eventually becoming so large as to involve the bones of the two rows, and uniting them as one, seen prominently from the side of the animal as he stands, and forming the characteristic tumour commonly known as a "spavin"—a "bone-spavin," in contradistinction to the bursal distension, "bog-spavin."

Simple, or common inflammation of the hock, as in all cases

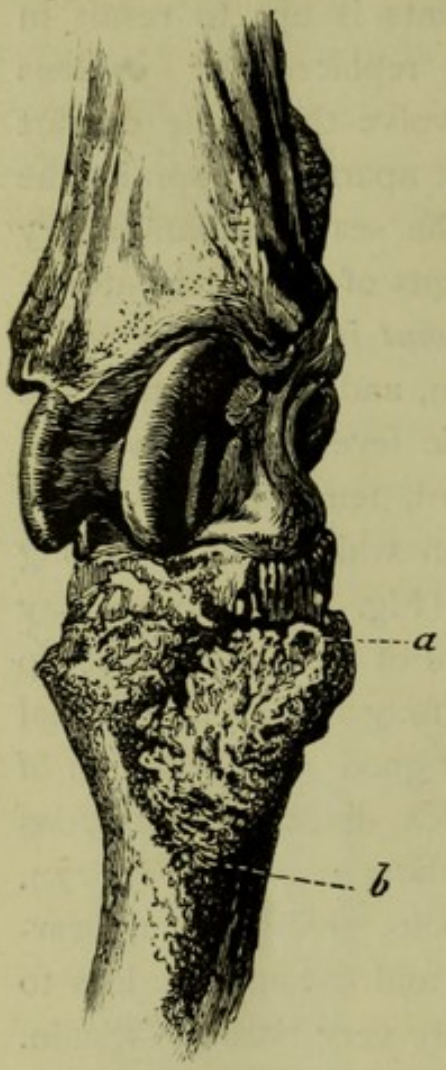


FIG 275.—*Bone Spavin—The bony tumour extends from a to b.*



FIG. 276.—*Eburnation of the Astragalus, a a.*

of similar joint disease, destroys the articular cartilage, and ends in uniting the bones composing each row, as well as by formation of outer deposit; and this process may be seen sometimes in some horses going on without any evidence of external deformity, giving rise to severe lameness—the "occult lameness" of the hock of earlier writers—the animal in first starting off catching up the leg as in "stringhalt," and throwing it outwards forcibly and suddenly. In taking up the lame limb of animals thus affected, we have known

the shoeing smith, or other person making the examination, and being ignorant of the affection, violently knocked down by the animal from this peculiarity in the mode of raising the limb, an effect doubtless due to the extreme pain arising from motion instituted between bones rendered acutely sensitive by continued inflammation.

Such chronic form of inflammation may also give rise to a solidification of the articular surfaces, by removal of cartilage, and replacing it by the ivory or porcelainous deposit, generally termed eburnation (Fig. 276). The articulations of the astragalus and tibia are the most frequent localities of this condition, which is characterised by a dense, hard, enamel-like surface, and exhibiting a profound contrast to that of the cartilage surrounding it. When this condition is present the increase of synovia is great, and by it the capsule of the joint is distended, forming the large fluctuating yet tense tumour, already described as "bog-spavin," the difference in the two instances being—the first is the acute form, that just described the chronic, and, unlike the first, not associated with heat, pain, or lameness. This chronic variety is a common result of rheumatic forms of inflammation.

Blood spavin. so called, consists of distension of the vena saphena vein as it passes over the inner side of the hock, arising from some obstruction to the flow of blood, such as pressure, the deformity of diseased bones and bursal cavities being the probable cause. Occasionally the vein is varicose.

Diseases of the hock are by no means uniformly present in both, and even when they are diseased there is generally such a disparity in form and size of the tumour, &c., that the precise spot is readily detected by the practised eye, and manual examination tends to confirm the conclusion. It is quite common to find horses having odd hocks—that is, having a peculiarity of formation confined to one of the inner or outer sides, yet showing no lameness or impediment

to motion ; and others exhibit a coarseness or irregularity of formation in both, which is often ascribed to spavin. Many instances of these come under the notice of the veterinarian in the course of a lifelong practice, and there is no difficulty in showing that the difference of formation in one joint may be due to previous periosteal inflammation, existing probably during the remote period of foalhood, which has firmly locked the small bones of the hock together, and so set aside the possibility of lameness ; coarseness of the hocks alone being doubtless due entirely to an absence of symmetry.

Bone-spavins in young horses rarely produce the incurable or protracted forms of lameness which are due to the presence of spavin in the old animal. In the first, the cause is more likely to produce a vigorous inflammation between the bones as well as upon their outer edges, and union by anchylosis is soon complete, thereby destroying the chances of lameness ; in aged horses, on the other hand, concussion plays an important part, often aggravated by absurd forms of shoeing ; and an external or periosteal inflammation is the result, giving rise to the form of catching lameness alluded to under simple or common inflammation of the hock, usually chronic, and therefore not capable of producing perfect union, but allowing a partial motion, in which roughened and sore surfaces are continually brought into close apposition by pressure. The wearing away of the toe of the shoe on the affected side is a certain sign of spavin. Such cases are often tedious and harassing, the lameness being constant, notwithstanding the activity of the measures adopted, blisters, firing, &c., alike proving abortive ; indeed, we have often seen cases in which blisters have largely augmented the external deposit without diminishing the lameness one atom. Experience in these phenomena has led practitioners to abandon both blisters and the actual cautery, substituting the cold

punch, by which the cancellated structure of the bone is pierced and internal inflammation set up, causing union of the bones. Others have performed pyro-puncture with like success.

The *cure* of a bone-spavin depends upon effecting a union between the bones of the lower rows when confined to them; but when exostosis involves the astragalus the chances are against possibility of union, and therefore the lameness exists. The same remark also applies, but with extreme force, to the astragalo-tibial articulation, for proportionate with the range of motion there exists a tendency to irritation, and exostosis may largely increase; but union will not, or cannot, take place.

Whatever may be urged against the barbarous nature of the operation of firing, it is impossible to reason away the simple fact that no other remedy has proved so successful in the cure of diseases of the joints in horses; not by contracting the skin, as erroneously supposed and hitherto taught, and thus acting as a permanent bandage in supporting the parts, nor yet by the amount of suppuration induced by the violence of the process; but simply by the power of inducing a healthy healing action in the parts where the contrary has existed, and led to the destruction of them. Firing often succeeds where blisters only irritate, inflame, thicken, enlarge, and eventually fail; the heated iron is a severe remedy, but we think only justly so as an appropriate means of counteracting very severe conditions. Some object to firing, on account of the blemish induced; but, reasoning on the subject a moment, we are led to the conclusion that the existence of malformation and acute lameness from disease is an awkward blemish also, the worse of the two we leave the reader to determine.

After firing, horses require a long rest—say of six weeks or two months; and instead of turning to grass, we would

commend the use of a loose box, a dry yard or paddock, with a daily allowance of sound oats along with roots, green food, &c., by which the condition will be greatly maintained and the healing process promoted, the animal being more rapidly fitted for work. We have often regarded the practice of turning to grass, so frequently resorted to almost for every ailment in working horses, with great regret ; animals in first-class condition, deprived of good sound food, and weakened by medicines and treatment generally—the trouble and expense of months literally thrown away—when brought up to work are as weak as babies, having lost all the strength and aptitude for it, and requiring months before they are equally developed as before.

Blistering ointment is generally applied over the fired surfaces, and to prevent the animal biting them the cradles should be put over the neck. On the day following, warm water may be thrown by the hand from a pail, so as to saturate the cauterised surfaces, and on the third day they may be dressed with the following application :—

RECIPE NO. 164.

LEAD LINIMENT.

Take of olive oil	½ pint.
Goulard's extract.....	½ oz.

Mix, and agitate until the fluid becomes thick and creamy, and apply by means of a soft brush daily, which will have the effect of giving ease to the parts, promoting suppuration and keeping the parts clean, avoiding the accumulation of incrustations, and preventing the burrowing of matter.

THOROUGH PIN.

An enlargement of synovial bursa, situated on the upper side of the hock, visible on both outer and inner surfaces, and between the point, os calcis and thigh bone—tibia—is

known by this name (Fig. 277). The tendon of the flexor pedis perforans muscle, as it glides over the os calcis in a groove specially designed for it (Fig. 273), is provided with a synovial sheath, and sprain of that tendon or the walls of the bursa at that point, results in inflammation, and of course distension of the synovial sac. Pressure on one side only has the effect of causing movement on the opposite, and erroneous judgment of preceding ages led to the belief that the occurrence was due to a solid body or pin passing from one side to the other. From anatomical peculiarities, this sheath may receive a supply of synovia from "bog-spavin," but not in the contrary direction; therefore, when bog-spavin exists, there is great liability for "thorough pin" to be present also, but the existence of the last does not insure the existence of "bog-spavin." Short and straight hocks are the common subjects of "thorough pin," more particularly when the horses are employed in heavy work or exertion.

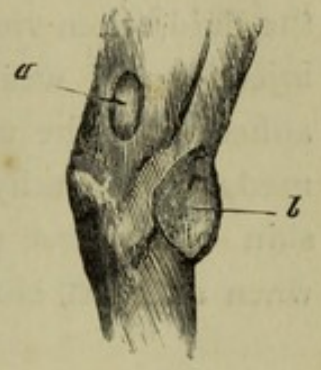


FIG. 277.
Thorough Pin, a, and Bog-Spavin, b.

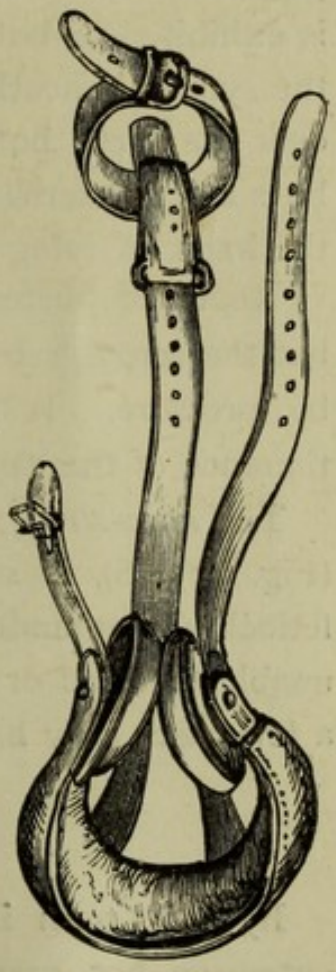


FIG. 278.
Broad's Truss for Thorough Pin.

Treatment of these cases is of various kinds. Mr. Broad, of Bath, recommends the use of a truss, which he designed for the purpose of producing pressure and ultimately adhesion of the walls of the bursa (Fig. 278). Setons are sometimes employed, being inserted above the enlargement and continued over it to the lower extremity, a blister laid over the

whole, and at the end of a month removed. This plan is objected to on account of the blemish induced by the seton. Some practitioners open the bursa and evacuate the fluid, when violent inflammation follows ; and assisted by injections of weak solutions of iodine or sulphate of zinc, adhesion of the walls of the sac takes place. Puncture is made horizontally at the lower portion with a lancet, the skin being first pulled upwards, that it may act as a valve when released, closing the orifice effectually.

Capped Hock.

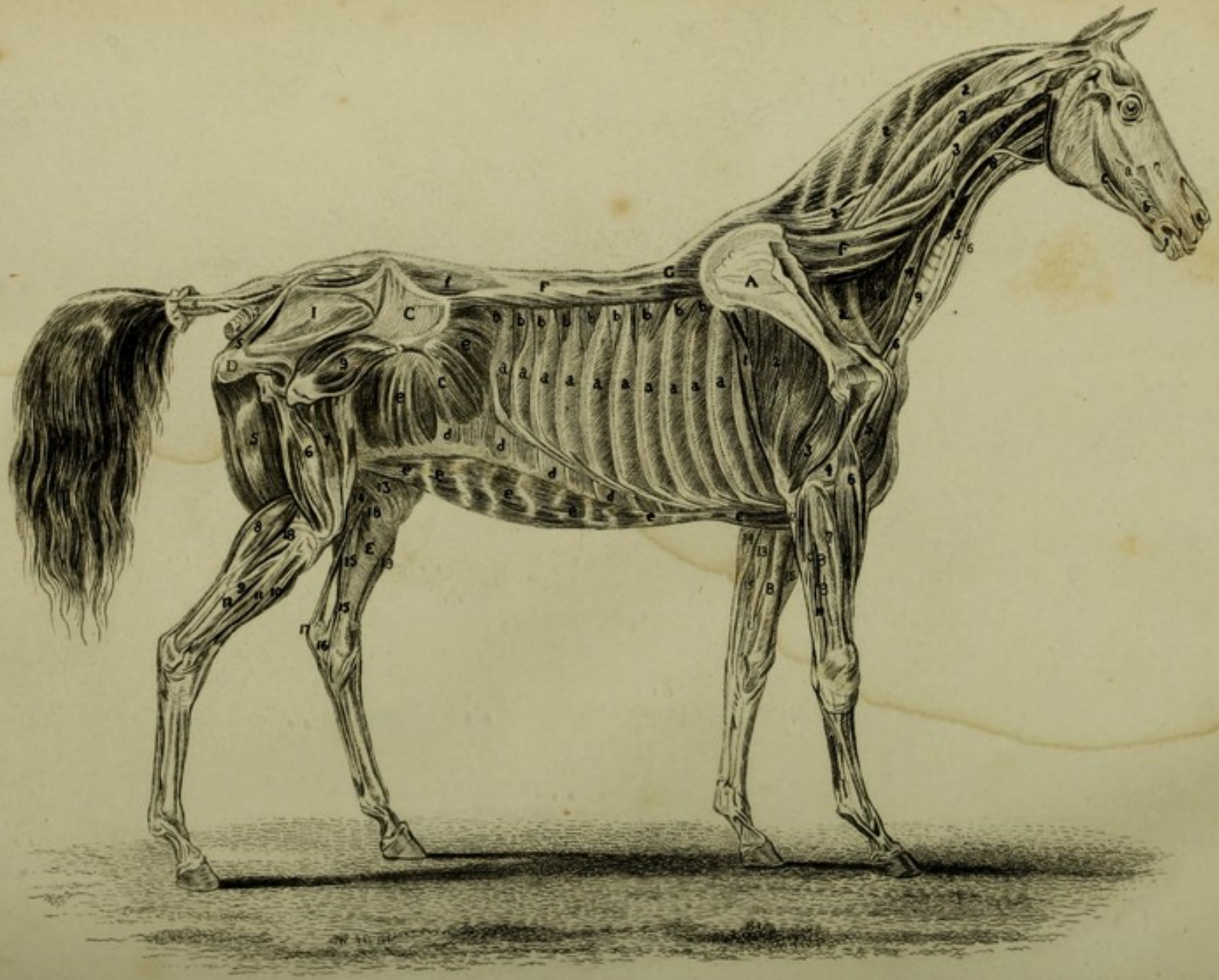
This condition consists of a fluctuating swelling at the point of the hock. Certain forms exist in which the swelling is exhibited on both sides, when it is due to distension of the synovial sheath of the gastrocnemius tendon as it glides over the part ; but when involving the point entirely, it may be simply a serous sac—a sign of kicking propensities, or the habit of lying on hard surfaces.

Repeated blisters may be applied in bursal enlargement, but the serous sac is best punctured and afterwards treated by pressure. It is, however, apt to recur from the continuance of the cause.

The *ham-string*, or tendon of the gastrocnemius muscle (Fig. 273, 6), is sometimes cut or torn asunder, when the fetlock drops under the weight of the animal, and he is unable to stand or walk upon the limb. Recovery is doubtful, a few cases only having proved successful.

Curb.

By this term is understood a swelling, more or less extensive, hot, hard, and painful, existing at the back of the hock, producing severe lameness, very often of a tedious character, and most commonly found in horses having



DESCRIPTION OF PLATE XIII.

"THE SUPERFICIAL LAYER OF MUSCLES, TAKEN FROM THE BODY OF THE HORSE, SO AS TO EXPOSE THOSE MUSCLES WHICH ARE MORE DEEPLY SEATED.

THE HEAD AND NECK.

"*a*, The buccinator; *b*, the caninus; *c*, the retractor labii inferioris.

1, 1, the orbicularis oris; 2, 2, 2, the complexus major; 3, 3, the trachelo mastoideus; 4, 4, the subscapulo hyoideus; 5, the sterno maxillaris; 6, 6, the sterno-thyro hyoideus; 7, the jugular vein; 8, the carotid artery, with the eighth pair, and sympathetic nerves; 9, the trachea; 10, the scalenus.

THE FORE-LIMBS.

1, the scapulo ulnarius; 2, the caput magnum of the triceps extensor brachii; 3, the caput medium of the same muscle; 4, the anconeus; 5, the flexor brachii; 6, the extensor metacarpi; 7, the extensor pedis; 8, the extensor metacarpi obliquus; 9, the extensor suffraginis; 10, the flexor metacarpi externus; 11, the perforans and perforatus; 12, the ulnarius accessorius; 13, the flexor metacarpi internus; 14, the flexor metacarpi medius; 15, the perforans and perforatus; 16, the extensor metacarpi.

THE TRUNK AND BACK.

A, the scapula; *F*, *F*, the longissimus dorsi; *G*, the spinalis dorsi; *a*, *a*, *a*, *a*, *a*, *a*, *a*, *a*, *a*, *a*, *a*, the intercostals;

b, b, b, b, b, b, b, b, b, the superficialis costarum ; *c, c, c, c, c,* the rectus abdominis ; *d, d, d, d,* the transversalis abdominis ; *e, e, e,* the obliquus internus abdominis ; *f,* the hollow in the longissimus dorsi, which part of the gluteus maximus once filled.

HAUNCH AND HIND EXTREMITY.

C, the ilium ; *D,* the ischium ; *E,* the tibia ; 1, the sacro-sciatic ligament ; 2, sphinctor ani ; 3, depressor coccygis ; 4, the muscles of the tail ; 5, 5, the triceps abductor tibialis ; 6, the vastus externus ; 7, the rectus ; 8, the gastrocnemius muscles ; 9, the plantarius ; 10, the extensor pedis ; 11, the peroneus ; 12, the flexor pedis perforans ; 13, the insertion of the gracilis ; 14, the gastrocnemii muscles ; 15, the flexor pedis accessorius ; 16, the course of the perforans tendon, inside the os calcis of the hock-joint ; 17, the insertion of the gastrocnemius externus into the point of the hock ; 18, 18, the popliteus muscles ; 19, the extensor pedis."

straight, short, and sickle hocks. As we have described it, curb consists of sprain of the calcaneo-cuboid ligament (Fig. 279, *a*)—which unites the os calcis with the cuboid bone, the swelling existing throughout its entire length, about four or five inches, and causing the animal to rest the foot, or walk on the toe with the heels raised from the ground. Enlargements of this locality, existing without heat, pain, and lameness, are the vestiges of former acute stages, which at some time again may give rise to inconvenience. A roundness merely of the hock at this part is not necessarily a curb, and the discrimination of the observer is required in order to avoid confusion in this respect.



FIG. 279.—*The Ligaments of the Hock—a, seat of curb.*

Treatment.—A shoe with raised heels should be applied. Firing is sometimes practised as for spavin, when the animal is lame, of course after the inflammation has been subdued. Successful treatment also consists in using repeated applications of the biniodide of mercury ointment, but is more applicable to those cases not attended by lameness.

NAVICULAR DISEASE—GROGGINESS.

There is probably no disease to which the horse is liable that has given rise to such an amount of speculative theory as navicular disease, or the "naviculararthritis" of Percivall. At the same time, it is to be admitted that the inquiry has been good, for no other affection has proved a greater bane to horseflesh, or more harassing to horse proprietors.

Causes.—Peculiarity of conformation, as upright pasterns and narrow feet; interference with the functions of the foot, by imperfect shoeing; rheumatic form of inflammation of the bone and articulation; punctures of the joint, wounding bone or tendon; bruises from treading on hard substances; too great length of the hoof at the toe as a result of neglect, whereby sprain occurs in the tendon as it passes over the navicular bone.

Symptoms.—Severe lameness in the fore-feet, which has come on gradually, or sometimes suddenly after a long rest, or after being newly shod; disappearance of the lameness, and ultimate reappearance in the same or opposite foot. When the disease comes on slowly the animal becomes gradually stilty in action, taking shorter steps, and assumes the practice of "pointing," which consists of advancing the affected foot or feet, resting on the toe, and easing the heels from strain and pressure. As the disease becomes developed these signs are more distinctly marked, and lameness immediately after rest is more pronounced, gradually disappearing during moderate work, until the animal is able to move with a freedom which is simply remarkable.

In order to decide upon the presence of disease in the navicular joint, the practitioner first makes a close examination of other parts in order to satisfy himself that they are free from disease; and if, along with such freedom, the horse exhibits the signs already detailed, his stilty action being attended by a limited or stiff movement of the whole limb, especially at the shoulders, together with wasting of the muscles of this region, there can be little doubt of the nature of the complaint. There will be added also, in later stages, contraction of the hoof, giving it a long and narrow form, with upright sides, exhibiting heat, and also pain on percussion. Throbbing of the arteries at the pastern is said to occur, and the tendency to trip or stumble is constant;

the sole becomes concave—a condition rendered more conspicuous by the shrinking of the horny frog, and elongation of the heels.

The parts involved in disease are—the tendon of the flexor pedis perforans, the navicular bone, synovial membrane, and fringes. The flexor tendon passes under the navicular bone, just as a rope glides beneath a pulley, to its insertion in the coffin bone, the situation of which will be seen in the section of the foot, given on Plate X., Fig. 1 ; and further understood by a consideration of the description and references furnished. The substance of the bone may be inflamed, or that morbid process may be confined to the articular surfaces ; the internal inflammation may give rise to changes upon the articular surface, and diminution of the integrity of the bone, leading to subsequent fracture under pressure of the tendon. Prior to this stage being reached, the tendon may suffer degeneration, be partially torn, and, by the attempt at reparation going on within the bone, union is effected between them, and shortly the synovial bursa is obliterated altogether by the process of adhesion.

Treatment.—We have to bear in mind that the primary states of this complaint are due to inflammation of the structures composing the navicular joint ; therefore the means to be employed must be those calculated to reduce that process as soon as possible—the later forms of the disease being entirely due to the ravages consequent upon continued existence of the destructive influences of inflammatory action—purgatives, sedatives, &c., internally ; fomentations, continued for hours, followed by poultices, and repeated daily for some time. The animal should be encouraged to lie down as much as possible, when he must not be disturbed. Reduction of the inflammation should be followed by blisters round the coronets, or setons through the frogs ; the latter being effected as the animal stands, by means of a sharp, curved

needle, caused to enter first the heels, at the centre of the back of the frog (Fig. 1, *h*, *g*, Plate X.), emerging from the horny frog a little behind the point or toe, a piece of tape being carried through the sensitive frog, the ends of which are tied together, sufficiently loose to admit of being moved daily for three weeks or a month; at the end of which time it may be withdrawn, and the hoof examined in order to see whether pus has occasioned any separation of horn by burrowing from the seton. The shoe is then put on, and the animal prepared by taking regular and gentle exercise. Simple and incipient cases usually yield to this kind of treatment; but, in case of failure, the operation of neurotomy must be performed.

Neurotomy, or division of the nerve, is a proceeding having for its object the destruction of the sensation of feeling in the foot, by which the animal may be assisted to work without pain and fatigue, arising from irritation of diseased structures. The animal is first prepared by a cooling diet, and probably laxative medicine, if such have not been given; the hair is closely clipped from the surface where the incision is to be made through the skin; after which, some practitioners have the leg bathed, or allowed to stand in a tub of cold water, in order to constringe the vessels of the skin, &c., and prevent hæmorrhage, which confuses the operation. We, however, have preferred to use a ligature, placed sufficiently tight upon the forearm after the animal is cast. The hobbles are employed to secure the animal, and when he is down the limb to be operated upon is released, but again secured and extended by a rope placed round the fetlock-joint, and held by an assistant. The skin is then divided longitudinally along the edge of the tendon, a few inches above the fetlock-joint, and the nerve exposed; it is then raised from the orifice by means of a thread which has been passed beneath, and divided as high as possible. The animal struggles

violently from the acute shock of this simple act, and, as soon as he is quiet, about an inch lower down may be dissected out and cut off, no sensation being experienced. The wound in the skin is then closed by sutures, and the operation repeated on the other side of the leg, or upon both legs, as required. When both are to be deprived of their nerves, the inside of the lowermost leg becomes the second subject of operation before the animal is turned over; after which the upper and lower legs are deprived of the nerves on the sides not yet reached, and when completed the animal is liberated, allowed to rise, and at once removed to the stall, where he is tied up to prevent his tearing open the wounds. In order to promote healing by the first intention, the orifices may be covered with collodion, styptic colloid, or treated by the antiseptic method.

Some cases are not favourable for the operation—especially those animals having thin, weak, and flat or convex soles, exhibiting signs of disease in the feet, or tendency to œdema of the legs (as such are liable to slough the hoof), or degeneration of the diseased structures, fracture of the bone, &c.—as they bring both the operator and operation into disrepute. Those animals having good and strong feet, in which the disease has not gone too far, and the action neither high nor violent, are the most promising subjects.

In the shoeing of horses deprived of sensation in the feet, great care is required, as in wounding the internal, and what were previously the sensitive, structures, there is no indication of pain, and the continuance of the source of inflammation occasions suppuration, eventually ending in sloughing of the hoof. Other injuries—as a stone in the foot, treading on nails, &c., producing similar states—are likewise to be avoided, or their effects mitigated as soon as possible, towards which end the feet should be regularly examined after work.

LAMENESS FROM DISEASES OF THE COFFIN BONE.

Injury of the Pyramidal Process.

This part of the os pedis is liable to injury from treads or blows inflicted on the front of the coronet, or from sprain of the extensor tendon which is inserted in it (Plate X., Fig. 1, *f*). The use of high heels and low toes on the shoes has much to do with the production of this disease, by constant stretching of the tendon at its insertion. The affection is common to both hind and fore feet. Sometimes a swelling only exists, at first hard and painful, but eventually suppuration establishes a wound ; when caused by bruises, the wound is opened earlier. The horse walks on the heel, but avoids going on the toe by snatching up the foot as the weight goes over. Sloughing of the wound is not uncommon, and tardiness of reparation follows.

Treatment.—Remove the shoe, and pare down the heels if they are grown too high ; apply fomentations and poultices, to reduce inflammation and stimulate the wound, together with suitable internal remedies. The antiseptic treatment is valuable. Blisters, the actual cautery, or even neurotomy may be required, and all these will be useless if the bone has become carious—a state which eventually renders the animal worthless by complication with the coffin-joint.

Side Bones.

The lateral processes, or wings, of the coffin bone are surmounted by plates of cartilage, which may be felt upon each side of the coronet over the heels (Fig. 2, *b b*, Plate X.). They serve to maintain the position of movable parts within the hoof, and ward off the effect of blows inflicted in their locality. From the effects of concussion in the fore-feet,

they are liable to inflammation, by which they are transformed into hard osseous material (Fig. 280); by this the foot loses much of its elasticity, the action becomes stiff and stilty, or they may occasion lameness. Heavy animals are the most liable to side bones, and the hereditary tendency towards their formation is so well known that sensible breeders reject all animals having them. In such they seem to arise without appreciable cause, being found at a few years old, giving rise to no lameness, and before the animal works on the roads. When town horses exhibit their formation a protracted lameness ensues, for which often no account can be given during the first few days. Removal of the shoe and examination of the nails elicit nothing; pressure on the cartilages at the top of the hoof shows they are still elastic, but probably a little tender; percussion with the hammer directed over the wall near the lateral cartilages at once causes the animal to suffer pain; and in a few weeks the cartilages are stiff, hard, and enlarged, the action stilty, the feet alter in shape, become contracted, weak at the heels, and probably convex at the sole. The toe is put first to the ground, and the steps are short, resembling those of navicular disease in a measure. The hind-feet are more rarely affected, and heavy horses more frequently than others. Ossification of the lateral cartilages, under persistent causes, seldom stops short of affecting contiguous structures, and thus the disease assumes an incurable form. Occasionally one side only is affected (Figs. 281 and 282).



FIG. 280.—*Ossification of the Lateral Cartilages—Side Bones.*

Treatment.—Rest, reduction of inflammation by usual means, and application of level shoes; after which, strong

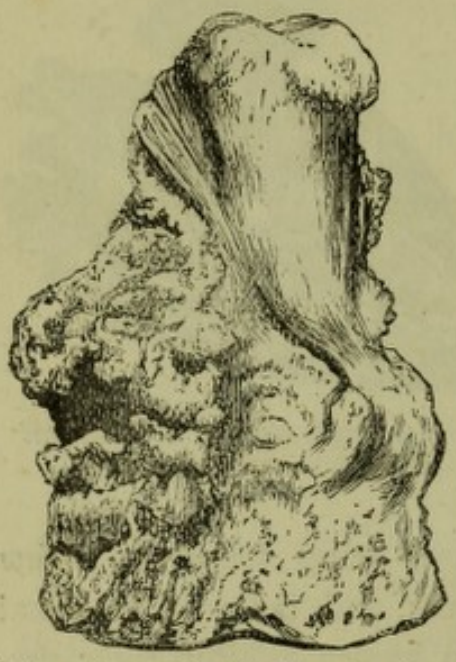


FIG. 281.—*Ossification involving the first and second Phalangeal Articulations.*



FIG. 282.—*Ossification and degeneration affecting the bones as far as the Fetlock Joint.*

blisters, or firing. If the animal is a draught-horse and requires calkins, let them be low and broad, so as to give ample support and occasion as little shock as possible, the shoe being thick and strong, and the heel for the affected side being carried straight backwards, projecting an inch beyond the heel, the other being only as long as the foot. This practice, instituted many years ago by the writer's father, was found to answer most successfully.

Neurotomy is proposed for the otherwise incurable forms of this disease, in which the results are generally more favourable than in navicular and some other diseases. All affected animals should be confined to slow and steady work.

Antiseptic Treatment of Wounds.

The application of antiseptic remedies to the healing of wounds is based on the conclusion that suppuration is not essential to the process of cicatrisation, but the reverse—detrimental to it. In further elucidation of the subject, it is shown that the origin of pus is an evidence of causes inimical to the healing powers—viz., death and gradual destruction of tissue, due to the primary injury; and the presence of microbes—micrococci—floating disease germs, both of which endanger the life of the patient by producing a state of septicæmia (blood-poisoning), ending in death.

This conclusion being arrived at by Dr. Harvieux in 1850, he employed a solution of chlorine gas in water, which he shortly abandoned on account of its extremely irritant properties. Similar conclusions and the use of antiseptics are not new. Galen used antiseptic ligatures, prepared in Rome under his direction, in his day. Professor Lister in 1866 employed carbolic acid, but this he has relinquished, with other remedies substituted for it, on account of their absolute poisonous tendencies. The remedies have proved more dangerous than the disease. After close observation we are led to the conclusion that very much, if not the whole, of the scientific mysticism which surrounds this question melts into nothing beneath the rigid adoption of sanitary measures in the general and medical treatment of the maladies of our domestic animals.

In all instances the objects for which an antiseptic remedy is required will be obtained by the use of "Sanitas" oil, being

non-irritant and non-poisonous, as an outward application. Wounds covered by a layer of cotton-wool or spongio-piline saturated in a mixture of this fragrant preparation, are effectually protected from the septic action of the filth of stables, and make remarkable progress. The patient is also relieved of much suffering. A form of mixture is given in the Dispensatory (see "Sanitas"), which should always be kept in readiness, being agitated before it is applied.

SECTION XII.

OPERATIONS.

OPERATIONS.

THIS Section will be devoted to a brief consideration of the various operations called for in the treatment of the diseases of the horse, and which have not already received more than a simple allusion.

CASTING OR THROWING.

For the performance of the major surgical operations, and indeed also some of the simplest, the horse requires to be put under restraint. A limb or other part to be subjected to the knife, actual cautery, &c., needs to be confined to one particular position, and as little under the control of the animal as possible, to insure expedition and success in the execution of the act; and, in order to secure this, as well as avoid useless suffering, casting or throwing is frequently resorted to. The horse, thus deprived of the use of his limbs, and lying prostrate with the whole of the feet firmly bound together, loses much of his self-possession and will, and quietly yields to the infliction of severe and prolonged pain, of which, when free, he would not suffer one hundredth part, nor even allow an operation to be attempted. It is often therefore a great saving of time and suffering, while surgical acts are conducted easily, safely, and with precision, eventually securing the ends desirable in removal or cure of the existing malady.

Casting is effected in two ways. Colts are thrown by means of a rope only, as when castration is to be performed, as hobbles could not be put on the feet of an animal unbroken without risk of injury. This course has already been described at page 438, and shown in Fig. 132.

Older and broken animals are cast by hobbles, which are so constructed as to admit of the release of one or more limbs for particular purposes; they are readily applied; they accomplish the act safely and effectively, and the total release of the animal can be secured in a few seconds.

The required set of hobbles consists of one for each foot, and a rope about six yards long, having one end surmounted by a strong chain, with small and close links, about eighteen inches in length. Each hobble is formed of two straps, about two inches wide—one, the longer (Fig. 283, *a*), having

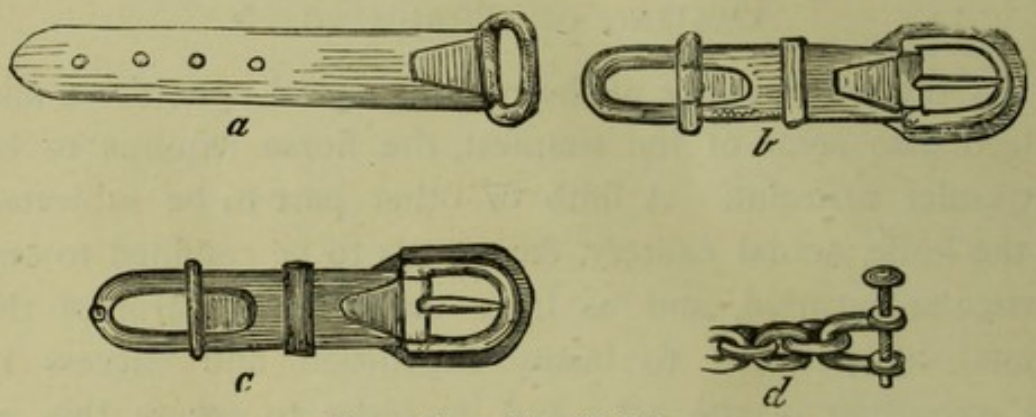


FIG. 283.—*The Hobbles.*

an oval link, secured by an iron strap at one end, the other being pierced by holes, to receive the tongue of a buckle on the second half. The shorter half, *b*, possesses at one end a D link, having stops, or shoulders, to prevent the oval link from going too far over; on the other end is an iron buckle, under which a leather chafe is placed; and outside, the usual runner, or keep, is provided. To put the hobbles in place, the strap, *a*, is first passed through the buckle, *b*, and its runner; thus forming a single strap sufficiently long to grasp the fetlock, and admit of the oval link being put over

the D, through which the rope is passed, and this locks the hobble on the leg. Each leg is thus secured, the D's being on the inner side, to prevent fixing with each other; and the rope going through each, all are ready for action. But we need to point out a difference in one—the first hobble always put on—and to which the rope is attached. The D of this hobble, *c*, is provided with an additional eye, or hole bored in the bow, upon which the shackle, *d*, on the end of the chain is secured by means of a screw; this hobble being put on, and the foot held by an assistant above the ground, to guard against movement in fidgety animals, the chain secured by the screw, the rope end is carried through the hobble on the hind-foot of the same side; next, through the hobble of the other hind-foot; then through that of the other fore-foot; and, lastly, through the D of the fore-foot first hobbled. The position of the hobbles and feet will then be as given in Fig. 284. To prevent

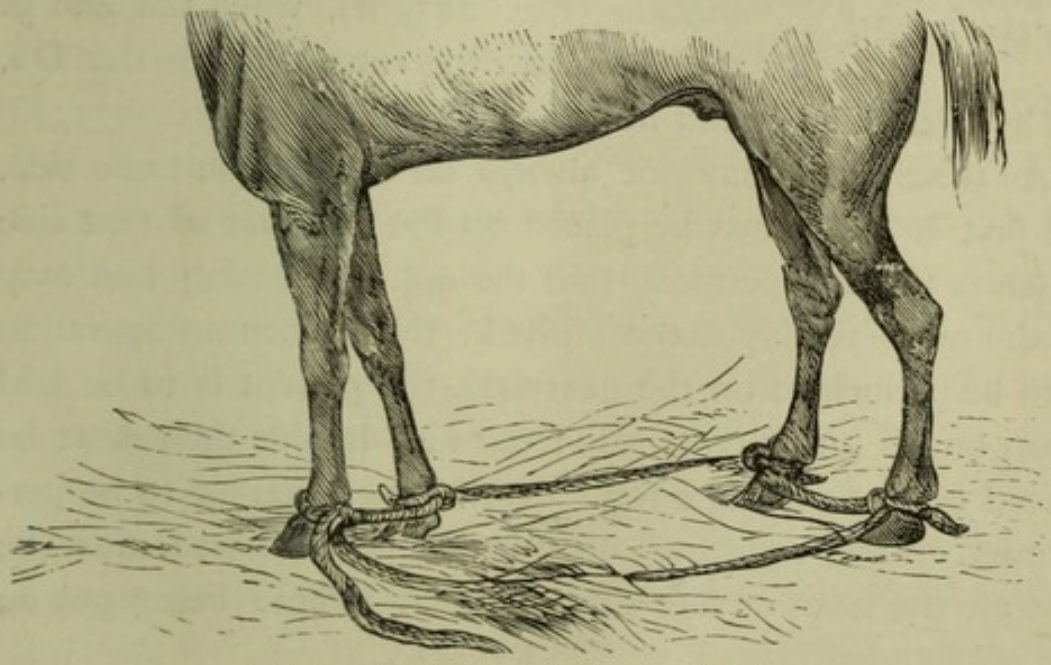


FIG. 284.—*The Hobbles on the Horse.*

injury to the eyes, blinds are used; and being put on as soon as the horse is led to the operating spot, he is prevented from being uselessly alarmed. A girth, web, or

rope is passed round the body, and the free end held by one or two men opposite to those who pull at the hobbles, three or four being told off for the purpose, one man having charge of the head.

All being in readiness, the signal is given, and every man pulls with a will ; the hobble-rope brings all the feet together, and lessens the power of the animal ; while that passed round the body pulls him on his side, the man at the head instantly falling flat upon it as soon as the animal is prostrate. The hobbles are now to be secured, which is to be effected by means of a hook and screw (Fig. 285), tightened on the chain as it is forcibly drawn through the hobble, the hook being fixed into the link nearest to the D. When the animal is to be released the screw is taken out of the shackle (Fig. 283, *d*), when the end of the chain swiftly runs through the D's, the hobbles fall off, and he is free to rise.

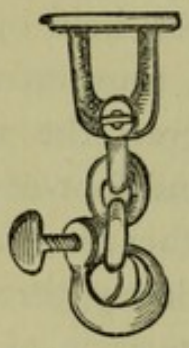


FIG. 285.
Screw and Hook for securing the Chain of the Hobbles.

As the animal may not always be cast on the same side, the first hobble must be placed on the fore-foot of that side which is to be uppermost, that the act of releasing him may be the more readily accomplished ; thus, when an operation is to be performed on the near-side, the patient is to be laid down on his off or right side ; the first hobble then must be placed on the near fore-leg. If the operation is to be performed on the right, or off-side, then the horse must be cast on the near, or left side, the first hobble being put on the off fore-leg.

When a leg is to be released, the strap is to be drawn through the buckle on Fig. 283, *b*, the D being secured by the chain ; and at the conclusion, the foot is readily included in the hobble by again buckling up the strap in the ordinary way. A leg released from the hobble should first be

secured by the *side straps* and *leg-rope*, the latter being given to an assistant; and for securing greater quietness of the limb it may be propped up by a truss, or bag, filled with straw.

The *side straps* are three in number, made of two thicknesses of stout leather, stitched firmly together, one of which is buckled on the leg above the hock, the other on the forearm; the third, being first passed through a ring or link on each, is used to draw the limbs together, or allow of the extension of one leg when released from the hobbles.

The *leg-rope* is simply an ordinary rope, three-quarters of an inch thick, having a stout strap and buckle firmly stitched on the end, of sufficient length to go round the hoof, or fetlock-joint, by which to keep the released leg in a proper position for the operator, being held by an assistant.

It may be employed to fulfil other important functions:—1st. The body-strap, or surcingle, being furnished with a ring about half-way down the chest, the strap of the leg-rope is buckled into it, and the rope passed over the withers, by which the assistants pull the animal on his side—acting, of course, in opposition to those pulling at the hobbles. 2nd. In the absence of a body-strap, the leg-rope may be looped round the forearm of the leg on which the first hobble has been placed, the strap serving to secure it, when it may be used as just described. 3rd. It serves to bind the hobble-rope neatly together when stowed away in the practitioner's gig, or pharmacy cupboard. The *body-strap*, or *girth*, is merely a leather strap, about three inches broad, packed on each side of the spine, furnished with a ring midway on each side, in which the strap of the leg-rope is inserted, for pulling over the animal in casting; and a loop-strap at the side, which is to go round the forearm, to prevent turning round during severe pulling.

The *Bed*.—Nothing answers better than tan, or sawdust, for permanent operating beds; but as horses have to be cast

at other places, where these cannot be obtained, straw, or refuse hay, the strawyard, and even the pasture, is resorted to. The strawyard is objectionable, as the feet cannot well be drawn together; the straw becomes entangled with the rope and D's of the hobbles, so as to prevent security in fastening up. The pasture is not quite suitable without a straw bed, as the animal may be hurt in the fall, even if the ground is very soft. It is safer and wiser, under all circumstances, to choose a suitable place, and put down a bed of straw or hay, well shaken out, a foot thick, about three yards long and two wide. The animal is led to the *side, not upon the bed*—at least, we prefer this plan—and thus avoid the annoyance of entangling the straw in the hobbles. The blinds are put on; then the body-strap and leg-rope to pull at; next the fore-foot is held up, first hobble put on, and the chain and shackle screwed to the D; the second hobble goes on the hind-foot of the same side, and the rope end passed through the D from the outside; the third hobble goes on the other hind-foot, the rope end being carried, as before, through the D, and afterwards through the D of the fourth hobble of the opposite fore-foot, and that of the first from which it commenced. The assistant holds up the fore-foot from the first, nor does he drop it until the proper signal is given; at which time, all acting in concert, the animal is pulled upon the bed, if the force has been properly distributed, ample power being placed at the rope pulling from the body-strap. By this arrangement the animal stands on free ground, there being no obstacle to the movements of the chain and straps; and the bed, placed as we have described, forms an effectual means of breaking the fall. When the patient is led on to the bed it becomes greatly disarranged; and we have seen horses sadly bruised by falling on bare, or slightly covered places. In the plan recommended the bed can be laid

undisturbed in a loose box, or other building, during wet weather—a practice we have followed many times—and a conclusive proof that, under proper management, animals may be thrown in a much smaller space than may be generally supposed.

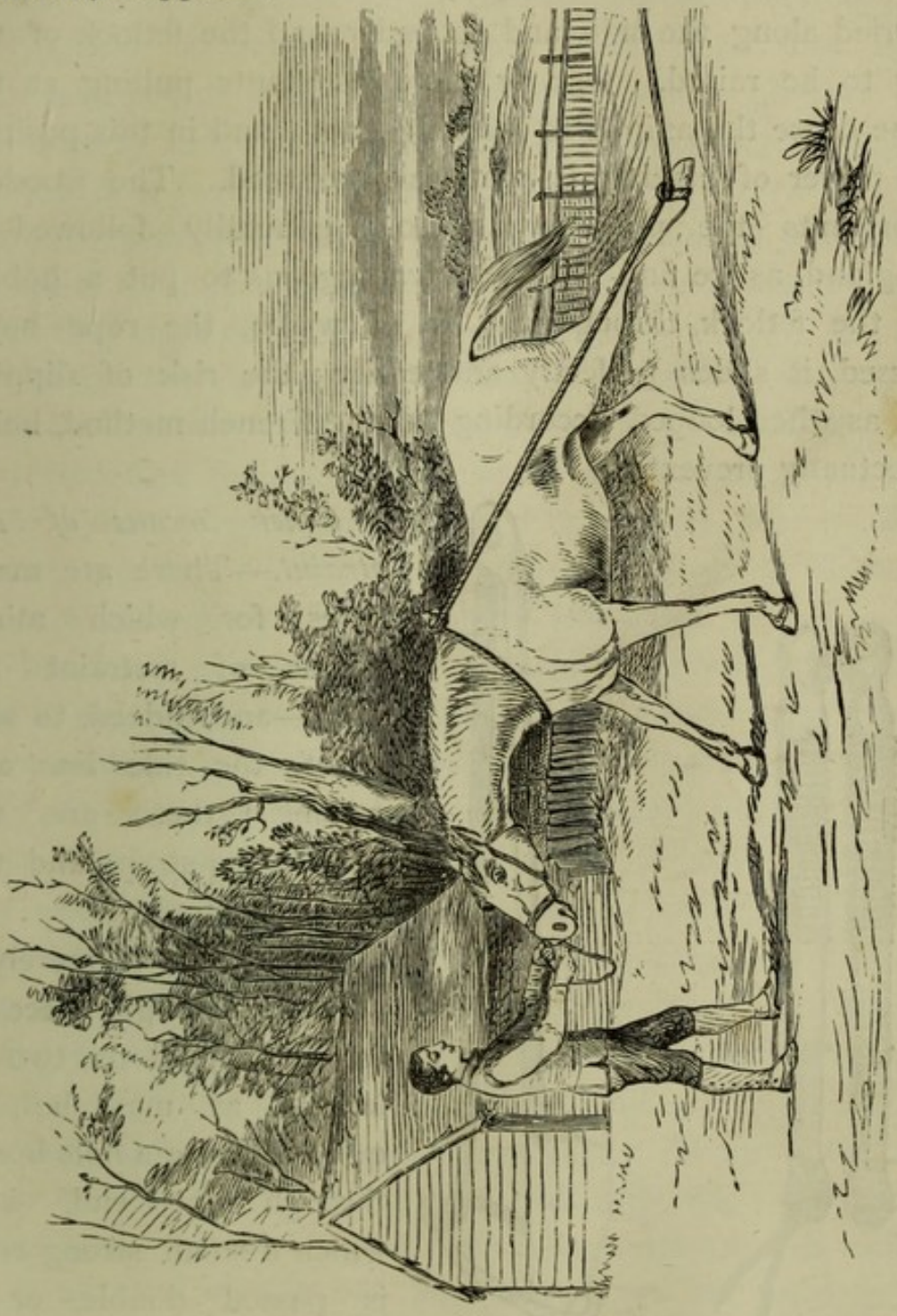


FIG. 286.—*The Side Line.*

The *side line* (Fig. 286) is chiefly made use of when the horse objects to have one of the hind-legs raised, as in

shoeing, for dressing the foot in canker, &c. &c. One end of the rope is passed round the neck as a collar, and secured by a fixed knot, to avoid tightening and strangulation ; the loop is turned so as to place the knot on the side of the shoulder, or on the withers, when the free end of the rope is carried along the side, and looped round the fetlock of the leg to be raised. One or more assistants pulling at the rope cause the animal to raise the foot ; and in this position his power of kicking is materially reduced. The woodcut represents the practice as now generally followed in England, as we find it more advantageous to put a hobble on the fetlock, through the D of which, the rope being passed, it slides perfectly and easily ; the risk of slipping off, as when looped according to the French method, being effectually prevented.

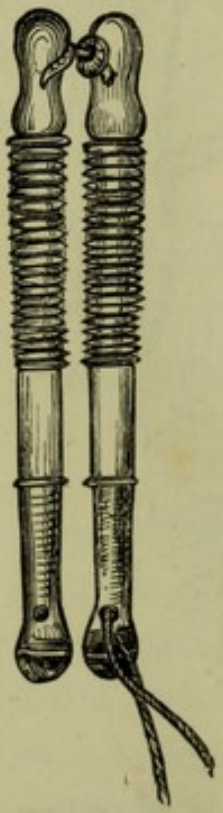


FIG. 287.
Wooden Twitch.

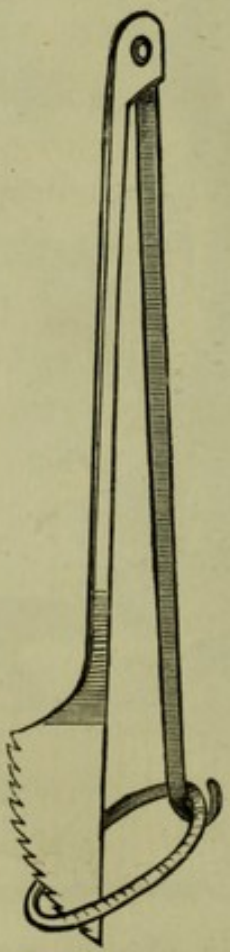


FIG. 288.
Iron Nose Twitch.

Other means of Restraint.—There are many cases for which minor means of restraint are used—and, indeed, to substitute the side line and casting ; these are, the twitch, leg-strap, and the trevis, or stocks.

The *twitch* is merely a stout and tough piece of wood, a yard or two in length, as may be required, having a hole bored through one end, into which a small strong cord is passed double, or if large, only single, forming a loop just large enough

to admit the hand. The nose or an ear is usually selected on which to apply the loop, when the wooden bar is twisted, so as to inflict sufficient pain, and thus take the attention of the animal during the operation to be performed. The twitch is rarely substituted by other means in England for simple operations; but in France two other instruments are still employed, by which pressure on the nose is induced. These are the *morailles en bois*, or wooden nose-twitch (Fig. 287); and *morailles en fer*, or iron nose-twitch (Fig. 288). The writer frequently witnessed the use of these instruments as late as the year 1842; since which they have deservedly disappeared.

The *leg-strap* is used when simple operations are to be performed, or when the practitioner desires to avoid casting. It is used to a fore-leg, being passed round the forearm and pastern-joint, when both are flexed upon each other. The animal stands on three legs, and feeling in a measure insecure, is frequently rendered perfectly quiet.

The *Trevis*, or *Stocks*.—Among the heavier breeds of horses used in the northern towns of England, the necessity for severe operations is frequent, and among them are often found animals of violent temperament, so that repeated surgical operations, dressing of wounds, shoeing, &c., would prove an endless and exceedingly expensive item, as well as being a great hindrance, and attended with serious risk and loss of time if the refractory creature were cast on each occasion. The trevis, or stocks, greatly mitigates all these evils. It consists of four stout posts firmly imbedded in the ground, corresponding to the shoulders and buttocks of the animal. At the head they are connected with a strong bar, which fits the front of the breast and lower end of the neck; the sides are also united by a top and middle bar, and stout rings are fixed in the posts near the ground. The animal is led between the posts, and secured by the head to a convenient wall, &c., opposite;

hobbles are put upon each fetlock, and the ropes drawn through the rings in the bottom of the posts, and secured to others half-way up the sides. Two stout bars, top and middle, are hinged securely across from one hind-post to the other when the horse has been led in, which prevents him going backwards. The top side-bars are provided with a roller, running the whole length of their outer side, furnished with a toothed wheel and catch ; and an iron pin projecting from each end, on which the roller turns in an iron eye, each being square at the ends, is used as the means of turning by a winch or handle. The use of these rollers is a highly important one. As soon as the animal has been secured by the feet, a canvas sacking is passed underneath the abdomen, each end being stiffened by a thin, flat rod of iron stitched between a double fold, and inserted into a longitudinal slit in the roller. The winches are put on and turned, which has the effect of tightening the sacking, and eventually taking the horse slightly off his feet, by which it is found his power of resistance is greatly diminished. When a hind-foot is to be raised for shoeing, the rope attached to the hobble is drawn up by the short roller behind, and strapped to the lower or middle bar. As it is rare that horses refuse to have the fore-feet shod, the stocks are seldom called into use for that purpose ; the hind-feet are mostly the subjects of difficulty, and they are readily raised in the stocks, and secured on the lower bar, which is thickly padded to prevent injury.

The Use of Anæsthetics.

The formidable nature of many operations has been greatly reduced, as well as their performance expedited, by the use of certain agents which, when inhaled in the form of vapour, have been discovered to possess the power of producing a total insensibility to pain. They are not, however,

without liability to fatal results; for it must be understood that anæsthesia, or loss of sensation, is most assuredly one of the stages of poisoning. The practitioner, having full knowledge of the properties of anæsthetics, combined with an intimate acquaintance with their action on the animal organism, knows how far these agents can be safely applied, and to him alone should their administration be entrusted.

Among the many agents which have been thus employed, chloroform is preferred under almost all circumstances, the results being most satisfactory when there is no existing disease of the heart, lungs, or brain, &c., and due precautions are taken as to quantity of the fluid, mode of inhalation, &c.

We give an illustration of the most efficient apparatus, or "inhaler," designed by Mr. Joseph Carlisle, M.R.C.V.S., of Carlisle * (Fig. 289). The blinders, or head collar, is first put on, and the animal is cast, if needful, on a suitable bed; after which the lower portion, or muzzle, is fixed. From the floor of the latter a small tray is withdrawn, and the sponge fitting within it is saturated with 1½ or 2 ounces of chloroform, and replaced. At first an amount of excitement is produced, sometimes amounting to violence, for which precautions must be taken; but in a few minutes the animal is insensible, and the operation may be proceeded with. Should consciousness return too soon, one ounce of chloroform will suffice to prolong anæsthesia to the end of the case.

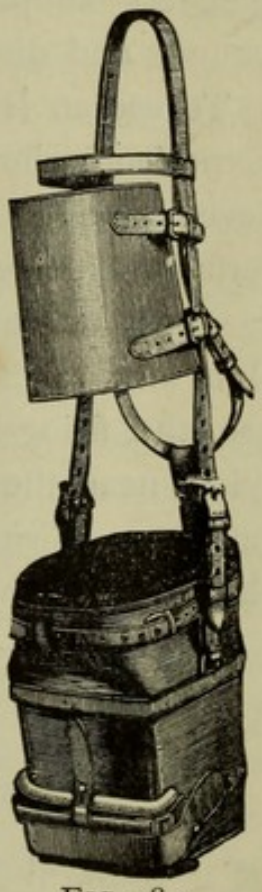


FIG. 289.
Carlisle's Chloroform Muzzle.

For local anæsthesia, sulphuric ether is used by means of the spray distributor, a modification of which is given in Fig. 33, p. 150.

* This efficient apparatus may be obtained of Messrs. Willows, Francis & Butler, 101, High Holborn, W.C.; or of the maker, Mr Richard Sewell, saddler, Carlisle. The cost is 28*s*.

Firing.

The application of the heated iron to the skin of an animal continuously over a large surface has the appearance of great barbarity in the estimation of non-professional observers. It is, however, a very valuable remedy for many of the severe sprains and diseases of joints, &c., to which the horse is a common subject; indeed, we know not what other remedy could be substituted with corresponding benefit. In the selection of cases in which its use is to be adopted great care should be exercised; under such provision success is the general result, but cruelty and barbarity we think is pre-eminently displayed in those instances where quackery adopts it as a common remedy for all manner of wounds and diseases.

To use an Irishism, the best firing-irons are made of steel. Experience shows that good shear or cast steel, which should never be raised above a blood-red heat, provides a smoother surface, with less liability to form scales, which, as in the case of iron, are sometimes large, and by adhering to the skin afterwards give rise to additional irritation. Before use, the firing-iron should be rubbed over on a soft brick lying near the operator, or by a smooth file kept for the purpose. Firing-irons are of various forms. Fig. 290 shows the form of one kind used for abruptly terminating a line

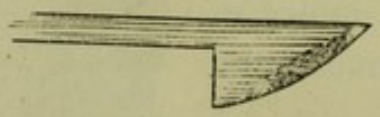


Fig. 290.

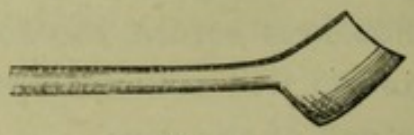


Fig. 291.

by means of the heel at a point nearest to the operator. Fig. 291 shows one used for commencing a line abruptly at a distal point. When the instruments are forged from cast-steel, they are constructed to fit into a handle, and secured by means of a screw; but when made of shear or blister

steel, the heads may be welded on iron, of which hollow, cone-shaped handles have been turned. These are light,

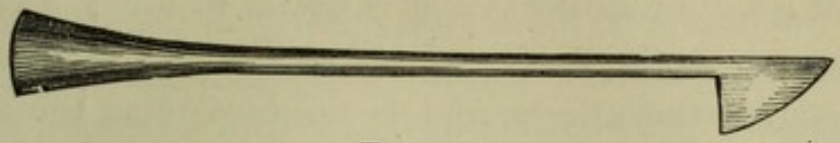


FIG. 292.

and, being readily cooled in water, are very handy instruments (Fig. 292).

Another form of instrument is sometimes employed, having a sharp point, as shown in Fig. 29, when the object is to penetrate the skin and bone beneath, as in spavin of old horses, described at p. 733. Some practitioners use an iron having several points.

Before the firing-iron is applied the parts should be made as bare as possible by close clipping, and the animal may be cast, one leg strapped up, or the side-line used as he stands, according to the opinion of the operator. The form of lines may be varied also as the operator thinks fit; they may be **across,** perpendicular and parallel, or feathered, but on no account should the diamond form be practised, as extensive sloughing is often the result.

Whatever may be the form adopted, let the reader understand, it is of little consequence, providing the requisite amount of inflammation is set up. The operation, it is now satisfactorily understood, does not produce the effect of contracting the skin and causing it to act as a permanent bandage; the good results of firing are manifest in setting up a healing action in, and union of, bones which before were undergoing a chronic inflammation, and between which motion existed, giving rise to great pain and lameness; or in tendons, in which the reparative power is deficient, the beneficial action is aroused.

The feathered form, we believe, admits of the greatest use of the iron with best effects and least risk, the skin being

seared until a brown line is produced, which soon becomes filled with a glutinous exudation ; deeper than this the iron should not go. In most cases it is useful to apply a cantharidine blister over the fired surfaces as a means of hastening and completing the effects, and in no case must the animal be subjected to the operation on more than two legs at a time. The idea of *firing to prevent disease* should never be entertained ; no greater cruelty and barbarism can be perpetrated. If the animal has not good limbs, firing will neither strengthen nor improve them, and operations based on such foolish assumption deserve the notice of Mr. J. Colam, of the R.S.P.C.A., Jermyn Street, St. James's.

Docking.

The bones of the tail are composed of small bodies or segments (*see* Plate XI.), having an interposed fibro-cartilaginous substance forming a means of movement, and when portions of the tail are to be removed, one of these divisions or joints

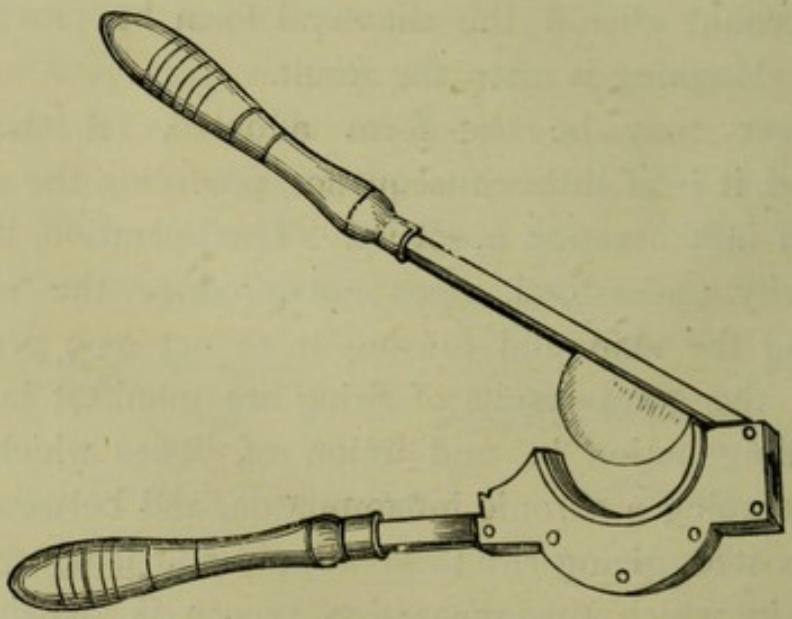


Fig. 293.—*The Docking Machine.*

should be chosen. The instrument used for this operation, called the docking-knife, is shown in the engraving (Fig. 293),

consists of two powerful levers, the lower having a hollow part to receive the tail, the upper being provided with a knife to sever the part when the levers are suddenly closed. Messrs. Willows, Francis & Butler have lately submitted to us an improved form as given above, which admits of the removal of the cutting part for sharpening or repair. After amputation of the part, a tubular instrument is employed by some at a red-heat, to cauterise the flesh around the bone and stop bleeding from the arteries. We would recommend a more simple, efficacious, and painless plan, adopted by Mr. Gamgee, sen. Before amputating, tie a ligature upon the tail immediately above the part to be cut off, using only just sufficient pressure to arrest the flow of blood; next turn the hair back and secure it for the operation, clipping the part close through which the knife is to pass. All being ready, amputate the part, after which carefully turn down the hair and tie it round immediately below the end of the stump. Next day both ligatures may be removed, when the clot of blood which formed at the end will drop out after a time, and healing proceed rapidly.

Among the several purposes for which docking is practised, it is often very successful in causing the animal to improve the carriage of the tail when it has been twisted to one side.

Slinging.

When bones of the limbs have been fractured, tendons sprained, or joints opened, the slings are employed to take the weight of the animal from the injured parts, and thus enable him to rest when he would otherwise be unable; besides which he may be saved many of the effects of irritative fever. Quiet and tractable animals only should be put into slings; those that are irritable and fiery seldom do any good, as they chafe, fret, and move about incessantly; or hang so heavily that congestion of the lungs may be

induced, and the original disease considerably aggravated. The weight of the animal is carried by a piece of sacking or stout canvas, having a wooden roller at each end ; and to the four corners, blocks and pulleys, with ropes, are placed, communicating with others attached above. A breast-strap and breech-band are required to prevent movement too far either way, and these are supported by cross straps above. Occasionally the slings are made use of to raise an animal from the ground.

Tracheotomy.

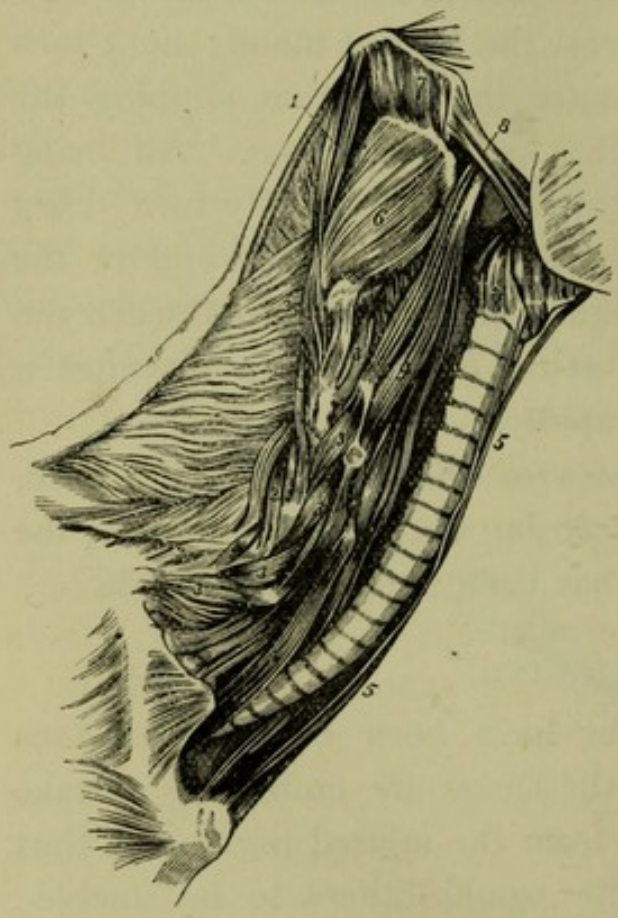


Fig. 294.—*Situation of the Windpipe.*

The spot for opening is at the upper third of the space between the figs. 5, in front of the neck.

When suffocation is threatened from the formation of abscess in strangles, or from the swelling, œdema, &c., of the throat, this operation is resorted to in order to admit the required amount of air to the lungs. It is performed as follows :—The head is held by an assistant, the nose being extended so as to bring the muscles on the lower side of the neck in a state of tension. The operator then selects that part where the rings of the windpipe are best felt by being the least covered by muscles, &c. (Fig. 294), and at once cuts down upon them, making an incision of two or three inches long, or thereabouts. The

trachea, or windpipe, is next to be opened, one of several ways being selected. One consists of cutting out a piece of two rings, so as to leave a round hole an inch in diameter; another, in which the fibro-muscular intervention is merely opened; and the third consists of making a longitudinal incision across two or three rings, and into the orifice produced in one of these ways a suitable metallic tube is placed, so long as the animal cannot breathe through his nostrils. This fact can be repeatedly ascertained by placing the hand over the orifice of the tube; if he is able to respire without signs of distress, the wound may be closed in the usual manner after the tube has been withdrawn. Of the various kinds of tube employed in this operation, the simplest is shown in the accompanying engraving (Fig. 295). The point being inserted between the slit ends of the cartilaginous rings, it is then turned downwards, the curved plate placed against the neck, and secured by cord or straps. Some inveterate roarers have been known to work for years with a tube of this kind in the throat.

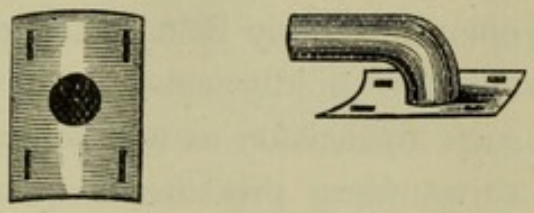


FIG. 295.

We have not given any directions for securing and restraining the animal under this operation. As a rule, he requires none, for the simple reason that he is too unwell to resist; besides, a skilful operator only requires a very short time for its performance, less than two minutes often serving to give the animal perfect freedom in respiration.

ŒSOPHAGOTOMY.

An opening is made in the gullet, as a last resource, when removal of an obstructing body has proved impossible by other means, and the situation is midway between the jaws

and the chest. Such an operation is neither difficult nor dangerous, but the greatest attention is required in order to secure proper union of the parts subsequently.

The horse will require the restraint of the twitch, and an assistant will be needed to elevate and extend the head and nose as for tracheotomy, while another is engaged in producing tension over the region of the obstruction by applying moderate pressure on the opposite side of the neck. The offending body being thus distinctly brought into view, the operator boldly cuts down longitudinally upon it, making such an incision as will sufficiently allow its escape, which by surrounding pressure is quickly accomplished if the wound is of proper size. Second cuts should be avoided if possible, while, on the other hand, the action of the knife should be firm, rapid, and well directed, so as not to cut more than is required, or to make the incision too large. Delay and repetition of acts in surgical operations exhaust the patience of the animal, and are calculated to irritate and make him restive ; thus the reader will understand how very necessary it is to observe the foregoing instructions, in order to avoid the difficulty which attends such important proceedings after the patient has become alarmed.

After the removal of the obstructing body, the wounds are closed in the ordinary way by sutures, allowing no tow, hairs, &c., to remain between the lips, as union must be effected, if possible, without suppuration. The opening in the gullet is to be closed by the continuous suture, the end of which must be long enough to hang out of the external wound, by which it can eventually be drawn away altogether. The external wound is united by the twisted suture, and treated by the antiseptic method, or it may be covered by collodion, styptic colloid, &c. The head is to be tied to the rack, and all food must be fluid and of the most nutritious quality, until the wound has become perfectly

healed; good gruel, milk, hay-tea, &c., forming the most useful kinds required.

Balling.

The plan of prescribing medicines for the horse in the form of bolus is attended with many advantages, amongst which that of expedition is prominent. Waste and difficulty are apt to occur from balls being too large or too soft, and by absence of dexterity on the part of the operator, a large hand militating greatly against his success. Usually the plan of administering a bolus is as follows :—The right hand being placed flat over the nose, to secure the head as the animal is reversed in the stall, the left seizes the tongue, when he at once opens the mouth, particularly as the tongue is held firmly and drawn moderately towards or between the molar teeth of the off-side. The bolus being held between the lips, or inserted within the vest-pocket, for instant seizure, is grasped between the tips of the first, second, and third fingers—the first and third being below, and the second above (Fig. 296), and rapidly delivered at the back of the tongue, which is liberated at the same moment, the effect being that the bolus is carried within the pharynx, and, grasped by its muscles, is passed into the gullet, and at length to the stomach. Of course, large horses will require large doses of medicine, and they are able to swallow larger boluses than small animals; but care must always be exercised in order to suit the capacity of the gullet of the patient, as choking may occur, particularly in such as are weak and feverish, the want of peristaltic action and



Fig. 296.—*Manner of Holding the Bolus.*

secretion often being great. A drink of water should be allowed afterwards to insure proper passage.

Horses are apt to become very obstinate and cunning under the operation of repeated balling, rendering it somewhat difficult, especially when the practitioner is alone. Sometimes the mouth is narrow and injures the hands, and if the surgeon has many patients to attend, especially in winter, the scratches do not heal; they are continually being torn open, inflaming and suppurating, and great inconvenience arises. To obviate this, the mouth may be held open by the iron-gag (Fig. 297).

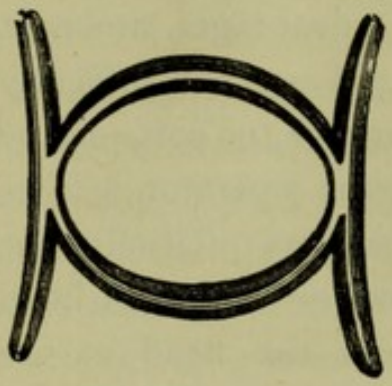


FIG. 297.—*Iron Gag or Balling-iron.*

When the mouth requires to be firmly fixed open, the dilating-gag may be used (Fig. 298), which is regulated by a screw at the bottom of the handle. As a suitable instrument for gagging the mouth in balling, examination of the

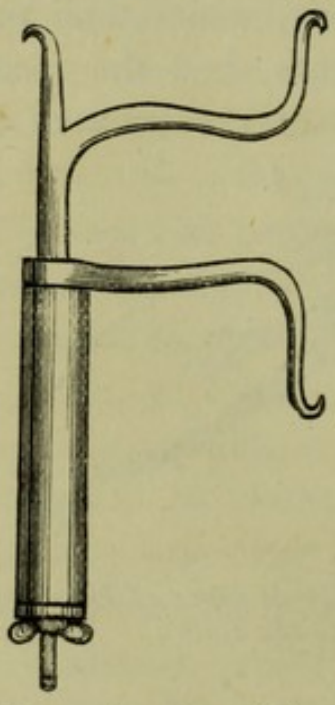


FIG. 298.—*Regulating Balling-iron.*

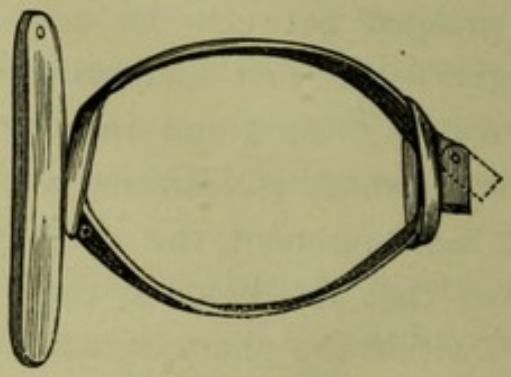


FIG. 299.—*Open.*

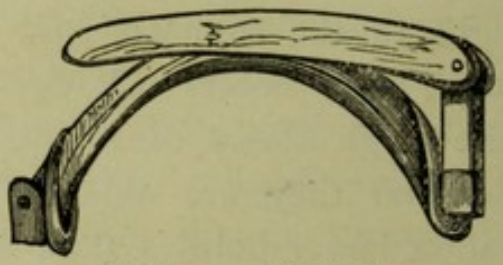


FIG. 300.—*Closed.*

teeth, &c., and especially for being constantly carried in the saddle-bag or pocket, we some years ago designed a folding balling-iron, as shown in Figs. 299 and 300, by which the hands are spared many injuries.

When the practitioner, for various reasons—as when the horse is vicious, the mouth narrow or diseased, or muscles of the jaws contracted, as in tetanus—cannot pass his hand into the horse's mouth, he employs a probang for carrying the bolus to the root of the tongue. In the army, a wooden tube (Fig. 301), having a moving rod within, is used. The

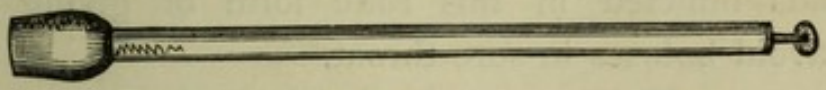


FIG. 301.—*Balling Probang—Wood.*

bolus being pushed into the wide end, the rod protrudes from the other, and by it the bolus is pushed into the pharynx when the instrument is applied to the back of the mouth. A still more ingenious, and, therefore, costly instrument, is the balling-pistol (Fig. 302), but this may be

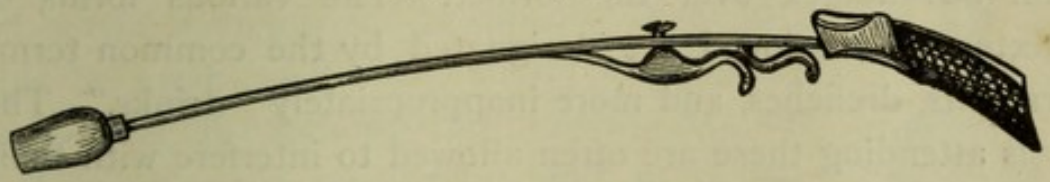


FIG. 302.—*Balling Pistol.*

entirely superseded by the simple, inexpensive, and effective, though old-fashioned, balling forceps, which have been some hundreds of years in use, and shown in Fig. 303. In order

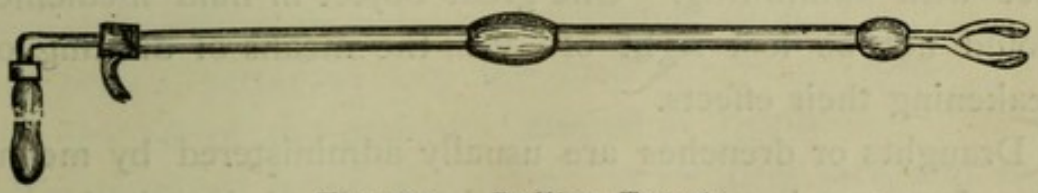


FIG. 303.—*Balling Forceps.*

to render the instrument portable, it is provided with a joint and screw in the middle, where it can be doubled up for the pocket or case. For foals and small animals it is especially

valuable, and as the ball is held between the spoon-shaped extremities, there is no danger of wounding the mouth, and the medicine is promptly delivered by pulling the hook, which allows the jaws to open and loose the hold upon it.

It must be understood that, whenever the foregoing instruments are employed for delivering boluses in the horse's mouth, the tongue should always be taken out on the off side, as directed in the first instance.

Pointed sticks should never be used. We have seen many horses die from injury to the throat, in consequence of wounds inflicted in this rude form of giving a ball. Lastly, avoid boluses in sore throat.

Drenching.

The bolus, or solid form of medicine, is not suitable for administration in every case, and we are compelled to resort to fluid mixtures, which, for the purposes in view, have certain advantages over the former. The various forms of mixture so employed are designated by the common terms draughts, drenches, and more inappropriately "drinks." The evils attending these are often allowed to interfere with their beneficial effects, and should be strictly guarded against by the operator:—1st. They are too large. 2nd. Too strong, being nauseous, or too powerfully acid, astringent, or alkaline, and, therefore, caustic, producing serious interference with swallowing. One great object in fluid medicines should not be lost sight of—viz., the means of diluting or weakening their effects.

Draughts or drenches are usually administered by means of a horn or bottle, as the animal's head is raised to a higher level; and here we would warn the reader against known dangers in this stage of proceedings. The head should not be raised higher than a horizontal position, by

which the fluid gravitates to the back of the throat. The medicine should be given in moderate quantities, and each portion swallowed before another is given. Avoid the use of all kinds of gag for the mouth, and do not pull out the tongue—these are efficacious means of choking the animal. Use a horn having the opening at the wide end (Fig. 304),



FIG. 304.—*Drenching Horn.*

and pour the fluid into a pouch, formed by pulling away the cheek by the left hand, thus avoiding the practice of cramming the instrument between the teeth to the danger of the mouth, &c. If these precautions are observed, a glass wine bottle answers very well, as we can be sure of its cleanliness beforehand ; but, if preferred, a tin bottle, having a similar capacity (Fig. 305), may be used. All such efforts as stopping respiration, by holding the nostrils, &c., are useless to cause swallowing, and even dangerous ; much greater advantages will be derived by manipulating the neck, or pressing in the hollow space between and under the jaws of refractory animals. When a fit of coughing ensues, the head should be immediately dropped ; it is better to lose the medicine than risk the life of the patient. Draughts should never be given when the throat is swollen, sore, and swallowing difficult.



FIG. 305.—*Oval Tin Drenching Bottle.*

The Method of holding the Horse.—A very common, but often decidedly objectionable, method is practised in Scotland. By means of a loop-rope, passed through a ring,

hanging from a beam in the stable or shed, the head is elevated, often too high, by which violent fits of coughing and risk of choking are induced. The plan naturally recommends itself on account of the ease with which the head is held up, as with heavy horses the operation otherwise proves tiresome. When such means are employed, the head ought never to be raised beyond the horizontal position, and the rope should be slackened instantly on the slightest signs of cough. Another plan consists of passing a cord through a hole in the end of a stout stick, and forming a loop large enough to take the upper jaw. By means of the stick the head is elevated by one or two persons, while the operator administers the mixture from the bottle as he stands on a pail. A similar loop may be hung on the stable-fork, and used in the manner described, when a proper drenching-staff is not at hand, but this plan is sometimes attended with danger; and where a number of horses are employed, it is better to have a proper staff, about five feet long, in readiness. With quiet horses the operator may, unassisted, administer a drench in many instances, but we think even with such it is better to use the staff, if possible, and thus facilitate the operation. Besides these methods, the stomach-pump is sometimes used to carry fluids to the digestive organs, as, for instance, in cases of locked-jaw, and some practitioners even pour the fluid down the nostrils, for, as will be seen by a reference to Plates I. and IX., there is little objection to be raised on account of anatomical peculiarities, the fluid readily finding its way into the pharynx, if poured with care along the floor of the nasal chambers. When this course is adopted, it must be understood that no solid substances, powders, &c., are to be used. The fluid must be a perfect solution, dilute, cool, and possess no irritating effect whatever.

Enemas, Clysters, Injections, or Lavements.

These are of three kinds : *simple*, *medicated*, and *gaseous*.

Simple Enemas are composed of water having the temperature of 96° to 100° Fahr., or 36° to 38° Cent., to which soap is added to form a solution. They are used to remove hardened accumulations of fæces from the bowels, and to restore their action when suspended by obstructions or otherwise.

Medicated Enemas are generally watery solutions containing medicines intended to act either immediately on the bowels or remotely on the system; occasionally also fluid prepara-

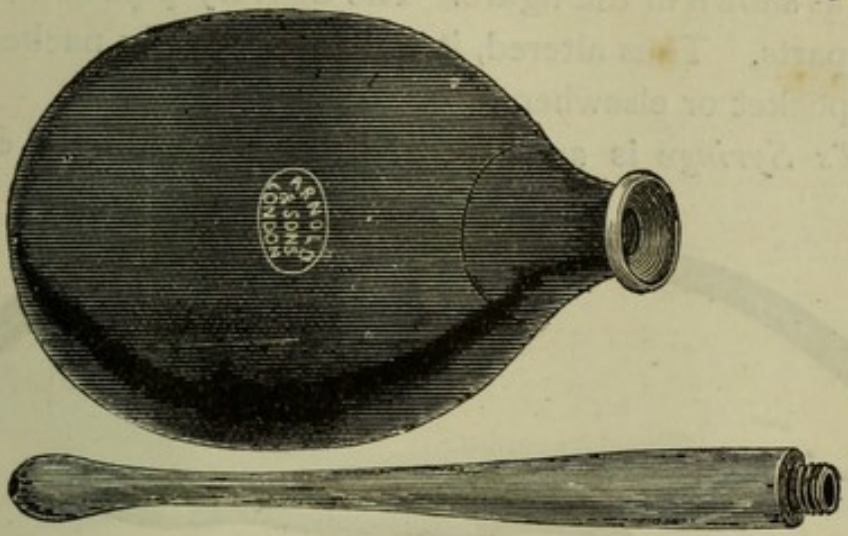


Fig. 306.—*Arnold's Enema Pipe and Bag.*

tions are substituted. The circumstances calling for these are given under the various diseases described throughout the work.

Enema Apparatus.—The several kinds of instruments made use of will now be noticed. The primitive form of bladder and pipe has properly disappeared, and in its place Messrs. Arnold & Son have introduced the caoutchouc bag and delivery tube. This not only answers for enemas, but is eminently serviceable for throwing up food mixtures, as gruel, &c., which would derange more complex instruments (Fig. 306).

Gamgee's Enema Funnel is perhaps the simplest, as well as being equally efficacious (Fig. 307). The horizontal tube is inserted within the rectum, and the requisite fluid, poured into the wider portion, rapidly descends with a gurgling sound. Some years ago the late Mr. Dickinson, of Boston, Lincolnshire, improved the instrument by having the cone flattened from side to side, and considerably reduced in size, as shown in the figure. The delivery pipe is also made in two parts. Thus altered, it was more readily packed away in the pocket or elsewhere.

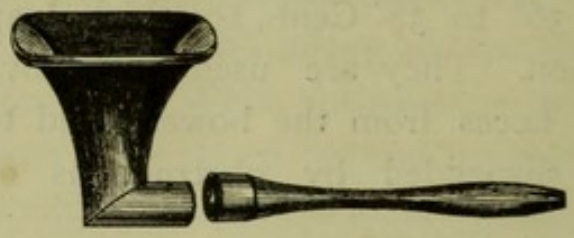


FIG. 307.—*Gamgee's Enema Funnel.*

Reid's Syringe is an expensive but exceedingly effective

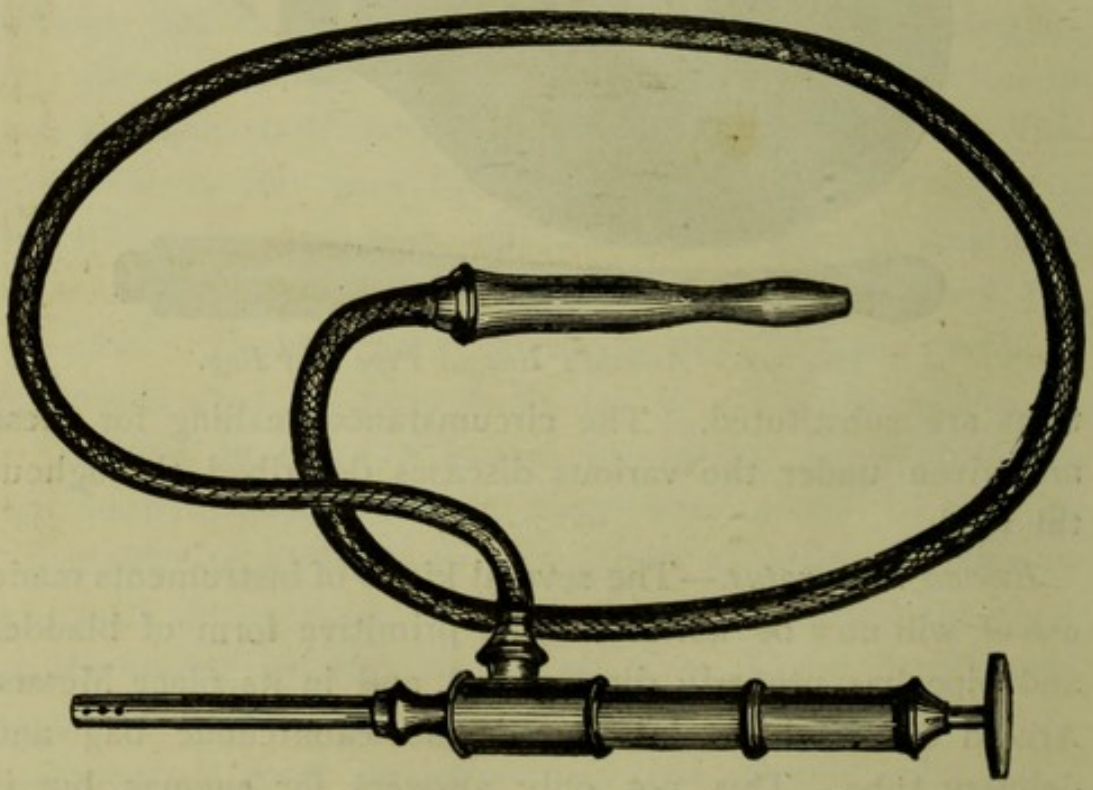


FIG. 308.—*Reid's Syringe.*

instrument (Fig. 308). It is virtually a force pump. The lower tube being immersed in the fluid to be used, the

piston within the barrel is worked up and down, and the fluid is forced along the tube, and enters the bowels by the delivery pipe, already placed within the rectum. Such an instrument is also furnished with suitable mounts and a stilette of whalebone, &c., by which the tube may be used as a probang in choking, for relieving the animal in tympanitis, or to convey fluid medicines to or from the stomach.

Gaseous Enemas consist of the fumes of tobacco, opium, &c., separately or combined, passed into the rectum with the view of assisting the effects of remedies already administered by the mouth, in cases of severe disturbance of

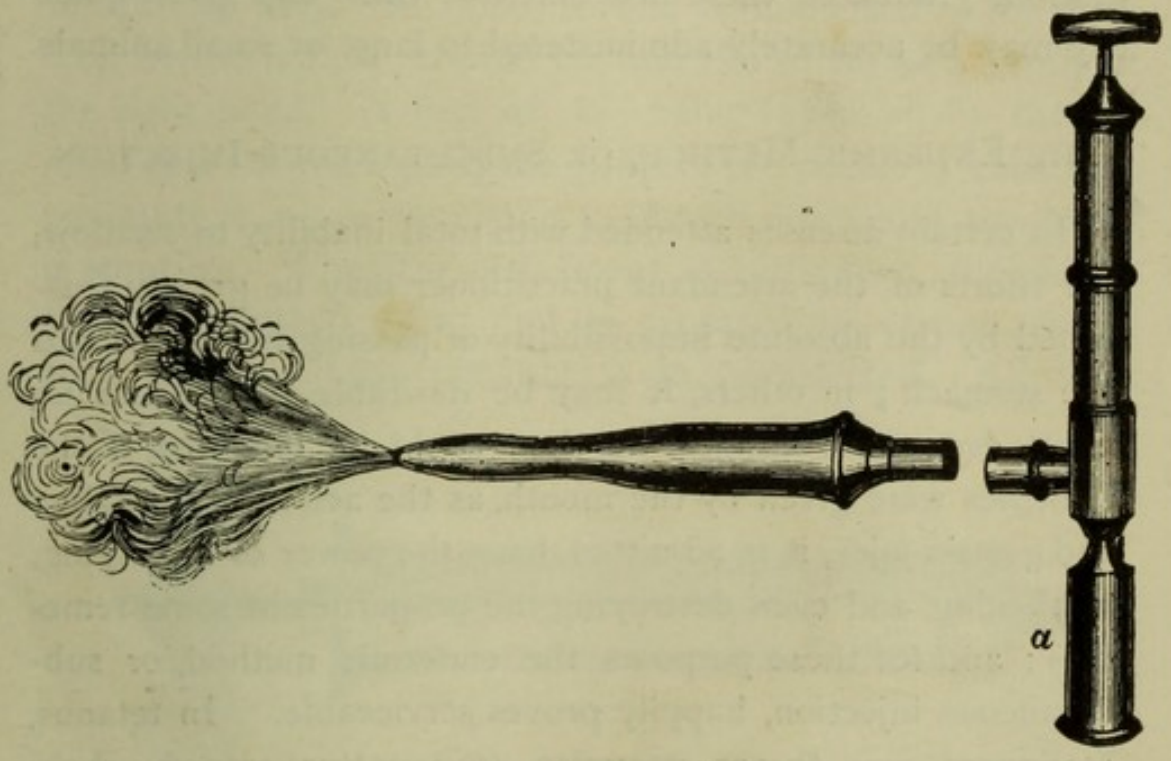


FIG. 309.—*Gaseous Enema.*

the intestines, as colic, strangulated hernia, tetanus, or when worms are present. For this purpose, Reid's syringe is fitted with a barrel (Fig. 309, *a*), which, on being charged with the medicament, is ready for use. A flame is applied to the lower end of the barrel, when, by a few strokes of the piston, the contents ignite. The delivery tube is then placed within

the rectum, and the effects of the fumes thus applied are speedily visible in a variety of ways.

Messrs. Arnold & Sons have made a brass syringe in various sizes (Fig. 310), capable of holding one pint, half a



FIG. 310.—*Arnold's Syringe for Foals, Calves, and Sheep.*

pint, and quarter of a pint. The makers, with their characteristic readiness to adopt any improvement, have, at our suggestion, graduated these instruments; thus, any given quantity may be accurately administered to large or small animals.

THE ENDERMIC METHOD, OR SUBCUTANEOUS INJECTION.

In certain diseases attended with total inability to swallow, the efforts of the attendant practitioner may be greatly frustrated by the absolute impossibility of passing medicines into the stomach; in others, it may be desirable to produce an effect even more immediate than could be obtained if the remedies were given by the mouth, as the action of the saliva and gastric juice, it is admitted, have the power of modifying, weakening, and even destroying the properties of some remedies; and for these purposes the endermic method, or subcutaneous injection, happily proves serviceable. In tetanus, malignant sore throat, strangles, suppurative catarrh, rheumatism of joints, &c. &c., the process is found to be of immense service. Lastly, in destroying animals by very powerful poisons, more particularly the small ones, when there is risk of waste in giving them by the mouth, the plan is ready and effective.

The instruments necessary are a small glass syringe, suitably mounted, being fitted with hollow needles, and the

barrels graduated, by which a known quantity of the drug can at any time be minutely administered. Such a contrivance is shown in the accompanying engraving (Fig. 311).

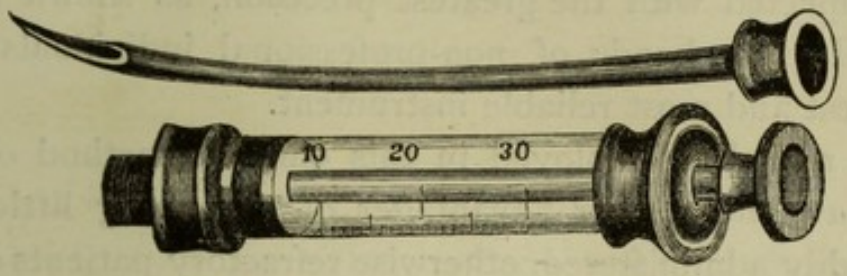


FIG. 311.

When required for use, the syringe is filled by drawing up the piston, while the opposite end is immersed in the fluid. The needle is then screwed on, and the whole held firmly in the right hand. A fold of skin being taken up by the left hand at a desirable part, the point of the needle is caused to penetrate it, when the piston is pressed down and the barrel is emptied. When the instrument is withdrawn, the skin is lightly smoothed over; and in repeated injections another spot at some little distance is to be selected. All solid

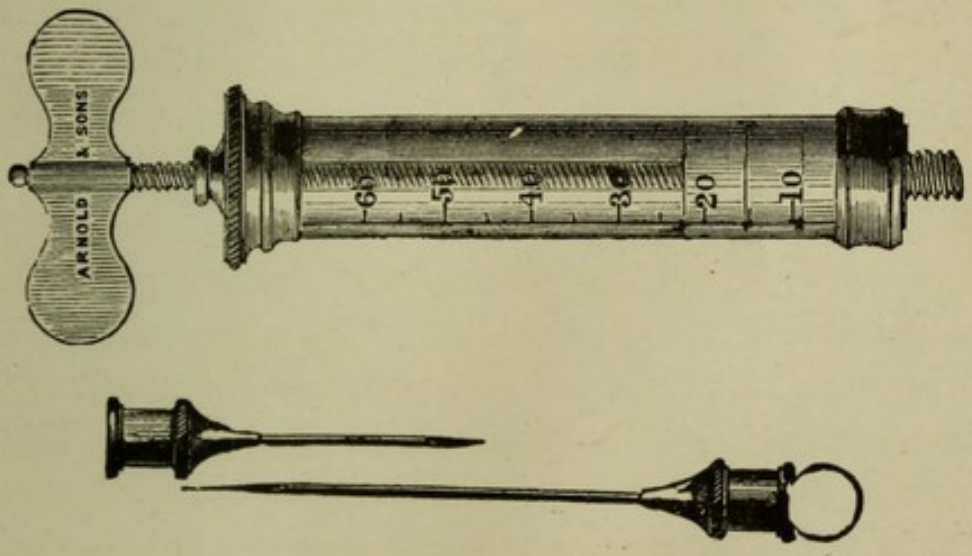


FIG. 312.—*Simond's Subcutaneous Syringe.*

remedies and powerful irritants must be excluded; none but perfect solutions are to be employed.

A valuable improvement has been effected in the instrument illustrated above. The plunger is moved by means of a screw, which enables the operator to regulate the quantity to be injected with the greatest precision, as shown in Fig. 312. In the hands of non-professional individuals this is the safest and most reliable instrument.

The remedies employed in this efficient method of treatment have the further advantages of occupying little room, are readily administered, otherwise refractory patients offering no resistance, the doses being regulated with the utmost nicety.

We advance these statements on the supposition that the remedies are of the approved strength and unquestionable purity. Messrs. Willows, Francis & Butler, of 101, High Holborn, W.C., have paid much attention to this branch of pharmacy, their preparations having gained the approbation of many painstaking veterinarians of the present day.

SECTION XIII.

POISONS.

POISONS.

THE lower animals are more frequently the subjects of absolute poisoning than is generally supposed; and the fact so repeatedly disclosed in the *post-mortem* examinations, strongly points to the advisability of continued investigations, in all cases of death, by competent men, which will not only result in immediate personal satisfaction, but further the ends of science in extending its benefits for the general welfare of those concerned in the breeding, rearing, and keeping of all kinds of live stock. The subject of toxicology, or the doctrine of poisons, is as comprehensive as that of disease generally; and, were we to do it the justice it deserves, the whole of this treatise would fail to exhaust it. In the limited space even of this Section, the reader will not fail to recognise its importance, and, we trust, endeavour to promote its application to the spread of information in regard to the diseases of our domestic animals, by affording opportunities for investigation on all suitable occasions.

Noxious substances coming within the meaning of "poisons," are derived from the animal, vegetable, and mineral kingdoms, and are thus subdivided :—

I. SIMPLE IRRITANTS.—Substances that irritate and inflame the parts with which they are in contact.

II. CHEMICAL OR CORROSIVE IRRITANTS.—Substances which enter into chemical combination with the tissues,

forming definite compounds, and otherwise carbonise, disorganise, or destroy them.

III. NERVINE POISONS.—These act in several ways. 1. Upon the brain; these are called *cerebral* poisons. 2. Those which act on the spinal cord are known as *spinal* poisons. 3. A combination of these effects in one substance stamps it as a *cerebro-spinal* poison. 4. Other agents, not only possessing the foregoing qualifications, but, in addition, through the agency of an acrid volatile principle contained within them creating obvious irritant effects, are denominated *narcotico-acrid* (or irritant) poisons.

The death of animals is caused by poisoning in three ways—viz., *empirical practice*, by *accident*, and with *malicious* or *wilful intent*.

In *empirical practice*, farriers, grooms, farmers, and others, often exceed the proper use of remedies, the action of which they do not sufficiently comprehend, and death results from conditions that are not only misunderstood, but more frequently unobserved until too late. Thus, *mercurial ointment* and *white precipitate* are extensively used to destroy skin parasites, and, either from absorption, or the animal being allowed to lick himself, fatal mercurialism is produced.

Arsenic and *corrosive sublimate* are used for similar purposes, and, in the form of ointment, as a specific for the so-called cancers and warts, fistulous openings, poll-evil, &c.; also for sloughing purposes in various other diseases, from which, now and then, fatal absorption of the poison ensues. *Common salt* may be given so long as to induce a dangerous plethora. *Aloes* and *opium* are often prescribed by druggists who can know nothing of the nature of the diseases of animals, and from which losses have taken place. *Tartar emetic*, we know, is purchased by some quacks in quantities of half a hundred weight annually, to form the bulk of their horse and cattle powders as specifics for almost everything. *Nitre*

and *sulphur* constitute the sole ingredients sent out from some learned establishments in alarming parcels, and the druggist improves the compound by adding *black antimony*. *Acetate of ammonia*—erroneously believed to be a stimulant—accomplishes, in unskilful hands, most deadly acts. *Aconite* is equally, if not more, dangerous, although many profess to guard its powers; and *sulphate of iron*, the best of mineral tonics, from careless administration may be caused to produce rapid wasting.

Accidental poisoning occurs in a variety of ways. Those who are in the habit of prescribing for, and treating their own animals, are frequently very careless in allowing packets of medicine, &c., to lie about on the corn-bins, accessible shelves, beams or projections of wood, stone, &c. The poison for rats and mice is incautiously placed, and when animals roam at will through buildings, or when mischievous boys commence their gambols, such dangerous articles are dispersed, and not unfrequently fall among the food. Sometimes from the absence of proper labels or marks, poisons are substituted for simple remedies; at others they are thrown upon the manure heap, and if not speedily consumed, are conveyed to the land and work irreparable mischief on some future and unlooked-for occasion. Animals returning from long journeys are turned hungry on bare pastures, or after long scarcity of food in dry summers, break into neighbouring shrubberies or copses, and browse upon poisonous plants, or at least upon those unnatural and unfitted as food; when trees have been thinned, their branches are carelessly thrown in the way of animals which devour them, and in one or other of these ways, the yew, laurel, rhododendron, hollyhock, and oak prove fatal. Acorns, after having fallen to the ground in dry seasons, are sometimes taken in large quantities, and with colchicum, beech-nuts, cow parsnips, sow thistle, hemlock, poppy-plant, upas antiar, &c., produce serious, if not deadly, effects.

Wilful and malicious poisoning is not uncommon. It may be generally traced to ignorant and spiteful *employés*, discharged workmen, &c., who rarely execute the details of their foul practice in a clever manner. Ordinary and available poisons are mostly employed, as arsenic, phosphor-paste (phosphorus), rat powder (strychnia, baryta, corrosive sublimate), savin, mineral acids, terchloride of antimony, &c.

Symptoms of poisoning.—Great similarity exists in the form in which many diseases are presented, and the signs by which poisons are denoted. There are, however, particular distinctions of importance—viz., the sudden appearance of the symptoms, generally after a meal, or in combination with turning upon a certain pasture, connexion with some particular operation, as the use of a medicinal preparation, &c. &c. There are additional signs special to each poisonous ingredient: thus sudden diarrhœa or dysentery may characterise arsenical and mercurial poisoning, while salivation and loosening of the teeth belong especially to mercury; and salivation with swelling of the eyelids, fœtor of the breath, &c., are seen as special tokens of arsenical poisoning. Veratrum album produces a copious discharge of ropy saliva with corresponding prostration, and possibly also violent abdominal irritation.

The various mineral acids and caustic alkalies produce erosions of the mouth, &c., staining of the teeth, inability to eat, gastro-enterites, and death. Aconite causes profuse foaming at the mouth, champing of the jaws, hiccough, besides abdominal pain; strychnia developes the most violent spasms and contractions. In the vicinity of lead works, paralysis is common, from an absorption of lead in a minute state of division, and more acute signs, as phrensy, occur after large quantities are taken. Arsenic also finds its way into the system under similar conditions, by being deposited on the vegetation in the locality where copper smelting is

carried on, and gives rise to enlargement of the joints, great lameness, emaciation, and eventually death.

Treatment of poisoning depends greatly upon the nature of the substance which has been administered. The desirable object of treatment in most cases is to follow such administration by another agent, which, having the power of entering into chemical combination with the first, produces a third, totally different, and inert compound. Such an agent is known as an antidote, and for each of the poisons a special antidote is required.

It is impossible to treat cases of poisoning properly without a knowledge of the nature and properties of not only the noxious agent, but also of that used as a destroyer of the poison. Much evil is apt to result from the agency and selection of antidotes, for, being in themselves capable of chemical action, the production of even a more poisonous compound may be the inevitable consequence. This fact at once points out the profound nature of the department we are briefly considering, and how dangerous a little knowledge may be. To the horseowner a good knowledge of the domestic treatment required will be of infinite service, which, being carried out with energy, will in many cases bridge over sufficient time until proper aid can be obtained. It should always be the practice to send to a practitioner suitable information connected with the known case of poisoning, otherwise he may arrive unprepared. The safest way is to send a *written note*, or an eye-witness of the case from the beginning, and thus prevent the wrong delivery of important messages.* When sudden cases of disease arise, and they are attributed to the presence of poison, attention should be directed to the alleviation of symptoms as much as possible.

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* See The Horseowner and Stableman's Companion. London: F. Warne and Co.

Thus, when profuse diarrhœa and dysentery prevail, large quantities of thick flour or starch gruel, milk, and even eggs beat up are valuable. If arsenic, corrosive sublimate, calomel, &c., are present, the above, also broths and soups, are valuable agents to restrict and weaken the powers of the poisons. When acute abdominal pains ensue in addition, doses of tincture of opium, or the extracts of belladonna, hyoscyamus, &c., are of efficacious service. This treatment also answers well after animals have taken many vegetable poisons, as colchicum, hellebore, &c. ; subsequent depression and prostration should be met by ammonia, or sweet nitre, &c.

When acids have been swallowed, plenty of milk, or large quantities of carbonate of soda in water, should be given ; and when the caustic alkalies, as potash, soda, or ammonia, are present, linseed or rape oil may be given plentifully, or vinegar in water, when at hand ; soups and broths are also valuable. The veterinary surgeon will readily supplement this treatment on arrival, if all the facts are laid before him ; and nothing paralyses his hands so much as to request his assistance in an urgent case, when known facts as to causes are withheld from him.*

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*A mass of concise information relating to the various subjects of this and preceding sections, will be found in the Author's work : Memoranda for Emergencies. London : John Churchill and Sons.

SECTION XIV.

THE DISPENSATORY.

THE DISPENSATORY.

A List of the Remedies employed in the Treatment of the Diseases of the Horse, with their Combinations, Doses, etc.

In stating the dose or quantity of a remedy prescribed, the smallest are those suitable for young and immature, or diminutive animals, and capable of inducing a mild or gentle effect. The larger doses will, therefore, be understood to be productive of more immediate and violent action, as well as being called for in the case of larger and coarsely bred animals. Those of medium size may receive the doses of an intermediate character, age and breed being taken into account. Thus, an adult waggon or dray horse may require 9 or 10 drams of aloes for a full effect; a large carriage horse, 7 or 8; a saddle-horse or hackney, 5 to 7; and ponies, 3 to 5. Some modification must also be made on account of age. Animals may give evidence of rapid growth, but such do not bear the action of remedies so well as those of greater age and development. It is, therefore, useful to remember that some such allowance as the following may be generally required:—A one-year-old colt will need only one-third the quantity prescribed for the adult horse of his particular breed; a two-year-old, one-half; and the three-year-old, two thirds, or thereabouts, the quantity gradually approximating the full dose as the age advances. Consideration must also be given to temperament, formation, general

habit, mode of life, character of food, and other matters which cannot possibly at this time come under review.

Before proceeding to a consideration of the various remedies in detail, the present appears to be the most suitable stage at which we should place before the reader some of the views, now largely promulgated, as to the supposed nature of many diseases, and the causes assigned for their production and development.

It has already been stated, at page 746, under Antiseptic Treatment of Wounds, that the chief cause of difficulty arises from certain disease germs, micrococci, or infinitesimally small organisms, which gain admittance to the diseased or injured surfaces. Similar organisms, recognized as bacteria, are the agents by which certain diseases are conveyed to the system of men and the lower animals. Some of these are confined to the former, while others operate only upon certain species of the latter. The study is extending, and promises to yield ample reward for the diligence expended upon it. The treatment of disease is gradually assuming altogether new and specific characters. Many observers have found as a result of experiment that certain substances have the power of arresting the development of the bacillus of a special ailment, as well as the development and reproduction of its spores. The *modus operandi* consists in attacking the cause, with the view to its possible destruction, by which the malady is at once checked and the patient recovers. Such remedies will be noticed in detail.

It remains to be stated that the possible serious danger to which all animal life seems to be exposed, is very much diminished by the power of the system to destroy the bacteria which find their way into the organism. Besides the various tissues which are antagonistic to such low forms of animal life, the white corpuscles of the blood—leucocytes,

possess remarkable powers of annihilation. Disease arises only when a large number of pathogenic bacilli enter the system, a number far beyond the means at its disposal for destruction. They then have the best of the warfare, and destroy the system.

Such are the conclusions of present day science. They demonstrate that specific and especially contagious maladies, are the products of the so-called pathogenic, or disease producing bacillus, after gaining an entrance to the system; or, more precisely, the genesis of such a disease alone depends upon these bacilli, and they likewise determine the nature of the malady. Of these bacteria, or schizomycetes, there are many varieties. They occur as microscopical bodies of various forms and sizes, together with remarkable powers of multiplication by increase of their units and formation of spores. Water, organic matter, and salts are necessary for their existence, while some require, in addition, a supply of oxygen, and others exist without it. They speedily destroy the tissue on which they grow, by exhausting the nutriment found in it, and this is replaced by deposited matter which is inimical to their life. The colony therefore perishes, but another follows, which flourishes on the scene of a former pestilence.

It is, however, uncertain whether these supposed disease-producing organisms, as at present observed in their several species, genera, or orders, are fixed; and whether by virtue of surroundings the harmless bacteria become possessed of dangerous properties. Further investigation will, doubtless, throw important light on these and other points. Meanwhile observers are at work, whose researches tend in the opposite direction. The existence of bacteria is in no way disputed; it is abundantly confirmed. The question they are seeking to determine is whether the bacteria are the *product*, rather than the cause of disease. The issues of investigation in such

subjects of vast importance to the public welfare will be looked for with some anxiety.

There are acknowledged difficulties in the way of even the most acute observers. Opponents of the pathogenic bacillus theory have shown the unreliable nature of the cultivation test. The micro-organisms live and multiply only in a suitable medium. When introduced to the blood of healthy beings or animals, it is absolutely necessary that they should find already prepared for them such a medium, otherwise they cease to become active or fruitful. Thus, they cannot be the direct or immediate cause of disease, and we are left pretty much as we were before, greatly dependent upon the scientific imagination to fill up such gaps in the method of research, on which we fail to obtain the least information. Again, it is observed that certain contagious diseases are alone dependent upon the presence of micro-organisms for their development. Such are small-pox, measles, &c., yet the same intelligent research furnishes the proof that identical micro-organisms are found in equal abundance in the blood of perfectly healthy individuals, and of others suffering from diseases of a benign and non-contagious character.

This fact has demonstrated the utility of looking away from the micro-organism, and taking up the study of the medium in which it exists and thrives, as well as the altered conditions of that medium as brought about by the life of the microbe itself. We are generally familiar with the common results derived from overcrowding. Whether the inmates of a building be men or animals, life functions go on only in proportion to the supply of pure air—oxygen. This, by the process of respiration, is converted into the deadly carbonic acid, which, in common with other excreta, completely alters the nature of the medium, and renders it unfit for supporting life. It now contains a poison, derived at the expense of the oxygen of the original medium. Under these circumstances

no method of reasoning would satisfy the logical mind that micro-organisms, if discovered to be present in the body after death, were the direct cause. Yet this is what some are attempting to do with respect to contagious maladies especially. Even such low forms of animal life must carry out the functional details of their existence, upon which they depend. That existence ensures the assimilation of particles—food—to the wants of the organism, such food being provided by the medium in which they thrive; the result, a production of new principles altogether unlike the medium, but now largely, if not entirely, taking its place.

The fermentation of sugar may be taken in further illustration of this view. The production of alcohol does not depend merely on the presence of yeast cells in the solution, but it is in consequence of chemical changes imparted to the sugar by a secretion derived from the yeast cells, a resulting product of their life action. Thus it is shown that blood-poisoning, or septicæmia, which follows the introduction of putrilage into the circulation, does not depend upon the presence, growth and irritation of micro-organisms. Under favourable circumstances, and in a suitable medium, they live and multiply, meanwhile living upon their surroundings, entirely changing the constitution, the resulting product being *sepsin*, derived either directly from the micro-organisms as their secretion, or it is a chemical product of the changes wrought upon the albumin upon which they feed.

It has been found by Nicati and Riltsch* that in "the culture of the so-called *comma-bacillus*, which exercises a poisonous effect when injected into the veins of dogs, depends for its effect not upon the micro-organisms themselves, but a poisonous compound which they produce in the cultivation fluid."

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* Journ. Chem. Soc., Abstracts, p. 169, 1886, and quoted in "Nature's Hygiene." Baillière, 1888.

In contradistinction to the foregoing, we may briefly refer to the "graft theory of disease." It is not a question of microbes, but of "bioplasm." Dr. Lionel Beale* has shown bioplasm occurs in every part of the body. It is germinal matter, capable of selecting the needful elements from the surrounding pabulum, and building up living tissue out of dead or lifeless material. Thus, owing to specific action and changes taking place in bioplasm, the nature and kind of tissue is determined, the result being hoof, horn, hair, skin, bone, teeth, muscle, &c. This is also true of vegetable, as it is of animal, life. Such tissues have also their various secretions, intended for provisions attendant upon their preservation and natural decay, and under normal conditions the changes are purely physiological. When, however, such changes are influenced by extraneous causes, then we observe certain departures from the normal course; secretions are impaired and their constitution changed; the actions cease to be physiological and become pathological in their nature—in other words, the secretions are diseased products. Long since it was observed that the exciting causes of all contagious diseases consisted of such diseased products—secretions—which pass by various means from patients suffering from the same maladies; and malarious fevers are due to the miasm, or poison, which is thrown off from diseased vegetables.

In like manner it is shown that such secretions contain bioplasm, or germinal matter which is living, and as active as the bioplasm of healthy secretion. When, therefore, such vitiated particles, thrown off from diseased subjects, gain access to the healthy system, they are enabled by the bioplasm or living matter which they contain, to attach—literally graft—themselves into the living body. Diseased

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* "Bioplasm," &c. J. and A. Churchill, 1872.

germinal matter thus engenders disease, subverting original functions, and even destroying the possibilities of life.

With this brief review of a subject presenting a variety of phases and surrounded with many difficulties, the reader will see the need which exists for a careful study of means whereby, in some measure at least, the ravages of disease may be mitigated or prevented. The resources of science have not yet disclosed even the outlines of a permanent cure. In the present state of knowledge, arrest depends entirely upon the only means at our disposal, of placing a limit upon the multiplication and spread of the causes of infection. We are dealing with invisible and imponderable matter; and here lies the chief difficulty. Nature, however, has bountifully disclosed there are means and processes inimical to the life of such disease-producing causes under certain conditions; that by cleanliness and good order, healthy conditions of land, the crops they grow, and the animals which feed upon them, may be largely secured. It is the province of the science of medicine to combat the states we have been considering. It also seeks to provide the weapons for the warfare, which find allusion in the following list of remedies known to possess the power of either arresting the development, or, otherwise, destroying the organism upon which the existence of disease is supposed to depend.

There is yet one important consideration in connection with this subject which deserves a reference. To what kind of classification are we hastening? There are certain diseases which have long been regarded as probably due to blood poison, arising out of an unnatural plethora, or to septic principles derived from alluvial or heavily manured soils, the vegetation sharing in the general state of toxemy. We allude to the anthrax diseases. Certain nutritious and other matters supplied in the food are supposed to undergo changes owing to non-elaboration. They act as a ferment, and serious

apoplectic states are induced. The bacillus of pathogenic characters has long been identified with these complaints, not as the cause, but as the effect. Once establish the opposite, and anthrax in all its forms, by a leap and bound, enters the category of parasitic diseases; glanders, farcy, cattle plague, hydrophobia, and others are no longer contagious, while some, hitherto viewed only as of minor importance, come into greater and even serious prominence. Modern science in certain quarters has almost accepted the conclusion that the "pathogenic bacillus" is responsible for almost all "the ills that flesh is heir to."

General Remedies.

Acetate of Ammonia.—(*See* Ammonia.)

Acetic Acid.—A powerful corrosive obtained by the destructive distillation of wood or sawdust. It is not used internally; and its use externally is limited. On account of its power of dissolving albuminous or fibrinous substances, it has found favour as a remedy for warts, horny excrescences, and the scaly growths due to irritation of the skin from cryptogamic parasites, as in ringworm, also scab, mange, and psoriasis. Largely diluted with water it is used as an antidote against poisoning by the caustic alkalies. Its chief use is confined to the formation of cooling lotions, of which the following are examples:—

1. Recipe No. 165.

Take of acetic acid	1 part.
Distilled water	7 „

Mix.

2. Recipe No. 166.

Take of acetic acid	2 fluid ounces.
Distilled water	14 „ „
Spirits of wine	2 „ „
Sal ammoniac	1 ounce.

Mix.

3. RECIPE NO. 167.

Take of acetic acid	2	fluid	ounces.
Distilled water	14	„	„
Acetate of ammonia	4	„	„
Spirits of wine	2	„	„

Mix.

N.B.—When distilled water cannot be obtained, soft, or rain-water, previously boiled and strained through several thicknesses of flannel, or fine canvas, may be used.

ACONITE (Wolfsbane, Monkshood).—A powerful and most excellent remedy in diseases characterized by high febrile action and abnormal increase of temperature. The greatest caution is needed during its use, otherwise unlooked-for poisoning from arrest of the heart's action as well as paralysis of the respiratory muscles may arise. All who do not possess a very accurate knowledge of the physiology of respiration and circulation, are advised against the use of this agent. In the hands of a skilful practitioner the drug is invaluable. The tincture is the most convenient form, and this is usually combined with the dilute solution of Acetate of Ammonia. Safe practice consists of the administration of a full dose at the outset and gradually diminishing the quantity, when its entire withdrawal may take place contemporaneously with a reduction of vascular action and animal temperature. Injected beneath the skin, aconite acts promptly and with certainty; on this account one-third or one-half the quantity is required. For administration by the mouth, the doses of the common or B.P. tincture are:—for horses, twenty to thirty drops. Fleming's Tincture of Aconite is the most powerful, and its doses are one-fourth of the above.

ÆGYPTIACUM.—A combination of mild caustic properties, extolled by some as a corrective for unhealthy wounds, thrush, canker, &c., in the following proportions:—

RECIPE NO. 168.

Take strong vinegar	17 parts.
Honey	14 „
Verdigris, finely powd red.....	5 „

Mix.

ALCOHOL (Spirits of Wine).—A clear, volatile, ethereal fluid, obtained by the distillation of solutions of sugar, or any kind of grain, &c., rich in that substance. It is principally used in the pharmacy for making tinctures. An *evaporating lotion* is made as follows :—

RECIPE NO. 169.

Take of spirits of wine	2 fluid ounces.
Distilled water	1 pint.

Mix, and apply to the inflamed parts by means of a thin covering, which should be constantly moistened. A mixture of alcohol and white of egg is used to prevent excoriation of the skin where pressure is acting injuriously, or to cover a wound ; with one-half to one per cent. of carbolic, or salicylic acid, or petroleum benzene, it acts as a soothing application in irritating skin diseases.

Other forms of alcohol will be alluded to under Ethers.

ALOES.—An extract from the aloe plant. Various kinds are met with in the market, as Cape, Socotrine, and Barbadoes. The last is generally used, being the most active and certain. Aloes are powerful excitants of the alimentary canal, and in moderate doses prove laxative, or mildly purgative, and in large doses cathartic, or violently purgative. They are eminently useful in reducing inflammation of local and general characters, removing worms and obstructions from the stomach and intestines, overcoming ordinary constipation, relieving congestions of the liver, kidneys, &c. &c. ; and from the fact of the bowels being the great outlet for waste and unused substances, their increased action is largely conducive to the relief of overcharged organs

and other parts. To act upon these aloes prove the best remedy, and may be given in doses varying from six to ten drams. The dose for young foals may be estimated as five grains for each week of the age of the patient. Laxatives and purgatives are thus prepared :—

RECIPE NO. 170.

LAXATIVE BOLUS.

Take of aloes, finely powdered	3 or 6 drs.
Ginger, powdered.....	1 dr.
Soft soap	sufficient.

Triturate the aloes and ginger together first ; then add the soap in successive quantities during further trituration, until a paste is produced ; then form a bolus, and wrap in thin paper.

RECIPE NO. 171.

PURGATIVE BALL.

Take of aloes, powdered	8 to 10 drs.
Other ingredients and directions as above.	

As a more ready and convenient plan, a form of "mass" is used, aloes being melted with some other agent—as treacle, lard, oil, &c. ; and when required, the requisite dose is cut off. Such is only applicable in a large practice.

In some instances a watery solution is required, which is compounded as follows :—

RECIPE NO. 172.

SOLUTION OF ALOES.

Take of aloes, powdered	20 oz.
Water	1 pint (20 fl. oz.)

Dissolve the aloes in the water maintained sufficiently long at 112° F., and when cold add one fluid ounce of spirits of wine, two drams of concentrated essence of ginger, and make up the loss by water to one pint. Set aside in a well-corked bottle, and in apportioning the doses, it must be remembered that each fluid ounce is equal to one dram of aloes.

Tincture of Aloes.—Employed only as an external remedy for wounds.—(*See* Camphor.)

ALUM.—Lotions of alum are useful for various purposes, and are therefore made of different strengths; one or two drams to a pint of water will constitute those of the stronger kinds, while for the weaker forms, ten to twenty grains may be sufficient. When burned and afterwards reduced to powder, it forms a strong caustic, and has been employed for the treatment of thrush and canker in the feet, and for repressing granulations. With treacle or honey and vegetable astringents the simple powder is used as an electuary for sore throat, aphtha, &c., or with water to which a few drops of sulphuric acid have been added, it forms an excellent gargle or wash for the throat and mouth, or a lotion for unhealthy wounds, &c.—(*See* Chloralum.)

AMMONIA.—The following compounds are employed:—The *Sesqui-carbonate* is given as a stimulant in doses of two to four drams, being finely powdered, otherwise it may irritate and derange the stomach. *Spirits of Ammonia*, three to six fluid drams, diluted with cold water, gruel, or linseed mucilage. *Liquor or Aqua Ammoniæ fortior* is a still more powerful remedy, and requires much caution in its use. The doses, one to two fluid drams, largely diluted as already stated. *Acetate of Ammonia* (Mindererus's Spirit), unlike the foregoing, is a valuable sedative or depressant, employed in affections of an acute inflammatory type. It should never be prescribed in typhoid affections in full doses, or without suitable combinations to guard against its depletive or reducing effects. The doses are two to four ounces, diluted with simple water or linseed mucilage.—(*See* Aconite.) When it is desirable to use the acetate of ammonia to reduce latent forms of irritability due to subacute affections, it is usefully combined with sedative extracts as belladonna, hyoscyamus, &c., and moderate

doses of the ethers. By these means the full diaphoretic action may be induced. With acetic acid the acetate of ammonia forms a cooling lotion. *Sal Ammoniac*, or Muriate of Ammonia, when dissolved in water acidulated with acetic acid, proves a good application for cooling inflamed parts when the skin is not broken.—(*See* Acetic Acid.) The most effective method is to drop the powder into the acid solution in small and successive quantities, by which the temperature of the fluid is reduced to the lowest degree, and consequently acts more beneficially. This salt is also usefully combined with nitrate of potash and carbonate of soda, with gentian or nux vomica in congestion of the liver after purgatives have been given.

AMYL-NITRITE.—A yellow, ethereal, limpid and volatile fluid, having the odour of pine-apple. It is used in asthma and spasmodic breathing due to sore throat, bronchitis, &c. It reduces the poisonous action of strychnine, and promises results of usefulness in tetanus, and epilepsy of young animals. Doses for horses, three to ten drops; smaller animals, one to three drops. This drug speedily decomposes; specimens become worthless in a few weeks. Insoluble in water. Prescribed with rectified spirits, ether, or chloroform. A still more powerful agent of the same form is *Nitro-glycerin*. It is a highly dangerous explosive, and requires extreme care.

ANIMAL TEMPERATURE.—The heat or warmth of the body, as indicated by this term, is due to vital and chemical forces in operation throughout the system. The principal source is doubtless the pabulum, consisting of the nutritious elements of the food, or, in other words, the substances which, under the regulation and control of the nervous system, contribute to form new compounds necessary for the building up and repair of the tissues of the body. These changes or transformations are largely attended with the evolution of

heat, and as they are constantly going on in every part of the healthy system, the temperature of each is ensured, but the proper equalization is provided for by the circulation of the blood, in which some of these changes also take place.

Another source of animal heat is in a process the reverse of that just referred to—viz., the metamorphosis or breaking up of tissue, and their change into substances which are readily expelled from the body.

The first or constructive process is essentially necessary, and of course most active in youth. It also predominates, the latter or destructive process being regulated according to the amount of wear and tear incidental to exercise or labour.

A certain measure or elevation of temperature is, therefore, consistent with natural laws and functional activity. It is also the measure or test of health, and we are enabled, by a close examination of the registration of temperature, to judge of departures from the measure or standard which is the sure indication of healthy function.

It will thus be apparent that when healthy functions are obstructed or arrested, the measure of natural temperature will also be perverted. It must either be increased or diminished, and the causes which produce such departures are more or less serious, being no less than diseased action. An increase of temperature—that is, an elevation above the healthy or natural standard—is an indication of great destruction of tissue, as may be proved by an examination of the urine, &c., which is found to be highly charged with compounds known to be formed only in that process. On the other hand, a fall of temperature below the natural standard is an indication of serious destructive action, while the products are retained in the system, often to the extent of causing death.

By the use of the clinical thermometer, all these ranges can be accurately measured and interpreted. We not only speak

with tolerable certainty as to the intensity and progress of disease, but we may also judge of the approach of dissolution when not the faintest physiological sign is evident to the ordinary observer; and further, the grand utility of the instrument is demonstrated in foretelling the welcome states of defervescence or decline in the intensity of disease, before the most careful veterinarian is able to detect a single reliable physiological sign of that process.

In the incubative stages of all contagious diseases, the prophetic registrations of the thermometer are also remarkable as they are unerring, and the thoughtful practitioner will derive from them, in many instances, the exact results of the effects of the remedies administered, as well as indications of the necessity for change, or the addition of others. Even the stock-owner should possess some knowledge of the use, as well as the science, of interpreting the indications of this simple yet invaluable instrument. Full information on the subject will be found in the Author's manual, new and revised edition.*

ANISE (Aniseed).—The dried seeds of *Pimpinella Anisum* are aromatic stimulants. They are usefully combined with saline medicines to promote their action, and diminish their nauseating or griping qualities. Such are also the carraway, coriander, fennel, fenugreek, &c. Their well-known stomachic qualities have rendered them famous in the estimation of many horse-owners, cattle feeders, and others who use them for improving the coat. With an admixture of ground locust bean, peas, linseed cake and common salt, they form the popular "horse and cattle foods," by which fortunes have been extracted from the farmer's pockets. Dose for cattle, four drams to one ounce.

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* "The Thermometer as an Aid to Diagnosis in Veterinary Medicine." London and New York: Frederick Warne & Co. Price One Shilling.

ANTIFEBRIN.—(*See* Bensol, under "Antiseptics.")

ANTIMONY.—The following preparations are now rarely used as remedies for the ailments of stock. The *Muriate, Oil, or Butter of Antimony* is a powerful caustic, and as such finds favour as a remedy for diseases of the feet, &c., with many who cling to ancient or empirical practices. It is decomposed by admixture with water, and is only safely diluted with compound tincture of myrrh. *Tartar Emetic*, once much extolled as a remedy in inflammatory diseases, is now deservedly thrown aside. *Black Antimony*, formerly used as an alterative, has now lost repute, and, like the preceding, has been superseded by remedies having reliable properties.

ANTIPYRIN.—(*See* Benzole, under "Antiseptics.")

ANTISEPTICS.

As a result of research during late years, the cause of disease, we have already stated, is believed to be due to the presence and habits of various organisms or low forms of animal life, capable of generating conditions inimical to the well-being of the higher organism. This has led to the testing of remedies for ascertaining their power of annihilating or destroying the germs, and those which have been said to possess such an effect have been grouped as a class under the term "Antiseptic." With the evidence of other investigators before us, which point to opposite conclusions, we need to guard against a hasty acceptance of propositions respecting which there are yet many particulars not yet satisfactorily accounted for.

AUGEAN FLUID.—This is a registered proprietary remedy for antiseptic and disinfectant uses, having all the excellent properties of carbolic acid without the danger from absorption. As an insecticide it answers admirably for cattle, leaving the coat clean and glossy. The makers are Messrs. Willows, Francis & Butler, 101 High Holborn, W.C.

BENZOIN (Gum Benjamin).—A balsamic resin, having mild, stimulant, expectorant, and antiseptic properties, now replaced by more efficacious remedies, as carbolic, salicylic, and boric acids. The tincture is known as "Friars Balsam," and used as a healing fluid for wounds.—(*See* "Sanitas.")

BENZOL, or BENZENE.—When coal tar is subjected to fractional distillation, a variety of important medicinal compounds are procured, known as the Benzole or Benzene series. They are remarkable for their aromatic, antiseptic, and febrifuge properties, their chief efficacy being in their power of destroying the bacteria of specific febrile diseases. The following is a brief description of each :—

Benzol, or *Benzine*, must not be confounded with *petroleum benzin*, properly petroleum ether, a product of the distillation of American petroleum—paraffin. Benzol from coal tar is a sedative and antiseptic, and is used externally to allay the irritation of skin diseases and destruction of parasites. It is given internally as an antiseptic. *Benzoic acid* is antiseptic, expectorant, and stimulant ; similar to carbolic acid. *Benzoate of Ammonia* is used as a stimulant and antiseptic. *Benzoate of Soda* answers for diarrhœa in young animals.

Antifebrin is probably the most reliable of this series of preparations. Its power of reducing febrile action is marked and lasting, without the after-effects of depression common to many forms of sedatives. It acts moderately upon the urinary organs. Horses may receive dram doses dissolved in ether, repeated at intervals of four hours.

Antipyrin, similar to Antifebrin, but not so powerful or lasting in its effects. Given in one-dram doses at intervals of two or three hours. Soluble in water.

Hydroquinone has special stimulant as well as antiseptic effects on the urino-genital mucous membrane, and is recommended in affections of those parts.

Naphthalin has been used as an internal antiseptic in

diarrhœa and dysentery, alone or with castor-oil. It has the effect of depriving the fæces of their odour throughout the entire length of the canal. Having similar properties to Hydroquinone, it is useful in diseases of the bladder.

Naphthol, when dissolved in alcohol, proves useful in mange and eczema as an external remedy.

Pyrocatechin, in its actions and uses, resembles Resorcin, being about three times more powerful.

Pyrogallic Acid acts beneficially in psoriasis, for which it is made into an ointment in the proportion of one to seven of lard or vaselin.

Resorcin consists of white crystalline plates, which readily dissolve in water and oils. Having well-marked antiseptic properties, it is used in diphtheric and ulcerated throat of man. It may therefore be used with marked benefit in sporadic aphtha or stomatitis of young animals.

THALLIN.—This is a colourless powder, having an odour and taste not unlike that of meadow sweet. It reduces abnormal temperature as well as the circulation, in which it resembles antifebrin, but is somewhat less powerful.

CARBOLIC ACID (Phenol).—Obtained from the distillation of coal-tar oils, and sold in the form of white semi-transparent crystals, soluble in glycerin, oils, alcohol, ether, acetic acid, water, and alkaline solutions. It is extensively used in surgery as an antiseptic to arrest the development of micro-organisms and promote the healing of wounds by what is known as the first intention. Spread over the skin, it acts, according to the degree of dilution, as a caustic or stimulant; and is very serviceable as a local anæsthetic, diminishing the sensibility of the skin as a favourable prelude to operations with the knife. It rapidly destroys many of the parasites which infest the skin, and of late years has been largely used in sheep dipping, &c. The application is not without danger from absorption, giving rise to congestion of the lungs. Carbolic

acid is strangely fatal to dogs and cats; even the human subject suffers disagreeably from its use in antiseptic surgery. Horses are somewhat less susceptible, and bear continued external applications favourably.

As an *external remedy* it is referred to in various parts of the work. The most convenient form is that of solution. The crystals melt at 91° F., and may be used as a caustic by means of a camel-hair brush. By the addition of five to ten parts of water, it remains fluid, and with fifteen parts it is permanently dissolved.

As an *internal remedy* carbolic acid has been approved for diseases caused and propagated by the various bacteria or micro-organisms, as Texan fever, cattle plague, malignant pustule, epizoötic pleuro-pneumonia, and epizoötic or contagious aphtha. The fever of bronchitis, pneumonia, &c., is greatly reduced by it, and when used as an inhalation with steam, it soothes and mitigates the cough of laryngitis. The moist air spray is also useful. The severity of malignant catarrh and purpura is reduced, particularly when iron or iodine is combined with it. In order to avoid the consequences of absorption by contemporaneous external use, it is advisable to alternate other remedies, as boric or salicylic acid. Carbolic acid finds favour as an application in stomatitis and excoriations about the mouth, dyspepsia, diarrhœa, and dysentery. It relieves the constitutional irritation due to skin diseases, stings of bees, ants, mosquitoes, &c. Diseases due to septicæmia, also those in which excessive discharges arise from implication of mucous membranes, are greatly mitigated by carbolic acid. It also proves a most serviceable disinfectant and deodoriser. Being highly volatile, it may be used as vapour (*see* page 150) or solution (p. 151). Further reference will be found under the head of "Inhalations."

Creosote.—An oily fluid obtained by distillation from hard woods. It is rapidly absorbed, and communicates its charac-

teristic odour to the various tissues of the body, being chiefly excreted by the kidneys. Caution is needed when used for internal administration. It is combined with chalk, catechu, &c., for diarrhœa and dysentery. As an inhalation with steam for lung complaints of chronic nature, a few drops prove serviceable, especially when those ailments are attended by offensive discharges. Externally it is employed to arrest the fœtid odours of caries; also as a stimulant and caustic for scrofulous tumours, thrush, and canker. Combined with glycerin, and in various dilutions with water, it is sometimes used to allay the irritation of various skin diseases and to destroy fleas, lice, and the acari of mange. Creosote has been generally superseded by "Sanitas," carbolic acid and other remedies. Horses may receive ten to thirty drops in bolus, or solution with mucilage, volatile oils, or alcohol.

SALICYLIC ACID.—The commercial source of this substance is sodium phenol, and therefore it is one of the group of benzene or aromatic compounds. Like carbolic, boric and benzoic acids, it is an antiseptic and a germicide, and it is thought that from this power is due the lowering of temperature and blood pressure commonly observed in rheumatism in man. The results in this direction among animals is by no means so satisfactory. It is said to prove beneficial in the metritis of septicæmia. As an external antiseptic it is sometimes substituted for carbolic acid, having the advantage of being non-volatile and less irritant. It is an excellent constituent of electuaries, gargles, or spray, for aphthous and malignant states of the mouth, throat, or nasal membranes, &c. For all these purposes it is usefully combined with borax to insure solubility. Lint soaked in a hot solution of the mixture, and dried, proves antiseptic as well as non-irritating to abraded surfaces. The horse will take one to two drams internally; foals ten to fifteen grains, which may be

given at intervals of one or two hours with borax and glycerin in mucilage.

BORIC or BORACIC ACID.—A crystalline substance obtained from the action of Sulphuric Acid on Sodium Biborate. It is also obtained from jets of steam as they issue from the earth in various parts of Italy and the Lipari Islands. It is a non-poisonous as well as non-volatile antiseptic, and usefully replaces carbolic acid as a lotion for burns, aphthous conditions of the mouth, wounds, eczema, and other irritable states of the skin. Such applications are improved by the addition of salicylic acid. Heated with glycerin and afterwards diluted with water, boric acid forms an excellent wash for the mouth and open wounds, as well as for the eyes under purulent ophthalmia. The horse will take three to six drams in simple water; foals twenty to thirty grains.

CINCHONA.—Various barks under this name are obtained from native shrubs in India, Ceylon, Java, and Jamaica. They yield, among various products, an especial alkaloid, known as *Quinine*, a white crystalline salt, having the remarkable power of arresting the oxidation of tissue, and thus reducing the fever of diseases common to malarial districts. It is antiseptic, being said to be alike antagonistic to the development of anthrax bacillus, and arrests fermentation, in which respects it is nearly equal to benzoic, boric, carbolic, and salicylic acids. It is also a bitter tonic and stomachic. Combined with potassium iodide or salicylic acid in solution, it has proved useful as a subcutaneous injection for local rheumatism, and, in the form of spray, equally so for wounds, aphthous affections of the mouth, throat, &c.

The doses of quinine for the horse are twenty grains to one dram; foals five to twenty grains. Of cinchona bark two to four drams for the horse; foals one to four drams.

COAL TAR, SOLUTION OF.—This is specially prepared by Messrs. Willows, Francis, & Butler, 101, High Holborn. It

readily mixes with lard, glycerin, vaselin, or water, and is an efficacious remedy for chronic eczema, prurigo, psoriasis, and other scaly diseases of the skin. It is also antiseptic, and is applicable as such for the treatment of wounds, ulcers, &c.

EUCALYPTUS.—Oil of the *Eucalyptus globulus*, or EUCALYPTOL—obtained from the growing trees of Eucalyptus, indigenous to the Australian Colonies. The plant is now cultivated largely in other countries in order to neutralise the results of widespread decomposition and prevent the occurrence of malarial fever. The oil is antipyretic and antiseptic, and in large doses irritant. It resembles quinine as an antiseptic and antipyretic, and is considered by some experimenters to be as powerful as carbolic acid in its action on bacteria. Its power of mitigating fever depends upon a paralysis of the nervous centres, thus enfeebling respiration and circulation, eventually producing death by a total arrest of those functions. Eucalyptol is used as a spray, gargle, and inhalation in cases of malignant sore throat, malignant catarrh, pharyngitis, abscess of the lungs, &c., &c., to check excessive secretions, and destroy the fœtor. It proves an efficient remedy in all forms of septicæmia, being usefully combined with quinine and the ethers, or alcohol. Some practitioners speak highly of it as an antiseptic for fœtid discharges from the urethra, uterus, and vagina, when used as an injection. It is also highly esteemed as a substitute for carbolic acid in the treatment of wounds.—(*See* "Sanitas.") One dram is a sufficient dose for the horse; for foals, five to thirty drops, given in milk, mucilage, or diluted alcohol. As an external preparation it is combined with oil or cocoa butter, and when desirable its action may be increased by the addition of iodoform, which see.

IODOFORM.—This compound has become an important member of the list of remedies having antiseptic powers, for

which they are employed in the treatment of diseases of a contagious character, or otherwise acknowledged to be dependent upon the presence of the lower forms of animal life. It also destroys the odour of fœtid wounds and discharges, promoting healthy action, and, destitute of irritant action, it proves an anæsthetic to the part on which it is placed. A solution of the powder by means of ether or chloroform greatly facilitates its action. In the form of inhalation or spray it is useful in ozæna, and ulcerated or malignant sore throat, malignant catarrh, &c.; or it may be used for the nostrils in the form of powder, by means of the nasal insufflator.

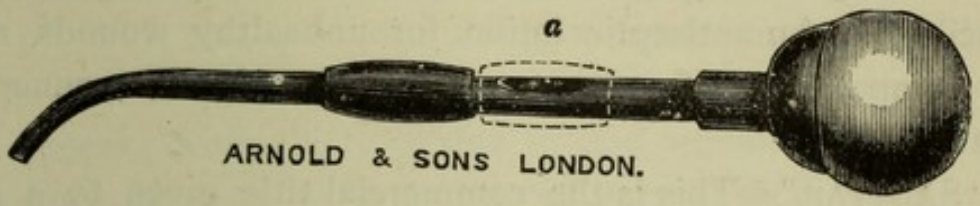


FIG. 313.—*Insufflator for conveying antiseptic powder to the membrane of the nostrils and sinuses.*

Combined with eucalyptol, it is eminently serviceable as an anodyne and local antiseptic, in diseases of the rectum, vagina, &c., attended with pain and irritation.

IODOL.—This preparation resembles iodoform, and being less irritant, as an internal remedy is of course preferable. It is a light brown crystalline powder, having a faint odour of thymol, soluble in alcohol, ether, and chloroform. The doses are fifteen to twenty-five grains for horses, given in mucilage or glycerin.

POTASSIUM PERMANGANATE (Condy's Fluid).—This is one of the number of very useful agents as an antiseptic and deodoriser. Its disadvantage consists in being non-volatile, and this limits its area of application. For all the purposes to which a lotion, gargle, or spray can be applied to destroy the odour of discharges, or spores, or low forms of animal life,

cryptogamic growths, &c., it is very active. As an internal agent it has not justified a preference for it above other remedies.

POTASSIUM CHLORATE.—This salt unites the properties of an antiseptic with those of a febrifuge, alterative, and diuretic. It reduces inflammations, soothes and heals the aphthous eruptions of the mouth and throat. It seems to exert an oxidising effect upon the tissues, and averts the tendency to extreme debility common in catarrhal epizotics, purpura, &c. Externally it is used as an electuary, lotion, or spray. The doses internally are two to six drams for the horse; foals take twenty to sixty grains, combined with tonics, bitters, or mucilage. An antiseptic lotion for unhealthy wounds may be composed of five to twenty grains for the ounce of water.

"SANITAS."—This is the commercial title given to a preparation now manufactured on a large scale for the general purposes of a disinfectant and antiseptic. It is produced by the oxidation of turpentine, in the form of oily and watery fluids, containing peroxide of hydrogen, upon which its efficacy depends. It is to this property that the benefit arising from the odour of pine forests is due, and the malarial districts of warm moist climates are purified by the analogous volatile exhalations from the *Eucalyptus globulus*. Indeed, all our essential oils fulfil, on a smaller scale, the same errand of purifying the atmosphere from the poison generated from decay and putrefactive processes going on in animal and vegetable substances.

"Sanitas" is employed in antiseptic medicine, externally and internally, with even greater and more satisfactory results than can be obtained with carbolic acid. While it is destructive to all the low forms of animal life, it is non-poisonous to the human subject and domestic animals. There is no danger to be apprehended from its absorption,

so that its use as a lotion, bath, spray, gargle, electuary, &c., &c., is practically unlimited.

For the general purposes of a deodoriser and disinfectant for the buildings and surroundings where domestic animals are kept, we have none more efficacious, nor perhaps one so generally safe and good.

A non-poisonous "antiseptic mixture," suitable for the various purposes referred to throughout the work, may be compounded as follows :—

RECIPE NO. 173.

Take "Sanitas" oil.....	1 part.
Glycerine	4 „
Olive oil.....	6 „

Mix, and agitate thoroughly before use.

The doses of Sodium Sulphite for horses are one to two ounces; foals, thirty grains to half an ounce, in powder or watery solution, with gentian or ginger, or in bolus with camphor or ammonium carbonate. Of the hyposulphite one fourth of the above doses will be sufficient.

SODIUM BORATE.—This salt possesses antiseptic properties, and may be used generally as indicated under boric acid, potassium permanganate, and potassium chlorate. It may be usefully applied in powder, or combined with potassium chlorate, glycerin, or "Sanitas." Being non-poisonous, there is no danger to be apprehended from absorption, or by the animal licking the parts to which it may be applied.

SODIUM CHLORATE (Chlorinated Soda).—Dissolved in water it forms the solution known as Labarraque's disinfecting fluid. It is chiefly used for external purposes, where chlorinated lime is not suitable as lotion, wash, spray, &c.

SODIUM SULPHITE AND SODIUM HYPOSULPHITE.—The actions of these salts are those of powerful antiseptics, deodorisers, and anti-ferments. They destroy the foul odours due to morbid action in wounds, mucous membranes, septic

principles within the blood, and arrest the fermentation states known as flatulent colic. Septic and malignant diseases are much benefited by them, and prevailing enzoötics, &c., are reduced in their severity.

SULPHUROUS ACID.—Water containing sulphurous anhydride in solution. The acid has a remarkable affinity for oxygen, and in depriving other compounds of that gas, their constitution is destroyed. In this way all bad odours and putrid action, ferments, &c., are decomposed. Animals suffering from catarrh, nasal discharges, sore throat (malignant and otherwise), are especially benefited by it; gastric irritation and tympanitis are arrested. It destroys also skin parasites, relieves the irritation of prurigo and psoriasis, and, combined with "Sanitas" and glycerin, it is an efficient antiseptic for wounds. The fumes of burning sulphurous acid have been found efficacious in purifying cowhouses, stables, &c., occupied previously by animals affected with contagious diseases. The writer is able to record many instances of the disappearance of such maladies after thorough fumigation. The method is referred to at pp. 147, 150. The gas in solution is conveniently used in the several forms of lotion, wash, spray, &c., as well as being readily administered by the mouth.

TEREBENE.—This is a product of the oxidation of turpentine, which it resembles, being, however, less acrid, and not so liable to disorder the kidneys. It acts as a stimulant when given internally, and arrests fermentation. Externally, it is used much for the same purposes as carbolic acid. Dose, one to two ounces in linseed oil or mucilage.

THYMOL.—A solid crystalline principle obtained from the volatile oil of thyme. It is antiseptic, disinfectant, diaphoretic, and diuretic, and its action on the nerve centres resembles, but are not so intense, as those produced by carbolic acid; neither is it so caustic, irritant, or poisonous. As a disinfec-

tant, it is said to be more powerful and lasting. It is useful in the various forms of skin diseases, for which it is combined with vaselin or glycerin; and is alike serviceable as a gargle, spray, or inhalation in the various aphthous affections of the mouth and throat, and fœtid mucous discharges from the nasal passages. It is the active principle of Volckman's disinfecting fluid. The cost of thymol retards its extensive use. Its internal administration has been limited, but satisfactory in cases of vesical catarrh. Dose for the horse, five to twenty grains.

ZINC CHLORIDE.—By virtue of its excessive irritant and corrosive action, zinc chloride in medicinal doses proves antiseptic, astringent, and tonic. It is rarely given internally. Externally it is astringent, antiseptic, disinfectant, and a deodoriser, and rapidly destroys skin parasites. Prepared in the solid form, it is employed as a caustic for malignant growths. Under careful and systematic use, zinc chloride proves one of the most powerful antiseptics known, its properties being actively exerted even when reduced to weak solutions. It forms the active principle of Sir William Burnett's disinfecting fluid, and is associated with sulphurous acid in Professor Tuson's disinfectant powder and solution.

GENERAL REMEDIES (*continued*).

ARNICA.—Tincture of Arnica, diluted with water in the following proportions, has been extolled as a specific for bruised and abraded surfaces:—

RECIPE NO. 174.

ARNICA LOTION.

Take of tincture of arnica	1 or 2 fl. oz.
Distilled water.....	1 pint.

Mix.

We have had repeated cause for questioning the value of this remedy, and believe that the above proportions of simple spirit and water are of equal efficacy.

ARSENIC.--A useful agent for internal use in skin affections and as a tonic in protracted and debilitating diseases. It is commonly supplied as an insoluble white powder, which may be given with the food in doses of five grains, combined with sulphate of iron and carbonate of soda.

The *Arsenite of Potash.*—Fowler's solution is the safest and most convenient form; being devoid of taste, it may be given in one half or one ounce doses, sprinkled over the food or mixed with the drinking water. In unpractised hands arsenic in any of its forms often proves a dangerous remedy. As a poison its effects are generally discovered with ease and certainty.

ATROPINE.—(See Belladonna.)

BELLADONNA (Deadly Nightshade).—In the form of extract, belladonna proves one of the most valuable remedies as an anodyne and anti-spasmodic in catarrh, pharyngitis, laryngitis, bronchitis, irritation of the digestive organs, and in diseases characterised by nervous irritability, as tetanus, &c. &c. The dose is half a dram to two drams. Reduced to an emulsion with water, it is used for dilating the mouth of the womb and allaying spasm of the neck of the bladder. In

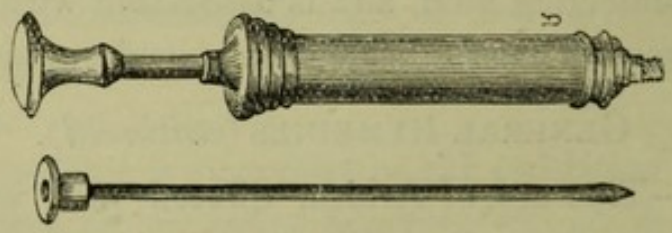


FIG. 314.—*Syringe for deep wounds and cavities.*

such cases the mixture may be injected by means of the syringe shown in fig 314, or applied to the part by means of a sponge. Extreme caution is, however, needful, as the active principle, atropine, is readily absorbed, and poisoning may take place when least expected. The tincture is suitable for *subcutaneous injection* (page 778). Atropine may be obtained in a specially prepared solution, containing half a grain to a fluid dram, for the same method of administration. It is

used for all the purposes for which the extract is applied; as an antidote to poisoning by opium, also dropped into the eye for diseases of that organ.

BLISTERS.—(*See* Cantharides.)

BLUE VITRIOL.—(*See* Copper.)

BOLE, ARMENIAN.—One of the argillaceous earths, used on account of its mild astringent qualities, and sometimes mixed with other astringents to reduce their action.

BUCHU.—The leaves of this plant yield a volatile oil and bitter substance, which confer the properties of a mild tonic and diuretic. Its special value consists in being stimulant as well as astringent to the mucous membrane of the urino-genital organs. It is used with benzoic acid, borax, boric acid, and other antiseptic remedies in cystitis, and irritable affections generally of the organs above named.

BURGUNDY PITCH.—Its chief use is to give stiffness and solidity to ointments made with lard.

BUTYR, OR BUTTER OF ANTIMONY.—(*See* Antimony.)

CALABAR BEAN.—(*See* Physostigmine.)

CALCIUM (Lime).—The following salts of this alkaline earth are employed as medicinal agents:—

Carbonate of Lime (Chalk).—This remedy is prepared for use by diligent washing with water, so as to remove foreign admixtures, when it appears as a dull white powder, having a peculiar soft and smooth feel between the fingers. It is used in cases of indigestion as an antacid, and enters into the composition of remedies for diarrhœa and dysentery, combined with various vegetable astringents, a form of which is as follows:—

RECIPE NO. 175. CHALK MIXTURE.

Take of powdered chalk	2	ounces
Powdered catechu or kino	1	„
Tincture of opium	1	„
Tincture of cardamoms	4	„
Water	16	„
		52

Mix, and agitate well before administration. Four or five tablespoonfuls to be given to foals suffering from diarrhœa. Gum mucilage, starch, gruel, or milk, also form good vehicles for the administration of chalk. In the state of fine dry powder it is useful as a mild astringent to abraded surfaces, and to dilute more powerful remedies of similar action.—(*See* Benzoate of Soda, described under "Antiseptics.")

PHOSPHATE OF LIME.—Prepared from bones, and is sold as a fine white powder, resembling chalk, from which it is distinguished by the absence of effervescence on the addition of an acid. It is a necessary constituent of food, and when from any cause it is not supplied, softening and wasting of the bones follow, a condition known as rickets.—(*See* Anæmia, p. 65.) To subjects of this character phosphate of lime is advantageously added to the grain food. Small and repeated doses are preferable to large, which frequently derange the bowels. Iron is also combined with it when signs of anæmia are present.

CHLORINATED, OR CHLORIDE OF LIME.—A soft, dull white powder, having a strong pungent odour, which arises from the chlorine evolved by it. It is a valuable disinfectant and deodoriser, effectually destroying the odour of ammonia, urea, &c., but rendering the manure, &c., of stables and cow-houses of little value for agricultural purposes. The chief uses in medicine are as a stimulant for unhealthy wounds, foul discharges, and for destroying the micro-organism of ring-worm, also the acari of mange and scab. Rats and mice cease to infest the places where a mixture of chlorinated lime and sulphur is sprinkled.

CALAMINE.—(*See* Zinc.)

CALOMEL.—(*See* Mercury.)

CAMPHOR.—In small and repeated doses—half a dram to one dram—camphor proves a useful stimulant. As a seda-tive and antispasmodic two drams may be used, being care-

fully reduced to a very fine and smooth powder. It is usually combined with opium, belladonna, ammonia, acetate, salines, &c., in enteritis and catarrhal affections. For arresting gangrene, a solution is made use of, containing one dram of camphor to one ounce of spirits of wine, which is applied to wounded parts which have suffered much contusion. Camphor is insoluble in water. For external use, it should be dissolved in oil or spirits of wine, when it forms a good application to wounds of unhealthy condition and tendency to gangrene, and for the restoration of the circulation in parts extensively bruised. The proportions are one dram to each ounce of oil or spirit. Camphor enters into combination with other agents as follows, for the production of a stimulating application for staked or punctured wounds :—

RECIPE NO. 176.

HEALING FLUID.

Take of spirits of camphor.....
Tincture of aloes .....
„ myrrh..... } equal parts.

Mix. Water must not be added, as the efficacy of the mixture will be destroyed.

CANNABIS INDICA (Indian Hemp).—Known in India variously as *gunjah*, *ganga*, *bhang*, or *pang*, and as the *haschish* of the Arabians. It is an anodyne and narcotic similar to opium, but without the astringent action of that drug, which renders it a useful substitute in colic, enteritis, tetanus, &c. The extract is the form employed, the dose for the horse being thirty grains to one dram ; foals, three to ten grains.

CANTHARIDES (Blistering Flies—Spanish Flies).—These are the active ingredients of *vesicatories* or blisters, one part of flies, finely powdered, being incorporated with six parts of lard, and heated in a water bath for two hours. The mixture is then strained and cooled. Other ingredients to flavour or

stiffen the ointment are added according to taste and requirements. Recipes No. 6, 7, 8, 9, and 10 (pp. 44, 45) are samples.—(*See* Croton Oil.)

Cantharides act powerfully upon the kidneys and bladder. When disease attacks those organs, other forms of blister, avoiding cantharides, should be submitted, or the existing malady will be greatly aggravated. On the other hand, cantharides prove very useful in states of weakness and want of tone, as indicated by inability to retain urine. Much care is needed in their use. Doses, three to ten grains, finely powdered, and given in bolus or the manger food, but never in a drench.—(*See* Mylabris Cichorii.)

CARDAMOMS.—(*See* Anise and Carraway Seeds.)

CARRAWAY SEEDS are of great service as warm stimulants or stomachics, and are combined with saline purgatives to prevent their griping effects. Sound dry seeds only should be used, and finely ground at the time of dispensing.—(*See* Anise.

CARRON OIL.—(*See* Linseed Oil.)

CARROTS.—These are of the greatest use in the sick dietary. The faulty appetite is often coaxed, and they prove most valuable in typhoid diseases by restoring the fluidity of the blood, besides being cooling and laxative.

CASTOR OIL.—A purgative chiefly used for foals suffering from constipation immediately after birth. It is, however, nauseous and not so applicable as the bland oil of linseed. Externally it is said to cure mange.

CATECHU.—A valuable vegetable astringent, eminently useful in protracted diarrhœa and dysentery. Dose for the horse, two to four drams, combined with ginger, &c. For sore throat and excoriations of the mouth it is used in the form here given :—

RECIPE NO. 177. ELECTUARY.

Take powdered catechu and kino, of each	1 ounce.
Linseed meal, finely ground	2 „
Honey or treacle a sufficiency.	

Rub the powders together in a mortar, and when thoroughly incorporated, gradually add the honey or treacle during further mixing, until a soft mass is obtained. A dessert-spoonful to be placed on the tongue two to three times during the day.

CAUSTICS.—These consist of the mineral acids, chloride of zinc, caustic alkalies, butter of antimony (which see), and the hot iron. They are chiefly used to destroy warts, tumours, &c., and repress too luxuriant granulations. Properly diluted, they are advantageous for sluggish wounds.

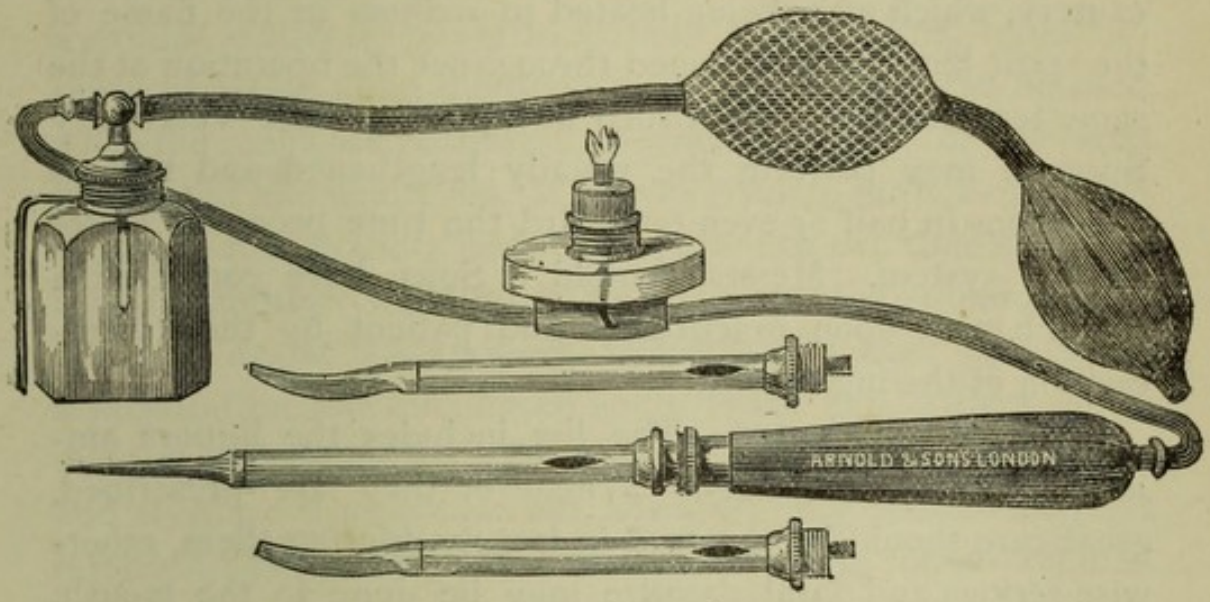


FIG. 315.—*Thermo-Cautery.*

The hot iron or actual cautery has been already referred to in connection with various operations at pages 144, 439 and 760. Whenever this remedy is resorted to it is of the utmost importance that a large and bright fire should be prepared, and the irons should also be sufficiently numerous to insure their use at the proper temperature, otherwise the operation may be rendered tedious and even cruel. Operations performed in country districts, at lone farms, and places distant from the resources of a Veterinary Infirmary, are liable to the danger of being grievously marred when these arrangements cannot be carried out. On the other hand, with irons sufficiently heated and quickly supplied, an operation may be

efficiently and rapidly executed with the least possible suffering. In order to avoid the inconvenience and dangers common to the plan, an instrument known as the *thermo-cautery* has been adopted, which is shown in fig. 315.

In place of the cumbrous irons, the operator has the choice of several cauteries shaped according to the purposes for which they are required, but much smaller and in every way handier. They are so constructed that a stream of benziline gas is driven through the handle to the extremity of the hollow cautery, which after being heated to redness in the flame of the spirit lamp, is maintained throughout the operation at the same temperature. With such an apparatus the Veterinary Surgeon may perform the usually lengthened and tedious operations in half or even one-third the time occupied under the old system. Messrs. Arnold & Sons have conferred a signal benefit upon practitioner and patient by their introduction of the instrument.

CAUSTIC ALKALIES.—The list includes the liquors ammonia, potass, and soda. Whenever they are prescribed, great care should be observed in largely diluting them, otherwise serious and fatal damage may be done to the mouth, fauces, or alimentary canal.

CHARCOAL.—Two kinds are used, viz., animal and vegetable charcoal, in fine powder, chiefly as an antidote in poisoning by strychnia, opium, and the vegetable alkaloids. The former is the most powerful. Charcoal is a useful addition to poultices, to remove the fœtor of wounds, and may be thrown over the floors as a deodoriser when other agents are not at hand.

CHLORAL HYDRATE.—A white crystalline substance, resembling in action that of chloroform, amyl-nitrite, opium, and the bromides. Being non-volatile, it cannot be inhaled, but its anæsthetic action is produced by an internal administration of the drug. It is very serviceable in all cases of extreme nervous irritability, as phrenitis, tetanus, chorea,

hysteria, epilepsy, and parturient epilepsy, in quieting the nervous system. It relieves colic, also gastro-enteritis and asthma, and is an antidote to poisoning by strychnine. It acts powerfully and promptly when injected beneath the skin. Externally, when combined with camphor and vaselin, it is beneficial for allaying the irritation consequent upon skin diseases, and, diluted with water, it corrects the fœtid discharges of wounds. It destroys micro-organisms, and frustrates the development of the bacillus of anthrax, having a similar antiseptic power to carbolic acid. Owing to its depressent action upon the nerve centres, it should not be used when the lungs are congested, or when the action of the heart is irregular and weakened. It may be given to the horse in doses of two to four drams; foals, half a dram to two drams; being usually combined with opium, belladonna, or the bromides.

CHLORALUM (Aluminum Chloride).—Under this name a preparation was introduced some years ago, with a statement of high-sounding properties, as an antiseptic, astringent, and styptic. Experience has, however, fully decided its great inferiority as an antiseptic and deodoriser to other reputed agents, as carbolic acid, sulphurous acid, sodium sulphite, and especially "Sanitas." Chloralum is an oily, colourless fluid obtained by the decomposition of aluminum sulphate and calcium chloride. Its non-volatility greatly reduces its value and limits its usefulness. As a styptic it is perhaps superior to many other agents. In the proportion of one part to sixteen or thirty-two of water, it forms an excellent lotion, wash, gargle, or spray, and has been recommended for the destruction of the parasites of mange, &c.; it also kills fleas, ticks &c. Internally it has been used in farcy, and for typhoid complaints and their dysenteric forms.

CHLORIDE OF ZINC.—(*See* Zinc.)

CHLORINE GAS.—(*See* Calcium; also p. 148.)

CHLORODYNE.—A proprietary medicine, said to contain

chloroform, ether, Indian hemp, and morphine, with tinctures of aconite and hyoscyamus as the active agents. It is a powerful and most effectual anodyne, being prescribed for diseases attended with severe pains, as gastro-enteritis, bronchitis, &c.

CHLOROFORM.—A valuable antispasmodic and anodyne. It speedily mitigates the pain of colic and other diseases, and its action is intensified by admixture with opium, belladonna, hyoscyamus, &c., thus forming an extempore chlorodyne. Horses will take one to two drams; foals twenty to forty drops. The smaller doses oft repeated do the most good. It should be combined with syrup—*i.e.*, water containing sugar or mucilage, whisked egg, weak spirit, &c.

SPIRITS OF CHLOROFORM, OR CHLORIC ETHER, as its name implies, is a solution of chloroform in alcohol. Its action resembles that of chloroform, and may be given in the same fluids: to the horse in doses of one to two ounces; foals, two to six drams.

CLYSTERS.—(*See* Enemas, p. 773.)

COCAINE (*Cocaine hydrochloras*).—A colourless crystalline powder, obtained by chemical process from a shrub indigenous to the mountain regions of Peru and Bolivia, known as Erythroxylon coca. This substance acts as a local anæsthetic, producing such profound and continuous insensibility of the skin and mucous membranes as to admit of the performance of severe and extensive operations without the least pain being felt. Animals thus treated rarely require putting under restraint. When dropped into the eye, it so diminishes sensibility as to enable the operator to remove foreign bodies from beneath the lids, and operate in various ways, without the least pain or hindrance. Its expense precludes any extended use. Owing to its power over the nervous system when given internally, it diminishes the sensation of hunger and fatigue. This is said to be its tonic and stimulant effect. Further observation may possibly

disclose that in this particular cocaine resembles alcohol, betel, tobacco, &c. The penalty for its use, however, is only delayed: the effects are simply postponed, and the debt must sooner or later be paid with compound interest.

COLCHICUM.—Employed, in conjunction with iodide of potassium, in pleurisy, pericarditis, and metastatic rheumatism. Horses will take half a dram to one dram of the powder. A solution is made with vinegar and spirit.

COLLODION.—(*See* Ether.)

COLOMBO.—A vegetable stomach tonic, similar to gentian or quassia.

COMMON SALT.—(*See* Soda.)

CONIA.—(*See* Hemlock.)

COPPER, SALTS OF.—The preparations used in medicine are the following:—

Iodide of Copper, on its introduction into medical use, was expected to fulfil an important mission by exerting the action of both its constituents—iodine and copper. The salt simply represents copper, and is employed in such cases for which the following salts of that metal are useful:—

Subacetate of Copper (Verdigris).—This salt is stimulant, caustic, astringent, and antiseptic. It is very rarely prescribed for internal use. The external forms of application are the powder and solution, useful in correcting the state of ill-conditioned wounds, being caustic, stimulant, or astringent, according to strength; and ointment made by adding one part of verdigris to eight or ten of lard. This salt is the essential ingredient in the once famous Ægyptiac ointment, which see.

Sulphate of Copper (Blue Vitriol, Blue Stone.)—This is the most familiar salt of the metal. Its actions resemble those of verdigris, and is chiefly used as an external remedy. When used internally, the object is to produce a tonic effect, for which iron salts are preferable. The preparations for external use are the powder, solution, and ointment, as stated under

Verdigris. An ointment, made by mixing one part of sulphate of copper (in fine powder) with one of lard and two or three of Stockholm tar, has been recommended for thrush and canker of the feet.

Nitrate of Copper.—Similar to the sulphate in action and uses.

CORDIALS formerly constituted the principal ingredients of many preparations of the old school, the more valuable and potent remedies not being intimately understood. They are the warm aromatic stomach tonics, or stomachics, to which some reference has already been made in this section, and comprise anise, carraway, cummin, ginger, &c. &c.; which see. Although as a rule they do not increase the action of the heart, their extended use is not encouraged during the existence of acute inflammation.

CORROSIVE SUBLIMATE.—(*See* Mercury.)

CREOSOTE.—(*See* the remedies described under "Antiseptics."

CROTON OIL AND SEEDS.—A valuable addition to linseed oil, aloes, &c., in order to insure a more prompt action during excessive states of constipation. The seeds (when sound) are deemed equal to the like number of drops of the oil, the doses of either being three to ten. The seeds require thorough reduction to powder, and neither should be given alone, but always in combination, as violent irritant effects are common. The oil is used for conferring additional strength to blisters, but on account of its powerful action it is liable to produce ugly blemishes, if used in too large qantities: one or two drops to the ounce are fair and safe proportions. The celebrated Danish remedy contains croton oil dissolved in ether and alcohol (*see* p. 178).

DIGITALIN.—(*See* Digitalis.)

DIGITALIS (Foxglove).—The leaves of this plant, on being dried and reduced to powder, are used as a remedy in heart diseases, pericarditis, &c.; to reduce cardiac depression, or to

regulate its action and increase the strength of the beats. In dropsies it is used in conjunction with salines. The drug derives its action from an alkaloid termed digitalin, which is frequently used in solution as a subcutaneous injection. The dose of digitalis is fifteen to thirty grains for the horse; smaller animals, five to ten grains, combined with nitrate of potash. Of the tincture, made by macerating 2½ ounces of the dried leaves to one pint of proof spirit, two to four drams may be given to the horse; foals, half a dram to two drams, in water or linseed mucilage. The greatest care must be exercised during the use of this drug. Its direct action upon the heart is such that a prejudicial effect may arise suddenly after a few doses have been administered, some patients being exceedingly susceptible. This may arise also when the tincture or solution is not of guaranteed strength.

DRENCHES, erroneously termed "Drinks."—These have already been referred to at some length at p. 770.

EMETIC TARTAR.—(*See* Antimony.)

ENEMAS, ENEMATA, CLYSTERS, LAVEMENTS, INJECTIONS.—A complete description of these is given at p. 773.

EPSOM SALTS.—(*See* Magnesia.)

ERGOTINA.—(*See* Rye, Ergot of.)

ESERINE.—(*See* Physostigmine.)

ETHER or ÆTHER.—SULPHURIC ETHER, so named on account of its preparation from ethyl-alcohol, to which sulphuric acid has been added and afterwards distilled, purified &c. *Absolute Ether*, free from alcohol and water, is a powerful inebriant narcotic, producing death by paralysis of respiration. The vapour, when inhaled, produces anæsthesia, or loss of feeling and perception. In medicinal doses it proves a beneficial stimulant, antispasmodic and carminative. Applied externally, it abstracts heat, produces local anæsthesia, and, by prolonged application—particularly when reduced to a fine state of division, or spray—the parts are

frozen, and finally the part dies, eventually succeeded by sloughing. It is not so agreeable as chloroform, which is always used as an anæsthetic by preference. The ether of the British Pharmacopœia, which is the form usually met with, contains a proportion of alcohol and water. It is generally prescribed with opium and the anodyne extracts as an antispasmodic. Worms in the intestines are destroyed by it, and ascarides in the rectum are best treated by enemata containing suitable proportions. It is a valuable stimulant, and highly useful in collapse from various causes. It equalises the circulation, restores the enfeebled powers from disease, exertion, &c. The safety of its use is betokened by a reduction of the number and increase in the strength of the pulsations. The doses as a stimulant are one to two ounces for the horse; foals, two to four drams; given in mucilage or cold water, to which sugar or treacle has been added. When immediate effects are desired, it should be mixed with alcohol and passed beneath the skin.

The highly volatile as well as solvent properties of ether are utilised in the production of an adhesive covering for wounds and abraded surfaces, known as COLLODION. The mixture is laid on with a brush, and shortly a film is produced of such strength and thickness as may be desired, and proportionate to the amount laid on. *Simple Collodion* consists of gun-cotton dissolved in ether and alcohol. *Flexible Collodion* is made by adding to the former Canada balsam and castor oil. *Styptic Collodion* is a solution of gun-cotton to which perchloride of iron, carbolic, tannic and benzoic acids have been added; and a fourth variety, having useful stimulative, antiseptic, as well as protective properties, suitable for sore teats, &c., contains glycerin, with carbolic acid, as well as gun-cotton.

ETHER, CHLORIC.—(*See* Chloroform.)

ETHER, NITROUS.—Sweet Spirits of Nitre. When alcohol

is distilled with sulphuric and nitric acids the result is a spirit known by the above title, having similar but less powerful action to those of sulphuric ether. Its effects upon the kidneys are perhaps more pronounced. It is also given in similar cases with the like combinations, the doses for a horse being one to two ounces; foals, two to four drams. It is decomposed by cold water, therefore it should not be mixed until the moment arrives for its administration. Linseed mucilage is a good vehicle in most cases.

EXTRACT OF LEAD.—(*See* Lead.)

FOMENTATIONS.—Reference has already been made to the use and value of fomentations at p. 39. We cannot insist upon the necessity for observance of those directions too earnestly. We have seen marvellous effects produced by persistent applications of water, maintained at a temperature of 118° F. or 48° C., rendering other treatment for the time unnecessary. When, however, additional effects are desired, *medicated fomentations* may be used. Under such circumstances, the various anodynes, as extracts of belladonna or hyoscyamus, laudanum, &c., will be found serviceable and more active than the leaves or seeds of the plants.

GALLIC ACID.—(*See* Tannic Acid.)

GENTIAN.—A vegetable tonic and stomachic, usefully combined, in the form of powder, with iron and ground ginger to promote strength, and added to cathartics to expedite their action. It is likely to be adulterated with flour. Dose for the horse, half an ounce to two ounces; foals, one to four drams.

GINGER.—This is one of the most useful of the carminatives, warm aromatics, or stomach tonics. The fresh powder should always be used with purgatives, to avoid griping. Dose—same as stated for gentian.

GLAUBER'S SALTS.—(*See* Sodium, Salts of.)

GLYCERIN, OR GLYCEROL.—A clear viscid liquid, forming

a useful solvent and efficient vehicle for many salts, and on account of not being liable to drying, evaporating, or becoming rancid, it unites the properties of a soothing emollient and antiseptic. As it readily mixes with water, oil, or spirits, the forms in which it may be combined are numerous, and there are few instances where its uses are inadmissible. Having a sweet taste, it is not readily refused when mixed with the food, with which it is sometimes given to promote assimilation in weakly foals. It is useful in checking the tendency to fermentation arising from dyspepsia, and should be given half an hour before each meal.

HAMAMELIDIS.—The active principle of the American witch hazel. In the form of a spirituous essence this preparation is used as an anodyne, antipyretic, antiseptic, and styptic. In the latter instance it is said to be as powerful in arresting hæmorrhage internally as when applied externally. Useful in sore throat, bronchitis and aphthous conditions of the mouth, when used as a wash, by the spray producer, or as an inhalation.

HARTSHORN.—(*See* Ammonia.)

HELLEBORE.—Four varieties of hellebore are usually recognised, viz.: green, fœtid, white, and black. The latter, known as the Christmas rose, is indigenous to many parts of Europe, and is cultivated in our gardens on account of its flowers appearing during the first or second months of the year. The active principle is helleborin which is also found in white hellebore, rendering it the most poisonous. Portions of the roots of these plants were formerly used by farriers as setons for almost all the ills that the flesh of animals is heir to. Great depression, copious discharge of ropy saliva, increasing exhaustion, small, weak and frequent pulse, occasional efforts to vomit, abdominal pain, diarrhœa, dysentery, follow somewhat in the order given, the animal at length falling, unable to rise, and dying from the arrest of circulation and

respiration. Such an uncertain and dangerous remedy should be avoided under all circumstances. In cases of poisoning, the animal should receive strong purgatives, followed by repeated stimulants with anodynes; also simple enemas to promote the action of the bowels, probably alternated with those of a gaseous character to mitigate the intestinal irritation.

HEMLOCK (Conium maculatum).—The active principle is Coniïne. From the uncertain action and limited uses to which this remedy can be applied, our list will not suffer by its being omitted altogether.

HENBANE.—(*See* Hyoscyamus.)

HONEY.—A valuable addition to vegetable astringents in powder, to ensure the requisite consistency of electuaries.—(*See* Catechu.)

HYDROQUINONE.—(*See* Benzole Series, under "Antiseptics.")

HYOSCYAMUS, EXTRACT OF, possesses similar properties to the extract of belladonna, is often alternated with it and given in the same doses.

INHALATIONS.—The use of inhalations in affections of the respiratory organs is deserving of much greater attention than at present received. Two kinds are employed—*simple* and *medicated. Simple Inhalations* consist of the application of the vapour of hot water by means of a bag, as shown in Fig. 26, p. 131. The object is to supply heat and moisture, the combined effects of which are the liberation of discharges from the mucous membrane of the respiratory track, and mitigation of pain or distress during breathing. In addition to the information given at p. 131, it should be stated that, as in the case of fomentations improperly carried out, much harm may arise from a careless adoption of inhalations. The required heat and moisture should be rigidly supplied. The contents of the bag should not be allowed to grow cold, hot

water being frequently supplied in order that steam or vapour may be constantly breathed. An improvement upon the common "nose-bag" may be secured by simple means. A tube conveying steam from water heated over a suitable lamp or stove, may be connected with the bottom of the bag, which should be covered with a loose layer of wood shavings. These will have the effect of distributing the vapour, preventing spurts during violent ebullition of the water, which might terrify the animal. The tube should be at least six or eight feet long, and this will ensure perfect freedom from the undue application of heat. *Medicated Inhalations* consist of the addition of medicinal agents either to the water which is being converted into vapour, or otherwise placed within the bag where they are acted upon. The latter is the most common method. The remedies employed being more or less volatile, or soluble in the vapour of heated water, rise within the bag and are inspired, when they exert a direct action upon the inflamed surfaces. In this way turpentine, "Sanitas," eucalyptus, carbolic acid, creosote, various tinctures, the ethers—indeed, numerous remedies may be used with marked benefit, largely supplementing any other measures that may be adopted at the same time.

We have yet to notice another form of inhalation which we have found very effective in affections of the respiratory organs. At p. 150 will be found a description of the "hand-ball spray distributor," as used for purifying the air of infected buildings. In the method we are now attempting to describe, steam takes the place of air, being generated from water heated to ebullition in a small vessel by a spirit lamp. The glass bottle shown in the engraving contains the medicated fluid, which, as the steam rushes from the horizontal tube, immediately rises in the vertical portion, and is distributed as a fine, warm, and moist spray; it is atomised or pulverised, in which state it may be projected within the

mouth, nostrils, vagina, upon a wound or swollen part, also upon or within the eyes.

HYPODERMIC MEDICATION.—(*See* Endermic Method, p. 777.)

INJECTIONS.—(*See* Enemas, page 773.)—The injection of fluids beneath the skin is described at p. 777.)

IODINE.—This substance is used for correcting imperfect assimilation, which is often denoted by derangement of the kidneys, &c.; for reducing enlargements of organs internal and external, as well as those depending upon rheumatism or chronic skin diseases, as psoriasis. It is sometimes combined with carbolic acid to allay the febrile attacks arising from malaria. In the form of steam inhalation it does good service in relieving the congestion of mucous membranes by promoting a healthy secretion of fluid; and excessive or offensive muco-purulent discharges from sinuses of the head, as well as nasal passages, are suitably met by the antiseptic qualities of this important remedy. Iodine is soluble in water containing Iodide of Potassium (which see), and thus a convenient solution for a variety of purposes is secured. Iodine acts beneficially in the various forms of ringworm, and is a useful stimulant to indolent or unhealthy wounds. It is a destructive agent to skin parasites; and as an injection for cysts or abscesses it rapidly promotes healing of the walls after the fluid contents have been withdrawn. The dose of iodine for the horse is from twenty grains to one dram; foals, fifteen to forty grains. As iodine forms a chemical compound with the starch of food, it should be given at least two hours after a meal, in order to ensure definite results.

Persesqui, or *Chloride of Iron.*—An acid solution of Iron, useful as a tonic in all cases where the sulphate is admissible, usually combined with nitrous ether and solution of quassia, and given in mucilage as a drench. Applied to bleeding

vessels, it arrests hæmorrhage, and diluted with six to ten parts of cold water, it acts beneficially in arresting "flooding," when injected within the uterus. In the proportion of two drams to one pint of water, it is useful in destroying worms in the rectum. The doses are: for the horse, half an ounce to one ounce; foals, ten to sixty drops.

JABORANDI.—The name by which several shrubs, natives of Brazil, are known, yielding alkaloids termed jaborine and pilocarpine, which possess the power of paralysing involuntary muscular fibre. On this account they have been used along with physostigmine in chronic constipation or impaction of the bowels. Large doses affect the heart, and produce death by arrest of its action. It is supposed they are capable of removing urea and other products of tissue wasting, as well as effusions due to disease by vicarious action set up in the salivary glands. They have been used in chronic eczema, prurigo, and rheumatism, in the human subject, for these purposes, it is said, with some degree of success. There are, however, differences of a physiological nature which do not permit the same results in bovine and ovine animals. The fresh leaves may be given to the horse in doses of two to four drams; but for the purposes of subcutaneous injection a soluble nitrate or hydrochlorate of pilocarpine is used in doses of one or two grains, and smaller animals $\frac{1}{10}$ to half a grain.

KAMALA.—A thick red, resinous powder, obtained from the capsules of the *Rottelera tinctoria*, acting as a drastic purgative, and used by some as a remedy for tape-worm. It is said to be less effectual than areca-nut and oil of male shield fern, but considerably more severe in its action. It is the Indian remedy for tapeworm in the human subject, and as such is greatly extolled, but our experience of its efficacy among cattle is limited. The doses for the horse are from four to eight drams; foals, one to four drams; given in linseed

mucilage sweetened with treacle. The bowels should be previously moved by a mild laxative.

KINO.—A vegetable extract, allied to catechu, having similar astringent properties, and is used for the same purposes.

KOUSSO, KOSSO, OR CUSSO.—The flowers of the *Brayera anthelmintica*, when powdered, are used for similar purposes as Kamala, the doses being two to six ounces for adult animals.

LAUDANUM.—(*See* Opium.)

LEAD.—The poisonous nature of the various preparations of lead greatly limit their use in the treatment of equine diseases. The following are those mostly in use. The iodide of lead has already been alluded to:—

Acetate or *Sugar of Lead.*—This salt is employed in solution with water as a lotion, in the proportion of one ounce to a quart, for inflamed surfaces. A few ounces of alcohol greatly increases the refrigeratory effects. Another form of lotion or healing fluid is composed of acetate of lead, one ounce; sulphate of zinc, six drams; soft water, one quart. This application possesses antiseptic, astringent, and sedative properties. It should be agitated before use, in order that the white sediment may be applied to the wound equally with the fluid, the best method of application being that of dashing or projecting it upon the wound from a small bottle having a long neck. This is preferable to laying it on by means of a rag or sponge, which retards the process of cicatrisation.

Sub-acetate of Lead (Goulard's Extract)—This is a fluid acetate preparation, containing double the quantity of lead. It is therefore more powerful, and is applied to similar purposes. In the proportion of two ounces to one pint of olive oil, it forms lead liniment, useful for burns and scalds, and to allay the irritation of psoriasis, rat-tails, and other

skin affections. Some practitioners add carbolic acid to confer upon it anodyne properties.

LIME, PHOSPHATE OF.—(*See* Calcium.)

LINSEED.—A valuable article of diet for sick and weakly animals. Being rich in oil, it promotes assimilation and a lax state of the bowels, obviating the use of depressing medicines. It is used in the form of gruel and mucilage, the first being made by boiling a quantity of the seeds in water, the latter by macerating it in cold water. In each instance a mucilaginous fluid is produced, which may be added to the food at intervals, or used as a vehicle for the administration of medicines.

LINSEED OIL.—A bland, slow purgative, and of great service in the early stages of diarrhœa, combined with opiates, &c. Its action may be hastened, when desirable, by the addition of croton oil. The greater part of the efficacy of linseed in promoting digestion, assimilation, and a regular state of the bowels, is due to the presence of this oil.*

CARRON OIL.—Formerly a popular remedy for burns and scalds, is composed of a mixture of linseed oil and lime water, which, agitated, forms a cream of fluid or liniment.

LUNAR CAUSTIC.—(*See* Silver.)

MAGNESIA.—The only compounds in use among horses is sulphate of magnesia, or Epsom salts. It forms one of the class of neutral salts, having a combined action on the intestines and kidneys, being used by some practitioners at the commencement of influenza, &c., in doses of about four ounces in solution. It is, however, of less value than others.

MASHES.—Food of a cooling and laxative nature is a great assistance in promoting the action of medicines. They also usefully take the place of stimulating or nutritious foods, which would add considerably to the existing derangement.

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* *See* "The Horseowner and Stableman's Companion." London and New York : Frederick Warne & Co.

During the stages of convalescence, various coaxing articles of diet may be made in the form of mashes of malt, barley, wheat, oats, peas, or beans, and further variety is effected by supplies of turnips, carrots, or potatoes, thoroughly washed. Sometimes apples or pears will surprisingly promote the appetite which has degenerated into almost loathing of the usual kinds of aliment.*

MERCURY.—The several preparations of this metal are as follow :—

Calomel.—A purgative, and liver stimulant in large doses; but in small ones is used to disperse enlargements, promote absorption of dropsical effusions, and overcome internal inflammations. It is not so commonly used as formerly, being superseded by aconite, a more efficacious remedy. Doses, ten to thirty grains.

Corrosive Sublimate.—This preparation is rarely used as an internal remedy, on account of its irritant, corrosive action. As an external remedy, it requires great caution. One part dissolved in about 500 of water forms a powerful antiseptic lotion for foul wounds; it also kills lice and the contagious growths of ringworm. It allays the irritation of the several simple inflammatory forms of skin affections, and is combined with prussic acid and glycerin for such purposes. For the metritis of puerperal fever it is used as an injection; and as a spray it will be found equally effective for malignant sore throat and malignant catarrh which is attended with fœtid discharges from mucous surfaces. Corrosive sublimate is, however, a dangerous remedy. Fatal results may unexpectedly arise from absorption of the metal. Greater dependence may be placed upon "Sanitas," as being perfectly safe and equally efficient. For troublesome sinuses the following will be useful as a

* *See* "The Horseowner and Stableman's Companion." London and New York: Frederick Warne & Co.

CAUSTIC INJECTION. RECIPE NO 178.

Take of corrosive sublimate	5 to 12 grains.
Muriatic acid	Half dram.
Mix, and when dissolved add	
Dilute hydrocyanic acid	4 drams.
Glycerine	2 „
Distilled water sufficient to make up	12 ounces.

This should be injected into the sinus by means of the glass syringe (Fig. 129).

Mercurial or *Blue Ointment.*—The chief use of this ointment is to mix with that of iodine to form a resolvent for chronic enlargements. If employed for destroying skin parasites, the animal should not be allowed to lick the parts to which it has been applied, and only limited surfaces should be covered. Death may result in either case.

Red Ointment of Mercury.—A compound of the red iodide with lard of vaselin, and employed for dressing joints enlarged by rheumatism.

Golden Ointment of Mercury.—This preparation consists of nitrate of mercury with lard, when it is known also as *citrin ointment,* useful for destroying warts, &c. Combined with carbolic acid and other tar preparations, as a mild application in the chronic stages of many skin diseases, it acts beneficially. The salt, nitrate of mercury, is sometimes used for canker, &c., when dissolved in water. Weaker solutions answer for destroying ringworm and the skin parasites generally. The greatest care, however, is required when this and the foregoing remedy is used, as mercury is liable to be absorbed by the skin, and occasion not only violent local destruction, but general or systemic poisoning.

MINERAL ACIDS.—These are *Muriatic* or *Hydrochloric Acid* (spirits of salts), *Nitric Acid* (aqua fortis,) and *Sulphuric Acid* (oil of vitriol). They are astringent, corrosive, and caustic as external applications. For internal use they are astringent and tonic. One to three or four drams to a

pint of water form lotions of proportionate strength for foul ulcers, indolent wounds, canker, &c., and in greater dilution they may be used as a spray for aphthous affections of the mouth, or lotions to allay the irritation of skin diseases. In the pure or undiluted form they are used to destroy warts, repress luxuriant granulations, and enter into most of the empirical forms of ointment for diseases of the feet. They are also used as a caustic to wounds occasioned by the bite of rabid dogs. The doses internally are half a dram to two drams, given in one or two pints of water.

MYLABRIS CICHORII (Chinese Blistering Fly).—These insects are readily distinguished from Spanish Flies by the orange-yellow bands and spots on the wing covers. Their action on the skin of the horse is probably somewhat more slowly developed than that of cantharides, but ultimately it is quite as effective, and they are not liable to act disagreeably on the kidneys or bladder, when circumstances call for their continuous use as a vesicant. On this account a few practitioners have successfully employed them for inflammatory diseases generally, as well as in diseases of those organs in which cantharides are contra-indicated. It is probable, however, that as time is often of great moment, cataplasms, more especially injections, of mustard (which see) are preferable. From what is at present known, the internal use of these agents is not indicated. In experiment the doses given for cantharides may be followed.

MORPHIA.—(*See* Opium.)

MURIATIC ACID.—(*See* Mineral Acids.)

MUSTARD.—The flour of mustard seeds finds a place among the remedies for the ailments of the horse. When it is decided to employ mustard, the following particulars should be observed:—A mixture of the black and white seeds in equal proportions should be taken and finely ground, the powder being made into thin paste with *tepid*—not hot—

water. The hair on the part to which the mustard is to be applied should be clipped quite close, and the paste is to be rubbed well in. At the end of fifteen or twenty minutes the application should be washed off carefully by means of a sponge and tepid water, and, if necessary, the application of mustard may be repeated several times. The addition of turpentine, ammonia, &c., destroys the efficacy of mustard.

Savary's Liquid Sinapism is a tincture or essence of mustard, prepared for hypodermic injection, and used somewhat extensively in France as a counter-irritant in severe chest affections, gastro-enteritis, colic, for ophthalmia, vertigo, &c. &c. From fifteen to thirty drops, injected at various points contiguous to the seat of the disease, produces an effect, as evidenced by the amount of œdema, more speedily, as well as more efficacious, than mustard in the usual form, the constitutional disturbance being also considerably less.

NAPHTHALIN.
NAPHTHOL. } (*See* Amyl Nitrite, under "Antiseptics.")

NEUTRAL SALTS.—(*See* Potash and Soda.)

NITRATE OF MERCURY.—(*See* Mercury.)

NITRATE OF POTASH.—(*See* Potash.)

NITRATE OF SILVER.—(*See* Silver.)

NITRE.—(*See* Potash.)

NITRIC ACID.—(*See* Mineral Acids.)

NITRITE OF AMYL.—(*See* Amyl Nitrite, under "Antiseptics.")

NITRO-GLYCERIN.—Ditto, ditto.

NUX VOMICA.—The seeds of the *Strychnos nux vomica*, a tree common to the islands of the Indian Archipelago, when reduced to powder, are comprehended in this term. The medicinal characteristics depend upon an alkaloid known as strychnine, a white crystalline substance, requiring 7000 parts of water for its solution. On this account, a soluble preparation is sold as the hydrochlorate of strychnia. The powder

of nux vomica, or its alkaloid, strychnine, are used for all the purposes of a nerve tonic and stimulant, to increase the action of purgatives, to overcome constipation, and give tone to relaxed states of the bowels. In paralysis from various causes strychnine acts promptly and beneficially, as is seen in that form which accompanies or precedes parturition. The doses of nux vomica for the horse are thirty to sixty grains; foals ten to forty grains. Of strychnine horses will take one to two grains; foals, one-fifth to one grain. These doses may be repeated during the daily administration, which should be continued some time, the quantity being slightly and cautiously augmented until the physiological signs are developed. When it is decided to use strychnine as an injection beneath the skin, to introduce it direct into the circulation, or within any cavity of the body, the above doses must be reduced to one-fourth only. For these purposes each grain of the hydrochlorate should be dissolved in one hundred parts of rectified spirits and distilled water.

OAK BARK.—The medicinal value of oak bark depends upon the tannin which it contains. It is a useful astringent, and may sometimes take the place of oak-galls, catechu, or kino, when lotions or fomentations are required.

OAK-GALLS.—(*See* Tannic Acid.)

OPIUM.—The value of opium depends upon its astringent and anodyne properties. It allays the pain of colic, diarrhœa, and dysentery, and retards the secretion of fluids which, in the latter ailments, prolong the complaint. The muscular spasm of tetanus, as well as the violent contractions of the uterus in difficult parturition, are controlled by opium; indeed it is difficult to state any case in which violent pain and perverted function exists that is not benefited in one way or other by its administration. The properties of opium are due to various alkaloids, the chief of which is morphine, more generally known as morphine hydrochlorate, a very soluble

preparation, and thereby especially suited for hypodermic injections. The doses of opium for the horse are one to two drams; foals, ten to forty or sixty grains, given in mucilage or starch gruel. Of morphine hydrochlorate, three to ten grains for the horse in diluted spirits, and for hypodermic injections, the smallest dose should be first made use of.

Tincture of Opium (Laudanum) is a solution of the active agencies of the drug in alcohol. The doses for the horse are one to three ounces; to foals, one to six drams.

ORIGANUM, OIL OF.—A frequent constituent of blisters and liniments recommended by those of the old school.

PEPPERMINT WATER.—A useful aromatic and stimulant, for combination with many remedies used for foals.

PERMANGANATE OF POTASH.—(*See* list of "Antiseptics.")

PHYSOSTIGMINE, or ESERINE.—This is one of the alkaloids contained in the Calabar bean, possessing the power of paralysing involuntary muscle. It also allays the pain incidental to muscular spasm, and is therefore classed as an anodyne. The chief use to which this alkaloid has been put is that of overcoming the contraction of the muscular coat of the intestines in all forms of obstinate constipation. It has also been found to be of some service in reducing slight forms of hernia and intussusception. For this purpose it is administered subcutaneously, or, as some experimenters prefer, it is injected into the trachea, when its action is more prompt and defined. As physostigmine is not sufficiently soluble in water, it is prepared in the form of salicylate, which confers all the required advantages. The addition of two or three grains of pilocarpine facilitates the action of the drug, and further benefit may be also derived by alternating it with injections of atropine. It is also recommended for further trial in tetanus, chorea, and epilepsy. Another alkaloid, named calabarine, is also present in the bean, the action of which resembles strychnine, and has been found serviceable in

causing contractions of the iris when local adhesions are to be broken down. The opposite character of these alkaloids need to be taken into consideration when the powder or tincture of Calabar bean are employed. The results cannot be precise or depended upon. The doses of physostigmine salicylate for internal use are: for the horse, two to three grains; and for smaller animals, one-twentieth to one or two grains, according to age and size. The alkaloid should be carefully dissolved in warm water with repeated agitation and when intended for use subcutaneously, half the above doses are sufficient. Calabar bean is used as an antidote in poisoning by strychnine and atropine.

PODOPHYLLIN.—A resinous body, containing two active principles—viz., *podophyllotoxin* and *picropodophollin.* It is extracted from the rootlets of the Podophyllum, May apple, or mandrake, a perennial plant common to the Northern States of America, which is noted for its irritant and drastic purgative properties in man. It exerts also emetic effects upon him, and increases the secretion of bile. These results are likewise attendant upon the administration of the drug to dogs and cats, but the same have not attended its use among horses. It is uncertain and tardy in its effects, and an unwelcome nausea prostrates the patient, which is afterwards increased by griping pains, while the bowels are but slightly moved. In some instances a laxative effect is not observed. In our present state of acquaintance with reliable medicines, and the number at command, we can dispense with podophyllin, suffering no loss.

POMEGRANATE ROOT BARK.—The powder or decoction of the bark has long been in repute for expelling the tape-worm. About four drams of the powder may be given in mucilage, or a decoction may be made by adding the above-named quantity to a pint of boiling water, which is increased as required by the addition of mucilage.

Probably the most efficacious treatment consists of the administration of oil of turpentine, and the extract of male shield fern, with which a small dose of pomegranate bark is combined. This mixture should be given after a suitable fast in the early morning, followed in twelve hours by a cathartic dose of aloes. Some practitioners supplement these remedies by a few daily doses of iron or copper sulphate, which generally proves effectual in restoring lost tone and condition.

POTASSIUM, SALTS OF.—The value of potassium salts depends upon their antifebrile properties, and during rapid excretion by the kidneys carry off matters deleterious to the blood and organism. Special properties, however, attach to the various preparations, which are as follow :—

Potassium bicarbonate is a useful antacid for the dyspepsia of young foals. It forms a good wash for external use in certain forms of irritable skin affections, when combined with salicylic acid and glycerin, opium, &c. Weak solutions are injected into the udder in mammitis, in conjunction with salicylic or carbolic acids, "Sanitas," &c. Doses, four to eight drams for the horse ; foals, one or two drams to six or eight, in water or mucilage.

Potassium Bromide allays nervous irritability and excitement, as well as muscular spasm resulting from it, producing calmness and sleep. Animals often drink it when dissolved in water. It is usually combined with chloral hydrate, ether, or opium, in doses of four drams to one ounce; smaller animals, twenty to sixty grains.

Potassium Chlorate is alluded to under "Antiseptics."

Potassium Hydrate is a solution of potash having powerful corrosive properties, used only on rare occasions for internal administration. When boiled continuously it parts with its water, and becomes pasty in consistence, when it is poured into pencil-shaped moulds and allowed to harden. It is then known as *Potassæ Fusa*, or caustic potash, and is used for

all the purposes of a caustic in destroying fungoid granulations, warts, and cauterising poisoned wounds, &c. Its deliquescent properties somewhat limit its use.

Potassium Nitrate is diuretic and sedative ; useful in various inflammatory conditions when combined with other remedies. Doses for the horse, four drams to one ounce; smaller animals, one dram to eight, dissolved in water or mucilage.

Potassium Permanganate is described in the list of remedies given under "Antiseptics."

Potassium Sulphate.—Similar to the nitrate, and used for the purposes of a febrifuge, &c., in similar doses. Dissolved in water, cattle will often readily take it when thirsty. Otherwise it is given in mucilage or water as a drench.

POULTICES.—These have been described at p. 41. When such applications are called for in the treatment of affections of the feet or extremities, attended with an offensive odour, "Sanitas," carbolic or cresylic acid, solutions of chlorine or sulphurous acid gases, chloride of zinc, animal charcoal, &c., should be added. For the feet alone, when the object is to apply heat or cold, with moisture, simple sawdust will answer effectually and at small cost. In order to render it more tenacious and retain heat longer, one or two handfuls of linseed meal will have the desired effect.

PRUSSIC ACID (Hydrocyanic Acid).—A powerful poison, acting on the heart and respiratory organs, through the brain and nervous system. On account of its sedative and anodyne properties, it is used very cautiously to allay irritability of the nervous system, and externally with glycerin, &c., to mitigate the irritation due to skin diseases. As a subcutaneous injection, its effects are more speedy. The B.P. acid (or acid of the British Pharmacopœia) contains 2 per cent. of the pure or anhydrous acid, of which the internal doses for the horse are twenty drops to one dram ; foals, ten to twenty drops, given in water in which sugar or treacle has been dissolved.

PYROCATECHIN.
PYROGALLIC ACID. } Described under "Antiseptics."

QUASSIA.—The chips, shavings, &c., of the wood of *Picræna excelsa*, contain an intensely bitter principle known as *quassiin*, which confers properties not unlike those of cinchona, colombo, and gentian. Quassia is used as a tonic in dyspepsia, loss of appetite, and for restoring energy in convalescence; it is also anthelmintic, and is a good remedy for lumbrici and ascarides. For such purposes a decoction is prepared by macerating one ounce of the chips to four pints of cold water for an hour. The various salts of iron and alkalies, acids, or alcoholic tinctures, may be combined with it. The dose for the horse is two to four ounces; foals and young horses, four drams to twelve, given in water, with the combinations named.

QUININE.—(*See* Cinchona, under "Antiseptics.")

RESIN.—The residue of distillation of turpentine. Used to stiffen ointments, and given internally as a diuretic when potassium nitrate is inadmissible.

RESORCIN.—(*See* "Antiseptics.")

RYE, ERGOT OF.—By the effects of close, damp weather, undrained land, &c., the grains of rye, as well as other Graminaceæ, suffer change by attacks from a species of fungus. The grain is disintegrated, and it acquires altogether new properties, containing an oil which possesses remarkable powers over the uterus of the human female, due to alkaloids, the chief of which is recognised as *ergotin*. In some Continental districts ergotised grain is abundant, and being mixed with the common food of the people, it induces paralysis, as well as mortification of the extremities. In this country lambs often suffer, the disease being described as hydro-rachitis.* Ergotised grasses are also productive of

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* *See* "Every Man his own Cattle Doctor." London and New York: Frederick Warne & Co.

abortion in entire herds of cattle, as well as flocks of sheep; the mare also suffers, but to a less extent (see p. 448). From this fact, ergot of rye is given internally, or the alkaloid ergotin, in solution, is used hypodermically, for the purpose of securing the earlier and more complete expulsion of the fœtus in protracted labour, due to want of power on the part of the mother. It is the belief of some experienced practitioners that this property has been greatly overrated; others state that in their hands the drug has never failed. The negative results are stated by the advocates to be due to long keeping, the ergot or its preparations having become inert by spoiling. The doses of the ergotised grains for the mare are half an ounce to one ounce. The simple decoction, including the dregs, is administered at intervals of thirty minutes or one hour, as may be required. Of ergotin fifteen to twenty-five grains may be given; but when the solution is used subcutaneously, half these quantities must be used each time.

SALICYLIC ACID.—(Described under "Antiseptics." *See* also Boracic Acid.)

SAL AMMONIAC.—(*See* Ammonia.)

SALT, COMMON.—(*See* Sodium, Salts of.)

"SANITAS."—(*See* list of remedies under "Antiseptics.")

SILVER, NITRATE OF (LUNAR CAUSTIC.)—An efficient remedy for promoting healing action in tardy wounds, arresting ulceration, and destroying warts, tumours, and cauterising parts bitten by rabid dogs or venomous reptiles. It is conveniently prepared in pencils, and when applied to the parts extracts their moisture and assumes the fluid form. In the proportion of three grains to an ounce of distilled water, it is used to remove opacity of the cornea, or to arrest ulceration of that part.

SOFT SOAP.—Besides having excellent detergent properties, rendering it available for the removal of foreign matters,

as ointment, &c., from the surface of the body, soft soap, when used in the proportion of about two ounces to three-fourths of a pail of warm water, and completely dissolved, forms a good enema or injection for promoting the action of the bowels.

SODIUM, SALTS OF.—These comprise:—

Sodium Bicarbonate, a useful and somewhat cheaper antacid than the analogous salt of potash, which it replaces for many purposes.

Sodium Borate.
Sodium Chlorate. } (*See* "Antiseptics.")

Sodium Chloride (Common Salt).—A useful condiment, promoting the assimilation of food, particularly facilitating absorption of calcium salts for the reparation of the bony skeleton. When too largely used a dangerous plethora is induced.

Sodium Hydrate.—A powerful caustic, resembling potassium hydrate in its character and usefulness.

Sodium Sulphate (Glauber's Salts.)—Similar to magnesium sulphate, which is usually preferred. In doses of two to four ounces, it is used to combat intense internal inflammations.

Sodium Sulphite and Sodium Hyposulphite.—(*See* "Antiseptics.")

SOLUTIO PICIS CARBONIS.—(*See* Solution of Coal Tar, under "Antiseptics.")

SPIRITS OF AMMONIA.—(*See* Ammonia.)

SPIRITS OF WINE.—(*See* Alcohol.)

SQUILLS.—A valuable expectorant. Useful in bronchitis and pneumonia to relieve the hard, dry cough due to congested membranes, &c. It is associated with the acetate of ammonia, belladonna, hyoscyamus, &c. Dose—two to four drams.

STRAMONIUM, EXTRACT OF, owes its efficacy to the active principle atropine, and is therefore used in the same doses and for similar purposes as the extracts of belladonna and hyoscyamus.

STRYCHNIA.—(*See* Nux Vomica.)

STYPTIC COLLOID.—(*See* Collodion, under "Ether.")

STYPTICS.—Agents which arrest hæmorrhage. The most efficient are chloralum, iron perchloride in solution or tincture, lunar caustic, the mineral acids, tannic acid, cold water, German tinder, &c.

SUBCUTANEOUS INJECTIONS.—(*See* p. 777.)

SULPHUR.—An alterative, so-called. It is usefully combined with nitrate of potash or carbonate of soda in skin affections. Dose—two to six drams once or twice daily, given in the form of powder and mixed with the food.

TANNIC ACID.—This with gallic acid is obtained from oak galls. The first is the most active, and probably gives character to most of the vegetable astringents used in medicine. Tannic acid is used for arresting excessive mucous discharges, as in diarrhœa, or hæmorrhage. It is applied as a lotion, powder, or spray; also as an electuary, for aphthous conditions of the mouth, relaxed sore throat, &c. It fulfils all the requirements of an astringent for external purposes, being combined with opium when pain or irritation are present, glycerin, lard, or vaselin being suitable vehicles. The doses of tannic acid for the horse are half a dram to three drams; for foals, &c., fifteen to thirty grains, suspended in water to which glycerine has been added.

TAR, BARBADOES.—A very useful vehicle for applying various strong dressings to the feet. It prevents the absorption of moisture, and on that account protects the hoof from causes which by fracture and disintegration, admits such irritants as sand, &c.

TAR, SOLUTION OF COAL.—(*See* "Antiseptics.")

TEMPERATURE.—(*See* Animal Temperature.)

TEREBENE.
THALLIN. } (*See* "Antiseptics.")

THERMOMETER.—(*See* Animal Temperature.)

TINCTURE OF ALOES.—When mixed with equal parts of myrrh, a valuable healing fluid is obtained.

TINCTURE OF BENZOIN OR BENJAMIN.—Used as the preceding.

TINCTURE OF CARDAMOMS.—A valuable stimulant and stomach tonic, used to overcome flatulence consequent on dyspepsia and want of tone generally in the digestive organs. Dose—one or two ounces for adult animals; one-half or one-third for those younger, &c.

TINCTURE OF MYRRH.—(*See* Tincture of Aloes.)

TINCTURE OF OPIUM.—(*See* Opium.)

TOBACCO.—Formerly used extensively for the destruction of parasites infesting the skin. It is an unsafe remedy for such purposes, and has properly given way to more appropriate and safe applications. (*See* Gaseous Enemas, p. 775.)

TREACLE.—A most useful and palatable vehicle for medicines. It forms the bulk of electuaries, and is largely used for making up boluses.

TURPENTINE.—Used as a stimulant externally, and added to blisters to increase their action. The ordinary white oils are thus made:

RECIPE NO. 179.

WHITE OILS OR LINIMENT.

Take of olive oil	1 pint.
Liquor ammonia	1 ounce.
Turpentine	2 „

Mix, and apply with friction.

As an antispasmodic, the dose of turpentine for the horse is from one to two ounces; as a diuretic only, half an ounce to one ounce; and for the destruction of intestinal worms two ounces should be combined with oil, aloes, salines, &c. Turpentine may be used as an inhalation, for which purposes the nose-bag or steam kettle should be employed. As an enema, it may be thoroughly mixed with two or three parts

of linseed oil, and afterwards incorporated with a warm solution of soap.

VASELIN.—This substance is obtained from the petroleum or rock-oils of America. It has the consistence of lard or summer butter, and varies in colour from red or yellow to white, according to the extent to which the process of refining has been carried. It is tasteless, odourless, neutral in action; insoluble in water, cold alcohol, ether, and glycerin, but soluble in chloroform, oils, and carbon bisulphide. It dissolves many substances, and is one of the most useful bases for ointments and liniments. It is emollient and lubricant, does not oxidise or become rancid, and is suitable for electuaries and for applying the remedies for skin diseases.

VERDIGRIS.—(*See* Copper.)

VINEGAR.—(*See* Acetic Acid.)

VITRIOL, BLUE.—(*See* Copper.)

„ GREEN.—(*See* Sulphate of Iron.)

„ OIL OF.—(*See* Mineral Acids.)

„ WHITE.—(*See* Zinc.)

ZINC.—The preparations of this metal used in medicine are as follow:—

Zinc Carbonate (Calamine).—A mild astringent. It is employed in the form of ointment with lard or vaselin, in the proportion of one part to six or eight, for cracks in the skin, wounds, &c.

Zinc Chloride.—(*See* "Antiseptics.")

Zinc Sulphate (White Vitriol).—An astringent used for arresting excessive discharges from wounds, mucous membranes, &c., usually in the form of lotion, the proportions of which are from four drams to one ounce, dissolved in cold water.

Zinc Oxide, being a fine white powder, is useful for all the purposes of a mild astringent when simply dusted over the parts. It replaces the carbonate in the form of ointment.

GLOSSARY, OR INDEX

AND EXPLANATION OF THE TERMS USED THROUGHOUT THE WORK.

A.

Abnormal. Unnatural; contrary to a natural or healthy state.

Ad libitum. At pleasure.

Adventitious. Applied to false membranes and other products of present or past disease.

Alkali. A substance which neutralises acids. Examples are potash, soda, and ammonia.

Alkaline. Having the action and other essential properties of an alkali, consisting of the power of saponifying oils and fats, uniting with acids to form salts, and turning vegetable reds to purple, and yellows to brown.

Alkaloid. The active principle of vegetable medicines and poisons.

Alvine Evacuations. The discharges from the intestines.

Amaurosis—Amaurotic. Blindness due to disease of the optic nerve, and frequently observed as a result or sign of other diseases.

Anasarca — Anasarcous — Œdema. Fluid within the cellular tissue, &c., beneath the skin, which recedes on pressure, and leaves the impress of the fingers, &c. A state of dropsy.

Anchylosis. Union of the bones of a joint by ossific matter thrown out during inflammation.

Anterior. The situation of parts before others.

Antiperistaltic. Applied to an inverted action of the alimentary canal as seen in vomiting.

Antiphlogistic. Treatment for the reduction of inflammatory action as bleeding, purgation, the use of sedatives, neutral salts, &c.

Antiputrescent. An agent which destroys offensive odours by arresting putrefaction.

Antiseptic. *See* Antiputrescent.

Anus. The opening to the rectum or fundament.

Aphthous. Vesicles or blisters terminating in crusts on mucous membranes.

Aplastic. Applied to the products of certain diseases which have no power to become part of the living body, as opposed to plastic, which *see.*

Apnœa. Suspended respiration.

Areolar Tissue. *See* Cellular Tissue.

Arthritis. Inflammation of joints.

Articulation. The union of bones and ligament to form a joint.

Asthenic. Applied to a low and weak form of inflammation or fever. *See* Sthenic.

Astringents. Those agents which constringe or contract the parts to which they are applied.

Atrophy. Wasting, diminution, loss of substance.

Auricle. One of the superior cavities of the heart which *receives* blood and passes it into the lower cavity. *See* Ventricle.

Auriculo-ventricular Opening. The orifice, guarded by valves, which connects the auricles and ventricles of the heart.

Auscultation. The practice of judging

by sounds the state of the circulation and respiration, &c., by applying the ear to the sides of the chest or cavity containing the organs implicated or suspected.

Autopsy. A *post-mortem* or after-death examination.

B.

Blue Disease. *See* Cyanosis.

Borborygmus. A rumbling noise caused by the presence and passage of gases in the bowels.

Bruit. A noise. Applied to the various sounds developed within the chest during morbid action in circulation and respiration.

Bruit de Soufflet. The bellows sound.

Buccal Membrane. The membrane lining the cavity of the mouth and covering the tongue.

Bulimia. An insatiable, morbid hunger.

Bulla—Bullæ. A bubble, bleb, or blister peculiar to certain skin diseases, also to burns, scalds, &c.

Bursæ. The secreting membranes which surround joints and supply the lubricating fluid.

C.

Cachexia. A vitiated or unhealthy condition of the system which favours the development of special diseases. The same as Diathesis and Dyscrasia.

Cadaveric Rigidity. Death stiffening.

Calculus — Calculi. Concretions of earthy matter in the bladder or intestines, commonly known as stones.

Canula. The tube used with the trocar.

Cancerous—Carcinomatous. Having the nature of cancer—malignant.

Cardiac. Belonging or pertaining to the heart.

Carminatives. Medicines which dispel wind.

Cathartic. A brisk purgative.

Cellular Tissue. The reticulated or cell-like substance connecting muscles, skin, organs, &c.

Centrum Ovale. The white or medullary portion of the brain.

Cerebral Complications. The state of disease of the brain and nervous system occasioned by disease already existing in other organs, &c. *See* Coma.

Coalescence. The union of fibres, nerves, bloodvessels, &c., forming a network.

Coma. Insensibility arising from the passage of impure blood through the brain; blood poisoning.

Compound Fracture. Bones fractured or broken, the sharp splintered extremities having protruded outwardly through the skin.

Congenital. A condition of disease or malformation, &c., existing at birth.

Constitutional Disturbance. The interference with general functions which attends most diseases. Symptomatic or irritative fever.

Conjunctiva. The membrane which invests the eyeball in front, and lines the lids.

Cornea. The transparent part of the front of the eyeball.

Cornuæ. Horns. Applied to extended or projecting parts of organs, as of the uterus, &c.

Crepitation. A crackling sound heard during respiration in disease of the lungs, or when motion is communicated to fractured bones.

Cul de sac. A little bag or blind pouch.

Cyanosis. The blue-disease, due to admixture of arterial and venous blood. *See* Foramen Ovale.

D.

Deodoriser. Having the power of destroying foul odours.

Depilation. Falling off of the hair.

Depletive. Lowering; same as Antiphlogistic.

Depurant. An agent that purifies the blood.

Desiderata. Conditions or things essential and imperatively called for.

Desquamation. Falling off in scales.

Detergent. Cleansing.

Diagnosis. The study of signs or symptoms by which one disease is distinguished from another.

Diaphoretic. Capable of producing perspiration.

Diaphragm. Midriff. The fleshy partition between the chest and abdomen —the main agent in respiration.

Diathesis. *See* Cachexia.

Disinfectant. An agent that destroys

the infectious or contagious matter of disease.

Dyscrasia.—*See* Cachexia.

Dysorexia. A depraved apetite.

Dyspnœa. Difficulty of breathing.

E.

Eburnation. An ivory appearance on the articular surface of bones, sometimes called the porcelainous deposit, due to rheumatoid inflammation.

Ecbolic. An agent supposed to possess a specific action on the womb by which its contents are expelled.

Ecchymosis. Blood effused in small spots beneath investing membranes, or within the structure of organs; a sign of blood poisoning.—*See* Extravasation.

Embrocation. A liniment or application having stimulative properties.

Emesis. The fact of vomiting.

Emphysema. Air confined in vesicles or bladders, &c., beneath investing membranes, or within the structure of organs.

Endermic Method. The system of passing medicines beneath the skin; known also as subcutaneous injection.

Enemata. Injections; enemas; clysters.

Enzoötic. A disease prevailing over a large district, but not essentially contagious.—*See* Epizoötic.

Epidermis. The scaly or outer portion of the skin; the cuticle or scarf skin.

Epileptic, Epileptiform. Relating to or having the nature of epilepsy.

Epithelium. The outer portion of mucous membranes corresponding in structure to the epidermis.

Epizoötic. A disease prevailing over very wide areas, affecting immense numbers of animals, and generally due to contagious influences.

Estrum.—*See* Œstrum.

Estromania.—*See* Œstromania.

Evisceration. The operation of removing the contents of the chest or abdomen of the foal in difficult parturition.

Exacerbation. An increased return of the symptoms of disease; a paroxysm.

Extravasation. Extensive effusion of blood in consequence of rupture of bloodvessels.

F.

Fœtor. A bad smell; the odour of sloughing and putrefaction.

Fœtus in Utero. The young animal unborn; within the womb.

Follicles. Bag-shaped secreting organs of the mucous membranes, &c.

Foramen Ovale. The orifice which exists before birth in the partition—septum auriculorum—between the auricles of the heart, imperfect closure of which gives rise to cyanosis, or the blue-disease.

Fundus. Applied to the bottom, or lowest portion of an organ.

G.

Gangrene. The early stage of mortification.

Gestation. The period during which the female carries the young in the womb.

Granulation. The sprouting of flesh in healing wounds.

H.

Hectic. A low, febrile condition, characterised by rapid sinking and wasting at the termination of incurable disease.

Hemiplegia. Paralysis, or uselessness of one side, or lateral half of the body.

Hydatid. A cyst containing a clear fluid, and usually also a worm.

Hypertrophy. An enlargement of organs or parts, due to morbid or diseased action.

I.

Idiopathic. A disease arising from peculiar conditions, having no known dependence upon a wound, other disease, or obvious causes for its origin, is said to be idiopathic.

Idiosyncrasy. Peculiar liability to the operation of agencies not common to all other individuals.

Incubation, Period of. The time during which a contagious disease is present in the body before any outward signs are developed.

In extremis. The last stages.

Inferior. Below or beneath other parts.

Ingesta. Food within the digestive organs more or less acted upon by the secretions.

Interlobular. Applied to space or substance between the lobes or separate portions of glands, &c.

Iris. A contractile muscular membrane, pierced in the centre by an oblong opening, and stretched across within the eyeball, behind the cornea, forming the pupil, and regulating the access of light.

Ischiatic Notch. The concavity or depression between the bony prominences of the ischium, which accommodates the urethra and penis of the male, situate immediately beneath the anus.

L.

Labii. The lips or rounded edges of the entrance to the vagina.

Lithontriptics. Medicines given with the view of dissolving stones in the urinary organs and their passages.

M.

Mammalia, Mammals. Animals that suckle their young.

Meatus Urinarius. The opening of the urethra into the vagina in females.

Medulla Oblongata. That part of the spinal cord, or marrow, that joins the brain.

Metastasis. The supposed removal of inflammation from one part to another.

Modus operandi. The mode of action, or of setting to work.

N.

Nares. The cavities known as the nostrils.

Normal. In a state of health and proper function.

Nucleus. The point or foreign object around which earthy salts aggregate and form stones, or calculi.

Nymphomania.—*See* Œstromania.

O.

Œdema. Anasarca, dropsy of the superfices

Œstrum. Heat. The period when the female evinces a desire for sexual intercourse.

Œstromania. Disease of the ovaries, giving rise to constant œstrum.

Omentum. The "caul," or loose part of the serous membrane of the abdomen, known as the peritoneum.

P.

Paralysis. Loss of power or sensation, or both.

Paraplegia. Paralysis of one half—the fore or hind parts—of the body.

Parasites. Insects, worms, &c., infesting various parts of the body.

Parri passu. In the same degree; with equal steps or pace.

Pelvis. The bones forming the hips or haunches.

Per se. Of itself; by itself; in itself.

Perinæum. The space between the anus and ischiatic notch.

Peritoneum. The serous membrane lining the cavity of the abdomen, and investing the organs within it.

Petechiæ. Purple spots or points on the surface of the skin, membranes, or organs, indicative of blood poison. Similar to ecchymosis.

Phlebitis. Inflammation of a vein or veins.

Plastic. Applied to the products of inflammation; capable of becoming organised.

Phlegmon. Circumscribed inflammation, tending to abscess.

Pleura. The serous membrane which lines the cavity of the chest, and invests the heart, lungs, &c.

Pleurodynia. External pain in the side of a rheumatic character.

Polydypsia. Intense thirst.

Posterior. Backwards. Parts situate behind others.

Proctorrhœa. Fæces, mucus, &c., covered with blood from the rectum.

Prognosis. An outline of the probable future; progress of disease.

Pulmonary. Relating to the lungs.

Puncta Vasculosæ. Small spots of blood oozing from the substance of

the brain when divided by the knife.

Purgatives. Medicines which open or promote the action of the bowels.

R.

Raphæ. A raised line running from the rectum or vulva downwards along the penis in males, and the udder in females.

Rectum. The terminal, or last and straight gut.

Regurgitation. A term usually applied to the passage of food upwards in the gullet, with or without vomition.

Rhonchus. A wheezing, rattling, or roaring sound in disease of the lungs, &c.

Rugose. Thrown into folds.

S.

Sabulous. Having the nature of sand.

Sanguineous. Bloody; having the colour of, or admixture with, blood.

Scirrhus. A hardening of tissue by increase in its substance.

Secernation. Purification.

Sedatives. Medicines that lower the action of the heart, and suppress fever.—*See* Antiphlogistic.

Segregation. Separation and isolation of animals, to avoid intercourse, and prevent the spread of contagious diseases.

Septic. Causing or pertaining to putrefaction.

Sero-sanguineous. Blood and water.

Sporadic. Diseases common to isolated districts, affecting few animals, dependent upon common causes, and totally apart from contagion.

Stasis. Blood in a state of congestion or inflammation; circulating fluids unable to move; a stoppage.

Sternum. The breast-bone.

Stertorous. Loud and noisy breathing, due to partial closure of the glottis.

Sthenic. Active, violent; relating to fever or inflammation, as opposed to asthenic.

Stomachics. Stomach tonics.

Styptics. Agents that arrest bleeding.

Subacute. Diseases of a less active nature than acute or sthenic.

Subcutaneous. Beneath the skin.

Superior. Above; higher than other parts.

Suppository. A solid medicine introduced into the rectum.

Suppuration. The formation and discharge of pus (matter) from an abscess or surface of membranes, &c.; purulent secretion. When mucus is also present, it is termed muco-purulent.

Sutures. The union of divided parts by means of stitches.

Symphysis Pubis. The line of union of the lower surface of the pelvic bones, extending from the ischiatic notch forwards to the brim of the pelvis.

Syncope. Fainting; a sign of internal hæmorrhage, disease of the liver, spleen, &c.

T.

Tonic. A medicine that increases the tone and vigour of the body.

Traumatic. Diseases caused by wounds and injuries are said to be of the traumatic kind.

Trephine. A cylindrical saw, by which openings are made into bones.

Trismus. Inability to open the jaws; locked jaw.

Trocar. The metallic stillette by which a tube called the canula is passed into cavities for the purpose of draining off effused fluids.

Tubercular. Roughened; having the nature of tubercles. Sometimes applied to diseased masses of irregular formation.

Tympanitis, Tympany. Distension of the stomach or intestines with gas.

Typhoid. Low; subacute; having the nature of typhus.

U.

Umbilical Cord. The navel-string.

Umbilicated. Depressed on the surface like the navel.

Urachus. The passage for the urine of the fœtus from the bladder to the membranes of the womb of the mother.

Urethra. The passage or canal in the adult male, through which the urine is discharged from the bladder, terminating outwardly at the point of the penis.

V.

Vagina. The canal or passage leading to the womb, the posterior extremity being closed by the vulva ; the birth-passage.

Vena Portæ. The vessels which receive venous blood from the abdominal organs, and convey it to the liver.

Ventricles. The inferior cavities of the heart, which receive blood from the superior cavities — the auricles. The right discharges its blood to the lungs for purification ; the left, after receiving it from thence, propels it over the system by means of the arteries.

Vermicular. Wormlike ; creeping or moving like a worm ; applied to the movement of the intestines.

Vertebra. The back-bones, or spinal column.

Vertigo. Giddiness ; swimming in the head, so called.

Vesicular. Having the nature of blisters or bladders.

Vicarious. Acting for another.

Virus. The morbid element by which contagious disease is transmitted ; a principle not appreciable to the senses.

Viscera. Organs contained within a cavity of the body, as the heart and lungs of the chest ; stomach, liver, spleen, kidneys, intestines, &c., of the abdomen.

Viscus. An organ, or part of such, having a special and appropriate office, as the stomach, bladder, &c.

Visible Mucous Membranes. A term employed to avoid useless or too frequent mention of the exposed mucous membranes of the eyes, nose, mouth, rectum, and vagina in females.

Vulva. The fissure in the external generative organs of the female, extending from above downwards, between the labii, or lips of the vagina.

ADDENDA.

Actinomycosis. A malignant spreading tumour of flesh or bone, supposed to be due to the ravages of a parasitic vegetable fungus. *See* Epiphyte.

Animal Alkaloids. The resulting fluids &c., from the action of bacteria and other low forms of animal life upon the living animal tissues in the production of disease.

Aseptic. The state of healthy action as a result of the use of antiseptics to wounds. *See* Septic and Septicæmia.

Epiphyte. A parasitic fungus growing on various plants, capable of transmission to man and animals, and generating disease. *See* Actinomycosis.

Osteophyte. A bony tumour. *See* Anchylosis.

Ovary. One of the female testicles, of which there are two. *See* Plate vii.

Pyæmia. Microscopical germs (Micrococci) from pustular discharges in circulating blood, producing fever and secondary abscess.

Septicæmia. Putrid principles (sepsin) in the blood, causing apoplectic and gangrenous states in various parts of the body.

Sinapism. A mustard application.

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