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ELEMENTARY VETERINARY SCIENCE

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ELEMENTARY VETERINARY SCIENCE

FOR

AGRICULTURAL STUDENTS, FARMERS, AND STOCK-KEEPERS

BY

HENRY THOMPSON, M.R.C.V.S.

FORMERLY LECTURER ON VETERINARY SCIENCE AT THE ASPATRIA AGRICULTURAL COLLEGE

FIFTH EDITION

REVISED BY

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BARRISTER-AT-LAW

LECTURER IN VETERINARY SCIENCE AT THE ROYAL AGRICULTURAL COLLEGE, CIRENCESTER

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PREFACE TO FIFTH EDITION

THOMPSON's 'Veterinary Lectures,' originally published in 1895, established itself as one of the most popular works of its kind ever issued. That it is still in demand after forty years, during which time it has passed through four editions, is evidence of its unfading popularity.

Science being progressive, it is necessary periodically to amend and add to the contents of a book of this nature.

Owing to the death of Mr. Thompson, I have been invited to undertake the revision of this, the Fifth Edition. In doing so, an attempt has been made to keep as closely as possible to the form and wording of Mr. Thompson's book; but, as the advance in knowledge has been rapid during the last ten years, mainly owing to the increased facilities for research, considerable alteration in detail has been found necessary, and some new matter has had to be introduced.

A short chapter has been added on Poultry Diseases which should be regarded merely as an introduction to a subject which is assuming a position of increasing importance in the agricultural world.

Originally this work was in the form of a series of lectures. It has been considered more inaccordance with present-day usage to arrange the matter in chapters, especially as new material has been added, and for this reason the title has been altered, but former readers will find the arrangement of the subject-matter but little changed. The references have also been altered from paragraphs to pages.

Some new illustrations have been included in this edition, for which I am indebted to Mr. W. Dennis Moss, photographer, of Cirencester, and Mr. H. J. L. Chambers. I am also indebted to Professor G. H. Wooldridge and to the Director of the Poultry Pathological Research Laboratory, Goring, for permission to reproduce illustrations from their publications.

A. C. DUNCAN.

CIRENCESTER,
July, 1935.

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VETERINARY SCIENCE

CHAPTER I

INTRODUCTION

ALL the functions and actions of a living body are, more or less, due to a stimulus or irritant of a vital character directly or indirectly applied; and from the peculiarity of the magnetism which surrounds our globe, and its influence on inorganic and organic material. electricity may be looked upon as the vital stimulus of organic life. From electricity we have light, heat, motion, etc., and by its agency the two great important gases, oxygen and hydrogen, are combined to form water; again, by its aid water can be decomposed into its elements. Thus, then, we derive from electricity light, heat, moisture, and motion, the essentials of vitality. By the aid of electricity, also, sensation and motion can be restored to a partially paralyzed limb; and when the electric current is made too powerful life is destroyed. There is also to be considered the extraordinary action of the X rays.

Life may be defined as an electro-vital phenomenon peculiar to an organism which includes the powers of absorption, assimilation, secretion, excretion, and reproduction; and death is the cessation of all these functions, with the return of the organic tissues to their ultimate elements.

Chemistry.—On the various constituents of the living body being subjected to chemical analysis, some sixteen of the elementary bodies are found to enter into their composition, and are as follows: Oxygen, hydrogen, nitrogen, carbon, potassium, sodium, calcium, magnesium, lithium, manganese, sulphur, phosphorus, iron, chlorine, silicon, and fluorine. These inorganic bodies, which vary very much both in proportion and combination, are not in themselves alive, yet by their subtle physico-chemical affinities, their atomic

electro-activity, or vital combination (vital force), all the gases, fluids, and solids of the organic structures of the living body are produced.

Cell.—The bodies of all the higher animals, which include the animals of the farm, consist of a vast multitude of cells. Originally, each of these bodies began as a single cell (the ovum or maternal cell) which, after it had been fertilized by the male cell, multiplied and formed many cells. After a time, groups of these cells began to take on special functions, and to alter in character; thus we recognize in the formed animal cells of skin, of muscle, of brain, and so on.

The simple cell is a minute sac containing a fine network of protoplasm, a living substance which is the essential substance of all life.

Microscope.—By the aid of this instrument the cells of the various tissues are revealed and recognized, and they are almost innumerable. Meinert estimated the grey matter of the brain alone to contain no less than 600,000,000 cells; and again, each cell was divided and subdivided into molecules and atoms respectively, while between two and three hundreds of trillions of red and white corpuscles were found in the blood of the adult horse.

By its means, also, the minute vegetable organisms (bacteria), and the smallest forms of animal life, both of which cause many diseases, are examined and studied.

Histology is a description of the minute structure of the body, and is not in the province of this work. Yet before we can undertake the treatment of the various afflictions to which domestic animals are prone, and which are studied under *pathology*, a knowledge of anatomy and physiology is necessary. But this will be of a brief and practical character, the object being that, when describing the different ailments, some little idea of the parts of the body alluded to may have already been gained.

Anatomy treats of the various portions and structures of the body, and is both general and descriptive, comparative and morbid. General or regional anatomy deals with the name and situation of the different organs and parts of the body. Descriptive anatomy enters into a minute detail of their forms and structures, and gives a systematic description of the parts; while morbid anatomy is the

study of diseased or morbid structures, and under comparative anatomy a comparison of the structures of various animals is made.

Physiology is the study of the functions or work that the different organs of the body perform in health. Thus, the function of the liver is to secrete bile; the kidneys, urine; and the mammary glands, milk, etc.

Pathology treats of the derangements of the structures and functions, and the changes which take place in the body as a result of disease. This is the principal object of this work, and to make the subject better understood, it is here divided into various sections, the general anatomy and physiology of the different parts being at the same time briefly touched upon.

ARRANGEMENT OF CHAPTERS.

The various subjects to be dealt with will be taken up in the following order:

(1) **Introductory.** — Inflammation; Terminations; Causes; Fever Treatment.
(2) **Bones.**—Ligaments and Joints; Injuries and Diseases.
(3) **Muscles (Flesh).**—Tendons or Sinews; Injuries and Diseases.
(4) **Feet.**—Horny Hoof and Shoeing; Injuries and Diseases.
(5) **Digestive Organs** (Horse).—Mouth and Stomach; Injurics, Derangements, and Diseases.
(6) **Digestive Organs** (Cow).—Stomach, etc.; Injuries, Derangements, and Diseases.
(7) **Dentition** and the Use of Artificial Foods.
(8) **Circulation.**—Heart, Arteries, Capillaries, and Veins; Diseases, etc.
(9) **Respiration.**—Lungs; Bronchial Tubes; Diseases.
(10) **Nerves.**—Brain, Eye, and Ear; Diseases.
(11) **Skin.**—Hair Follicles, Sweat Glands, etc.; Affections; Diseases.
(12) **Urinary and Generative Organs.**—Parturition and Diseases.

Metabolism.—What is known to the physiologist by the name of metabolism is a very familiar set of phenomena whereby the

bodies of all animals are in a constant state of wear through work done, and of repair by the taking in of food. The body waste varies considerably according to the amount of energy put forth, but always there is some waste, for there is not a thought or movement of the body without some expenditure of tissue. This tissue must be, and is, renewed by the process of nutrition, which is carried on by means of the food taken into the stomach, which, when digested—that is, subjected to the secretions of the various glands connected with the digestive organs—and absorbed, is then transformed into suitable material, which may then be either stored for future use or pass directly into the blood-stream, where, by means of the circulation, the new materials are brought into contact with the minute cells of the various tissues of the body. Each cell with its atomic activity and selective power extracts its own suitable pabulum for its own special function, while it passes the products of tissue waste into the blood-stream, to be eliminated from the body by the excretory organs, the chief of which are the kidneys, the skin, and the lungs.

During the process of breaking down of tissue by the doing of work heat is evolved; at the same time much of this heat is lost by radiation and evaporation from the skin, lungs, etc.

All the animals of the farm belong to a class known as warm-blooded animals, as opposed to those described as cold-blooded, which include frogs and lizards. In the former class the temperature of the body is regulated, mainly by control of the loss of heat, by means of centres in the nervous system. As a result of this mechanism the body temperature of all farm animals, as in man, remains constant in health, with but slight variation due to external causes.

While the balance of metabolism and body heat may thus be maintained during health, circumstances are constantly arising which interfere with the equilibrium of these functions. Disorders and disease are thus associated with an altered and perverted metabolism.

Health and disease are so intimately blended that it is often difficult to tell when one ends and the other begins.

DEFINITION OF TERMS.

Before proceeding further, it will be necessary to note and define certain terms which are in general use in the veterinary profession.

(1) **Pathology** is the study of disease, and the changes which take place in the tissues as a result of disease—the science of the nature and causes of disease.

(2) **Etiology** shows the various causes of disease—external, internal, mechanical, chemical, climatic, predisposing, hereditary, exciting, etc.

(3) **Symptomatology** gives the various symptoms, negative and positive. In some cases there are very definite symptoms, which indicate clearly the nature of an ailment; in others the indications are few, and lead to no definite conclusion. In such a case the practitioner may resort to the negative method; the absence of certain symptoms shows that the malady is not so-and-so. Thus, he can exclude certain complaints from being the actual one until the choice is brought down to a few possible diseases only.

(4) **Prognosis** means the prediction of probable progress and result of a malady.

(5) **Therapeutics** is the branch of medicine concerned in the treatment of disease.

(6) **Hygiene** treats of ventilation, sanitation, clothing, dieting, nursing, etc.; in fact, all items for the maintenance of health and its preservation.

(7) **Epizootic**, or epidemic, is a term used when a disease is very prevalent, attacking many people or animals at the same time—*e.g.*, influenza, pleuro-pneumonia, and foot-and-mouth disease.

(8) **Enzootic** refers to diseases confined to certain localities—ague in man, red water in cows, louping ill and braxy in sheep, etc.

(9) **Specific** is a term used when the disease arises from some specific germ—*i.e.*, glanders, pleuro-pneumonia, anthrax, etc.

(10) **Sporadic** refers to diseases which occur as isolated cases, such as, for example, inflammation of the bowels or lungs, etc.

There are other terms used, but the foregoing are quite sufficient.

Before reviewing some of the injuries, derangements, and diseases of the different organs of the body, I shall first refer briefly to that extensive and most important subject—*inflammation*.

Inflammation may be defined as the reaction in living tissue to any injury, whatever the nature of that injury may be, whether external, chemical, thermal, or bacterial. It is a healing process. Without inflammation there is no repair; without its aid, the ends of fractured bones would not unite; nor would surgical operations result successfully if it were not for the inflammatory adhesive exudate that favours the formation of new connective tissue. The practitioner performs the operation, and trusts to nature and reparative inflammation to accomplish the rest. Wounds, however simple, would never heal without inflammatory action.

It should be noted that the reaction can only occur in living tissue. If a part is so injured as to be dead, then no further action towards healing can take place, and the dead part or tissue simply decomposes, and, if not removed, acts as a foreign body, retarding the healing of the still living parts.

If one were to look closely at the injured and inflamed part, as can be done with the aid of the microscope, a great deal of cell activity might be observed. First, following the injury, there is a rush of blood to the part, the bloodvessels momentarily contract, and then dilate, and soon a quantity of lymph suffuses the tissues. Special cell activity is also increased for a time. This is seen, for example, in the excess of mucus poured out from an inflamed mucous membrane. The intercellular fibrous connective tissue (the fibres which hold together the cells of tissues and organs) particularly proliferates and grows across the injured part. In the case of a wound this is the method by which the cut surfaces are actually bound together. It may also be observed in other situations, as, for example, when, following pleurisy, the surface of the lung grows to the chest wall.

Congestion, or accumulation of blood, may be the preliminary

stage of inflammation. Not infrequently, however, the congestion abates when early relief is given by the removal of the cause. A certain measure of congestion also may be a normal result of the increased physiological activity of a particular organ.

The noted external local signs of inflammation are heat, pain, redness, and swelling.

Heat is caused by the large amount of blood sent to the affected part, and the consequent increased chemical action that follows. The heat is not, however, so great as is thought, for the temperature does not increase more than 2° or 3°; and yet in an inflamed foot there is a perceptible increase of heat.

Pain is the result of irritation of nerve fibres, from the pressure caused by the distension of the tissues from the effused blood materials. Pain, however, varies in different portions of the body: it may be reflex and far distant from the affected part; in some places it is dull, as when the mucous membranes are inflamed; but when fibro-serous or serous membranes are affected, as in rheumatism and pleurisy, the pain is most acute and at times throbbing. Bone in health is almost non-sensitive, but when under inflammation, from its unyielding nature, the pain is excruciating.

Redness is due to the accumulation of blood, coupled with a distension of the vessels and a crowding of red corpuscles in the part, and, finally, extravasation into the structures.

Swelling arises from many causes, but in inflammation it is occasioned by the congestion and exudation of the serous or watery portions of the blood, and extravasation of the blood itself, owing to the coats of the distended vessels giving way.

When all these signs are found combined—*i.e.*, heat, pain, redness, and swelling—they are characteristic of inflammation, and cause more or less constitutional disturbance in the body, with a certain amount of fever, according to the situation and nature of the attack.

Inflammation is sometimes described as acute or chronic, according to the intensity of the reaction to the injury. In some cases, especially in weakly subjects, the tissue reaction may be feeble; as also the resistance to general bacterial infection. Whereas in strong, healthy subjects the resistance may be great, and the reparative action of inflammation correspondingly active. This is

EXPLANATION OF PLATE I

POINTS OF A HORSE

1. Nape of the Neck or Poll.
2. Forelock.
3. Ears.
4. Forehead.
5. Face.
6. Muzzle.
7. Nostril.
8. Upper Lip.
9. Under Lip.
10. Lower Jaw.
11. Zygomatic Ridge.
12. Hollow above the Eye.
13. Maxillary Joint.
14. Mane or Crest.
15. Neck.
16. Throat or Windpipe.
17. Withers.
18. Back.
19. Girth or Chest Measurement.
20. Shoulder Blade.
21. The Loins.
22. Side of Chest.
23. The Chest or Breast.
24. Floor of Chest.
25. Barrel, Front Ribs, and Short Ribs.
26. Abdomen.
27. Flank.
28 Sheath.
29. Shoulder.
30. Point of Shoulder.
31. True Arm.
32. Elbow.
33. Fore-Arm.
34. Knee.
35. Shank or Cannon Bone.
36. Fetlock-Joint.
37. Pastern.
38. Coronet
39. Heels.
40. Hoof.
41. Chestnut
42. Haunch.
43. Point of Hip Bone.
44. Croup.
45. Rump.
46. Root of Tail or Dock.
47. Hip-Joint.
48. Upper Thigh.
49. Stifle.
50. Lower Buttocks.
51. Hair of the Tail.

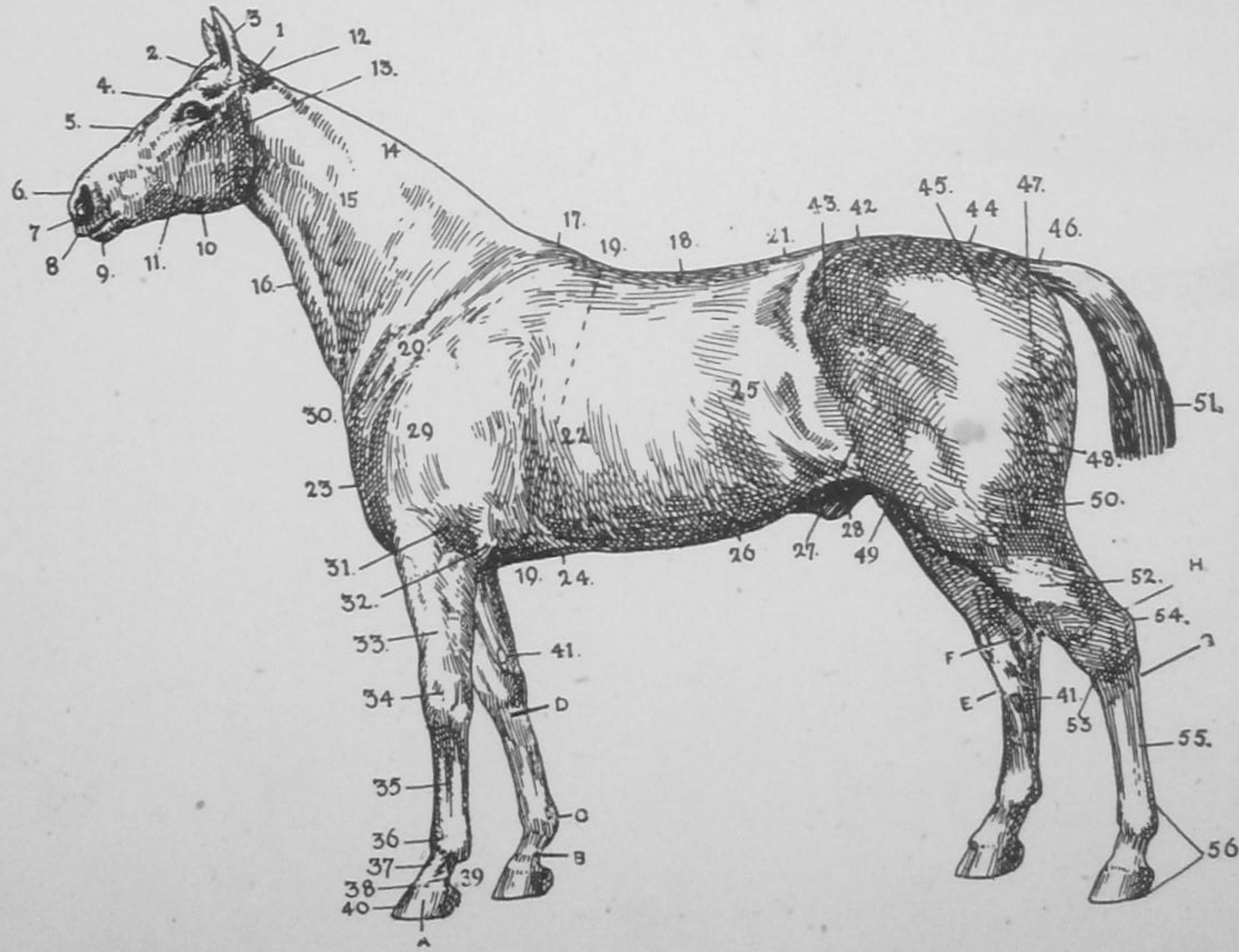
43-50. Quarter.

52. Lower Thigh.
53. Hock.
54. Point of Hock or Hough.
55. Back Sinew or Tendon.
56. Growth of Hair—Feathering.

THE SEATS OF THE COMMON DISEASES ARE:

A. Side Bone.
B. Ring Bone.
C. Windgall.
D. Splint.
E. Spavin.
F. Thorough-Pin.
G. Curb.
H. Capped Hock.

PLATE I


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well seen in the septic sores which occur in men and animals constitutionally weakened by hardship, and unsuitability of climate, during war time. Such sores heal badly, and occur on slight provocation.

Resolution is the favourable termination of inflammation. The cause having been removed and bacterial action overcome, the tissues unite and the part is healed.

Suppuration is a less favourable result of the injury, and is caused by infection of the part by pus-producing bacteria, either at the original occurrence of the injury or by subsequent infection.

There are many different kinds of bacteria which produce suppuration, and the character of the material produced varies with the type of organism producing it. Most commonly pus is a creamy, more or less fluid substance, composed of dead tissue cells, dead corpuscles from the blood, dead and living organisms, and a quantity of watery material. At times the material is darker in colour, and may be even of different colours; various shades of yellow and even blue pus may thus be produced.

In some cases the organisms which cause certain specific or definite diseases are also pus-producing, such as the organism which causes strangles in horses.

An **Abscess** is a local accumulation of pus. Here the destructive action is confined, usually, to the point of entry of the organism. The inflammatory action may be seen as a red zone of reaction round the abscess, tending to limit its encroachment in the part. Sometimes, however, the inflammatory defence breaks down, and foci of infective material may be carried by the blood-stream to other parts of the body. Such secondary abscesses are spoken of as *metastatic*; and if a number of these occur in various parts of the body the condition is described as **Pyæmia.**

A general infection of the blood-stream by organisms is called **Septicæmia.** This also may be of a specific nature, as in anthrax, or may be the result of a general infection of the blood-stream by pus-producing organisms, frequently indicating a feeble local resistance on the part of the tissues.

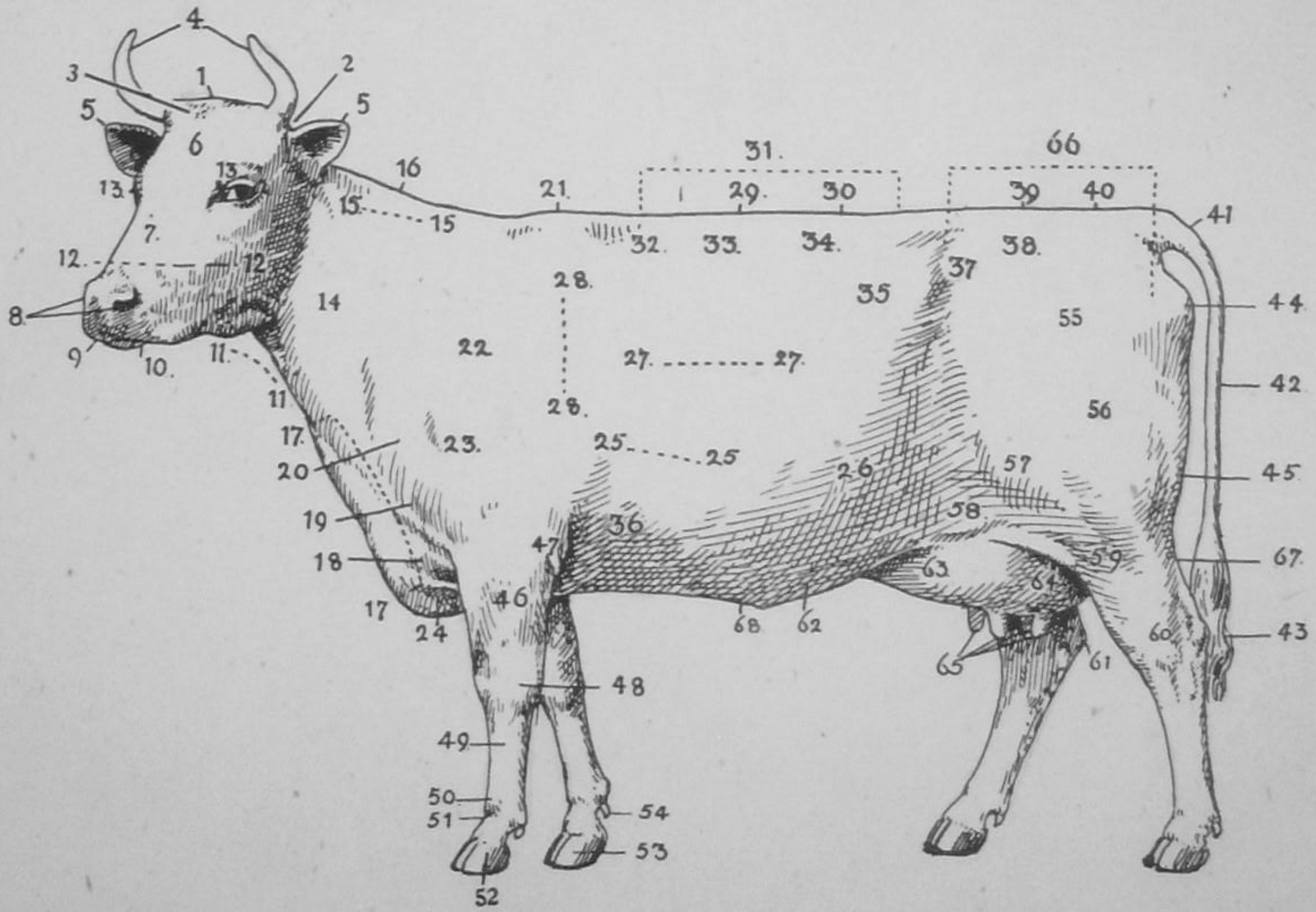
Gangrene.—This is another unfavourable result of injury. It is the death of a part while still attached to the living animal, and is described as moist or dry. Gangrene is moist when the tissues

EXPLANATION OF PLATE II

POINTS OF A COW

1. Head.
2. Back of the Head.
3. Frontal Crest or Protuberance—Poll.
4. Horns.
5. Ears.
6. Forehead.
7. Bridge of the Nose.
8. Nostrils.
9. Mouth, with Upper and Lower Lips.
10. Chin.
11. Throat.
12. Cheeks.
13. Eyes and Eyelids
14. Neck.
15. Nape of Neck.
16. Crest.
17. Dewlap.
18. Brisket.
19. Bosom.
20. Chest.
21. Withers.
22. Shoulder.
23. Shoulder Point.
24. The Breast.
25. Walls of the Chest
26. Belly.
27. Barrel or Side.
28. Crop.
29. Back.
30. Loin or Kidney Region.
31. Spine.
32. Fore-Ribs.
33. Mid-Ribs.
34. Back-Ribs.
35. Upper Part of Flank.
36. Fore-Flank.
37. Hip Bone, Hooks.
38. Haunches.
39. Rump.
40. Croup.
41. Tail Head, Root of Tail
42. Tail.
43. Tuft or Switch.
44. Pin Bones.
45. Twist.
46. Fore-Arm.
47. Elbow.
48. Knee.
49. Shin or Shank.
50. Fetlock-Joint.
51. Pastern.
52. Coronet.
53. Hoofs.
54. Dew Claw.
55. Hip-Joint.
56. Upper Thigh.
57. Stifle-Joint.
58. Flank.
59. Lower Thigh.
60. Hock or Hough.
61. Point of Hock.
62. Milk Vein.
63. Fore-Udder.
64. Hind-Udder.
65. Teats.
66. Pelvic Arch.
67. Purse in Ox.
68. Sheath in Ox

PLATE II


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undergo softening or liquefaction; in this case the part is invaded by micro-organisms. It is dry when the circulation is cut off or obstructed without septic infection. Such a condition may be produced, for example, if a very tight bandage were applied to a dog's leg, or a cord tied tightly round a horse's tail.

Slough, the throwing off of a dead part. The tissues may be involved to a greater or lesser extent, when the morbid process is arrested and a line of demarcation is then formed between the living and dead structures; the dead portion sloughing off, as is seen in mares and cows, when the passage has been damaged in difficult parturition; or the sloughing off of one or more quarters of the udder in mares, cows, and sheep from extensive inflammation of the mammary gland. When these occur, nature should be left to herself as much as possible, and the strength of the patient maintained with a good nutritious diet.

Septic Fever.—Many of the foregoing septic conditions may be accompanied by general symptoms of fever, characterized by a loss of appetite, rise of temperature, hurried breathing, and shivering. Such cases should at once be put under the care of a qualified practitioner, as treatment will be urgent, and will vary with the nature and intensity of the condition. Quinine is useful, and can be given in doses of from 1 to 3 drachms two or three times a day; hyposulphite of soda in 2-ounce doses and chlorate of potash in 3-drachm doses are also given alternately every six or eight hours, with nourishing gruels, linseed jellies, green food, carrots, hay tea, etc.

Of late years a great change has taken place in the mode of treating derangement and diseases of farm stock generally, but more especially those maladies which are now known to be due to the presence of pathogenic or disease-producing germs (bacteria). As a result of this knowledge more attention is directed to increasing the natural resistance of the body to such diseases. This is largely brought about, both as regards treatment and prevention, by the use of sera and vaccines, which are prepared in bacteriological laboratories and are injected hypodermically, or in other ways, into the animal.

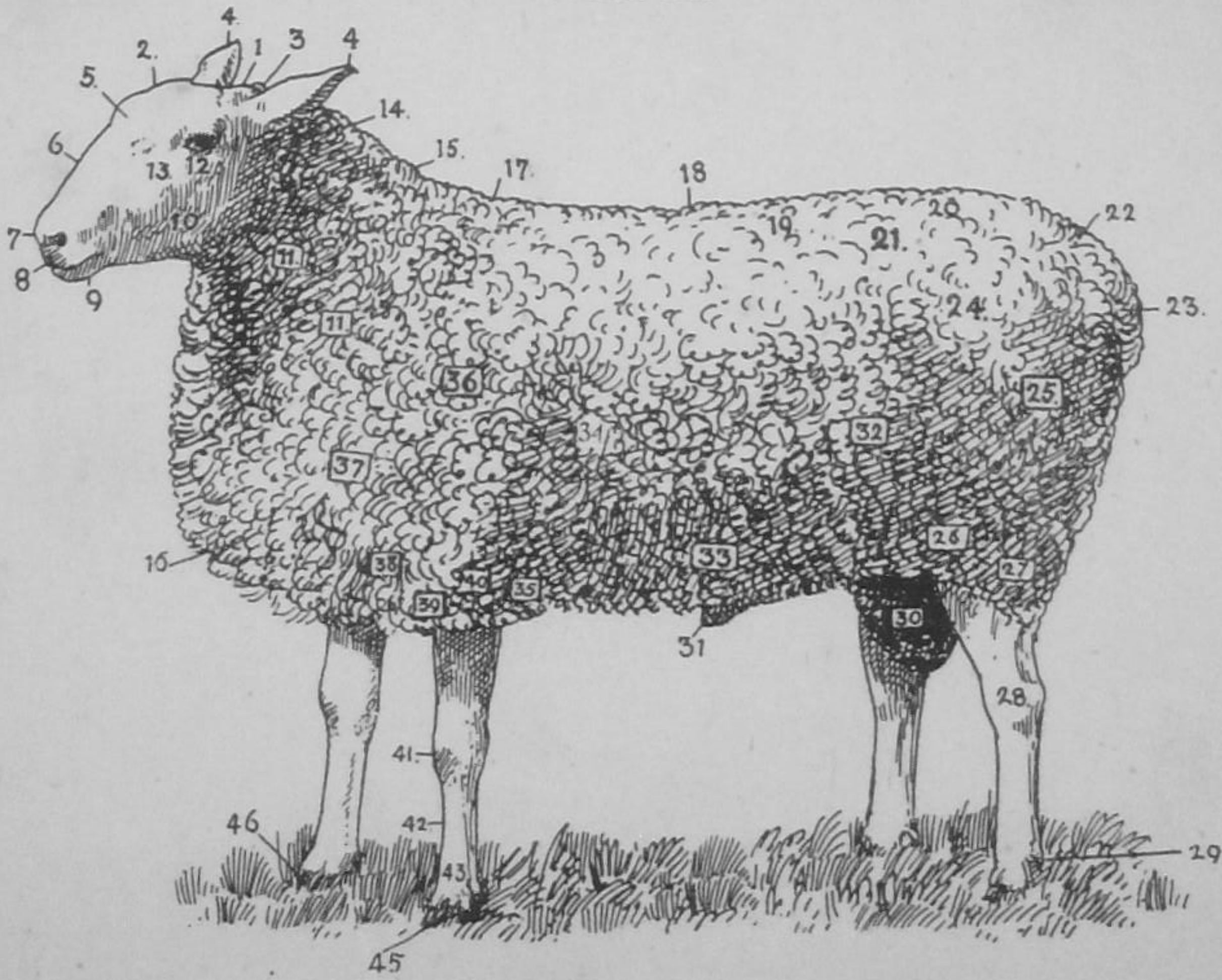
Immunity is the power of resistance which is naturally offered by the body to disease.

EXPLANATION OF PLATE III

THE POINTS OF THE SHEEP

1. Back of the Head.
2. Horny Protuberance.
3. Horns.
4. Ears.
5. Forehead.
6. Bridge of Nose.
7. Nostrils.
8. Mouth, with Cleft Upper Lip and Lower Lip.
9. Chin.
10. Cheeks.
11. Throat.
12. Eyes and Eyelids.
13. Lachrymal Pit.
14. Nape of the Neck.
15. Crest.
16. Dewlap.
17. Withers.
18. Back.
19. Loin or Kidney Region.
20. Rump.
21. Haunches.
22. Croup.
23. Tail.
24. Hip-Joint.
25. Upper Thigh.
26. Stifle-Joint.
27. Lower Thigh.
28. Hock.
29. Heel.
30. Scrotum.
31. Point of Discharge from Sheath.
32. Flank.
33. Abdomen.
34. Walls of the Chest.
35. Lower Breast.
36. Shoulder.
37. Point of Shoulder.
38. Fore-Part of Breast.
39. Fore-Arm.
40. Elbow.
41. Front Knee.
42. Shin Bone.
43. Fetlock.
44. Pastern.
45. Coronet.
46. Hoofs.

PLATE III


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It is a matter of common knowledge that certain individuals, whether animals or men, show a greater resistance to infectious diseases than others. It has also been noted that frequently one attack of a specific disease, followed by recovery, increases this resistance. This is notably so in the case of many diseases associated with childhood, which, as a rule, do not recur. Similarly one attack of distemper in a dog induces a strong immunity to future infection.

This immunity is due to various factors, but particularly to certain antibodies in the blood, which not only protect the animal in whose blood they exist, but even afford some protection to other animals, if blood is drawn from the immune animal and the serum injected into the one which it is desired to protect.

A good example of this is the antitetanic serum, now so extensively used for protection against tetanus (lock-jaw).

There are other ways in which a varying degree of immunity may be artificially induced; but, for the present, sufficient has been said to show the very practical assistance which is given by laboratory workers in the prevention and treatment of disease.

Unfortunately, such methods are not applicable to all diseases, and the results in some diseases are better than in others; but the number of diseases which can be so dealt with is increasing, and the veterinary surgeon in attendance will be able to advise, in any particular case, whether such methods can be usefully applied.

From these remarks it will be seen that from the various constitutions and the different forms of disease which are met with, and the great differences in their treatment, it is quite unsafe to start and tinker with them unless the nature of the complaint is thoroughly understood. My advice is this: In the first place, get a clinical thermometer, which can be had from 2s. to 5s. each; and, when an animal is ailing, take its temperature by passing the thermometer into the rectum. If it rises to 104° or 105° (normal temperature of the horse being 100° to 101°; cow, 101° to 102°; sheep, 102° to 104°), you should lose no time in calling in a qualified veterinary practitioner, as the case may be looked upon as tending to be serious. Don't think because your neighbour had a horse or a cow in just the same state (apparently) last week, and some wonderful patent nostrum cured it, that yours will be set right with

the same treatment. Your neighbour's animal may have had one or two of the symptoms similar to those exhibited in your case, but yours may have others accompanying these, which can only be detected by the professional eye. Don't waste time, money, and, perhaps, the animal as well, by delay in such a case, but send at once for your veterinary attendant, and, in the meantime, do as much to relieve the animal as possible, such as putting it in an airy box, clothing well, bandaging the legs, etc. This of itself will often, both in the case of horses and cattle, set them right, and the temperature will come down 2° or 3° by simply putting them alone in a loose-box. Animals, as a rule, when ailing in the fields, get away by themselves in a quiet corner. Follow their example; but whatever you do, do not start and tamper with quack medicines, of the composition of which you know nothing, and which may be exactly the reverse of what is required. Try to find out which way nature is working, and then do what you can to assist her. If you fail in this, send for your professional adviser.

MEDICINES: THEIR ACTIONS AND USES.

On account of the large number of diseases that are now found to arise from the presence of pathogenic or disease-producing germs in the fluids and tissues of the body, the administration of medical agents has, during the last twenty years, undergone a great change. Medical agents act both *locally* and *generally*, and are much influenced in their action by climate, temperature, habit, surroundings, susceptibility of the patient, and the nature of the disease. Some medicines, again, have special actions on certain structures and organs of the body, but their influence varies considerably in different classes of animals. To meet these conditions, medicines are, therefore, compounded and used in a variety of forms.

Medical preparations are, as a rule, given by the mouth in the form of *balls*, *boluses*, *pills*, and *draughts*, or they are injected into the bowels by an *enema*. *Hypodermic injections*—that is, injections of certain medicines under the skin—are now extensively practised with good results; medical and various other preparations are also frequently directly injected into the blood and into the windpipe.

The peculiar actions of some of the drugs on the living body are known under special terms, such as *alteratives*, *anæsthetics*, *anodynes*, *antiseptics*, *aperients*, etc.

Alteratives have an extensive range, and include the various preparations of the bromides, chlorides, iodides, sulphides, and the alkaline carbonates, and also the mercurial, arsenical, and vegetable extracts. It is not exactly known in what manner a number of them establish their action on the tissues of the body, but it is thought that they displace and remove effete debris from the system, and at the same time supply the necessary normal constituents to the tissues. Alteratives have been in common use for ages past. The best of all the alteratives are, however, plenty of fresh air, proper ventilation and drainage, good sweet food, and clean bedding; also clipping, exercise, and good grooming in winter. Raw linseed oil and cod-liver oil, from ½ ounce to 2 ounces, given once a day, have a splendid alterative action on horses and cows. For *sheep*, one-fourth of the quantity may be given. Grass and other green foods are the best alteratives during summer. Winter, however, is the time when alterative medicines are usually given to the *horse*. As an alterative for the *pig*, 1 drachm each of carbonate of soda and flowers of sulphur can be given daily in the food. For the *dog*, the dose ought to be 1 to 2 drachms of Parrish's syrup or Fellows' syrup of hypophosphites.

Anæsthetics are agents that produce insensibility, and control muscular action, and may be said to act both generally and locally. *General anæsthetics* produce insensibility by the inhalation through the nostrils of the fumes of nitrous oxide, chloroform, and æther, or a mixture of the two latter. *Local anæsthetics* produce non-sensitiveness in the parts to which they are applied. A 5 per cent. solution of cocaine is a local anæsthetic frequently used. Carbolic acid, aconite, and extreme cold are also occasionally used.

Anodynes relieve pain, and act both locally and generally. The *local* agents are for outward application, and are many, such as hot and cold water applications, belladonna, cocaine, menthol, tar, carbolic acid, blisters, etc. The *general* agents are either given by the mouth or (hypodermically) by the skin. Those most generally given by the mouth are opium, chloral hydrate, spirits; also turpentine, and, hypodermically, morphia and atropine.

Anthelmintics, Vermicides, and **Vermifuges** are worm annihilators and expellers. The *vermicides* are supposed to kill the worms, while the *vermifuges* purge the parasites from the inside wall of the bowels and expel them. Green food in the early summer months is a good vermifuge, particularly for *bots* in the horse.

Antiseptics are agents which prevent the development of, or destroy, septic or disease-producing organisms. Disinfectants have a similar action, but the term is chiefly applied to agents used to destroy organisms in buildings or places which may have become contaminated. A very large number of such agents are used, of which carbolic acid, perchloride of mercury, and lysol are common examples.

Antispasmodics are remedies that relieve or prevent spasm or cramp of the muscular fibres. The list of such agents is very great. *Those used externally* are cold and hot applications, friction, massage, and any form of counter-irritation. *Those used internally* are spirits, laudanum, morphia, chloral hydrate, turpentine, camphor, etc. Hypodermic injections of morphia and atropine are used, also inhalations of chloroform and æther, and watery vapours of essential oils—eucalyptus oil, camphor, etc.

Aperients (*see* Purgatives).

Aromatics (*see* Carminatives).

Astringents check and arrest too abundant secretions, and cause the parts to contract and condense. The materials used are the mineral and vegetable acids, mineral salts, chalk, oak bark, alum, turpentine, and opium.

Antipyretics (*see* Febrifuges).

Blisters, Counter-Irritants, Rubefacients, Vesicants.—These agents differ very much in their action and intensity, according to the materials used. They set up a new inflammatory process in a part which stimulates it to continue the work of healing or repair, and they also promote absorption of adjacent enlargements. A number of substances are used as *counter-irritants*. From 2 to 3 ounces of mustard mixed in 1 pint of cold water make a good simple counter-irritant for the throat in *common cold*, *pharyngitis*, and *laryngitis*. For applying to the sides of the chest in *bronchitis*, *pneumonia*, etc., double the strength of the above must

be used. *Blisters* for horses and cattle are used in the form of liquids and ointments, and of these there are various preparations.

Carminatives, Aromatics, Cordials, and Stomachics.—These articles, like antispasmodics, are used to stimulate the stomach and intestinal canal into action, also to condense gases and to expel flatus. The aromatic seeds and the essential oils—as oil of mint—are used for this purpose. As a general *cordial* or *stomachic* the following mixture is useful: Equal parts of ginger, gentian, caraway seeds, aniseed, coriander seeds, and pimento; grind very fine, and mix well together. For the *horse* and *cow* from 3 to 5 ounces of the mixture may be given in 3 gills of warm ale or treacle gruel, as a warming drench. For *sheep* give one-fourth of this dose. Four ounces of this cordial, if added to a dose of salts, assist the latter greatly in its action.

Cathartics (*see* Purgatives).

Caustics, Escharotics, Styptics.—These agents are generally used to arrest excessive granulations in wounds, or to stimulate healthy action in indolent ulcers; also to remove warty excrescences, and they are used both in solid and liquid forms. Nitrate of silver (caustic), sulphate of copper, sulphate of zinc, etc., can be applied in fine powder or dissolved in water. Tincture of iron and tincture of benzoin, carbolic acid, turpentine, etc., make good styptics—*i.e.*, arrest bleeding; and for this the hot iron is also at times used with good effect.

Counter-Irritants (*see* Blisters).

Decoctions, Infusions, Tinctures, are medical solutions prepared in different ways. *Decoctions* are made by cutting or bruising the roots, seeds, or leaves of medicinal plants, boiling them in distilled water for a certain time, and straining through muslin, a little spirits being added to preserve them. *Infusions* are prepared by digesting bruised vegetable products in hot water and straining, also adding a little spirit. *Tinctures* are made by macerating drugs in spirits, or spirits and water, for a certain period, and then filtering. When these are properly prepared, they are all useful and handy forms of medical preparations.

Deodorizers are agents that disguise, neutralize, or destroy bad smells, such agents being chloride of lime, mercury, carbolized lime, strong acids, chinosol, charcoal, moss litter, etc.

Demulcents, Emollients, Lubricants.—These agents have a semi-mechanical action. They protect raw surfaces from external influences, also *soothe*, *soften*, and *relax* the parts to which they are applied. They include flour, starch, treacle, milk, cotton-wool, fuller's earth, oils, fats, vaseline, glycerine, etc. Applications of cloth wrung out of cold or hot water come under this head.

Diaphoretics, Sudorifics.—These act on the sweat glands of the skin, increasing their action, and causing the animal to perspire. It is difficult to get the horse or cow to sweat. One way is to damp the body all over with cold water, covering up with a sheet wrung out of the water, over which dry woollen rugs and waterproof sheets are put, with plenty of cold water given to drink. From 1- to 2-ounce doses of spirits of nitre given in 1 pint of cold water at the same time will assist the action.

Disinfectants.—A large number of simple and compound articles are used as disinfectants, but nothing beats a good supply of fresh air, bright sunshine, thorough cleanliness, good ventilation, and effective drainage. Boiling water, steam, a good fire, the burning of disease-producing products, chemical agents, such as carbolized lime, mineral salts, and the preparations of chlorine, also Condy's fluid, are all good disinfectants.

Diuretics.—These stimulate the kidneys to extra action, and cause an increased secretion of urine, washing out the kidneys, as it were, also removing waste products from the system, and dropsical swellings from the legs and depending parts of the body. The substances most commonly used for this purpose are turpentine, nitrate of potash, resin, spirits of nitre, oil of juniper, etc.

Ecbolics, Parturients.—These act upon the womb, and cause it to contract and expel its contents, or they arrest hæmorrhage from the womb. Excepting for the bitch, these agents are rarely used in veterinary practice. Ergot of rye is supposed to have this property. Putuitrin, or the extract of pituitary gland, is chiefly used.

Embrocations, Liniments.—These are stimulating counter-irritants used for external application for sprains, bruises, sore throats, etc. They increase the action of the absorbent vessels, and also hurry forward suppurative processes. There are numerous formulas for the making of liniments and embrocations.

Emetics are articles used to cause vomiting and emptying of

the stomach. Those used in veterinary practice are for dogs and cats only. One teaspoonful each of mustard and common salt, given in half a teacupful of warm water, generally answers for a dog.

Emollients (*see* Demulcents).

Expectorants assist in the removal of the secretions from the air-passages, and for this purpose ammonia, camphor, turpentine, and balsams can be used; but the best expectorant for the horse or cow in catarrhal and lung affections is the inhalation of warm vapour, arising from steamed hay in the bottom of a pail, over which some camphor shavings, or oil of eucalyptus, and 1 quart of boiling water have been sprinkled.

Escharotics (*see* Caustics).

Febrifuges, Antipyretics.—These agents are numerous, and have different actions on various parts of the body, according to the cause of the fever, but are generally used for lowering the temperature of the body. Sponging the body with cold water, and putting on a sheet wrung out of the water, and covering up with woollen rugs, has a good effect. The medical agents used are spirits of nitre, antimony, camphor, salicylates, carbolic acid, quinine, etc. From 1½ to 3 ounces of hyposulphite of soda can be given every six hours as a drench, or in drinking water. Sulphate of quinine or salicylate of soda can also be given.

Germicides, Parasiticides, Insecticides.—These are preparations that destroy parasitic or insect life. Those most commonly used are carbolic acid and carbolic preparations generally, such as phenyle and sheep-dip preparations; also chlorides, bromides, and iodides. The inhalation of chlorine, sulphur, or iodide fumes acts as a parasiticide to the small thread-worms in the bronchial tubes in young calves and lambs when affected with hoose (*see* Worms).

Hypnotics and **Sedatives** are used to induce sleep and relieve pain. The substances commonly used are laudanum, morphia, chloral hydrate, bromide of potassium, and spirits. Excepting in the dog and cat, sleep is difficult to induce in the larger animals.

Infusions (*see* Decoctions).

Insecticides (*see* Germicides).

Lotions, Refrigerants (*Cooling Lotions*).—These watery solutions of drugs are numerous, and are generally used externally. They cool the part to which they are applied, allay pain, and check

the circulation, and are used after fomentations on swellings and bruises, such as capped elbow and hock.

Lubricants (*see* Demulcents).

Ointments are semi-solid, paste-like substances, made by incorporating certain medical agents with lard or vaseline, and these may be mixed on a slab, or in a mortar. Ointments consisting of lard, wax, turpentine, resin, etc., are melted over a slow fire with medical agents stirred in.

Parasiticides (*see* Germicides).

Parturients (*see* Ecbolics).

Purgatives, Cathartics, Laxatives, Aperients.—There are a great many medical agents that are used as such. They stimulate the action and increase the secretion of the lining membrane of the bowels, and empty the alimentary canal. For the *horse*, Barbadoes aloes is most generally used, also castor and linseed oils, Epsom and Glauber salts. For the *cow* and *sheep*, Epsom and Glauber salts, linseed or castor oil. To the *pig*, jalap and croton oil are given; and to the *dog*, castor oil and syrup of buckthorn. For full doses, see the table. For *laxative or aperient* doses, from one-fourth to one-fifth of the full dose can be used. Croton oil *should only be given to the pig. It is highly dangerous to the other domestic animals.*

Refrigerants (*see* Lotions).

Restoratives (*see* Tonics).

Rubefacients (*see* Blisters).

Sedatives (*see* Hypnotics).

Stimulants are various. They have different actions on different organs of the body, and are used both externally and internally. *Externally*, cold and hot applications, embrocations, liniments, blisters, etc., have a stimulating effect. *Internally*, spirits, ammonia, cold water, tea, coffee, etc., are used. *Sedatives* generally have a more or less stimulating action at first, but this is followed by a sedative reaction (*see* Carminatives).

Styptics (*see* Caustics).

Stomachics (*see* Carminatives).

Sudorifics (*see* Diaphoretics).

Tinctures (*see* Decoctions).

Tonics, Alteratives, and Restoratives.—These agents give tone and impart strength to the portions of the body for which they are

specially adapted. They are usually given when the system or any one or more parts of it become weakened and relaxed from over-exertion. The tissues of the body, when not diseased, have an innate power within themselves of replacing the waste; therefore the essentials most needed as a tonic and restorative are a good supply of fresh air, pure water, sound and proper food, good ventilation, drainage, and clean beds. *Restorative tonics* are vegetable bitters and aromatics, combined with some of the alkalies, and also the mineral acids and mineral salts.

Vermicides (*see* Anthelmintics).

Vermifuges (*see* Anthelmintics).

Vesicants (*see* Blisters).

METHODS OF ADMINISTERING MEDICINES

Balls, Boluses, Pills are the most convenient forms of administering medicines to horses and dogs. To prepare *a ball for a horse* the medicinal agents are mixed together with a little linseed meal, and beat up into a paste in a mortar, with the addition of honey, treacle, or soft-soap, and rolled into a cylindrical mass about ¾ inch in diameter; then cut into lengths about 3 inches each, and either folded into fine paper, secured at each end, or put into a gelatine capsule. *Pills for dogs* are prepared somewhat similarly, but much less in size. In administering the ball to the horse, the operator stands to the right or *off-side* and rather to the front, and with the left hand takes hold of the horse's tongue and gently pulls the point of the tongue to the outside of the mouth, and with the ball fixed between the three first fingers of the right hand, passes it quickly along the roof of the mouth to the back of the throat and leaves it; then withdraws the hand from the mouth, releases the tongue, and holds the jaws firm and close together by the aid of the left hand on the nose and the right on the under jaw, and looks for the ball to pass down the gullet on the near or *left side*. Or the mouth may be kept open with the balling iron, the tongue held, and the ball put in as above. A balling gun is sometimes used instead of the hand to place the ball at the back of the mouth. To give a pill to a dog, place the left hand over the nose, just below the eyes, and press the cheek of the left side against the upper teeth

with the fingers, and the cheek of the right side with the thumb, when the dog will himself open his mouth wide enough for the pill

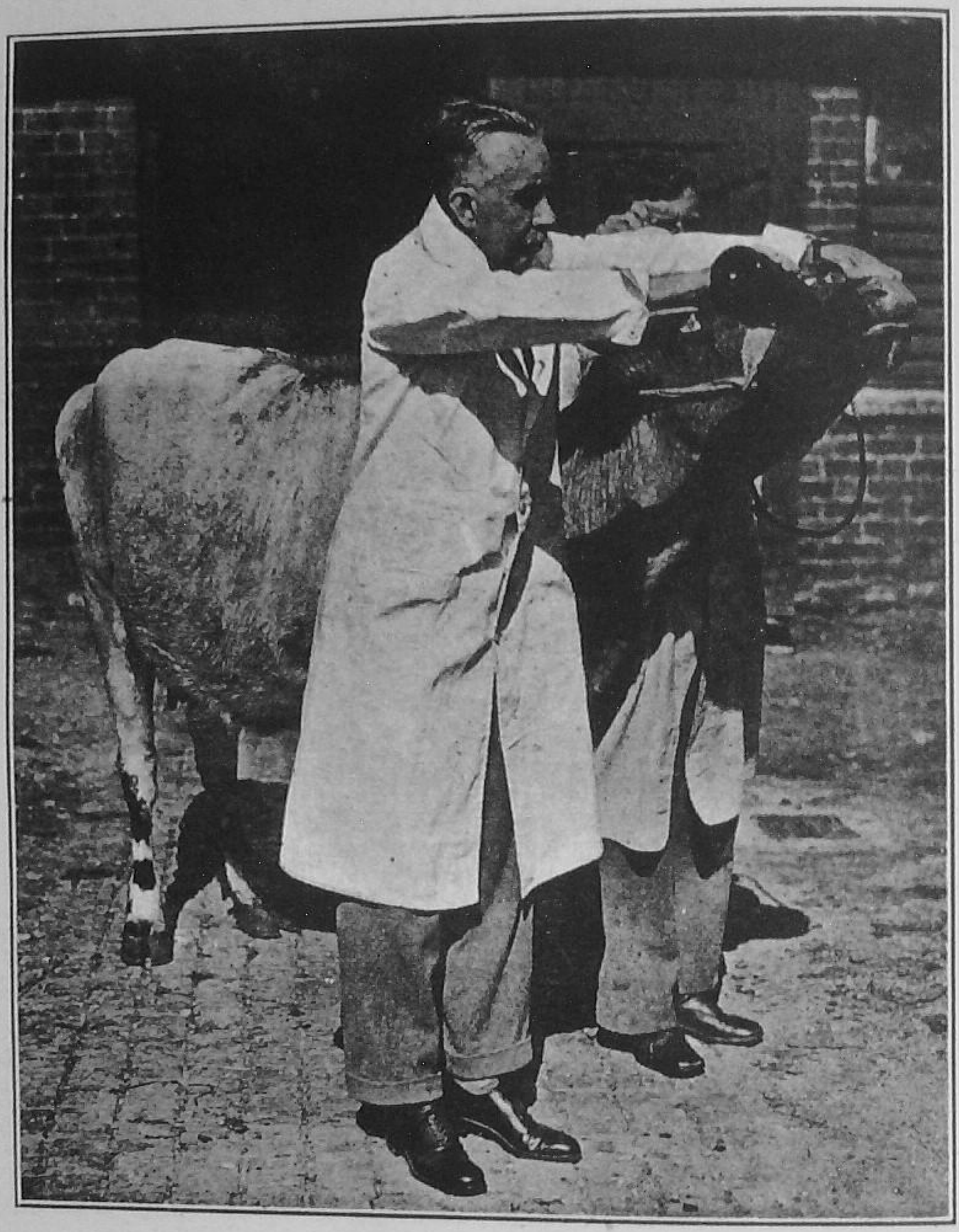


FIG. 1.—THE CORRECT WAY TO ADMINISTER MEDICINE TO A COW.

to be put into the back part of the throat with the thumb and fore-finger of the right hand.

Drenches, Draughts, Drinks.—When medicines are too bulky

to give as a ball, the ingredients are mixed together and suspended in cold or warm water, thin gruel, warm ale, or in linseed or castor oils, and given as a drench. The majority of medicines are administered in this form to cattle, sheep, and pigs in particular. In drenching a *horse*, buckle the ends of a narrow leather strap together in the form of a loop; put one portion into the mouth of the horse behind the incisor teeth; the other part is then carried over the nose close up to the eyes, through which put one of the prongs of a stable fork, to be held by an assistant standing on the left *or near* side. By raising the prong end of the fork, the head is elevated and the draught then administered by the aid of a special tin drenching bottle or a long-necked glass bottle, the neck of the bottle being inserted into the mouth on the off side, and the contents of the bottle emptied slowly and carefully into the mouth. The *cow* is best drenched with the old-fashioned drenching horn. The head of the cow is steadied by an assistant standing on the left side and taking a firm hold of the horns, while the operator, standing on the cow's right side, passes his left arm round the forehead of the animal and puts his fingers into her mouth on the left side, takes a firm hold of the upper jaw, and with the right hand the open end of the drenching horn is inserted into the mouth, the head elevated, and the contents of the horn delivered to the back part of the mouth. A bottle may be used instead of the horn. The *pig* is best drenched by holding it by the ears, and inserting well into the mouth an old strong-soled or wood-soled shoe, with a small hole in the toe. Hold the shoe firmly in the mouth, and pour the draught down the inside of it. In drenching the *dog*, tie the upper and lower jaws together with a piece of tape, and with the fingers pull the cheek out behind the tape, and with a long-necked bottle—small as possible—pass the draught between the cheek and back teeth. The pig can also be drenched by this method.

Electuaries are medical agents mixed up and made into a paste or mass with honey, treacle, jellies, etc., and used in cases of sore throat, or where it is dangerous to administer balls or draughts. A piece of the mass is rubbed on the upper surface of the tongue, or on the roof of the mouth, three or four times a day, when it is sucked in by the patient. It is thought by many to have a soothing effect.

Enemas, Clysters, or **Injections** are valuable agents, and are made with cold or warm water, soap and water, tobacco infusion, solution of aloes, etc., according to the purpose required. They are injected into the bowel by means of a large special syringe, or a funnel pipe, or by a funnel fixed on to a long or short flexible indiarubber tube; also by the injection pump, or by an ordinary indiarubber enema syringe. Warm water or warm water and glycerine are mostly used.

Firing is performed by specially made instruments, which are heated in the fire to a deep-red heat, and lines are drawn over the diseased part with the hot iron, or the part is punctured by a pointed instrument made hot. The operation can also be done by electricity with the thermo-cautery. Firing hurries on the process of reparative inflammation in disease of the bones, tendons, and joints, and also increases the power of absorption.

Fomentations are accomplished by warm, soothing agents applied to a damaged or diseased part, and mainly consist of warm water, to which medical agents may be added, according to circumstances. The process can be performed by simply bathing the parts with a sponge or cloth, applying woollen rugs wrung out of hot water, and by poultices, or spongio-piline.

Fumigations are now extensively employed for the destruction of disease-producing germs, parasitic pests, and for disinfecting stables and other buildings. The agents mostly used for fumigations are chlorine gas, iodine, sulphur, and formalin fumes. Chlorine gas is liberated by mixing equal parts of common salt and black oxide of manganese in an earthenware jar, to which is added 2 parts each of vitriol and water. Sulphur fumes are generated by burning roll sulphur in an old pan, or by sulphur candles. Iodine fumigations are made by putting 1 or more drachms of iodine on a piece of hot iron or hot brick. Formalin tablets are placed in a special crucible, and by the aid of a spirit lamp the fumes are liberated. When fumigating buildings all the animals must be removed, and the openings, windows and doors tightly closed; after the fumigation the doors, windows, and ventilators must be freely opened before the animals are again admitted.

Hypodermic Injections.—The method of giving medicine by injecting it through the skin is one of the greatest boons in medical

science, and is now largely practised. It is found that by injecting certain medicinal agents in solution—which for this purpose are very numerous—under the skin, they establish their action more quickly than when they are inhaled by the lungs. They are carried direct into the blood without undergoing any chemical changes, which they are very apt to do when given by the mouth. The operation is very simple, and is performed by the aid of a graduated glass-barrelled syringe, with a fine hollow needle, fitted on to the nozzle of the syringe. The instrument in all cases must be kept scrupulously clean. The most convenient places for inserting the needle and injecting the medicine are in the side of the neck or behind the elbow, where the skin is fine and thin.

Inhalations are mostly used for soothing or stimulating the cavities of the head and air-passages, also for the destruction of parasites in the windpipe and bronchial tubes. For cold in the head, laryngitis, and bronchitis they are highly serviceable. The most common is the warm, moist air from a steam kettle, or the steam vapour from a hot mash or a sop of hay in the bottom of a stable bucket, the nose of the horse being held over it for twenty minutes three or four times a day. The action is very much benefited when about one tablespoonful of camphor shavings, turpentine, carbolic acid, or oil of eucalyptus is put amongst the hay before pouring on the hot water.

Insufflators are hollow tubes made either of vulcanite, wood, japanned tin, or indiarubber, with a glass nozzle. They are of various lengths and shapes. The ordinary nasal insufflator is a hollow vulcanite tube about 9 inches long, with an indiarubber ball, having a hole in it, fixed to the broad end of the tube. It is used for inserting dry dressings, such as iodoform, into wounds, and the nose or ear. The dressing is put into an opening in the side of the tube near the broad end; this is covered by a slide. The small end of the instrument is inserted into the nose, ear, etc.; the rubber ball is then pressed, and the dressing is distributed into the affected parts.

Vaccines, or Antitoxin Treatment.— Vaccines and sera are principally used for preventing bacterial diseases by artificially producing a greater or less amount of immunity. They are either cultures of the various organisms, attenuated in different ways

or blood-serum from animals which have previously been hyper-immunized. A familiar example of the latter is the anti-tetanic serum so largely used as a preventive against tetanus. Sera are also used curatively, and, especially in the early stages of a disease, are of great service.

Bedding.—It is important that animals should have clean, dry beds. For this purpose *straw* is mostly used, both in stall and box. When straw is scarce the bedding should be well dried in the fresh air every day. *Sawdust* is now extensively used in large towns, also *moss litter*, and both answer well. For boxes we prefer the *moss litter* for horses and cattle; it keeps down bad smells, absorbs moisture and ground damp. In outlying districts dried bracken and dried rushes are much used for bedding.

METHODS OF CONTROL.

Holding up a Foot.—A simple method of controlling a horse when handling hind-parts or taking temperatures is to have an assistant holding up a fore-foot; this is best done by holding the foot by the toe, not supporting it by holding the fetlock, for in the latter case the horse will bear his weight on the holder, rendering the position difficult and constrained.

Twitch.—This may be looked upon as a mechanical anæsthetic when put on the tip of the nose and upper lip, or the ear. It has a wonderful effect in keeping the horse quiet, and when used numerous minor operations can be performed without much trouble. The ordinary mode of making a twitch is by boring a hole through the end of a piece of wood—a portion of a stable-fork shank—about 18 to 24 inches long, putting a piece of cord through the hole, and knotting the two ends together; the cord is then fixed on the upper lip and tip of the nose, and twisted up to get a firm hold.

Bull-Dog, or Bull-Grip, is an instrument used for restraining cattle; the action is somewhat similar to the *twitch* for the horse. It resembles a pair of pincers, with bulbs on the ends of the mouth or grip. When opened, one bulb is put into the end of each nostril; they are then closed on to the partition dividing the nose, and held tight by a screw, or spring and slide. In many minor operations this is the only instrument used for restraint, or more

frequently the thumb and finger of an attendant is used in the same manner to steady the animal.

Cradle.—This is a simple appliance made of cylindrical pieces

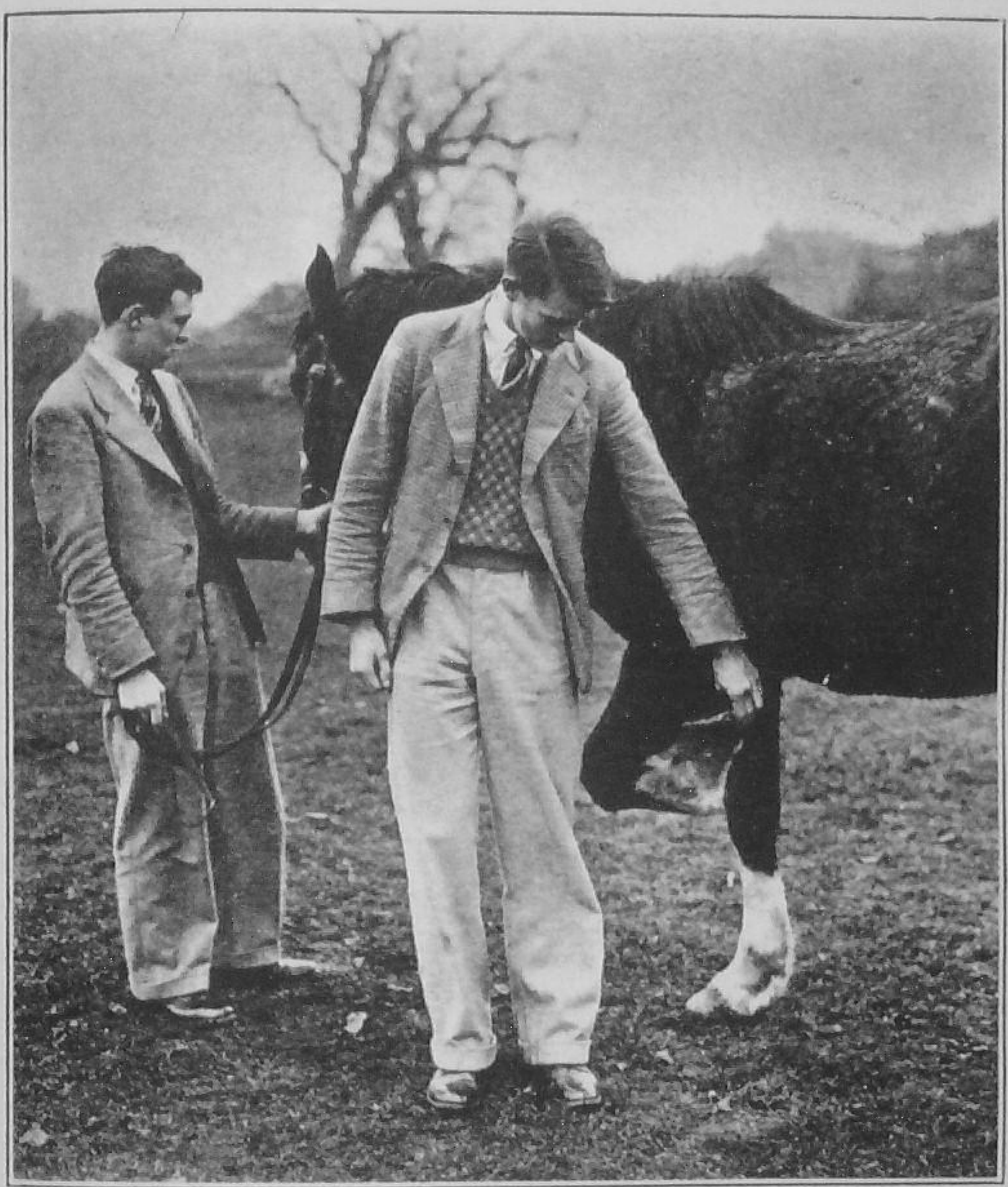


FIG. 2.—HOW TO HOLD UP A HORSE'S FOOT: (*a*) THE CORRECT WAY.

Note the easy position of the holder and the foot held by the toe.
(*W. D. Moss, Cirencester.*)

of wood or bamboo, about 1½ inches in diameter, and varying in length from 15 to 20 inches, and about eight to twelve in number.

They are fastened together by cords, with intervening spaces, and put round the horse's neck to prevent it biting or rubbing the parts, after firing and blistering.

Restraint Rope for the Horse.—Put the horse loose into a



FIG. 3.—HOW TO HOLD UP A HORSE'S FOOT: (*b*) THE WRONG WAY.
Note the uncomfortable position of the holder and the foot supported on the hands at the fetlock; the horse is throwing its weight on the hands.
(*W. D. Moss, Cirencester.*)

stall, but with a halter on the head and twitch on the nose. Double a strong cart-rope, and tie the loop end to the ring in the manger, or to the staps of the hayrack; then twist the loose ends of the rope together, and carry behind the thighs, above the hock; here make a loop in the rope, and pass the ends over the top of the stall division and around the stall post, putting the free end of the rope through

the loop behind the thighs, one or two attendants pulling the rope tight. Firing the hind-legs can frequently be accomplished under this method. If possible, operate on the leg next to the boards, then change sides for the other leg. For the *cow*, a ready mode of restraint is to put a strong, soft rope around the body of the animal, over the loins and in front of the udder, or the sheath in the male. Tie the ends of the rope securely, and put a strong walking-stick under the rope on one side of the spine, and twist the stick round

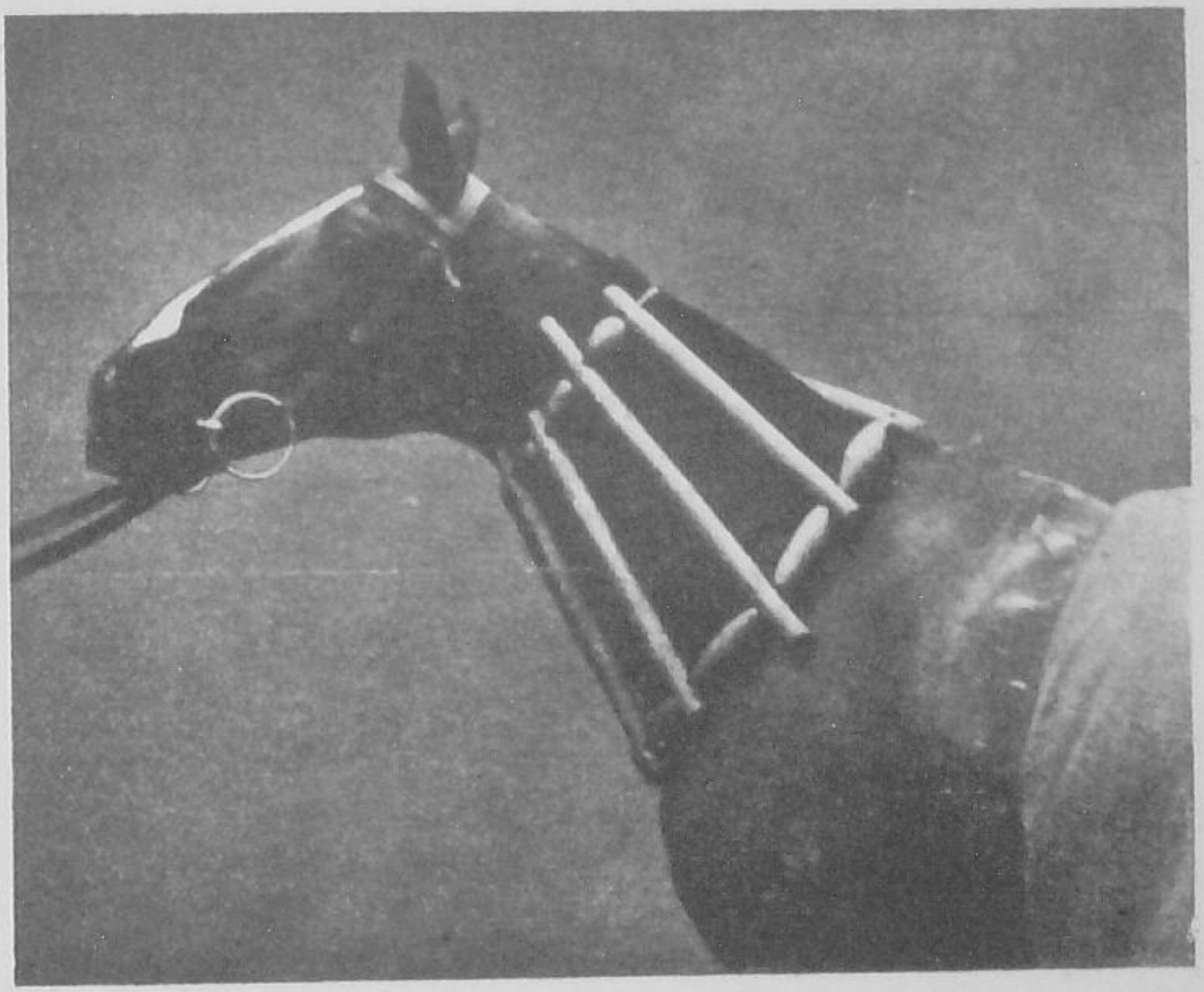


FIG. 4.—HORSE'S NECK WITH CRADLE IN POSITION.

and round until the rope is sufficiently tight. This will prevent the animal from kicking, and keep it quiet during the operation. Another method is to tie a piece of rope, about 5 feet long, around the hind-legs; the middle of the rope is put around the outside of the left hind-leg above the hock, and the ends brought between the legs and twisted, bringing one end in front of the right hock and the other behind, and knotting together on the outside.

Casting.—When some operations have to be performed, it is necessary to cast the animal. There are various methods. For

the *horse*, the most simple is that known as the side-lines. A good strong, soft hemp or cotton rope, about 20 to 25 yards long, is doubled at the middle, where a loop is made to go round the animal's neck, close to and in front of the shoulders, with the free ends of the rope hanging from the lower side of the loop. These ends are passed between the fore-legs, one to the left and the other to the right, and are each carried to their respective sides, round each hind-

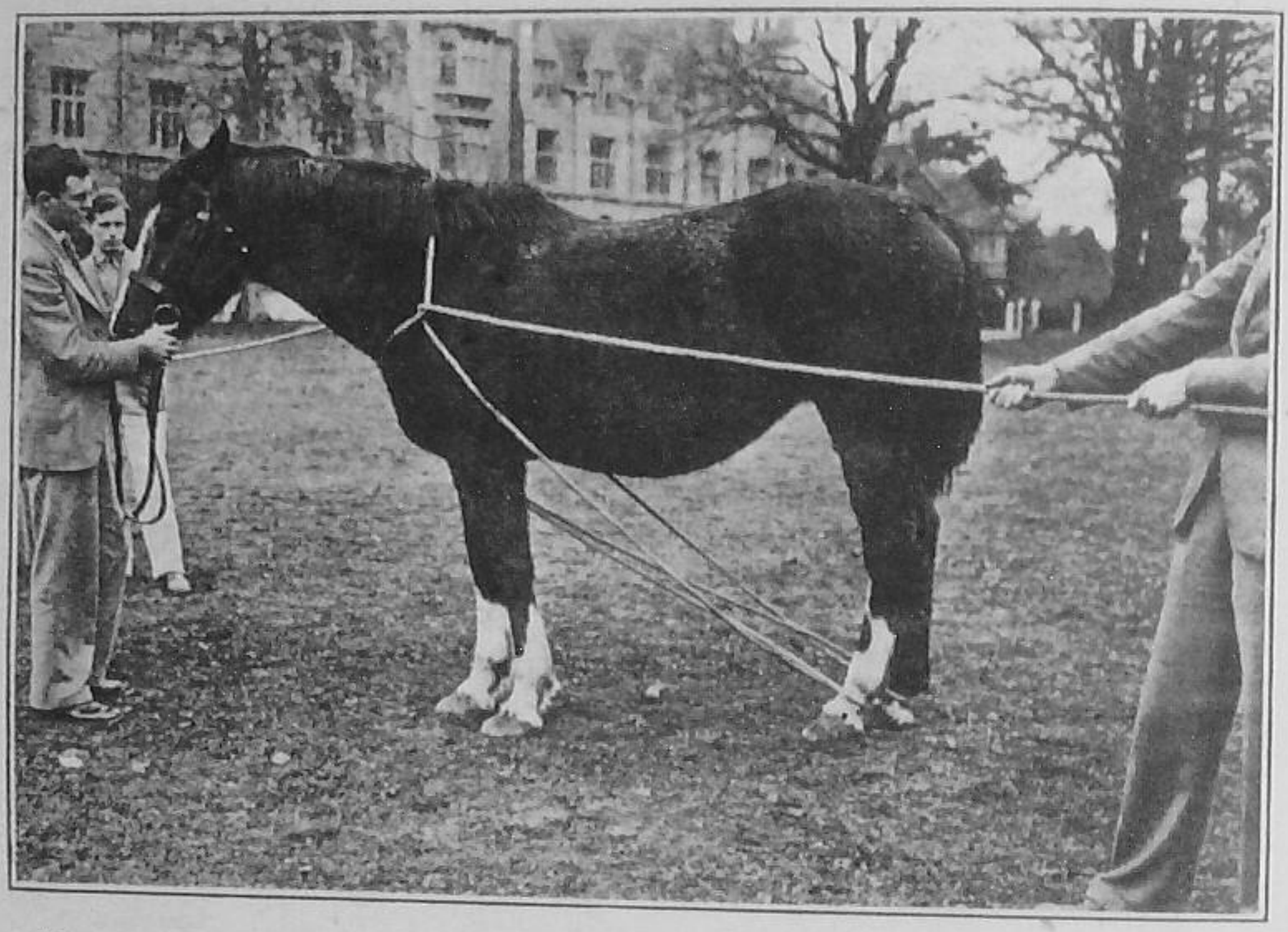


FIG. 5.—METHOD OF CASTING A HORSE WITH LONG COTTON ROPE: THE ROPE IS IN POSITION.

The man at the head pushes back the horse while the slackening rope is taken up by the holders. When the four feet are together the horse is pushed over.

(*W. D. Moss, Cirencester.*)

pastern from the outside to the inside, passing the rope underneath the line running from between the fore-legs, then up to and across the side of the shoulder through the loop round the neck. The assistants on the right side stand in front of the horse, and those on the left stand behind. When the ropes are pulled, and the animal is cast, the head must be kept well back. The hind-legs are then made fast by pulling the feet forward close up to each side of the chest, and making a hitch round the pasterns; the fore-legs are

then secured by passing the rope round each pastern at their respective sides, and tying them to the hind-pasterns. Special hobbles are also made of strong leather, and put round the pasterns of each leg, and held together by loops through which a chain or rope is passed. The legs are pulled together and the animal is thrown. For the *cow*, make a loop at the end of a good strong cart-rope. Put the loop over the head of the animal, carry it down to and in front of the shoulders, taking care not to have it too tight. Place the knot in the loop on the side of the neck; the rope is then carried along the side of the shoulder, and over the back just behind the shoulder, and under the chest; then make a half-hitch by putting the long end of the rope through the part coming from the neck loop; pass the rope along the side and put it over the loins, around and under the belly, in front of the udder in the female, and in front of the sheath in the male, bringing it up and making another half-hitch on a line with the first. The free end is next carried behind and pulled; the animal quietly lies down. A number of operations can be performed under this method of restraint.

Slinging.—This method of giving mechanical support to the horse is frequently resorted to. The slings should be made of good strong double canvas, about 5 feet long and 2 feet 6 inches wide, and fixed at each end to a horizontal bar of wood or iron, with loops or rings at each end of the two bars, to which ropes, chains, or pulleys are attached, and fixed to overhead beams. A good strong, broad leather breast and neck strap and broad breeching band behind are required to keep the patient in its place. It is not necessary to suspend the animal; the slings are only for support, and to keep the patient steady and prevent it falling. This appliance is of great service in cases of tetanus or when extensive injury has been done to the limbs or other portions of the body. A good strong indiarubber bag or bed filled with air and placed in the centre and sides of the slings affords great comfort to the patient, and prevents chafing of the skin.

Slinging the Hind-Quarters in Difficult Parturition, or in Eversion of the Womb.—First fix a good pulley-block to a beam above the patient, then double a good strong, soft cart-rope. Raise the hind-quarters, and, with the loop end of the rope facing the back of the animal, draw the rope under the quarter on which the

patient is lying, until one portion of the rope is pulled in front of the haunch bone, the other part being beneath the quarter, half-way between the root of the tail and haunch point. The two free ends are now situated under the hind-legs, one of which must be fixed to the left hind-leg, and the other to the right by means of two half-hitches around the hock, one being above and the other below the joint; then carry the two ends over the upper quarter, and pass them through the loop end; pull tight, and tie them securely. Hook on the pulley-block and raise gently, packing bags of chaff or bundles of straw under the lower quarter to assist in maintaining the animal in position. Or, again, a good strong sack may be used, and to make it secure and to prevent the ropes slipping, pieces of old rags rolled into a ball, or a medium-sized potato, should be tied into each of the four corners of the sack. The sack is then drawn underneath the quarter on which the animal is lying, one end towards the back and the other towards and under the hind-legs. Get the front edge of the bag well forward and in front of the haunch, and front of the stifle-joint on which the animal is lying; the other two corners of the sack should be one above the root of the tail and the other behind the thigh. The four corners of the sack are then tied securely together with a strong rope over the upper quarter. Hook the ropes on the pulley-block and raise up, supporting the under quarter with bundles of straw or bags of chaff.

Thermometer Reading.—The clinical thermometer should be in the possession of every owner of stock; by its use the state of the body is best indicated. The mercury in the instrument is shaken down to 95°. The mercury end of the thermometer is then introduced into the rectum of the animal, and held there for three minutes, unless the instrument has a special registration period. The Fahrenheit registration of the thermometer is most commonly in use, but the centigrade is also given. The normal temperatures of healthy animals are as follows:

	Degrees Fahrenheit	*Degrees Centigrade.*
Horse	100–101	37·7–38·3
Cow	101–102	38·3–38·8
Sheep	103–104	39·4–40·0
Pig	102–103	38·8–39·4
Dog	101–102	38·3–38·8
Cat	100–101	37·7–38·3
Poultry	105–106	40·5–41·1

Charges, or **Plaster Bandages**, are agents which act as external supporters, and in many cases they have a decided beneficial action, such as in wind-galls, bog-spavin, thorough-pin, and sprung tendons. The most convenient charge is made by melting over a slow fire 2 parts of black pitch and 1 part of Stockholm tar; stir well together, and when nearly cool smear over the parts. Plaster bandages are now greatly used for the support of sprung tendons and weak shanks. They are specially made from adhesive matters, in various lengths, breadths, and colours.

Chloroform Bag is an ordinary leather bag resembling a muzzle, and is fixed on to the nose of the animal by a leather strap put behind the ears; a sponge saturated with chloroform is put into the bottom of the bag, and to prevent the fumes escaping a towel is rolled

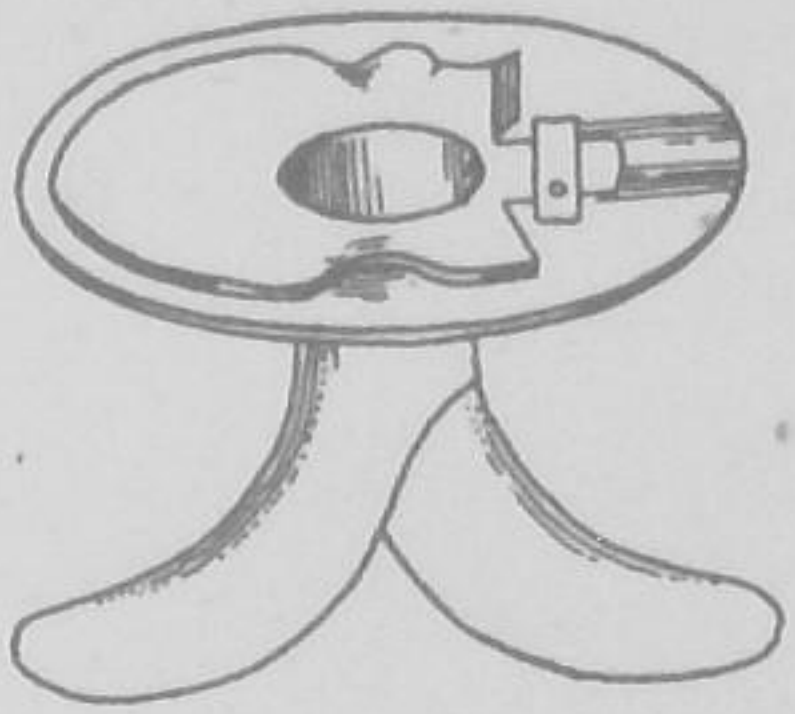


FIG 6.—TRACHEOTOMY TUBE.

round the top of the bag. Previous to administering the chloroform the animal should be cast and properly secured, to prevent it injuring itself when the chloroform is taking effect and passing off.

Docking is the amputation of a portion of the tail of young horses. Although it is considered by many to be an act of cruelty, the operation is still in vogue among certain classes of horses. There are various arguments for and against docking, also at what age it is best to operate. In performing the operation, a portion of the tail varying in length is selected, the hair is clipped off round the part, and the amputation is best done by a special docking knife or scissors, and the bleeding stopped by the application of the hot docking iron. All the instruments must be scrupulously clean, as both lock-jaw and blood poisoning occasionally follow

docking. Under the Anæsthetics Act, it is necessary to give an anæsthetic when docking horses.

Tracheotomy, or Opening into the Trachea or Windpipe.—This operation is of great service in bad cases of *roaring*, or when there is difficulty in breathing from the formation of abscesses around the throat, as in *strangles*. The operation is very simple. An opening is made through the skin and flesh into the windpipe about 9 to 12 inches from the angle of the throat, and a tube is put into the opening (Fig. 6). Sometimes the windpipe is slit open, and at others a piece about the size of a shilling is removed, and the tube inserted. The tube has to be removed and thoroughly cleaned two or three times a week.

CHAPTER II

BONES

Osteology (the study of bones).—Before entering into the details of the diseases and accidents peculiar to the bones of domestic animals, I shall first briefly run over the general skeleton.

Bone may be defined as a yellowish-white, hard substance, forming the framework of the body. Individual bones are made up of two types of bone, one of which is very hard, dense, or compact, the other being spongy and porous or cancellated. It is composed of one-third animal matter and two-thirds earthy or mineral matter, and is covered by a tough membrane called 'periosteum,' and lined internally with a fine membrane called 'endosteum.'

For descriptive purposes bones are divided into classes—namely, long, short, flat, irregular, and elongated.

Periosteum—the outer covering of bone—is a dense fibro-vascular membrane consisting of two layers, an outer fibrous one, and an inner one of fine connective tissue which is continued into the Haversian canals—minute tunnels in the bone—by means of which it is nourished through the blood system.

Endosteum is a very fine vascular membrane lining the internal or medullary cavities of hollow bones, wherein the marrow, a fatty substance, is contained, and by its means the internal arteries are distributed through the internal parts of the bones. The endosteum, unlike the periosteum, cannot be detached as a continuous membrane. In most birds the medullary cavities of the long bones contain air.

Long bones are the weight-bearers, and are found in the extremities or legs. They are hollow, and have a shaft and two ends. The compact or hardest kind of bone exists on the outside, being thickest in the middle and inner side of the shaft, or wherever most weight falls. The cancellated or spongy bone is to the inside of the shaft, and is most abundant at the ends of the bone, increasing

EXPLANATION OF PLATE IV

THE SKELETON OF THE HORSE

1. Upper Jaw.
2. Lower or Under Jaw
3. Occipital Bone.
4. Parietal Bone.
5. Frontal Bone.
6. Temporal Bone.
7. Superior Maxillary Bone
8. The Upper Molars.
9. Infra-Orbital Foramen.
10. Pre-Maxillary Bone.
11. The Upper Incisors.
12. The Upper Canine Tooth or Tusk.
13. Nasal Bone.
14. Lachrymal Bone.
15. Orbital Cavity.
16. Zygomatic Bone.
17. Inferior Molars.
18. Inferior Canine Tooth.
19. Inferior Incisors.
20. The Cervical Vertebræ (7), the first being the Atlas and the second the Dentata or Axis.
21. The Dorsal Vertebræ (18).
22. Eight True Ribs on the Breast Bone.
23. Ten False Ribs.
24. Breast Bone (Sternum).
25. Lumbar Vertebræ (6).
26. Sacrum, which consists of five vertebræ grown together, at the sides of which are four openings through which the sacral nerves pass.
27. Coccygeal Vertebræ (20).

Bones of the Pelvis.

28. The Ilium.
29. The Haunch.
30. Pubis.
31. Ischium.
32. Hip-Joint.
33. The Hip-Joint downwards.
34. Upper Thigh Bone, or Femur.
35. Stifle-Joint and Patella, or Knee-Cap.
36. Tibia, Large Lower Thigh Bone.
37. Fibula, or Small Lower Thigh Bone.

Bones of the Hock.

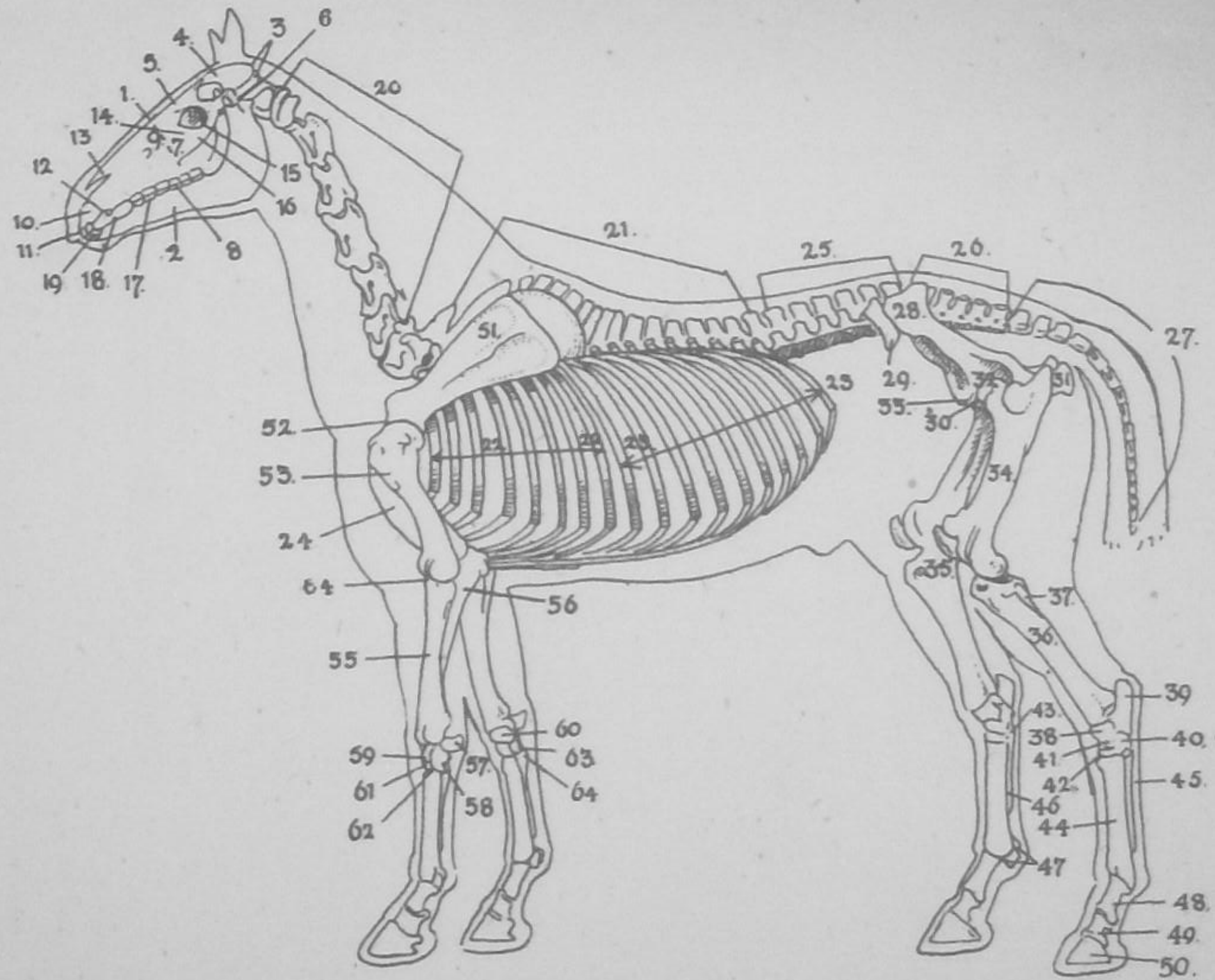
38. Astragalus.
39. Calcis, or Heel Bone.
40. Cuboid Bone.
41. Large Scaphoid Bone.
42 Small Scaphoid Bone.
43. Cuneiform Bone.
44. The Shank, or Large Metatarsal Bone.
45. Outer or Splint Bone.
46. Inner Splint Bone.
47. Sesamoid Bones (2).
48. Large Pastern Bone (Os Suffraginis).
49. Small Pastern Bone (Os Corona).
50. Coffin Bone (Os Pedis).
51. Shoulder-Blade.
52. Shoulder-Joint.
53. Humerus—Upper Arm Bone, articulates at the elbow-joint.
54. Elbow-Joint.
55. Fore-Arm, or Radius.

Bones of the Knee.

56. Ulna.
57. Pisiform.
58. Unciform Bone.
59. Semilunar Bone.
60. Scaphoid Bone.
61. Cuneiform Bone.
62. Os Magnum.
63. Trapezoid Bone.
64. Trapezium.

Bones below the Knee same as below the Hock, except the Shank Bone, which is called Metacarpal.

PLATE IV


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the attachment of muscle, as in the case of the shoulder-blade, to which are attached the strong muscles of the shoulder. Flat bones are made up of two layers of compact tissue, with a layer of cancellated tissue in the middle.

Irregular bones are found in the backbone, or vertebral column. They are unpaired, and are formed of a body, an arch, the arches of all these bones forming the canal in which is lodged the spinal cord, and various projections for the attachment of muscle.

Elongated bones are the ribs, forming the greater part of the skeleton of the chest. They are long, but have no marrow cavity.

The skeleton is divided into head, trunk, and extremities. These divisions will, perhaps, be better understood by reference to the tables, and to Plates IV. and V.

The Head is subdivided into cranium and face, the former consisting of a number of plates of bone which unite to form the protective covering of the brain.

Bones of the Head.

Bones of the Cranium—

	Horse.	*Ox.*	*Dog.*	*Pig.*
Frontal (pair)	2	2	2	2
Parietal (pair)	2	2	2	2
Temporal (2 pairs, in horses only) ..	4	2	2	2
Occipital	1	1	1	1
Ethmoidal	1	1	1	1
Sphenoidal	1	1	1	1
Interparietal	1	1	1	0

Bones of the Ear—

Malleus, Incus, Stapes, Orbicular	(4 pairs)	8	8	8	8

Bones of the Face—

		Horse.	*Ox.*	*Dog.*	*Pig.*
Nasal Superior maxillary Pre-maxillary Malar Lachrymal Palatine Pterygoid Superior turbinated Inferior ,,	(9 pairs)	18	18	18	18
Vomer		1	1	1	1
Inferior maxillary (lower jaw)		1	1	1	1
Teeth		40	32	42	44
Os hyoides (7 or more sections)	bones of the tongue	1	1	1	1

In the pig there is an additional single bone—the os rostri, or snout bone.

The Trunk is also divided into spine, thorax, and pelvis.

Bones of the Trunk.

		Horse.	*Ox.*	*Dog.*	*Pig.*
Cervical (neck)	..	7	7	7	7
Dorsal (back)	..	18	13	13	14
Lumbar (loins)	..	6	6	7	7
Sacrum (croup)	..	5	5	3	4
Coccyx (tail)	..	13 to 18	20	18 to 22	
Ribs (pairs)	..	8 true 10 false	8 true 5 false	9 true 4 false	7 true 7 false

The Sternum, or breast bone, is in seven sections, and in the horse is placed edgeway up, while that of the cow lies flat.

The Sacrum in the horse, ox, and sheep is composed of five segments each; in the dog, three; and in the pig, four. The elements composing it are fused together in the adult animal, forming one triangular-shaped bone. The tail bones are variable in different animals.

The Ribs of the ox are straighter, broader, and more uniform than those of the horse; they expand at their lower end, and the

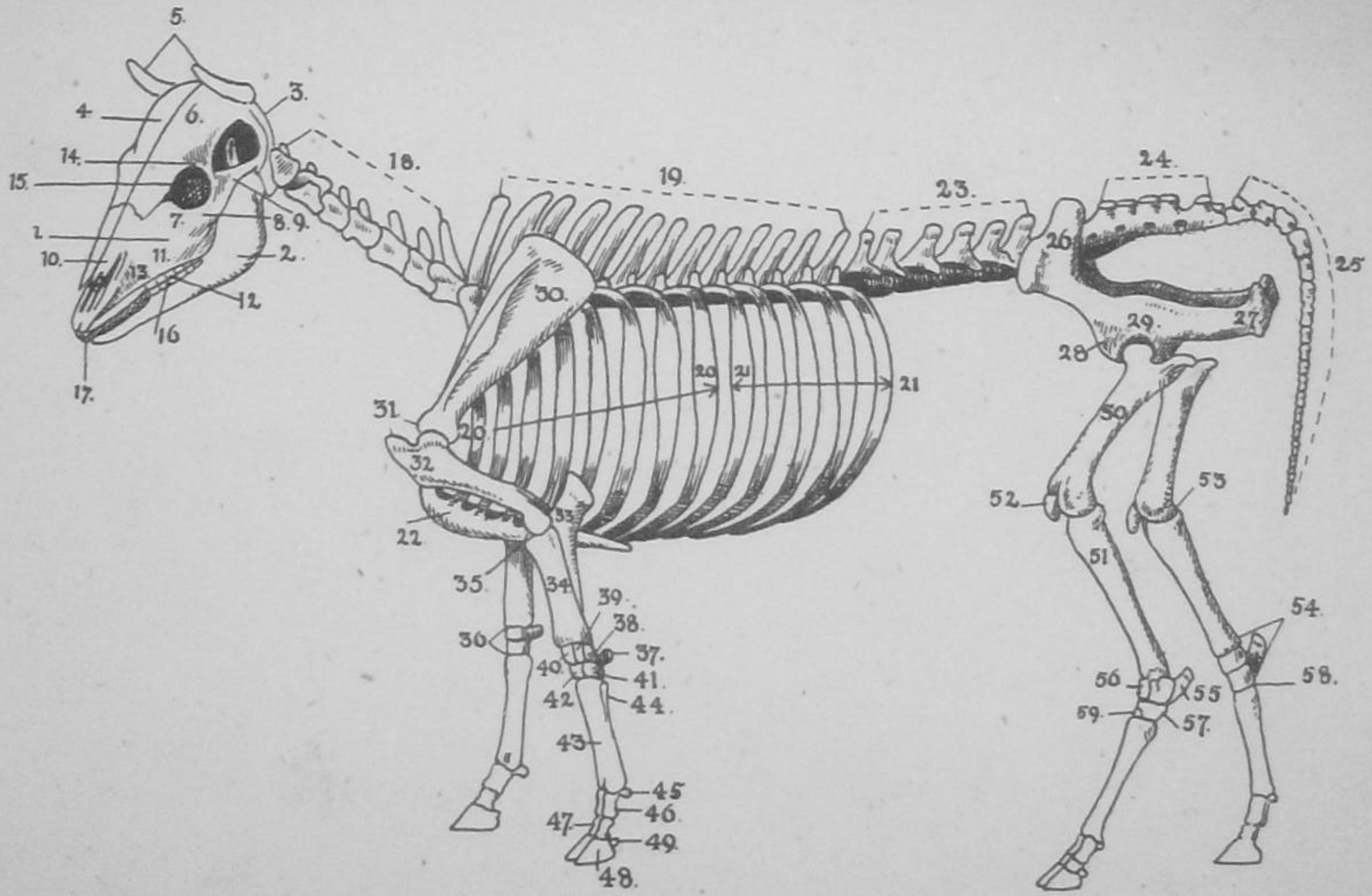
EXPLANATION OF PLATE V

THE SKELETON OF THE COW

1. Upper Jaw.
2. Lower or Under Jaw.
3. Occipital Bone.
4. Frontal Protuberance.
5. Horn Cores.
6. Frontal Bone.
7. Lachrymal Bone.
8. Malar Bone.
9. Zygomatic Bone.
10. Nasal Bone.
11. Great Maxillary Bone
12. Six Upper Molars.
13. Great Maxillary Bone.
14. Temporal Bone.
15. Orbital Cavity.
16. Six Lower Molars.
17. Eight Incisors.
18. Seven Cervical Vertebræ, the first bone being the Atlas.
19. Thirteen Dorsal Vertebræ.
20. Eight True Ribs.
21. Five False Ribs.
22. Sternum, or Breast Bone.
23. Six Lumbar Vertebræ.
24. Sacrum.
25. Eighteen to Twenty Coccygeal Vertebræ.
26. Ilium.
27. Ischium. } Bones of the Pelvis.
28. Os Pubis.
29. Hip-Joint.
30. Scapula.
31. Point of Shoulder.
32. Humerus.
33. Elbow Bone (Ulna).
34. Fore-Arm Bone, or Radius
35. Elbow-Joint.
36. Fore Knee-Joint.
37. Pisiform Bone.
38. Polygonal Bone.
39. Lunar.
40. Scaphoid.
41. Semilunar Bone.
42. Magnum.
43. Metacarpal.
44. Rudimentary Metacarpal, or Splint Bones.
45. Sesamoid Bones.
46. Pastern Bones.
47. Coronet Bones.
48. Hoof Bones.
49. Navicular Bones.
50. Thigh Bone (Femur).
51. Tibia.
52. Patella.
53. Stifle-Joint.
54. Hock.
55. Calcis (Heel Bone).
56. Astragalus.
57. Scaphoid and Cuboid.
58. First Cuneiform Bone.
59. The Second Cuneiform Bone.

From the hock downwards the bones are the same as in the fore-limbs, except the Shank, which is called Metatarsal.

PLATE V


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true ribs (excepting the first) articulate with their cartilages by true (diarthrodial) joints.

The ox has a small bone (sometimes two) in the heart, and the dog has one in the penis.

Bones of the Extremities.

Bones of the Fore-Legs (Right and Left)—

	Horse.	*Ox.*	*Dog.*	*Pig.*
Scapula (shoulder-blade)	2	2	2	2
Humerus (upper arm)	2	2	2	2
Radius (fore-arm)	2	2	2	2
Ulna (elbow bone) (much larger in the ox than the horse) ..	2	2	2	2

	Horse.	*Ox.*	*Dog.*	*Pig.*
Carpus (knee) ..	8 pairs	6 pairs	7 pairs	8 pairs

Bones of the carpus from inside outwards:

Upper Row—
Scaphoid, semilunar, cuneiform, pisiform.
Lower Row—
(Trapezium), trapezoid, os magnum, unciform.

The trapezium is usually absent, and in the ox the trapezoid and os magnum are represented by a single bone.

Metacarpal	2 large	2 small
,, ...	4 small	2 small
Sesamoids	4	8
Os suffraginis (long pastern)	2	4
Os coronæ (short pastern)	2	4
Os pedis (coffin bone)	2	4
Os navicular (shuttle bone)	2	4

See page 52 for pig and dog.

The arrangement of the bones under the knee of the dog resembles that of the human hand.

The Pelvis consists of two bones—namely, the right and left innominate bones. Each of these is composed of three sections—ilium, ischium, and pubis—and these form the side, floor, and part of the roof of the pelvic cavity.

Bones of the Hind-Legs (Right and Left)—

	Horse.	*Ox.*
Femur (thigh bone)	2	2
Patella (knee-cap)	2	2
Tibia (leg)	2	2
Fibula (leg)	2	—
Tarsus (hock)	6 pairs	5 pairs
Astragalus, os calcis, cuboid, scaphoid, and two cuneiforms.		
Large metatarsal	2	2
Small ,, ...	4	2

The pastern bones correspond with those of the fore-extremities both in name and number. The bones above the hock are the same in the pig and dog; the hock, however, consists of seven pairs of bones in these animals, while each has twenty-nine pairs of bones under the hock.

The skeleton of the sheep is analogous to that of the ox, both in number and names of bones.

In examining the skeleton, it will have become apparent that the skeletons of all the higher animals, including man, bear a very considerable resemblance, but that various modifications have occurred during the evolution of the different animals. Of these, the most important changes are found in the limbs. None of our farm animals possess a clavicle or collar bone, through the medium of which, in man, the arm is joined to the trunk by a true joint. Occasionally, however, in the cat a splinter of bone has been found in the muscles of the neck, representing the clavicle.

The Radius and Ulna, bones of the fore-arm, in man are two separate bones which articulate with one another at their extremities. Man is therefore the only animal of this class having complete power of supination, or turning the hand with the palm upper-

most. The gradual disappearance of the shaft of the ulna is seen in varying degree in the other animals; in the horse, only the upper extremity remains, whereas, in the dog and cat, the two are separate bones. The gradual disappearance of the ulna bears relation to the disuse of the limb for purposes other than walking.

The dog and cat still possess five digits, which are analogous to the five fingers of man. In the horse only the middle finger remains, while the inner and outer small metacarpal bones (splint bones) represent all that remains of the other fingers.

Somewhat similar changes may be observed in the hind-limb.

Arthrology (or the study of joints).—The union of any two elements of the skeleton constitutes a joint. There are three main classes of joints—synarthrosis, immovable, such as the union of the bones in the head; amphiarthrosis, slightly movable, as between the bodies of the vertebræ—in this case the slight movement possible is due to a small piece of flexible cartilage (gristle) which is interposed between the bodies of the vertebræ; diarthrosis, movable in any direction, as in the hip, shoulder, etc. Here, the bones are actually separate, but connected by means of a fibro-membranous bag, called a capsular ligament, which envelops both ends of the bones; the capsular ligament is lined by a fine synovial membrane, which secretes the synovia, or joint oil, by which the articulation is lubricated.

Ligaments are dense, fibrous, amber-coloured, flexible bands, and capsular envelopes connecting the ends of bones to form articulations, and are composed mainly of white fibrous tissue. Some ligaments, however, are mostly of yellow elastic tissue. The ligamentum nuchæ, which supports the head and neck, is V-shaped, and extends from the top of the shoulder, or withers, to the crown of the head, and consists of two layers or plates.

The binding ligaments are flattened or rounded bands running from the lower end of one bone to the top of the succeeding bone, but when found between the shafts of adjacent bones they are called interosseus, and when they bind down tendons passing over the joints are named annular ligaments.

Cartilage, or gristle, is a pale bluish-white, firm, elastic, glistening substance, which is found adhering to the surface of bones, and forming parts of the skeleton, and is of two kinds—temporary

and permanent. The temporary cartilage forms the original basis of bone, which in adult life becomes ossified. Permanent cartilage consists of two varieties—viz., hyaline cartilage and fibro-cartilage. And these again are named according to the purpose they serve, such as articular, when at the ends of bones to form joints; or interarticular, when it forms a pad in the middle of a joint, as between the bones of the vertebræ, and in the stifle. We have also the costal cartilages, prolonging ribs anteriorly; the cariniform cartilage, keel-shaped, at the front of the sternum; the ensiform cartilage, heart-shaped, at the posterior end of the sternum; and the cartilage of prolongation, attached to the top of the scapula. Lateral cartilages are found on each side of the foot; and various cartilages form the basis of the ear, larynx, and windpipe. In short, cartilage is found giving shape and form where bone would not answer. Now, all these structures are liable to disease and injury, as well as the soft parts of the body.

Periostitis is inflammation of the covering of the bone, and mostly occurs in young race-horses as sore shins. When the inflammation is very acute and continuous, great constitutional disturbance is set up, the parts affected become swollen and very painful to the touch, and if not speedily relieved the disease may terminate in death of the bone (necrosis), or the death of the patient. Although periostitis is generally the result of some injury done to the bone or its covering (periosteum), it may also arise from constitutional disturbance, such as rheumatism (rheumatoid periostitis), causing acute pain to the animal, accompanied by a great loss of flesh.

Treatment.—Rest is the first essential. Some practitioners recommend the use of hot fomentations, or bandages wrung out of hot water. For my part, I like cold water applications best, or spongiopiline soaked in cold water, and secured over the affected part with a bandage. For combating the fever, I find saline fever medicines answer best. Sometimes the parts affected have to be cut down upon to liberate the exudate under the periosteum. At times a plaster bandage has a good effect.

Ostitis is inflammation of the bone, and may be due to a direct injury, or may arise from constitutional or specific causes—tuberculosis, or from other diseases, such as attacks of rheumatism.

Sometimes a very slight injury may set up inflammation of the bone, and cause bony material or exudate to be thrown out, forming bony enlargements, such as splint, ringbone, and spavin. These deposits are known as exostoses, and our endeavour should be to find out the exact place affected, and apply such remedies as will hurry on the inflammation to resolution and consolidation, and thus form a true bony deposit. For treatment, nothing beats the application of cold water. When there is no water main, such as is found in most towns, this treatment can be accomplished by elevating a large cask or tub filled with water, and connecting with it one end of a piece of $\frac{1}{2}$-inch indiarubber piping, 10 or 12 or more feet long, the other end of which is secured over the parts affected or to the horse's limb by a bandage or other appliance; this secures a constant stream of water on the syphon principle—tub and tube irrigation. When the inflammation has abated, a blister may be applied.

Caries or **Ulceration** of the bone is a molecular death of a portion of the bony structure, which has a worm-eaten appearance. There is no bone in the body that is not subject to this affliction, but it affects some bones more commonly than others. The pain is continuous, and wears the animal down. The strength must be supported with good nutritious diet, while cold applications should at first be resorted to, followed by blisters, firing, and, where practicable, cutting down on the part and scraping with a bone spoon, thus endeavouring to bring about healthy action. These latter operations should be in the hands of a professional man. If the disease is near to, or in connection with, a joint, the object should be, if the animal is likely to be of any service afterwards, to hasten on the inflammatory process to throw out healthy bony material sufficient to unite the ends of the bones and form a stiff joint.

Anchylosis (the abnormal consolidation and immobility of a joint).—In this case the articular cartilage becomes absorbed or destroyed, and a bony deposit takes its place in and around the damaged joint, the two bones becoming united. Sometimes the disease is associated with a septic infection and breaks out, forming sinuses, which discharge a fœtid, irritative matter, and are extremely difficult to deal with, requiring an operation and antiseptic treatment. Generous diet is highly necessary. Old horses are very

subject to anchylosis from hard work or rheumatic affection, particularly in the back bones. Great care is therefore necessary in casting these. The knee, hock, fetlock, and pastern joints also on many occasions become fixed, and the flexibility of the limb is interfered with; but slow work, particularly that on the farm, can be done without pain to the animal, although what may be called mechanical lameness might be present. Anchylosis may, however, arise from other causes, and the joint become fixed.

Necrosis, or death of the bone, resembles mortification in the soft structures. When inflammation of bone is very intense, it may at times terminate in death of the affected part. The hard or compact structure is said to suffer most from necrosis, and when the dead bone is encased in the healthy structure it acts as an irritant, and causes a fœtid discharge. I have seen it in the lower jaw, incited by the rough usage of the horse breaker, where the dead portion, as soon as it became loose enough, was removed, and the part healed. I have removed half of the navicular bone and wing of the coffin bone, also a portion of the shank (metatarsal) bone, with success. It must be dressed with antiseptics (and nothing is better than a weak solution of hydrochloric acid) and interfered with as little as possible, in order to let it mend. At times the dead portion cannot be got at to remove, and it then becomes sequestrated by healthy bony matter being thrown out, and enveloping the dead portion; but this is a long process.

Rickets is a peculiar yielding or bending of bone, arising from imperfect assimilation of lime elements in the food, the result being that the proportion of earthy or mineral matter in the bone (which gives the necessary rigidity) is far too small compared with the animal matter (which supplies resilience), so that the bone will scarcely support the weight of the body. Rickets is mostly seen in young dogs and pigs, and not so frequently in foals and calves. The cause of the faulty assimilation of lime salts is, either a deficiency of these salts in the food, or, as is now known to be more commonly the case, a deficiency of certain vitamins in the food.

Vitamins have been called accessory food factors; they exist in very minute quantities in natural foods and exercise a profound influence on the processes of body building. Several different vitamins, having specific effect on certain aspects of metabolism,

have of recent years been studied, and the effect of their absence from the food of experimental animals noted. One, known as vitamin D, is found to be necessary for the proper assimilation of lime salts to form bone; it is therefore called an antirachitic vitamin. So far as our knowledge goes, vitamin D is the only one of the series which is produced by animals themselves, being formed by the action of certain rays of light from the sun on a material known as ergosterol, found in the superficial layers of the skin. It is also found in such foodstuffs as milk, eggs, and butter; but the best source is cod-liver oil.

This modern knowledge gives an important clue to the treat-



FIG. 8.—A CASE OF RICKETS.
(From *The Veterinary Journal.*)

ment which should be followed in cases of rickets. The animal should be put into a well-drained and ventilated box, and provided with a comfortable bed, and whatever special treatment is advised, the diet should include substances known to contain the necessary vitamin D. Fresh milk and cod-liver oil are both known to be rich in this food factor. A plentiful supply of sunshine and reasonable exercise are advisable. Syrup of phosphates of iron, potash, soda, and lime; and cod-liver oil, given in doses of 1 table-spoonful twice a day in milk. Good, well-boiled oatmeal porridge, with plenty of milk and a wine-glassful of lime-water night and morning, is also recommended.

Mollities Ossium (osteomalacia) is real softening of the bone, which becomes of a spongy red texture; the treatment is much the same as for rickets. Another disease of the bone, which is thoroughly described in Williams' 'Principles and Practice of Veterinary Surgery,' is called osteoporosis, and is a remarkable softening and swelling of the bony structure.

Fragilitas Ossium, or brittleness of the bone, is mostly seen in aged animals; as they advance in life the bones become firmer, and lose their animal matter to a certain extent, so much so that the bones of an old horse, owing to their fragile condition, are very subject to fracture.

It also occurs more rarely in younger animals, following some other long and wasting disease; in this case the bone may become so fragile that it will easily break into fragments, and even to powder in parts.

Osteosarcoma is a malignant disease of the bone of a cancerous nature, which at times implicates the flesh as well. It is common in cattle and horses, attacking generally the head, and frequently commencing in the inner corner of the eye; the ribs are also the seat of the disease. It creeps on very insidiously, producing little or no constitutional disturbance. The animal seems to have no pain, but gradually loses flesh. The first appearance of the disease is a large swelling, which finally breaks out with a dirty brown discharge and a rapid growth of spongy-looking flesh. An exact diagnosis is made by an examination of a portion of the growth in a laboratory. If the true nature of the condition is thus determined the animal had better be destroyed, as treatment is not likely to be successful. This disease may sometimes be mistaken for actinomycosis, which it much resembles.

Tubercular Disease of the Bone.—Bone, like all other tissues of the body, is subject to invasion by the tubercle bacillus. Both bones and joints are thus affected, most commonly as a secondary infection to tuberculosis elsewhere in the body. In cattle and horses cases occur where the bones and joints of the spine are affected, causing a peculiar staggering gait, and the animal finally loses the power of the hind-legs. The animal affected may continue to live, feed, and chew the cud, but finally gets so bad that it cannot get up. The stifle, knee, and other joints

are also frequently affected. Treatment in these cases is of little use.

Enchondroma is a cartilaginous growth or tumour upon a bone, such as the sternum and ribs, seldom causing, however, any



FIG. 9.—FRACTURE OF FIRST PHALANX IN TOE OF GREYHOUND, ILLUSTRATING THE VALUE OF X RAYS IN DIAGNOSIS.

This fracture was not diagnosed before the X ray was taken.

constitutional disturbance; when practicable this has to be removed by a surgical operation.

Fractures.—What is a fracture? Some define it as a solution of continuity, which, I think, is not a good description. My definition of a fracture is: 'A forcible separation of the cohesive particles of a hard substance into two or more parts.' Now, the bones of an animal are as liable to fracture as those of the human subject. Formerly it was thought that the bones of a horse would

not mend; yet this is not so, for they will unite as quickly as those of the human frame, but we cannot place the patient in the same state of rest and quietness, hence the difficulty in getting recoveries. With flat bones, as the shoulder-blade and pelvic bones, where they are enveloped with flesh, the ends of the bones are kept fairly well in apposition, and at times do capitally, simply by putting the animal in slings, with perfect quietness, and with a good pitch charge applied over the affected parts. The bones of the pastern-joints, when the injury is not too extensive, also occasionally do well, and where the animal is likely to be useful for stud purposes is worth the attempt. Fractures of the long bones or weight-carriers, such as the thigh, fore-arm, and shank, are the most difficult to deal with, especially in the horse, which, if so injured, is generally destroyed; yet in the human being these are the best to treat. The long bones of cattle unite readily by putting on with melted burgundy pitch thick shoe-sole leather splints, 1½ inches broad, all being held with a bandage which is not too tight, so as to allow of the swelling which takes place. Fractures of the bones of dogs, and small animals generally, unite readily, and treatment in these cases is particularly hopeful. In such animals the diagnosis of the exact position of the fracture may be greatly assisted by the use of X rays, while a further X-ray photograph taken after the bones have been set will show whether they have been successfully placed in apposition. In these animals splints of cardboard, or thin wood, well padded with cotton-wool, may be kept in place by plaster of Paris bandages. Great care and judgment are required in putting splints and bandages on a broken limb. If the pressure is uneven, or the bandage too tight, the blood-supply of the limb may be cut off, resulting in death of the part.

Callus (a deposition of bony material).—Before a fracture can unite, inflammation has to take place, and an exudate is thrown out between and around the broken ends of the bone; after a time this exudate ossifies, spongy bone first being formed, to be replaced, later, by a hard, dense, bone material. This new bone material is called the callus. From four to six weeks are usually required before the callus is sufficiently strong to support the weight of the limb, but the process of forming the final hard callus may continue for many weeks longer. Further time may be required for the

muscles of the affected limb to regain their tone and action. Sometimes, instead of the ends of the bone uniting, they become covered with cartilage, and form what is termed a false joint; when this is the case it is best to have the animal destroyed.

Fractures are of various kinds—viz.:

1. Simple.
2. Compound.
3. Compound Comminuted.
4. Complicated.
5. Green Stick.
6. Impacted.

Simple Fracture is when the bone is broken only into two parts, and without any external wound.

Compound Fracture is one which is accompanied by an external wound. This wound is frequently caused by the sharp points of the broken ends penetrating through the flesh and the skin. In the horse this is difficult to deal with, and often in such cases the most humane course is to have the animal destroyed.

Compound Comminuted Fracture is where the bone is broken into several pieces, and in addition there is an external wound. If in a limb, there is little hope for such cases.

Complicated Fractures are where the fracture extends into a joint, or wounds important organs, bloodvessels, etc.

Green Stick Fracture is a partial fracture, where only a part of the bone is broken and the bone as a whole is bent or bulged.

Impacted Fracture is the jamming or driving in of one broken fragment of bone into the other, without movement or crepitus.

All the bones of the body are subject to fractures. These occur either as a result of external violence, such as a blow, or by reason of violent contractions of muscles.

Occipital Bone, at the back part of the head, is often fractured by the horse falling back, and so is the atlas, or first cervical vertebra. The injuries are generally followed by paralysis, and the animal has to be destroyed.

Cervical Vertebræ.—The oblique processes of these bones are now and again fractured, mainly by the horse getting a hind-foot shoe fixed in the head collar on scratching its head. When this takes place, the head turns round to one side, the nose nearly touching the knee, and there is all the appearance of some of the neck bones being dislocated. The head, when this occurs,

should be tied up short to the rack with a double-shanked halter, and the part supported by a stout pitch plaster, with wooden splints, and a cradle put round the neck. The bones of the neck also occasionally get smashed by the horse falling on its head. Greyhounds also frequently come to grief in this fashion when coursing.

Broken Back.—When this happens, the animal may rise on to its fore-legs, but cannot get the hind ones up. To test it, stick a pin into the hind-limbs, and if it shows pain and can pull its legs up to its belly or kick out, there is some chance for the patient; but if no pain is evinced the case is hopeless.

Haunch Bone, or external angle of the ilium, is frequently broken or chipped, and should be noticed particularly, especially when examining for soundness. It may be caused by the horse tumbling down or by going through a doorway, but it does not hinder the horse from doing its work. The piece broken off may drop into the flesh below, but very rarely it brings on bad effects. Sometimes, however, it forms an abscess, which has to be cut down upon, and the piece or pieces of detached bone removed. This lesion is frequent in cattle as well as horses.

Ilium.—When the shaft of this bone is broken, the horse has a peculiar way of walking; on putting one hand on the point of the haunch and the other on the rump bone, and getting someone to stir the leg, you will both hear and feel the ends of the bones crunching underneath. Long rest and support with pitch charges are required.

Pelvic Bones.—The floor of the pelvic cavity (pubic symphysis) may be fractured by a fall, or by slipping on a smooth floor with the hind-legs spread outwards. This more frequently occurs in cattle. The animal may be supported by slings, with the hind-legs tied together at the hocks. Recovery may take place in six or eight weeks, but if the accident happens to a beast which is in fat condition it may be more profitable to send it to the butcher.

Ischium, or rump bone, is now and again fractured in the horse. This may be caused by the animal falling over backwards, and occurs more particularly in a young horse, when first tied up, breaking its halter and rearing, or from a slip when backing. It is not of much consequence; only the side injured is more flattened than

the undamaged one. This should be carefully noticed in examination for soundness. It is best seen by viewing the animal sideways.

Femur is at times fractured at the top or neck, and also in the shaft. It may be due to a fall, or it may occur when a horse has been cast and tied for some operation. On account of the quantity of flesh surrounding the bone, little or nothing can be done; the animal has to be destroyed.

Tibia, or leg bone, is very liable to fracture, but often without displacement. Such a fracture commonly occurs when two horses are standing side by side in a stall, or on horse-lines in the open. The one, which may be a little further forward than the other, kicks out and hits its companion on the inside of the thigh. There is probably a skin wound, and swelling round the part, which is painful to the touch. The best thing that can be done in a case of this kind is to tie up the injured horse by the head, with two halters, one on each side, and put in slings, if possible, not permitting it to lie down, as the limb frequently gives way when the animal gets up. If it is kept working for two or three days, which it may be equal to, the least exertion will cause the bone to part asunder. Hence, if there is a doubt whether the horse's leg be cracked or not, give the animal the benefit of the doubt, and tie it up for a time. In the case of a blow on the inside of the fore-leg—the radius—there is the same danger, and similar treatment must be adopted.

Scapula, or shoulder-blade, may be broken by excessive muscular contraction, owing to the lower parts of the limb, particularly the foot, being suddenly injured. It may also be damaged by the animal falling through making too sharp a turn when galloping. If the fracture be oblique, and the horse is put in slings, the parts being well supported with a good pitch charge, a good recovery may result; but if the neck of the bone be broken, and the joint be implicated, treatment is of little avail.

Humerus can be fractured by the animal falling in its gallop, or by a kick from another horse. Recovery entirely depends on the extent of the injury. Treatment is the same as for the shoulder-blade.

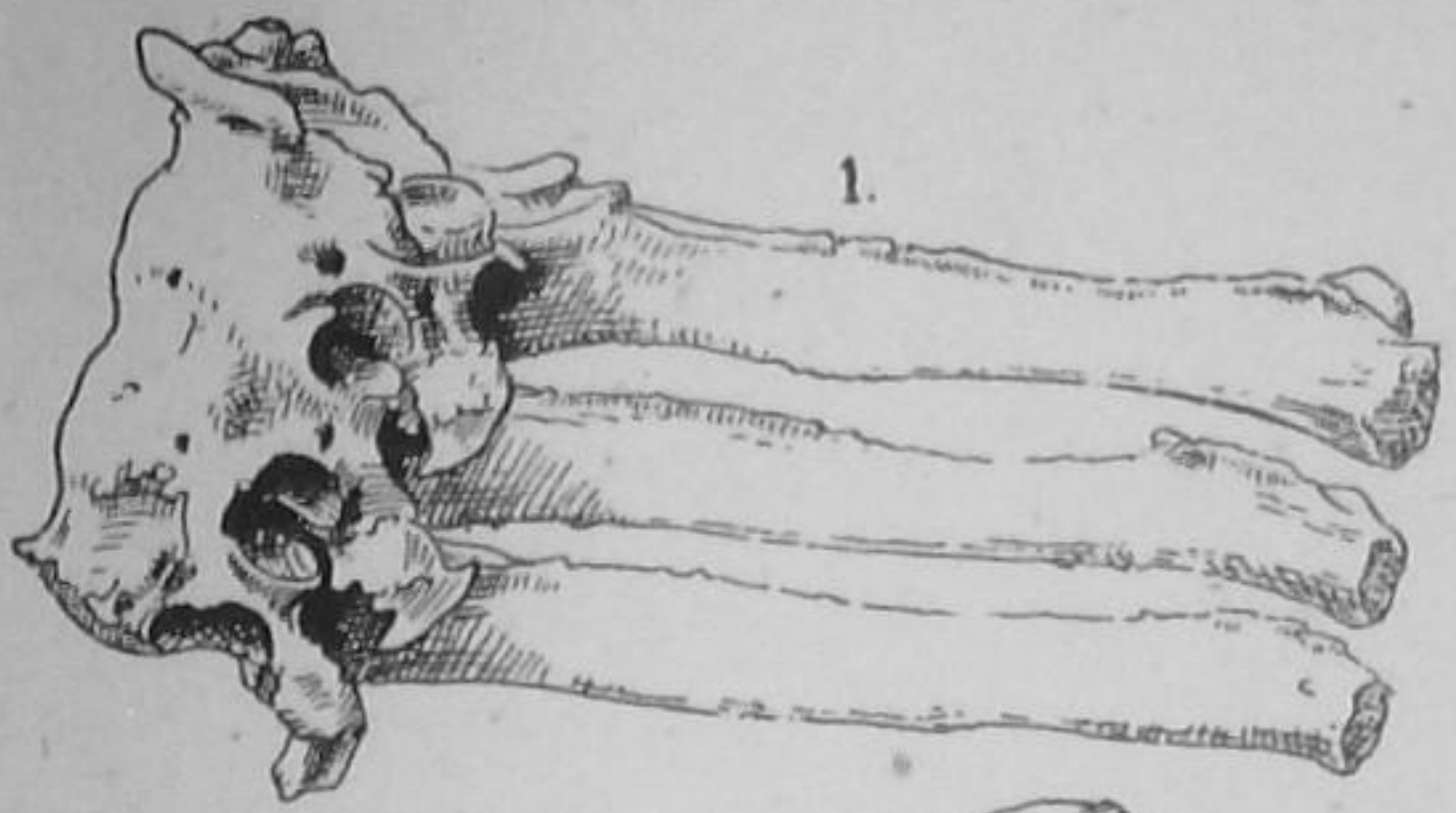
Ulna.—The upper and posterior portion of this bone forms the *elbow*, the point of which is occasionally fractured by a kick

EXPLANATION OF PLATE VI

BONE DISEASES

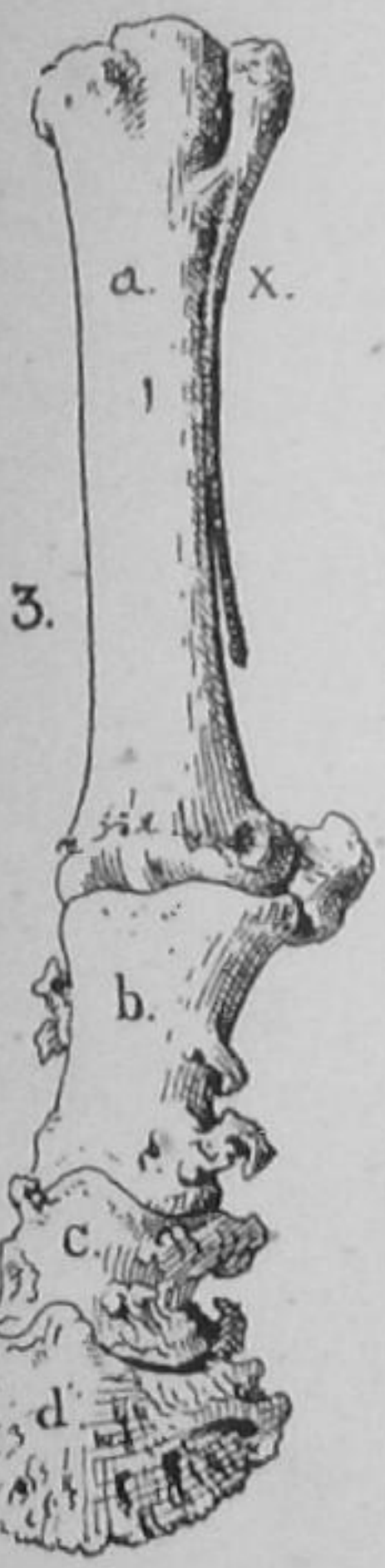
1. Anchylosis of the Back Bone, showing Three Bones fused together.
2. Anchylosis of the Pastern Bone, with Caries and High Ring Bone.
3. Shank Bone (*a*), Long Pastern (*b*), and Short Pastern (*c*), and Coffin or Pedal Bone (*d*), showing Bony Deposits, with Ulceration; (X) Seat of Splint.
4. Left Hock-Joint. (*x*) Seat of Bone Spavin.
5. Occult Bone Spavin, showing Three Bones united together (the two Cuneiform Bones and the Scaphoid), as a Result of Inflammation and Bony Deposit.
6. Ulceration or Caries of the Elbow-Joint of a Horse.
7. Coffin Bone, with Lateral Cartilage ossified and enlarged as Side Bones.
8. Bad Caries, Side Bones.
9. Normal Coffin or Pedal Bone
10. Knee Spavin with Caries.
11. Sound Navicular Bone.
12. Navicular Bone: Dark Spots indicate Ulceration of Bone, as in Navicular Disease.

PLATE VI


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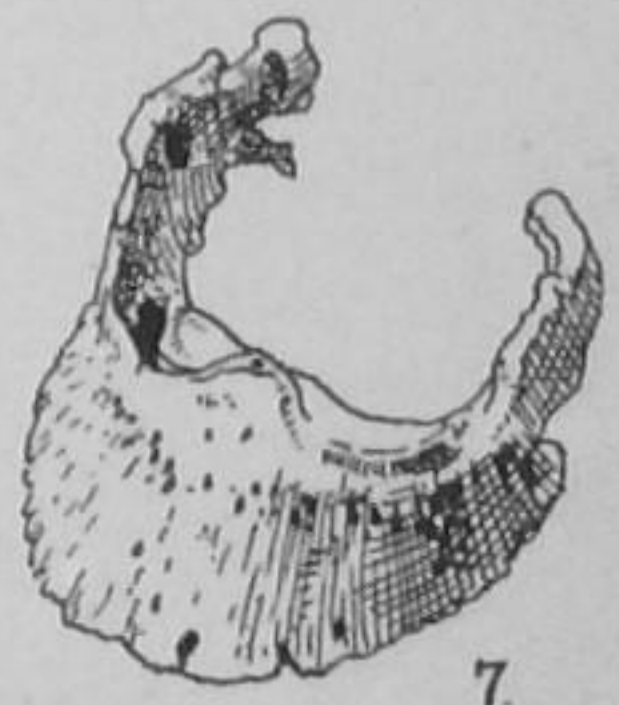


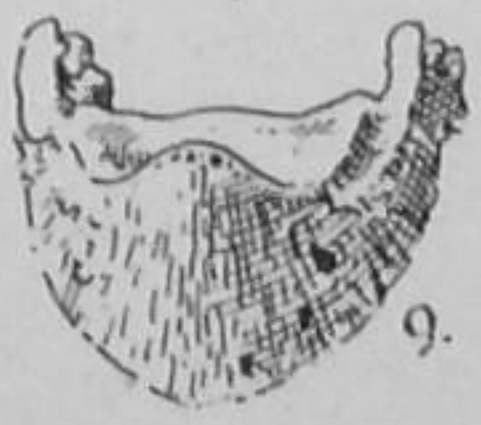
3.



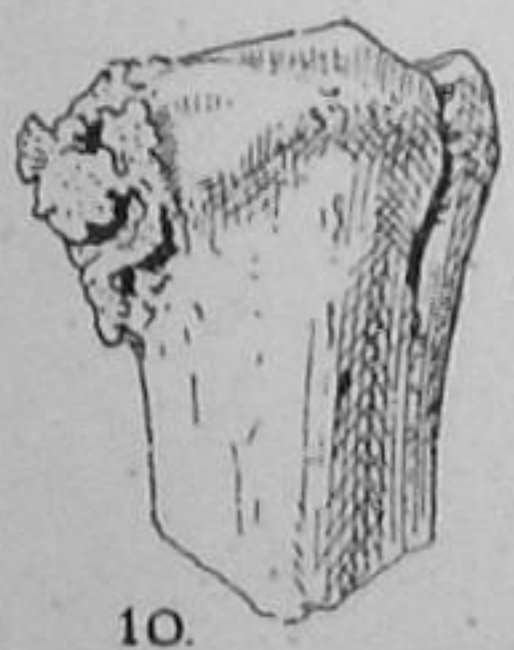
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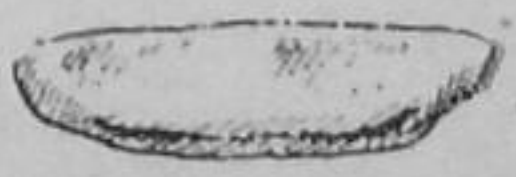

5.


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or from a fall. When this happens, the limb hangs down (dropped elbow) and the knee-joint bends forward as if all the muscles between the back of the shoulder-blade and the elbow-joint were torn asunder, and recovery is very uncertain. Fracture of the first rib shows similar symptoms.

Radius, or fore-arm, and the *Cannon*, or shank bones, of the fore- and hind-legs in the horse are most subject to fractures, and are very difficult to treat, owing to the limb having to hang pendulous. There is great pain, and the parts swell, frequently ending with septic infection of the soft structures and death of the patient. The most humane treatment, therefore, is to destroy the animal at the outset. These bones in cattle, sheep, and dogs, however, generally do well when splints and bandages, as already named, have been properly applied.

Knee-Joint.—Some of the small bones of this joint are at times fractured by the animal being kicked, or by its coming in contact with a stone wall, etc. Splints and bandages should be applied and a long rest given, but the result is invariably a stiff joint.

Sessamoids, or fulcrum bones, at the back of the fetlock are occasionally fractured; when this occurs the fetlock descends and the toe sticks up. The os suffraginis, or large pastern bone, in the fore-leg, seems generally to be the most subject to fractures, being at times broken into a number of pieces. The same thing occurs to the os coronæ, or small pastern. Such cases, when the bone is not too much smashed, make good recoveries when put under treatment, but leave behind stiff joints. The os pedis, or coffin bone, as well as the navicular bone, are also occasionally fractured. These fractures are generally caused by the horse galloping on a hard road, or on rough, uneven ground, or on hard sand.

SPECIAL DISEASES OF THE BONE.

Splint is a bony enlargement, and is usually found on the inside of the fore-leg, just below the knee, sometimes on the outside, and also, but rarely, on the hind-shanks. It is due to an injury or concussion setting up inflammation of the bone and periosteum, and resulting in the throwing out of an exudate, which in due time becomes ossified, forming an exostosis, or bony

tumour. Young horses of the light class are most subject to it, chiefly through their being put to too fast and heavy work on hard roads before their bones are properly set, some breeds being more prone to it than others. The usual position of the splint is between the large and small metacarpal bones, most frequently on the inside of the limb, but sometimes on the outside also. It is usually found about the junction of the upper and middle thirds of the bone, though sometimes it may be still higher, close to the knee-joint, and may even interfere with the articulation of the knee itself.

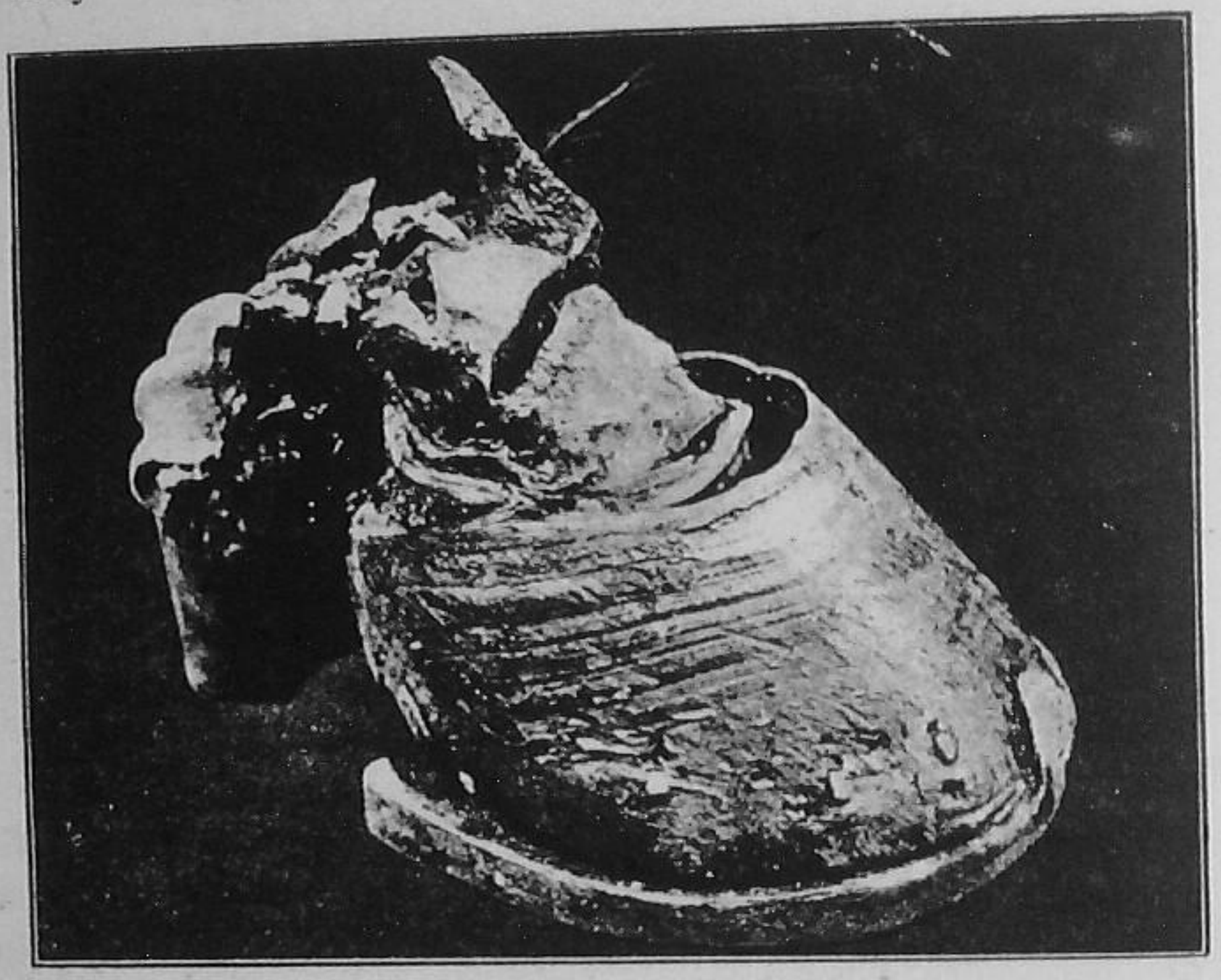


FIG. 10.—FRACTURED LONG PASTERN (OS SUFFRAGINIS) IN THIRTY-FOUR PIECES.

In these latter cases it must be regarded as most serious. Splints are very commonly found in all horses of the lighter breeds over middle age. During the early, inflammatory stage, which usually occurs in young horses, lameness will be caused, but even in older animals there are occasionally cases of persistent lameness caused by splints. When the anatomy of the part is considered, it will be seen that the small metacarpal bones are degenerate remains of long, weight-bearing bones, which once were supported by digits reaching to the ground. The digits have long disappeared, but weight is still carried on these bones through the carpal or

knee bones; when, therefore, the limb is subjected to any undue concussion, a periostitis is set up, or even an inflammation of the interosseous ligament, with the result that a splint is formed. When, as a result of the ossification, the small metacarpals become firmly united to the large, no further ill-results should follow.

The lameness caused by splints is apparent at the trot, seldom at a walk, and is more pronounced on hard ground than soft. When the enlargement can be felt, pressure on it by the fingers may cause flinching.

Treatment for splint is to give rest, with cold water applications until the inflammation subsides. In many cases this is sufficient, but if the lameness should persist a blister may be applied, or in some cases point firing over the site of the splint. In a few cases the inflammatory process is not confined to the original site of the splint, but may extend even across the back of the large metacarpal bone, causing lameness for a long period.

Ring Bone is an exostosis occurring in the region of the pastern bones; it may be due to direct injury, or to continued concussion, especially where the pasterns are too upright. As the latter cause is a result of faulty conformation, the ring bone may in this sense be regarded as hereditary. It may be considered under two heads—high and low. Low ring bone is seen just above the top of the hoof, generally largest at the sides, but the pyramidal process of the os pedis may be involved. High ring bone involves the long pastern bone, or the joint between the long and short pastern bones. In some cases the shafts only of these bones are affected, the disease arising at the insertion of the tendons. In other cases it is a true arthritis, involving the joints between the bones. To the former some have given the name false ring bone, and to the latter true ring bone. Diagnosis is not easy in the early stages until the enlargement can be felt.

Treatment of ring bone is mainly unsatisfactory. Rest is essential. In the early stages cold water applications may assist in arresting the progress of the inflammation, followed by blisters and point firing. In cases of low ring bone, involving the joint, the horse, after blistering round the coronet, should be turned out for a long period on soft ground, when the hoof may expand to some extent and thus relieve the lameness.

Side Bone and Navicular Disease.—These are fully explained under Chapter IV., on 'The Horse's Foot: Shoeing, etc.'

Stifle-Joint Disease.—This joint, which corresponds to the knee of man, besides being subject to direct injury, which may cause fracture of the patella, or of the head of the tibia, or a septic inflammation of the joint, is sometimes the subject of a chronic inflammation suggestive of rheumatoid arthritis. The lameness which accompanies this condition is gradual in its onset, and slowly progressive. The affected limb is generally kept flexed in the stable, and frequently raised from the ground and lowered after a moment or two. During progression there is a tendency to drag the toe, as in spavin lameness. The bone becomes carious (worm-eaten), the cartilages are absorbed, and a porcellaneous deposit takes place between the ends of the bones. Treatment is of very little use. At the outset rest and cold water applications may have a beneficial effect, and sometimes blistering is resorted to, but prognosis must be unfavourable.

Bone Spavin.—A chronic arthritis of the hock-joint, involving more particularly the small cuneiform bone, the upper part of the inner small metatarsal, and sometimes extending to other bones of the hock at its inner, and lower, aspect. In many cases great pain and lameness are caused, and eventually there is a deposition of new bone, forming an exostosis, which can be seen and felt at the inner and lower part of the hock and partially to the front. Spavin is brought on by injury or over-exertion, as in jumping, more particularly in young horses when not trained or in condition. The pain frequently is so acute that the animal, when first brought out of the stable, dare scarcely put its foot to the ground, and then, if it does, only on the toe; yet, after going a short distance, the lameness gradually disappears, and the animal goes sound; the lameness however, returns again after a short rest. The toe of the shoe of a spavined horse, it will be noticed, is generally well worn. Bone spavin is not always easily diagnosed, more particularly when the joints are weedy and dissimilar, and there is an absence of lameness, which is of frequent occurrence in half-bred horses. This causes great difference of opinion to occur amongst members of the profession—spavin or no spavin—more particularly so in cases of so-called occult spavin, when three or four small bones of the

hock become united to such an extent that the original divisions are not distinguishable, there being little or no enlargement outside the bone. These cases are difficult to detect, as little or nothing can be seen or felt outside. A decision, therefore, can only be arrived at by judging the movement of the joint, which in such cases is generally carried stiffly, with a roundabout action of the toe inwards. In cases of doubt, lift the foot, take hold of the toe, and press the front of the fetlock against the stifle-joint for two or three minutes, then make the animal trot; if it goes very lame, and only puts the toe to the ground, the lameness gradually disappearing with the exercise, it may be concluded that spavin is developing. In some cases a bone spavin may be patent both to the eye and touch, and yet the horse goes sound and does his work correctly. To detect bone spavin, stand about 1 foot sideways from the animal's shoulder, and look diagonally across the lower and inner part of the hock-joint, and compare the joints.

Treatment of bone spavin is the same as that laid down for splint and ring bone (p. 69); but if there is one thing more than another that firing has a decided benefit upon it is bone spavin, as it hurries the inflammatory action forward to a healthy termination. It must be borne in mind that when we have any extensive accidents or disease of the bones and joints, the muscles surrounding or above the injury waste away, and take a long time before they resume their proper standard and tone.

In connection with the diseases of the bones, special attention may be given to Plate VI., and the text explanatory of the different figures, particularly to the anchylosis of the three bones of the spinal column, or backbone; also the ring bone, the bones of the hock, and occult spavin; while the mark $\times$ on Fig. 3 shows the point of true splint, and Fig. 6 caries of the elbow-joint. Figs. 7 and 8 are good specimens of side bones, or ossification of the lateral cartilages of the foot.

CHAPTER III

MYOLOGY, OR THE STUDY OF THE MUSCULAR SYSTEM

Muscle, or flesh, is a contractile, fibrous structure, and forms the bulk and symmetry of the body. It is composed of bundles of small fibres held together by connective tissue, and is in intimate connection with the bony structures. Muscles are the active organs of locomotion, and are also found entering into the formation of the walls of various organs of the body, as the stomach, bladder, etc. There are two kinds of muscles—striped or voluntary, also known as red muscle from its colour, and skeletal muscle, because this type is found attached to the bones forming the skeleton; and non-striped or involuntary, also called white muscle from its colour. The voluntary muscles are under the control of the will—as, for example, those of the legs, etc.—while the involuntary muscles carry on the functions of the body independently of the will, as those of the intestines, uterus, bloodvessels, etc. The muscle of the heart, however, though involuntary, is striped and red in colour.

A **voluntary** muscle may be said to consist of three parts: First, the tendinous origin—*i.e.*, where it arises; second, the body, or fleshy part—the contractile portion, or tissue, which does all the work, producing the movements of the body; and third, the termination in the pale, yellowish-white, glistening bands, or fibrous cords, called tendons, or sinews, which are extremely strong, though very light. These latter are inserted into the various portions of the bony structure, which are to be acted upon in locomotion, and thus attach the muscle to the bone.

Muscles, like bones, have particular names, according to their situation, form, attachment, and action, and they are well supplied with bloodvessels and nerves. Their action is under the influence of the nervous system. Muscle in a state of rest is said to be

neutral, or slightly alkaline, but becomes acid when in action. In close connection with the muscular system there are also other tissues, such as cellular, white fibrous, yellow elastic, and adipose.

Cellular or **Areolar Tissue** consists of small filaments interwoven together, forming a network. It is found in the different organs of the body, giving support to their substance, also binding them together and holding them in position. Cellular tissue is loose connective tissue having large interspaces.

White Fibrous Tissue is made up of bundles of very fine white fibres, and is the very tough, unyielding substance found in the tendons of muscles and most ligaments; it is also present in the periosteum, pericardium, etc. Fibrous tissue is connective tissue of the body, and composed of fibres.

Yellow Elastic Tissue consists of yellow elastic branching fibres, which are much larger than those of the white fibrous tissue, but not so tough or strong, and, as the name indicates, more elastic. It is of this connective tissue that the middle coat of the larger arteries is formed, and it is very plentiful beneath the skin. It is also found in certain ligaments, the ligamentum nuchæ, for example, being entirely composed of this tissue.

Adipose or **Fatty Tissue** consists of a number of cells containing an oily substance held together by a network of areolar tissue. It is found in nearly every part of the body—underneath the skin, around joints, and enveloping the kidneys, etc.

Tendons or **Sinews** are amber-coloured, dense fibrous structures, forming bands and cords attaching muscles to the bones, and found at the ends of muscles at their points of origin and termination. They are most abundant in the lower parts of the extremities, shielding and protecting joints; at other times they are spread out like a fine, strong, thin membrane, according to their situation and action. They are very strong and fibrous, combining great strength with lightness, their extreme strength being well illustrated by the everyday occurrence of slaughtered animals being suspended by their Achilles tendon or hamstrings. Tendons are brought into action by the middle or fleshy part of the muscle contracting and relaxing.

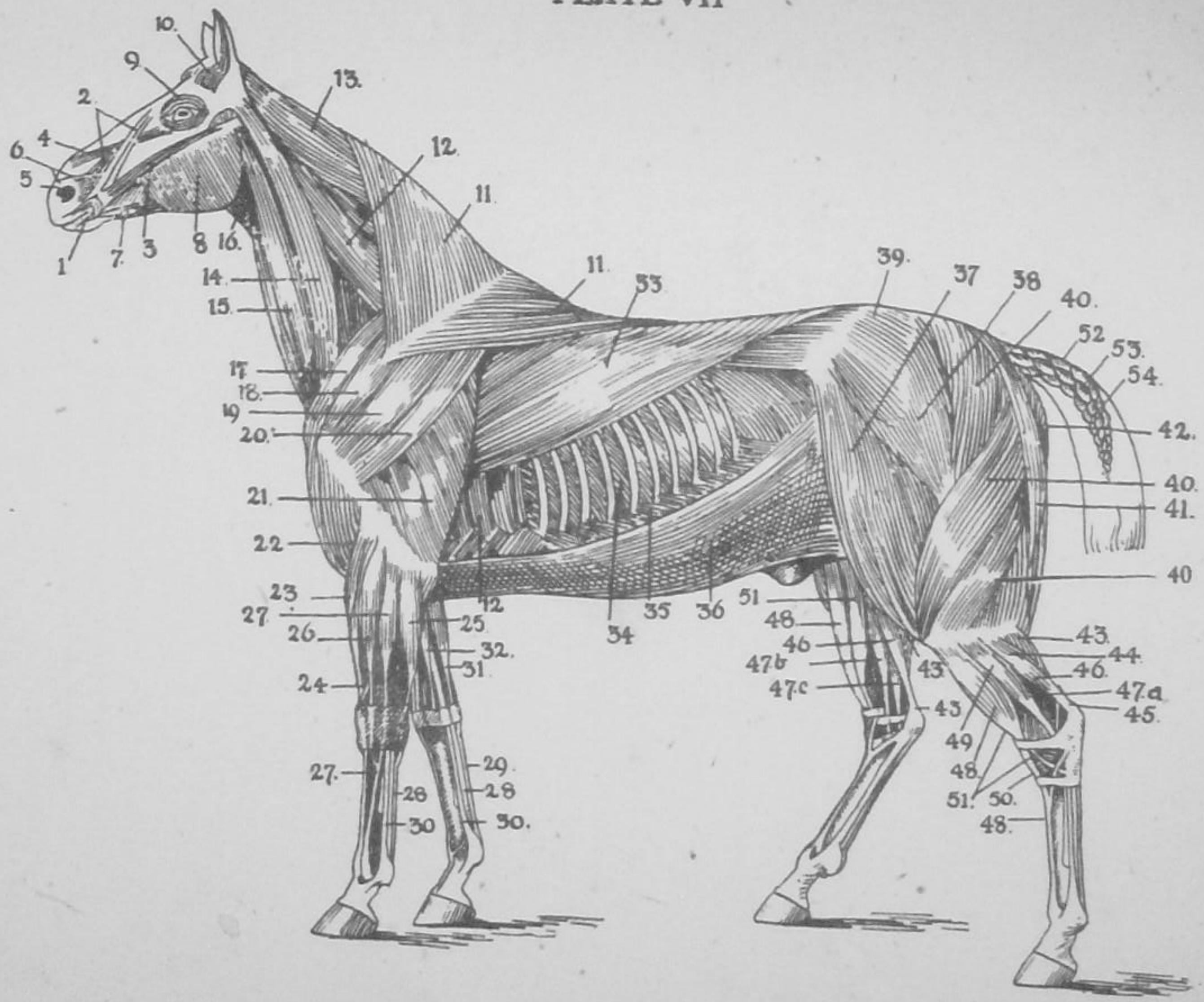
Involuntary or **Non-Striated** or **Non-Striped Muscle** consists of spindle-shaped cells, each with its own nucleus. The cells are

EXPLANATION OF PLATE VII

THE MUSCLES OF A HORSE

1. Circular Muscle of the Lips.
2. Elevator of the Upper Lip and Wing of the Nostril
3. Zygomaticus.
4. Proper Elevator of the Upper Lip.
5. Transverse Muscle of the Nose.
6. Pyramidal Muscle of the Nose.
7. Depressor Muscle of the Under Lip.
8. Masticator Muscle.
9. Circular Muscle of the Eyelids.
10. Temporalis Muscle.
11. Trapezius.
12. Cervical Portion of the Serratus Magnus, the Chest Division being behind the Shoulder.
13. Splenius.
14. Mastoido-Humeralis, or Levator Humeri.
15. Sterno-Maxillaris.
16. Scapulo-Hyoides (the upper part is alone visible).
17. Pectoralis Parvus.
18. Antea Spinatus.
19. Postea Spinatus.
20. Teres Externus, or Long Abductor of the Arm.
21. Triceps Extensor Brachii.
22. Coraco-Brachialis.
23. Extensor Metacarpi Magnus.
24. Extensor Metacarpus Obliquus.
25. External Flexor of the Metacarpus.
26. Anterior Extensor of the Phalanges.
27. Extensor Suffraginis.
28. Flexor Perforans and its Tendon.
29. Flexor Perforatus and its Tendon.
30. Suspensory Ligament of the Fetlock.
31. Oblique Flexor of the Metacarpus.
32. Internal Flexor of the Metacarpus.
33. Latissimus Dorsi.
34. Intercostal Muscles.
35. Obliquus Abdominis Externus.
36. Rectus Abdominis.
37. Muscle of the Fascia Lata.
38. Gluteus Maximus.
39. The Upper Part of the Gluteus Externus or Superficialis.
40. Triceps Abductor Femoris.
41. Semi-Tendinosus.
42. Semi-Membranosus (only a small portion is visible).
43. Gastrocnemius.
44. Soleus.
45. The Tendo Achillis, which comes from the Gastrocnemius Muscle, but it is also partly formed by the
46. Superficial Flexor of the Phalanges or Perforatus.
47. Deep Flexor of the Phalanges or Perforatus: (*a*) Lateral, (*b*) Middle, (*c*) Larger Heads.
48. Anterior Extensor of the Phalanges.
49. Lateral Extensor of the Phalanges.
50. Oblique Flexor of the Phalanges.
51. Flexor of the Metatarsus.
52. Muscles which elevate the Tail.
53. Muscles which curve or draw the Tail to one side.
54. Muscles which curve or draw the Tail downwards.

PLATE VII


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arranged in such a manner that they overlap, and are held together by a small amount of intercellular cementing substance. They are most commonly collected into bundles of varying size, which may cross each other or interlace. Although involuntary muscle, as its name indicates, is beyond the control of the will, it is none the less necessary that it should be supplied with nerves. It is chiefly found in the walls of hollow viscera, such as the stomach and intestines, the urinary bladder, the uterus, etc., and also forms an important constituent in the formation of the coats of bloodvessels. In the hollow viscera the muscular tissue is very pale, thus differing materially in appearance from the voluntary muscles of the body. The heart contains a form of muscular tissue which is involuntary, but possesses a deep red colour.

Muscles and **Tendons** are subject to injury and disease of various kinds. Injury may be caused by *wounds*, and these may be:

(1) *Incised—i.e.*, clean cut, as with a sharp cutting instrument.
(2) *Bruised* or *Contused*, when caused by severe blows or falls.
(3) *Lacerated*, when the skin and flesh are torn by a foreign body, as by barbed wire or a cart shaft, etc.
(4) *Punctured*, when made by a pointed object, as a prick or probe with a thorn, or stab with a pitchfork, etc.
(5) *Gun-Shot*—from shot, bullets, etc.
(6) *Poisoned*—from, say, wasp stings, snake bites, or a wound of some other type poisoned, for example, through the use of arsenical sheep-dip.

Of the foregoing, the only one that is likely to heal by first intention is the incised or clean-cut wound. However simple the injury may be, it ought to have early care and attention, otherwise it may become septic through the admission of septic organisms, and might even result in *septicæmia* (blood-poisoning), or *pyæmia* (the formation of abscesses in different parts of the body).

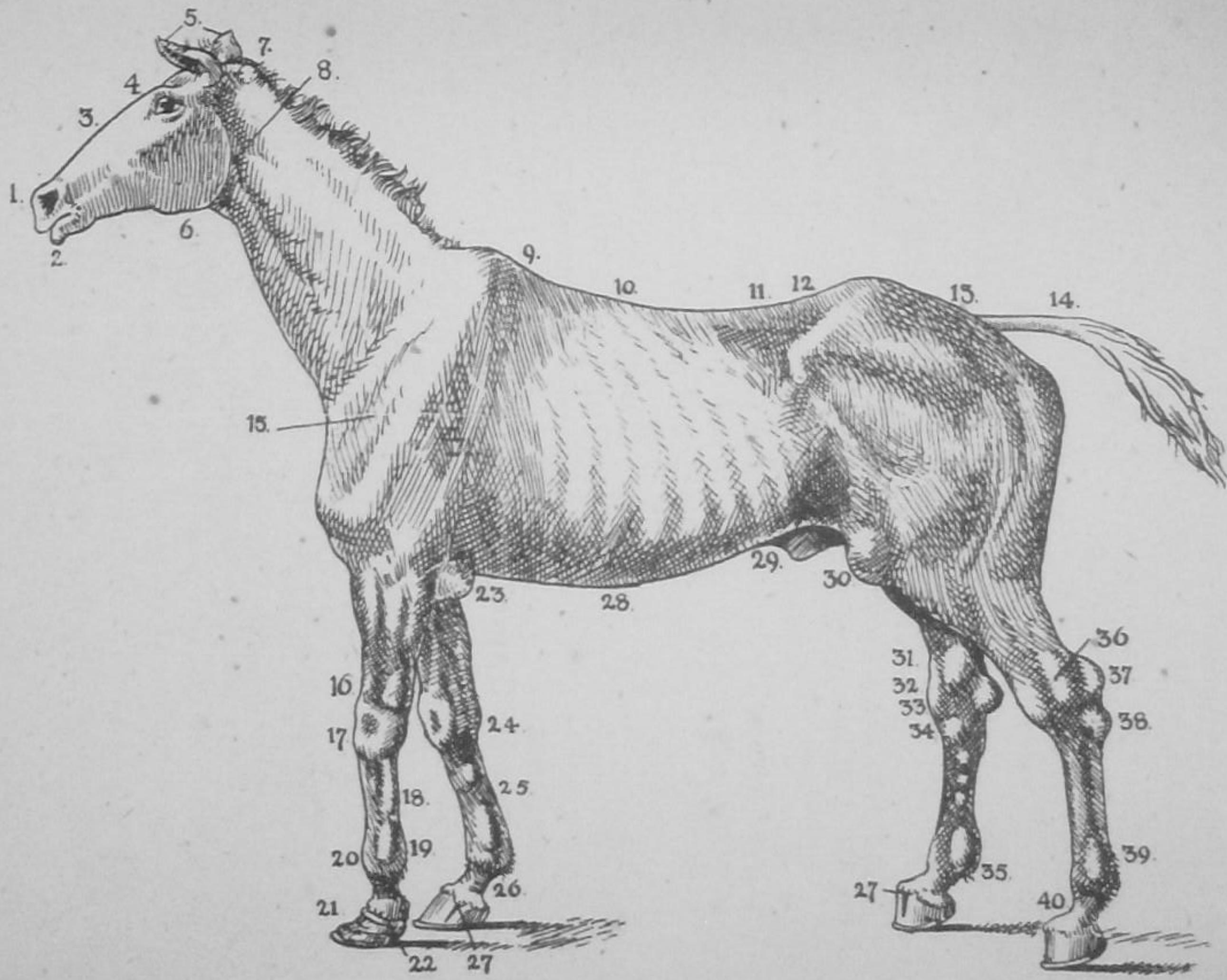
Wounds are said to heal in different ways: (*a*) By first intention; (*b*) by second intention or granulation; and (*c*) under a scab. The particular manner of healing depends largely on the amount of tissue destroyed, and the extent to which it has been possible to restore the parts to their original position, and bring cut surfaces into apposition.

EXPLANATION OF PLATE VIII

HORSE, SHOWING VARIOUS DEFORMITIES AND DISEASES

1. Nostrils.
2. Dropped Lip.
3. Roman Nose.
4. Eye.
5. Lop or Pig Ears.
6. Sub-Maxillary Glands.
7. Poll Evil.
8. Parotid Gland.
9. Fistulous Withers.
10. Saddle Galls.
11. Loins.
12. Ragged Hooks.
13. Mule or Goose Rumped.
14. Rat-Tailed.
15. Shoulder Galls.
16. Knee Windgalls.
17. Broken Knees.
18. Sprained Tendon.
19. Windgalls.
20. Knuckling Over at Fetlock.
21. Foot Deformed from Laminitis.
22. Sidebone.
23. Capped Elbow.
24. Mallenders.
25. Seat of Splint and Speedy Cut.
26. Cracked Heels.
27. Sandcrack at Quarter.
28. Flat Ribbed.
29. Tucked-up Flank.
30. Enlarged Stifle-Joint.
31. Bursal Enlargement.
32. Bog Spavin.
33. Sallenders.
34. Bone Spavin.
35. Grease or Grapes.
36. Thorough-Pin.
37. Capped Hock.
38. Curb.
39. Enlarged Fetlock.
40. Knuckling Forward from Contracted Tendon.

PLATE VIII


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Hæmorrhage or Bleeding.—In different types of wounds this is likely to occur from the severance of arteries or veins, and frequently it is a matter of primary importance to arrest the bleeding before any attempt at dressing the wound is made. Bleeding from an artery may be recognized by the manner in which the blood spurts from the vessel in jets, whereas in venous hæmorrhage the blood pours out in a continuous stream.

Arterial blood is of a brighter red colour than venous, although the latter becomes bright as it runs down a limb, owing to the oxidizing effect of the air.

To Arrest Hæmorrhage.—If in a limb, apply a cord or bandage (the latter can be improvised from a twisted handkerchief) round the limb on the side of the broken vessel nearest to the heart—*i.e.*, the side from which the blood is coming. The bandage may be tightened by inserting a piece of stick under it, and twisting until sufficient pressure is caused to stop the bleeding. In the case of venous hæmorrhage, a bandage may be similarly applied on the side furthest from the heart, or a pad made from cotton-wool (or a folded handkerchief in case of emergency) may be applied over the wound, and tied tightly with a bandage. Should the wound be in a part other than a limb, where it is impracticable to apply a bandage, it should be plugged with tow, cotton-wool, or even a clean handkerchief, preferably soaked in an antiseptic solution. The plug may be retained in position by stitches (sutures) of strong silk, or even held in position until help can be obtained.

It should be clearly understood that as hæmorrhage usually occurs accidentally, and proper appliances for dealing with it are seldom at hand, the methods suggested are emergency methods which may be carried out with the means that can be readily obtained, and expert assistance should be sought for as soon as possible. Meanwhile the animal should be kept as quiet as possible, and the lesser hæmorrhage from capillaries kept in check by the application of clean cold water.

Incised Wounds are wounds caused by sharp cutting instruments. Of this type are the wounds intentionally inflicted by the surgeon, who, however, makes such preparation that all instruments, dressings, and the skin itself are previously rendered sterile. Very little destruction of tissue takes place, and such wounds

usually heal readily by first intention. Accidentally inflicted, these wounds are more liable to contamination, and even comparatively clean materials causing such are unlikely to be sterile. *Treatment.*—First examine the part and remove any dirt or foreign substance which may have obtained access. Bring the edges as closely together as possible; if the wound is large, stitches of silk or catgut may be required. If the wound is obviously soiled, it will be advisable to wash with an antiseptic solution; for lesser wounds it will be sufficient to paint with tincture of iodine, and where practicable, cover with an antiseptic pad of lint and cotton-wool, supported by a bandage.

Contused Wounds are made with blunt instruments, in horses commonly caused by kicks, blows, or contact with the ground. There is, in addition to the wound, bruising of the surrounding tissues, with extravasation of blood. Such wounds are very liable to infection, and suppuration may result. After removal of any foreign material or dead tissue, bathing with hot antiseptic solution may relieve the condition and limit the activity of septic organisms. Healing in this case usually takes place by granulation: a soft vascular and granular material is seen to fill the depth of the wound. Sometimes these granulations are excessive in amount, and tend to project from the wound; this is what is popularly known as 'proud flesh.' Such excessive granulations may be restrained by suitable pressure evenly applied.

Lacerated Wounds are those in which the skin, and often the soft tissues underneath, are torn in an irregular or jagged manner; they are caused by some rough or sharp instrument, such as barbed wire, and frequently by kicks. Treatment is very similar to that for contused wounds. Dress with antiseptic solution, and restore the parts as nearly as possible to their original position, retaining them by sutures. These wounds usually heal by granulations.

Punctured Wounds are produced by sharp-pointed objects, such as knives, pitchforks, stakes, thorns, etc., and are at all times regarded as dangerous. A minute examination should be made, as frequently a piece of wood, etc., is found, after many days, at the bottom of the wound. In all cases the foreign body should be carefully removed where practicable. When the bleeding is excessive it must be stopped by plugging; and in no case should

this description of wound be 'tinkered' with, more particularly if the wound takes a downward direction—*i.e.*, the internal part of the wound is lower than the external opening—in which case it has to be cut into. Punctures from thorns in the hunting field often cause a great deal of lameness, as well as constitutional disturbance, more particularly if in the knee, hock, or other joint. Punctured wounds, especially those about the feet, such as may be caused by picked-up nails, frequently cause tetanus or lock-jaw. For this reason, when such wounds are inflicted in valuable horses, it is advisable to give a protecting dose of antitetanic serum as soon as possible after the wound has been discovered.

Gun-Shot Wounds are caused by bullets and shot, and are mostly met with in time of war, but are frequently found in dogs. The bullets or pellets should be removed if practicable, then dress as under incised wounds; but the bullets or pellets may often be left in the part with safety, nature enveloping them with a covering of dense tissue, when they cause little inconvenience.

Poisoned Wounds may be due to poisonous medical agents, to bites and stings of different animals, or to septic organisms. Where the skin has been damaged by lice or otherwise, numerous animals have been poisoned by being subsequently washed with arsenical dips, therefore arsenical preparations should never, under any circumstances, be used for washing horses, cows, or dogs affected with lice. Poisoned wounds in animals are also caused by wasp sting, snake bite, etc. For stings, apply a diluted solution of ammonia. In bites from dogs, the best treatment is to wash the part well with cold water, and apply tincture of iron.

From wounds of every description we may have a great deal of constitutional disturbance, when the temperature rises to 104° or 106°. This also must be attended to. All wounds in the process of healing are greatly assisted by a daily application of a solution of iodine prepared as follows: Iodine 1 drachm, iodide of potassium 2 drachms, water 1 pint, mixed, and a little applied with a feather.

Lacerated Muscles.—Muscles occasionally become lacerated, or torn, without the skin being broken or any swelling or lameness being visible, the animal merely going 'stiff.' All the muscles of the body—those of the neck, back, loins, quarters, etc.—from slipping on the ice, falling, galloping, jumping, etc., are liable to this;

and to arrive at a proper conclusion the history of what the animal had been doing previously is indispensable. Frequently nothing is seen until the flesh is noticed to waste away from the part, as, for example, the so-called shoulder-slip in young horses when first put to work. If the animal does show lameness, rest, with cold water irrigation by means of the hosepipe, or tub and tube irrigation, several times a day answers well, and a run at grass is to be highly recommended, while, at times, blistering may be found expedient.

Lameness of the Shoulder may arise from many causes, such as an injury to the muscles of the shoulder, or to the long muscle of the neck, or to rheumatism, disease of the liver, or even a slight disorder of the stomach, caused by a feed of new oats, Indian corn, or strange food of any kind, inducing indigestion. In all these cases the symptoms of the lameness are much alike: the limb is carried stiffly, and swung in a roundabout, outward manner, with dragging of the toe. To detect from what source it arises, the history of the case is necessary, accompanied by the eye and finger of an expert. It may be from any one of those already enumerated, or others not mentioned, so that a careful and proper examination must be made before any treatment is adopted. If from injury, cold water irrigation daily, followed by blisters and long rest, should be resorted to; if from indigestion or change of food, 1 ounce of carbonate of soda daily for a few days in the food will be found very beneficial.

The Shoulder-Joint is also frequently the seat of disease, either from injury of the joint itself or through the muscle as it passes over the head of the humerus being sprained, or from the sprain of some of the muscles in the near neighbourhood of the joint. The point of the shoulder is occasionally damaged by the animal running against some hard substance, such as a stone wall, etc. Any one of these injuries causes great pain, lameness, and enlargement of the parts. *Treatment.*—Rest is the first essential; then hot or cold applications of water may be tried, followed by blistering, and later a run at grass.

Rheumatism may be regarded as being due to the same causes as operate in the case of human beings, but in horses it is much less common; it occasionally occurs in these, and is sometimes associated with heart disease. In dogs rheumatism is not infrequently seen, and the condition known as kennel lameness is probably a form of

rheumatism. In acute cases the animal is very stiff, walks with difficulty, especially up steps or stairs, and evinces pain on being lifted or handled in almost any part of the body. Rheumatism or rheumatoid arthritis is also sometimes seen in cattle. *Treatment.*—The animal should be kept in a dry place and given salicylate of soda daily in doses suitable to its size—for dogs 10 grains, for horses and cattle 2 to 3 drachms. In the case of highly valued dogs, radiant heat and massage will also be found useful to relieve the condition.

Poll Evil is usually recognized as an abscess on the top of the head or poll, and occurs just behind the ears. It usually commences as a bursitis or inflammation of the synovial bursa which is situated at this point, but most frequently infection takes place, probably by abrasion occurring at the time of the original injury. It is a very troublesome complaint, and is caused by an injury to the part—for instance, from a blow with a stick, or through a horse, when in a low-ceilinged stable, throwing up its head and striking against a beam, or the top of a low door, or from a heavy bridle. At first the animal goes with its neck very stiff, and points its nose, with drooping head; it flinches when the collar or bridle is put on; and then swelling of the part is next noticed. As this is a very formidable disease to deal with, it should at once be put in the hands of a qualified man. At first cold water cloths ought to be constantly applied, afterwards blistering may be necessary, and, finally, an operation. Owing to the difficulty of getting efficient drainage for an abscess in this part, great care and judicious treatment must be exercised, or the disease may extend to, and cause, caries of the bones. Injecting the sinuses with a solution of peroxide of hydrogen answers well both for this and also for fistulous withers.

Fistulous Withers is similar in character to poll evil, and, as the name indicates, is a disease found at the top of the shoulders (Plate VIII., No. 9). It is due to some damage done to the neighbouring parts, as from one horse biting another; or through injuries to the bony spines by blows; or from nips from badly fitting riding or harness saddles. Here again swelling is the first visible indication, and prompt attention is necessary. Cold water cloths should be applied and kept constantly wet, and the saddles must be examined and altered; again, on account of its formidable nature, the case

should not be 'tinkered' with, but must be immediately placed in the hands of a professional man.

Elbow-Joint (Plate VIII., No. 23) is also subject to injury from kicks and blows, as well as from the shoes being made too long, or with too much caulking, thus damaging the elbow-point when the animal lies down. If the shoe is the cause, it must be at once removed and remedied to prevent further injuries from that source; a stocking-leg stuffed with horsehair, or special pad, should be placed round the pastern every night. Hot or cold fomentations ought to be applied to the damaged elbow night and morning, with soothing absorbent lotions, but beware of strong, stimulating en brocations. Should the tumour be soft to the touch and just underneath the skin, it may contain watery fluid (serum), or, if infected, matter, when it will have to be opened; if it is hard, or deeply seated, a small piece of 15 per cent. of oleate of mercury, applied every other day, can be tried.

Broken Knee (Plate VIII., No. 17) is an injury of greater or less extent done to the front of the knee, and of frequent occurrence. In some cases it is slight, only abrasion of the skin, in others so extensive that the joint may be permanently damaged, particularly so when it is laid open and the ligaments and tendons injured. The parts to be treated must be properly cleansed from all sand, grit, etc., then a pledget of tow saturated in an antiseptic solution should be applied, secured with cold water bandages, which must be kept constantly wet and not removed for three days, unless the leg swells very much. The animal should have its head tied close up to the rack, so that it cannot lie down. Any constitutional disturbance that may arise must be treated as fever. If the joint be damaged, and joint oil run from the wound, a special splint must be placed at the back of the knee to keep it steady. The cold water bandages keep the inflammatory process in check, conducing to healthy action and closing the wound by granulation, which may appear in eight to ten days; then the cloths must be removed and the wound left bare, dressing it daily with an astringent lotion or a preparation of iodoform. In treating these cases, great care is required in dieting the animals, keeping them cool and quiet. At times lock-jaw supervenes; to prevent this an injection of antitetanic serum is advisable. When the injury is slight,

dressing the parts with Friar's balsam twice a day is all that is required.

Speedy Cut.—This is a bruise on the inside of the fore-leg. It may be between the knee and the fetlock, at the knee, or even, in a high-actioned horse, above the knee. It comes under the class of contused or bruised wounds, and is caused by the horse striking the inside of one fore-leg with the opposite foot; very careful shoeing is required, while the damaged part should be treated as under Contused Wounds.

Brushing and Cutting may be classed under the same heading as speedy cut, being caused by one foot striking the fetlock of the opposite leg; both fore and hind fetlocks are liable to the injury, but the hind ones more frequently than the fore. The causes vary: sometimes it is the outer rim of the inner web of the shoe that brushes or cuts the joint; in other cases the toe or inner quarter of the hoof itself is at fault (see p. 109).

Sprain of the Tendons or Back Sinews and their sheaths may be said to be laceration of the tendinous fibres, causing heat and a painful swelling. This usually occurs below the knee, just where the inferior check ligament joins the tendon (Plate VIII., No. 18; also Plate X., Fig. 6, E), but any portion of the latter is liable to lesions, and it is most frequently seen in the fore-leg, especially in cart-horses having heavy loads to pull up steep hills. High-heeled and high-toed shoes may have something to do with causing it, also slipping on ice, overreaching in jumping, etc. The animal steps short, and rests the limb whenever it has a chance. On examining the leg the damaged part is found to be swollen and painful on pressure. The most essential point towards recovery in such cases is entire rest from work; next, the application of a cold water bandage. The shoe must be removed and the heel slightly elevated, so as to act as a support to the part; or the following, as recommended by Captain M. H. Hayes, F.R.C.V.S., may be tried: 'A good ply of cotton wadding to be wrapped loosely round the part, and held in its place by a long calico bandage rolled firmly round the leg, to be taken off and re-wrapped once every twenty-four hours.' After the active symptoms have abated, blistering should be resorted to and the animal turned out to grass. Firing before turning out may be necessary, and is as a rule very effectual. When the animal is

worked too long and the case neglected, the tendon becomes so much contracted that the fetlock knuckles over and the animal walks on its toe. A special shoe with a turned-up toe is required for this, and the operation of tenotomy, dividing the tendon, has to be performed. From this it will be seen how highly necessary it is to give rest in the first stages, and thus obviate future ill-consequences.

Break-down—a laceration of the suspensory ligament, the flexor tendons, or fracture of the sesamoid bones, allowing the back of the fetlock to come to the ground—is of common occurrence in race-horses, steeplechasers, and hunters. For this cold water bandages with splints may be applied until the active inflammation is arrested; the animal should also be put in slings, and dieted on mashes or green food; finally, an adhesive plaster bandage may be applied, and the horse turned out to grass.

Sesamoiditis is inflammation of the joint at the back of the fetlock, due to some injury, either to the small bones, or to the ligaments or tendons in connection with them. The parts are much swollen and tender to the touch, while the fetlock stands forward and the animal steps short. When certain that this is the seat of the lameness, cold water bandages can be used first with complete rest, and the adhesive plaster bandage may be applied; but, finally, blistering or firing may have to be resorted to. In the early stages of both breakdown and sesamoiditis the cotton wadding wrapping with bandage and splints can also be used, as noted in Sprain of the Tendons.

Hip-Joint Lameness may arise from a variety of causes, such as sprain of the muscles, tendons, or ligaments in connection with the joint and the head of the hip bone. As in the fore-leg the shoulder was generally considered the seat of lameness, so in the hind-leg the hip is often pointed to when the cause is really in some portion of the limb below, thus showing that lameness in this part is by no means easy to trace, as it may arise from muscular sprain, or from some nervous derangement, such as sciatica, etc. So that before any treatment is adopted a qualified practitioner should be consulted, as I have often seen a large surface of the skin permanently damaged by the use of some fancy advertised quack nostrum, the animal having rubbed the part after application and thus

destroyed the skin. When certain that the lameness is in the hip, rest, with cold water irrigation for two or three hours daily, is of great service. Blisters and pitch charges are, when desirable, of great benefit.

Windgall is a puffy, elastic swelling caused by an oversecretion of synovia of the *bursa mucosa*, a fluid similar to joint oil, and is of very common occurrence in nearly all classes of animals, found at the knee and fetlock joints, etc. (Plate VIII., Nos. 16 and 19). Some classes or stamps of animals are more prone to it than others. The swelling may be brought on by overwork, or by putting the animal to work too soon. It very rarely causes lameness, or in any way interferes with the usefulness of the animal; but still, it is very unsightly and objectionable, and not easily removed. *Treatment* consists of rest, the application of cold water, indiarubber, or adhesive plaster bandage and blistering; also firing, when very large. In olden times the enlargement was supposed to contain wind, hence the name.

Bog Spavin is an overdistension of the capsular ligament of the hock-joint with synovia, and is found on the front and inner part of the hock-joint (Plate VIII., No. 32), and is of the same nature as windgall. It is mostly seen in cart-horses, certain strains of Clydesdales having a special tendency to it; and it is frequently found in young horses rising two years old, more particularly in overfed, forced animals. It very rarely occasions lameness, and sometimes disappears without any treatment. If hard feeding is thought to be the cause, it should be diminished, and the animal turned out to grass, after applying a good dressing of green tar to the part. Compression by means of an indiarubber bandage has also a splendid effect, but when lameness is present, blistering and subsequently firing have to be resorted to.

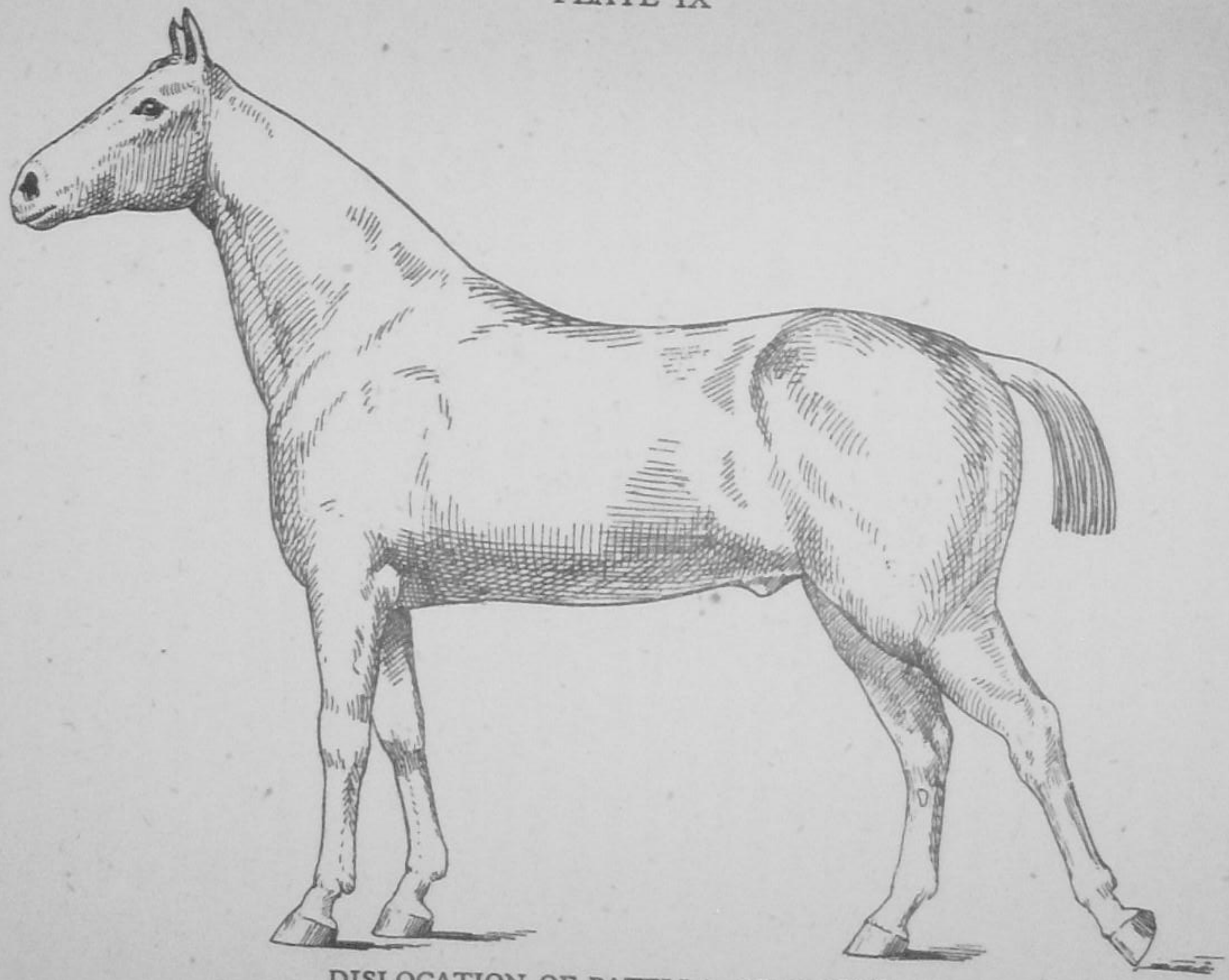
Thorough-Pin.—An enlargement of the synovial sac through which one of the tendons passes, and is situated behind the main joint, and in front of the os calcis, or point of the hock (Plate VIII., No. 36). It varies very much in size, and is generally seen more prominently on the outside than on the inside, or *vice versa*, and sometimes it is right through. Pressure on one side makes it more apparent on the other. It seldom causes lameness, but, being unsightly, is very objectionable, and is frequently associated with

large bog spavin. The treatment greatly resembles that for windgall (see p. 89). An indiarubber bandage may be applied, or a truss specially prepared for the hock-joint may be used, causing compression and absorption. A run at grass, with green tar dressings of the affected part, have also been found to answer splendidly. These bursal distensions, like windgall, bog spavin, and thorough-pin, when very large, are sometimes tapped and the oversecretion drawn off by means of a special instrument, an aspirator; but this should only be attempted by a professional man, as it is very dangerous to admit air into a synovial or serous cavity.

Capped Hock consists of a swelling on and over the point of the hock (Plate VIII., No. 37), and is of two kinds, either a serous or watery effusion immediately under the skin, or a synovial or bursal distension. The *serous capped hock* is caused by kicks or other bruises; when recent, it is very painful to the touch. Soothing treatment is necessary, such as hot or cold applications, accompanied by cooling lotions (see p. 442). All stimulating embrocations are to be avoided, as they have a tendency to consolidate the effused products. Some animals get capped hocks by scraping all their litter behind them, and then lying down on the bare brick or pavement. This may be remedied by bedding thickly with sawdust or moss litter. When the swelling is very large it may be opened and the watery fluid drawn off, but great care is required to distinguish the serous effusion from the synovial secretion, and if the synovial bursa is punctured it might lead to serious consequences. The *synovial capped hock* is generally not so painful as the serous variety, but is more deeply seated, and is best treated by repeated applications of 20 per cent. oleate of mercury.

Curb.—An enlargement seen on the back and lower part of the hock-joint where the heads of the small metatarsal bones join the lower row of bones of the hock (Plate VIII., No. 38). There are two kinds of curb, false and true. *False curb* is an effusion of serum under the skin, due to a sharp blow on the part. The treatment for it consists of hot fomentations or cold water applications, followed by an iodine blister.

True curb is of a more serious nature, and consists either of a sprain of the tendons passing over the seat of curb or laceration



DISLOCATION OF PATELLA, OR STIFLE.

of the calcaneo-cuboid ligament at its attachments to the cuboid and outer small metatarsal bone. This is caused by over-exertion, as when galloping, jumping, rearing up, etc. Some breeds of horses have joints naturally predisposed to curb, called curby or sickle hocks, and therefore of congenital formation. In *sickle hocks* the head of the metatarsal is set too far back; and the os calcis, the upper end of which forms the point of the hock, is too short and straight up, forming a narrow joint, or ' tied in ' hock, with a sharp angle at the lower part of the front of it. This class of joint is more subject to curb than a well-formed, broad, and developed one. When the enlargement is seen, and the animal is noticed to be lame or the part found to be tender, it should be put off work, and cooling applications used, such as the hosepipe irrigation of cold water or a cold water bandage, until the inflammation is reduced; then iodine or fly-blisters must be used, but the best and most satisfactory treatment for curb is to fire, in lines.

Sprung Hock.—This name is popularly given to a sprain of the soft structures of the hock generally. The injury varies very much in degree; in slight cases the ligaments only may be affected, but in more severe injuries not only the ligaments, but the tendons and bones, are implicated. Great pain is evinced, with high fever. *Treatment.*—Cold water irrigation applied to the joint until the inflammation and pain subside. Hypodermic injections of morphia near the joint have a soothing effect, while complete rest is essential.

Open Joint is an opening into a joint with the escape of synovia or joint oil. All the joints are liable to be laid open from kicks or other injuries. The joints most frequently damaged in this manner are the knee, elbow, stifle, and hock. The three latter are very formidable to deal with, and, owing to their arrangement, are difficult to treat successfully. When a joint is opened into, it should have immediate attention, or it may end in a stiff joint, or *caries* of the bone, and even in the death of the animal. As soon as it is ascertained that the discharge coming from the wound is joint oil, entire rest must be given, and cold water irrigation resorted to. The water must be kept running constantly over the part for four or six days. I have on many occasions, with this treatment alone, been successful in stopping synovia and healing the joint. Next to this is the application of a fly-blister, which has generally the

desired effect; and to turn the animal on to the grazing pasture. The blister causes the parts to swell, thus closing up the opening in the joint and preventing the admission of atmospheric air. Creosote, oil of cloves, or carbolic acid may also be applied to the wound, if thought necessary.

Stifle-Joint.—Independent of the disease of the bones that enter into the formation of this joint, the soft structures in connection with it are frequently the seat of injury and disease. Some breeds



FIG. 11.—DISLOCATION OF THE NECK.
(From Dollar's 'Veterinary Surgery.')

of horses are more susceptible to contract diseases and enlargements of this joint than others.

Luxation or Dislocation of the Patella is a displacement of the patella or cap of the stifle-joint. This occurs in horses, cattle, and dogs. It may be partial or complete, and is caused by sudden and violent movements. Youth and weakness are predisposing causes. When dislocation takes place, the cap comes to the outside, on account of the ridge on the femur being less on the outside than

on the inside. The leg is extended behind in a rigid condition, the front of the point of the toe resting on the ground with the sole of the foot looking upwards and backwards. If in a stall, the animal must be got into the yard, a neck collar put on, and a strong rope passed through the bottom of the collar, between the fore-legs, and tied round the pastern-joint of the dislocated limb. The foot must then be pulled forcibly forward under the belly until the sole can rest flat on the ground; the cap must now be manipulated to the front and held there, when, on the horse stepping forward, it readily drops into its place. A good blister should be applied, and the animal tied up short for a week or so to prevent it lying down, as, when once the cap has been disturbed and ligaments stretched, it is apt to again become displaced.

Hip-Joint Dislocation.—From some extensive injury this joint occasionally becomes dislocated, being usually accompanied by a fracture. The leg seems much shorter than its fellow, and does not reach the ground. When the dislocation is forward, in front of the articulation, the back of the leg hangs, pressing against the front of the shank bone of the opposite leg; and when the dislocation is backward, the front of the leg presses against the back of the shank of its fellow. When the muscles are so extensively lacerated, and the swelling is great, the animal is usually destroyed.

CHAPTER IV

THE HORSE'S FOOT: SHOEING, ETC.

THE horse's foot is made up of soft and hard structures of a sensitive and non-sensitive nature. The external horny covering or hoof is *non-sensitive*, and is made up of the wall or crust and bars, sole, frog, and frog band.

The Wall (Plate XI., No. 2, F) is that portion seen when the foot is placed flat on the ground, and is divided into toe, quarters, and heels; at the latter it turns inwards and forms the bars, which run on each side of the frog, on the ground surface, towards the toe. The wall is thickest at the toe, becoming thinner as it reaches the quarters; while the outside quarter, or *spread*, of the foot is more rounded than the inside, which is nearly straight up. The fore-foot is more of an oval shape at the toe than the hind one, which is oblong, pointed, and straighter up. The wall is said to contain about 25 per cent. of moisture, and externally has a smooth, fibrous-like appearance. These so-called fibres are, in reality, small horny tubes, filled with and matted together by a gelatinous matter; they run from the top of the hoof to the bottom in an oblique manner, and are secreted by the coronary band, or cushion (Plate XI., No. 3, K K), which lies in the hollow groove running round the top and inside of the hoof. The perioplic ring, or frog band (Plate XI., No. 2, G), is a light-coloured, soft, horny-like structure, which runs round the top and outside of the foot at the junction of the hoof and skin, and becomes blended with the bulbs of the frog. It is best seen when the foot is wet, and secretes a layer of thin horn, which covers the hoof; it has a protective influence on the newly-secreted horn, and should never be destroyed by the rasp. The internal portion of the wall is a leaf-like, or laminated, structure, which dovetails into the sensitive laminæ surrounding the coffin bone. It has been estimated that there are between 500 and 600 of these non-sensitive horny laminæ and a like number of sensitive ones, each being again studded with about 100 secondary

ones, like the barbs of a feather, making the dovetail more complete.

The Sole (Plate X., No. 5, F) is the under or ground portion of the hoof, and is slightly concave, filling up the space between the bars (Plate X., No. 5, D) and the ground surface of the crust or wall. On the ground surface a white rim is seen, called the 'white line,' which marks the union of the sole with the wall (Plate X., No. 5, E). The sole consists of thin plates of horny material, which flake or fall off successively when they have done their work at the ground surface. The internal surface presents a sort of very fine honeycombed appearance, with little depressions, into which dip the papillæ of the sensitive sole, and by which the horny matter is secreted. The sole is supposed to contain about 37 per cent. of moisture.

The Frog (Plate X., No. 5, G) is the triangular elastic pad of horn, containing about 43 per cent. of moisture, fitting into the space between the bars. It runs to a point towards the toe, and at the back forms the bulbs (Plate X., No. 5, K) of the heels. The deep cavities between the frog and the bars are called commissures (Plate X., No. 5, H) of the frog. Along the middle of the ground surface runs the cleft (Plate X., No. 5, I), corresponding to an elevation on the internal surface, which is called the frog-stay (Plate XI., No. 2, M), and is attached to the fatty frog or sensitive cushion.

The Sensitive Structures of the foot are: (1) The coronary band; (2) the sensitive laminæ; (3) the sensitive sole; (4) the fatty frog; (5) tendons and ligaments; (6) bones and cartilages—all of which are highly supplied with bloodvessels and nerves. The coronary band (Plate XI., No. 3, K K) is situated in the hollow or semicircular groove which runs round the top and inner aspect of the hoof, and is attached to the true skin by its upper margin, while the under portion is covered with minute sprout-like projections (papillæ), which dip into the small orifices of the wall and secrete the horn fibres. The sensitive laminæ, or leaves (Plate XI., No. 3, H), correspond in number to those of the non-sensitive or horny laminæ seen on the inside of the wall of the hoof, to which they are firmly attached. The sensitive laminæ surround the bony structures of the foot, to which they are connected by dense con-

EXPLANATION OF PLATE X

1, 2, 3, 4. VARIETIES OF FEET.

5. SOLE OF HOOF.

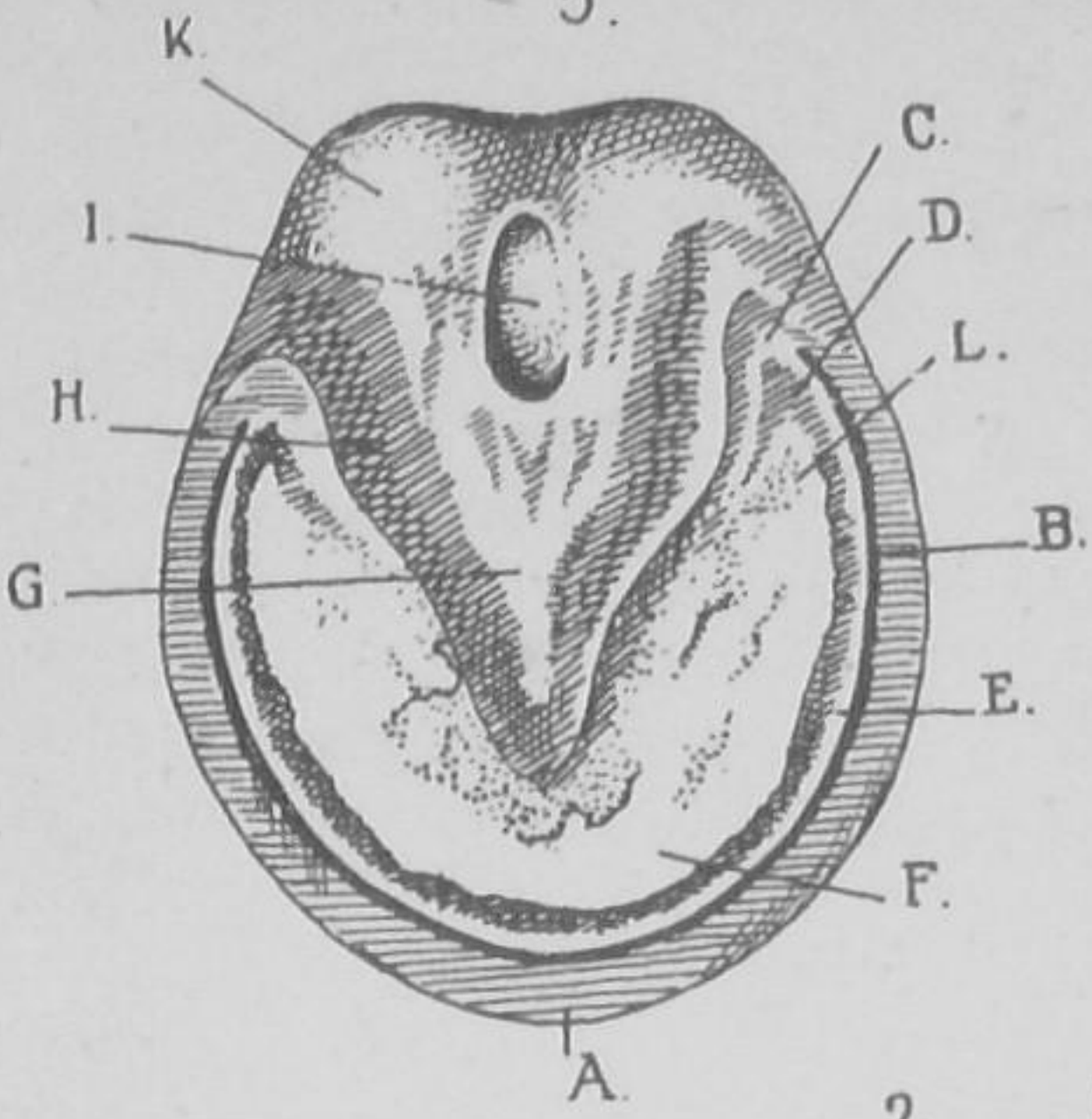
A. Ground Surface of the Wall at the Toe.
B. Ground Surface of the Wall at the Quarter.
C. Ground Surface of the Wall at the Heels, where it turns and forms the Bars.
D. The Bar.
E. White Line or Junction of the Wall and the Sole
F. The Sole.
G. The Frog.
H. The Commissures.
I. The Cleft of the Frog.
K. The Bulb of the Heel.
L. Seat of Corn.

6. FORE-LEG FROM KNEE, SHOWING BONES, TENDONS, AND LIGAMENTS.

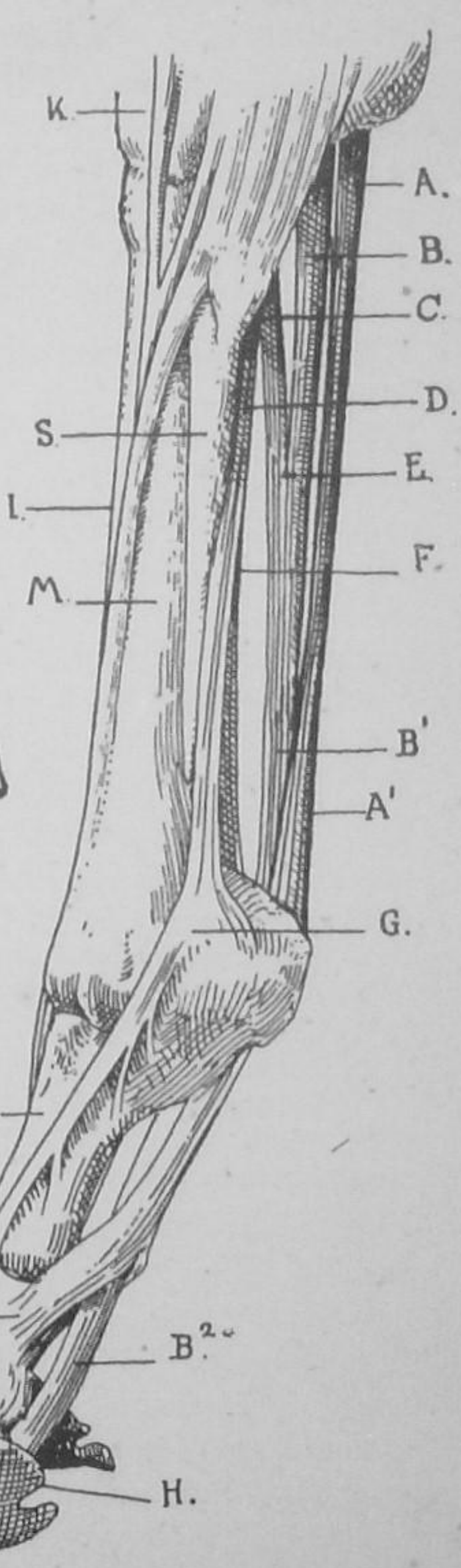
A. Flexor Perforatus.
A^1. Flexor Perforatus.
B. Flexor Perforans.
B^1. Flexor Perforans.
B^2. Flexor Perforans.
C. Metacarpal Ligament.
D. Suspensory Ligament.
E. Insertion of Metacarpal Ligament into Perforans.
F. Bifurcation of Suspensory Ligament.
G. Continuation of Suspensory Ligament.
H. Coffin Bone.
I. Extensor Tendon.
K. Knee.
M. Metacarpal Bone.
N. Os Suffraginis (Large Pastern).
O. Os Coronæ (Small Pastern).
S. Splint Bone.

PLATE X

5.



6.



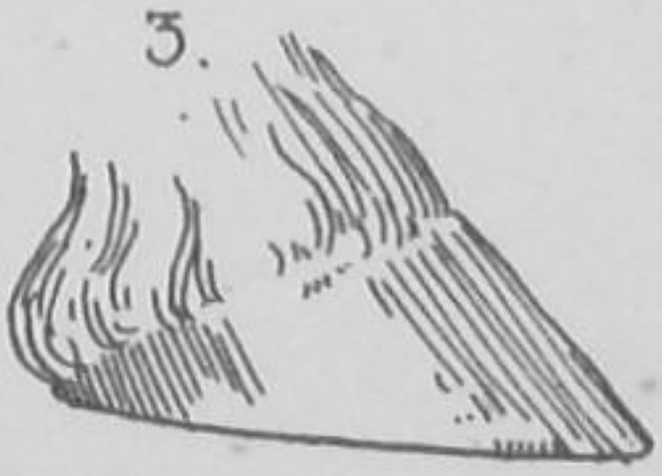
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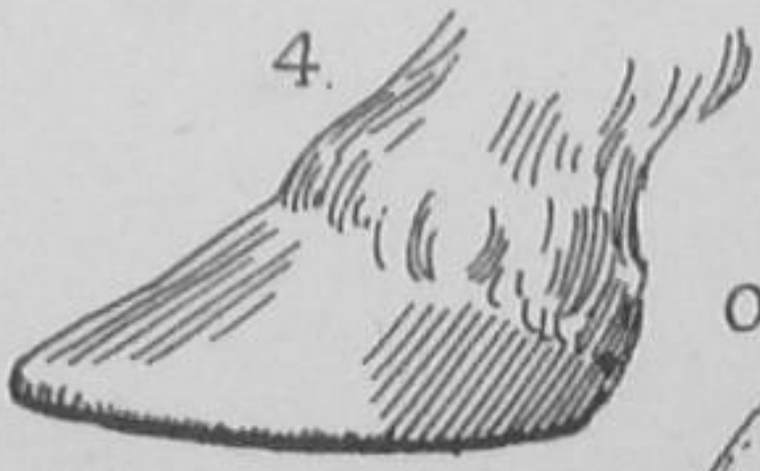
2.



3.



4.



nective tissue, and they assist in the secretion of horn. The sensitive sole (Plate XI., No. 3, I) is attached to the bottom of the coffin or pedal bone, and the under surface next to the horny sole resembles a piece of fine velvet, being covered with small projecting papillæ, which not only secretes the horn, but also gives attachment to the non-sensitive sole. The sensitive frog (Plate XI., No. 2, D), sometimes called the fatty frog, is situated at the back part of the foot, and lies between the wings of the coffin bone, above the horny frog; it acts as a cushion by supporting the weight in progression. The tendons found in the foot are the terminal points of the extensor and flexor muscles of the limb, and the ligaments are those in connection with the foot (Plate XI., Nos. 1, 2, and 3).

In the **Foot** there are three bones: (1) The *coffin* or *pedal bone* (Plate XI., No. 2, B). This bone is crescent-shaped, the body resembling the front of the hoof, with an elevation in front at the top. The two quarters or wings run backwards on each side, to which are attached the lateral cartilages (Plate XI., No. 3, L L) that so often in cart-horses become ossified and form side bones. The bone itself is very porous in structure, and contains numerous fissures, thus allowing the ramification of nerves, bloodvessels, etc. (2) The *os coronæ*, or *short pastern bone* (Plate XI., No. 2, A), which is situated above the coffin bone, forming with it a joint, into the formation of which also enters—(3) the *navicular* or *shuttle bone* (Plate XI., No. 2, C), which just behind the coffin bone acts as a fulcrum for the tendon passing over it.

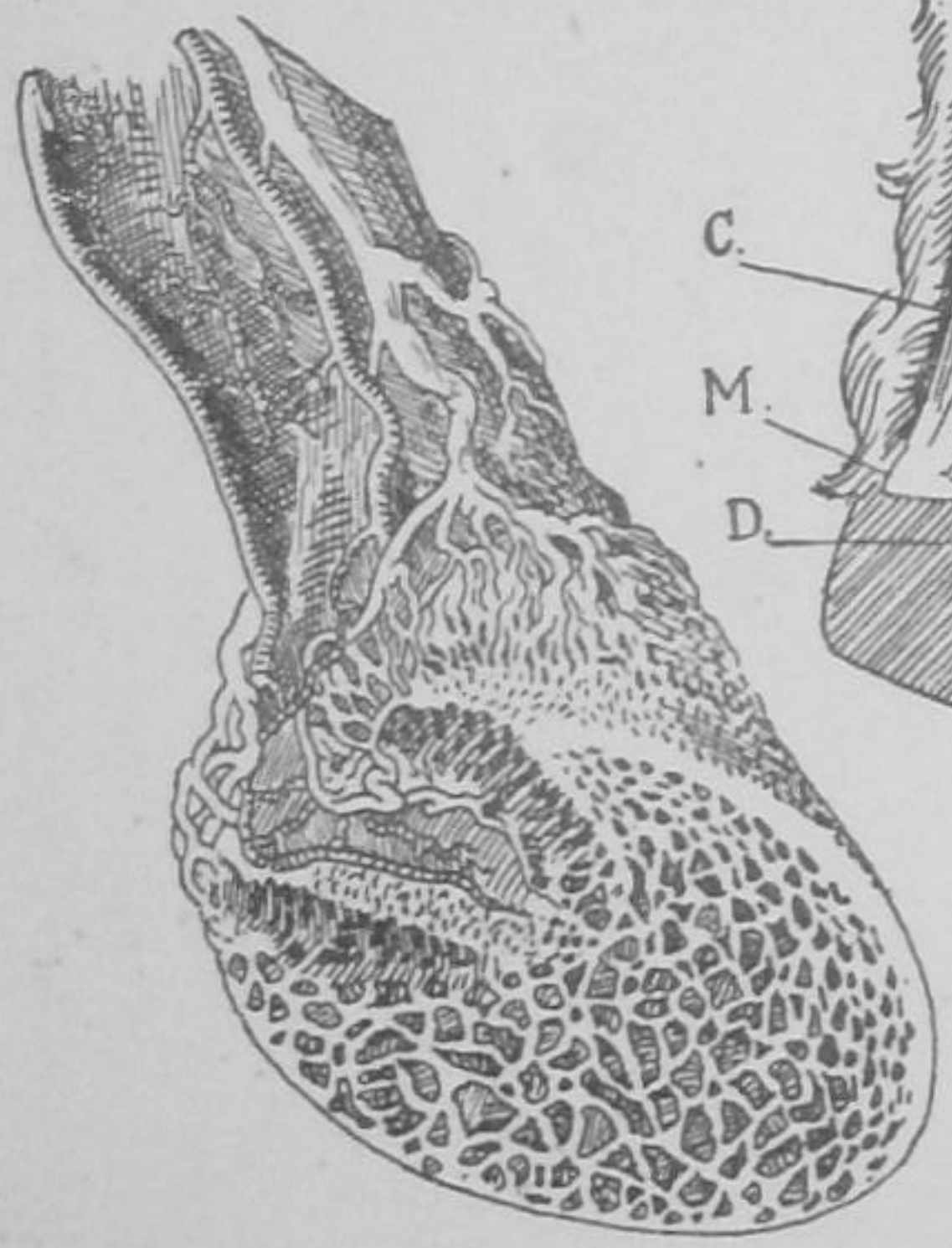
Historical—In paleolithic ages there is evidence to show that the horse was an object of the chase and a source of food. In neolithic remains representations of it appear, but still, apparently, only as a creature of the chase. It is first known to have been domesticated by the Egyptians, but not until a late period; at least, no evidence of its having been domesticated can be gathered from the earlier monuments. In the Old Testament (in which the first mention occurs in Gen. xlvii. 17, when Joseph gave his brethren bread in return for horses, etc.) the horse is chiefly referred to in connection with warfare. In the Book of Job (xxxix.) the war-horse is described as rejoicing in his strength and smelling the battle afar off. Horses, horsemen, and chariots, and trading in

horses, are referred to in many places—*e.g.*, 2 Kings xviii. 23; Ezek. xxvii. 14; Zech. vi. 2, 3—thus showing the general usefulness of the horse to mankind. Even in the earliest ages man's attention had been drawn to the brittle nature of the horse's hoof, for in Judg. v. 22 we find it stated that, 'Then were the horsehoofs broken by the means of their pransings.' In the ancient Greek and Roman journals, also, we find that armies had to be disbanded in consequence of the horses' hoofs breaking and wearing; while Suetonius and Pliny, as well as other historians, specially record the horses' frequent incapacity to do work from the wearing of the hoof. The exact time, however, when shoes were applied to horses' feet is not known, but the Persians get the credit of being the first to use them. In a Mosaic painting of Pompeii a shoe is noticed on the foot of the war-horse of Satrapes (333 B.C.). In the year 1653 an iron shoe was found in the tomb of Childeric, King of France, who died A.D. 481, and William the Conqueror is credited with having introduced the art of shoeing into this country.

The horse's hoof has been a subject of deep study for centuries; and I know of no mechanical contrivance which the mind of man can contemplate with greater wonder and admiration. If there is one thing more than another which has a tendency to encourage and advance 'science with practice' it is the art of 'horse-shoeing.' For the shoer to have a knowledge of the different forms or kinds of feet, to frame the various kinds of shoes and attach them properly, and then to give a reason for his work, would be, I think, one of the finest examples of 'science and practice.'

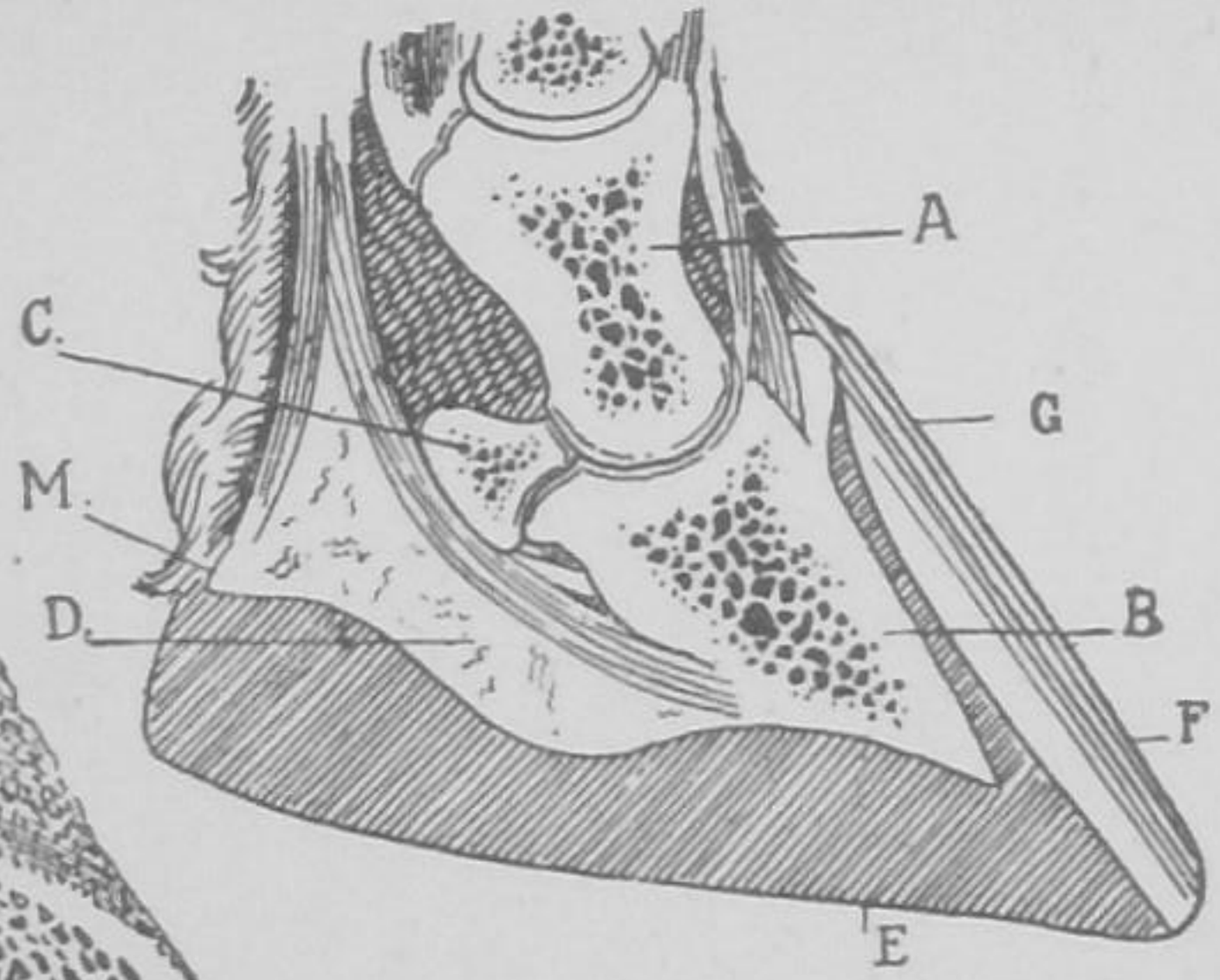
The horse in its native wilds or at grass seldom has any need for protection for the foot, but the condition of our roads and streets is such that it is necessary to protect this beautiful structure from injury; therefore shoeing becomes a necessity, requiring science and practice for its proper application; and, owing to the great variety of feet met with in the different breeds of horses, and the peculiar formation of some of the hoofs, horse-shoeing (with brains as well as with the hands) is actually of much more importance than it is usually credited with. What is the use of a horse, however good or well fashioned, if it has not a sound foot to stand upon?

PLATE XI



1

1 The Foot with Skin and Hoof removed, showing Arteries and Veins ramifying to form a beautiful network.

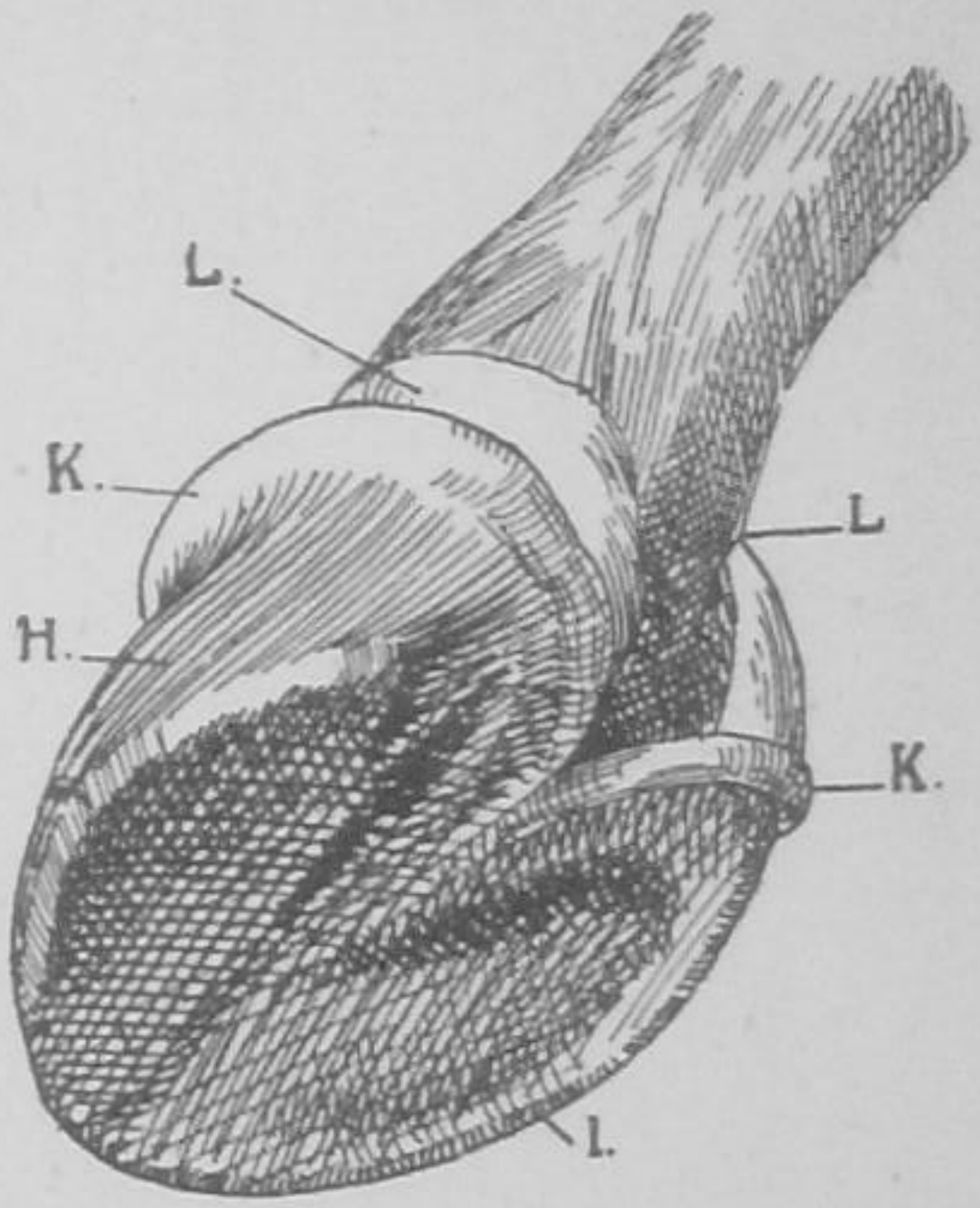


2

HORSE'S FOOT

2. Foot sawn through the middle.

A. Coronet Bone, or Small Pastern
B. Coffin or Pedal Bone.
C. Navicular or Shuttle Bone.
D. Sensitive or Fatty Frog.
E. Non-sensitive or Horny Sole.
F. Non-sensitive or Horny Wall.
G. The Perioplic Ring, or Frog Band.
M. Frog Stay.



3

3. Foot without Hoof.

H. Sensitive Laminæ.
I. Sensitive Sole.
K K. Coronary Band.
L L. Lateral Cartilage.

feet, however, may become of different sizes by frequently pulling the shoe off one of them, which is done by the animal galloping round in a circle, the inside fore-shoe being apt to be clicked off by the hind one on the same side; and each time the shoe is replaced the foot decreases in size; still, there is no disease. But the foot may also become smaller from disease.

Different Kinds of Shoes are required, according to the kind or breed of horse, and the work it has to do:

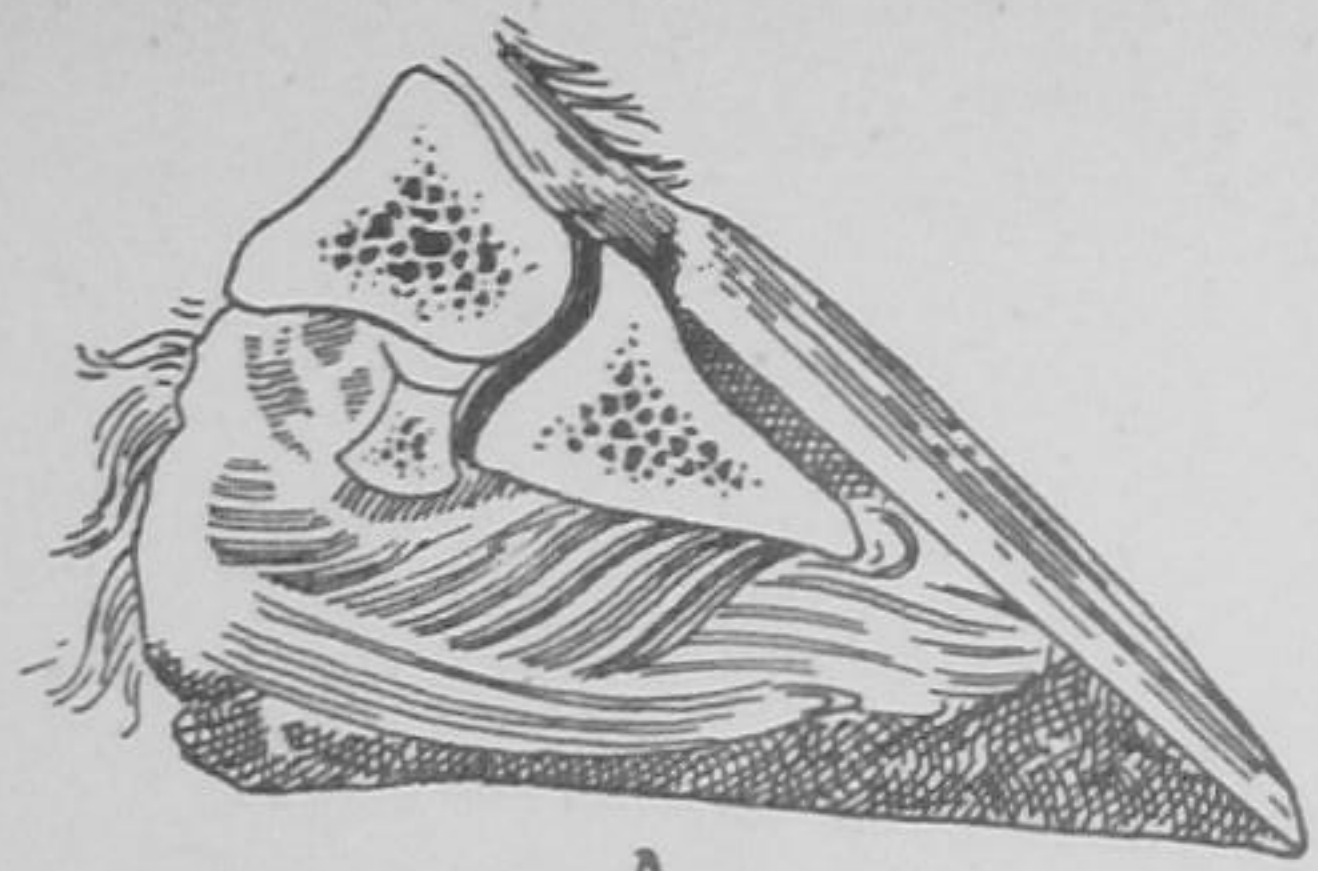
(1) **Race-Horses** require only a very narrow plate, covering the ground surface of the wall, and but slightly overlapping the junction between the sole and the wall, or white line (Plate XIV., 1 A and 1 B). The French or Charlier system meets these requirements. In this form of shoeing a groove is made round the ground surface of the wall, into which the shoe is fitted, there being no covering on the sole. It certainly gives the frog full play, but does not answer for animals in use on tarred or concrete roads and paved streets.

(2) **Hunters** are generally shod with a broader web, having a flat face next the sole, which it slightly covers (giving support to the connection of the wall with the sole), well seated, and concave on the ground surface, imitating as far as possible the bottom of the foot, so as to get a better grip of the ground. A fuller or groove on the ground surface of the shoe also helps to prevent slipping (Plate XIV., 2 A and 2 B).

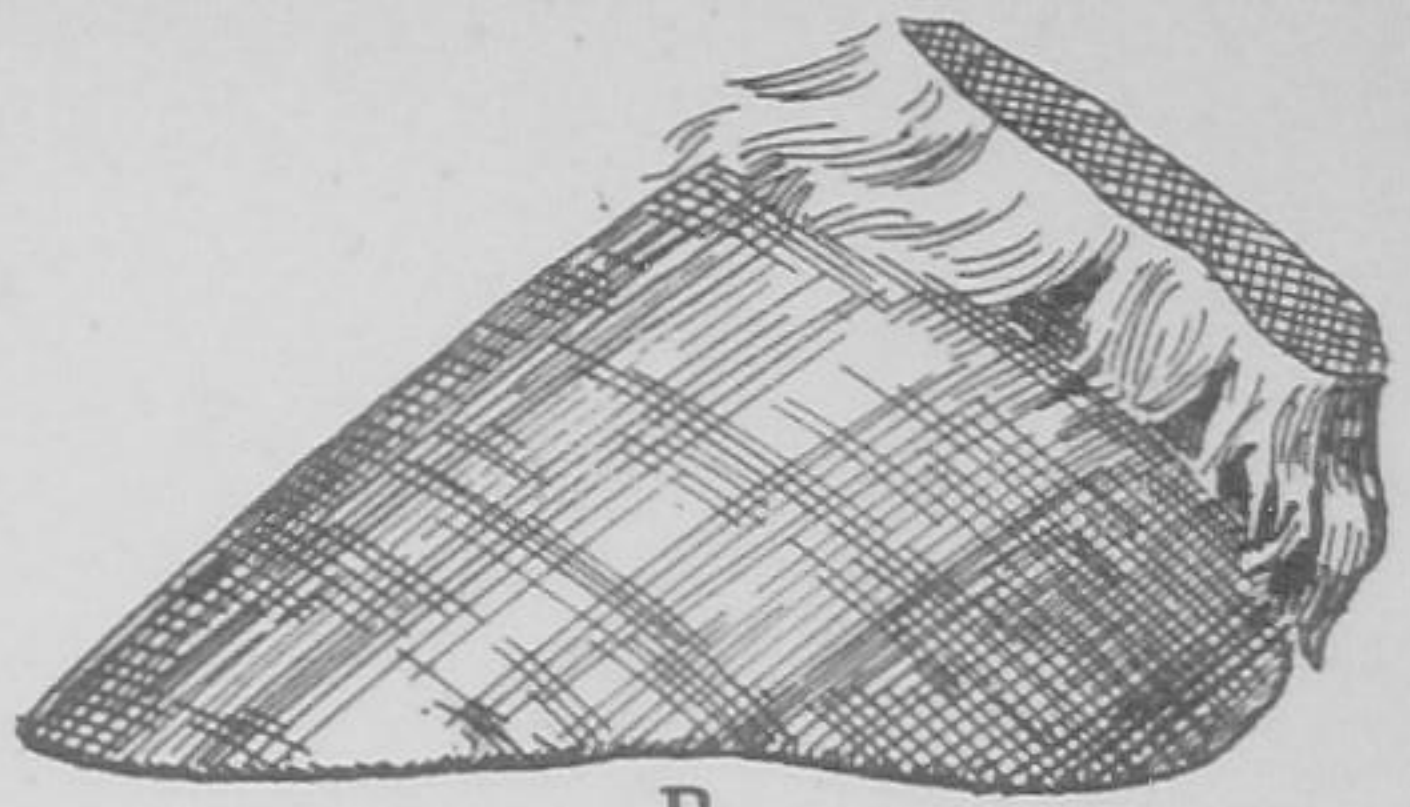
(3) **Hackneys and Carriage-Horses.**—A shoe is generally adopted that is well seated on the upper surface, next the sole, with a good flat level bearing at the heels, and round the bottom surface of the wall (Plate XIV., Nos. 3 and 2 B); but for a good foot (as Nos. 1 or 2), a shoe prepared on the lines of the hunter's shoe is to be preferred.

(4) **Cart and Waggon Horses** have shoes made similar to those for carriage-horses, but much heavier and broader, being seated on the surface next the foot. They are

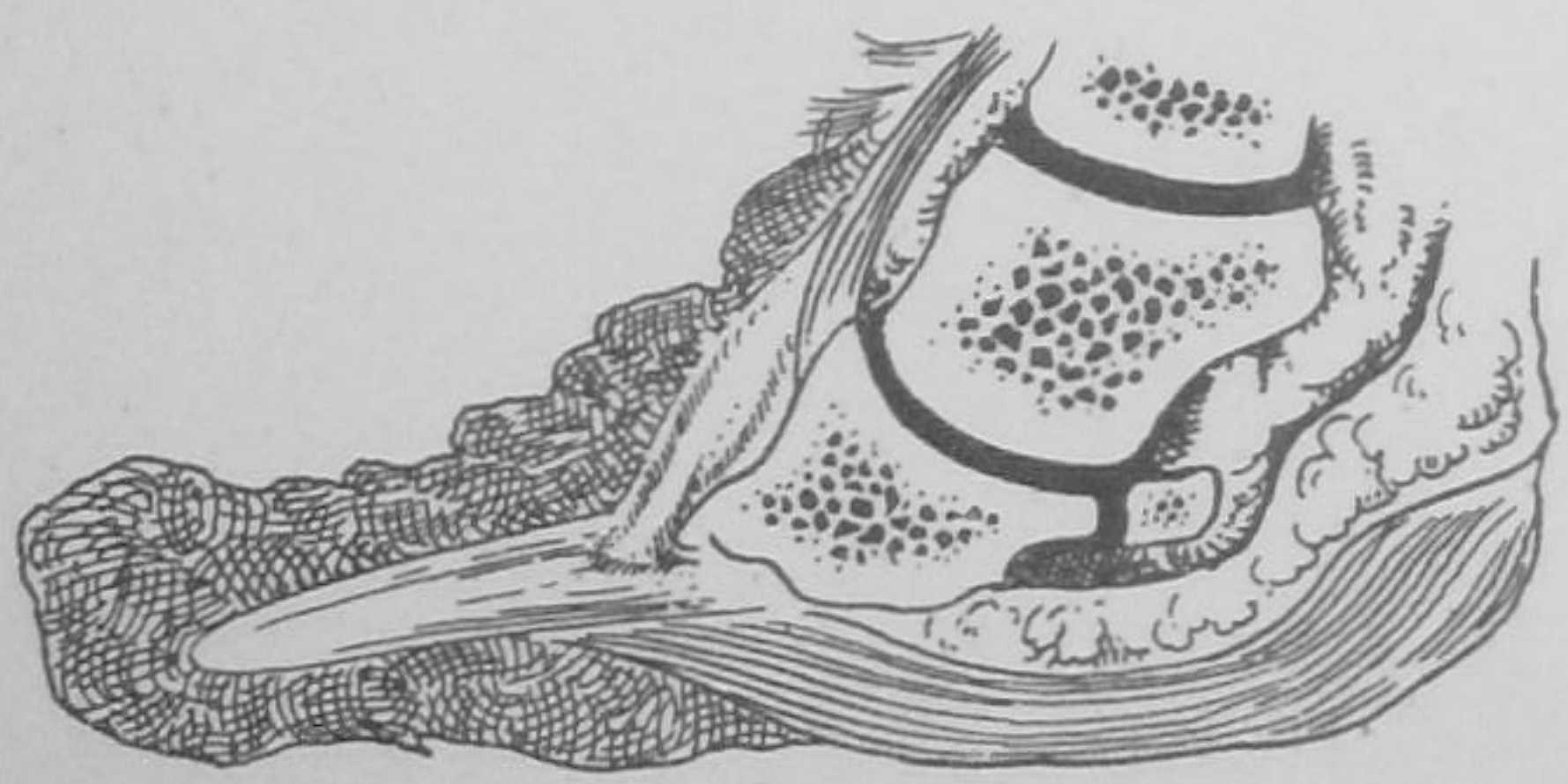
PLATE XII



A.



B.



C.



D.

A. Section of Overgrown Hoof.
C. Section of Laminitic Foot.

B. Side-View of Overgrown Hoof
D. Side-View of Laminitic Foot.

generally turned up at the heels (caulkings), and may have a toe-piece (Plate XIV., 4 A and 4 B). This turning up of the heel, more particularly in dealing with a young horse, is a great mistake. It should be shod flat, as the heels lift the foot from its centre of bearing and the frog is taken away from its proper work. This is fully explained under Side Bones.

(5) **Bar Shoes** are used for weak-heeled horses, or where damage has been done to the quarters. They give additional support and pressure to the frog and relieve side bones and corns (Plate XIV., No. 5).

(6) **Round or Rocker Shoes** are something analogous to bar shoes. They are very useful for weak feet, and also in cases where there has been extensive inflammation (laminitis). Their ground surface is formed in the shape of a rocker, thin at heel and toe and thick at the quarter, so that when the horse puts its heel to the ground the foot rocks gently over, and the animal is assisted very much in progression (Plate XIV., No. 6).

(7) **Three-quarter Shoes.**—When we have disease of, or injury to, either outside or inside heels, as from corns, etc., a shoe is made with a bar to lie across the frog, while the side of the shoe next the damaged part is cut off to prevent pressure (Plate XIV., No. 7).

(8) **Diamond-Toed Shoes** have diamond points, and are used on the hind-feet to prevent the horse from 'forging' or 'clinking'—that is, where the toe of the hind-shoe strikes the ground surface of the fore-foot shoe. A young horse, when first put to work, frequently acquires the habit of forging, but this often disappears when the animal is in condition (Plate XIV., No. 8).

(9) **Feather-Edged Shoes.**—These are preventive shoes, and are more frequently used on the hind than on the fore feet. They are used for animals that brush—*i.e.*, strike the fetlock-joint or shank on the inner side of the opposite leg. Some young horses are very subject to brushing, and for treatment of the bruises see p. 82. The shoe is made with a feather-edge on the inside,

tapering inwards on the ground surface towards the frog, nailed on the outside and round the toe. India-rubber rings, leather pads, or boots, and woollen bandages, are also used to protect the opposite leg from further injury (Plate XIV., No. 9).

In all cases where there is a good, healthy, well-formed foot, with concave sole, the surface of the shoe next the foot ought to be flat, so as to give little pressure to the sole, and also to support the union of the wall with the sole. In weak, convex soles, however, the shoe should be seated so as to meet the requirements of the case.

Preparing the Foot for the Shoe.—A young horse, when first brought in from grass, should be put into a loose, open shed for ten days or a fortnight before shoes are applied to the feet. The ground surface of the crust or wall of the foot should then be levelled with a rasp, to make an even bearing for the shoe, which should invariably be a plain one, without the heels being turned up; and on no consideration must the shoe be applied too hot to the foot, for, although horn is a bad heat conductor, yet I have on several occasions seen laminitis produced through neglect of this caution. In future shoeing—*i.e.*, re-shoeing—the clinches ought to be carefully turned back, and, if possible, each nail drawn separately, thus preventing the crust being broken; the rasp may then be run gently round the sharp edges of the crust, and as the foot always grows in length at the toe (Plate XII., Figs. A and B) and very sparingly at the heels, it must be shortened. This is usually done by cutting a piece from the front of the wall at the toe; but to this method I have great objections. The foot should be shortened by rasping down the ground surface from one quarter round the toe to the other. This, when properly done, gives a level bearing for the shoe, preventing pressure on the heels, without having to spring the heels of the shoe. In paring the sole, only the rough, loose flakes ought to be removed, except in navicular disease, where we have, from continued irritation, an overgrowth of horn, in which case the sole must then be thinned by paring the ground surface of the sole of the foot.

Farmers themselves are very much to blame in not paying more attention to their horses' feet. 'No foot, no horse'—that is to

PLATE XIII

SECTIONS OF HOOF AND SHOE

1.



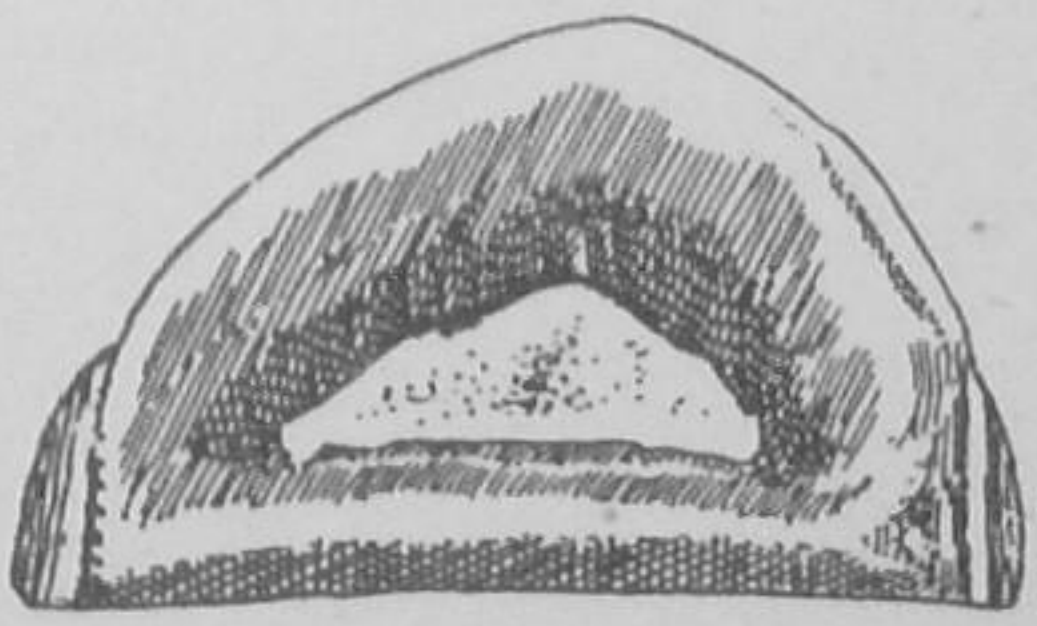
1. Section of Hoof, showing Position and Direction of the Two Front Nails

2.



2. Shoe and Nails *in situ*, showing the Inward Direction of the Nails when driven into the Hoof. Right Side of Shoe, showing Clinches turned over.

3.



3. Toe-Piece of No. 1, showing Marks of Nails.

say, no matter how good the animal may be otherwise, it is of very little account if it has not sound feet. Sometimes farmers allow a horse to go three or four months without being re-shod, by which time the feet are so overgrown and in such a state that it takes months to get them into form again. It would be much better to take the shoes off altogether, and then the foot, with use, would naturally wear away. Shoes are best removed once every four or six weeks, and should never, on any account, be allowed to remain longer than two months.

Fitting the Shoe.—Before the shoe is fitted, the foot in many cases requires a certain amount of trimming; this should be done with care and judgment. Then the shoe should be made to fit level, and be a shade larger than the foot at the ground surface, continuing the angle of inclination of the wall of the hoof. As already said, it must not be applied too hot—just hot enough to char the horn, and thus enable the shoeing-smith to see whether the surface is level or no.

Nails and Nail-Holes.—The fewer nails there are in the shoe the better, but, as a rule, four nails are put on the outside and three on the inside; more are used at times, but if the shoe is efficiently fitted, even a less number may be sufficient. The nail-holes, whether punched through the racing or fullering, or stamped, are, as a rule, made so that the nails, when driven, have a decided inward bearing (Plate XIII., Nos. 1, 2, and 3), particularly at the toe, so as to keep in line with the angle of the hoof, while the quarter and heel nails are more nearly vertical. When the holes are made too oblique, the nails are apt to break off at the neck. Some feet, however, are so constituted that the shoe has to be nailed round the toe instead of the quarter. In driving the nail, care should be taken not to get into the sensitive parts, nor to get so near as to press on them. This shows how necessary it is to fit the shoe properly, and also to make the nail-holes at proper angles. After the shoe has been attached, in dressing the hoof some smiths persist in rasping the walls—'to make them look nice,' they say. To my eye, nothing looks worse than a rasped hoof. By the use of the rasp, not only is the outer covering, perioplе, or varnish-like structure of the hoof, destroyed, but some hundreds of the little fibrous tubes which are seen running from the top to the bottom

of the hoof are wounded and left exposed to the action of the atmosphere, which makes the hoof turn hard and brittle, breaking off where the nails are turned down or clinched. I thus strongly say that the knife and rasp ought to be used sparingly and with great caution. The hoof must not be rasped above the clinches on any account.

Leather Soles should not be used except in cases of injury, when they become necessary; for, to stimulate and preserve the healthy action of the hoof, air should be allowed free access to all parts. Exercise also is very essential, in order to keep both the outside and inside of the hoof in sound condition. Without it healthy circulation cannot be maintained in the foot, and the result is disease; therefore, if a horse cannot be taken out every day, it should be turned into a loose-box or paddock.

Indiarubber Pads.—In connection with leather soles rubber pads are now made of various descriptions and sizes, and are found to answer well. The rubber frog pad, for example, is an artificial indiarubber frog fixed on a leather sole, which is nailed on between the foot and the shoe, and is very useful for narrow-heeled fore-feet and small or wasted frogs. Anti-slipping pads are also many, and one of them in common use is a sort of bag of indiarubber in the shape of the foot, with a corrugated ground surface, and fixed within the inner rims of the shoe. The frog bar pad is another indiarubber pad fixed on to a stout piece of leather, the rubber bar of which runs across the back part of the foot and covers both heels and frog, and is nailed to the foot above a short shoe. This is one of the best forms of pads, for, besides preventing slipping, it is of great service in the case of corns, weak heels, narrow or contracted quarters, navicular disease, and chronic laminitic feet.

For further particulars respecting the horse's foot and shoeing, Hunting's 'Art of Horse-Shoeing,' revised by Major A. B. Mattinson, R.A., is recommended.

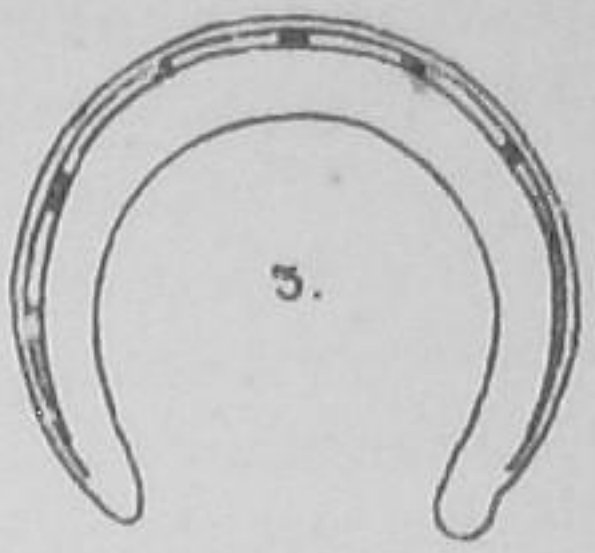
INJURIES TO, AND DISEASES OF, THE FOOT OF THE HORSE.

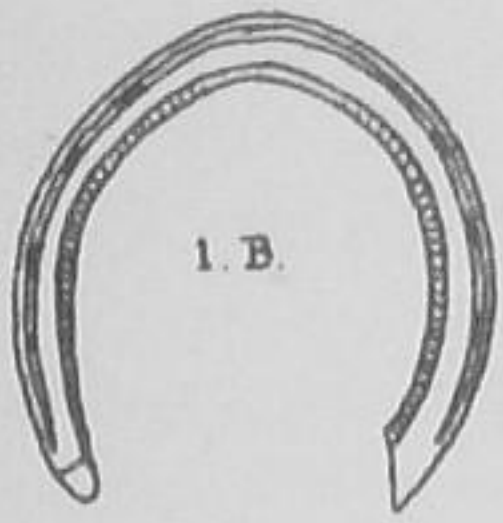
The foot of the horse is at all times very liable to injury and disease, and in all cases of lameness the foot should be examined to make sure that all is right there. The diseases or injuries to

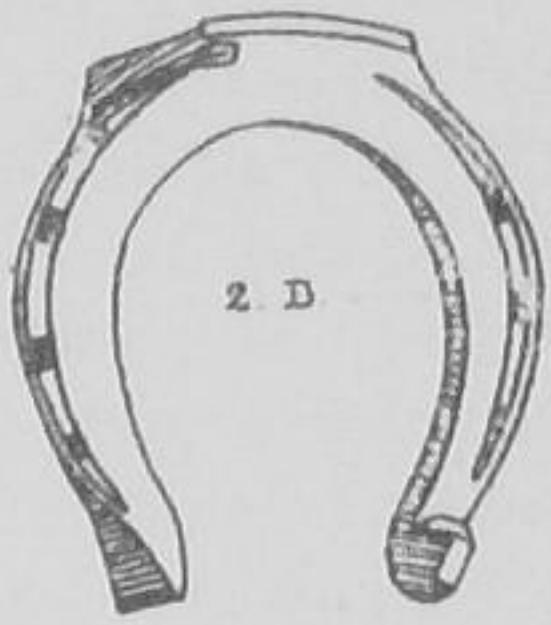
PLATE XIV

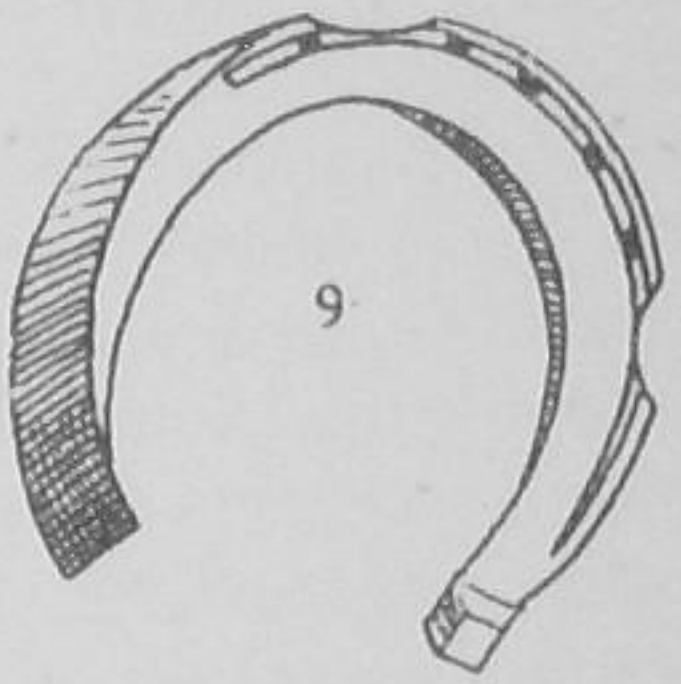


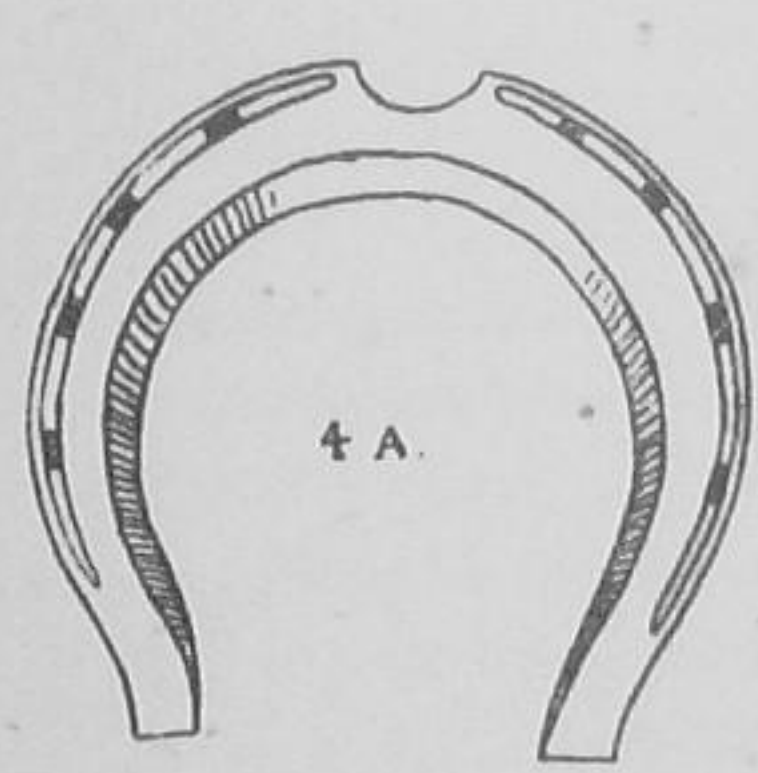


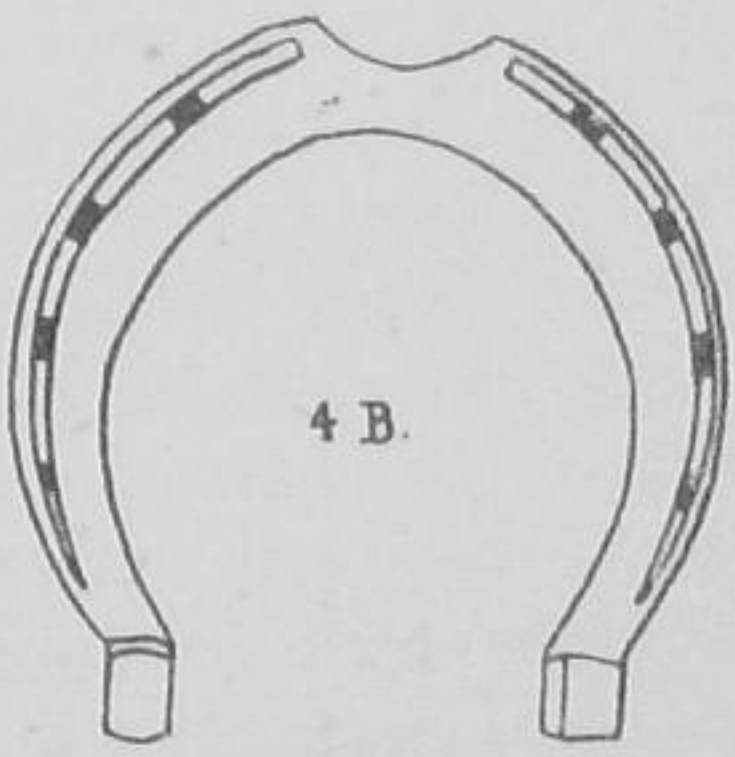


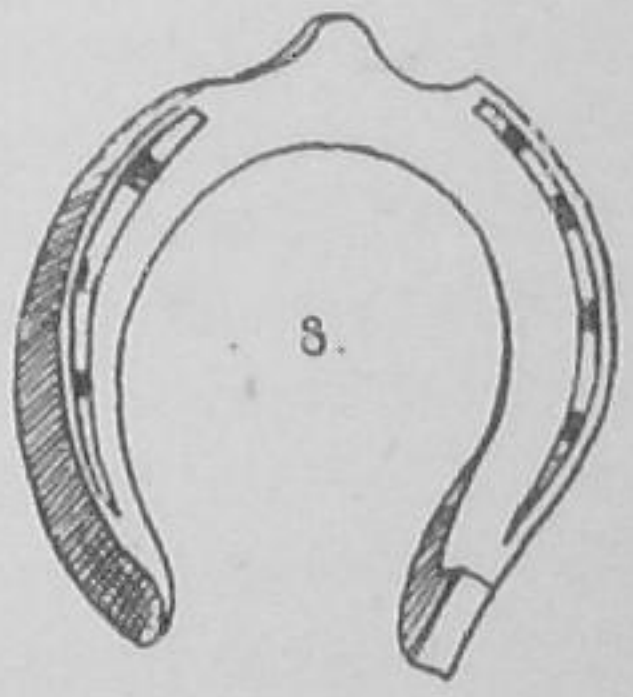


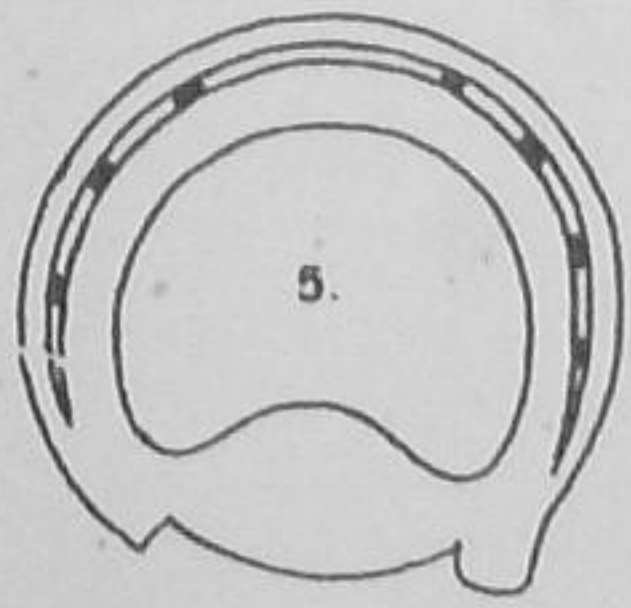




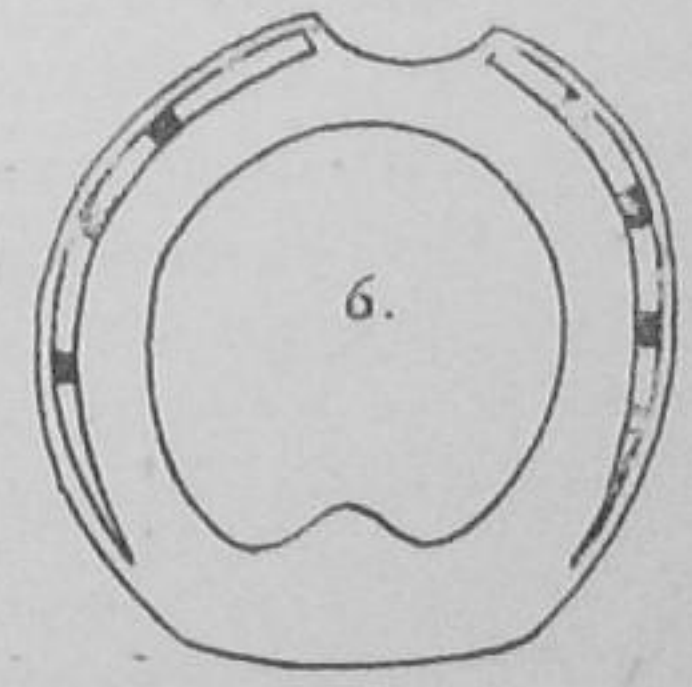








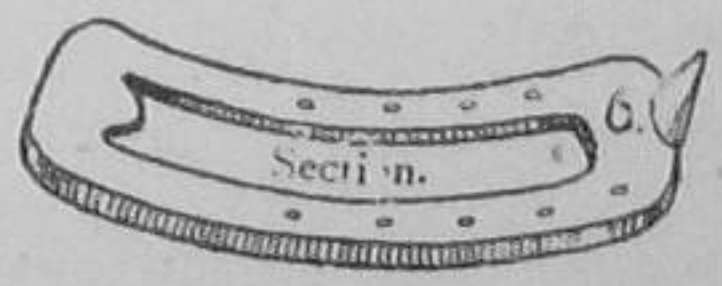




HORSE-SHOES

A. Signifies Fore-foot Shoe.

B. Signifies Hind-foot Shoe.



which the feet of horses are most subject are pricks, corns, quittor, side bones, sandcrack, seedy toe, false quarter, thrush, canker, treads, overreaches, navicular disease, and laminitis.

A Prick from Shoeing, or Otherwise.—This is the most common injury to the foot. In shoeing, if a nail should unfortunately be driven into the sensitive part of the foot, the owner ought at once to be told of the misfortune. At the same time the shoe must be removed, and the foot put into an antiseptic bran poultice made with cold water and a little carbolic acid, and kept constantly wet for a few days, when the part generally heals without any bad effect. But as a rule the nail is withdrawn, and no mention is made of the matter, with the result that the horse is put to work and in the course of two or three days becomes lame. The injury may be detected by tapping the part with a hammer, or by removing the shoe and pressing the foot with a pair of pincers, the animal flinching when the injured part is touched. The sole must then be carefully pared away, following the black spot with the point of the shoeing-knife, when a dirty, thin, dark-coloured fluid will generally be met with at the bottom of the nail-hole. If left alone too long, this fluid sometimes works under the sole, and, if not liberated, will find its way out at the top of the band of the hoof or at the bulbs of the heel. After the escape of the matter, the foot should be placed in a cold bran poultice, to which a tablespoonful of carbolic acid, or any good antiseptic, has been added, until all the inflammation has subsided; then, after dressing with tow and tar ointment, and protecting with a leather sole, the shoe may be put on. Sometimes the nails are driven too near, causing pressure on the sensitive parts and making the animal step short, or decidedly lame. Taking off the shoe and poulticing the foot for twenty-four hours is all that is necessary in such cases, for cutting into the parts does more harm than good.

When a horse drops suddenly lame on the road, the foot must at once be examined, to see whether it has been injured by a nail or a piece of wire. If this is found to be the case, remove the foreign body at once, and at the first house on the road wash the wound by pouring hot water on to it; then heat the nail or piece of wire in the fire, and with a pair of pincers press it into the hole already made, thus cauterizing the wound; a little hard soap may then be pressed

into the hole, after which, as a rule, no further trouble arises; but should the animal become lame afterwards, take off the shoe and poultice the foot as already stated. Pricks from nails are very dangerous, and should receive prompt attention, as tetanus (lock-jaw) often arises from a simple prick in the foot.

Corns are recognized by a blood-red stain in the horn, and are caused by a bruise or injury, with subsequent infiltration of blood through the horn. They occur chiefly in flat-footed, weak-heeled horses, and are generally found in the fore-feet, principally in the inner corner of the heels, between the wall and bars (Plate X., No. 5, L). Hunters are great sufferers from this class of injury, owing to their being shod with short-heeled shoes. Corns are very common, and as they are looked upon as unsoundness, in all cases of examination the shoes should be removed, and the feet carefully searched. When they cause lameness the shoe should be removed, and the parts dressed out, particularly if the bar is too strong, and doubled over, and pressing on the sole, for it must then be pared away, so as to remove all pressure from the part. At times the corn becomes infected, and pus forms; this must be liberated. In bad cases poultices have to be applied to reduce the inflammation, and a three-quarter or bar shoe (Plate XIV., Nos. 5 and 7) is found to be necessary; while the indiarubber bar pad is also of great service. If neglected, the inflammation extends to the internal parts of the foot, when pus or matter forms, and finds its way out at the top of the hoof, causing much pain and suffering to the animal, and perhaps ending in quittor.

Quittor is a fistulous disease of the foot of a most painful and troublesome nature. Injuries of any description to the foot may end in quittor. It is not often seen in the country, but in towns it is very common. Railway horses are very subject to it, owing to getting their feet fixed in the rails and waggons or carts passing over them. The structure of the foot becomes so much implicated that the bone and cartilage become diseased, when holes, or sinuses, are formed at the quarter and round the band of the hoof. At first cold water poultices may be of some service in reducing the active inflammation, but when the disease has become chronic, blisters, caustic dressings, and the hot iron have to be applied; while, as a last resource, an operation has to be performed by which

the diseased bone and cartilage are removed, making the complicated sores into one simple wound. These cases are much too formidable for the attempts of an amateur.

Side Bones consist of the ossification of one or both of the lateral cartilages, which are situated at the sides and top of the hoof (Plate VI., Nos. 7 and 8). They are met with in the fore-feet, particularly in those cart-horses which have strong, upright quarters; but they are very rarely found in flat-footed horses, hacks, or carriage-horses. The principal causes are hereditary predisposition (in so far as conformation is hereditary), injuries of various kinds, concussion on hard roads, overreaches, etc.; but, in my opinion, the greatest evil of all is the use of high-heeled shoes, removing the frog from its ground pressure, thus throwing the weight on the lateral cartilages. Above the horny or insensitive frog there are elastic fibres running from the inside of one lateral cartilage to the inside of the other, forming what is called the fatty or sensitive frog, into which is inserted the frog stay, or elevation corresponding to the cleft in the middle of the ground surface of the frog. Now, when the weight of a horse is thrown on its foot, the pastern descends, the lateral cartilages yield and bend outwards at the top of the hoof about the middle of the cartilage, whilst the top of the cartilage bends over and inwards, acting like a spring, letting the weight of the limb gently down on to the fatty frog, which in turn presses on the insensitive horny frog, bringing it in contact with the ground, and thus preventing concussion. But when a horse is shod with high or turned-up heels the horny frog becomes displaced, as it were, and thrown out of work, and all the weight is put on to the lateral cartilages, which in time, through having all their own work as well as that of the frog to do, become ossified, and form side bones, and this process may go on without any inconvenience or lameness. Shoeing-smiths—particularly those in the country—have the very great fault of cutting away the sides of the horny frog, yet it ought never to be touched. When side bones cause lameness, remove the shoe and apply cold water poultices until the inflammation and pain have abated, then ease the shoe or substitute a bar shoe (Plate XIV., No. 5); this removes the pressure from the quarters, and throws weight on the frog. In a great proportion of cases no lameness is observed, and although

the animals step short, yet they can do their work with little or no inconvenience; nevertheless, they are always considered as unsound. One or both sides of the foot may be affected with side bone. When they are very large and cause much lameness, the hoof is cut through with a special saw at the quarter from top to bottom in two places, just below and at either side of the side bone; then, with a special shoeing-knife, the sole is divided from the crust at the white line at the bottom of the foot, when the piece becomes partially loose, and, on the horse putting its weight on the foot, the saw-cuts spring open, and have to be filled in with beeswax. A bar shoe is then put on, a blister applied to the band of the hoof, and in a few months the foot expands and the horse goes sound.

Sandcrack is a fissure, rent, or separation of the horny, fibrous tubes of the hoof to a greater or less extent. It is more common in the town than in the country, occurring most frequently on the inner quarters of the fore-feet, and at times extending from the top of the hoof to the bottom. When slight, it causes little or no inconvenience; but when the fissure extends into the sensitive parts, and any dirt gets in, inflammation is set up, and, if infected, pus is formed. This must be liberated by cutting each side of the crack, dressing with carbolic oil, and applying poultices; after getting rid of this, clips may be inserted across the crack in order to keep it closed; but a better method is to isolate the portion of horn containing the crack by making a V-shaped groove, with the point of the V at the lowest part of the crack; another groove, forming the base of the triangle, is made close to and parallel to the coronary band. These grooves may be made with a firing iron, but care should be taken not to go through the horn. The horn within this triangle is then thinned with a rasp, and pressure removed from the ground surface just below the crack; the new sound horn will then gradually grow down from the coronary band.

Seedy Toe.—A morbid secretion of the sensitive laminæ, inducing the formation of degenerate horn (which has a crumbling, sawdust appearance, or, when moist, is of a cheese-like nature), and causing a separation of the laminæ from the outer wall of the hoof, along with, when extensive, a bulging out of the wall at the part. It is due to some injury done to the foot—such as laminitis, or too much pressure by the clip of the shoe—and is mostly found

at the toe of the fore-foot, but may occur at other parts of the hoof as well. The hind-foot may also be affected. When seedy toe is suspected, the shoe should be removed, and all the degenerate horn cleared out with a fine-pointed shoeing-knife; then some stimulating dressing should be applied, nothing being better than tar ointment. Tar by itself must never be used, as it is too stimulating, and causes a crumbling of the horn. In examination for soundness the shoe should be taken off, as the morbid horn can only be found on the removal of the shoe.

False Quarter is known by a thin layer of modified brittle horn on the hoof, chiefly on the sides, when the parts are constricted, and form, where it is connected to the ordinary horny hoof, rifts or furrows (resembling sandcracks) on each side; and at times it may overlap the normal part, and is the result of some extensive damage done to the coronary band from such injuries as stabs, treads, quittor, etc. A horse with a false quarter may work equally as well as one with a good sound foot, and without showing signs of lameness if properly shod; but great care is, however, necessary in shoeing.

Thrush is the term applied to a fœtid discharge from the cleft of the frog, varying in character. Some formations of feet are more prone to this than others. It is generally produced by the animal standing in a wet, filthy stable or box, and can exist without causing any lameness whatever; in fact, I cannot call to mind a single case of lameness that could be attributed to thrush. If neglected, however, it may run on until it implicates the sensitive parts and destroys the healthy growth of horn. A change on to good dry bedding in the first instance, bathing the parts nightly with salt and water, and dressing with equal parts of iodoform and charcoal mixed—or a little calomel—and pressed into the bottom of the frog cleft with a flat stick will generally have the desired effect. Neglected thrush may run on into that formidable disease called canker.

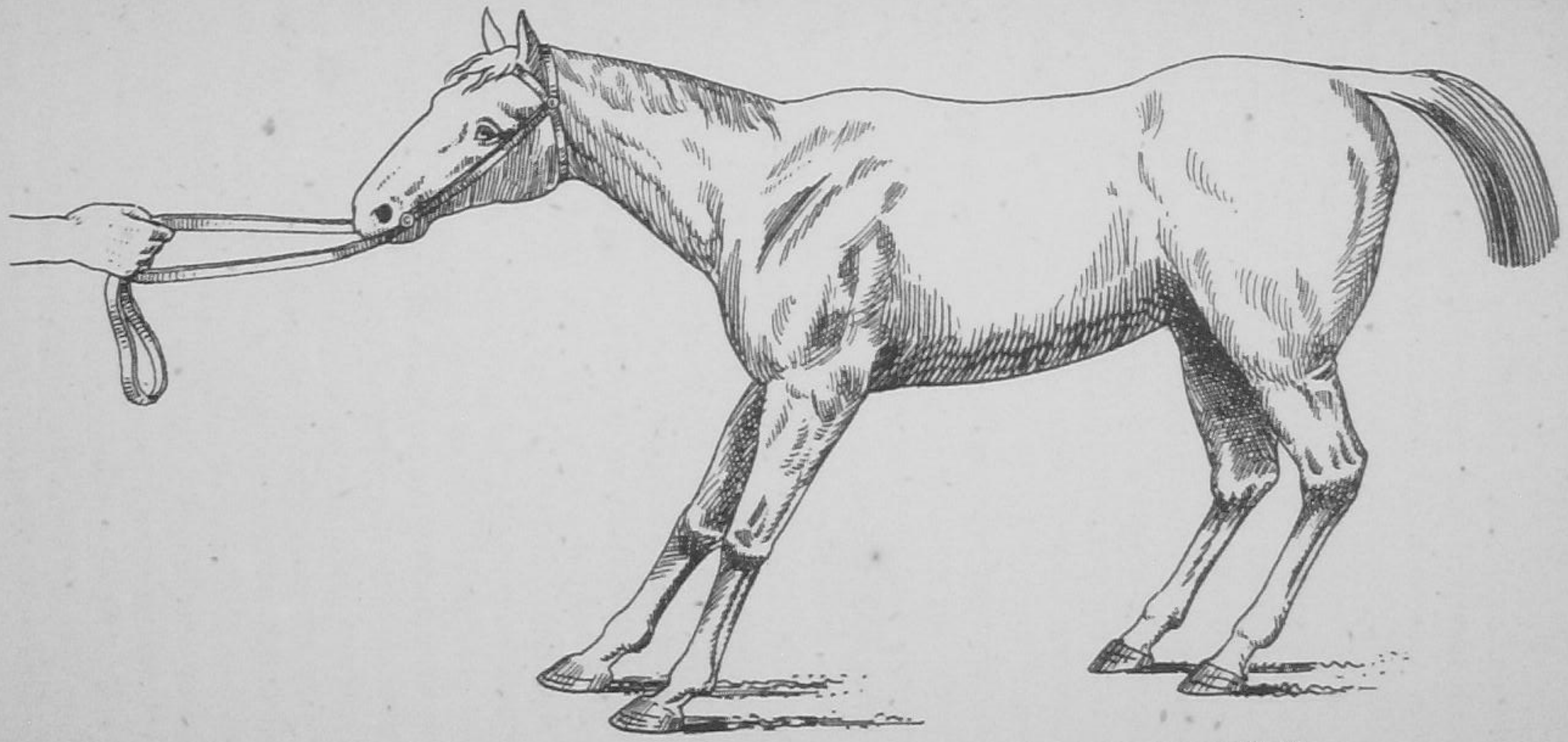
Canker is a morbid fungoid growth of horn at the bottom of the foot, implicating the sensitive sole and frog. It may be produced by injuries, also by standing in a filthy, wet stable or box, etc., greasy-legged horses being very prone to it. Instead of the ordinary horn, little soft, spongy, sprouting growths of a greyish-white

appearance are seen, which bleed on the slightest touch. It is usually first noticed in the commissures involving the bars and frog, and it may extend all over the sole, and affect one or more feet, but it seldom causes much lameness. Being of a very formidable nature, it is very difficult to treat, and should never be tampered with by amateurs. The animal must at once be put into a dry box, as moisture encourages the spongy growths, which develop rapidly. I have been most successful with daily dressings of powdered alum and dry tow, kept in place by a thin plate of iron screwed on to a special shoe, at the same time placing the animal on dry engine ashes instead of straw, and promptly removing all wet matters, such as fæces, urine, etc., as soon as evacuated or observed.

Treads and **Overreaches** are injuries done to the top of the foot and caused by the hind-foot overreaching on to the heel or quarter of the fore-foot, or by one foot treading on its fellow. Washing the parts well with clean cold water, removing all jagged edges of the wound with a pair of sharp scissors, and dressing with carbolized oil, will be found to answer in ordinary cases. Should the underlying parts be damaged, and the animal go tenderly and show pain, cold water cloths or poultices must be applied until the inflammation is reduced.

Navicular Disease may be defined as inflammation and ulceration of the tendinous or inferior articular surface of the navicular or shuttle bone, situated at the back of the coffin or pedal joint; or it may be produced by laceration of the fibres of the tendons passing over the bone to its insertion in the floor of the coffin bone, setting up inflammation and adhesion of the parts. It invariably occurs in the fore-feet, affecting chiefly horses of the light-legged class. Injury from fast work on hard roads is a frequent cause, but by far the most common cause is keeping horses in the stable day after day without exercise, then, on taking them out, giving them too much quick travelling, thus lacerating the tendon and setting up inflammation. Generally, the first symptom noticed is the horse pointing first one foot and then the other—that is, if both are affected—so as to ease the tendon as it passes over the acute angle of the bone; but this pointing must be confirmed by other symptoms. When brought out of the stable, the animal

PLATE XV



HORSE WITH LAMINITIS, OR INFLAMMATION OF THE FORE-FEET.

affected digs the point of the toe into the ground, stepping in a short and stilty manner until it gets warmed up, when it goes fairly well. The shoe is also much worn away at the toe, and, as a rule, the feet are very strong, high-heeled, and contracted (Plate X., No. 2). Owing to the constant irritation within the foot, there is an extra growth of horn, giving a box-like appearance to the hoof. The disease is never cured, yet an animal can be made to do a great amount of work by careful attention to the feet, such as frequent shoeing, shortening the toe, and dressing the ground surface thin to relieve pressure, thus removing the overgrowth of horn, and by shoeing with the indiarubber bar pad and short shoe. Further, applying cold water swabs nightly round the feet, and turning the animal into a loose-box, instead of allowing it to stand in the stall, also gives relief. Blistering and unnerving are also useful, but, as above stated, the disease is never cured. As a preventive, however, never allow the animal to stand in a stall for days without exercise. If this cannot be given, turn it into a loose-box.

Laminitis (inflammation of the sensitive laminæ of the feet commonly called founder).—The disease, which more frequently affects the fore than the hind feet, is a very formidable one. It has a great variety of causes, such as getting too much oatmeal and water when the animal is heated; overfeeding with boiled wheat or Indian corn, or gorging with oats or potatoes; travelling on snow; galloping on a hard road; applying a too hot shoe to the foot when shoeing; the effects of too large a dose of physic; inflammation shifting from one part of the body to another (metastasis); the retention of the after-birth in mares after foaling, etc. It may be acute, subacute, or chronic. The *symptoms* noticeable are that the animal is very unwilling to stir, the body is thrown backwards, putting the weight on to the hind-legs, which are 'propped' well forward under the belly, while the fore-legs are extended well in front (Plate XV.). It moves with great difficulty and reluctance, walking on its heels. In acute cases the breathing is heavy and hurried, perspiration rolls off the body, eyelids are red, nostrils distended, pulse full and bounding, and the animal stands persistently, rarely lying down. The *treatment* consists of placing the patient in a loose-box, removing the shoes, putting the feet into hot or cold water bran poultices (cold for preference), which must be

kept constantly wet, and moving the horse frequently round the box. The cause must also be ascertained. If from overfeeding, a pint of linseed oil should be given. If from an overdose of physic, doses of carbonate of soda (1 ounce each) may be given in well-boiled thin oatmeal gruel two or three times a day. If retention of the cleansing is the cause, the membranes must be carefully removed, as the smallest piece of the after-birth left in the womb of the mare soon undergoes decomposition, and the septic material is readily absorbed and carried through the system, and in many cases induces laminitis of a septic character; therefore the womb must be washed out by means of an injection of 6 quarts of tepid water containing 1 ounce tincture of iron or some other antiseptic, while 2 or 3 ounces of Epsom salts given in the drinking water will assist in reducing the fever. A dose of the prepared solution of adrenalin injected under the skin over the fetlock joints has been used with success. Finally, round rocker shoes, as described under Shoeing (Plate XIV., No. 6) must be put on. At times, in severe cases of laminitis, the foot has to be opened at the toe to let out the effused material, as it is so great in some cases, especially those neglected at the first, that, if not liberated, it causes the sole to come down, producing great deformity of the foot. Laminitis is therefore by no means a fit case for an amateur to dabble with, and should have professional attendance from the first. In severe cases of laminitis the foot becomes elongated at the toe, the point of the coffin bone is dislodged and drops down to the sole of the foot, and numerous irregular (ribbed) rings form round the hoof (Plate XII., C and D). Rings, however, are also formed round the hoof from irregular nutrition, caused by frequently changing the animal from a grazing pasture to the stable, but these rings are more regular, and are seen on all the four feet.

INJURIES TO, AND DISEASES OF, THE FEET OF THE COW, SHEEP, DOG, AND PIG.

COW.

The Foot of the Cow, like that of the horse, is made up of sensitive and non-sensitive tissue; but, unlike that of the horse, it is '*cloven*'—*i.e.*, divided into two sections, or toes, each containing

three bones, thus showing six small bones in the foot, instead of three as in the horse. The non-sensitive or horny part is secreted and attached to the sensitive structures similarly to that of the horse, only the laminæ and villi are much finer. The foot of the cow at the heel is deeper, more upright, stronger, and broader at the sole than the foot of the horse, while the claws are pointed and twist slightly towards each other. The *wall* is convex on the outer part, and at the toe makes a very acute and strong turn inwards, and runs back in wavy lines on the inner aspect of the claw, where it is met by the portion winding round the heel, to which it is united by a section of horn springing up from the sole; this is well defined in the foot of the sheep. The *horny sole* is flatter and smoother than in that of the horse, and is partially overlapped at the heels by the wall. Unlike the horse, the cow has no frog.

The cow is not nearly so subject to disease of, or injury to, the foot as the horse. Great lameness is, however, often induced by foreign bodies, such as pieces of iron, slate, stone, wood, etc., getting between the digits, and nails, wire, and sharp bodies are frequently found in the sole of the foot. Therefore, in all cases of lameness the foot should be carefully washed and the sole scraped and examined, and if foreign bodies are met with they must be removed, and the foot put into a cold water and bran poultice for a day or two, keeping the poultice moist by dashing cold water over it three or four times a day.

Foul in the Foot consists of an irritative inflammation and ulceration between the digits, and is the most common foot affection in the cow, and usually caused by the animal standing in a filthy wet box or yard, or on soft, wet, marshy pastures. There is acute lameness present, and the foot is swollen round the top of the hoof, and there is also a strong fœtid smell, with ulcerated sores of the soft tissues between the digits. The worst cases have been caused by rough treatment and the application of strong caustics, and I must here strongly condemn the barbarously cruel treatment of pulling a rough rope between the toes and applying butyr of antimony. This latter dressing burns and destroys the parts, bringing on what is termed 'bastard fouls.' I have on many occasions seen the bones laid bare with such brutal treatment. Simple soothing applications are all that are necessary. The *treatment* for

foul in the foot is very simple. The beast should be removed to a clean, thoroughly dry box, the parts washed with cold water containing phenyle or some disinfectant, and dressed with carbolic oil and tow, and the foot poulticed for a day or two with bran and cold water, to which a tablespoonful of carbolic acid has been added. This in ordinary cases is all that is required. But when the ulceration is more extensive, and after the inflammation has been reduced with the poultice, the sores must be dressed with caustic powder, and a pledget of tow, smeared with tar ointment, should be inserted and held in its place by a bandage put round the top of the foot and between the digits, like the figure of 8, this giving great support.

Ulcerations and damage of a very serious character are also caused by *Foot-and-Mouth Disease*. In many cases the bones are entirely bare through this disease, so that repairs to the damaged parts are most difficult to accomplish. In this country foot-and-mouth disease is notifiable, and is dealt with by officers of the Ministry of Agriculture and Fisheries. All infected animals, and those in contact, are destroyed.

Laminitis.—Inflammation of the sensitive tissues of the foot, although of frequent occurrence in the horse, is rarely seen in the cow, yet I have had several cases arising from the after-effects of difficult parturition; also from metastatic inflammation—*i.e.*, inflammation shifting from one part to another, as from the mammary gland to the feet. Unlike the horse, the patient is inclined to lie continually, while there is great difficulty in getting it on to its feet, when great pain is evinced, with but slight constitutional disturbance. *Treatment.*—Cold water poultices must be applied to the feet, and fever medicine given night and morning.

Sore Feet.—This is occasionally seen where cows have been driven long distances on a hard road. *Treatment.*—Wash the feet with some antiseptic wash, cover the damaged part with a small portion of tar, and then turn the animal into a clean loose-box or good pasture. If great lameness is present, with heat in the foot, poultice for a day or two with cold water and bran.

Interdigital Growths (*fibromata*) are sometimes met with, and are mostly seen in front, at the top, and between the digits. When they get large they cause the claws to spread apart, and produce lameness. *Treatment.*—The animal must be cast, and the tumour

cut out with a sharp knife, and the part dressed with antiseptic wool and tar ointment, kept in place with figure of 8 bandage.

Overgrown Hoofs.—Animals kept on soft litter, bulls in particular, are subject to this. The walls of the hoof grow, turn on to, and overlap the sole, while the toes get to great length. This overgrowth rarely or never causes lameness, yet interferes with the walking of the animal. All that is required is to shorten the toes with the hoof-shears, then, with a rope over a beam, pull up the foot, and with a shoeing-knife dress off the overlapped wall from the sole.

SHEEP.

The foot of the sheep in conformation is closely analogous to that of the cow.

Foot Troubles and Disease in Sheep.—Like cows, sheep are subject to foreign bodies getting fixed between the digits, to stabs or pricks in the sole of the foot, to ulceration from foot-and-mouth disease, to excoriation of the skin round the band of the hoof and between the claws, to excessive travelling on hard roads, and to inflammation of the blind duct or canal, found in the front of each sheep's foot. When lameness is observed, the foot should be carefully examined and dressed where required, as recommended for the cow. The commonest ailment the feet of sheep are subject to is foot rot.

Foot Rot in Sheep.—An ulcerative disease of the feet of sheep of a highly inoculative character, and most frequently seen amongst heavy, well-bred, and well-fed sheep, folded on long luxuriant grasses and on soft, velvety turf. These take too little exercise to wear away the ground surface of the crust of the hoof, which gets too long, turns round, and in the angle thus formed infective material lodges, and dirty-looking sores and sprouty growths are developed. Although the disease is favoured by softening of the horn on wet pastures, there is evidence that it is of an infective nature. Sheep affected with foot rot should on no account be taken on to a farm or amongst a flock where the disease has never existed. I could relate case after case where the malady has been carried in this way. On bare rocky mountain slopes and the gritty

sandy banks adjoining the sea the malady is seldom or never seen.

Treatment for foot rot is first to separate the lame sheep from the sound; next, have the lame ones turned up, and their feet examined and dressed every fifth or sixth day. All dead or broken horn should be carefully dressed off with a sharp knife, being careful not to cut too deep or make the part bleed; then the sores should be dressed with a strong solution of blue vitriol or crude carbolic acid, or a mixture of equal parts of the two, and the sheep so treated should be turned on to some sharp fallow for three or four hours every day. When the disease is very rife and a large number of sheep are affected, a strong solution of sulphate of copper may be put into a trough, and the sheep driven through it every fourth or fifth day. Arsenic is also used in a similar way; but I strongly advocate the spreading of crushed rock salt to about 4 inches thick on the floor of a good-sized open shed or loose-box, and the animals being put in to paddle amongst it three or four hours every day. To prevent the occurrence of this complaint, the sheep ought to be turned on to some good sharp fallow for three or four hours daily.

DOG.

The dog's foot differs very materially from that of the horse, cow, and sheep by having four toes and horny appendages or claws, with a fifth, or dew-claw, on the inner side of the leg a little above the foot. This dew-claw is found on the fore-leg of dogs of every class, but not often on the hind-limbs, the latter being mostly observed on curs, retrievers, and mongrel-bred dogs, and sometimes they are double. All sporting dogs, however, are, as a rule, exempt from them. These dew-claws are sometimes attached to the limb merely by skin, or by a bony connection. The ground surface of the dog's foot is protected by five firm dense elastic pads, one under each toe and one at the back of the foot.

Dew-Claws.—These, when large, should be cut off the hind-legs, as they are of very little use, and apt to get torn, and cause troublesome sores; they are readily removed, when the puppy is not more than a few weeks old, by clipping them off with a pair of sharp scissors. Stop the bleeding with a pad of medicated

cotton-wool and bandage, and leave this on for twenty-four hours.

The Claws.—Dogs that are petted, and pass the principal part of their time trotting about on carpets, have their claws growing to such a length that in some cases the horny toe turns round and up, and penetrates the pad at the bottom of the foot, causing great pain, lameness, and inflammation. When this is observed, the feet should be put into warm water to soften the horn, and the extra growth of the nails clipped off with a pair of strong scissors or a pair of special nail-clippers.

The Pads of the Foot are subject to injuries from prods and cuts, with nails, thorns, glass, etc. The foot should be carefully examined, and if any foreign body is found it must be removed, and the parts washed with a solution of chinosol or izal. If much inflammation be present, put on a linseed meal poultice and muzzle the dog for twenty-four hours or more; then dress the wound with tincture of benzoin once or twice a day.

The Interdigital Space sometimes becomes excoriated and inflamed, and when this is seen, wash the feet with izal or chinosol solution night and morning, and dust the sores with a little finely-powdered fuller's earth.

Interdigital Cysts are frequently found in dogs; they occur immediately in front of and between the toes; they cause lameness, and, if not previously opened, burst, when the lameness disappears. There is a tendency for the cysts to recur.

Sore Feet.—At the beginning of the season, when the feet of sporting dogs are soft, they are apt to become tender and sore, in which case they should be well washed, cleared of all grit and dirt, and then dressed with oil of cloves or tincture of iron, and a little boracic powder dusted between the toes.

PIG.

It is not often that veterinary aid is requested to examine and treat injuries and diseases of the feet of the pig; yet, like the cow and the sheep, foreign bodies, such as stones, bones, wood, and nails, occasionally become fixed between the digits, but, as a rule, these can be removed by the owner or his servant. Like the cow

and the sheep, pigs may be affected with foot-and-mouth disease. The feet in these animals are most commonly affected, blisters being found above the hoof, in front, between the toes, or immediately behind. Great lameness is caused. As in other animals, this disease, when suspected, must be notified to the police, and is then dealt with by officers of the Ministry of Agriculture.

CHAPTER V

THE DIGESTIVE ORGANS

As some of the organs of digestion of non-ruminants and those of ruminants present marked differences from one another, and the derangements and diseases to which they are subject are still more dissimilar, I shall deal with the stomach and bowels of each separately, while the accessory organs of digestion, with their diseases, will be considered in Chapter VI.

THE HORSE.

The digestive organs of the horse consist of:

(1) **The Mouth.**—This comprises the lips; the cheeks; the hard palate, or roof (Plate XVI., No. 1), which is in the form of ridges, or bars, running from side to side, between the upper molar teeth, with a longitudinal line in the middle; the soft palate, at the back of the mouth, a sort of dense curtain hanging between the mouth and throat, which from its size does not allow the horse to breathe through the mouth; the tongue; and the teeth. Owing to the importance of the last named, they are specially dealt with in a separate chapter (Chapter VII., 'The Teeth'). The mouth is also lined by mucous membrane.

(2) **The Salivary Glands** (situated in the region of the mouth).—There are three pairs of these—namely, the parotid glands (Plate XVII., Fig. D), just below each ear; the sublingual, underneath the tongue; and the submaxillary, below and within the angle of the lower jaw. There are also situated, in the mucous lining of the mouth, the labial, buccal, and mucous glands.

(3) **The Pharynx, or Throat** (Plate XVI., No. 4).—This is a muscular tube lined by mucous membrane, and connects the mouth with the œsophagus.

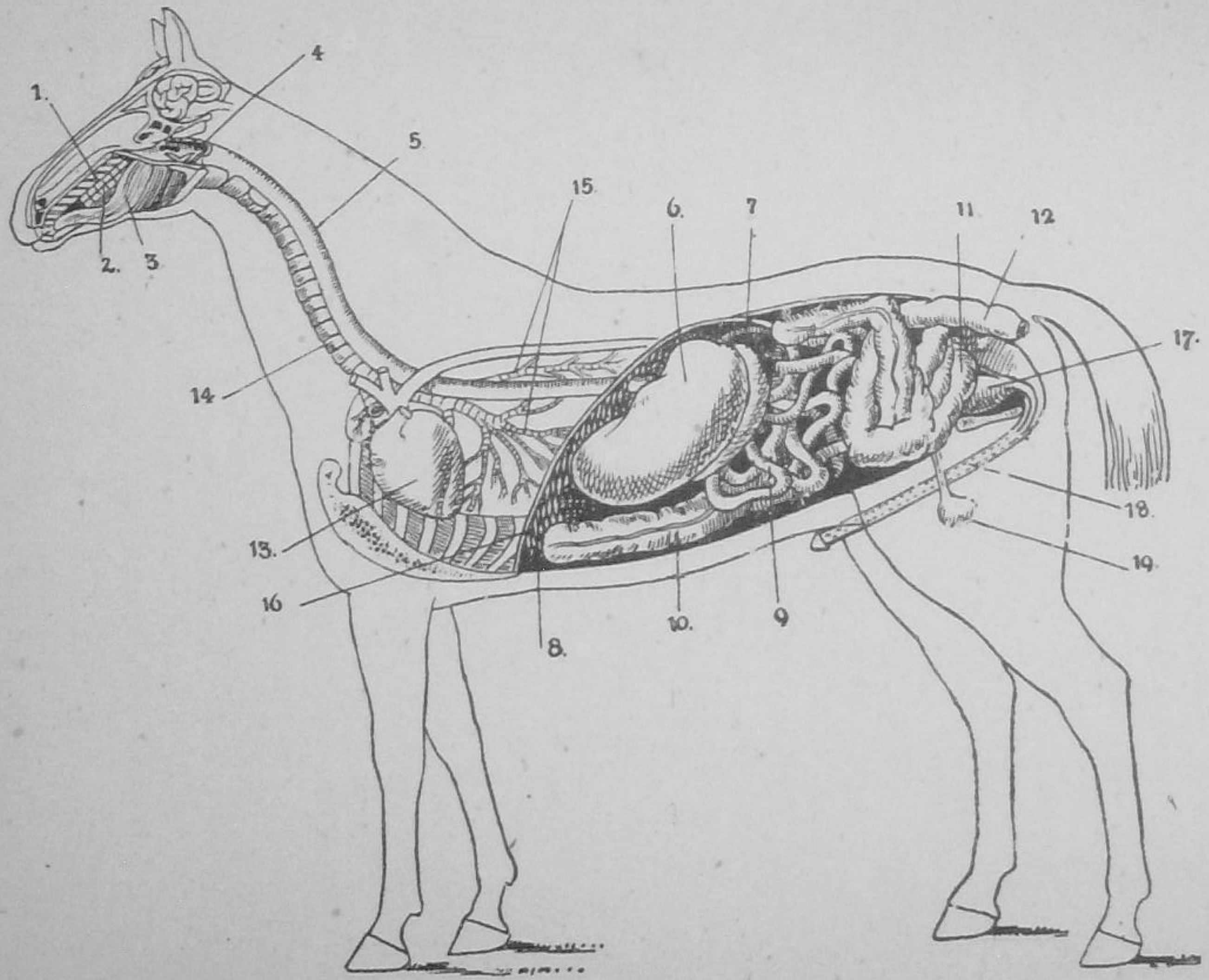
(4) **The Œsophagus, or Gullet** (Plate XVI., No. 5).—This is the canal which leads from the throat to the stomach; it is lined by mucous membrane, and the walls are made up of longitudinal and circular involuntary muscle fibres and connective tissue

(5) **The Stomach** (Plate XVI., No. 6) is the connecting medium between the gullet and small intestine. It inclines to the left of the anterior portion of the abdominal cavity. The stomach of the horse is very small compared with the size of the animal, and greatly resembles a bagpipe in shape. It has three coats: outside serous; middle muscular, in three layers; and inside mucous, of two parts—*i.e.*, one white cuticular, resembling the lining of the œsophagus, with which it is continuous (the œsophagus enters the stomach on the left side by the cardiac orifice); the other pale pink, villous, or velvety, on the right side of the stomach, and this is the true digestive portion, being continued into the small intestine by the opening termed the pyloric orifice.

(6) **The Small Intestine of the Horse** (Plate XVI., No. 9).—This comprises the duodenum, 2 feet long; the jejunum, 30 feet long; and the ileum, 40 feet long. The total capacity of the small intestine is estimated to be about 11 gallons.

(7) **The Large Intestine of the Horse** (Plate XVI., Nos. 10, 11, and 12).—This is divided into the cæcum, or blind gut (commonly called the water bag), 3 feet long, having a capacity of 4 gallons; the colons, large and floating, 20 feet long, with a capacity of 12 gallons; and the rectum, which is the termination of the intestinal canal, 2 feet long, and with a capacity of 3 gallons. The estimated average length of a horse's intestines is 97 feet, and total capacity 30 gallons. Like the stomach, the walls of the intestines have three coats: the outside serous; the middle muscular (longitudinal and circular); and the inside, covered with epithelium and a mucous membrane, and well studded throughout with various glands.

PLATE XVI



DIGESTIVE SYSTEM OF THE HORSE

1. Roof of Mouth or Palate showing the Ridges.
2. Molar Teeth.
3. Tongue.
4. Pharynx.
5. Œsophagus or Gullet.
6. The Stomach.
7. Spleen.
8. Region of Liver.
9. Small Intestines.
10. Lower Portion of Colon.
11. Higher Portion of Colon.
12. Rectum.
13. The Heart.
14. Trachea.
15. Bronchial Tubes of the Lungs.
16. Diaphragm.
17. Bladder.
18. Penis.
19. Testicle.

Besides the above named, which are found, not only in the horse, but also in the pig and dog, and in a general sense also in cattle and sheep, there are also the accessory digestive organs, that perform functions which assist digestion—that is to say, they convert the food into such a state that it can be absorbed and taken into the blood and conveyed to the different parts of the system, to be assimilated for nourishment (see Chapter VIII., 'Circulation,' The Lymphatic System). Such accessory digestive organs are the liver, the spleen, the pancreas, or sweetbread, and the portal vein, all of which will be further noticed.

The Processes of Digestion are as follows, and in the order given:

(1) The food is taken into the mouth; in the horse it is gathered in by the mobility of the upper lip, called the prehensile property, when it is seized by the incisors, or front teeth.

(2) It is then pushed between the back (molars) teeth by the tongue; the cheeks assist the tongue in keeping it there while it is masticated, or chewed, by these teeth.

(3) During this process of mastication the salivary glands pour out saliva (an alkaline fluid secreted from the glands). This moistens the food, thus making it easier to swallow, and also acts chemically on a small proportion of the starchy matter, converting it into sugar by the action of a special ferment in the saliva.

(4) The food, having been well masticated, is formed by the tongue and cheeks into a bolus, which is passed to the back of the mouth, where it is seized by the action of the muscles of the pharynx and pressed into the gullet, down which it is propelled by the progressive contraction of the involuntary muscular fibres of that canal into the stomach.

(5) In the stomach it is mixed with gastric juice, a fluid of an acid character, which, again, acts chemically upon it. For the better accomplishment of the process, the food is being constantly rolled about, or 'churned,' by the action of the different muscular coats of this organ. The flesh-forming matters—albuminoid portions, or

proteids—are here converted into the more soluble peptones, and a portion of the nutritive elements is absorbed and carried into the portal vein, and thence to the liver; while the rest of the food is converted into a soft-soap-like material called chyme.

(6) The chyme is next passed on into the small intestine. Here it is met by the bile (which the liver is constantly secreting), the pancreatic juice, or intestinal saliva (formed by the pancreas), and by the juices of the various small intestinal glands. The pancreatic juice, which is alkaline, and somewhat resembles saliva, has a powerful action on fats, converting them into such a form that they are capable of being absorbed, while the bile assists in the emulsification of the fats. The bile also appears to act as a natural purgative.

(7) The different kinds of food having now been acted upon by the fluid secreted by the salivary glands and stomach—*i.e.*, saliva and gastric juice, as well as by the bile, pancreatic, and intestinal fluids—the chyme is converted into a milky emulsion called chyle. While this process is going on, a portion of the new material is absorbed by the vessels of the intestines and carried to the portal vein, and so to the liver.

(8) By the action of the muscular walls of the bowels the chyle is forced along the intestinal track, when numerous little bodies called villi, which are studded all over the lining membrane, select more of the available nutritive material, and this is carried by the lymphatic vessels into a receptacle lying under the backbone in the lumbar region, and called the receptaculum chyli; here it meets with other material absorbed from the posterior parts of the body, and, along with this, is carried by the thoracic duct into the blood by one of the veins (just before it enters the right side of the heart), and by means of the circulation of the blood is then distributed to all parts of the body.

(9) The unabsorbed residue, being that which is indigestible, or in excess of requirements, passes along the intestines, and is expelled by the rectum as fæces.

I may here mention that a horse should never be watered after feeding, as it has a very small stomach. It is generally believed that, if a feed of oats be given, and then a drink of water in close succession, the water will wash the oats in front of it right along the 72 feet of small intestines into the cæcum or blind gut. The food has, therefore, no chance of being digested, consequently fermentation occurs. Whether this is so or not may be an open question; but from the smallness of the stomach there can be no hesitation in stating that a horse can drink more water at a time than would fill that organ, therefore it is a safe rule always to give water before feeding. In cold weather let the horse's drinking water stand indoors for some hours before use to take the 'chill' off, and then give from half to one pailful before its food.

INJURIES TO, AND DISEASES OF, THE DIGESTIVE ORGANS.

The Lips of animals are liable to many injuries, such as being torn with nails, hooks, thorns, etc.; and are also subject to warts or angle-berries. These growths, if large, may be cut off with a knife, or pair of scissors; if very small and numerous, an application of acetic acid twice a week will be found beneficial. The angles of the mouth are sometimes lacerated in the horse by the rough usage of the bit; for this, rest and the application of some antiseptic dressing is all that is required.

The Roof of the Mouth is often also the seat of injury. In cows and dogs particularly pieces of turnip, wood, nails, leather, bones, tin, etc., are apt to become fixed here. The animal foams at the mouth, cannot feed, and loses flesh. When such symptoms are shown, a close examination should be made, and if there is a foreign body it should be removed at once. When a horse is casting its front teeth, or nippers, the gums and bars behind the upper teeth usually become swollen. It does not feed well, and is said to have got lampas. Long ago a lampas iron used to be kept by blacksmiths. This was made red hot, and the inflamed bars were burned; but it was a most unnecessary and cruel operation. The congested gums are only the natural effects of shedding the

EXPLANATION OF PLATE XVII

HORSE LAID OPEN, SHOWING:

A. Temporal Artery.

B. Branch of Facial Nerve.

C. Sub-maxillary Artery Vein and Parotid Duct.

D. Parotid Gland.

E. Division of Jugular Vein.

F. Trachea or Windpipe.

G. Aorta.

H. Anterior Vena Cava.

I, I. Lobes of Lungs—Three on Right; Two on Left.

K. The Heart.

a, *a*. The Diaphragm.

b. Lobes of the Liver.

c. Bile Duct.

d. The Stomach.

e. Spleen.

f. Posterior Aorta.

g. Posterior Vena Cava.

h, *h*. Right and Left Kidneys.

i, *i*. Ureters.

k. Bladder.

l. Portion of the Rectum.

m, *m*. Testicles.

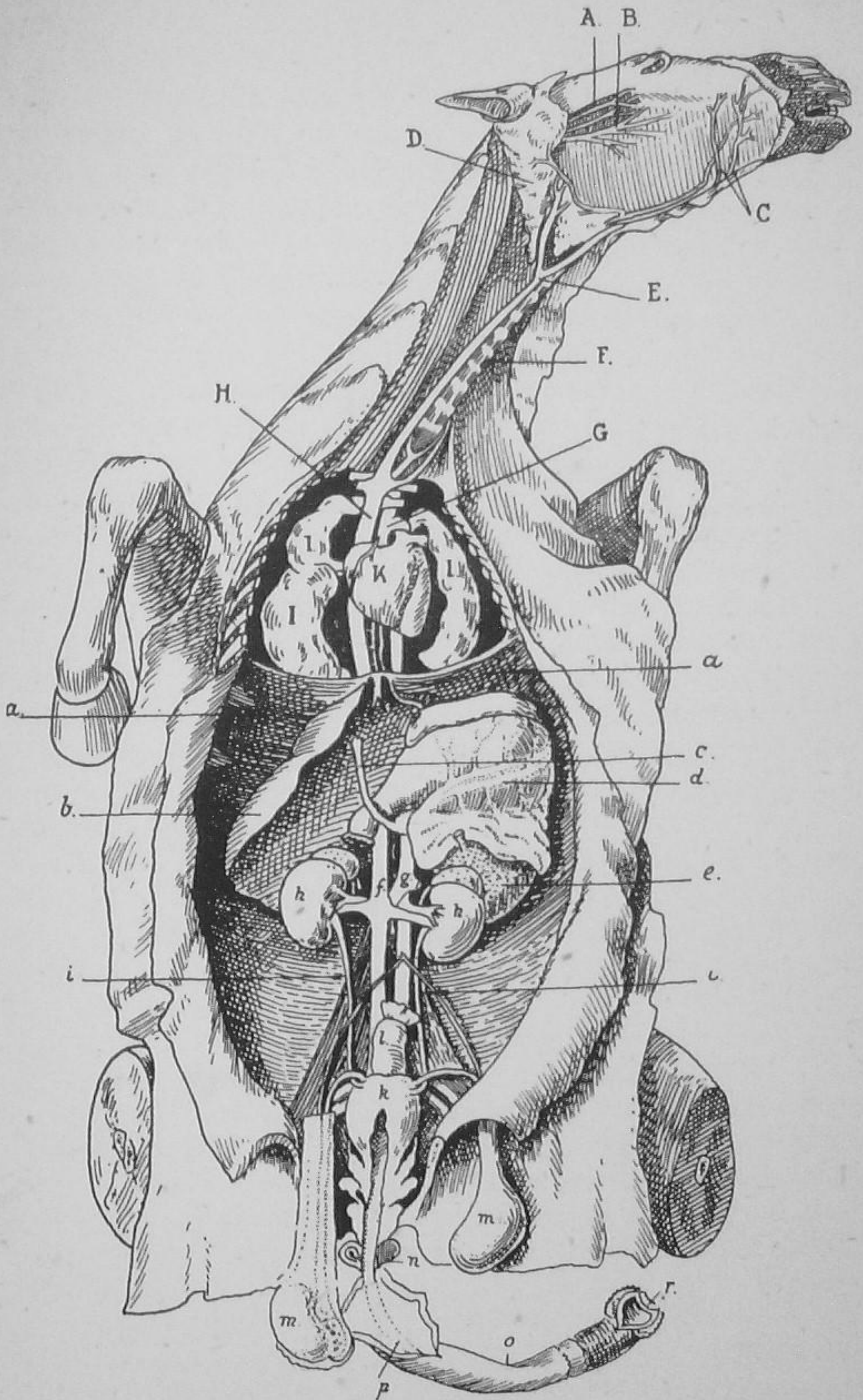
n. Cowper's Glands.

o. Penis.

p. Urethra laid open.

r. Fossa in Glans Penis.

PLATE XVII



milk teeth. Half an ounce of saltpetre in a mash should be given every night for a week (see Chapter VII., 'The Teeth').

The Soft Palate of the horse (or fleshy curtain which hangs behind the hard palate) is occasionally damaged from various causes. For instance, it may get bruised when a ball is given on the sharp end of a stick, and this may cause troublesome abscesses. Balls should never be given on sticks. Use the hand, failing which, a balling gun or a balling iron may be used.

Lower Jaw.—The space between the corner nippers and the first molar teeth in young horses when being broken in to work is frequently injured by the use of a big heavy breaking-bit, particularly when the horse's head is bridled in too tight, and the bones at this part are in many cases so much damaged that pieces flake off (exfoliate), or have to be removed by an operation. The parts so injured must be dressed once a day with antiseptic lotion, and the bit should be kept out of the mouth until the parts are healed. The lower jaw is occasionally fractured, and such an injury must be supported by plasters and splints, and the animal fed on thin gruel, hay tea, and other slops, until union takes place. It is generally six or eight weeks before the animal can masticate solid food.

The Tongue, which in the horse is much broader at the point or apex than in the cow, has in all animals important functions to perform, being the organ of taste, and also helping the animal to swallow, etc. It is a fine, delicate, muscular organ, well supplied with nerves and extremely sensitive. It is very easily injured through ill-treatment whilst being handled by ignorant people, when it is liable to be torn, become paralyzed, and mortify; or it may even be pulled out. The entire horse 'Pickpocket,' for instance, had his tongue torn away while being given a ball. This happened on the groom taking hold of the tongue, when the horse reared up and left a large portion of the tongue in the man's hands. On two occasions I have had to cut about 4 inches off the end of the tongue of a horse through its being damaged—one being too much pulled on giving a ball, the other by putting on a twitch. In each case the member was partially paralyzed and hung out of the mouth, and was so much nipped and bitten by the front teeth (incisors) that it became quite black and mortified. It was cut off at the line of demarcation, and did well; but afterwards, on drinking,

both animals plunged their heads up to the eyes in water before they could suck any up.

Glossitis, or inflammation of the tongue, may be due to injuries of various kinds, such as putting a twitch on the tongue—which ought never to be done—or giving strong medicinal agents undiluted.

The Frænum—the guide or bridle of the tongue—is the membrane by which the tongue is attached to the lower jaw, and occasionally it is torn by the bit getting under the tongue, and being roughly pulled at by the rider or driver. I have seen some bad cases of this kind. *Treatment.*—Keep the bit out of the mouth until the parts are healed, and wash the mouth night and morning with boracic acid lotion.

Ulcers on the tongue are sometimes met with in the horse, and are generally due to injuries occasioned by the sharp edges or irregular wear of the teeth. Cows and sheep suffer from this even more than horses. In cattle, blisters on the tongue may be suggestive of foot-and-mouth disease, which must be reported to the police. *Treatment.*—Wash the mouth with boracic acid lotion, and if the teeth are at fault, remove the sharp points with the tooth rasp.

Dogs and Cats frequently pick up needles and pins, or sharp bones, which penetrate the tongue. The animal shows signs that something is wrong in the mouth by rubbing the floor with the cheeks, or poking the side of the face with the fore-paws, the saliva at the same time running from the mouth. When this is noticed, examine and remove the offending object. A common cause of injury to the tongues and mouths of horses and cattle is due to the administration of drugs, such as turpentine and ammonia, in unsuitable vehicles. Turpentine should be given in linseed oil, or, if oil is not handy, milk makes a good substitute, or it may be beaten up with eggs and water. Never give turpentine in cold water; but ammonia, on the other hand, should be diluted with plenty of cold water when administered. If strong ammonia has been administered by mistake, wash the mouth out with vinegar and water. Spirits, such as whisky, should always be diluted with the same quantity of cold water, for I have known of extensive injury having been done to the mouth by giving raw spirits. The tongues of horses and cattle are often injured by thorns, pins,

needles, bones, or broken teeth; and are also affected by morbid growths, such as actinomycosis.

Actinomycosis (Ray fungus), a complaint which may be looked upon as a morbid change in the tissues of a part, due to the presence of a vegetable micro-organism—the Ray fungus—causing an enlargement, which is composed of numerous central nodules with radiating fibres, having a star-like appearance (Fig. 12). Cattle

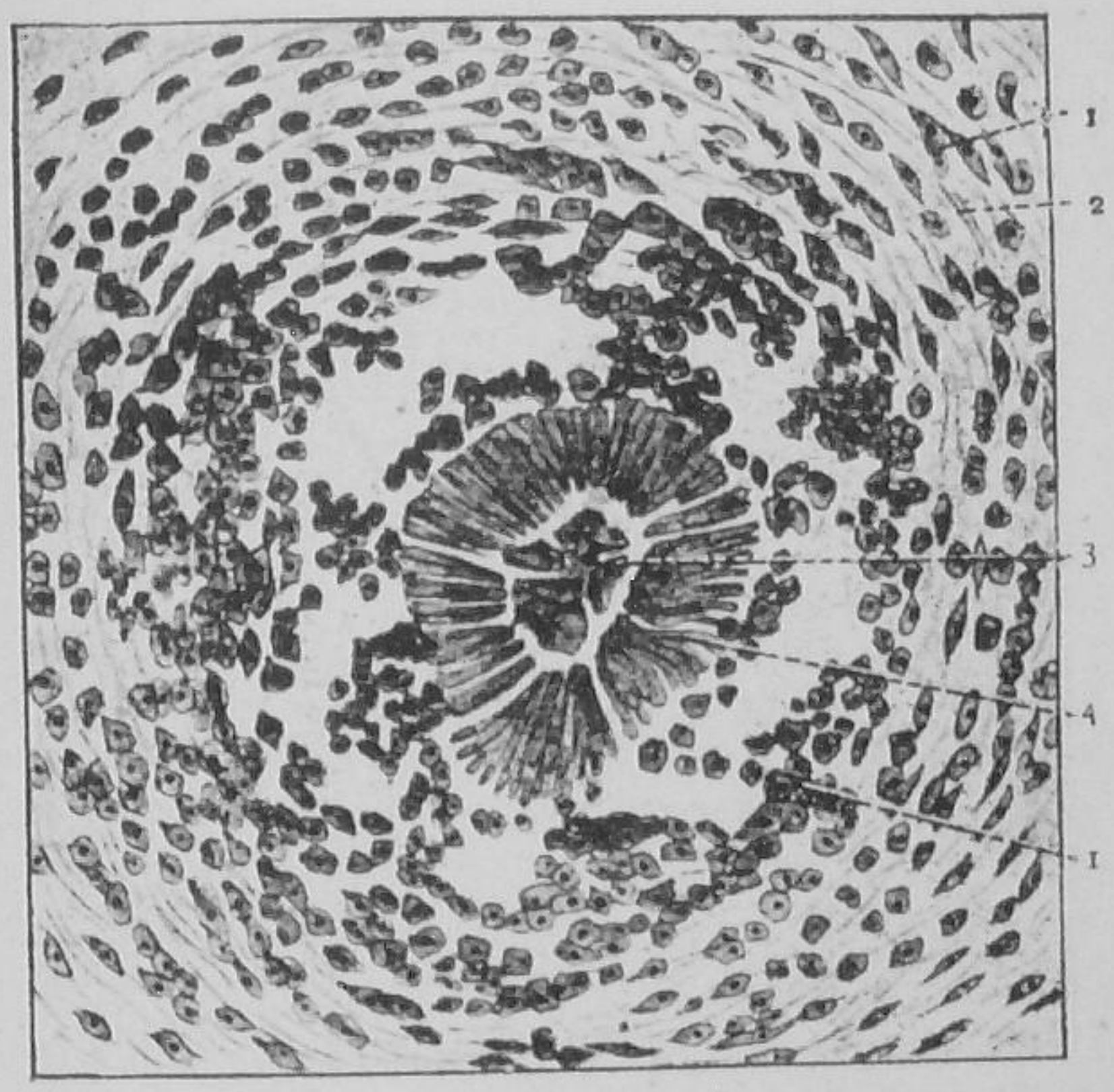


FIG. 12.—ACTINOMYCOSIS IN COW'S TONGUE.

1, 1. Cancerous cells.
2. Fibrous tissue.
3. Nodules of ray fungus.
4. Radiating fibres of ray fungus.

are apparently the most subject to the malady, although other domestic animals and human beings are not free from its influence. Any part of the body may be affected, yet the bones of the face, jaws, and tongue are mostly attacked. When the tongue is the seat of the disease, it is known as 'wooden tongue'; while the term 'lumpy jaw,' or 'big jaw,' is applied when the disease affects the jaw. The micro-organism which causes the disease is frequently found on barley, and the complaint is often caused by

barley awns lacerating the mucous membrane of the tongue or cheek, or getting into broken or diseased teeth. When the tongue of the animal is affected, and as the disease progresses, the patient is found rolling that organ about, holding its nose slightly up when attempting to swallow, and seems to have great difficulty in getting the food passed between the molar teeth, or rolled about for mastication. Saliva also flows freely from the mouth, the patient loses flesh rapidly, but, as a rule, is not hide-bound; and, on examining the mouth, the tongue is found to be very much enlarged and hard

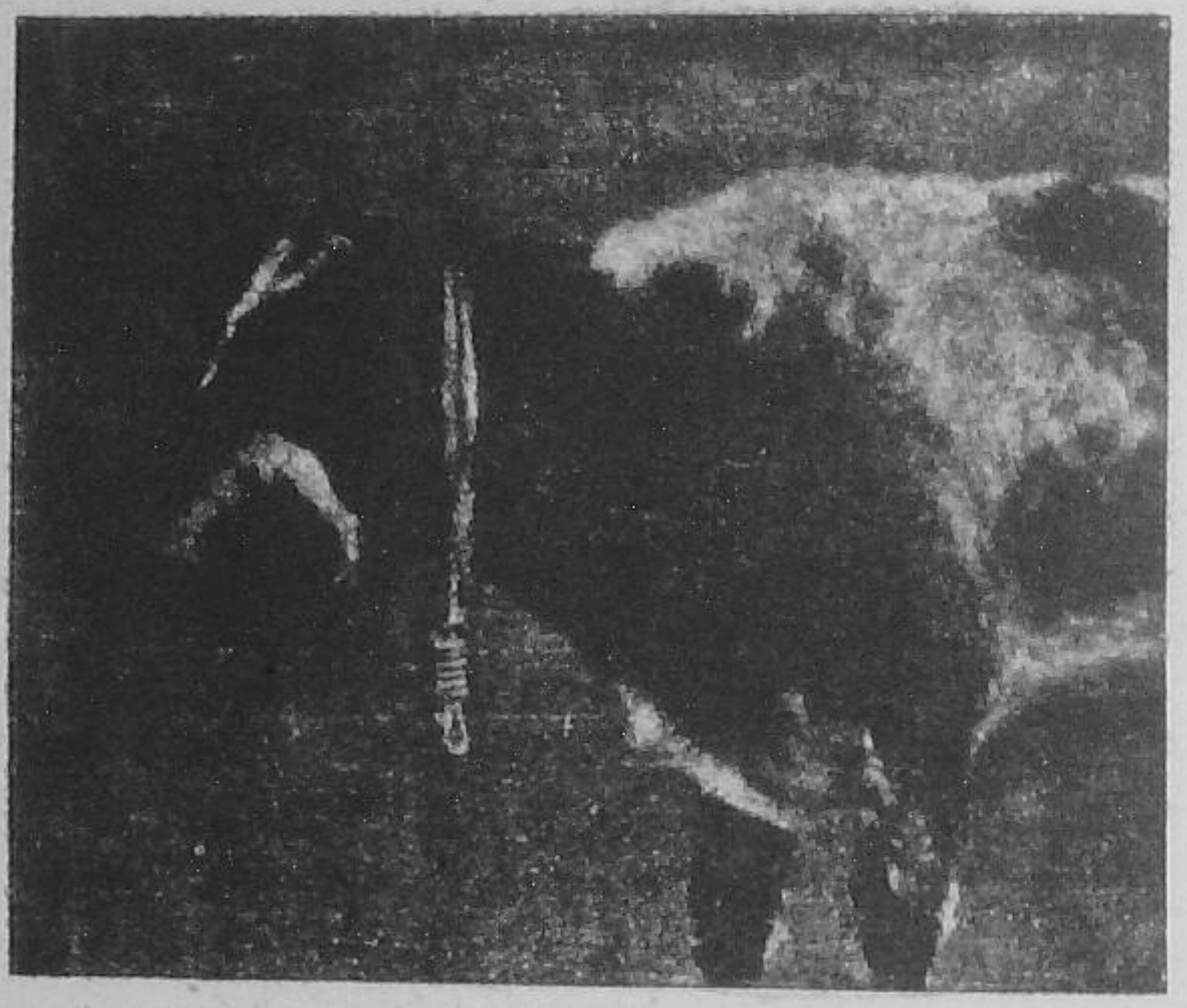


FIG. 13.—ACTINOMYCOSIS OF THE JAW.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

in places, causing considerable loss of power. When the bones of the face and jaws are attacked, the disease crawls on very slowly, and finally a large swelling is noticed on the side of the face or jaws, the surrounding tissues become implicated, and at times the complaint gets so far advanced before anything particular is noticed that the molar teeth are, on examination, found loose in their sockets, and can be easily removed with the fingers; eventually offensive, filthy-looking, fistulous sores break out on the face, with a disagreeable discharge and large fungoid granulations.

Treatment.—Iodide of potassium, given in 2-drachm doses night and morning in a pint of cold water, scarifying the tongue with a sharp knife, and applying tincture of iodine to the indurated parts, usually answers well. When the bones are affected, the iodine treatment is of little or no avail, and surgical interference is rarely beneficial.

Bothryomycosis is another condition in which fibrous tumours are formed. In this case the organism causing the swellings is

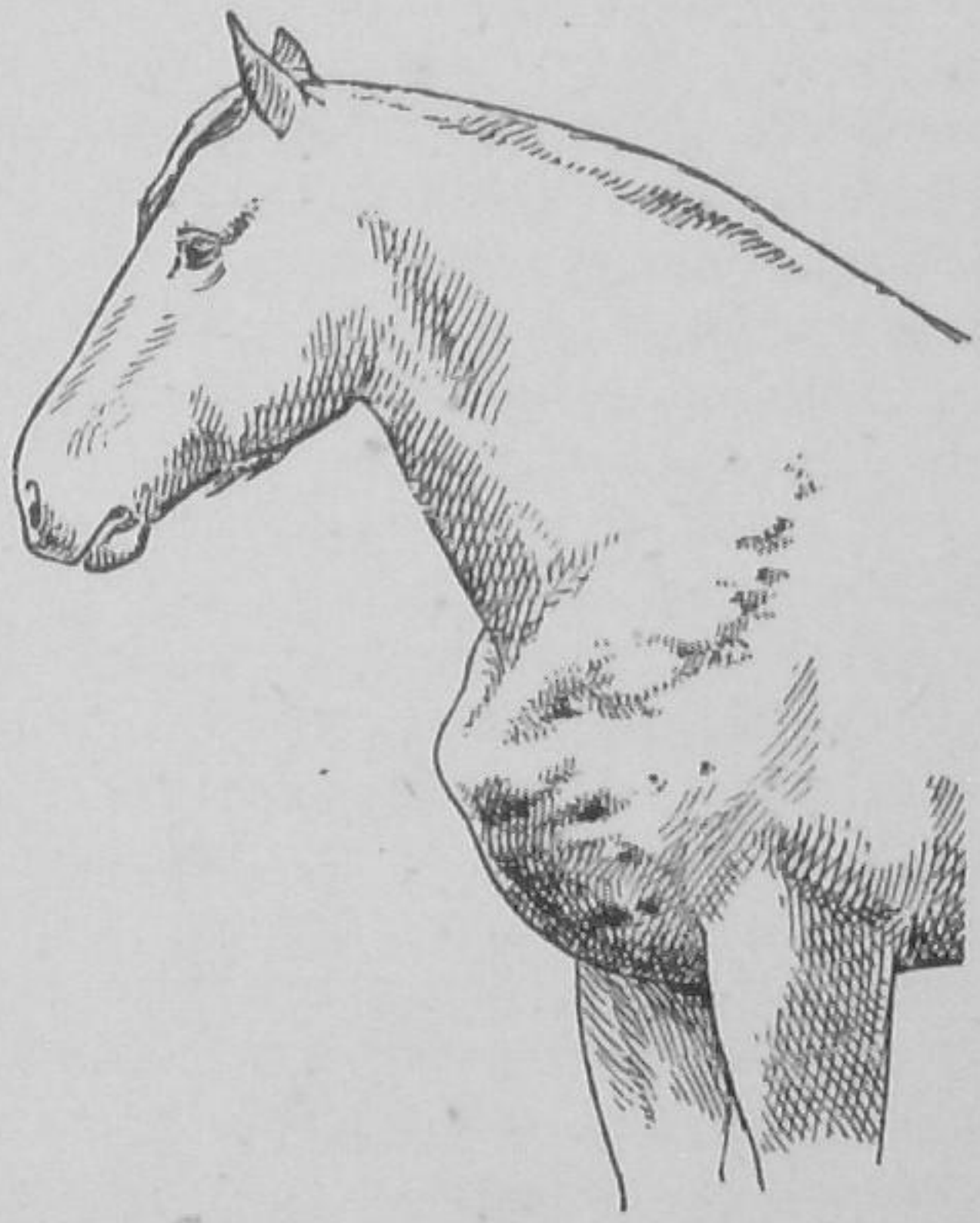


FIG. 14.—BOTHRYOMYCOSIS (SHOULDER TUMOUR).
(From Dollar's 'Veterinary Surgery.')

the *Discomyses equi.* It is commonly found on the shoulders, forming the familiar "shoulder tumours," and on the end of the spermatic cord, following castration. In the former case infection follows chafing from a collar, and in the latter infection of the castration wound by the causal organism. Treatment is surgical.

Aphtha, or Thrush.—Simple inflammation of the lining membrane of the mouth. Young calves and lambs are also subject to this complaint. On examining the mouth, sometimes numerous

small blebs, or vesicles, are seen, filled with a thin, watery fluid, which leave little white-looking ulcers when they burst. In other cases the mouth is very red and hot, with the mucous lining peeling off, and this prevents the young animals from sucking and feeding, while, in cases of the lamb, it sometimes affects the teats of the dam, and sets up inflammation of the udder. Thrush is generally thought to be due to some derangement of the digestive organs. *Treatment.*—For lambs, 2 scruples each of carbonate of magnesia, carbonate of soda, powdered rhubarb and powdered ginger, should be given in a little cold water night and morning; and for calves double the above dose may be given; also the mouth should be washed with boracic lotion two or three times a day. Further, place blocks of rock salt on the pastures for the animals to lick, or in the manger for the calves.

Stomatitis Pustulosa.—Deep-seated inflammation and ulceration of the lining of the mouth and tongue, varying in degree. Young calves, five or six weeks after birth, also sheep and lambs, occasionally suffer from small enlargements, resembling carbuncles, which form on the tongue and on the inside of the cheeks, terminating in ulcers, with thick granular matter at the bottom of them. Occasionally the outside of the cheeks are enlarged, when a quantity of frothy saliva flows from the lips, and the little animal does badly. On looking into the mouth, ulcers will be seen on the inside of the cheeks, corresponding with the enlargements on the outside. *Treatment.*—When the thick granular matter is seen, it should be scooped out, and the wounds dressed with tincture of iron and water, or boracic acid lotion, or tincture of iodine, while 30 grains of chlorate of potash may be given with advantage in the milk night and morning; or tablespoonful doses of Parrish's food, which is recommended to be given once a day, with 2 tablespoonfuls of cod-liver oil. The external application of iodine ointment to the enlargements generally has good effect.

Pharyngitis, or inflammation of the lining of the throat, may arise from a variety of causes, as injuries from foreign bodies or from a severe cold. When the throat becomes much congested and inflamed, the animal is unable to swallow, and, on attempting to drink water, a portion is returned through the nostrils. If the inflammation is at all persistent, the chances are that the horse will

ultimately become a 'roarer.' In very severe cases, where the effusion, or œdema, has so swelled the inside of the throat that there is a danger of asphyxia, tracheotomy has to be performed. This is done by cutting out a portion of two rings of the windpipe in front, and inserting a tube suitable to the size of the animal. *Treatment.*—In cases of a mild character, stimulating embrocations may be applied round the throat, from the root of one ear to the root of the other, and 3-drachm doses of chlorate of potash, with 2 tablespoonfuls of treacle, should be given in a sloppy mash of bran night and morning.

Post-Pharyngeal Abscesses.—The formation of matter or pus at the back of the throat. Cattle suffer very much from these, which are very frequently tubercular. They cause the animal to make a great noise—a kind of snoring—in the breathing, so much so at times that tracheotomy has to be performed, thus allowing free respiration until the abscess is ready to open. As soon as the patient is better, it should be fattened right away and sent to the butcher. Tumours with long necks (polypi) are also found in the throat, producing somewhat similar symptoms to the abscesses just described, but they are readily twisted out by the hand.

Choking.—Partial or total obstruction of the gullet. Some horses, especially those that are greedy feeders—if the corn is not carefully spread out on the bottom of the manger—will take too big a mouthful and choke themselves. Sometimes a piece of turnip or potato sticks in the gullet, but this is very rare in the horse. The symptoms of choking in the horse are rather peculiar: the animal stands in a crouching position, with the hind-legs forward under the belly, while the head and neck are extended, and saliva flows from the mouth; the nose is pointed up and straight out, with the back of the head seemingly pulled backward and down, giving a remarkable convexity to the lower portion of the neck. The action of the muscles of the neck every now and again gives the impression that the patient is trying to eject the lodgment, and the horse occasionally gives a peculiar scream and falls down on the knees (Fig. 15). In this case, all that can be reached by the hand must be removed, and the animal given a drench of warm water and skim milk mixed, or, better still, thin oatmeal gruel, which induces the action of the gullet, the gruel to be put through a milk

strainer or muslin. Should this not succeed, the small end of the probang must be passed with great care. The injection of a dose of arecoline hydrobromide under the skin causes excessive salivation and foaming at the mouth, when, in some cases, the obstruction passes down into the stomach. Arecoline can also be used for cows. Cattle, however, are more subject to choking than horses. They foam at the mouth and soon begin to swell up on the left side, switching the tail and stamping the feet, and this action is accompanied by diarrhœa. *Treatment*.—If the obstruction—

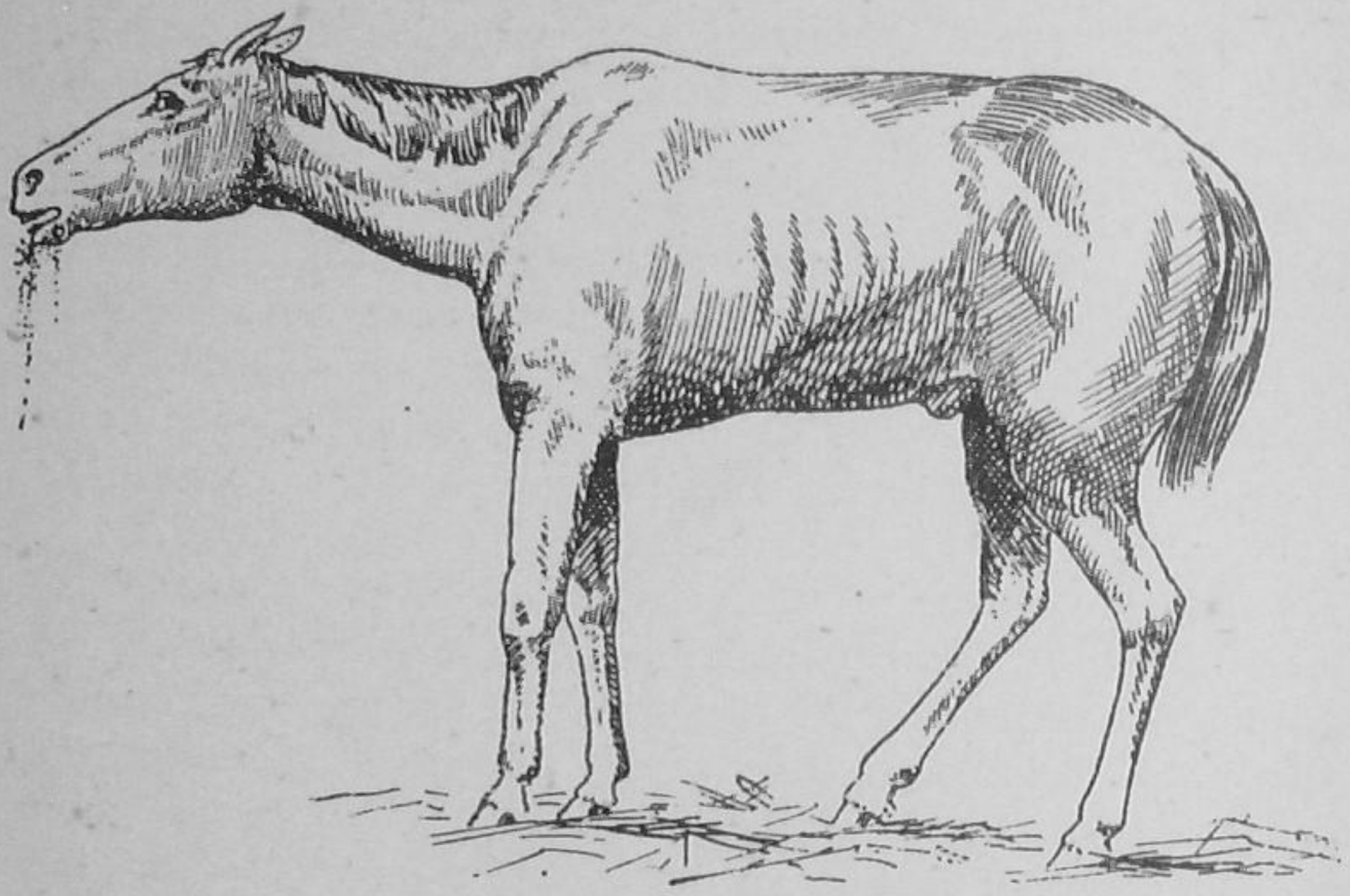


FIG. 15.—CHOKING

usually a potato or turnip—can be felt, an attempt should be made to work the foreign substance up again into the mouth by putting one arm round the cow's neck and, with the fingers on each side of the gullet below the offending body, pressing it firmly and forcibly into the mouth. If this method does not succeed, and the object cannot be withdrawn by the hand, the probang may be used. This should always be done very carefully and not in a hurry, especially if the animal resists. Should there be a quantity of gas in the stomach and the patient much swollen it may die a mechanical death, owing to the pressure of the gas on the diaphragm affecting

the heart and lungs, before it can be relieved. If there is any likelihood of this happening, the stomach must be punctured so as to liberate the gas. This may be done with a trocar and canula, or, in extreme cases, even with a knife, by plunging it into the stomach half-way between the last rib and the haunch bone on the left side, then turning it crosswise, when the gas will rush out. A little treacle and brown paper placed over the opening in the side as soon as the knife is withdrawn is all that is required for the wound made, and it is seldom that any bad effects follow. I have met with cases where the offending body has dropped into the stomach after the pressure of the gas was removed.

The Œsophagus, or **Gullet**, is subject to injuries and derangements: the former may be caused by pins, needles, thorns, and other foreign bodies; the latter by strictures, dilatation, or the formation of tubercular growths. All these have a tendency, particularly in the cow, to cause periodical swellings (hoven) on the left side similar to that seen in choking. Stricture is a contraction of the muscular walls of the gullet, and is sometimes met with in the horse and cow. Dilatation, or distension of the gullet, also occasionally affects these two animals, and may be due to paralysis of the muscular coat. In some cases of dilatation a pouch or pocket is formed, and is a very serious form. All the above produce analogous symptoms to those of choking, and are very difficult to diagnose, while treatment is very unsatisfactory; the probang may, however, be passed occasionally.

Derangement of the Stomach of the horse arises from many causes, such as injudicious feeding or overfeeding with too much badly-cooked food, as, for example, boiled wheat and barley, neither of which should be left to cool and then warmed up again—a common and very dangerous practice with many—as it turns sour and ferments. Wheat and barley should always be used newly boiled. Another cause of stomach derangement arises from the animal bolting the food without chewing it, thus preventing the food being properly mixed with the salivary secretions, and, consequently, fermentation or generation of gases takes place, which may even distend the stomach till it ruptures. Colicky, griping pains may be present; but occasionally cases are met with when no

such symptoms are shown, the animal standing quite still, hanging its head, blowing fast, and having its stomach greatly distended. If this is not quickly relieved, the mechanical pressure of the gas may cause death by suffocation. *Treatment.*—In such cases, at the commencement, 1 or 2 ounces of bicarbonate of soda should be given in a pint of water with ½ pint of whisky—this may neutralize the gas and give the stomach a fillip as well—or 2 to 4 ounces of hyposulphite of soda dissolved in 1 pint of cold water, given with 2 ounces of tincture of ginger, has a good effect. A ball composed of 3 drachms of Barbadoes aloes, 2 drachms of carbonate of soda, and 2 drachms of powdered rhubarb, can also be given.

Rupture of the Stomach.—A rent or tear in the walls of the stomach. This fatal lesion is occasionally the result of some of the causes named in the preceding paragraph, and may take place with or without inflammation. In old subjects it is thought to be due to degeneration of the walls of the stomach; but one of the principal causes is when the stomach is much distended with gas from fermentation of the food and the patient throws itself about, as in colic. When the rupture takes place, there is a sudden and great prostration of the animal, breathing is short and quick, nostrils are dilated, a cold, clammy perspiration bedews the body, accompanied by trembling and quivering of the muscles, particularly of the limbs, heavy sighs, and seeming fear to move; in fact, the animal stands obstinately until it drops and dies. Sometimes volumes of gas are to be seen regurgitating up the gullet towards the mouth, and in some cases there is an attempt to vomit; but I have met with cases where both regurgitation of gas and vomiting have been seen without any rupture, and the cases have recovered. When rupture takes place nothing can be done; the great point is to try to prevent it. First and foremost try judicious feeding, then, when cases of intestinal disturbance, with colicky pains and gas distension of the belly, are observed, lose no time in getting the patient relieved by administering the medicinal agents named for derangement of the stomach.

Stomach Staggers in the Horse.—A disorder of the stomach accompanied by nervous derangement. In hot, dry weather, more particularly on hilly ground, where there is a second year's growth of rye grass, the horse is sometimes attacked with this malady.

The horse has an unsteady gait as if about to fall, first on one side and then on the other, swinging its head backwards and forwards. If in the stable, it may be found with its nose pressed on the bottom of the manger and forehead against the wall, or steadying itself with the nose fixed between the bars of the hay rack. The breathing is slow and laboured, and the pulse full and slow. The exact pathology of this condition is not fully known; investigations have suggested an intoxication from the stomach, and there have also been observed alterations in the blood contents. *Treatment*.—The best treatment is to empty the stomach of its contents by giving 4 to 6 drachms of aloes, according to the size of the animal.

Indigestion.—Imperfect digestion of the food, generally due to injudicious or over feeding, and common both in horses and cattle, particularly in the former, when being fed up for shows or for the market. The horse shows no pain, but simply loses its appetite. *Treatment*.—Give 3 drachms of aloes, with 3 drachms of bicarbonate of soda, in the form of a ball; stimulants should also be given—aromatic spirits of ammonia, nitrous ether, or turpentine in linseed oil are useful. When the more acute symptoms have passed off, vegetable tonics will help to restore the tone of the stomach. Another form of indigestion is due to an excess of acidity in the stomach, being more common in young foals and calves than adult animals. This particular form of indigestion is known by the names of 'pica' or 'licking complaint,' owing to the subjects licking the walls, eating soil, bones, stones, etc. As treatment for young stock, giving lime water or carbonate of soda in the milk answers splendidly; for adult animals, change the diet, and give ½-ounce doses of carbonate of soda night and morning in the food.

Crib-Biting is when the horse gets hold of the side of the crib, the bar of a gate, or any other handy object, with its teeth, and, by arching its neck, gulps in air, the while making a peculiar noise, and filling the stomach with wind. This habit is often due, in the first instance, to idleness, or a form of dyspepsia. The front portions of the incisor teeth of horses with this habit get gradually worn round; but this is also seen in horses that bite at the manger or stall on being groomed. The best remedy I know of is to use iron fittings, in which the front of the crib is of iron, and too broad for the horse to get a hold of. Brick troughs with a broad mould

on the top, a strap round the neck, or feeding the animal from the ground, are all useful, and worthy of a trial.

Wind-Sucking in the horse is a similar complaint to crib-biting, and is also a bad habit. To test a horse for wind-sucking the following can be tried: Put a handful of soft sugar into the animal's mouth and leave it for ten minutes or so. If a wind-sucker, you will generally find it standing with its nose elevated, its neck strangely arched, and making a peculiar and distinctly characteristic noise; or the tongue may be noticed curled and protruding in front of the lips, and the animal sucking for dear life. Some horses only show the habit when a sloppy mash is given to them, when they suck in the air with the mash, making a peculiar noise. Crib-biting and wind-sucking are both considered as unsoundness.

Gastritis, or inflammation of the stomach, may arise from a variety of causes, such as eating rough, coarse, indigestible food, and from the effect of mineral poisons, such as arsenic or mercurial salts; or it may be induced by drinking water charged with free sulphuric acid, sulphate of iron, or strong alkalies, or by feeding on mouldy grain; while at other times it is due to worms and bots. It usually proves fatal in a very short time. The horse shows great pain, lying down, rolling about, and perspiring freely, with no intervals of rest; the nostrils dilate widely and are red inside; the under side of the eyelid is also dark red; the breathing is fast and heavy; whilst there is an anxious look on the faoe. The animal soon becomes exhausted, trembles all over, with cold, clammy sweats, and finally drops and dies. *Treatment*.—Ascertain, if possible, the cause of the trouble; if there is good reason to suspect any particular poison as the cause of the irritation, then a suitable antidote to that poison should be given. Carbonate of bismuth in doses of 1 to 2 drachms, mixed with gum mucilage and water, will help to allay the irritation of the stomach. Blankets wrung out of hot water should be rolled round the body, with a piece of stair-carpeting wound above them, or a good application of mustard and water to the belly. But professional advice ought to be sent for at the very onset, as injections of morphia and atropine under the skin are useful to relieve the pain.

Bots (Plate XXXVIII., Nos. 7, 8, and 9) are the larvæ or grubs of a species of the gad-fly, the Gastrophilus of the horse (*Œstrus equi*),

of the order Diptera, or two-winged insect, the breeze or horse bot. The bots, when seen in the stomach of the horse, are of a reddish-brick colour and about $\frac{7}{8}$ inch long, made up in segments or rings with serrated borders, and are found in clusters varying in number from eight to ten up to between two and three hundred (Fig. 16). The section of the stomach from which the photo was

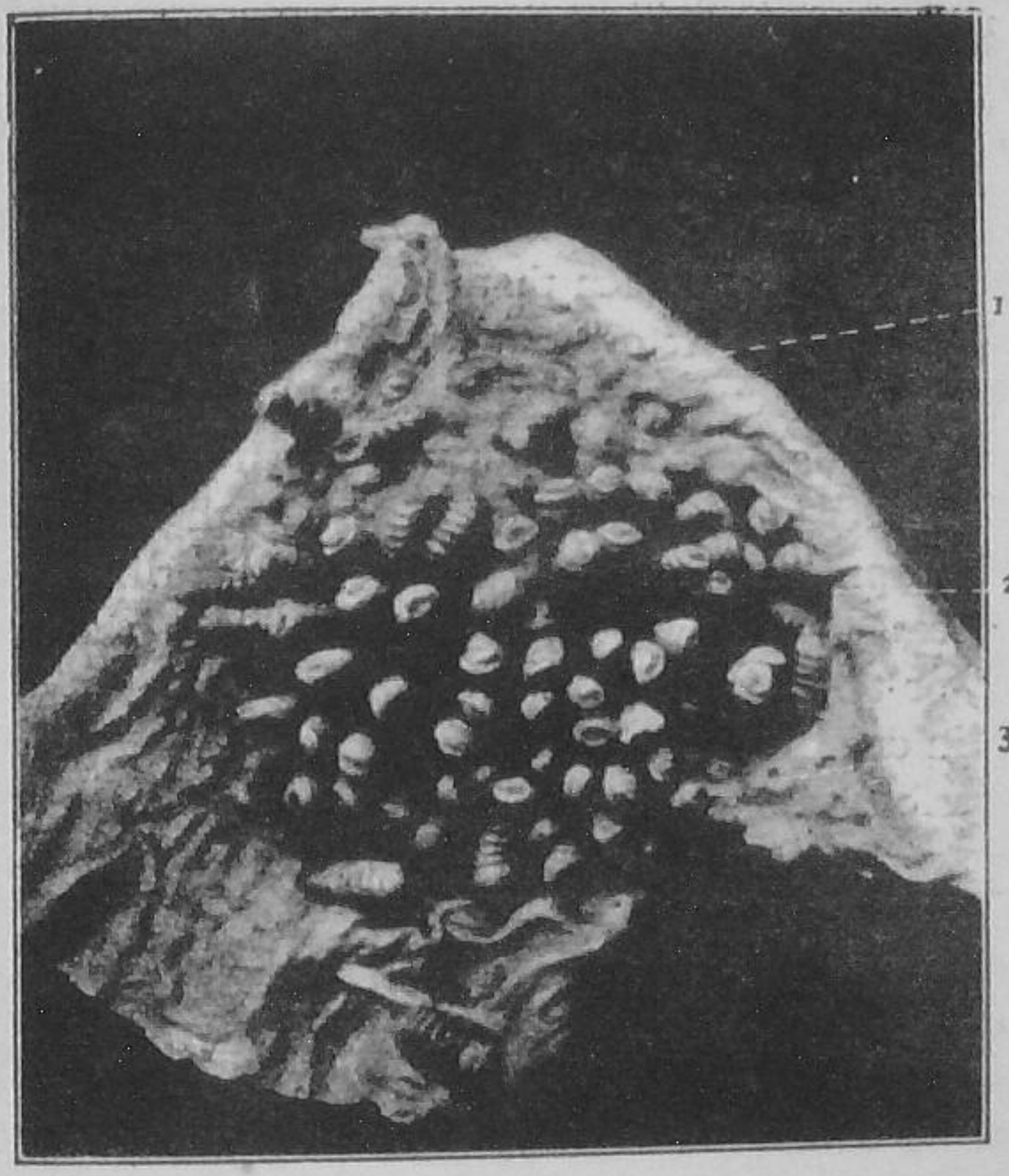


FIG. 16.—BOTS IN HORSE'S STOMACH.

1. Cuticular coat of stomach.
2. Cluster of bots (total number 203).
3. Orifices left in stomach where bots have fallen off.

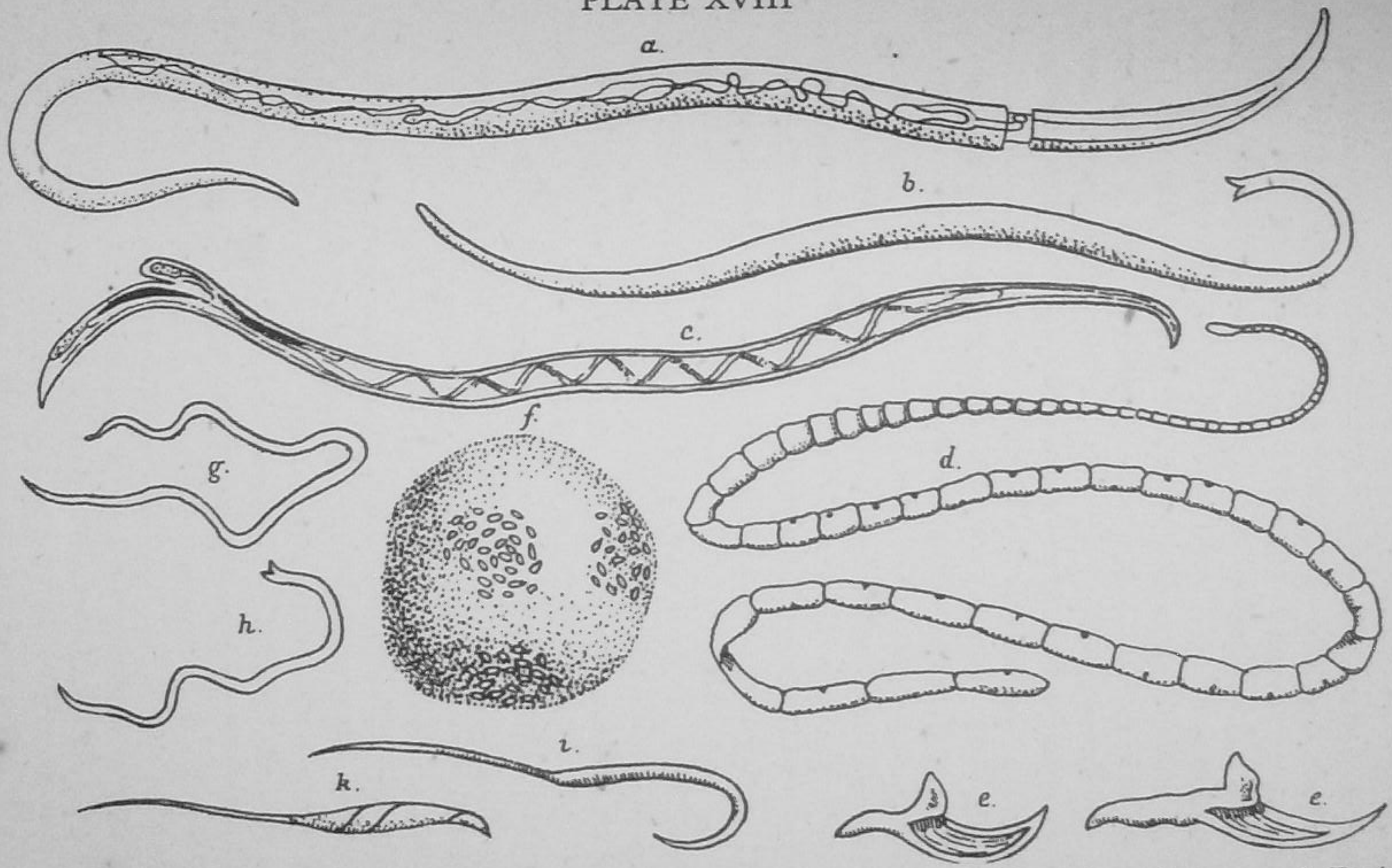
taken had 203 bots attached to its lining, and was taken from a one-year-old cart colt, the animal having died from eating a large quantity of sand and soil, which had collected in the large intestine, the irritation of which induced inflammation of the feet (laminitis), and finally death of the patient. The life-history of the *Œstrus equi* is as follows: The female fly lays her eggs about the months of July and August—a time when the horses are working or grazing

in the fields; these eggs are laid on the shoulders and fore-legs, more particularly behind the knee, where they may be seen as tiny yellow bodies sticking to the hairs. The eggs when first dropped are covered with a gelatinous material, which glues them to the particular hair on which they are deposited. By the heat of the body of the horse combined with the rays of the sun these tiny eggs are hatched, causing an itching sensation at the roots of the hairs on which they are fixed, and in consequence of this the horse licks the parts with his tongue, when the newly hatched embryos are carried by the tongue into the mouth, from whence they readily pass along the gullet to the stomach, and with their two little hook-like processes (tentacles) attach themselves to the cuticular or non-sensitive lining on the left or cardiac side on the stomach, where they remain from about July or August until the following May or June. The stomach of the horse is their natural habitat or winter quarters for their development and growth during the larval stage. When spring comes again, they loosen their hold, pass away with the fæces, and fall upon the ground, when they turn into chrysalides, or the third stage, which occupies about four or five weeks, and in due course of time form the perfect fly (*Œstrus equi*), ready to perform another circular tour. Bots seldom cause any disturbance except when the numbers present are very great, and symptoms of their presence are seldom seen until they pass out in the spring. The best preventive to be adopted is to run a horse-singeing lamp over the legs and shoulders of the horse in harvest-time, as soon as the little tenacious yellow spots are seen.

Worms.—Parasites found infesting the various organs and parts of the bodies of domestic animals may be said to be legion. For a full description of the different kinds, their names, habits, size, form, etc., Dr. Fleming's translation of Neumann's 'Parasites and Parasitic Diseases of Domesticated Animals' can be consulted with interest.

Round-Worms.—(1) The *Ascaris megalocephala*, a large round white worm, varying from 7 to 16 inches long, found in the stomach and small intestine. Affects the horse, and is also common to the ass and mule. Although a large worm, this does little harm except when large numbers impede the passage of food along the intestine. (2) *Oxyuris curvula*, a small curved worm, from 1½ to 2 inches

PLATE XVIII



a. Female *Ascaris megalocephala*. *b*. Male *Ascaris megalocephala*. *c*. Female *Strongylus contortus*. *d*. *Tænia cœnurus* (Tape-Worm of the Dog). *e, e*. Hooks of the Tape-Worm. *f*. Cyst or Watery Tumour of the Brain (*Cœnurus cerebralis*), showing white dots of Tape-Worm Heads. *g*. Female *Strongylus filaria* of Sheep. *h*. Male *Strongylus filaria* of Sheep. *i*. *Strongylus curvula*. *k*. *Oxyuris*.

long, thick and curved at the front, with a fine pointed tail, found in the large intestine, and generally known as the maw-worm. This causes little actual harm, but causes a certain amount of irritation by its presence. (3) The *Sclerostomum armatus*, or armed strongyle, a straight worm, in length from 1 to 2 inches, although mostly found coiled up in the walls of the large intestine—cæcum and colon—and in the intestinal canal, is also found in the bloodvessels, scrotum, etc., and is one of the most numerous parasites found in the horse. (4) *Sclerostomum tetracanthus*, a spindle-shaped worm, varying in size up to 1½ inches in length, and found embedded in the mucous membrane of the intestinal canal (Plate XVIII.). These last two worms are those producing the most serious effects on the horse. The immature stages of these worms are passed in the bloodvessels, and they not infrequently cause death, especially in young animals, by the blocking up of a bloodvessel, particularly the anterior mesenteric artery, where a dilation of the artery occurs (aneurysm), which may burst and cause a fatal hæmorrhage. Apart from this result they cause great emaciation, particularly during the winter and early spring months, when the following symptoms may be noticed: Staring coat, irregular appetite, dulness, languor, legs trailed on moving, belly tucked up, with occasional diarrhœa, and a great loss of flesh.

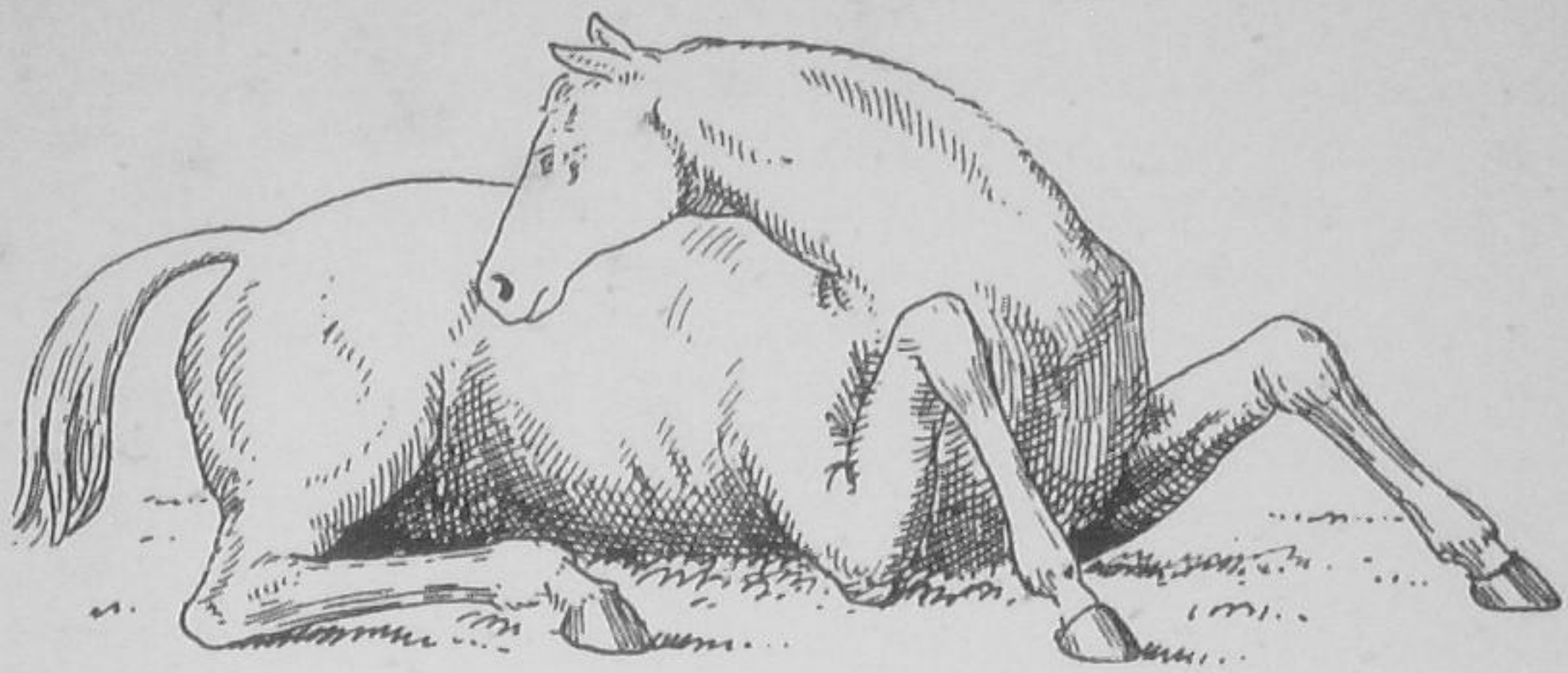
Tape-Worms are occasionally found in the horse, but being unarmed with hooklets they are comparatively easily expelled and cause little disturbance. *Treatment.*—Two ounces of turpentine mixed with 1 pint of linseed oil can be given every seventh or eighth day until four doses are given. It will be necessary to prepare the horse for the worm medicine by fasting for at least twenty-four hours before it is administered. Oil of chenopodium and carbon tetrachloride are also effectual remedies for strongyles in horses, but these should only be administered under professional advice, as they are not without some danger unless administered with caution.

From personal observation, I am led to hold the opinion that the ova or eggs from which some of these parasites are developed are deposited on the ground, along with the dung, during the summer months, and that they undergo some transformation outside of the body of the host, in which they are fully developed. For

after wet seasons horses out at grass during August and September are generally found affected with worms and parasites, which show their effects in winter and early spring. November is, therefore, the proper time to treat such cases, before they become too well developed. One tablespoonful each of flowers of sulphur and common salt should be given in a mash of oats and bran once every day every alternate fortnight, both in the stable and at grass during the winter months. The land on which the animals pasture should be dressed with roughly crushed rock salt—say, 8 to 10 hundredweight per acre. Although salt is the best and safest germicide we have in nature, not nearly enough of it is applied to the land. Every year the above quantity, at least, should be put on the grazing land, lea ground, and the meadows.

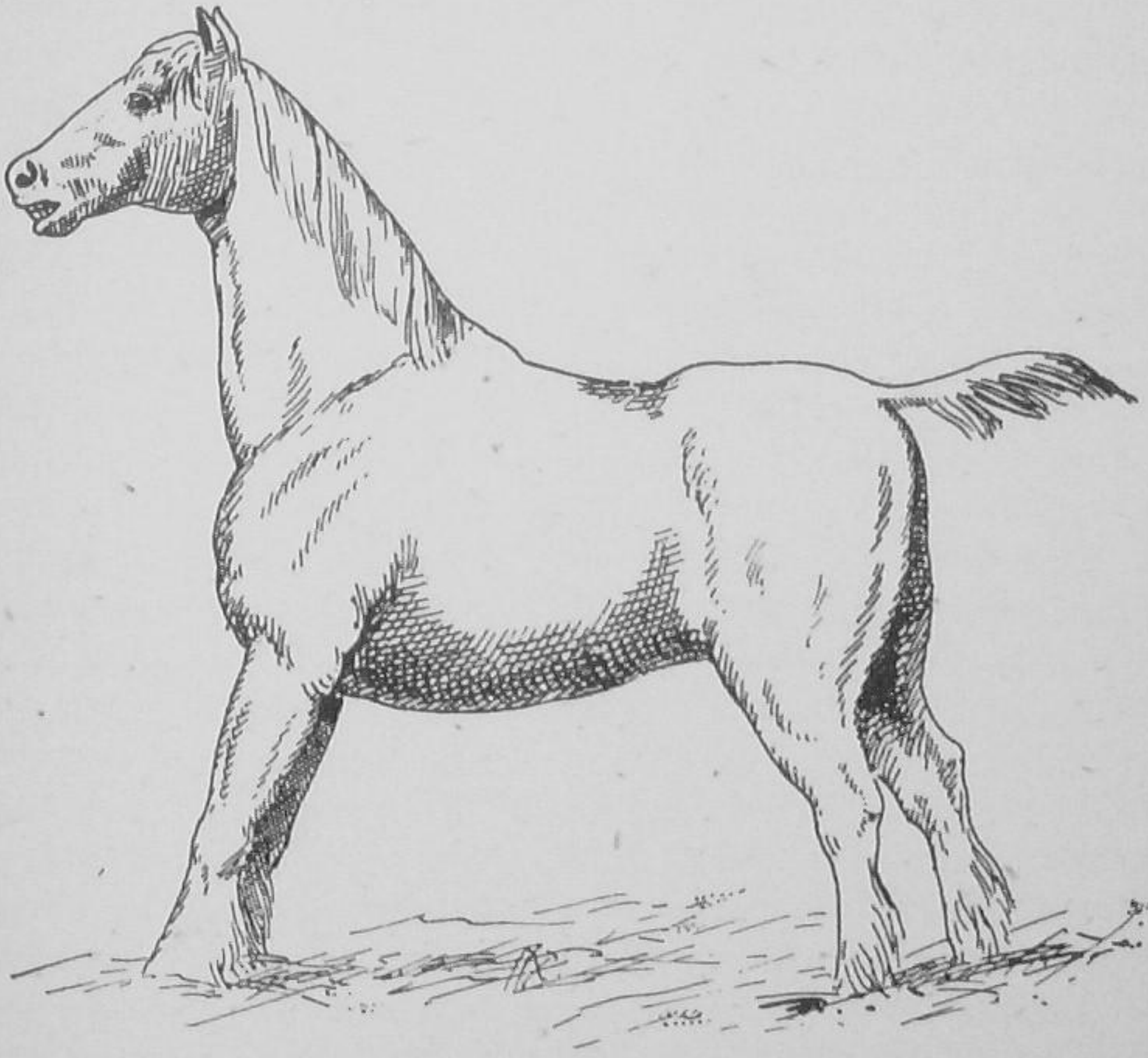
Colic (Plate XIX., A) is the name commonly given to those cases where there are signs of pain in the abdomen or belly. The majority of disorders found in connection with the abdominal organs are accompanied by more or less colicky pains; as the variety of causes of abdominal pain are therefore many, so the symptoms presented in these cases vary and need to be carefully studied, and rightly interpreted, if a correct and reasonable treatment is to be applied. Among the various forms of this condition particularly affecting the intestines, spasmodic colic and flatulent colic are very common. They are due to the ingestion of unsuitable foods; to damaged, musty, or fermenting food. A frequent cause is giving large feeds of whole corn to a very tired horse. Both of these forms are usually accompanied by a slowing down, or irregularity of peristalsis, or the rhythmic movement of the bowel; and the immediate symptoms are due either to spasm or cramp of the intestinal muscle (spasmodic colic), or to distension of the bowel with gas (flatulent colic). The contents of the bowel accumulate at various points, and, owing to fermentation, gas is produced, which cannot escape. When first attacked, the horse wriggles the body from side to side, sniffs the ground, paws with its fore-feet, cringes on its hind-legs, bends its knees, and then lies down, or throws itself down, and rolls; jumps up again, perspires freely, and looks at its side. This may go on for a few minutes or half an hour, when the pain leaves the animal for an interval, and it stands or lies perfectly quiet. In a short time,

PLATE XIX



A

HORSE IN COLIC.



B

CASE OF OBSTRUCTION OF THE BOWELS FROM CALCULUS IN LARGE COLON.

however, the pain returns again. In flatulent colic somewhat similar symptoms are shown, and in addition the animal is swollen by gas in the intestines, the abdomen being distended, particularly on the right side, behind the last rib. As these symptoms may be the forerunner of more serious trouble no time should be lost before seeking professional assistance. *Treatment.*—It is advisable to avoid giving laudanum, or made-up colic drinks which may contain opium, which was formerly very often administered in such cases; but this drug not only masks symptoms and renders subsequent examination more difficult, but also reduces the peristaltic action of the bowel. A safer remedy is 1½ to 2 ounces of turpentine in a pint of linseed oil. Apply hot water blankets to the abdomen, and give rectal injections of warm, soapy water. Stimulants are also useful, and for this purpose carbonate of ammonia may be given, while beer, or whisky mixed with water, are stimulants readily obtainable.

Enteritis, or inflammation of the bowels, is, as a rule, a very fatal disease in the horse, death frequently taking place in five or six hours. The symptoms at the onset are much the same as those exhibited in colic, but more severe, and with this exception—that in enteritis there are no intervals of rest, the pain being continuous. There is a peculiar dejected appearance and an anxious expression on the animal's face; the nostrils are dilated and very red inside, and excessive perspiration covers the body, followed by cold, clammy sweats. At length the pain apparently disappears, the animal stands quietly, trembling, and sighing heavily; the pulse, which at first was full and bounding, now becomes small, weak, and scarcely perceptible, when the patient finally drops and dies.

The acute inflammation, which is described as enteritis, may accompany certain specific diseases, or be due to the ingestion of irritant poisons. Fairly common are loops or knots in the bowel, and in these cases a rent has been made in the mesentery or net, and through this a portion of the small intestine is pushed, becoming strangulated, and filled with dark, congested, bloody fluid. The expression of pain in such cases is something terrible to behold, the animal being dangerous to go near. Again, we have twists occurring, where one portion of the bowel gets rolled over another; but the pain here is not quite so violent as in loops. Occasionally,

through irregular peristalsis, a part of the small intestine becomes telescoped—that is, drawn inside the neighbouring part. I have a specimen invaginated to the extent of 23 inches (Plate XX., A). Here again the pain, though acute, is not nearly so severe as in loops. Tumours in the mesentery are sometimes formed, having a long neck, which gets twisted round a part of the small intestine, thus producing strangulation. The animal from which the photo of the section of the small intestine was taken was ill, and

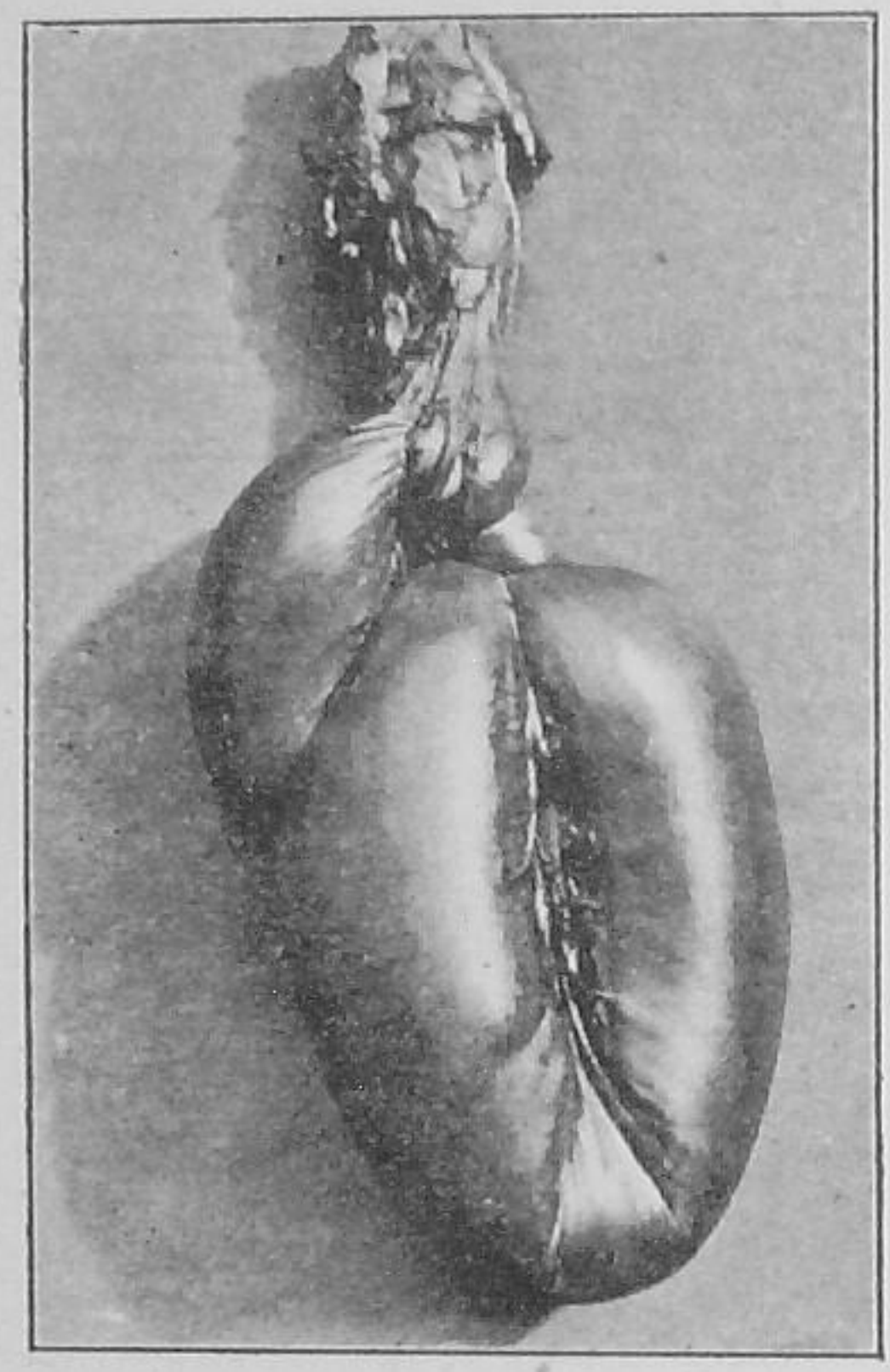


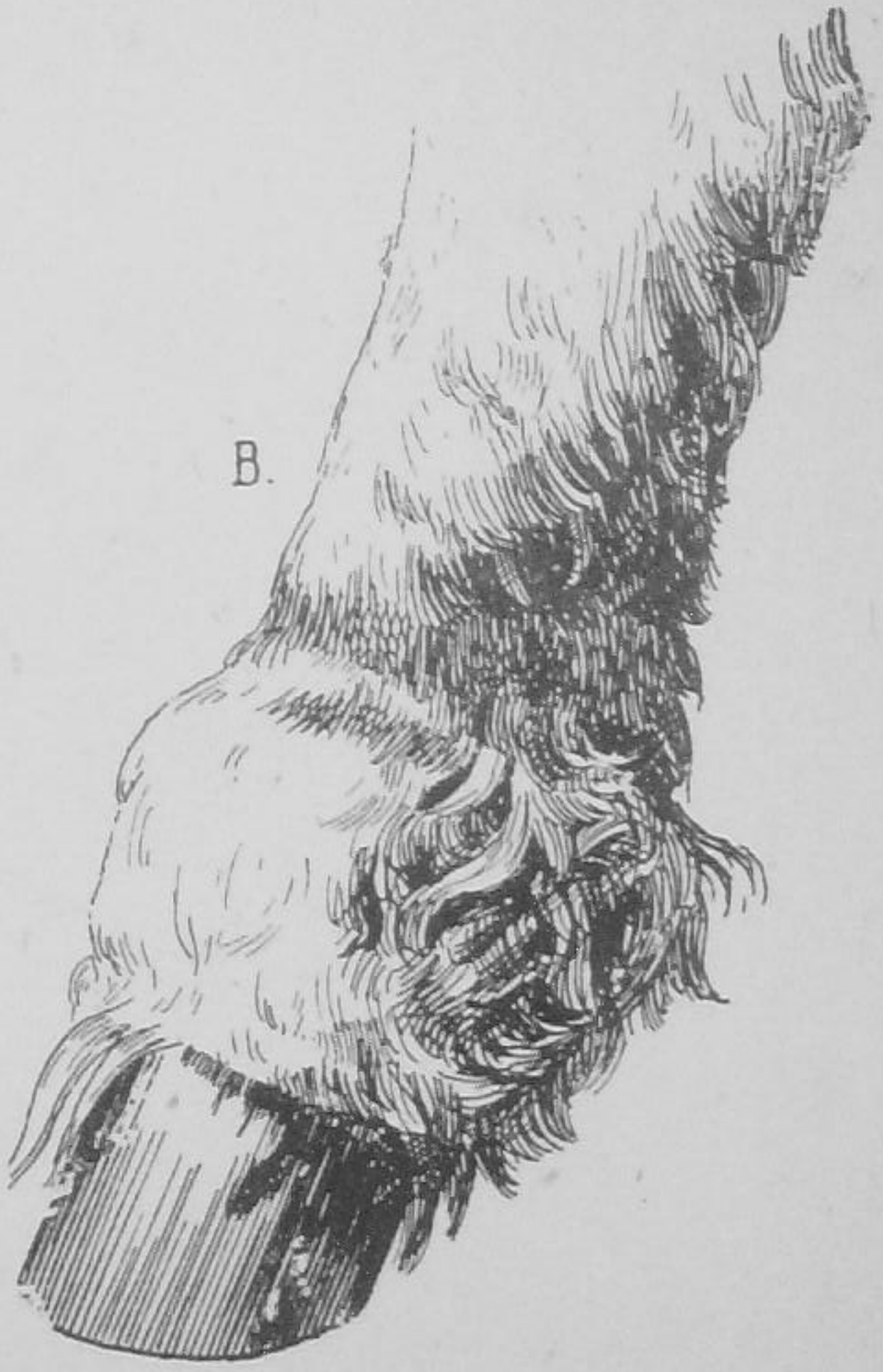
FIG. 17.—COMBINED LOOP, TWIST, AND KNOT OF SMALL INTESTINE OF THE HORSE.

suffered more or less from colicky pains from 7 a.m. on Saturday morning until 10.30 a.m. on the following Monday, when it died. It will be noticed that there is a distinct half-hitch knot in the neck of the tumour. All these lesions are accompanied with more or less severe colicky pains, and as a rule terminate fatally. Treatment for enteritis and lesions in the intestines is the same as recommended for gastritis, while hypodermic injections of morphia and atropine may, in such cases, be given to relieve the intense pain.

PLATE XX



A. Telescopic Gut, 23 Inches Long.



B. Elephantiasis.

Large Intestine.—Acute inflammation of the large intestine occurs as in the small intestine; twists of this bowel also occur, and are usually fatal.

Concretions or Calculi—accumulations of lime and other matters in the bowels—occur in the large intestine, and occasionally are of a great size, but sometimes are numerous and small. They are usually composed of phosphates of magnesium or calcium, deposited round a nidus of some indigestible substance, such as a nail, or a small piece of stone; some are hard as a stone, and very

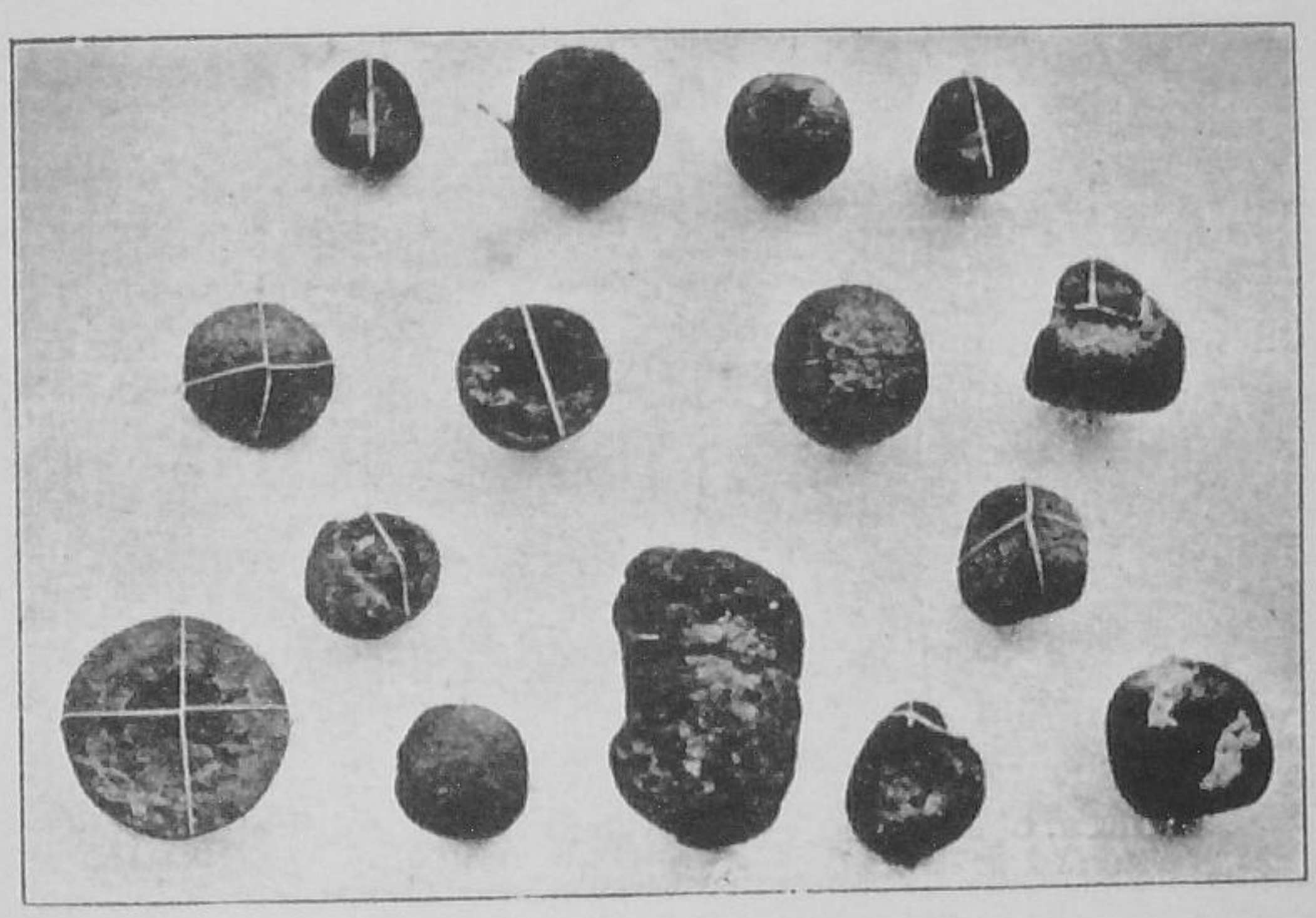


FIG. 18.—CALCULI.

smooth; others are soft and convoluted. Millers' horses are most subject to these. As long as the calculi remain quiet in the pouches or wide part of the intestine in which they were formed, no ill effects are seen; it is only when displaced, and moved to a part of the intestine with a smaller lumen, that they produce a stoppage in the bowel, pain, and frequently death. The symptoms exhibited resemble those of knots, twists, etc., but are not nearly so acute. As a rule, in all cases of bowel displacement and obstruction from calculi the animal cannot retain injections; in fact, it strains very much when enemas are given. If the presence of calculi is diagnosed,

large enemata of warm water should be given, and occasionally the calculi, if not too large, may be passed out *per rectum*.

Constipation, or **Impaction** of the large bowel with food, causing inertia of the intestine and loss of tone, accompanied by partial paralysis. We may have it with or without flatulence. One of the greatest causes of constipation I have met with in the horse is a slight feed of new grass or clover—fog partially dried. The indications are slight colicky pains; the animal lies down, and may remain quiet for three or four hours, occasionally screwing itself on its belly, getting up, stretching, and standing with the hind-legs well backwards, taking a bite of food now and again which causes the spasm of pain to return. *Treatment*.—A draught of from 3 to 7 drachms of aloes (according to the animal's size), in solution, mixed with 1 pint of linseed oil, is the best remedy. This should be accompanied by warm water injections given every two hours, followed by a ball every four hours, and composed of 6 drachms of carbonate of ammonia and 1 drachm of powdered nux vomica. In all cases of bowel complication the symptoms at the onset are very much alike, and the great point is to ascertain as clearly as possible the cause of the colicky symptoms. I have found the following to answer admirably: Carbonate of ammonia, chloral hydrate, 4 drachms each; carbolic acid (B.P.), 30 drops; mix, and make into a ball with the aid of linseed oil, and administer every four or six hours if necessary.

Diarrhœa, or Purging.—This is a fluid or semi-fluid discharge of the contents of the bowels, and may be acute, subacute, and intermittent. Acute diarrhœa in the horse is very rare, but very dangerous, and may be due to some deleterious material, either in the alimentary canal or the system, and of which nature tries to relieve herself by a spontaneous diarrhœa, in which case the animal is very sickly and dejected, standing quiet, breathing quickly, pulse hurried and weak, tongue dirty and breath fœtid; the inside of the eyelid is of a dirty orange colour, and great thirst is present; the fæcal discharge varies in colour from dirty brown to grey, with a very offensive smell. *Treatment*.—Great care is necessary, for if the diarrhœa is too suddenly checked inflammation of the bowels may result, generally with a fatal termination, or the irritation may be transmitted to the fore-feet, and set up laminitis. My treat-

ment for this form of diarrhœa is to give ½ ounce each of carbonate of magnesia, carbonate of soda, aromatic spirits of ammonia, and tincture of ginger, with ½ ounce of laudanum or chlorodyne in 1½ pints cold water, repeating the dose every six or eight hours if necessary, also using well-boiled oatmeal gruel strained through the milk strainer, cheese cloth, or open seed-bag sacking, 1 quart of the warm strained gruel mixed with 1 quart of cold water being offered frequently to the patient to drink. When the animal shows signs of recovery, a handful of dry oats and bran mixed can be put before it, with a small quantity of well-drawn clover hay to pick. Subacute diarrhœa may arise from injudicious feeding with improper food or a too hearty draught of cold water when heated, or from eating stale lawn-mown grass, or from over-excitement, particularly in long-middled, short-ribbed, narrow-made, washy-looking horses. Careful feeding of such animals is necessary, while the medicine mentioned under acute diarrhœa should be given. Intermittent diarrhœa is seen in young animals when casting the crown of their molar teeth, or from the presence of worms in the alimentary canal. Examine the mouth, and remove the crowns of the milk teeth, and give occasional doses of 15 ounces of raw linseed oil mixed with 1 to 1½ ounces turpentine, repeating once every sixth or seventh day till four or five doses are given. Super-purgation is often caused in the horse by giving an overdose of purging medicine, and such frequently ends in laminitis. Treatment in this case is the same as for acute diarrhœa.

Dysentery is a fluid discharge from the bowels mixed with blood. Although very common in cattle, it is very rare in the horse —at least, in this country. *Treatment.*—Give the mixture recommended for diarrhœa, to which 30 to 60 drops of oil of cloves may be added for dysentery.

Hernia is the passage of a portion of the bowel, or other viscus, through an opening, natural or artificial, in the body wall. The term 'rupture' is sometimes erroneously used synonymously, but this word only refers to the artificial opening, and not to the hernia. The hernia may occur at different points; there may, for example, be a rupture in the diaphragm, and a portion of the intestine pass through it into the chest, such a hernia generally terminating fatally. Or, again, the lower portion of the abdominal wall may

be ruptured, and the intestines escape under the skin. In this case sew a bandage tightly round the body, to support the bowels, until the hernia is reduced.

Scrotal Hernia is very common in young foals; but in 95 per cent. of the cases the bowel returns to its proper place before the animal is twelve months old. Another very common hernia is that of the navel—umbilical hernia, as it is called. The best remedy for this is to apply a special truss when the foal is first taken from its mother, or it may be reduced by an operation—casting the animal on to its back, and passing needles through the sac and ligaturing, or by a special clamp. Umbilical hernia, also, in many cases disappears of its own accord in the course of time. The great danger of a hernia is that the bowel passing through the opening may become strangulated; in such case it will be necessary to call for assistance without delay, for an operation will be required to free the bowel.

The Rectum.—A number of cases have been reported where this intestine was damaged by a stick, or other foreign body, being passed up by malicious individuals, with the result that troublesome abscesses have formed, causing great straining and swelling round the vent and under the tail. These cases are best diagnosed by passing the hand into the rectum, when the lesion may be felt. When full of matter (pus), they have to be cut into through the walls of the bowel. Rupture of the rectum may take place where an aged mare is being served by a young and vigorous horse; a few cases of this kind have come under my notice, and invariably the groom has been blamed for injudicious service in the rectum, of which I am very doubtful, and do not favour the idea, for if the bowel be loaded with dung, the roof of the rectum is very readily torn from its attachments even during proper service. I have had two cases in mares, one of which was climbing over a fence and fell heavily on to her side into a ditch, and the rectum, which was full of excreta, was extensively torn for about 18 inches; the other case was somewhat similar, the animal falling when yoked in a loaded cart, the same misfortune occurring. Aged mares that have had several foals should always be examined, and the rectum emptied either with warm water injections, or with the hand, before service. The principal injury, however, is found in the mare when, in the

act of foaling, one of the foal's feet is pushed through the roof of the vagina into the rectum, resulting in a troublesome fistula; or the rectum and vagina may be torn into one. In these cases there is, as a rule, extensive inflammation and sloughing of the parts. Occasionally we meet with cases of eversion of the rectum, caused by impaction through some error of feeding, when, on attempting to pass the fæces, the rectum becomes turned out. In such a case it must be well washed in tepid water and replaced at once, whilst warm water injections should be given three or four times a day, dieting the animal on soft food, such as bran mashes, etc. When neglected, it mortifies, becomes black, and has to be cut off, which is rather a formidable operation. Young foals when newly born suffer very much from impaction of the rectum with hard balls of meconium; the animal arches its back and strains. Warm water injections must be given, and the hard balls ejected with the assistance of the finger.

Paralysis of the Rectum, or a want of power to expel the contents, is occasionally met with, when the rectum becomes impacted with fæcal matters which the animal has no power to expel; and this may be due to an injury to the spine, or to degeneration of the muscular and nervous tissue of the walls of the bowel, or to fracture of the pelvic or tail bones. A careful examination will be necessary in order to ascertain the cause of the paralysis. As a rule treatment is unsatisfactory.

DOG.

The arrangement of the alimentary canal of the dog is rather peculiar. The stomach is pear-shaped, slightly curved, and relatively large; the bowels are short and nearly all of the same size, while the cæcum is almost rudimentary. As the stomach of the dog is large compared to the size of the animal, and a large proportion of the digestive process is carried on in this organ, it is not surprising that derangement of the stomach is of very frequent occurrence in this animal. Until comparatively recent times, the feeding and management of dogs received but little attention.

Gastritis.—Acute inflammation of the stomach is very common in dogs. It may be specific, due to bacterial infection, or may be

caused by unsuitable feeding, or by the ingestion of poisonous substances. At first the dog is off his food, and listless; later vomiting on eating any food, and this vomiting becomes more persistent even though the animal refuses all food, even milk, but there is an inclination to drink cold water. *Treatment.*—Avoid all solid food, give albumin water—the white of an egg mixed with a saucerful of cold water. Gastric sedatives should be given; carbonate of bismuth, carbonate of soda, and chlorotone may be useful to relieve the vomiting. As soon as the stomach can retain food, give small quantities of one of the best extracts of meat every four hours.

Indigestion, or a want of tone to convert the food into nutriment, is mostly seen in old, fat, and pampered dogs. The symptoms are a morbid appetite, foul breath, and a great fancy for eating or chewing foreign bodies, such as rope, wood, rags, etc., accompanied by costiveness. When these are observed, the dog should be carefully watched and sparingly and regularly fed. The teeth too should be examined, as caries of the teeth is also a cause of indigestion. *Treatment.*—The following tonic alterative medicine can be given: 10 grains each of powdered aloes, rhubarb, bicarbonate of soda, and extract of gentian, made up into a small ball or pill, and given once every other day if necessary. The above dose is for an adult collie or spaniel, and larger and smaller doses ought to be regulated according to the age, size, and breed of the dog.

Costiveness (or retention of the fæcal matters in the intestine).—The fæces of the dog are, as a rule, of a very dry nature, and usually expelled with a large amount of straining, due to the great fondness the dog has for eating bones without a sufficiency of other food to counteract the dry, costive effect. The symptoms are somewhat analogous to those given in the preceding paragraph, but on pressure being applied to the belly with the fingers behind the ribs, the bowels feel hard and stiff, and pain is generally evinced. *Treatment.*—Purgatives must be given with great caution; it is well to soften the contents of the bowel by giving liquid paraffin, ½ to 2 tablespoonfuls daily, followed by the medicine named for indigestion; but the most reliance must be placed on enemas, and nothing is better than 1 ounce of glycerine mixed in ½ pint of warm water, and injected into the bowels once every eight hours if necessary.

Impaction of the Rectum (accumulation of fæces in the back bowel).—This arises from causes similar to those given in the above paragraph, and a similar treatment has to be adopted, only the hard impacted matter, which generally contains sharp pieces of bone, has to be removed with the finger, well oiled, assisted by the warm water and glycerine injections.

Diarrhœa, a discharge of the contents of the bowels in a fluid or semi-fluid condition, is often seen in the dog without any constitutional disturbance, and greatly depends on what the animal has been eating. *Treatment.*—Should the purgation become troublesome, a dose of castor oil—from 1 teaspoonful to 2 tablespoonfuls—followed later, if necessary, by 5 to 30 drops of chlorodyne, according to age and size of dog, may be given. This may be all that is required, but if necessary follow up with 5 to 20 grains subnitrate of bismuth, 10 to 60 grains carbonate of soda, and 10 to 60 grains carbonate of magnesia, according to age and size. Mix, and give in a little warm milk twice a day.

Worms.—A large number of worms are found in the intestines of the dog. The kinds mostly met with are the *Ascaris marginata*, or common round-worm of the dog, and the tape-worms. The *Ascaris marginata* varies in size from 2 inches to 6 inches, and is generally found in the stomach and small intestines, while occasionally they are vomited up. Young puppies are frequently infested with these worms as early as a fortnight old and upwards. For these young animals, small doses of santonin—from ½ to 1 grain given every four or six days in a little milk—answers best.

Tænia, or Tape-Worms.—These are segmented worms of which there are several kinds, and they are numerous in the dog. The life-histories of these are known, a cystic or bladder-worm stage of the parasite being passed in other hosts. The sheep, rabbit, hare, and flea are common hosts of the secondary stages of these worms. Some of these tape-worms are armed with hooklets, by means of which they cling very tenaciously to the intestine of the host dog. Probably most dogs harbour worms at some period in their life, and frequently without apparent injury to the dog. Segments of tape-worms may be seen at times in the fæces. When the worms are numerous, symptoms may be shown, and these vary; usually the appetite is good, but the animal loses flesh, has a rough,

staring coat, gummy eyes, and a dry nose. *Treatment.*—Preparations of the extract of areca nut are most suitable for expelling tape-worms. The powdered nut is now seldom given, as modern chemistry has provided us with many more convenient preparations. This medicine is either combined with, or to be followed by, an aperient.

Liver Disorders.—See Chapter VI., 'Digestive Organs.'

PIG.

Besides the specific diseases known as swine fever and swine erysipelas, which are widespread, and cause lesions in the alimentary canal, and which, on account of their importance, will be dealt with separately, the ailments most commonly met with are gastritis, or inflammation of the stomach, constipation, diarrhœa, worms, and protrusion of the rectum.

Gastritis.—Inflammation of the stomach is generally caused by consuming irritating indigestible substances, drinking salt brine, the presence of worms, etc. When attacked, the animal is very restless, refusing all foods, vomiting, and has a great thirst, while sometimes the attack is accompanied by diarrhœa or constipation. *Treatment.*—When constipation is present, small doses of castor oil in milk can be given every six or eight hours. Warm water and glycerine enemas should be given every six or eight hours, and flannels wrung out of hot water ought to be rolled round the body, with a waterproof covering above. When diarrhœa is present, small doses of castor oil, containing from 20 to 30 drops of laudanum, should be given at the onset, followed up with 20 grains each of bismuth, bicarbonate of soda, magnesia, and cassia, given in a little warm milk every six or eight hours if required. Young pigs often suffer from gastritis when fed on unboiled or unscalded Indian meal. When thus fed they are also liable to take fits. Indian meal should not, therefore, be given to very young pigs. Sharps or parings, with bran, well scalded or boiled, answer better.

Constipation in pigs is generally caused by injudicious feeding or through overfeeding on too much dry food. Sows that are close on pigging also often suffer both before and after parturition from obstinate constipation. *Treatment.*—If there is one thing more

than another that I advocate for this ailment it is croton oil. I know of no other animal that can stand dosing with this oil like the pig, and I have frequently given from 10 to 20 drops of it mixed in 1 teaspoonful of soft sugar and put on to the pig's tongue; this can be done without much trouble. Half the quantity may be repeated if necessary. Warm water enemas must be given three or four times in the twenty-four hours, while 2 quarts of cold water in which a dessertspoonful of bicarbonate of soda has been dissolved can be offered to drink, and this should be changed every four or five hours.

Diarrhœa, or **Scour**, is occasionally seen in the adult animal, and is generally the result of some offending matter in the alimentary canal or system; in fact, scour is at times nature's own cure. When seen, a dose of castor oil and laudanum may be given at the onset, followed up with bicarbonate of soda and bismuth. Young pigs are great sufferers from diarrhœa when sucking; it is mostly due to damp floors, bad drainage, and scarcity of good dry bedding—in fact, the want of good sanitation. *Treatment.*—First clean out the sty, thoroughly wash down the walls and floor with boiling water and carbolic acid, then limewash the walls. A good dry bed should be made of short straw or chaff, and the mother given teaspoonful doses of bicarbonate of soda three times a day in her food. Diarrhœa in pigs is also present in cases of tuberculosis.

Worms.—The most common worm of the pig is the *Ascaris suilla*, a worm creamy white in colour, and varying from 3 to 7 inches in length. It is found in the stomach and small intestine, and is of the nematode or round-worm order (Plate XVIII). A very large number of pigs are infested by this worm, although their presence is frequently unsuspected owing to lack of definite symptoms. The symptoms which may be noticed are: a general lack of thriftiness, the animal is restless and hide-bound, with the skin dirty, dry, and scaly; and when the worms are numerous there may be convulsions or fits. *Treatment.*—Santonin in doses of 2 to 10 grains is effectual.

Protrusion or **Eversion of the Rectum** is sometimes met with in young pigs, but most frequently in sows after parturition. When seen, the parts must be thoroughly washed with tepid water containing an antiseptic, smeared with extract of belladonna, and

returned, and then kept in its place by stitches of tape put across the opening.

Imperforate Anus.—Calves, lambs, and pigs are occasionally born with the end of the bowel covered up, and blinded by a continuation of the skin over the opening. On manipulating with the fingers, the hard fæces are felt underneath. It is very easy with a sharp knife to cut through the skin into the canal, and to dress the wound daily with an antiseptic mixture or ointment until the parts are healed, when the animal, as a rule, does well.

Swine Fever.

This is a specific disease of pigs, and is of a highly infectious character. It is rapidly spread by contact and cohabitation, and by putting healthy pigs into a place from which diseased animals have been taken, and which has not been properly disinfected. It is also easily spread by indirect means, the infective material being carried on the boots of persons visiting markets, or other places where affected pigs have been. As this disease is scheduled under the Diseases of Animals Acts, and is still prevalent in this country, it is important that pig owners should be familiar with the symptoms.

Swine fever is caused by a small organism, so small that it cannot be seen through a microscope. After exposure to infection, the malady has a period of incubation varying from five to seven days. Young animals are most commonly affected, though older pigs may be affected also, and may die. The virulence in outbreaks may vary considerably; in some cases symptoms will be slight—in fact, merely unthriftiness—with few deaths, while in other cases the mortality may be very high, and symptoms well marked.

Symptoms.—Affected pigs are unthrifty and show loss of appetite. They persist in lying, and show no inclination to stand up or walk about; in fact, are extremely prostrated, even from the very first, and if made to get up, lie down again immediately, pushing themselves under the straw. There is usually great thirst, and, as a rule, constipation, followed by diarrhœa. The breathing is quick, and at times laboured, accompanied by a grunt. As the disease progresses the pigs become very weak, look dejected, with tails

hanging straight down, and stagger, as if partially paralyzed in the hind-quarters. The skin under the belly and behind the ears is frequently discoloured with red patches, and deaths occur at intervals. Any of the above symptoms, especially when several deaths have occurred, should give rise to suspicion of swine fever, in which case the owner should report the matter to the local police. The post-mortem examination reveals that the organs principally affected are the large intestines (cæcum in particular), the stomach, and, in more advanced cases, the small intestine. At first these are inflamed, either diffusely, or with small red patches, which later become ulcers. In typical cases these ulcers have a centre of a

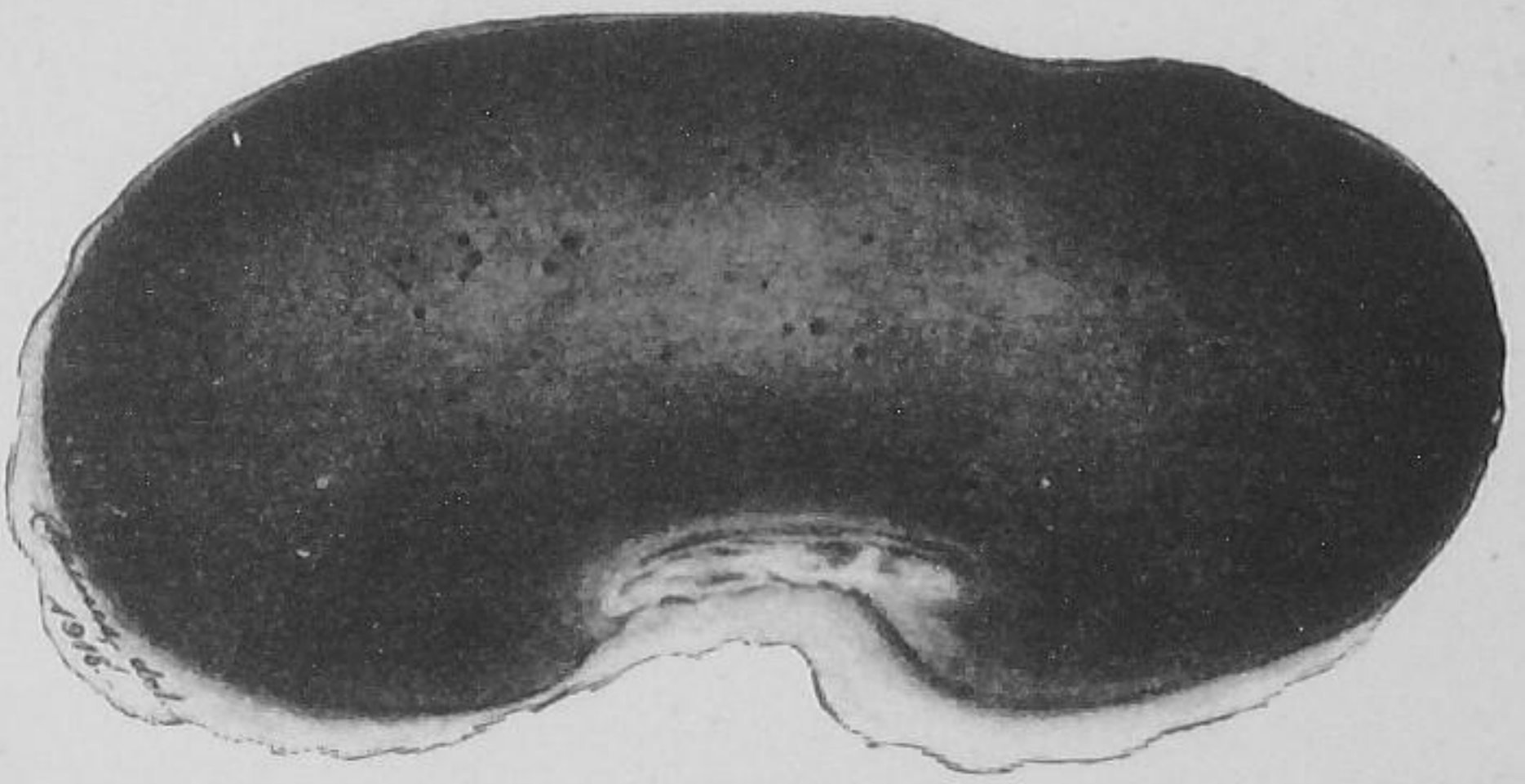


FIG. 19.—KIDNEY OF PIG AFFECTED WITH SWINE FEVER, SHOWING RED SPOTS (HÆMORRHAGES) ON THE SURFACE.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

dirty grey or dark appearance, surrounded by well-defined yellowish-red rings. The lymphatic glands in the abdomen are red and swollen, and the lungs are almost invariably affected with patches of pneumonia. Sometimes other organs become implicated, particularly the kidneys, which show small red spots on the surface, but the lesions in the alimentary tract are most to be depended upon in the diagnosis of the disease. *Treatment*.—While the treatment of pigs showing definite symptoms is not likely to be effectual, much may be done to limit the spread of the disease by attention to the sanitary conditions under which the pigs are kept; by isolation of all newly acquired pigs, especially those bought in the open market;

by early reporting of cases showing suspicious symptoms, and isolation of ailing pigs; and in suitable cases by serum inoculation. This last treatment is now known to be effectual when the conditions are suitable, and the Veterinary Officers of the Ministry of Agriculture will always advise as to which are favourable for that



FIG. 20.—PORTION OF CÆCUM (BLIND GUT) OF PIG AFFECTED WITH SWINE FEVER, SHOWING ULCERS.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

treatment. The inoculation of blood-serum from immunized pigs is effective for animals which are not already affected, in which case the swine fever serum gives a temporary immunity lasting for about ten days, and if, during that period, the pigs so treated are mixed with affected animals, they will take the disease in a mild form and should remain thereafter permanently immune,

or at any rate for the normal life of a pig. Recovered pigs should be fattened, as it is not advisable to breed from such animals.

Swine Erysipelas.

Swine erysipelas is a specific disease of pigs, occasionally mistaken for swine fever. It is contagious, though not scheduled under the Diseases of Animals Act, and is due to the bacillus of swine erysipelas. As this organism can live for a long time outside the animal body, the disease may be spread, not only by contagion from living pigs, but also by being taken from infected ground. It is widespread throughout the British Isles. The animals affected are usually older pigs than those affected by swine fever, and while in acute outbreaks there may be varying symptoms, and a number of deaths, more commonly only one or two deaths occur; the pigs are frequently fatting animals or sows in fairly good condition, and few symptoms are observed before a death occurs, either suddenly, or after about one day's illness. *Symptoms.*—These vary according as the outbreak is acute or of a mild type. In acute cases, a number of pigs may be ill, being off their food, lying under the litter in the sty; constipation may be present, followed by diarrhœa, and red patches appear on the ears, and on various parts of the body; these patches are roughly square, or diamond shaped, and are well seen in a dressed carcase; in some cases the joints swell and there is lameness. In less acute cases, symptoms may be slight or unobserved: a few pigs may be out of sorts, and off their food for a few days, and the red patches may be seen on the body; then they apparently recover. But in some of these recovered cases lesions develop in the heart, which may be the cause of sudden death later on when the pig is nearly fat. In these cases the valves of the heart are thickened, and in old cases there may be a considerable growth on the valves, or a quantity of fluid in the heart sac. *Treatment.*—The best treatment is by the inoculation of immunizing serum, which not only gives a certain period of protection against the disease (immunity), but, given early in affected animals, may be curative. While some of the symptoms in acute cases resemble those of swine fever, there are no ulcers present in the intestines in swine erysipelas. Where this disease is suspected, ailing pigs should be isolated, and thorough disinfection carried out.

EXPLANATION OF PLATE XXI

1. Cavity of the Mouth, with Teeth.
2. Tongue.
3. Roof of Mouth showing Ridges.
4. Pharynx or Throat.
5. Œsophagus or Gullet.
6. First Stomach or Paunch.
7. Left Upper Portion of Paunch.
8. Left Lower Portion of Paunch.
9. Spleen.
10. Second Stomach or Honeycomb.
11. Colon.
12. Cæcum.
13. Rectum.
14. Anus
15. Bladder.
16. Neck of Bladder.
17. Vagina.
18. Turbinated Bones in Nostrils.
19. Entrance to Larynx.
20. Trachea or Windpipe.
21. Thyroid Glands.
22. Left Lung.
23. Diaphragm.
24. Sternum or Breast Bone.
25. Section of Udder.

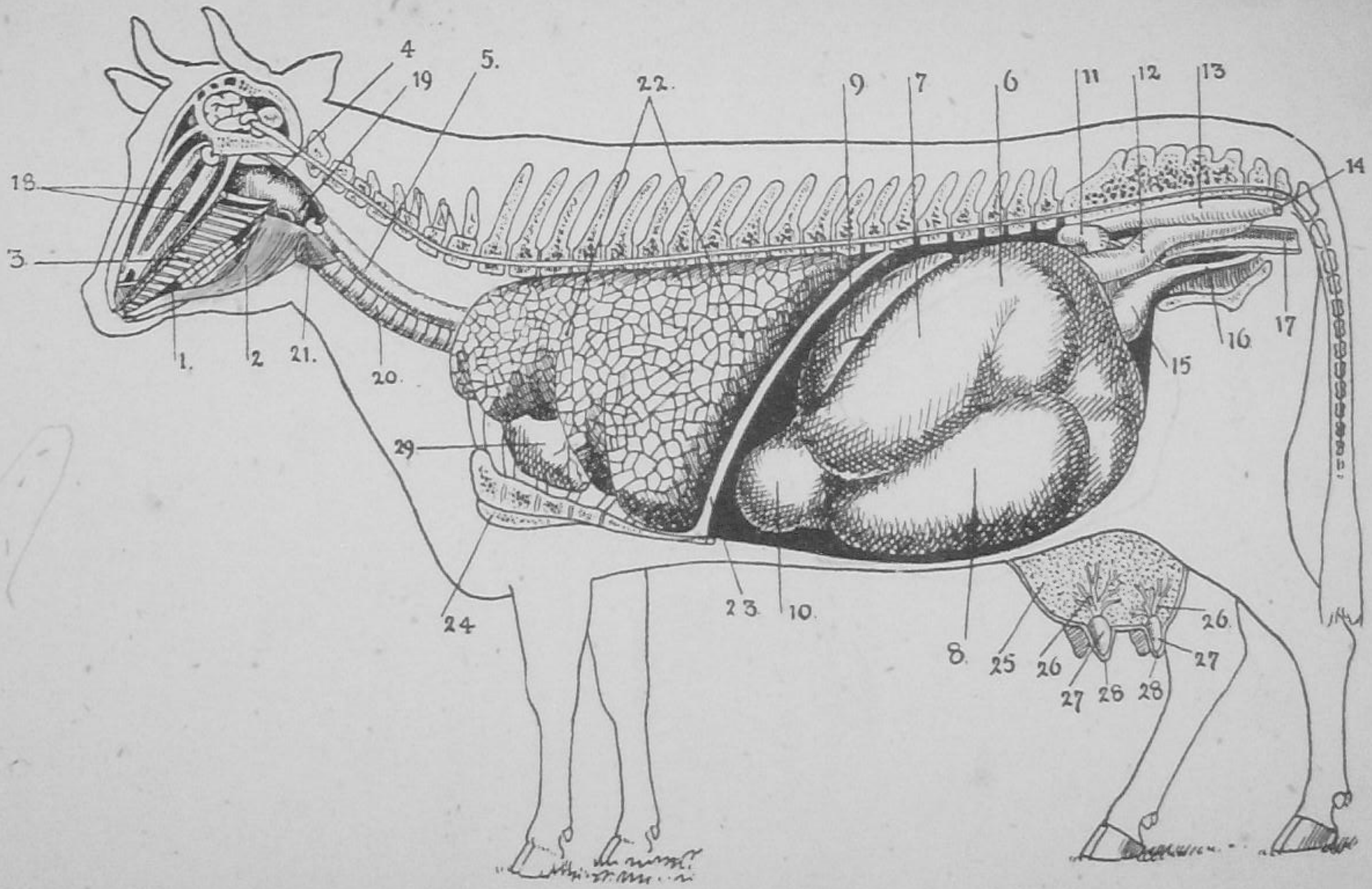
26, 26. Milk-collecting Ducts.

27, 27 Milk Sinus.

28, 28. Duct of Teat.

29. Heart.

PLATE XXI


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CHAPTER VI

THE DIGESTIVE ORGANS (*Continued*)

THE organs of digestion in ruminants, prior to the stomach itself, present few differences from those of the non-ruminants. Certainly, the mouth does contain distinctions; for whereas that of the horse has incisor teeth in both upper and lower jaws—six in each—cattle and sheep possess them in the lower jaw only, their place in the upper one being taken by a fibro-cartilaginous pad. The lower jaw of ruminants has eight incisors, and no canine teeth; the two corner incisors are sometimes regarded as modified canines, but they have completely taken the character of incisors. The tongue, too, is of a different shape, being short and pointed, and instead of having a smooth surface, it is extremely roughened by little papillæ. It is also the prehensile agent. The soft palate, though present, is much less developed than in the horse. When we come to the stomach, however, we encounter wide differences. Cattle and sheep have four stomachs, or, to be more precise, a stomach divided into four compartments.

The first is the *rumen*, or *paunch* (Plate XXII., Nos. 1 and 2, A A A A).

The second is the *reticulum*, or *honeycomb* (Plate XXII., C C).

The third is the *omasum*, or *manyplies* (Plate XXII., D D).

The fourth is the *abomasum*, or *true digestive stomach* (Plate XXII., E E).

The first, second, and third stomachs are compartments for storing and preparing the food—more particularly the cellulose portions of it—for digestion by the fourth.

The First Stomach, the **Rumen** (Plate XXII., A A A A), which is the largest of the four stomachs, and lies on the left side, occupies, in the adult animal, about three-quarters of the whole abdominal cavity. It has strong muscular bands running in the walls in various directions to assist and control its actions, and is

EXPLANATION OF PLATE XXII

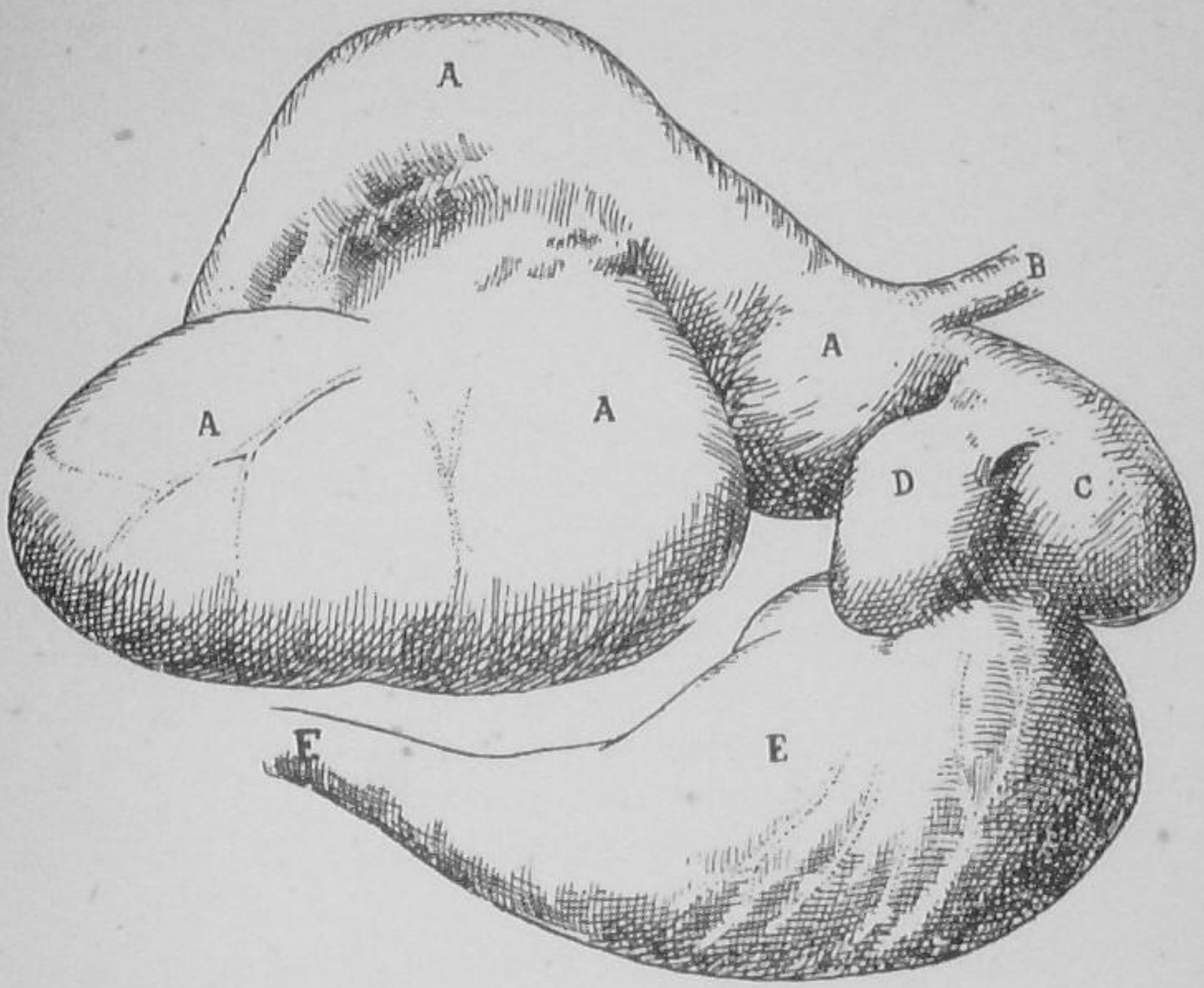
1. External Appearance of Cow's Stomach.

A A A A. First Stomach, Rumen or Paunch.
B. Œsophagus or Gullet.
C. Second Stomach, Reticulum or Honeycomb.
D. Third Stomach, Omasum or Manyplies.
E. Fourth, True Stomach, or Abomasum.
F. Pyloric Portion of Fourth Stomach.

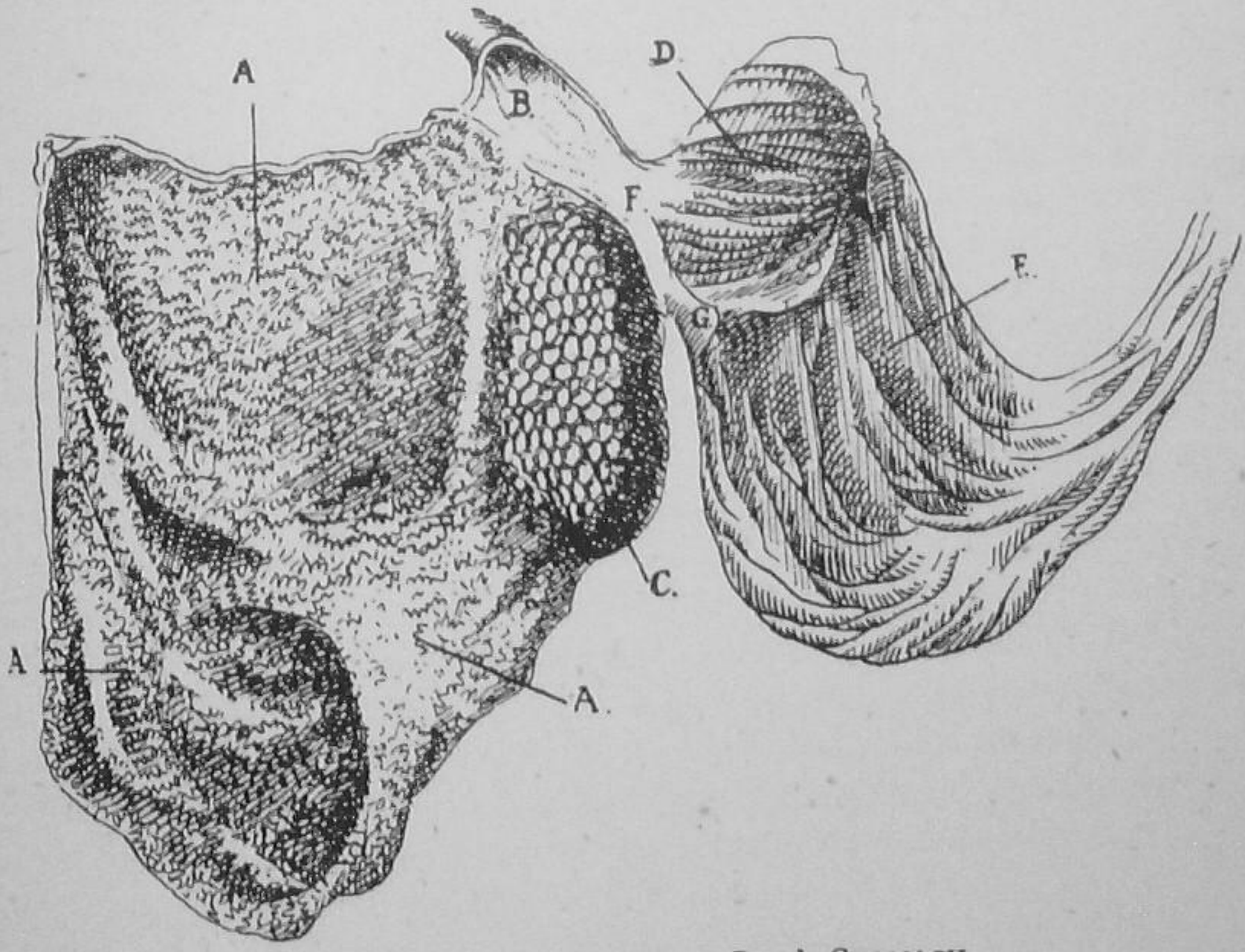
2. Internal Appearance of Cow's Stomach.

A A A. First Stomach, Rumen or Paunch, showing Pouches, Muscular Bands, and Papillæ.
B. Œsophagus or Gullet laid open.
C. Second Stomach, Reticulum, everted to show the honeycombed cell appearance.
D. Third Stomach, showing the Leaves.
E. Fourth Stomach, with its numerous folds.
F. Œsophageal Canal leading to Third Stomach.
G. Œsophageal Canal entering the Fourth Stomach.
H. Small Intestine.

PLATE XXII



1. External Appearance of Cow's Stomach.



2. Internal Appearance of Cow's Stomach.

very strong. It is lined with cuticular mucous membrane, which is studded all over with little projections or papillæ.

The Second Stomach, the **Honeycomb** (Plate XXII., C C), which is the smallest of the four stomachs, is also lined with cuticular mucous membrane that is pitted all over with little cells, giving it a resemblance to honeycomb, and is covered with papillæ.

The Third Stomach, the **Manyplies** (Plate XXII., D D), has its lining membrane arranged in a peculiar manner, forming a large number of leaves, or folds; hence its name, *psalterium*, or *omasum*—manyfolds, or manyplies. The leaves run lengthwise, and extend from one end to the other, one border being free, while the other is attached to the wall of the stomach. Between the large leaves there are smaller ones, all being covered with small projections, or papillæ. The function of this stomach is to press and triturate the food before it passes into the fourth stomach.

The Fourth Stomach, the **Abomasum** (Plate XXII., E E), is the true digestive stomach, and in the calf it is much the largest. The interior presents the appearance of large folds, running lengthwise over its surface, and this mucous membrane is soft, velvety, and of a pale pink hue. Here the food is chemically acted upon, as described.

Rumination, or Chewing the Cud.—This process consists of returning the coarsely masticated food, stored in the rumen, back into the mouth, there to be remasticated. Some portions of the food are returned several times, whilst others only require one chewing. The food is taken into the rumen, where it remains macerating for a time, being moistened by liquid thrown across from the reticulum, through the large opening between these two compartments. During this time it is constantly being turned over by the action of the muscular walls of the rumen, and pellets of food are from time to time forced on to the groove which forms the termination of the œsophagus, and sent back to the mouth for further mastication—chewing the cud. On being swallowed a second time, if sufficiently masticated, it passes straight through to the omasum, where it is rubbed between the leaves of that organ into a paste, and then passes on to the abomasum, where digestion takes place as in the stomachs of other animals.

The small intestine in cattle is much less in diameter than that of the horse, yet it is about twice as long, being about 140 feet in length. The large intestine is about 36 feet in length. The cæcum, or first portion of the large intestine, is very simple, and oblong in shape; its free or blind end is rounded, and without any bands or furrows. It joins the *colon* at its other extremity, where it also receives the insertion of the small intestine. The colon, or second portion of the large intestine, is narrow and without bands or furrows, and is arranged in irregular coils, and finally ends in the rectum.

Sheep.—The *alimentary canal* in sheep resembles that of cattle throughout.

DERANGEMENTS AND DISEASES OF THE ALIMENTARY CANAL AND ACCESSORY ORGANS.

While in the horse the intestines are most frequently affected, cattle suffer principally from derangements and diseases of the stomachs.

Hoven, or **Tympanites**, an overdistension of the rumen with gases, is of very frequent occurrence. The causes are many; but one, the most common, is from cattle being turned on to clover and gorging themselves. Hoven from such a cause is very acute and dangerous, and frequently fatal if not speedily relieved. Eating frosted turnips or mouldy grain, or drinking snow water, are also frequent causes of tympanites. *Treatment.*—Give 1 wineglassful of turpentine in 1 pint of raw linseed oil. Should this not give immediate relief, a probang, which is a flexible tube, may be passed through the mouth into the stomach; should no probang be available, the patient must be punctured *on the left side* with a trocar and canula; if this instrument also is not to be had, then, in case of extreme urgency, plunge the large blade of a pocket knife into the stomach and turn it crossways, when the gas will escape. Fermentation of food is another common cause, and nothing is worse for this than an overfeed of potatoes, followed by a hearty drink of cold water. A beast that has unfortunately gained access to a potato heap and gorged should not be allowed any water for three or four days. As distension from this cause is extremely dangerous,

the contents being of a yeasty character, it should be fed on small quantities of rough straw. *Treatment* in such a case is to administer 2 ounces of bicarbonate of soda in 1 pint of cold water, with ½ pint of whisky; or 4 ounces of hyposulphite of soda in the same quantity of water and spirit. If this does not give speedy relief, then the probang may be used, or the trocar and canula inserted into the side, and the hyposulphite of soda and water, as above, or a solution of chloride of lime, be injected into the stomach through the canula by a small enema syringe. Choking with potatoes, turnips, etc., also causes the stomach to be distended with gas. When the animal picks up foreign bodies, such as stones, bones, leather, wood, etc., or has tumours, abscesses, or hair-balls in its stomach, there are periodical or intermittent distensions about every five or six hours. These are very difficult to treat. Tablespoonful doses of *chloride of lime* in milk, or 2 ounces of hyposulphite of soda in water, at times gives relief in such cases. In all these cases, the sooner professional advice is got, the better for the animal and the owner as well.

Impaction of the Rumen (*Plenalvia, Grain Sickness*—an over-distension of the stomach with food).—This derangement occurs in stall-fed animals, more particularly if they have had an excess of dry food, such as meals (of doubtful quality) or frosted turnips. The walls of the stomach become partially paralyzed, and their actions are suspended. *Symptoms.*—On pressing the fingers into the flank, between the last rib and haunch bone, the stomach is felt to be full and doughy, and at times slightly 'drummy.' The animal stands perfectly still, emitting a peculiar grunt. The head is extended, nose slightly lowered, and back arched, while there is a thoughtful expression on the face. The pulse may, or may not, be disturbed. The appetite is entirely gone, and rumination is suspended; while in the milch cow the secretion is stopped. There is generally slight diarrhœa at the onset, but this soon stops, and then no fæces are passed for some days. *Treatment.*—If gas is present, 1 pint of linseed oil and 2 ounces of turpentine should be given first, followed up in an hour or so by 10 to 16 ounces of Epsom salts, along with 2 ounces each of powdered ginger and sweet peppers, or other aromatics. These should be given in a quart of thin gruel, mixed with another pint of oil. Owing to the distension, the walls of the

stomach lose their tone and become inert, and are unable to perform their function, the derangement often being further aggravated by the owner continually dosing the animal with too many sickly purgatives instead of administering warm stimulating tonics and cordials, which are mostly required after the first purgative has been given. These cases require time and patience, as they are very difficult to manage, for in many instances, and according to the will and condition of the animal, the medicine drops into the paunch or rumen and remains inert, whilst in other cases the drench passes along the œsophageal canal, through the third and fourth stomachs, and establishes its action.

When the rumen has become very much impacted by the animal getting loose in the byre and gorging itself with corn or other foods, medicine has little or no effect. Good results are sometimes had by cutting into the stomach on the left side, making an opening about 6 or 8 inches long, and emptying the rumen with the hand. This operation is called *rumenotomy*, and should be performed only by a fully qualified professional man, as there are several important points to be observed before, during, and after the operation. When the rumen has been distended either with gas or food, and after relief has been given, it will be some considerable time before the stomach regains its normal tone, and the animal, therefore, has to be fed with great care and judgment. In such cases of distension, if the animal is a cow in calf, she is almost sure to abort.

Vomition, or **Vomiting**, a forcible ejection of the contents of the stomach through the mouth, while not of frequent occurrence in either, is more often found in cattle than the horse. It has been said that the horse cannot vomit; but it occasionally does occur, when the stomach is so distended with gas or food that it is in contact with the body wall. In such case the effort of vomition may cause a rupture of the stomach. If this occurs, there will be no further vomiting, but the result is invariably fatal.

The Second Stomach.—There are no set symptoms to indicate any derangement of this compartment. In cases of derangement of the paunch the second stomach is also more or less implicated.

Impaction of the Third Stomach—Fardel Bound.—Cattle, when hard fed in stalls, or through eating old, dead grass, or the

deciduous stipules or 'bud scales' falling from oak trees, frequently suffer from indigestion and constipation. Here rumination, the action of the bowels, and the secretion of milk are suspended. The animal stands in an extremely stiff and listless fashion, emitting a *continuous grunt* and grinding its teeth. The functions of the manyfolds being stopped, the leaves of the organ become partially paralyzed from impaction of the food. Any of the causes affecting the rumen may also occasion derangement of this pouch, and a somewhat similar *treatment* must be adopted. Small doses of purgative medicine, with cordials, and from 12 to 15 ounces of linseed oil or castor oil, may be given with advantage every six or eight hours, following up this treatment by offering small quantities of rough oat sheaf, dry hay, cabbage leaves, etc., to induce and encourage the action of the stomach, and hay, nettle, or bran tea and cold water freely to drink. Occasionally foreign bodies, such as stones, nails, etc., find their way through the opening into this stomach, and stick there. *Inflammation* of the first, second, and third stomachs is very rare, either in cattle or sheep.

The Fourth, or Digestive, Stomach suffers most from inflammation (gastritis). It is frequently caused by the drinking of strong acids, or through mineral, alkaline, or fungoid poisons, etc. As already stated, the first three stomachs, being merely organs for preparing the food for digestion by the fourth, are lined by cuticular mucous membrane, having no digestive glands, and poisonous materials rarely have much effect on them; but when the poison reaches the fourth stomach, with its fine velvety mucous membrane and digestive function, it soon establishes its action. We have known arsenic to have been taken by cattle, which showed no ill-effect till the fourth and up to the eighth day, when the poisonous action set in, killing them in from four to six hours. The abdominal pain, perspiration, and excitement in these cases were something frightful to see; the animals became quite frantic, then dropped down and died suddenly. Irritation and inflammation of this stomach is at times also set up by the irritating husks of castor or croton beans and other deleterious seeds having been incorporated in feeding cakes. Moulded cakes, particularly undecorticated cotton cake, have also a very injurious and frequently fatal action on this stomach.

Micro-organisms. — Several specific diseases due to micro-organisms are associated with acute gastritis. *Parasitic gastritis*, due to the invasion of the mucous membrane of the fourth stomach by strongyles, and other thread-like parasites, is common in both cattle and sheep. Young animals particularly are affected, the symptoms being diarrhœa, emaciation, exhaustion, and probably some deaths. *Treatment*.—First find out the cause, and, if possible, remove it. As the subsequent treatment will depend on the accuracy of the diagnosis, it is advisable to seek for professional advice as early as possible.

Lead Poisoning is both *acute* and *chronic*. In the acute cases the attack is sudden, and resembles stomach staggers at first, or the later stages of milk fever, accompanied by paralysis and coma, and may be caused by the animal picking up spent bullets near rifle ranges or grazing on lands near lead-smelting works, but it is most frequently seen on pastures where town rubbish has been spread, or where the scrapings of paint tins and tea lead have been deposited; sometimes it is due to the animal getting to tins of white lead and eating the contents. The salts of lead are very sweet, and cattle eat them with great relish. *Treatment* is generally of very little avail; 60-drop doses of sulphuric acid, largely diluted with cold water, might be pumped into the stomach, to act on the lead chemically, and form the insoluble sulphate of lead; and this should be followed up by ½-pint doses of raw linseed oil every six or eight hours. In chronic lead poisoning the animal slowly dwindles away, blue lines being noticed round the gums. Thirty-drop doses of sulphuric acid, with 1 drachm of sulphate of quinine, given in 1 quart of cold water twice a day, is in such cases useful.

Vegetable Poisons.—Plants of a poisonous nature are many, and, considering their distribution, it is astonishing that there are not more fatal cases. Some of the most common and well-known poisonous plants are as follows: Meadow saffron (*Colchicum autumnale*); hemlock (*Conium maculatum*); fool's parsley (*Æthusa cynapium*); water hemlock, or cowbane (*Cicuta virosa*); water dropwort, or dead tongue (*Œnanthe crocata*); deadly nightshade (*Atropa belladonna*); foxglove (*Digitalis purpurea*); monkshood (*Aconitum napellus*); yew tree (*Taxus baccata*); rhododendron (*Ponticum*). The half-dried twigs of the yew tree and rhodo-

dendron, as already stated, are more acute and dangerous than the green branches. The water dropwort, or dead tongue, is sometimes mistaken for water hemlock, or cowbane; both plants are, however, poisonous to cattle, and great care should be taken, when ditches are being cleaned out, that the roots of these plants are gathered, dried and burnt, as, when half-dried, cattle are very fond of them. The green leaf of the foxglove in the winter months, when the ground is covered with snow, is also dangerous to sheep, and should be cut down and removed from pastures on which sheep are grazing. Vegetable poisons usually prove fatal on account of the peculiar arrangement of the stomach compartments of cattle and sheep, which permits of large quantities of the poisonous material being gathered before the poisonous action is established, thus rendering treatment of little avail. *Acorns.*—Although pigs eat acorns with impunity, yet when taken in excess by horses and cattle they are very dangerous, causing indigestion and, at times, death. When plentiful, they should be gathered off the ground. Two tablespoonfuls of ground coffee put into 2 quarts of hot water, stirred well up, and drenched into the animal every four or five hours in cases of vegetable poisoning, has a highly beneficial action. An occasional teacupful of raw linseed oil can also be added with advantage. In arriving at a diagnosis of the nature of the vegetable poisoning, assistance may be obtained by finding recognizable portions of leaves in the rumen; or evidence of the particular plant having been eaten may be found in the fields.

Stomach Staggers, acute indigestion with head symptoms, is most frequently seen in the summer months. This particular phase of indigestion may possibly be caused by fungus-infected plants. It is said to be associated with rye and rye grass, especially when these are in flower. *Symptoms.*—The animal stops feeding and chewing the cud; the hair looks dingy and on end, with muzzle dry; the sides appear flat, the belly tucked up, and the patient is very listless. If a milch cow, she suddenly drops off her milk. This goes on for thirty-six or forty-eight hours, when the pupil of the eye is noticed to be dilated, and the eye has a starry appea-r ance; the breathing is slow and heavy, and the animal stands over on its fetlocks. At the commencement there is slight diarrhœa, followed by considerable constipation, due to the want of nervous

energy in the stomachs and bowels. If large doses of purgative medicine have been given, there may be a watery discharge from the bowels, but little or no fæces. At this stage the animal begins to press its head against the wall and snores loudly, or when let out seems quite blind, rushing forward or backward, and tumbling over any object which may be in the way. *Treatment.*—The administration of strong saline purgatives, such as Epsom or Glauber's salts, is to be strongly condemned. In the first stages raw linseed oil in from 8 to 10 ounce doses, mixed with 1 drachm of quinine and a teacupful of whisky, should be given every six or eight hours in 2 quarts of strong coffee; plenty of boiled gruel, linseed jelly, and bran or hay tea and cold water, should be offered the animal to drink, the object being to get some food into the stomach to neutralize, or at least modify, the action of that which is causing the complaint. Once the patient begins to press its head against the wall, the best plan is to have it slaughtered.

Spasmodic Colic in cattle is mostly manifested by the animal kicking at its belly, switching and twisting the tail, lying down, and getting up with occasional intervals of rests, for one or two hours, when a renewed attack occurs, and this condition lasts for twelve or more hours. As already stated, the arrangement of the intestines in cattle is quite different to that of the horse; they are much smaller, but a great deal longer. On account of cattle being of a less excitable temperament, they do not suffer so much as the horse from bowel complaints, but are more prone to stomach derangements. Spasmodic colic in the cow is sometimes readily enough relieved, but at others may go on for some days. *Treatment.*—From 8 to 12 ounces of linseed oil should be given, mixed with $\frac{1}{2}$ to 2 ounces each of chlorodyne and turpentine, and half the quantity repeated in six or eight hours if necessary.

Enteritis, or inflammation of the bowels, in cattle is, happily, very rare. The animal lingers on for four to six days, whereas in the horse it would prove fatal in as many hours. Nor do cattle exhibit the acute symptoms seen in the horse, but lie continuously, breathing quickly, with a sharp, moaning grunt, and appearing very much depressed. *Treatment.*—Chlorodyne from 4 drachms to 2 ounces, or the same quantity of laudanum, in 8 to 12 ounces raw linseed oil, can be given every four to eight hours, and blankets

wrung out of hot water should be rolled around the body, with a waterproof covering on the top.

Gut-tie is a condition occasionally occurring in young bullocks. It is generally due to the end of the spermatic cord, left after castration, becoming entangled round a portion of the bowel. The animal stops feeding, twitches the hind-quarters, elevates and twists the tail, crosses one hind-leg over the other, and occasionally, with pain, passes a small quantity of bloody mucus. If let out, it has a great tendency to walk backwards, and, if near a bank, will back its hind-legs on to the top, and stand with its fore-feet in the ditch. This appears to give great relief. *Treatment.*—It is dangerous in this ailment to give large doses of purgative medicine. If definitely diagnosed, small doses (5 to 8 ounces) of linseed oil, with 1 ounce of chlorodyne, may be given every six or eight hours to keep the patient quiet. Another remedy recommended is to cut into the right flank, pass the hand through the opening, and endeavour to find the cord and divide it, if possible; but this operation should only be attempted by a professional expert.

Before going any farther, a word of caution may here be added, which is, never to horn gruel into an animal recovering from an illness, as is too frequently done. If the patient will drink cold water, hay or nettle tea, milk, or oatmeal gruel, offer them frequently, and entice it to eat with all sorts of titbits of food—oat sheaf for preference, or good hay, sliced potatoes, etc.—so as to induce chewing the cud, which the horning in of nutriment prevents, and therefore retards recovery. In all ailments in cattle one very pronounced symptom is evident, that being the dryness of the muzzle.

Diarrhœa, or **Scour**, is *acute*, *chronic*, and *intermittent*, and a very common complaint in cattle. It is due to a variety of causes, such as eating frosted turnips, mouldy food, or any irritant in the intestinal canal; or to worms, liver flukes, tuberculosis, or Johne's disease. Diarrhœa, in fact, is, as a rule, a symptom of intestinal irritation, whatever the cause of that irritation may be, and it may be regarded as a natural effort to expel the irritant. If long continued, however, it has a very weakening effect, and sometimes is found accompanying debilitating diseases, such as influenza, septicæmia, navel infection in young animals, etc. Seeing

that there is such a multitude of causes, it is of the greatest importance to the owner, as well as to the veterinary surgeon, to find *the cause*, and treat accordingly. Upon no consideration should diarrhœa be stopped suddenly. *Treatment.*—For cases other than specific diseases, in the early stages give a dose of castor oil, from 1 ounce (for very young calves) up to 1½ pints, according to the age and size of the animal. This alone is frequently sufficient to assist nature in expelling the offending irritant; if not, then give 1 drachm to 2 ounces of chlorodyne, diluted with water, following it up with vegetable tonics. Good nutritious food of an easily digestible character should also be given, such as crushed oats, bran, and linseed cake, milk, and linseed jelly, and upon no consideration should a small quantity of salt be omitted from the food at each end of the day. Where the affection is attributable to worms, treatment similar to that for worms in horses (p. 159) may be adopted.

Liver Fluke is a frequent producer of diarrhœa, and often with a fatal result, both in young cattle and sheep. As it is also the cause of a great amount of troublesome litigation amongst neighbours, a sketch of its character may not be out of place here. The liver fluke, or *Distoma hepaticum*, is of the order Trematoda, or flat-worms. It has a very interesting history, passing through seven stages between fluke and fluke, six of which are accomplished outside the body of the sheep, or other host (Plates XXIII. and XXIV. show the various stages through which it passes). The flukes are bisexual, having both male and female organs in one body, and are generated from little eggs. These eggs are developed inside the parent fluke, which lies in the bile ducts of the liver of the host, and are ejected from the parent by one of its openings and carried by the bile to the intestines, and there eventually carried, ejected, and deposited on the ground in the droppings. As many as 200 flukes have been counted in one liver, whilst each fluke may produce a very large number of eggs. Mr. A. P. Thomas's summary of the life-history is as follows:

'The adult fluke in the liver of the sheep produces enormous numbers of eggs, which are distributed with the droppings of the sheep. If these eggs have moisture, and a suitable degree of warmth, they continue to live, and in each is formed an *embryo*. The embryo leaves the egg, and swims in search of

PLATE XXIII

A. The Egg of the Liver Fluke. 1. The Lid or Cap.
B. The Egg of the Fluke, containing an Embryo ready for Hatching. 1. The Cap or Lid.
C. The Ciliated Embryo of the Fluke boring into a Snail (*Limnæus truncatulus*).
D. A Young Sporocyst dividing into Two.
E. A Fully-developed Sporocyst, showing a Young Redia. 1. The Young Redia.
F. A Redia, showing Mouth and Stomach.

the particular snail, *Limnæus truncatulus*, within which its future life and growth take place. The embryo bores into the snail, and then grows into the form which is called a *sporocyst*. The *sporocyst* gives rise to the second generation. This is known as *rediæ*. The *rediæ* in turn produce the third generation, which has the form of a tadpole, and is called *cercariæ*. The *cercariæ* quit the snail, and enclose themselves in envelopes, or *cysts*, which are attached to the grass. When the grass to which the *cysts* adhere is eaten by the sheep, or other suitable host, the young liver fluke comes out of the *cyst* and takes up its abode in the liver of its host, and the fatal circle is thus completed. It will be seen, therefore, that the fluke disease is one which alternates between a particular snail and the sheep. A sheep cannot take the infection *directly* from another sheep, nor can one snail take it *directly* from another snail. The sheep, by spreading the eggs of the fluke, gives infection to the snail, and the snail in turn, by harbouring and distributing the *cercariæ*, conveys the infection to the sheep.

'The conditions necessary for the existence of liver rot in any given locality are as follows:

'1. There must be fluke eggs on the ground.

'2. There must be wet ground, or water, during the warmer weather for the eggs to hatch in.

'3. A particular snail, called *Limnæus truncatulus*, must be present.

'4. Sheep, or other animals, must be allowed to feed on the same ground without proper precautions being taken.

'If any one of these conditions remains unsatisfied, there can be no fluke disease or liver rot in the locality.

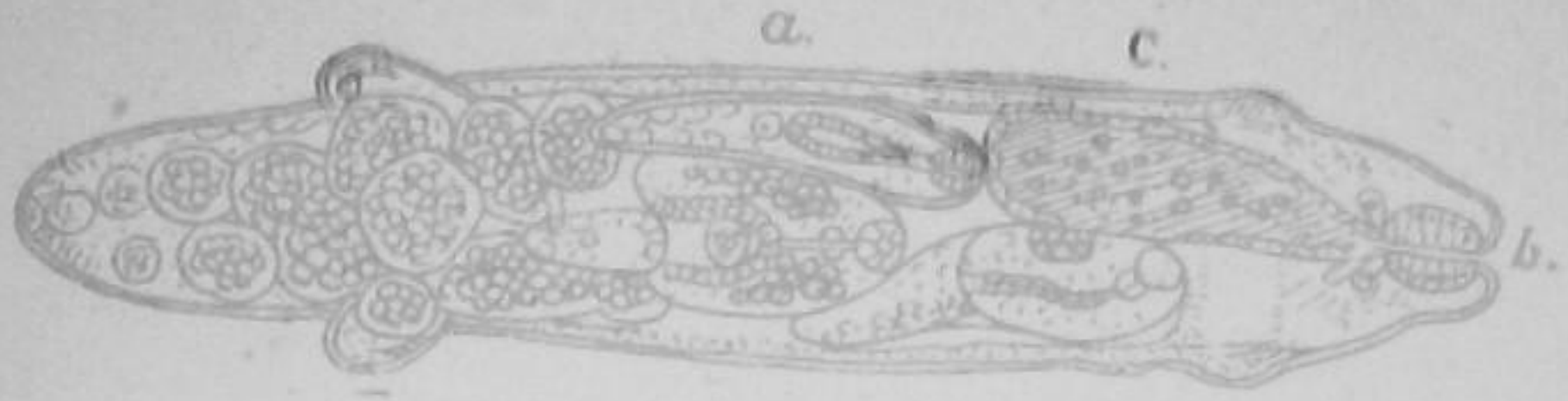
'If the eggs of the liver fluke are to be hatched, they must be in water, or, at least, be kept moist, during some weeks of warm weather, or even some months if the temperature be lower. If the eggs are once thoroughly dried, their vitality is destroyed, the side of the shell being usually crushed in. A temperature of about 74° to 78° F. is the most favourable, and then the embryo is formed in about two or three weeks; with less warmth progress is slower, and with an average temperature of 60° the growth occupies two or three months.'

From the foregoing summary it will be seen that the snail (*Limnæa truncatula*) is necessary to complete the life-cycle of the fluke. Marshy land and wet summers favour the attacks of the disease. Sheep and cattle are most commonly infected during the autumn months—from August to October. *Treatment* may be preventive or curative. The former is directed towards breaking the continuity of the life-cycle of the fluke by destroying the snail. With this object, wet land should be drained. Where it is not possible to do this efficiently, it should be dressed with copper sulphate, which destroys the snail; this may be applied by spraying in solution ($\frac{1}{2}$ to 2 per cent. of copper sulphate), or may be spread

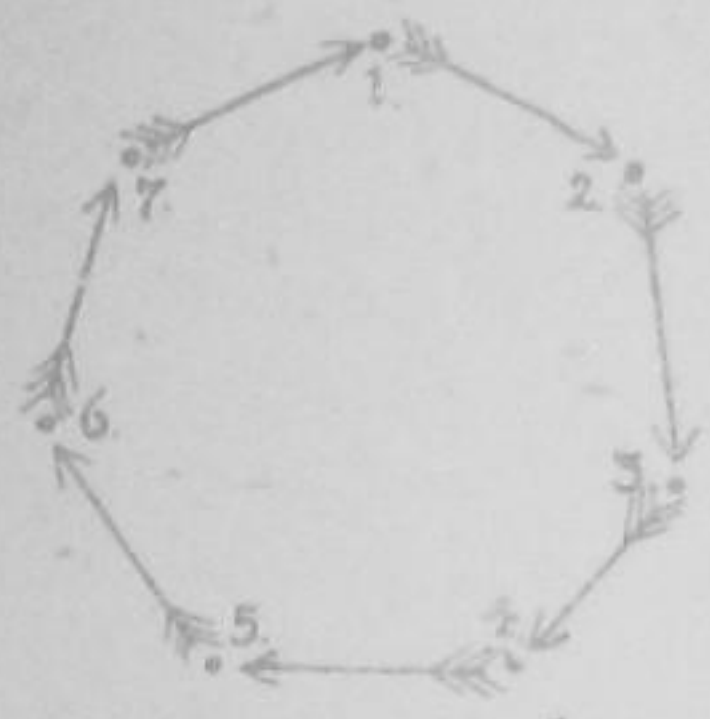
in powder form, mixed with fine, dry sand to facilitate its distribution. The dressing should be applied in August or September. Curative treatment is applied to infected animals. Extract of male fern and carbon tetrachloride are suitable remedies for this purpose; but, as before pointed out, these require to be administered with great caution, or deaths may occur, and they should be given under the advice of a qualified veterinary surgeon. Cattle appear to be more susceptible to the poisonous effects of carbon tetrachloride than sheep.

Johne's Disease.—One of the most common causes of diarrhœa in cattle, and at the same time one of the most serious, is a form of chronic specific enteritis, known in this country by the name of Johne's disease—Johne being the discoverer of the causal organism. In America it is called 'chronic bacterial dysentery.' This disease is frequently mistaken for intestinal tuberculosis, many of the symptoms being similar, both conditions producing the emaciation in cattle which causes them to be recognized as 'wasters'; and, like intestinal tuberculosis, it is very infectious. The onset is insidious: for months there may be little to observe but a certain amount of intermittent diarrhœa, staring coat, and unthriftiness; the animal eats well, and the temperature is normal. Later these symptoms become more pronounced as the disease is well advanced. This is particularly noticeable in the case of a milking cow after calving; she may have shown few signs before, but, when the calf has been born, she may rapidly waste and die. In the acute stage the liquid fæces appears frothy, containing bubbles, but this sign is not to be considered as absolutely diagnostic. On post-mortem examination the most striking lesion found is a thickening of the latter part of the small intestine, which, in advanced cases, shows deep wrinkles; the lymphatic glands are also swollen. From the thickened mucous membrane Johne's bacillus can be recovered in large numbers. Unfortunately, treatment of individual cases is not successful; the usual bowel astringents may be followed by some remission for a time, but the diarrhœa returns. A few cases, however, seem to recover naturally. Seeing the uncertainty of the early signs, and the infectious nature of the disease, it becomes of first importance to make a diagnosis as early as possible, and limit the spread of the disease by separating

PLATE XXIV



A FULLY-DEVELOPED REDIA, SHOWING—
a. A Young Redia. *b*. The Mouth. *c*. The Stomach.

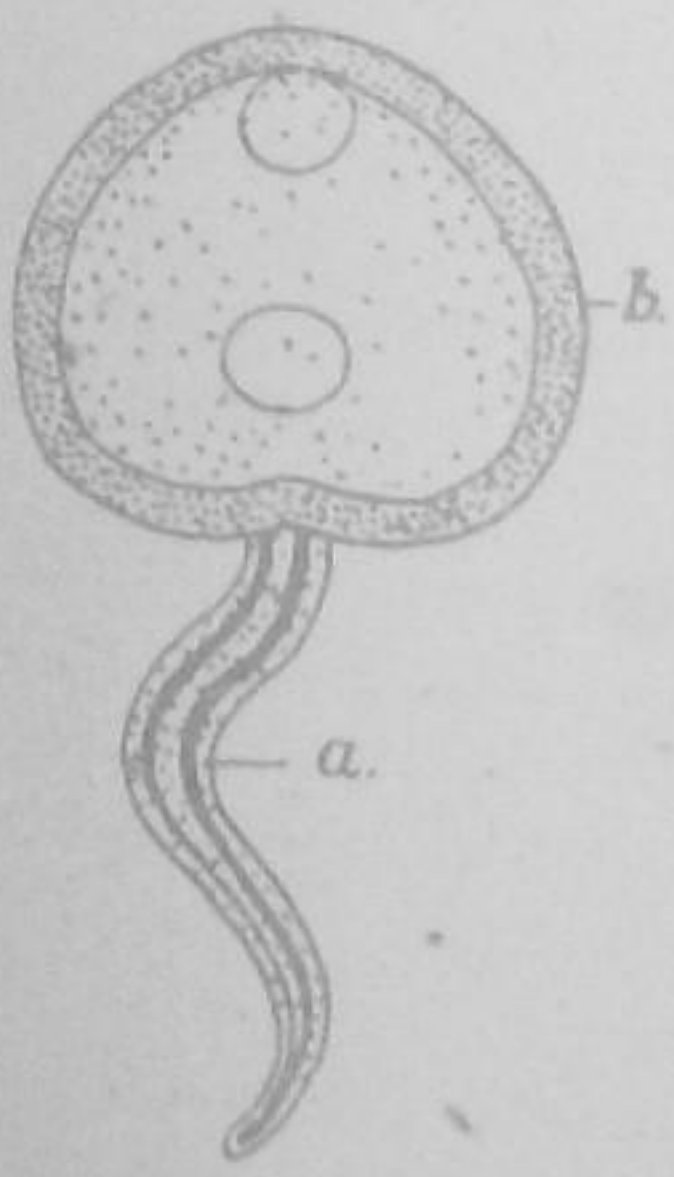


REPRESENTS THE LIFE-HISTORY OF THE LIVER FLUKE.

1. The Fertilized Egg. 2. The Ciliated Embryo. 3. The Sporocyst. 4. The Redia. 5. The Cercaria. 6. The Encysted Cercaria (Pupa). 7. The Full-grown Fluke.



A PORTION OF STEM OF GRASS, SHOWING—
a. The Cysts fixed to the same, each Cyst containing the Pupa of the future Liver Fluke ready to be swallowed by Sheep.



A CERCARIA OF LIVER FLUKE, SHOWING—
a. The Tail, by which it swims.
b. The Cyst or Envelope.



A FULL-GROWN FLUKE, SHOWING THE DIGESTIVE SYSTEM, AND—
a. The Mouth.



AN ADULT FLUKE SHOWING THE REPRODUCTIVE ORGAN AS BRANCHES, AND—
a. The Mouth.

all affected animals. Many attempts have been made to prepare a diagnostic agent in order to facilitate an early diagnosis. The latest—known by the name of *Johnin*—appears to be most reliable. This test is a very delicate one, and requires care and skill in application and interpretation, and should only be applied by a qualified veterinary surgeon. Used, after the manner of tuberculin, by intradermal injection—*i.e.*, into the skin—a positive reaction will indicate the infected, even when few general symptoms are to be seen. By this means the diseased can be detected, and isolated from healthy cattle. Thorough disinfection of places where the affected have been should be carried out, and such affected animals as appear hopeless, or can be used for meat, should be slaughtered. Sheep are also occasionally affected.

Intestinal Tuberculosis is another of the most common causes of diarrhœa in cattle; many of the symptoms resemble those of Johne's disease, but there are commonly signs of tuberculosis elsewhere in the body also. This condition will be dealt with later under Tuberculosis.

Dysentery is the name given to diarrhœa which is blood-stained. It may be caused by any very intense irritation of the intestinal tract, or may be a symptom of some specific disease, as, for example, tuberculosis, or hæmorrhagic septicæmia. *Treatment.*—As for diarrhœa (p. 196).

Peritonitis consists of inflammation of the serous membrane, called the 'peritoneum,' which lines the inside walls of the belly and covers the outside of the bowels, and also forms the net or mesentery. Injuries—the results of foaling, calving, lambing, or castrating, and wounds penetrating the abdominal cavity—are the principal causes of peritonitis, while, at times, it accompanies other diseases, such as tuberculosis, swine erysipelas, or septic metritis. This disease steals on so insidiously that the affected animal is generally at death's door before much notice is taken of it. This is especially noticeable in the horse, which generally dies in a few hours after being noticed. But the cow may linger on for a few days, having a dull, anxious look, with eyes red and suffused, hurried breathing (which is mainly done by the front ribs), moaning, and grinding of the teeth, trembling of the limbs, and deathly coldness pervades the whole body; there is acute fever, and death

from septicæmia frequently occurs. On post-mortem examination the peritoneal cavity is found to contain a large quantity of straw-coloured fluid, or even pus may be present; while, if the condition has lasted for any time, the intestines and other organs in the cavity may be covered with a fibrinous deposit, and adherent to the body wall. *Treatment.*—This is not, as a rule, hopeful. When the disease is discovered injections of morphia should be given, and cloths wrung out of hot water rolled round the body, covering these again with dry rugs and waterproof sheeting.

Dropsy, or Ascites—*i.e.*, dropsy of the belly—may arise from *peritonitis*, from disease of the liver, from tubercle, and other causes. It is not of common occurrence in the horse, but is common in the dog, arising from tumours in the liver, or tuberculosis of the liver; while in sheep it is frequently associated with liver fluke disease. The chief symptoms seen are enlargement of the belly, with swelling of the limbs. Good nutritious food, with iron tonics and diuretics, should be resorted to, while in some cases it is necessary to 'tap' the animal.

The Liver (Plate XVII.; B) is a large, reddish-brown, glandular body, situated between the stomach and the diaphragm, and held in its position by ligaments. It possesses four lobes in the horse and two distinct lobes in the cow, and is covered by a coating of peritoneum, called *Glisson's capsule*. The substance consists of small lobules, made up of cells arranged like a cart-wheel, between which the capillaries run. The liver has various functions. The cells secrete bile; here also is stored up any excess of absorbed carbohydrate (starchy) food in a form known as *glycogen*. This store may be called upon should the animal require it, and so the supply to the body is kept fairly constant. The liver also assists in the excretion of certain of the waste products of the body, a quantity of urea being formed here. The bloodvessels of the liver are:

1. The *hepatic artery*, which supplies it with nutrient blood.
2. The *hepatic vein*, which conveys venous blood back to the heart.
3. The *portal vein*, or functional vessel, which brings the blood, charged with absorbed material, from the stomach and intestines.

Bile, manufactured by the liver cells, is carried by the biliary ducts to the gall-bladder, and from thence by the hepatic duct,

which opens into the small intestine, close to the stomach. All animals, with the exception of the horse and rat, have a bag, called the 'gall-bladder,' for the purpose of collecting and storing the bile—a viscid, greenish-yellow, and bitter fluid. Bile assists in the digestion and absorption of the nutrient material in the intestines; it also increases the peristaltic action of the bowels, and, being alkaline, it neutralizes the acid formed in the stomach, so that digestion in the intestines is in a neutral or slightly alkaline medium.

The liver is the largest gland in the body, and, like other organs, is subject to various diseases. The liver is frequently the seat of tumours, tuberculosis, and parasites, and also other disorders, the symptoms of which are not very clearly defined. Such cases should always, therefore, be entrusted to professional care. Occasionally, on making a post-mortem examination, enormously enlarged livers are found, both in horses and in cattle, of which ailments the animals, when alive, gave no indication. Sometimes, however, these enlarged, or hypertrophied, livers are accompanied in the horse by dropsical swellings of the legs, and shortness of breath; while in cattle the brisket, under-side of the neck, and lower jaw become filled with a watery effusion. The latter symptom is also seen in traumatic heart disease in cattle. Sometimes the liver undergoes *fatty degeneration* or *fatty infiltration*; the latter may occur in stall-fed animals which get but little exercise. In the former the liver cells become changed into material of a fatty nature, while in the latter, fat globules are deposited in the cells. *Symptoms.*—The animal refuses its food, drinks large quantities of water, and soon becomes greatly emaciated, but rarely hide-bound (although the hair looks staring and on end), and is affected with a lead-coloured, offensive diarrhœa. *Treatment* is very unsatisfactory, a fatal termination usually supervening. Chloride or bromide of ammonia, with carbonate of soda, ½ ounce each, night and morning, may, however, be tried. The liver is liable also to *rupture.* This is usually due to external violence: in the horse, most often to the effects of falling in jumping; and in the dog, being run over by a motor-car, or other such accident. The symptoms are those of internal hæmorrhage: the mucous membranes become pale and blanched; there is a running-down pulse;

then muscular twitchings supervene, the legs and body get icy cold, and death soon follows. As a rule it proves fatal.

Jaundice, or **Yellows**, arises from many causes, but is generally looked upon as a symptom of some derangement of the liver, such as congestion, obstruction in the bile ducts, loss of tone, and consequently inability to secrete the bile, and is frequently a sequel to some other disease—distemper of the dog, influenza, etc. Congestion is one of the most frequent liver disturbances met with in horses and cattle. It generally occurs in hot, dry seasons. The animal becomes sluggish, languid, and lazy, drops the head, loses the appetite, but evinces no pain. The pulse is full, slow, and soft; eyelids and gums of a dirty yellow or orange colour; tongue furred; breath fœtid; bowels costive; fæces of a light slate colour; while in some cases in the horse the animal goes lame on one fore-leg, usually the off (right) one. Cattle are, however, more subject to this complaint than the horse, and the dirty yellow or orange colour can be readily noticed in the corner of the eye or inside of the ear, on the udder, under the tail, and, indeed, on any white part of the skin or any visible mucous membrane, particularly the vagina. The belly is flat, the appetite bad, and the animal rarely chews the cud. *Treatment.*—A good dose of opening medicine should be given at first. One drachm of calomel, suspended in from 1½ to 2 ounces spirits of nitre, and 1 pint of linseed oil, may be given with advantage, either to horses or cattle, followed up by alkaline and vegetable tonics. In cattle and sheep the presence of the liver fluke may give rise to symptoms of jaundice.

Gall-Stones.—These are extremely rare, either in horses or cattle. When they occur in horses they may produce symptoms of jaundice, also acute colicky pains, irregular bowels, sometimes slightly purged, and at other times costive, dry, hard, primrose-coloured pellets being excreted. Treatment of gall-stones is not likely to be effectual, and surgical treatment, in the horse, impracticable.

Liver complications are more common in the dog than in any other of the domestic animals, more particularly the overfed petted dog that is being continually stuffed on sweet and fancy foods, which are apt to set up various derangements and diseases of the liver, such as congestion, enlargement, cirrhosis, etc., and which

creep on very insidiously, being frequently accompanied by asthma and shortness of breath. *Symptoms* of the different forms of liver complication in the dog are not well defined. The first symptom generally to be noticed is that the skin and coat begin to look dry and harsh, the mouth and the tongue lose their bright rose colour, the breath becomes fœtid, and the eye is dull and sleepy-looking, while the teeth are dirty. The appetite, however, is fair, yet the dog loses flesh, and the belly becomes enlarged and hard, while there is nearly always present a peculiar barking, long, husky cough. *Treatment.*—First all fancy foods should be stopped and a plain diet given, such as dog biscuit steeped in soup, feeding twice in twenty-four hours, and giving gentle walking exercise. For medicine, mix 1 drachm each of blue pill, powdered aloes, and powdered rhubarb, and make into twelve pills, and give one every third or fourth day. This dose is for an ordinary-sized collie dog; other doses should be regulated according to age, breed, and size of dog. Tumours in the liver and tuberculosis of the liver are also fairly common in dogs. These produce ascites (dropsy) in addition to other symptoms of disordered liver.

Pancreas.—The only disease likely to be found in this organ is tuberculosis.

The Spleen, Milt, or **Cat Collop** (Plate XVII., *e*), is situated on the left side of the larger curvature of the stomach. It has a bluish-grey, mottled appearance (in the pig slightly red), sickle-shaped in the horse; in other animals it is shaped like a dog's tongue. It is ductless, having no channel for the removal of its products, except by means of the bloodvessels. It contains groups of lymphoid cells and many red corpuscles in varying stages of disintegration, and is believed to be concerned in the production of white corpuscles of the blood, but all its proper functions are not exactly known. The spleen is supplied with blood by the splenic artery—a branch of the cœliac axis, which is a large artery that arises from the posterior or abdominal aorta just after it passes through the diaphragm. This artery divides into three branches: (1) The *gastric artery*, supplying the stomach; (2) the *hepatic artery*, supplying the liver; and (3) the *splenic artery*, which supplies the spleen with nutrient blood. Sometimes in the horse the spleen reaches an enormous size, without, however, showing

any appreciable symptoms during life. In cattle, an enlarged spleen is frequently a sign of anthrax. The spleen is also the seat of tuberculous lesions.

Lymphadenoma.—This is a peculiar disease of the spleen in the horse. The symptoms are very remarkable: the animal feeds well, but gradually loses flesh; has a dingy, staring coat, and a staggering, swinging gait. The visible mucous membranes, under the eyelids, etc., are as pale as white paper; the pulse is soft and quick, varying from 80 to 90 per minute; the bowels, as a rule, are quite normal. The animal lingers on for some considerable time, having to be supported in slings to keep it on its feet. These cases are invariably fatal, the post-mortem showing the presence of pearly-white tumours of lymphoid tissue, varying in size from that of a marble to that of an orange, made up in concentric layers which are studded through the spleen, while at times the lymphatic glands are also implicated.

Anthrax is a specific contagious disease, caused by the presence in the blood of an organism known as the anthrax bacillus. This is one of the contagious diseases scheduled under the Diseases of Animals Acts; when, therefore, there is any suspicion of its existence, the case must be reported as soon as possible to the police. All animals are liable to be infected with anthrax, and human beings are frequently affected also. In man it is known by the name of *malignant pustule* when the infection is by inoculation; at one time it was common among wool-sorters, who inhaled the spores, and this form was called 'wool-sorters' disease.' Cattle and pigs are most often affected, and less frequently sheep and horses. An extensive outbreak of anthrax among horses is recorded as having occurred in Palestine during the Great War.

Anthrax was one of the earliest diseases to be definitely attributed to the action of bacteria. The causal organism is a rod with square-cut ends, and under certain circumstances a single spore, which is the resting stage of the organism, is formed in the middle. This spore, being very retentive of life, is unaffected by ordinary disinfectants. When blood containing the bacilli is spilled, the organism soon dies, but the spore will remain almost indefinitely, resisting dryness, heat, or cold, and when circumstances again become favourable for development, as, for instance, when the

spores obtain access to an animal body, the bacilli are formed and the disease makes its appearance. The foregoing facts concerning the anthrax bacillus point to the care necessary to avoid the spilling of blood from an infected animal. In cases where the disease exists, or is suspected, no post-mortem examination should be made, or the carcase cut, until a definite diagnosis has been made.

Symptoms.—As a rule few symptoms may be observed during life, death occurring suddenly; an animal may be seen apparently all right, say, the last thing at night, and be found dead in the morning. After death a blood-stained and frothy discharge may be seen issuing from the nose, mouth, and anus; the body is usually

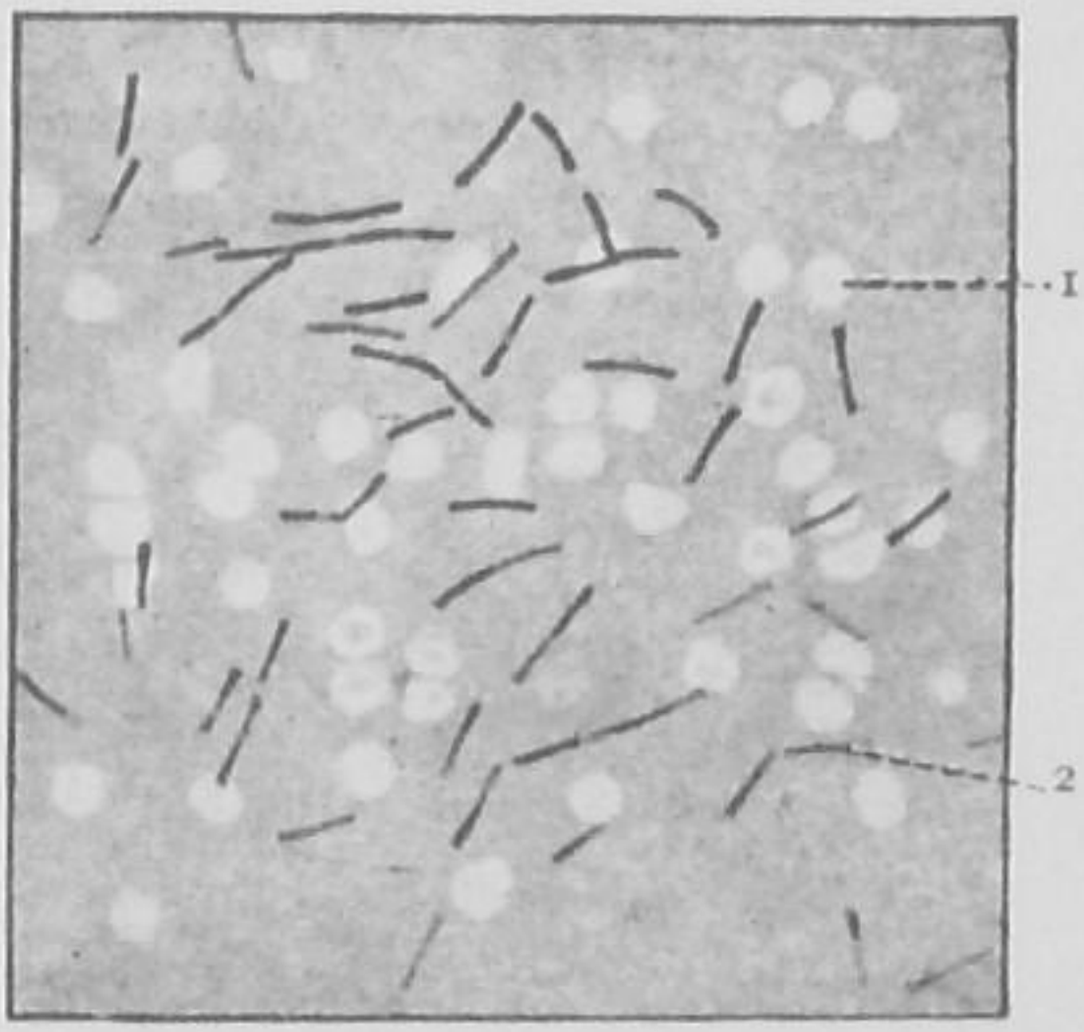


FIG. 21.—ANTHRAX BACILLI AND RED CORPUSCLES.

1. Red corpuscles of blood. 2. Anthrax bacilli rods.

abnormally swollen. When an animal is found dead in a byre or field from no evident cause, and especially when the carcase presents the appearance described above, anthrax should be suspected and the case reported to the police. Until a diagnosis has been made, the carcase should not be moved; it should be protected from the approach of other animals, and the orifices of the body plugged with pieces of cloth saturated with a disinfectant. The diagnosis is made by examining a smear made from a drop of blood taken from the ear; the bacilli, which are usually numerous, may be seen unstained, or more easily in stained preparations. Should a post-mortem examination be commenced before anthrax is suspected

other signs will become visible—the blood, oozing from the subcutaneous vessels, will be black like tar, and when the body is opened, the spleen will be found to be very much enlarged and soft. This is a constant symptom, and gives rise to the name 'splenic fever' which is given to the disease; the serous membranes lining the body cavity will be splashed with petechiæ, or small hæmorrhages, under the membrane. Outbreaks of anthrax in the British Isles are usually of a sporadic nature, the source of infection in many cases being either imported foodstuffs, hides, or bones, which have been contaminated; or the ingestion of anthrax spores from pasture where an infected carcase has been opened or been buried. Occasionally symptoms may be observed during life, particularly in horses; in such cases the temperature is high, varying from 104° to 106° F., there is loss of appetite, and the visible mucous membranes are congested; diarrhœa may be present. These symptoms may persist for two or three days, and sometimes recovery takes place. *Treatment.*—In the majority of cases only preventive treatment is possible. Avoid spilling blood from an infected animal. Prevent contact between living animals and an anthrax carcase. Do not let animals graze where a carcase has been lying, or been buried. Carcases should be burnt or buried deeply in quicklime. In cases where symptoms are observed, carbolic acid in 1 drachm doses, mixed with linseed oil, may assist recovery.

Calves.—As already stated, the fourth stomach is the largest in the calf, on account of the young animal living principally on a milk diet. The first, second, and third compartments are not required to prepare the food until the animal begins to eat hay, or other rough material. The fourth stomach of the calf contains the acid juices (the *rennet*, used in cheese-making), which have the property of coagulating milk. This fact is of great importance in the feeding of calves, showing that they should be fed frequently and with small quantities for the first fortnight, at least. They ought not to be fed less than four or six times a day, although most farmers feed them only twice a day, giving large quantities at once. This practice is much to be condemned, for, as soon as the milk comes in contact with the walls of the stomach, it is coagulated, or curded, this being the first process of digestion. The weak digestion

of the calf is quite unfitted for disposing of a large bulk at a time, and perhaps some of the old curd is still in its stomach when next fed. This sets up irritation and inflammation of that organ, which nature tries to relieve by means of diarrhœa.

White Scour is a discharge from the bowels of a dirty white or yellowish-coloured watery fluid, due to the presence of a disease-producing organism; it is of an infectious character, being readily carried by an affected calf from one building to another—a complaint which carries off a large number of calves yearly, and when once established is difficult to deal with, running through the young stock in many cases like an epidemic, varying in degree in accordance with the severity of the attack and the constitution of the animals. The late Professor Nocard, the noted French savant, in conjunction with Professor Mettam, when inquiring into the great mortality amongst the calves in Ireland in the year 1901, reported that the malady *white scour* in calves was caused by the microbe which they isolated from numerous other microbic germs, and named it a 'pasteurella'; they also proved by direct experiment that *joint felon* (septic arthritis) was due to the same cause, and that the germ gained admittance into the body of the calf at its birth through the medium of the navel cord. In many cases the disease is very acute, and young calves may die within twenty-four hours. In other cases it may appear within twelve to fourteen days, when the symptoms presented are very liquid diarrhœa, the excrement, which is passed with straining, and apparently with pain, being dirty white in colour, and occasionally blood-stained; there is an offensive smell. Emaciation is rapid, and soon the young animal will be found lying stretched out, with eyes closed, mouth and body cold, and death usually follows. Recovery may take place, but frequently complications arise—septic pneumonia and pyæmia. *Treatment.*—In most cases curative treatment is of little use; 2 ounces of castor oil may be given, followed by 1 to 2 teaspoonfuls of chlorodyne twice a day, in milk. *Prevention.*—The calf at birth should be received on a piece of clean sacking or clean straw. Immediately the calf is born the navel string should be tied with a piece of cord or narrow tape previously dipped in lysol, 2 per cent. solution. The severed end of the navel string should then be very thoroughly disinfected with tincture of iodine,

and sealed with collodion. Previous to the birth of the calf, the box should be thoroughly cleaned out and disinfected, the walls and woodwork washed with boiling water and washing soda, and sprayed with a disinfectant of adequate strength.

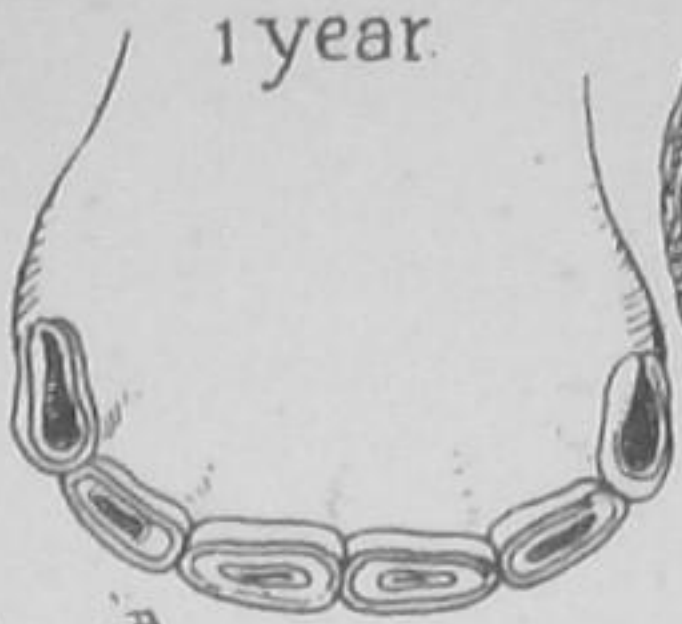
Navel Ill is a septic inflammation of the navel string with suppuration, caused by small germs infesting the navel opening, and a common complaint in young foals, calves, and lambs up to a week or fortnight old. The animal appears dull and listless, lies stretched out flat on its side, refuses its milk, and breathes rapidly, perhaps moaning. On examining the navel it will be felt to be hard and swollen. It should be laid open with the knife, and dressed with carbolized oil or iodine solution; a flannel folded five or six ply thick, wrung out of hot water, should then be applied to the navel, and kept in place with a bandage round the body. Tablespoonful doses of Gregory's powder or magnesia may be given daily. *Prevention.*—Dress the navel string as per instructions given under White Scour. The advice given under that heading for general disinfection should also be followed.

Hair and Wool Balls are accumulations of hair or wool in the stomach of the young calf and lamb. They may be caused by the animals licking and sucking one another, by which means a quantity of hair and wool is drawn into the mouth by the tongue, whence it is passed on to the stomach, where, by the churning motion of the stomach, it becomes matted and formed into balls. Another cause is that of giving the calf unstrained milk, which is a great mistake. Milk given to calves should always be put through a strainer. When these balls are present, they cause a good deal of derangement, with impaired appetite and a puffing-up or swelling of the left side. Should the swelling occur several times daily, the best plan is to make the animal into veal or lamb as soon as possible, or the stomach may be cut into and the offending ball removed. Occasionally a calf may recover, in which case the ball or balls, highly polished, are found in the paunch of the adult animal on slaughtering, having been a frequent cause of tympanites during life.

Joint Felon (a septic inflammation of the joints).—The knee, hock, and stifle are the joints most frequently attacked, and it is usually noticed a few days after birth. A large number of young

PLATE XXV


10 days


1 year

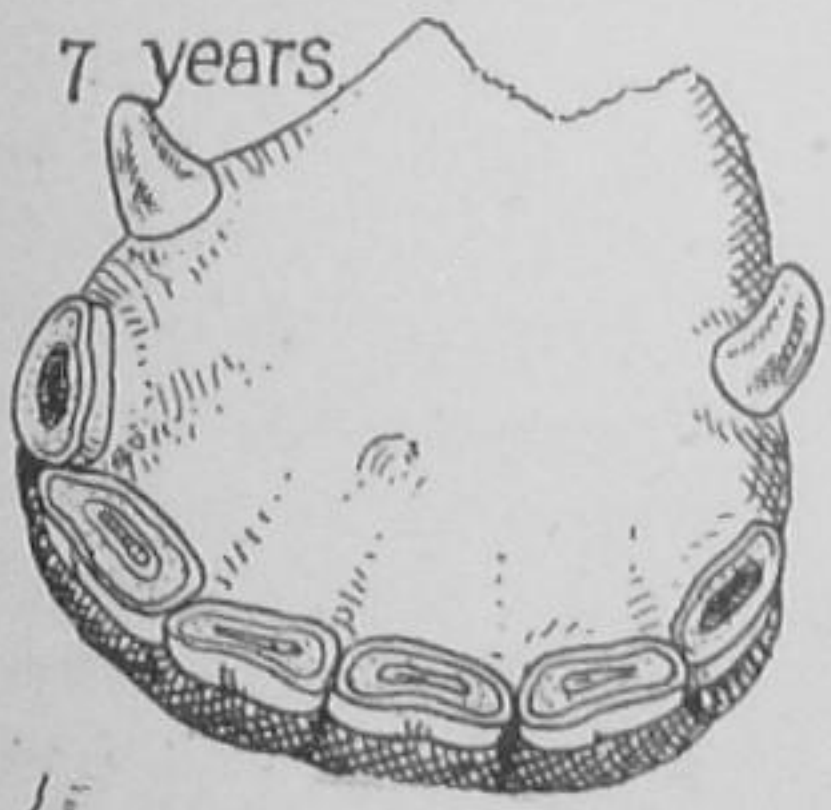

2. years.


3. years.

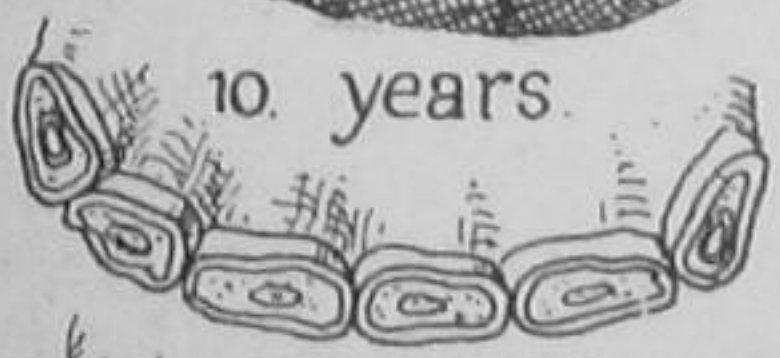

4 years


5. years.


6 years.


7 years.


8 years.


10. years.


12. years.


20. years.

animals are yearly lost from this disease. The patient is very feverish, and unable to stand when put on its feet, while, on being made to move, lameness is noticed in one or more of its limbs. There is enlargement of the joints, accompanied by great pain on pressure being applied. As a rule the disease is fatal. On opening the diseased joints, they are generally found to contain a quantity of *sanious* brown stinking fluid, in which are shreds of tissue. The disease is due to septic material being carried into the system through the vessels that form the navel string, which in most cases are found to be open, and from which there is a slight discharge of thin, watery fluid; consequently, as a preventive, it is advisable that at all times the navel string be tied immediately after birth with a piece of cord dipped in carbolized oil or iodine solution; above all, the box in which the mare foaled, or the cow calved and cleansed, should be thoroughly washed out with water containing an efficient disinfectant. Clean, dry bedding is an absolute necessity. *Treatment* is extremely unsatisfactory. Rubbing the affected joint with 3 ounces each of essential oil of camphor and soap liniment and 2 ounces of liquid extract of belladonna mixed, and a little applied twice a day; 1 to 2 drachm doses of hyposulphite of soda, with 5 to 10 grains of sulphate of quinine added, and given in a little milk or water every six or eight hours, may be useful.

SHEEP.

Many of the ailments affecting the digestive organs of the cow are seen in the sheep, and the *treatment* is somewhat analogous, only the medicine used must be about *one-fourth* less than what is given to the cow. An exception is intestinal tuberculosis, as this disease is not naturally found in the sheep. Parasitic gastritis and enteritis are very common, and should be suspected when a number of lambs show symptoms of diarrhœa and wasting. Some of the worms which infest the intestine are very minute, and may be overlooked when examining a carcase after death; they may be seen if a scraping is made from the inside of the bowel and shaken up with a little clean water in a glass vessel.

CHAPTER VII

THE DENTITION OF HORSES, CATTLE, SHEEP, PIGS, AND DOGS, AND DENTAL DISEASES

TEETH are the principal agents in mastication, and, although composed of the hardest structures in the body, are, in the first instance, developed by a very interesting process from one of the softest structures—the mucous or lining membrane of the mouth.

The Tooth is divided into the crown, neck, and root or fang, and is made up of three structures—*ivory* or *dentine*, *enamel*, and *cement* or *crusta petrosa*. The dentine is whitish-yellow in colour, and forms the bulk of the tooth. It is found in the middle, in contact with the pulp, and consists of about 72 per cent. earthy matter and about 28 per cent. animal matter. The enamel—the hardest substance of the three—is of a pale bluish-white, and contains 95 per cent. earthy and 5 per cent. animal matter. It acts as a protection covering the external parts of the crown, and is interspaced in irregular curves between the *dentine* and *crusta petrosa*. The crusta petrosa is yellowish-white, and found on the outside of the tooth, in connection with the root or fang, and is softer than either the dentine or enamel; in fact, it is the bone of the tooth, and is composed of 67 per cent. earthy and 33 per cent. animal matter.

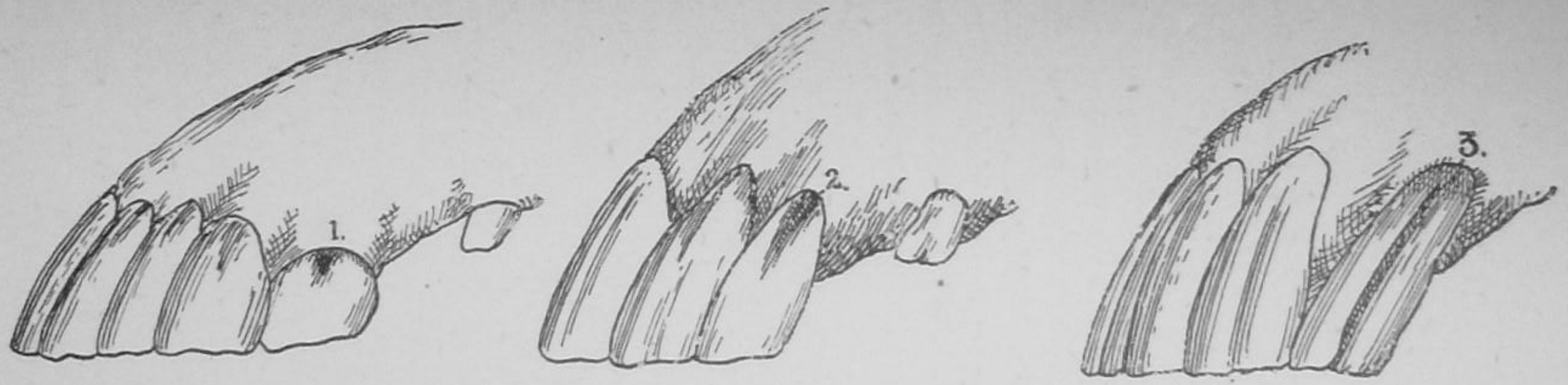
There are two sets of teeth—viz., temporary or milk teeth, which are much smaller and whiter than the second set, the permanent.

HORSE.

The horse, when full-mouthed, has forty teeth, as follows: Twelve incisors, six above and six below; four canine teeth, or tushes, one on each side of the upper and lower jaw (in the mare the canines are either absent or rudimentary); twenty-four molars, six above and six below, on each side.

The marks on the tables of the lower incisors are an indication

PLATE XXVI



HORSE'S TEETH AT DIFFERENT AGES.

1. At 10 years, Groove in Upper Corner—Incisor Tooth
2. At 16 years.
3. At 21 years.
4. At 26 years.
5. At 30 years.

of the horse's age up to eight years. The indication marks in the lower jaw are nearly worn out in the central incisors at six years, in the lateral at seven years, and in the corner incisors at eight years old (Plate XXV.). In an old horse, with well-formed teeth, artificial marks are sometimes burned in, to give the animal the appearance of being young. This process is called *Bishoping* (so named from the man Bishop, who introduced it), but it is readily detected, as the enamel round the depressions is destroyed in the operation. At the age of from nine to ten years the teeth change their shape, and begin to turn *triangular* and long. At ten years the upper corner incisor on the outer aspect presents at the top, close to the gum, a *dark yellow groove*, known as Galvayne's groove, which, as the horse grows older, extends down the middle of the tooth until, at the age of twenty-one years, it reaches the bottom. When this mark is present—for it is not always so—it is a very good indication of the age (see Plate XXVI. and text, which is after 'Galvayne').

The Number of Teeth in our domestic animals is as follows:

Animal.	*Incisors.*	*Canines.*	*Pre-molars.*	*Molars.*	*Total.*
Horse ...	$\frac{3}{3}$	$\frac{1}{1}$	—	$\frac{12}{12}$	40
Ox ...	$\frac{8}{8}$	—	—	$\frac{12}{12}$	32
Sheep ...	$\frac{8}{8}$	—	—	$\frac{12}{12}$	32
Dog ...	$\frac{3}{3}$	$\frac{1}{1}$	$\frac{4}{4}$	$\frac{10}{12}$	42
Pig ...	$\frac{3}{3}$	$\frac{1}{1}$	$\frac{4}{4}$	$\frac{12}{12}$	44

The top figures represent the upper jaw and the lower figures the under jaw.

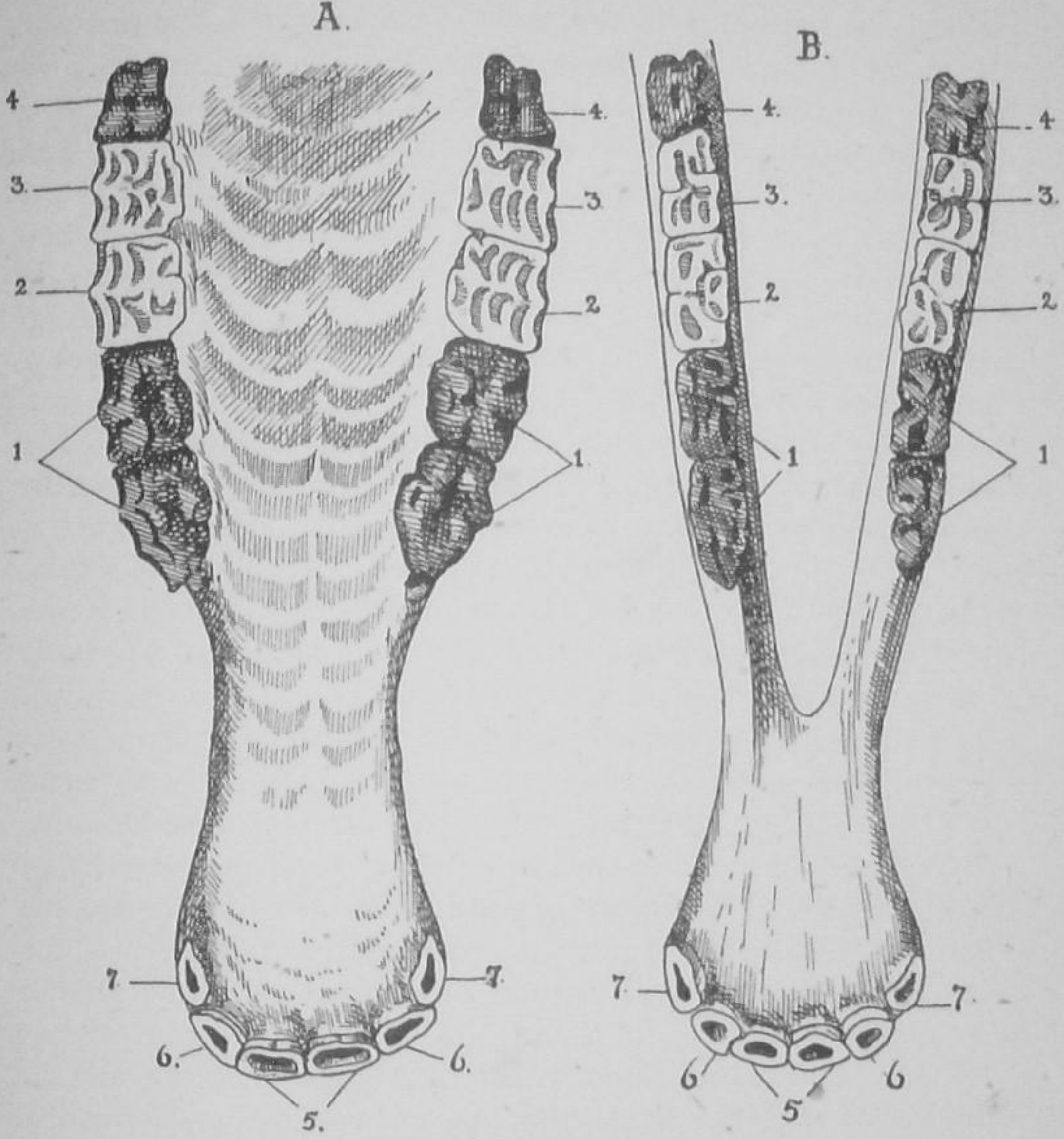
If there is one thing more than another that should command the attention of the country practitioner, it is dentition. The condition of the teeth at times creates various disorders, disease, and even death. By the casting or shedding of the crowns of the temporary and their replacement by the permanent teeth, together with certain marks, the age of an animal for a time is indicated. Looking at Plate XXV., it will be noticed that at birth the foal generally has two central incisors, and three temporary molars on each side, above and below (sixteen in all), and all of them are temporary. At six to eight weeks old it gets two lateral temporary incisors, above and below, and from eight to ten months the corner incisors; the latter, however, are not fully in wear till some time

later. The yearling is occasionally mistaken for a five-year-old, the marks on the crowns being similar. This deception can, however, be detected by looking at the front aspect of the teeth, when it will be seen that the temporary teeth are small and white, with a plain smooth surface, while the permanent teeth are much larger and broader, and of a creamy tinge, with a well-defined deep dark groove down the front of each tooth. The temporary tooth also has a well-defined neck, or division between the crown and fang, which is not present in the permanent tooth. At one year the fourth molar, a permanent tooth, appears, and at two years the fifth molar, also permanent, should be in wear. From two years and nine months till three years old the horse commences to cast the two central incisors, also the first and second molars, above and below, and these are replaced by permanent teeth. When from three and a half to four years old the horse casts its lateral incisors and the third temporary molar, and these are replaced by permanent teeth. The sixth molar now comes into view; thus at *four years old* four of the six incisors and all the molars are permanent teeth in wear; at this age also the tusks are usually coming through. These are generally absent in the mare, and if present are small and rudimentary. At five years old the corner milk incisors are replaced by permanent teeth; these, however, are for some time shell-like, and in contact with the corresponding incisors of the other jaw only at the anterior edge. The horse has now its full number of teeth.

With the exception of a young horse casting its teeth, and an old one with unevenly worn surfaces, I am not in favour of giving crushed or bruised oats to horses, as the crowns of the horse's molar teeth resemble the surface of the old fashioned millstone, being properly adapted for grinding the grain. I therefore recommend oats to be given whole, so that the animal can have the pleasure of grinding them, thereby getting the full benefit of the salivary juices, and their action on the starchy matters of the food. Crushed oats are also more liable to be bolted, and cause stomach derangement.

The upper molar teeth in horses and cattle are much larger and broader than the lower ones. The upper jaw, being a fixture as it were, gives a broader and firmer surface for the rotary movement

PLATE XXVII



A. Upper Jaw of a Horse Rising Three Years Old.

1, 1. First and Second Permanent Molars (Crowns of Temporary Teeth just cast).
2, 2. Third Temporary Molars.
3, 3. Fourth Teeth, Permanent Molars.
4, 4. Fifth Permanent Molars on Each Side coming into Wear.
5, 5. Permanent Central Incisors.
6, 6. Lateral Temporary Incisors.
7, 7. Corner Temporary Incisors.

B. Lower Jaw of a Horse Rising Three Years Old.

Numbers have the same reference as in A.

of the lower jaw to act upon; thereby, in some instances, in aged horses, the uneven wear leaves sharp ridges on the outer edge of the upper molars and inner edge of the lower. These sharp points should be removed with the tooth-rasp, to prevent laceration of the tongue and inside of the cheeks. Occasionally the teeth become elongated and very uneven (particularly the last tooth on the lower jaw), and have to be cut by special shears. Molars are sometimes split through getting some hard substance amongst the food, and for causing this there is nothing worse than foreign grain. A bit of stone, a piece of iron, or a nail may have got into corn and caused the injury. By removing the loose portion of the tooth the animal generally does well, but in time the tooth opposite becomes elongated, owing to its not meeting sufficient wearing surface, and has to be cut off, or levelled with a tooth-rasp.

It is said by some writers that teeth grow; to a certain extent this is true, but at six years old all the teeth are fully developed, after which period they gradually wear away. This is well exemplified by the incisors, or nippers, becoming triangular as they wear down, when their crowns take the shape of the fang or root. Teeth, however, become elongated when they are not made use of, owing to the tooth opposite becoming decayed or removed. Damaged teeth are, however, most likely to become carious. Disease of the teeth of the horse is not very common, but when a diseased tooth is present the animal generally quids its food—*i.e.*, chews it, and then lets it drop out of the mouth in small pellets. In such cases the teeth should be examined, for the cause may be the sharp edges of the teeth which injure the mucous membrane when the horse chews, or it may be a loose or caried tooth; the latter may have to be removed.

Wolf Teeth are found in the upper jaw immediately in front of the first molars, and are generally thrown off when the horse casts the crowns of the two first molars on rising three years old; but I have seen them in aged animals, and, in my opinion, they do no harm. I have never known them affect the sight of the horse, as is stated by some. They may, however, easily be removed if so desired.

Parrot-Mouthed animals are known by the upper jaw being much longer in front, overlapping the lower, when the teeth in

the latter become elongated from not meeting the wear of the upper teeth, and in time injure the bars or gums of the upper jaw. These cases have to be closely watched, and the teeth rasped when necessary.

CATTLE.

The cow, which we may take as illustrative of type, has eight incisor teeth, which are shovel-shaped, and with well-defined necks;

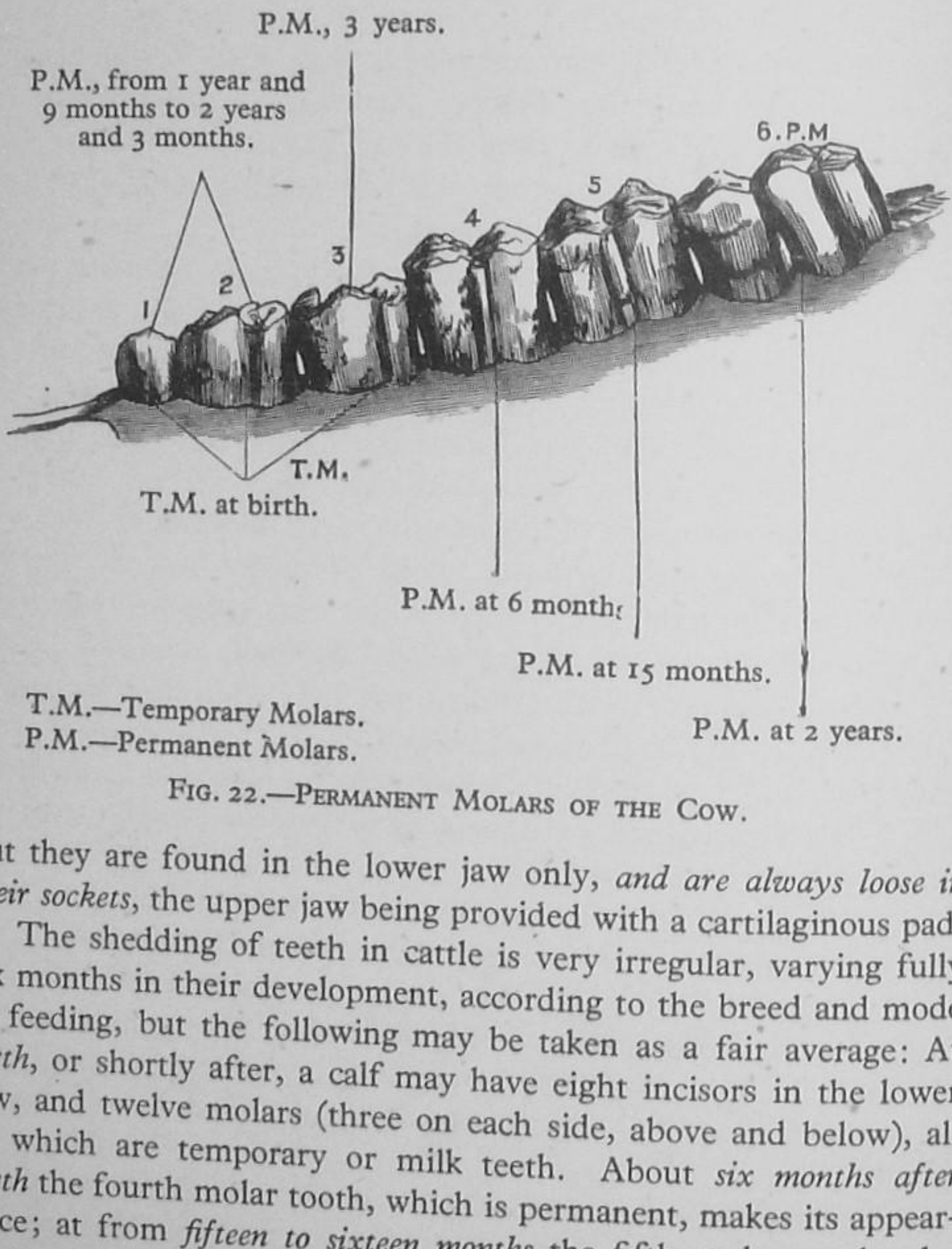
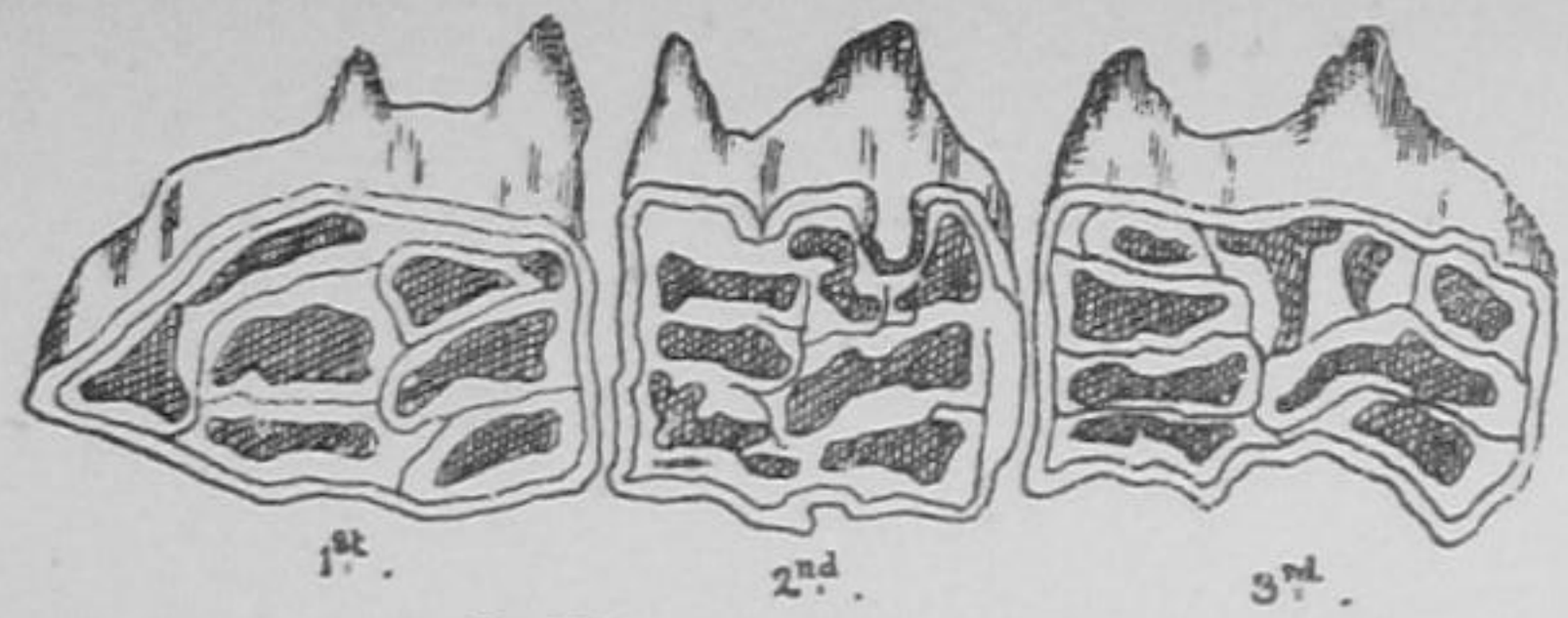


FIG. 22.—PERMANENT MOLARS OF THE COW.

but they are found in the lower jaw only, *and are always loose in their sockets*, the upper jaw being provided with a cartilaginous pad.

The shedding of teeth in cattle is very irregular, varying fully six months in their development, according to the breed and mode of feeding, but the following may be taken as a fair average: At *birth*, or shortly after, a calf may have eight incisors in the lower jaw, and twelve molars (three on each side, above and below), all of which are temporary or milk teeth. About *six months after birth* the fourth molar tooth, which is permanent, makes its appearance; at from *fifteen to sixteen months* the fifth molar tooth, also

B.



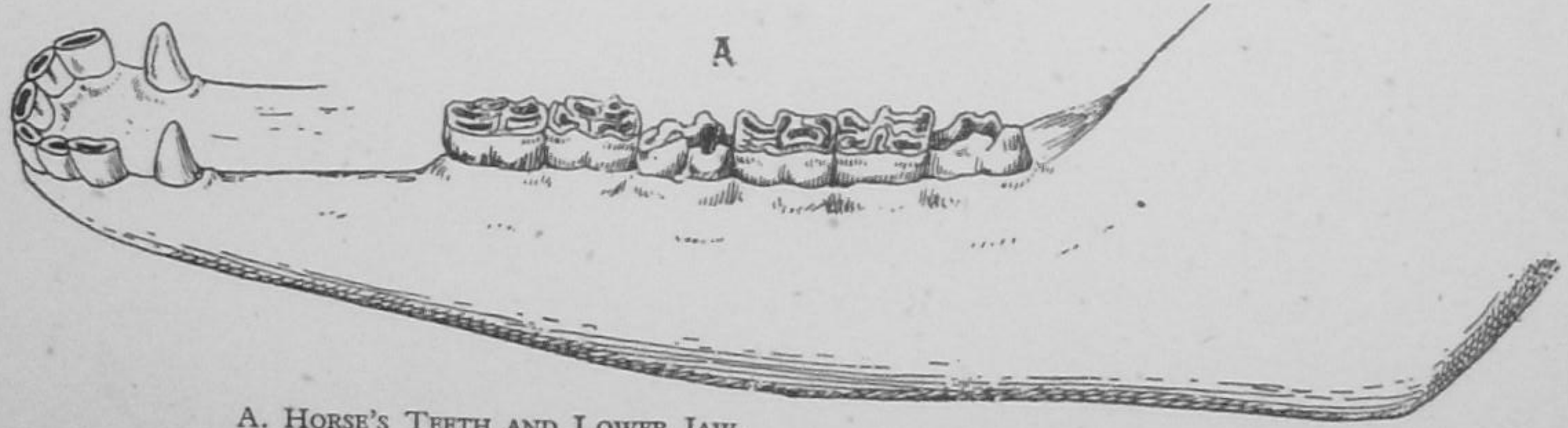
B. THREE UPPER SHELLS.

C.



C. THREE UNDER SHELLS (NOS. 1 AND 2 JOINED TOGETHER).

A



A. HORSE'S TEETH AND LOWER JAW.
The third having cast the shell of the temporary tooth, and the sixth coming into wear.

permanent, is seen; and at *two years* the sixth permanent molar tooth is through. About *two years and six months* the first and second temporary molars are replaced by permanent teeth, and the third temporary molar is replaced by a permanent tooth at about *three years.*

Fig. 22, representative of one side of the under-jaw, shows the age when the permanent molar teeth are cut, and when the three first temporary molars are cast and replaced by permanents.

Incisors.—*Between one year and nine months and two years and three months* the two central incisors are replaced by permanent teeth; *at two years and three months to two years and six months* the two middle lateral incisors are cast, and the animal has four broad teeth; *at three years old* six permanent teeth are seen; and at about *three years and three months* the corner milk teeth are shed, and eight broad teeth are in view. The permanent teeth are very much larger and darker than the milk teeth, which are very white, and are thus readily distinguished.

The following illustration shows at what age the incisor milk teeth of cattle are cast and replaced by permanents:

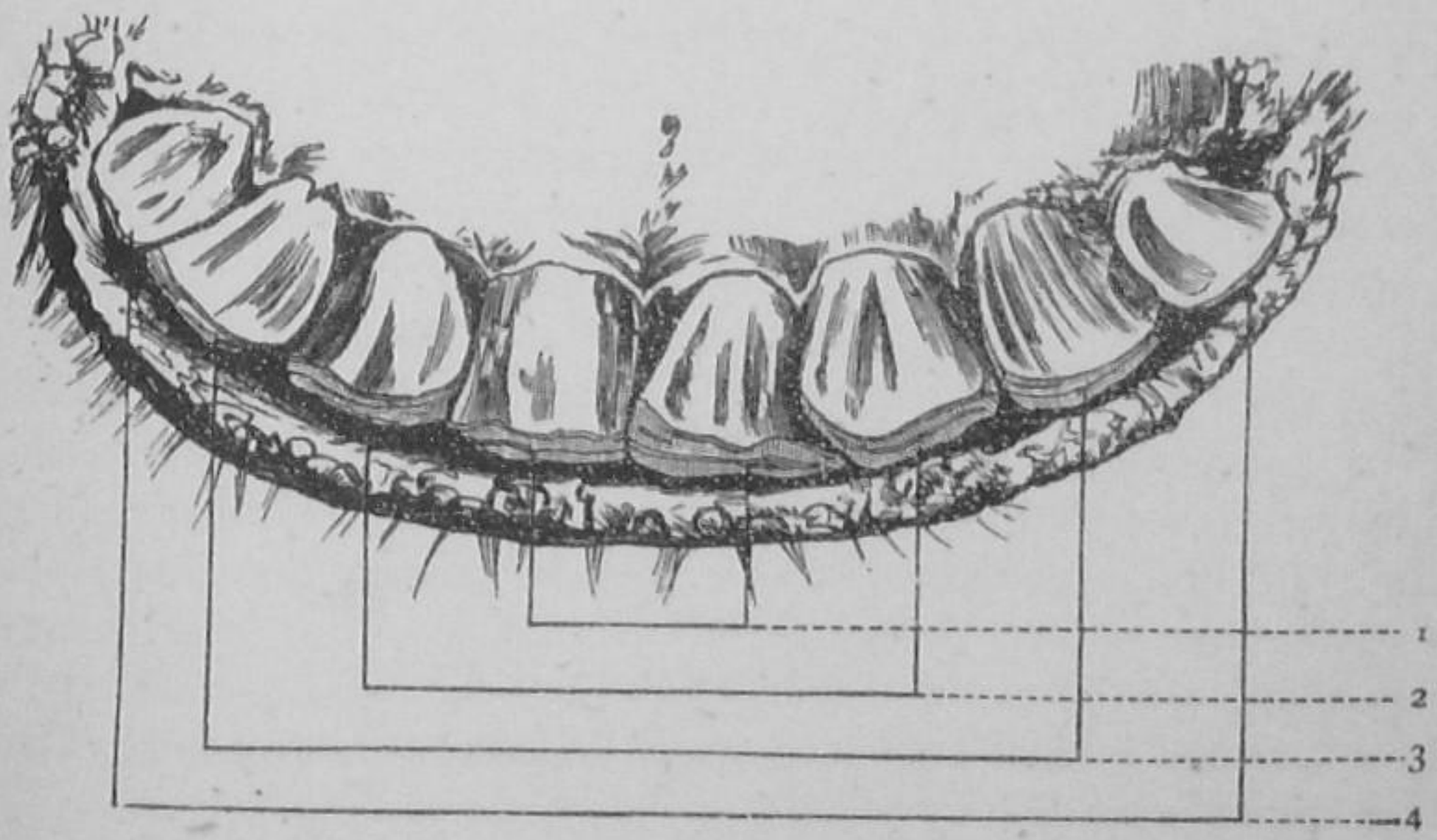


FIG. 23.—PERMANENT INCISORS OF THE COW.

1. Centrals, 1 year 9 months to 2 years 3 months.
2. Middle laterals, 2 years 3 months to 2 years 6 months.
3. Laterals, 2 years 6 months to 3 years.
4. Corners, 3 years to 3 years 3 months.

The crowns or wearing surfaces of the molar teeth of cattle are much sharper than those of the horse, having sharp elevations and depressions suited for tearing down rough fibrous grass.

SHEEP.

The dentition of sheep resembles that of the cow as to the number of teeth and their position. There are eight incisors on the lower jaw only; the upper jaw in front has, like the cow, a dense elastic pad. The molars are twenty-four in number (*i.e.*, six on each side, above and below). The teeth in shape are similar to those of the cow, but very much smaller.

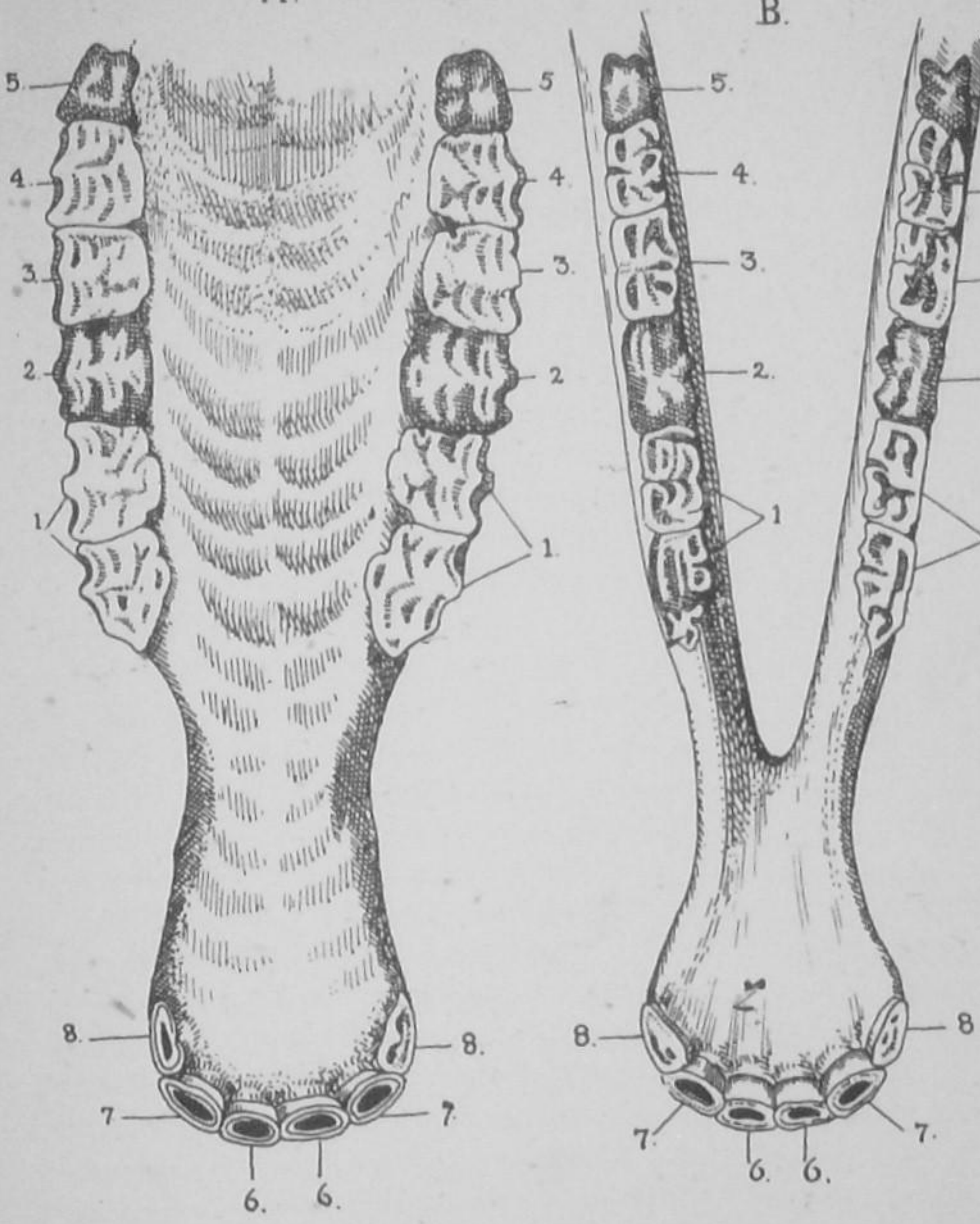
Incisors.—From the birth of the lamb to the end of the fourth week the eight temporary incisors are cut, also the first, second, and third temporary molars; and at twelve months the crowns of the incisors are well worn, the teeth being small and far apart. At about fifteen months the two central temporary incisors are shed and two permanent teeth take their place. At about twenty-two months the middle laterals (incisors) are replaced by two more permanent teeth, and the animal now has four broad teeth. At two years or two years and three months the permanent laterals make their appearance, and the sheep shows six broad teeth, and at three years old the corner permanents are up.

Molars.—About the age of three months the first permanent molar, or fourth tooth, makes its appearance; at nine months the fifth tooth, or second permanent molar, is seen; and at eighteen months the sixth tooth, or last permanent molar, comes into view; and from twenty to twenty-two months old the first and second temporary molars, above and below, on each side, are replaced by permanent teeth; and at about two years old the third temporary is shed, and a permanent tooth takes its places, the sheep now having twenty-four permanent teeth, and in some early mouths possibly six permanent incisors. The permanent teeth, both incisors and molars, are much larger and darker in colour than the temporary ones.

PIG.

The dentition of the pig differs a good deal from that of the cow and sheep. Pigs have six incisor teeth above and below in front of the jaws; behind the corner teeth on each side in the upper and

PLATE XXIX



A. Upper Jaw of a Horse Rising Four Years Old.

1, 1. First and Second Permanent Molars.
2, 2. Third Permanent Molar (Crowns of Temporary Teeth just cast).
3, 3. Fourth Tooth on Each Side, or First Permanent Molars.
4, 4. Fifth Tooth on Each Side, or Second Permanent Molars.
5, 5. Sixth Tooth on Each Side, or Third Permanent Molars, just into Wear.
6, 6. Permanent Central Incisors.
7, 7. Permanent Lateral Incisors.
8, 8. Temporary Corner Incisors.

B. Lower Jaw of a Horse Rising Four Years Old.

Numbers have same reference as in A.

lower jaws are the canine teeth, or tusks; and between the latter and the first molar teeth, one on each side, both above and below, are the premolars; while there are six molars on each side, above and below. This makes a full total of forty-four teeth—*i.e.*, twelve incisors, four canines, four premolars, and twenty-four molars. The incisors, canines, and three first molars are temporary, or milk teeth, while the premolars and last three molars are permanent.

Incisors and Tusks.—Two sharp-pointed teeth are to be seen on both sides of each jaw at birth, with an open space in front, and these are the temporary corner incisors and tusks. About the fourth week the central temporary incisors make their appearance, being well in wear by the seventh or eighth week, and about the twelfth week the lateral temporary incisors are seen. Between the seventh and eighth month the corner incisors are replaced by permanent teeth, which are well in wear at nine months, while the permanent tusks are now making their appearance through the gum. When the pig is twelve months old the central temporary incisors are replaced by permanent ones; and when about eighteen months old the lateral permanent incisors take the place of the temporary teeth, and the central incisors show signs of wear at their edges.

Molars and Premolars.—Between birth and up to four weeks old three temporary molars on each side of each jaw, above and below, are seen, the second and third coming through before the first. The fourth tooth, or first permanent molar, and the premolars make their appearance between the fifth and sixth month, and are well up at the ninth month. From ten to twelve months the fifth tooth, or second permanent molar, is seen, and about three months after (fifteen months old) the first three temporary molars are shed, and permanent teeth take their place; while between the seventeenth and eighteenth month the sixth tooth and last permanent molar is forward. And after this the teeth wear and become dark in colour. Dental derangements in pigs are, however, of rare occurrence, and veterinary aid is seldom or never required.

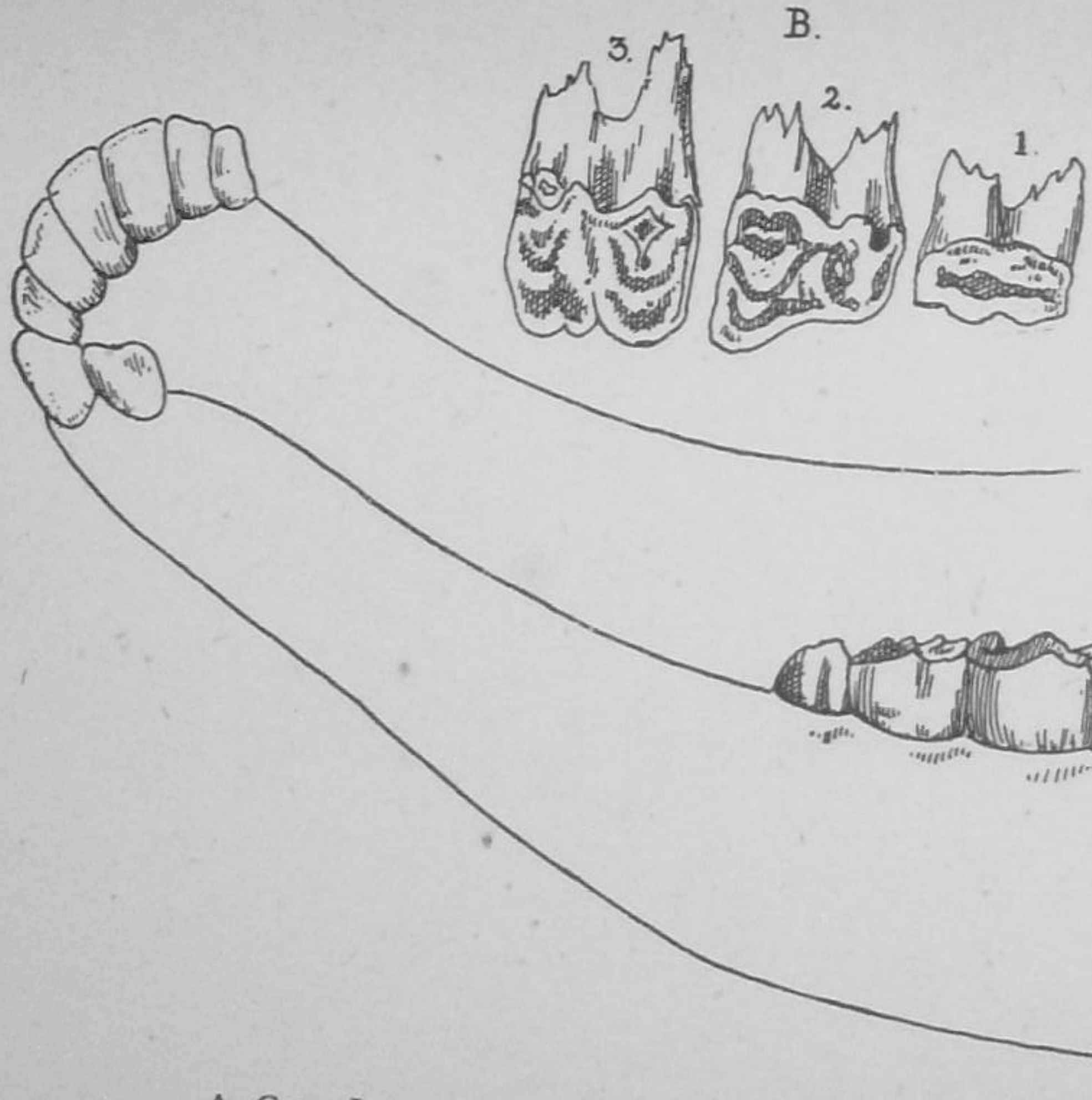
For further information on the subject of the dentition of the horse, cow, sheep, and pig, the reader is referred to Professor Sir Geo. Brown's pamphlet, 'Dentition and Age of the Animals of the Farm.'

DOG.

The dog, like other domestic animals, has both a temporary and a permanent set of teeth, consisting of incisors, tusks, and molars. The molars, of which there are seven on each side in the lower jaw, and six on each side in the upper jaw, vary considerably in size, the largest being the fourth in the upper jaws and the fifth in the lower jaws. All the teeth in front of these appear at first as milk teeth, to be replaced later by permanent ones. About the fifth week after birth all the milk teeth are in view. When the puppy is three and a half months old the temporary or milk teeth fall out, and are replaced by permanent teeth, which process takes from four to six weeks; so that when the dog is four and a half to five months old the dental process should be completed—*i.e.*, in the large breeds, but the small types, such as toy dogs, etc., take several weeks longer. The full dentition of the dog is: twelve incisors (six above and six below), four canines or tusks (two above and two below, one on each side, the upper, as a rule, being the strongest), and twenty-six molars, seven on each side in the lower jaw, and six on each side in the upper jaw. These teeth are adapted for tearing rather than crushing the food, and, unlike the teeth of the herbivora, have no flat tables, but cross one another.

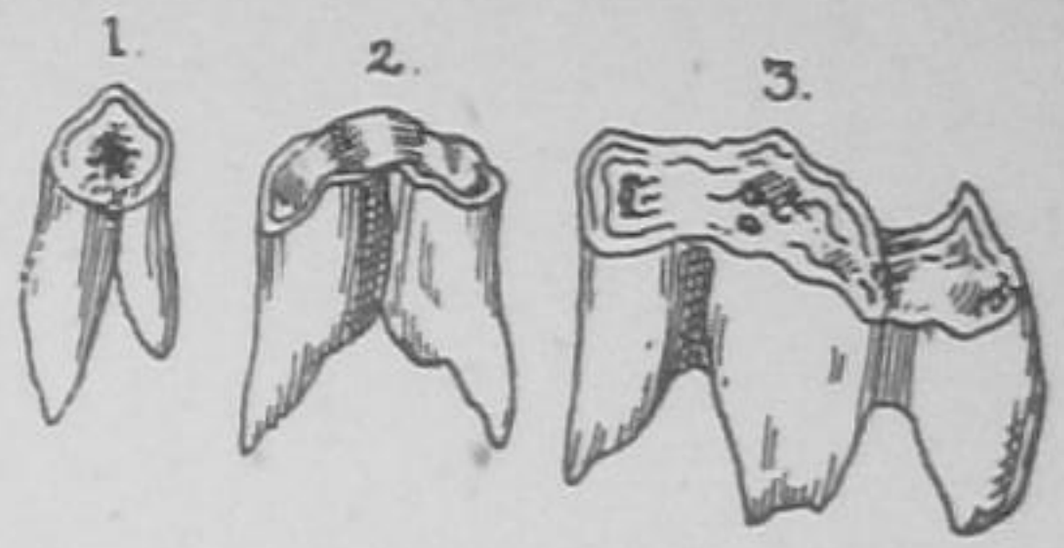
Dental Derangement.—As a rule, puppies rarely show any inconvenience when getting their milk teeth, but in casting the temporary and getting the permanent teeth they sometimes suffer from digestive trouble with diarrhœa, fits, etc. Occasionally the roots of the temporary teeth are pressed to one side by the permanents, when they become attached to the bony processes of the jaw, and cause inconvenience and trouble; in such cases they must be removed. The tusks seem more liable to this than the other teeth. The teeth of the dog are at times broken by the animal chewing hard substances, such as stones, etc.; and in such cases the sharp edges must either be filed or cut off. Tartar also occasionally accumulates round the tooth just above the gum, and when this gets to be troublesome it must be scraped off. Any diseased teeth that may be observed, when interfering with the feeding of the dog, should be removed. Generally speaking, the dog suffers more from dental disorders than any other domestic animal, pyorrhœa being very common.

PLATE XXX

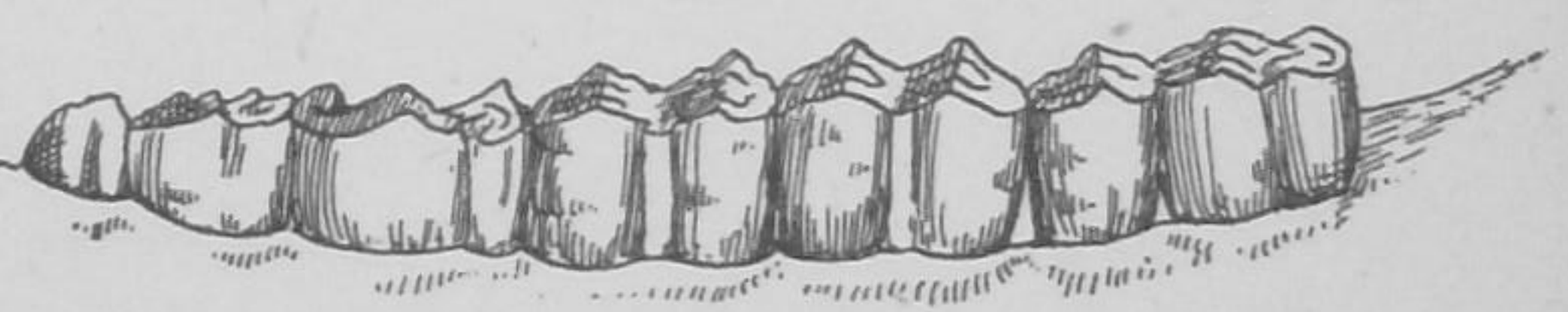


B.

C.



A.



A. Cow's Lower Jaw and Teeth. B. First, Second, and Third Shells, Upper Jaw.
C. First, Second, and Third Shells, Lower Jaw.

FEEDING STUFFS.

(In Connection with Dentition.)

A few brief remarks anent some of the various kinds of feeding stuffs may not be out of place in this chapter.

Wheat.—The general consensus of opinion is that this is not a suitable grain for horses or cattle, that its use produces stomach and intestinal disorder and laminitis. Although this view is probably exaggerated, wheat is unlikely to be used as a general food for animals, there being other grains obtainable at a less cost, and containing more suitably balanced ingredients. The envelopes which surround the grain are more generally used for animals under the name of bran.

Barley.—In this country barley is mainly used as a special diet for sick or unthrifty horses. As a grain feed it is seldom given, whereas in some countries of the East it is used, in the place of oats, as the staple grain diet. For tired or sick horses barley is usually given boiled, either alone, or as a mash mixed with bran; it forms an excellent and tempting food for such cases. As barley meal, it forms one of the chief items in the diet of pigs.

Oats may be looked upon as the staple food for both horses and cattle. *For the horse*, as already stated under Teeth, oats should be given whole in the berry, except in the case of a young animal which is teething, or an old one with uneven teeth, when they may be bruised. *For cattle* they should always be mashed or crushed, and mixed with other foods.

Maize (Indian corn).—This is a good all-round article, and will give better results on expenditure than any other known feed. *For the horse*, when doing quick work, it is, however, of little or no use, either boiled or raw, nor should it be given to a horse which has a tendency to lay on fat, or to one having little work to do, as it throws the animal out of condition, conduces to swelled legs, grease, and cracked heels, and makes the animal lazy and sluggish; but for a cart-horse, or waggon-horse, having regular working-days, it answers fairly well, when broken and mixed with oats, beans, peas, and bran. *For cattle or sheep* it answers splendidly when flaked or made into meal, or broken and mixed with cotton and linseed cakes. *For the pig* it should not be given to a very young

animal, as it is apt to produce irritation of the stomach, accompanied with fits. Pollards are much better, or barley and oatmeal mixed, and well boiled. The use of maize for fatting pigs is considered undesirable on account of the greasy nature of the fat produced in the bacon. There are several preparations now made from maize and used for the feeding of stock, such as maize germ cake and meal, cooked and rolled maize, known as Uveco, Ceros, cooked food, etc., all of which mix well with other concentrated foods.

Beans.—These are much favoured by many feeders, being given boiled, whole, or broken, and as meal, both to horses and cattle. For heavy horses in hard work 1 or 2 pounds of crushed beans may usefully be added to the feed. Beans, it will be found, generally enter into the composition of the mixed horse foods prepared by corn merchants. *For cattle*, beans may be given crushed, or in the form of bean meal, mixed with oats. They form a useful home-grown food.

Peas are used for horses and cattle in the same manner as beans. They should be given in small quantities, 1 or 2 pounds at most, and mixed with other grains, as they contain too large a proportion of proteid matter in their composition. Pea meal may also be used in pig-feeding. A variety of pea known as gram is largely used in parts of India for feeding horses. It is very hard, and should be given cracked and mixed with barley or other grain.

Linseed.—The seed of the flax plant is largely used in various forms for feeding animals. The seed is not given unprepared, as, owing to the hardness of the coat, it is not digested. It may be used boiled, or steeped in hot water, or crushed into meal. For sick or debilitated horses, or those convalescent from illness, boiled linseed is an excellent and nutritious food; it may be added to boiled barley and bran. Similarly *for a cow* it may be given boiled, or crushed and mixed with other food. *For a calf* it is generally boiled, or steeped, and mixed with milk or ground into meal.

Linseed Cake.—This cake is made from a variety of seeds grown in different countries. These cakes vary in the amount of oil they contain. There are, of course, a good many inferior makes of linseed cake, as of other cakes, as can be gathered from the physical appearances of the various brands on the market. There is also a great difference of quality in what are called *pure*

linseed cakes. Undoubtedly the best, and those most entitled to be classed as *pure*, are those manufactured from *genuine* seed that, previous to crushing, has been passed through a closely-meshed screen, which takes out all the impurities, such as small weedy seeds, dirt, etc., called screenings. Linseed cakes are now made by the best seed-crushers guaranteeing 95 to 98 per cent. of purity.

A good screened sample of linseed, and linseed cake made therefrom, should show an analysis something like the following:

	Linseed.	*Linseed Cake.*				
		A.	*B.*	*C.*	*D.*	*E.*
Moisture	7·80	11·46	13·33	9·80	11·04	14·68
Oil	36·94	12·63	10·96	14·34	11·63	10·96
*Albuminous compounds	25·31	30·00	31·87	29·50	30·12	30·13
Mucilage and other carbonaceous principles ...	20·27	32·29	30·85	30·58	32·82	30·75
Phosphate of lime ...	3·63	4·90	4·66	4·90	4·89	4·26
Fibre	6·05	8·12	7·13	8·02	7·74	7·72
Insoluble matter ...	Traces	0·60	1·20	2·86	1·76	1·50
		100·00	100·00	100·00	100·00	100·00
*Containing nitrogen ...	4·05	4·80	5·10	4·72	4·82	4·76

A and B.—Analyses of cakes guaranteed 95 per cent. of purity.

C.—Analysis of Bombay linseed cake shows a high percentage of oil, but a little too much insoluble matter. The seed cannot have been well screened.

D.—A sample of Hamburg linseed sake.

E.—A new-made English cake, guaranteed, which shows too much moisture.

Cake showing an analysis of from 8 to 10 per cent. of oil is more frequently met with than the above qualities, and is by no means bad, but buyers are advised never to go below this figure, if a cake is wanted that will give satisfaction. It must be borne in mind that the seed is crushed and pressed more for the oil it will produce than for the cake alone. Linseed oil is worth considerably more than the cake. It is, therefore, to the interest of the manufacturer to get the best and most improved machinery that

will extract the greatest percentage of oil, and when this is done the cakes are generally hard and of a light colour. The broad, thin, flat cakes are of this class, and are largely manufactured in America, as well as in England. These often show only from 6 to 7 per cent. of oil, and are useful for feeding growing cattle, and at times profitable enough to buy; but for quick feeding of stock the old-fashioned oblong shapes, which are made from screened seeds, are the best, when guaranteed 95 to 98 per cent. of purity. They are much thicker, and richer in oil—oil may be looked upon as ready-made fat—are darker in colour, and of a softer texture than the other cakes.

Good linseed cake is one of the safest foods we have, and is of great value for feeding cattle and young stock, especially in winter. It is also a useful feed for milch cows, though it is more a fat-producing than a milk-producing food. Another recommendation in favour of linseed cake is that cattle fed upon it invariably enjoy good health, and are not liable to contract skin or other diseases. *For a horse* thriving badly, with an unhealthy, ragged, dingy-looking coat, a handful each of crushed, pure linseed cake and whole peas, given night and morning, mixed with corn and bran, has a splendid effect. *For the cow*, linseed cake may be given at the rate of from 3 to 9 pounds per day with the best possible results; whilst a young calf, six to eight weeks old, may receive it in quantities of from 3 to 4 ounces with a little crushed oats and bran daily, the quantity being gradually increased as the calf grows older.

Decorticated Cotton Cake is cake made from seed having the husk removed, and is chiefly made in America, as the husk of the cotton seed can best be removed when the seed is green. The cake is then manufactured from the seed or kernel. Like linseed, cotton seeds are crushed for the oil they contain, and of late greatly improved machinery for this purpose has been devised. Decorticated cotton cakes are generally very hard, so much so that farmers are almost afraid to use them. This causes some dealers to have their decorticated cake made into meal, an expedient which increases the risks to feeders, for the meal when kept too long in closely-packed bags becomes heated and perhaps mouldy, when it is dangerous to stock. Great care is, therefore, necessary for the

buyer not to purchase too much of the ground article at once. Decorticated cotton cake is also very dangerous when it has been damaged at sea, for the same reasons as those urged against the mouldy meal. Numerous cases are on record where numbers of cattle have died from the effects of eating moulded decorticated cotton cake. This cake should always be used in combination with some farinaceous matter, such as Indian meal, crushed oats, barley or wheat, bran, etc. As a milk, butter, and flesh producer it stands unrivalled, owing to the heavy percentage of flesh-forming (nitrogenous) materials it contains. It should never, for this reason, be given to stock under one year old, except with the greatest caution and judgment, and should not on any account be used for cows on the point of calving, nor for a month after, as the milk with such feeding is too rich, and brings on diarrhœa when given to young calves. The manurial residue of decorticated cotton cake is also valuable, and is estimated at £2 16s. 5d. per ton of food consumed; in fact, it stands without a rival for the renovation and improvement of old laid grazing pastures. In the course of a couple of years or so, given in anything like liberal quantities, it has a marked effect, both on the quantity and quality of the herbage.

Soya Bean cake and meal has, of recent years, come into favour for feeding cattle and pigs; being rich in proteins, it is useful to supplement a ration deficient in this ingredient.

Undecorticated Cotton Cake.—In the manufacture of this cake the husk and the kernel are ground together, and it is extensively made in England. The best qualities are manufactured from Egyptian seed, and command the highest prices, although the Bombay seed gives equally good results and is sold at less money. Even the best class of these, however, show but a poor analysis compared with decorticated cake, as the analyses on p. 240 indicate.

Undecorticated cotton cake is largely used in some districts. In early spring, when the grasses are young, it has a good effect, owing to the tannic acid it contains preventing looseness of the bowels in cattle, but it should always be used fresh. When cakes become mouldy they are very dangerous to stock, often producing disease, and even death. Serious fatality frequently arises from the use of cake of this description, often leading to lengthy and unpleasant litigation, the case generally going against the manu-

facturer or seller when actually the feeder is to blame for having too big a stock at the wrong time of the year and allowing it to mould. Mouldy cakes of any class should never be given to stock.

Palm-nut Cake and Meal are prepared from palm fruit, which is ground, heated, and pressed in a somewhat similar manner to linseed and cotton cakes. Cattle do not take very readily to either of these articles, but when once they acquire the taste they thrive and do well. As milk and butter producers, palm-nut cake and meal are great favourites with many dairymen and farmers when used in combination with other feeding materials.

Rice Meal.—There is always a considerable quantity of this

	Undecorticated Cotton Cake.		*Decorticated Cotton Cake.*	
Moisture	11·24	12·16	7·10	8·10
Oil	6·54	6·74	14·08	13·50
*Albuminous compounds	21·62	22·12	44·37	41·26
Starch, sugar, and carbonaceous compounds	55·97	54·05	27·81	30·80
Phosphates	4·63	4·93	6·64	6·34
Insoluble matters	Traces	Traces	Traces	Traces
	100·00	100·00	100·00	100·00
*Containing nitrogen	3·46	3·54	7·10	6·64

food on the market. It forms a fairly good cattle food, and is extensively used in many districts; but great caution is needed in its purchase, as it can be bought at almost any price, and is frequently adulterated and damaged. It is more used in making fancy mixed meals and cakes than as a feeder by itself.

Cocoa-nut Cake and Meal are made from the dried fruit or flesh of the cocoa-nut, which is reduced to a rough powder by machinery, and treated in much the same way as seeds are in the manufacture of other cakes, the great object being to extract the oil, which is very valuable, and, unlike the others, is solid, resembling lard at ordinary temperature. The residue is a light-coloured cake, having a delicious smell and nutty flavour, and is

much relished by all kinds of stock. It is especially valuable for dairy cattle and breeding ewes in frosty weather.

The analyses of cocoa-nut cakes show:

	F.	*G.*	*H.*
Moisture	9·60	8·40	9·12
Oil	9·68	11·36	11·50
*Albuminous compounds	20·62	20·37	15·50
Carbonaceous principles	37·23	40·61	36·45
Phosphates, etc.	5·43	5·00	23·69
Fibre	15·34	12·97	
Insoluble matter	2·10	1·29	3·74
	100·00	100·00	100·00
*Containing nitrogen	3·30	3·26	2·48

F.—Analysis of a sample of Egyptian cocoa-nut cake, but not so rich ir oil as English-made cakes.
G.—Analysis of cocoa-nut cake.
H.—Analysis of palm-nut cake.
G. and H.—Both English-made cakes.

Balanced Ration Nuts, containing the correctly balanced food-stuffs for dairy cattle and pigs, are now prepared by several of the best firms of corn merchants. If purchased from a reputable firm, these form a very convenient method of supplying the concentrated foods required by these animals in their proper proportion.

Bran.—The feeding properties of the husk of wheat have been regarded by some as almost non-existent. Analysis shows, however, that bran is rich in protein contents, while practical feeders have long recognized its value as an occasional feed, in the form of a mash, especially for tired or sick horses, or for mixing dry with corn. If given wet it acts as a laxative, probably owing to the amount of indigestible matter contained in it, but if dry bran is given it seems, on the contrary, to have a constipating effect. It is also used, mixed with crushed oats and flaked maize, for feeding cattle.

EXPLANATION OF PLATE XXXI

A. RIGHT SIDE OF THE HEART

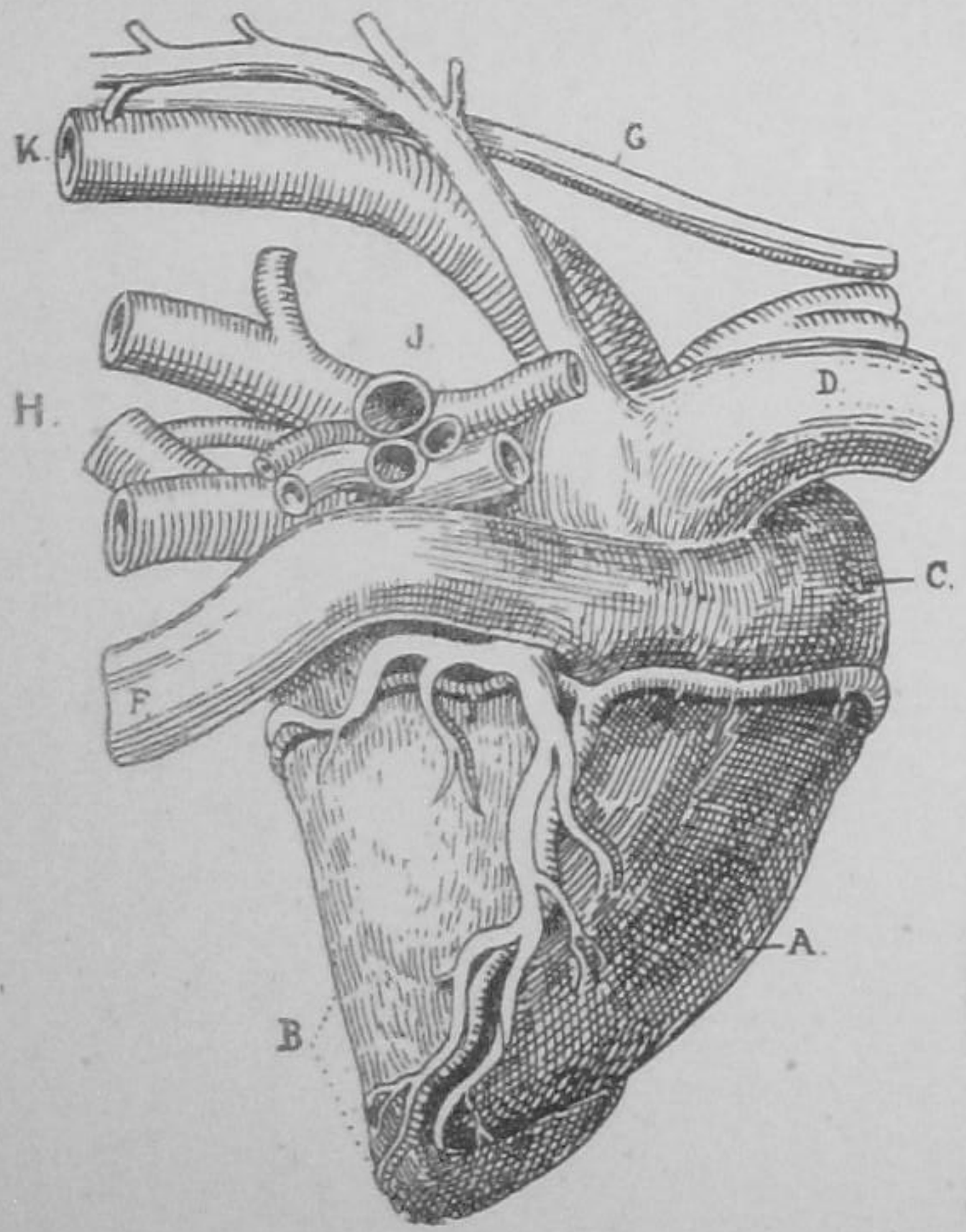
A. Right Ventricle.
B. Left Ventricle.
C. Right Auricle.
D. Anterior Vena Cava.
F. Posterior Vena Cava.
G. Thoracic Duct.
H. Pulmonary Arteries.
I. Coronary Artery—Nutrient Vessel of the Heart.
J. Pulmonary Veins.
K. Aorta.

B. RIGHT SIDE OF THE HEART LAID OPEN

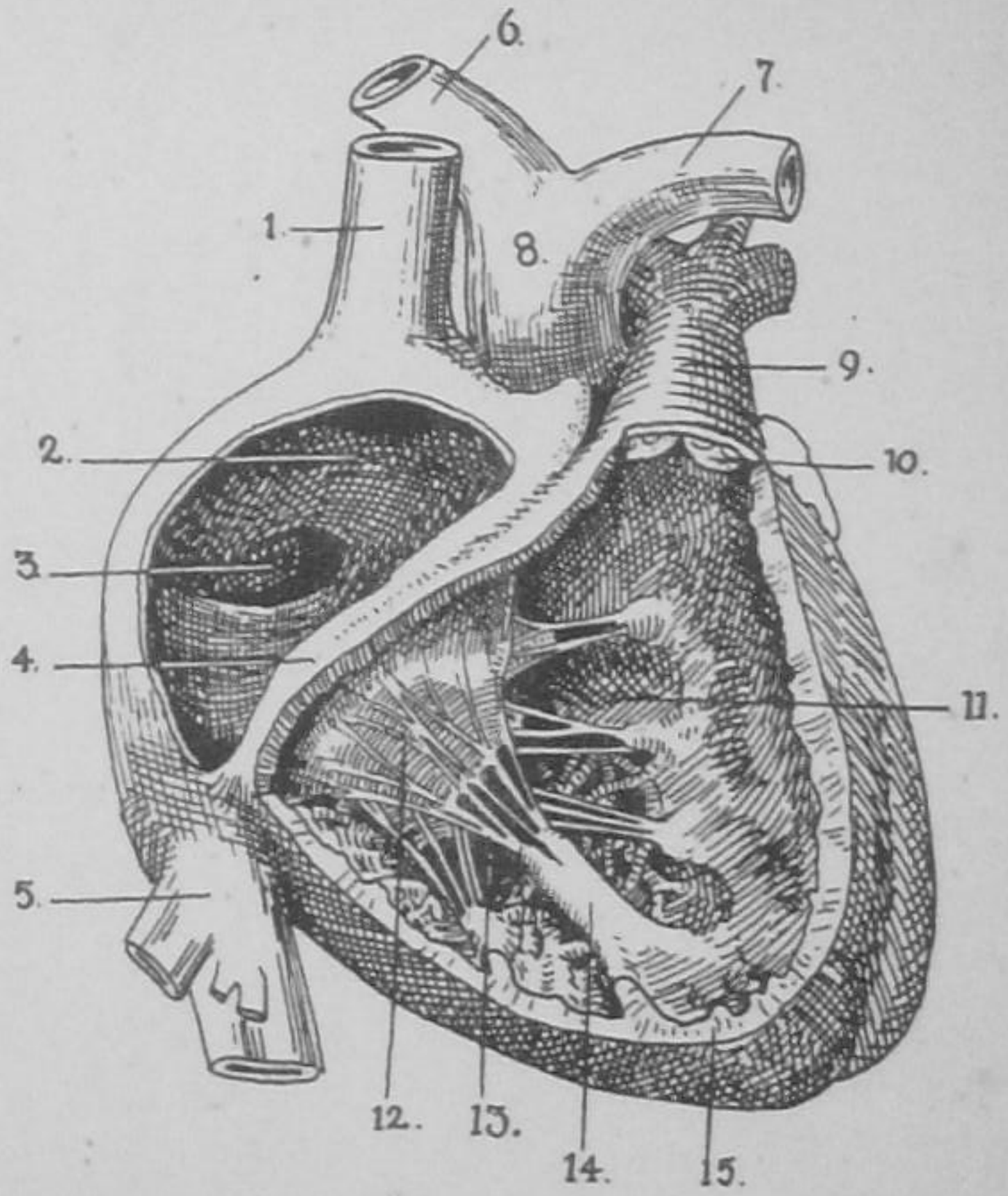
1. Anterior Vena Cava.
2. Musculi Pectinati.
3. Interior of Right Auricle.
4. Division between Auricle and Ventricle.
5. Posterior Vena Cava.
6. Anterior Aorta.
7. Posterior Aorta.
8. Trunk of Aorta, as it arises from the Left Ventricle.
9. Pulmonary Artery, as it arises from the Right Ventricle.
10. Semilunar Valves.
11. Interior of Right Ventricle.
12. Tricuspid Valves.
13. Chordæ Tendineæ.
14. Papillary Muscle.
15. Walls of Right Ventricle.

PLATE XXXI

A



B.



CHAPTER VIII

CIRCULATORY AND LYMPHATIC SYSTEMS, AND THEIR DISORDERS AND DISEASES

THE CIRCULATORY SYSTEM.

THE organs of circulation, in all animals, comprise—

1. **The Heart**, which, so to speak, pumps blood through the body for circulation.
2. **The Arteries**, which carry blood to various portions of the body.
3. **The Capillaries**, which form the connecting medium between arteries and veins.
4. **The Veins**, which return the blood to the heart.

The Heart is a reddish-brown, hollow, cone-shaped muscular organ, situated between the right and left lungs, in the middle of the chest, or thorax, having a base which looks upwards, a body, and an apex pointing downwards in a slightly oblique manner towards the sternum, or breast bone, inclining slightly to the left side. It is composed of involuntary muscular fibres, and is enclosed in a fine fibro-serous sac, or bag, called the *pericardium*, the surface of the heart being covered by a serous membrane—the *epicardium*. In the horse and cow it is about 8 inches in length from the base to the apex, and weighs from 6 to 7 pounds. The walls on the right side of the heart are much finer and thinner than those on the left, whilst the walls of the left ventricle are about three times as thick as those of the right. The heart receives its nutrient blood from the *coronary arteries*, the blood being returned by the *coronary veins* into the right auricle.

Internally, the heart is divided into four cavities—*two auricles* and *two ventricles*—the auricles and ventricles being separated from each other by a partition—the *auriculo-ventricular* septum—whilst the cavities are lined by a delicate membrane, called the *endocardium*.

The Auricles are the upper cavities of the heart, and form its base, and open into the ventricles by orifices guarded by valves—the valve on the right side being in three segments, and named the 'tricuspid' (Plate XXXI., B, 12); while that on the left is in two, and is called the 'bicuspid,' or 'mitral.' On the inside of the auricle, chiefly in the appendix of each, are noticed fleshy elevations, called *musculi pectinati* (Plate XXXI., B, 2), while there is a depression on the auricular septum, which is the remains of the *foramen ovale*, through which the blood courses in fœtal circulation.

The Ventricles are the lower chambers of the heart, the left forming the apex. Inside the ventricles are seen the fleshy columns—*papillary muscles* (Plate XXXI., B, 14)—from which run white fibrous cords, called *chordæ tendinæ* (Plate XXXI., B, 13), to be attached to the auriculo-ventricular valves, their purpose being to limit the range of movement of the valves, and prevent them from being swept into the auricles during contraction of the ventricles.

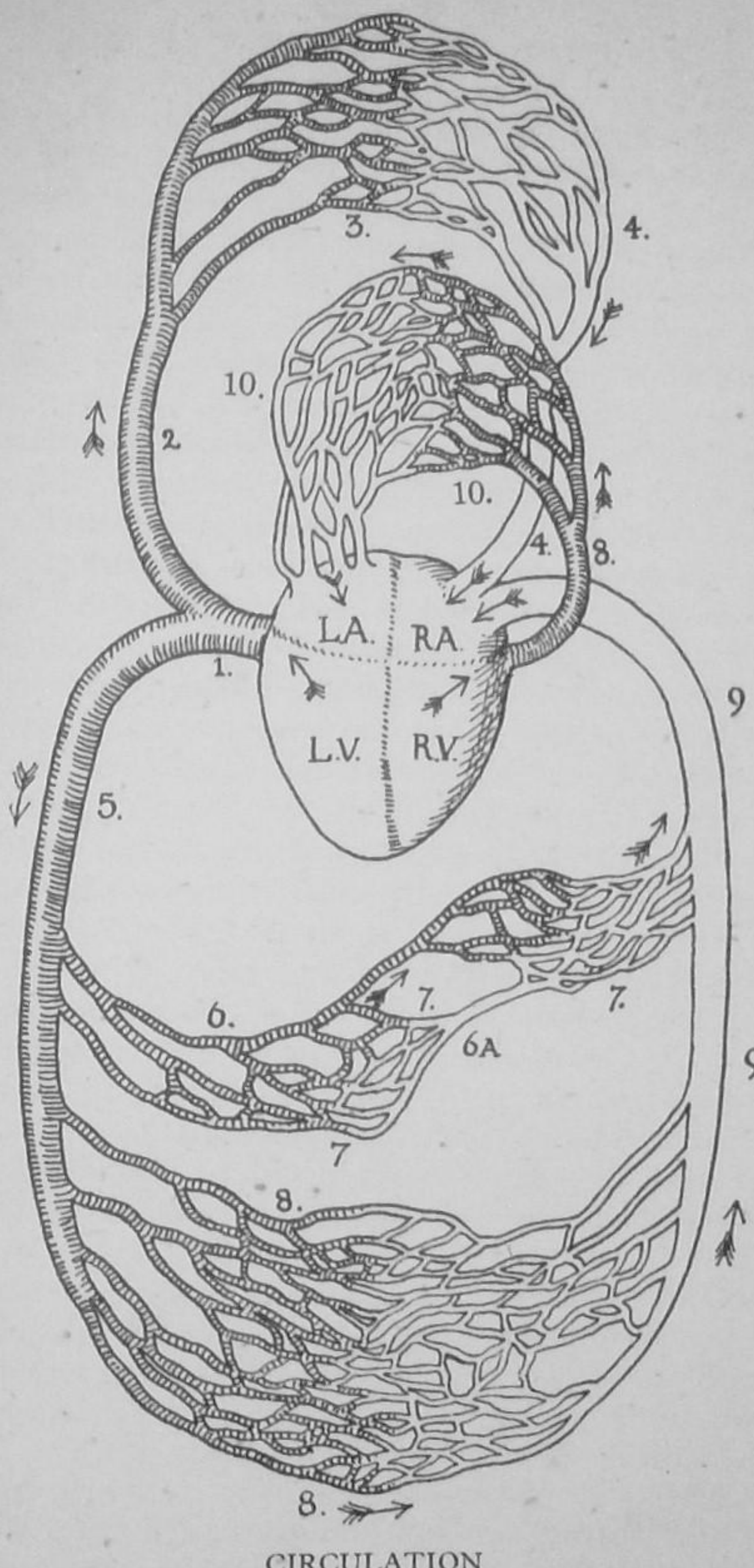
Into the right auricle we have opening the *anterior* and *posterior* venæ cavæ (Plate XXXI., B, 1 and 5) and the coronary sinus (into which the coronary veins open), while the four pulmonary veins open into the left auricle.

The Pulmonary Artery (Plate XXXI., B, 9) arises from the right ventricle, and carries venous blood to the lungs to be oxygenated, while the pulmonary veins (Plate XXXI., A, J.), which are generally four in number, bring back the oxygenated blood from the lungs to the left auricle of the heart. It will thus be seen that the *pulmonary artery* carries venous blood, and the *pulmonary veins* arterial blood.

Inside the *aorta* and pulmonary artery, just as they leave the heart, are the *semilunar valves* (Plate XXXI., B, 10), three in number; on the free edges of these are small fibrous bodies, called the *corpora Arantii*. These valves, like the other valves of the heart, are to prevent regurgitation of the blood.

The Aorta (Plate XXXI., B, 8) rises from the front and upper part of the left ventricle, and is the main stem of the arterial circulation. The common aorta is about 2 inches long, and divides into two great branches, one—the anterior aorta (Plate XXXI., B, 6)—

PLATE XXXII



CIRCULATION

L.A. Left Auricle. R.A. Right Auricle. L.V. Left Ventricle. R.V. Right Ventricle. 1. Common Aorta. 2. Anterior Aorta. 3, 3. Capillary Circulation of Anterior Portion of the Body. 4, 4. Anterior Vena Cava. 5. Posterior Aorta. 6. Hepatic Artery. 6A. Portal Vein. 7, 7. Capillaries of Hepatic Circulation. 8, 8. Capillary Circulation of Posterior Portion of the Body. 9, 9. Posterior Vena Cava. 10, 10. Capillary Circulation of the Lungs.

The arrows show the direction in which the blood flows.

going to supply the head, neck, and fore-extremities, while the other —the posterior aorta (Plate XXXI., B, 7)—proceeds to the hinder parts of the body and limbs.

Arteries (Plate XXXII., 2 and 5).—These are the vessels which convey the blood from the left side of the heart to the various portions of the body. They are very dense and elastic, having three coats—viz., *internal*, lined by endothelium; *middle*, or contractile, consisting of non-striated muscular fibre and elastic tissue; and *external*, of areolar structure. The arteries anastomose frequently with one another, and finally terminate in the capillaries.

Capillaries (Plate XXXII., 3.3, 7.7, and 8.8).—These form a system, or network, of minute vessels, constituting the connecting medium between the arteries and veins. They are very small, being about $\frac{1}{3000}$ inch in diameter. It is through their thin walls that the changes between the blood and tissues take place; the nutrient material is given out, and the effete products are taken up into the blood-stream and carried to the various excretory organs, such as lungs, kidneys, skin, etc., to be thrown off by them.

Veins (Plate XXXII., 4 and 9) are the vessels which return the blood to the right side of the heart. They, like arteries, have three coats, which, however, are not so dense, strong, or elastic, and they are, moreover, provided with pouch-shaped valves, to prevent the back-flow of the blood. The walls of the bloodvessels are nourished by means of small vessels called the *vasa vasorum*.

The Portal Vein (Plate XXXII., 6 and 7) forms a separate circulatory system. It commences in the sub-lumbar region, being formed by various vessels. It carries blood, which is charged with material newly absorbed, through the walls of the stomach and intestines from the food, and conveys it to the liver.

The Circulation of the Blood.—Through the medium of the large venæ cavæ the dark venous blood reaches the heart; entering by the right auricle, and passing through the opening guarded by the tricuspid valve, it gains the right ventricle. From thence it is driven, by the contraction of the walls of the ventricle, into the pulmonary artery, and is carried to the right and left lungs, where it gives off carbonic acid gas and becomes charged with oxygen. This action changes its colour from a dark brown to a bright scarlet. The blood is then returned by the pulmonary veins to the left

auricle, then through the passage guarded by the bicuspid valves into the left ventricle, whence it is forced into the aorta; thence through the arteries all over the body, carrying to the various parts nourishment, as well as oxygen, to build up the tissues, and make good the wastage caused by work done. Having given up its supplies, it is again returned by the veins to the heart, taking in fresh nourishment on the way. Thus we have a double circulation, the right side being venous or pulmonary, while the left is the arterial or systemic.

By the action of the heart—*i.e.*, by the contraction of the ventricles—the blood is forced into the aorta and pulmonary artery; this causes the arteries to dilate, and this dilatation, running in the form of a wave, pressed forward by the contraction of the arteries and the force behind it, constitutes the pulse, which corresponds to the beats of the heart.

The horse's pulse beats from			38 to 43	times	per minute.
The cow's	,,	,,	50 to 60	,,	,,
The sheep's	,,	,,	75 to 80	,,	,,
The pig's	,,	,,	70 to 80	,,	,,
The dog's	,,	,,	80 to 90	,,	,,

The number of beats of the pulse is not the only thing to be considered; the character of the volume of the vessel is to be taken into account as well, for the pulse may be *quick* or *slow*, *hard* or *soft*, *strong* or *weak*, *full* and *bounding*, *double* or *intermittent*, *corded* or *wiry*, *irregular*, *thready*, and *running down*. All these varieties have a significance and value in the diagnosing of disease.

In the horse the pulse is generally felt at the jaw or inner side of the forearm or fetlock-joint; in the cow, at the lower part of the neck, opposite the shoulder-joint, or at the inner side of the knee, or under the root of the tail; in the sheep, pig, and dog, it is felt for inside the forearm or thigh.

The Blood is a red fluid (of varying specific gravity in different animals—*e.g.*, 1060 in the horse, ox, and pig), of which we recognize two kinds:

1. *Arterial blood*, of a bright scarlet colour.
2. *Venous blood*, of a dark brownish-red.

The difference in colour is due to the relative quantities of oxygen in each. Blood consists of:

1. Liquor sanguinis or plasma.
2. Red corpuscles. These are very numerous; it is estimated that a horse's blood contains about 7,000,000 per cubic millimetre.
3. White corpuscles, the number of which is estimated to be in proportion to the red as 1 : 500.
4. Some proteids, extractive and mineral matter.

The Plasma (*liquor sanguinis*) contains water, proteids (one of which, fibrinogen, gives rise to fibrin, which enables blood to clot), solids (not proteid in nature), extractives (including fat), and inorganic salts. The main function of the plasma is to carry the dissolved food material, as well as the corpuscles, to the tissues.

The Red Corpuscles are bi-concave, disc-shaped cells, without nuclei; they are said to be about $\frac{1}{3200}$ inch in diameter; and it is to them that the red colour of the blood is due, owing to the material (hæmoglobin) which they possess, and which is the oxygen-carrier to the tissues. The red corpuscles, when seen singly under a microscope, are of a pale green or yellowish colour, and float in the middle of the blood-stream, moving along more rapidly than the white ones. The purpose of the red corpuscles, as already stated, is to carry oxygen to the tissues. The hæmoglobin very readily takes up oxygen from the air in the lungs and becomes oxy-hæmoglobin, and as readily gives it up to the tissues of the body, when it again becomes met-hæmoglobin.

The White Corpuscles (or *leucocytes*, as they are also termed) are protoplasmic cells, and have no cell wall; they are very remarkable bodies, which float more slowly along the sides of the vessels. They are larger than the red corpuscles, and contain one or more nuclei. Different types are recognized according to the number and characters of the nuclei present. They have no constant shape, but are continually altering, slowly pushing out projections of their protoplasm in different directions followed by the main mass of their substance; in this way locomotion is imparted. This power of amœboid movement, so called because it resembles the movement of the lowly animal called an *amœba*,

enables the leucocyte to move about independently, and even in some cases to creep through the walls of bloodvessels, as in inflammation. The principal function of the white corpuscles is to defend the animal body against bacteria, and other foreign invaders. The particular leucocytes which destroy such foreign particles are termed *phagocytes*.

Proteids.—The proteids of blood-plasma are fibrinogen, serum albumin, serum globulin, and fibrin ferment; of these, fibrinogen, when acted upon by fibrin ferment, gives rise to the fibrin found in clotted blood.

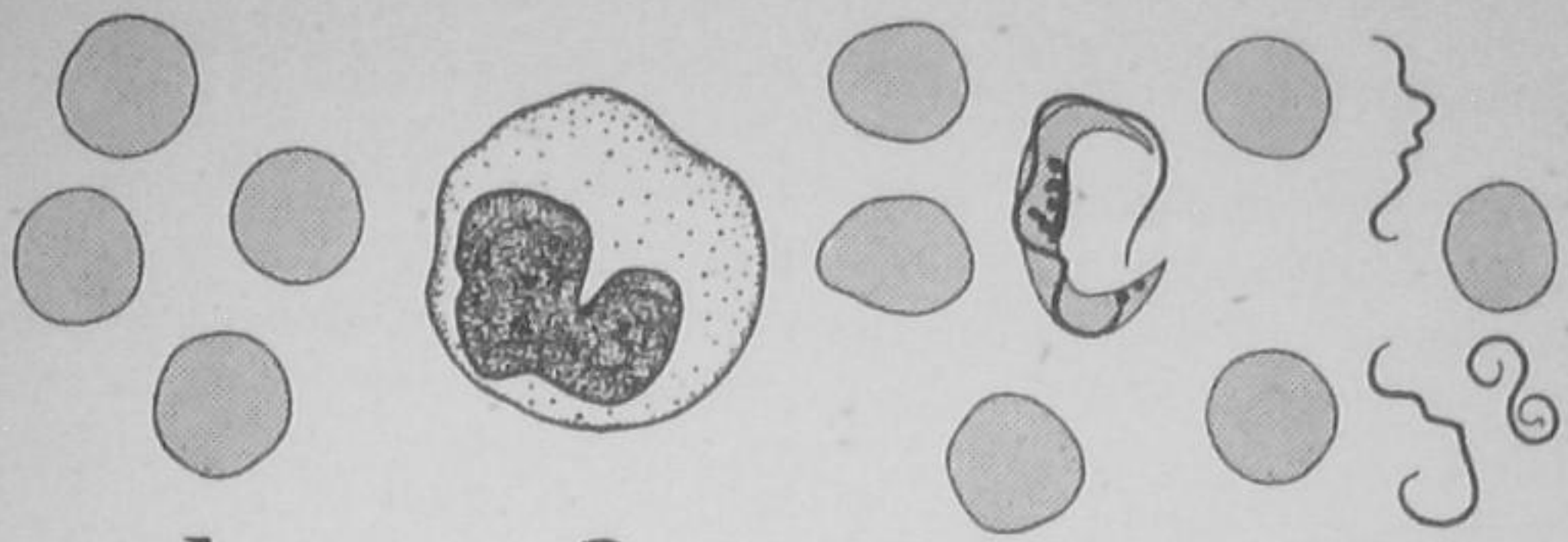
Extractives.—These are of two kinds—viz., nitrogenous and non-nitrogenous. The nitrogenous extractives are urea, uric acid, hippuric acid, creatine, creatinine, xanthine, and hypoxanthine; the non-nitrogenous are fats, soaps, cholesterine, and sugar.

Mineral Matter.—The salts in solution in the blood are chiefly the salts of potash, soda, lime, and magnesium, phosphates, and iron; of these, by far the most plentiful is common salt, or chloride of sodium, of which the ash of human blood is said to contain as much as 54 per cent.

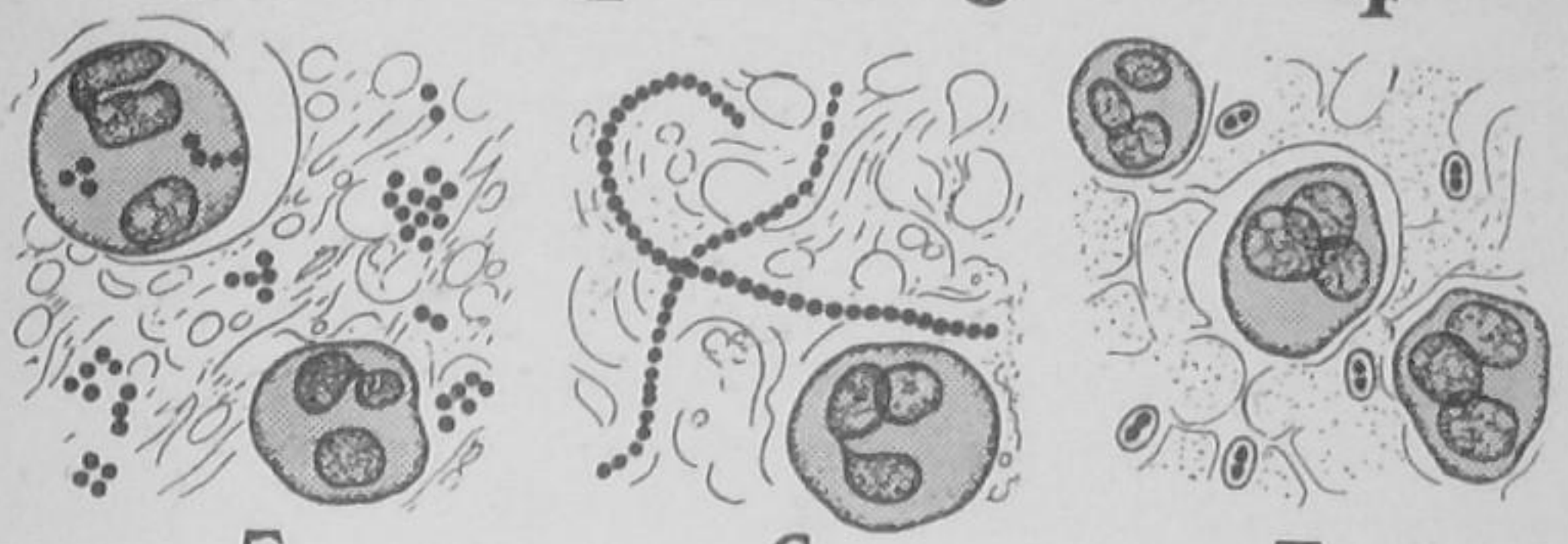
The Clotting of Blood.—When blood is drawn from the body, it does not remain fluid, but in a short time forms into a jelly-like mass. Then, if left to stand for a few hours longer, it separates into (1) the *crassamentum*—a firm red clot, consisting of red corpuscles, entangled in a network of *fibrin*, which has been precipitated from the blood-plasma; and (2) the *serum*—a clear, straw-coloured fluid, in which the clot floats. Fibrin is normally thus precipitated, and a clot formed when blood is shed. This action is a natural protection against excessive hæmorrhage, for when a vessel is cut or broken, and blood exudes, sooner or later a clot is formed which seals the opening, and the flow ceases. In practice it is frequently necessary to assist this action by applying pressure for a time, in order that the newly-forming clot may not be forced out by the blood-pressure before it has time to consolidate. Sometimes, under abnormal conditions, fibrin may be produced in the living body, such as the internal clotting which sometimes follows injury to a bloodvessel, although the vessel may not be cut.

Serum may be considered as plasma from which the fibrin-forming elements have been removed during clotting. It contains

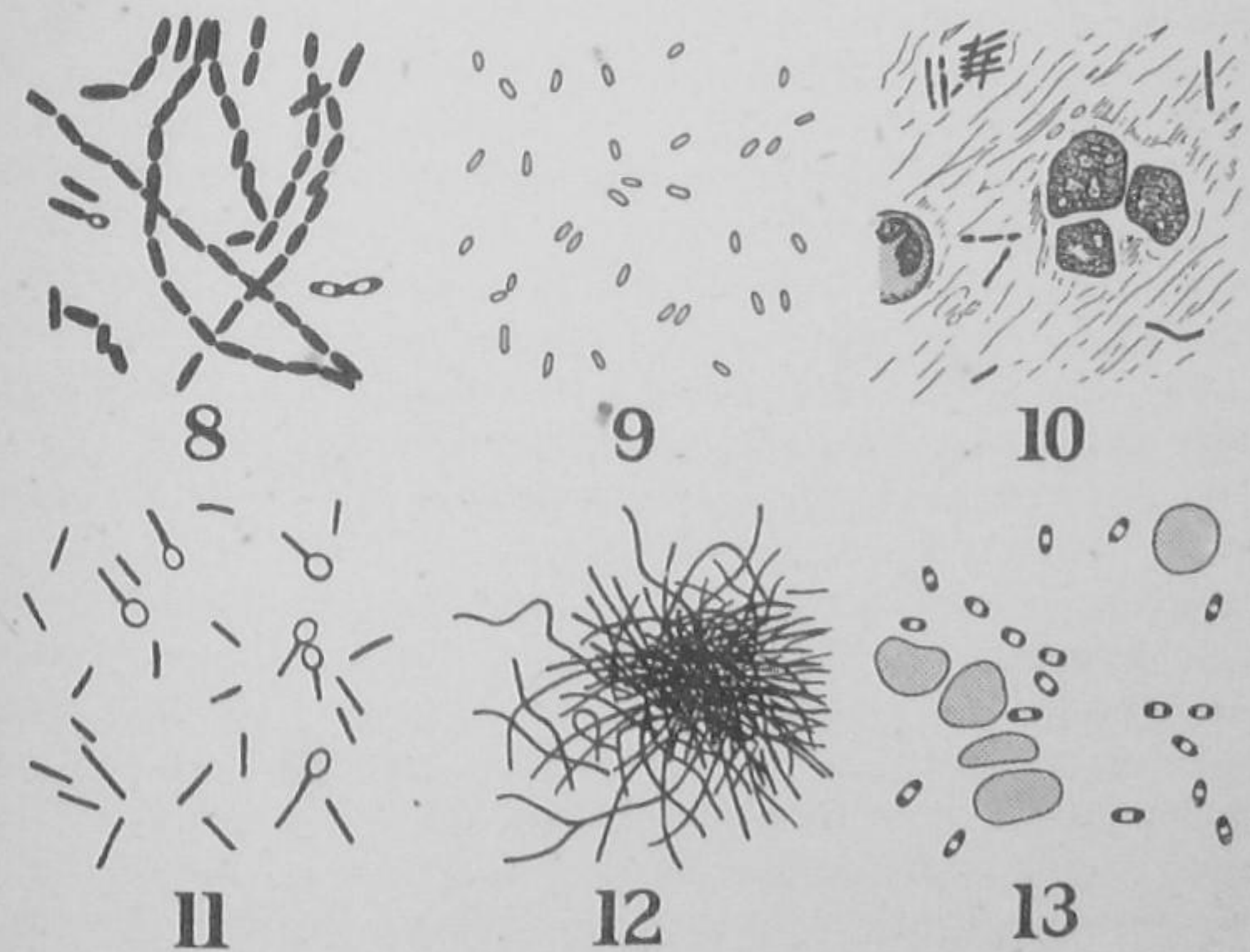
PLATE XXXIII



1 2 3 4



5 6 7



8 9 10

11 12 13

TYPES OF MICRO-ORGANISMS.

1. Red blood corpuscles.
2. Leucocyte (white corpuscle).
3. Red Corpuscles and Trypanosome.
4. Spironema.
5. Staphylococci (pus producing).
6. Streptococci (pus producing).
7. Pneumococci.
8. Anthrax bacilli.
9. Bacilli coli communis.
10. Tubercle bacilli.
11. Tetanus bacilli.
12. Actinomycosis.
13. Bacilli pestis.

(*After French and Nuttall.*)

proteids, extractives, and salts, just as the plasma does. The extractives and salts are the same in both fluids; but the proteids of serum are serum albumin, serum globulin, and fibrin ferment.

THE LYMPHATIC SYSTEM.

The Lymphatic or **Absorbent System** is made up of numerous vessels of various sizes, and small bodies, also of different sizes, called glands, and is intimately connected with the circulatory system. The absorbents originate in a very fine network communicating with fine delicate tubes, which are more numerous than the capillaries of the bloodvessels, and are found in almost every structure of the body, being both deep-seated and superficial. The walls of the larger vessels have three coats, and, internally, they are supplied with valves which give them a beaded appearance when distended.

A number of the smallest of these absorbent vessels (*afferent vessels*) will be found running to the glands. These are present in almost every portion of the body, and are of various sizes, being usually named after the region in which they are found—for instance, the *mesenteric glands* in connection with the intestines, and the *bronchial glands* associated with the lungs. These glands give off other vessels (efferent vessels), which are slightly larger, and these again pass to other glands, and so on, until they end in one or other of the two large trunks—*i.e.*, the *thoracic duct* and the *right lymphatic* vessel, the former being the larger of the two.

The Thoracic Duct, a vessel which carries a mixture of both *lymph* and *chyle*. The lymph is a colourless fluid that is absorbed from the various tissues of the posterior portion of the body and hind extremities, also from the left side of the head, neck, thorax, and left fore-leg. The chyle is a milky fluid that is prepared during the process of digestion, and is taken up by the lacteals or lymphatic vessels and carried to the receptaculum chyli, a large vessel or reservoir situated in the lumbar region between the posterior aorta and venæ cavæ, wherein it mixes with the lymph, and is then conveyed by the *thoracic duct* into a vein near the heart.

The Right Lymphatic Vessel is a receptacle for the *lymph* that is taken up by the absorbents on the right side of the head, neck,

thorax, and right fore-leg, and it empties itself into the venous blood-stream near the heart, generally at the confluent vein of the jugulars.

DISEASES AND DISORDERS OF THE CIRCULATORY AND LYMPHATIC SYSTEMS.

Heart Diseases.—These occur in all animals as in the human subject, though an exact diagnosis of many of these disorders is more difficult in the lower animals, and it may be on this account that too little attention has been paid to them in the past. Among the more commonly recognized disorders of the circulatory system are:

Hypertrophy or **Enlargement**, which may be:

(1) Hypertrophy without dilatation, when the walls of the heart are thickened, but the capacity of the cavities remains unchanged.

(2) Hypertrophy with dilatation, when the cavities are enlarged as well as the walls thickened.

The former is usually associated with valvular disease of the heart; the latter, which is more common, is found in race-horses or those which have done much hard and fast work. As this condition seldom affects both sides of the heart to the same extent, a double sound or beat will be heard on auscultation; the animal is easily distressed. When, for example, a horse is noticed, while pulling a load up a hill, or when galloping, to stop, almost breathless, with dilated nostrils and staring eyes, and the heart beating with a thumping sound, loud enough to be heard, and there is a waving flow in the jugular vein up the neck, then it may be assumed that heart disease is present, and a careful auscultation—listening to the sounds of the heart—may indicate the nature of the disorder. The sounds of the heart may best be heard on the left side, behind the elbow.

Incompetence of the Heart Valves, indicated by a murmur, or soft sound, an intermittent beat, and by regurgitation of blood in the veins, may result in sudden death if the animal so affected is made to undertake severe exertion.

Fatty Degeneration and Fatty Infiltration of the walls of the heart are sometimes met with, but are rarely diagnosed before a post-mortem examination is made.

In the examination of horses for soundness it is of the greatest importance to note the state of the pulse, and the sounds of the heart, as well as those of breathing. Some cases, said to be 'broken-winded,' have proved, on examination, to be affected with heart disease. The normal sounds of the heart are represented by the two words, *lŭb—dŭp*, the first sound, *lŭb*, being long and sustained, and the second, *dŭp*, short and sharp. Horses with heart disease may live for a long time and do slow work. Some conditions may be relieved by giving digitalis and by prolonged rest, but such animals are unfitted for hard, fast work, such as racing or hunting.

Acute cases of diseases of the heart and its covering—the pericardium—are frequently associated with severe attacks of *pneumonia*, *pleurisy*, *influenza*, and *rheumatic affections*. Pericarditis and endocarditis, with a cauliflower-like deposit on the valves of the heart, are also commonly seen in cases of swine erysipelas. Here the covering of the heart becomes intensely inflamed, producing fibrinous deposits and effusion of water into the pericardial sac (*hydrops pericardii*). These cases are so complicated and so rapid that they require early and judicious treatment, as they are frequently fatal.

The Cow may suffer from diseases of the heart, particularly those disorders which are associated with other diseases. One form of heart disease is almost peculiar to the cow—namely, traumatic pericarditis. Cattle not uncommonly take into the stomach foreign bodies, such as pieces of wire, nails, etc., and these, in course of time, may pierce the stomach wall and the diaphragm, and enter the pericardial sac, or even the heart itself. When such foreign bodies are in the stomach, the animal may go on feeding and doing well without exhibiting any symptoms of illness, until one day it is found dead, post-mortem examination revealing the cause to be a piece of wire or other foreign body sticking in the heart or its covering. Sometimes the animal is very lame, and on close examination an enlargement is found in the side behind the elbow, which, on cutting into, is found to contain perhaps a large

needle or pin. Again, in other cases the symptoms are that the animal begins to lose flesh and milk, feeds badly, rarely chews the cud, and shows all the symptoms of a '*piner*,' having a dry, ticklish, barking cough, standing with the hind-legs down in the gangway of the byre, the belly tucked up and sides dropped in, the breathing short and slightly quickened. But the most confirming symptom is the jugular vein being greatly enlarged, sticking out as thick as the handle of a hay-fork, with a wavy pulsation in it. As the case progresses watery swellings are seen under the jaw, and on the lower side of the neck and dewlap, while the pulse is so small and quick as to be scarcely perceptible. On applying the ear to the flat or bottom of the sternum, just behind the elbow, the heart can be heard splashing in the water with a peculiar tinkling, running sound. This symptom may be due to some foreign body sticking in the pericardium, or to chronic inflammation of the pericardium from other causes. *Treatment* is very unsatisfactory.

Thrombi, or plugging of the bloodvessels, are occasionally met with in the horse. They generally make their appearance when a horse has had a long, quick journey, and is pulled up for a time. On re-starting, it is found to be intensely lame on one of its legs—usually a hind one; in fact, it can scarcely move. The limb has all the appearance of being paralyzed, only the animal can move and stand on it; but it does so with great difficulty and pain, and perspires freely. The affected limb may be perceptibly colder to the touch than the other limbs. As the case proceeds, the veins are seen to be varicosed, the leg begins to swell, and is very painful to the touch. There is a great deal of constitutional disturbance present, the animal taking little or no food. These cases take a long and tedious time to recover. The acute febrile symptoms must be combated with mild laxatives and sedative medicine. There is also a chronic form of this disturbance, which is accompanied by swelled legs, varicose veins, and a peculiar clumpy action of the leg. Diuretics, with iron tonics and long rest, answer best in these cases.

Aneurysm is the name given to dilatation of an artery at a particular point, generally close to a thrombus. The constant pressure of the blood coming from the heart meeting the resistance of the thrombus causes the artery to swell. The most common

site of an aneurysm in the horse is the anterior mesenteric artery where a short vessel leaving the main arterial trunk almost immediately divides into a number of small branches to supply the small intestines. Here, in cases of heavy infestation with strongyles (red worms), the immature forms of the worms assemble and block the small vessels, resulting in the formation of an aneurysm, which may rupture, and cause a fatal hæmorrhage.

Hæmoglobinurea, or free hæmoglobin in the urine, is believed to be due to an overloaded state of the system, and occurs usually amongst horses which are too well stall-fed, and have too little work or exercise. It is more particularly met with after a spell of frost, during which time the animals have had a term of enforced idleness, without the necessary care and attention having been paid to their dieting. Mares are even more acutely affected than horses. *Symptoms.*—On the animal being taken out of the stable, it seems to be possessed of more life and high spirits than usual, and rushes off on its journey in great form, but does not proceed far—generally from half a mile to two miles—before it begins to flag, wants to stop, and breaks out into a most profuse perspiration; the back becomes arched, and the hind-legs stiffen. In many cases the symptoms are those suggestive of colic, but in this disease the muscles, particularly of the quarters, will be found to be hardened. Though the difficulty is great, the animal should be got into a stable, when, if a mare, it may throw itself down, and commence to strain, as if in the act of foaling, ejecting from its bladder large quantities of dark brown, coffee-coloured urine. A horse, on the other hand, generally stands leaning against the stall or wall, pressing its head in the manger, perspiring freely, breathing quickly, with a full, strong, corded pulse, while the eyelids and other visible mucous membranes are highly injected. Quantities of the same peculiar coffee-coloured urine are passed at intervals with great straining. *Treatment.*—If the urine has not already been voided, the catheter should be passed, and the urine drawn off; the colour, being a dark brown, will confirm the diagnosis. Cloths, wrung out of hot water, should be applied to the hardened muscles of the quarters, and the bowels emptied by enemas and a ball of aloes (4 to 7 drachms) according to the size of the animal. Potassium bromide, in doses of 2 to 4 drachms, may be given. Hypodermic injections

of adrenalin has in some cases had a beneficial effect. If the attack is allowed to run its course, the animal, as a rule, dies, or if by chance it recovers, it is worthless for a very long time, and there is considerable muscle waste in the affected quarters. To prevent the occurrence of this troublesome disorder, animals should be regularly exercised daily; if this is not practicable, they must be put into a loose-box and lightly fed as long as their period of idleness lasts.

Purpura Hæmorrhagica, or Purple Bleeding.—This is an eruptive, non-contagious febrile affection, most frequently found in the horse, and following in the wake of some debilitating disease, such as catarrhal fever, influenza, strangles, diabetes, etc., or it may arise spontaneously without any previous derangement. It is of more common occurrence in town than in country practice.

Symptoms.—When an animal is evidently on the way to recovery from a severe attack of influenza or some such disease, it may all at once be found with swelled legs, eyelids, nose, and mouth, and patchy swellings all over the body, while, on closer examination, dark purple blotches are seen inside the nostrils. The breathing becomes much quicker, and the pulse is small and fast, while there is a yellow discharge from the nostrils. Occasionally the swellings about the head are so large that the breathing is oppressed to such an extent that suffocation is threatened, and tracheotomy must be performed, while the limbs may become so much swollen that the animal can scarcely stir, and has at length to be supported on slings.

Treatment.—When first observed, the horse should at once be put in a loose-box, where it can have a plentiful supply of fresh air, and, when necessary, it ought to be put in slings. Milk, linseed jelly, and eggs beaten up in milk may be given, as well as green food and boiled barley, if it has any appetite. All the food must be light and easy to digest. Light laxatives such as 2-ounce doses of hyposulphite of soda can be given night and morning in sloppy mashes or drinking water; chlorate of potash in 2-drachm doses every four or six hours (given in drinking fluids) answers well; while repeated intravenous injections of adrenalin eases the blood-pressure and diminishes extravasation. But the malady being of such a formidable character, the patient should be placed at once in the care of a veterinary surgeon, as in many difficult cases, by the

injection of preparations of iodine in solution into the windpipe, many animals have been saved.

Urticaria, or Nettle Rash.—This is another blood affection of a non-contagious and non-febrile type. It is characterized by the sudden appearance of patchy, elastic swellings all over the body, which, however, cause little or no distress to the animal, and may disappear quite as suddenly as they came. The cause is generally traceable to some strange food, or quality of food, being given to an animal, such as the first feed of new grass, new hay, or oats, Indian corn, etc. *Treatment.*—For the horse, from 1 to 2 ounces of bicarbonate of soda, or the same quantity of hyposulphite of soda, dissolved in 1 pint of cold water, to which is added ½ pint of whisky, if given when first observed, will generally be found to have the desired effect. In the cow this complaint is most frequently met with during the spring months, when stock are changing their quarters. The head, eyes, ears, neck, and the base of the tail are swollen up, while the skin all over the body feels much thicker and harder than usual. The swellings at times are so extensive in the region of the neck and head that the animal foams at the mouth, and shows all the symptoms of choking. All the *treatment* that is necessary is to give the cow a wineglassful of turpentine in a pint of linseed oil or milk, or 2 ounces either of bicarbonate of soda or of hyposulphite of soda may be given in 1 pint of cold water, to which ½ pint of whisky has been added. After this the animal should be left alone, and a little patience exercised on the owner's part.

Lymphangitis, Weed, Shot of Grease, or **Monday Morning Complaint,** consists of inflammation of the absorbent vessels, and most frequently affects the hind-legs of horses; occasionally, however, it is met with in the fore-legs. It generally appears on Monday mornings after Sunday's rest—and perhaps overfed—and affects heavy horses, more particularly the sluggish, gummy-legged ones. Nineteen people out of twenty are in the habit of calling this a '*shot of grease*,' whereas in reality there is no grease about it, grease being purely a skin disease. *Symptoms.*—In some cases the attack is ushered in by a shivering fit, while in others the first symptom noticeable is a sudden and extreme lameness in one leg, on touching which great pain is evinced even before any swell-

ing makes its appearance, while patches of sweat may be observed on the limb. The large vessels running up the inside of the leg soon begin to enlarge, as well as the glands in the groin, and excessive lameness and pain accompany any attempts to move. General swelling of the limb then takes place, on the appearance of which the pain diminishes a great deal, most of its acuteness being lost. In some cases there is a considerable amount of constitutional disturbance, but in others very little or none is observable. *Treatment.*—The treatment to be recommended is to put a bandage-syme—made of soft meadow hay, not too tightly twisted—round the limb, commencing at the foot, and rolling lightly and loosely round up to the top of the affected limb, and when once in position soaking it well with several pailfuls of cold water, repeating this action every three or four hours. In very many cases the animal will be seen to get great relief from this treatment in less than an hour. Linseed oil—from 1 to 1½ pints—may be given, followed up by 3- to 4-drachm doses of nitrate of potash every eight hours in drinking water. When the pain and lameness have gone, which is usually the case as the limb becomes thickened, the swelling is then best reduced by gentle exercise. Iron tonics, with diuretic medicine, may be given every night with much benefit. In very excitable cases aloes balls should be used with extreme caution (*inflammation of the bowels*). Animals once affected are subject to subsequent attacks, and may ultimately end with their having a chronic thick leg, which in some cases gets to an enormous size. This is called *elephantiasis*.

Elephantiasis (Plate XX., B) consists of a chronic abnormal thickening of the connective tissues beneath the skin. The horse may continue to do slow work on the farm, feeding and doing well, but the leg is very unsightly. Best results are obtained from applying a cold water hay bandage to the leg every night, while tarring the limb and giving a winter's run at grass have also a wonderfully good effect. Liniments of a slightly stimulating nature may also be used.

Inflammation of the Lymphatics is a corded, painful enlargement of the vessels, and is frequently induced in the limbs by injuries, such as wounds, thorn-pricks, bruised ankles, and cracked heels. In some cases the vessels are enlarged to such an extent

that the gland at the top and inner part of the leg becomes so much inflamed that often an abscess is formed, which, if it does not burst of its own accord, has to be opened and the matter liberated. *Treatment.*—The leg should be dressed with an antiseptic mixture, and alterative tonic medicine given night and morning.

Epizootic Lymphangitis.—This malady simulates glanders and farcy, but differs from them in the absence of the glanders bacilli, and the affected animal does not react to the mallein test. The cause is an ovoid organism, known as a cryptococcus. The disease was prevalent in the last South African War, and in 1902 was introduced into this country. It makes itself manifest by enlargement and thickening of the lymphatic vessels, which seem like branches of a tree on different parts of the body, but the limbs particularly, with the formation of abscesses and ulcers. The diagnosis is made certain by finding the cryptococcus in smears of the pus with the aid of the microscope. As this is one of the scheduled contagious diseases, it must, if suspected, at once be reported to the police.

Swelled Legs and Sheath.—During the winter months, when horses are stall-fed and have thick coats of hair, they are frequently seen with thick legs, and occasionally the sheath becomes swollen and pendulous. This is generally due to want of condition or to giving them too much boiled food of a 'slushy' nature, such as boiled turnips or potatoes and cut corn sheaves. Soft unconditioned hay or oats will have a similar effect. If the food be at fault it should be changed at once and the sheath well washed out with soap and water; then the administration of iron tonics, combined with suitable diuretics, will soon remedy the mischief. The best treatment, however, is to clip the hair off the animal, and feed with well-conditioned corn and hay.

Anthrax, or Splenic Apoplexy.—Although this is a disease of the blood, it has already been noticed under 'Digestive Organs,' Chapter VI.

Red-Water, Black-Water, Muir-Ill, or Hæmo-Albuminuria.—Known in America as Texas fever, tick fever, and in the Argentine as La Tristeza. This is a disease of cattle, due to the presence in the blood of a protozoon (animal) parasite, known as a piroplasm. In typical cases of the disease the parasite, which is found inside the red corpuscles, causes a disintegration of the corpuscles, with

the setting free of hæmoglobin. The hæmoglobin is then eliminated from the body by way of the urinary tract, giving rise to the most characteristic symptom—red-coloured urine. The colour may vary from bright red to coffee colour, or almost black. For many years this disease, as it occurred in America and other countries abroad, was associated with the presence of ticks, and it was therefore called tick fever. It is now known that the condition which is found in this country is similar to the forms seen in foreign countries, the cause in each case being the *Piroplasma bigeminum*, or other species of piroplasm; and the means by which the parasite obtains access to the body is by the bites of ticks, several species of which may transmit the causal organism. The piroplasm, taken into the body of the tick when it sucks the blood of the affected host, is transmitted through the eggs subsequently laid by the tick; and as these in turn hatch out, they seek a new host, which thereby becomes infected. The ticks which commonly transmit the disease in this country are the *Ixodes ricimus*, and the *Hæmaphysalis punctata*. *Symptoms.*—These vary according to the extent of the infection. Where a large number of blood-corpuscles are destroyed by the parasites, the characteristic red colour of the urine is observed, but it has been shown that cases of infection occur where, owing to the small number of corpuscles affected, this symptom is not exhibited. Other symptoms are dulness and loss of appetite, breathing short and quick, the heart beats accelerated. In milking cattle the secretion is suspended; the nose, eyes, mouth, and vagina have a dirty yellow appearance, and in the first stages the animal is affected with diarrhœa. As the disease advances, all the symptoms become aggravated, but an obstinate constipation takes the place of the diarrhœa. *Treatment.*—The following remedies, though old-fashioned, are apparently successful in the majority of cases: When the animal is first observed to be affected, give it from 14 to 20 ounces of common salt in 2 quarts of gruel, and then place in front of the patient a large pailful of hay or bran tea, or cold water and milk in which from 2 to 3 ounces of hyposulphite of soda is dissolved. This must be renewed as soon as the patient drinks it. It should be followed by 20-ounce doses of linseed oil, to which is added 2 ounces of turpentine. Should the bowels not respond, 4-ounce doses of

hyposulphite of soda may be given along with warm cordials, such as 1 ounce each of ginger, gentian, sweet pepper, mustard, etc., in 2 quarts of warmed ale every six or eight hours. The subcutaneous or intravenous injection of trypan blue is supposed to destroy the parasites in the blood. *Prevention.*—Where practicable, the ticks should be got rid of, or rendered free from piroplasmic infection, by keeping cattle off the land for some time. Sheep, being immune to red-water, may be grazed on the land, and officers of the Ministry of Agriculture have reported that pasturing sheep with cattle has a good effect, the ticks going on to the sheep in preference to the cattle. A method of preventive inoculation can also be practised.

The following diseases, though not diseases of the blood-system, may conveniently be considered here:

Black-Quarter, Black-Leg, or Quarter-Ill, formerly erroneously regarded as a species of anthrax, and for this reason called symptomatic anthrax, is due to a bacillus which obtains access to some of the tissues of the body, particularly the muscular tissues. Cattle and sheep are affected, most frequently young animals from six months to two years old, but older animals may be affected also. In young stock it is invariably fatal, while aged animals occasionally make good recoveries. Various parts of the body may be attacked, particularly the limbs, loins, and shoulders. The causal organism is rod-shaped, and frequently has a spore at one end, giving a characteristic 'drum-stick' appearance. In the tissues it forms gas. The soil may be infected with the spores, which can retain their vitality for a long time. The disease may thus be endemic in certain farms, and even in particular fields. The bacilli usually obtain entrance to the body through small wounds or abrasions. The *symptoms* of black-quarter or quarter-ill to be first noticed are that the animal seems very languid, breathes quickly, and hangs its head, while the white of the eye has a peculiar pale, cold, steely hue. The temperature is high, ranging from 104° to 106°. Lameness may also be present in one of the limbs. On examining the body, the confirming symptom will be a puffy swelling, which, when the hand is passed over it, gives a crackling sound and feeling, due to the presence of the gas formed by the organism. On post-mortem examination the affected muscular

tissue has a dark red appearance, and a peculiar odour, which is characteristic. *Treatment*.—In adult cases the following prescription is said to give good results—namely, 1 ounce of hyposulphite of soda and 1 ounce of charcoal given every six or eight hours in water, and 10 to 15 ounces of linseed oil given every other day. But, as a rule, remedial treatment is useless. Preventive treatment consists of inoculating young stock which may be exposed to infection with preparations of dried muscle from affected animals,

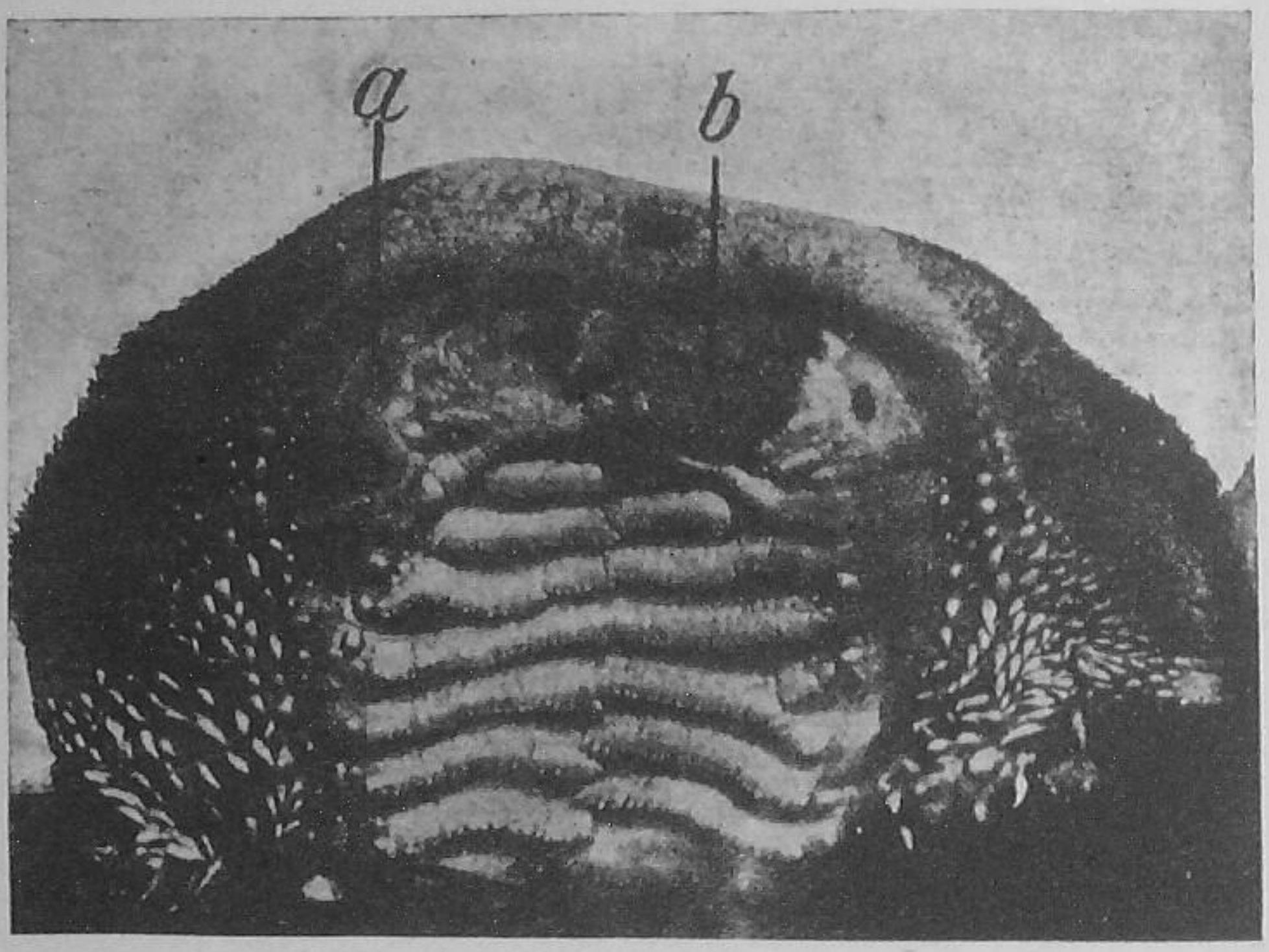


FIG. 24.—FOOT-AND-MOUTH DISEASE AFFECTING THE DENTAL PAD OF A COW: (*a*) A BLISTER; (*b*) A BLISTER BROKEN, LEAVING A RAW, PINK SURFACE.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

or with immune serum, together with preparations of the virus of the disease. The particular method to be adopted should be left to the discretion of the attending veterinary surgeon. Such measures have given good results, though occasionally an animal may contract the disease. Such cases are, however, rare. Care should also be taken to prevent contamination of the soil by cutting up an affected carcase on land where stock are likely to be placed.

Rinderpest, or Cattle Plague.—An acute specific, contagious disease of ruminants, which runs its course in a very short time.

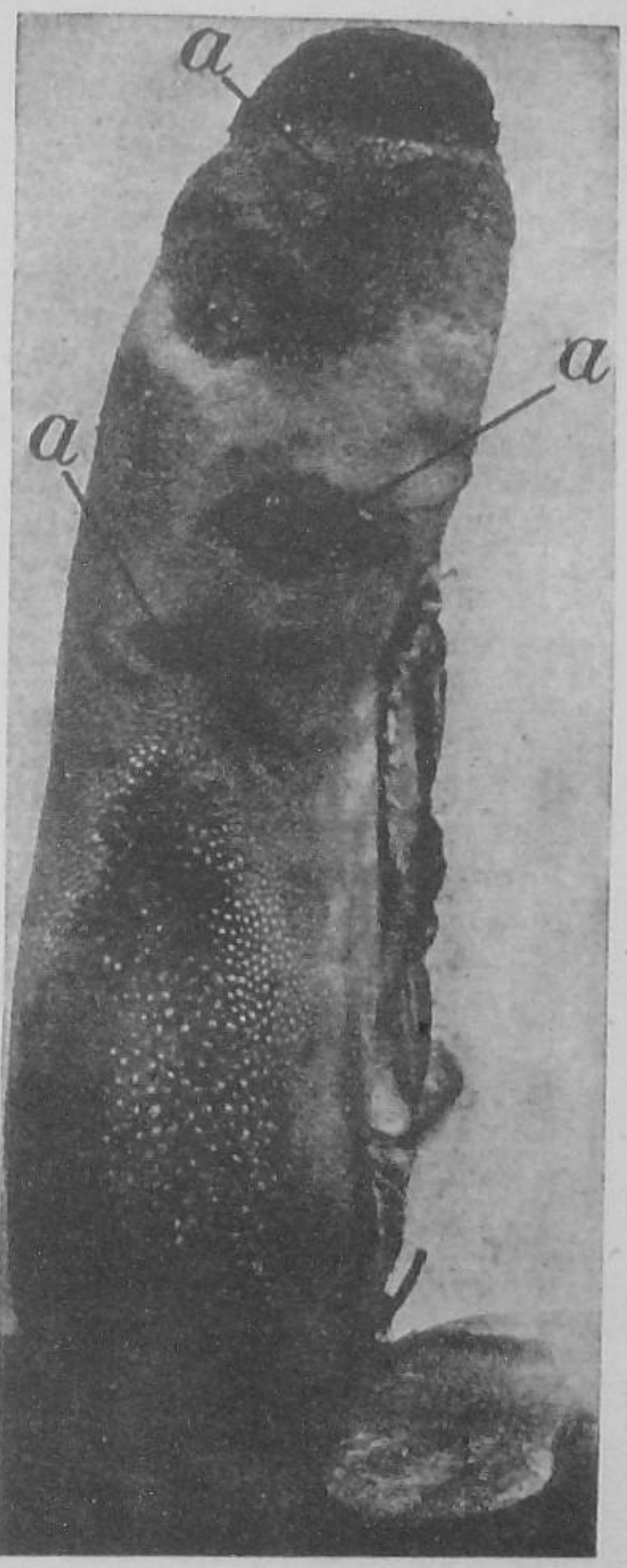


FIG. 25.—FOOT-AND-MOUTH DISEASE: LESIONS ON THE TONGUE, BLISTERS AND ERODED AREAS.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

The noticeable symptoms consist of elevated temperature, quick breathing, pulse scarcely perceptible, watery discharge from the

mouth and nostrils, drooping head and ears, trembling and twitchings of the muscles all over the body, coat on end, and dirty eruptions and ulcerations seen in the mouth, on the vagina, udder, and thighs. Constipation in the early stages is followed by a profuse diarrhœa, which is frequently blood-stained. The disease is fatal in the majority of cases, but those which recover show lasting immunity.

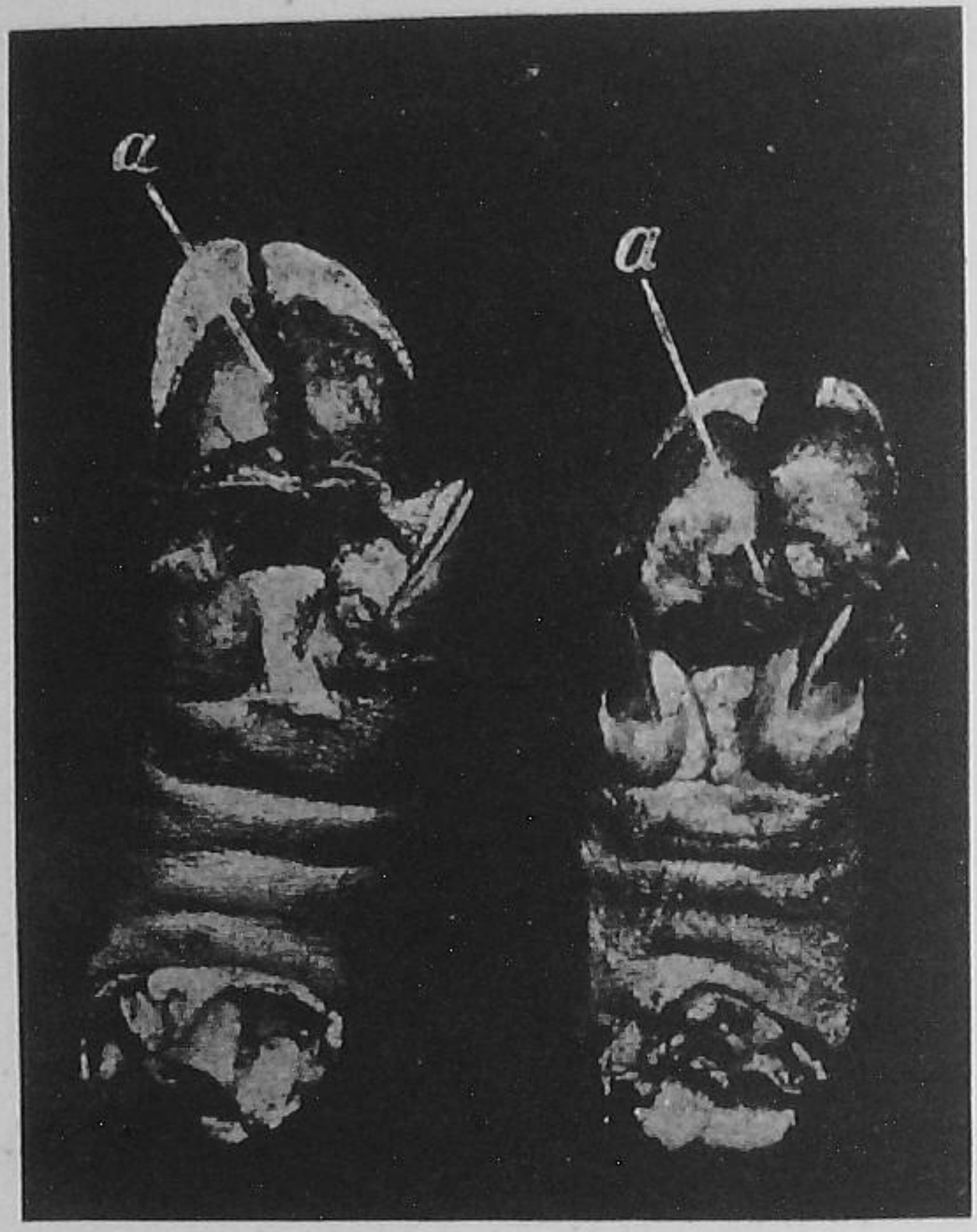


FIG. 26.—FOOT-AND-MOUTH DISEASE ON THE FEET OF PIGS: BLISTERS BEHIND THE HEELS.

(From Wooldridge's ' Encyclopædia of Veterinary Medicine.')

Cattle plague, while it has long since been eradicated from the British Isles, is found in other countries, and is of considerable historical interest on account of the severe outbreak in England in 1865, which was largely responsible for the passing of the Cattle Diseases Prevention Act, 1866, the forerunner of the Diseases of Animals Acts, under which contagious diseases are now controlled.

Foot-and-Mouth Disease.—A contagious, eruptive, vesicular, febrile disease, in which the mouth, feet, and udder are affected, at first with small vesicles or blisters, which afterwards burst, leaving a smooth, red surface, which may turn to a yellow colour. Some outbreaks are of a more acute nature than others; and, again, we may have the mouth attacked and the feet free, and *vice versa*. It affects cattle, sheep, pigs, and goats, and may also be transmitted to man. It is caused by an ultra-visible virus. The period of incubation varies from one to four days, or more, with an elevation of temperature from 2° to 5°. The most prominent symptoms are saliva foaming from the mouth, with a *distinctive peculiar smacking of the lips and tongue*; lameness may also be present, and cattle, when standing, will frequently stamp, or shake the feet. The vesicles may be found on the tongue, inside the lips, or on the dental pad; also on the feet, usually just above the hoof, in front, or immediately behind. In sheep and pigs it is not uncommon to find only the feet affected. This disease, though not often fatal, is the cause of very great economic loss. The affected animals lose flesh very rapidly, milk secretion is in abeyance, in severe cases portions of the tongue or udder may become gangrenous, while pregnant cows may slip their calves. The disease is very easily spread by direct or indirect contagion; it is scheduled under the Diseases of Animals Acts, and must be reported to the police if suspected. At present, the only effectual means of controlling it is by limiting the movement of animals in affected areas, and slaughter of all affected and in-contact animals. Compensation is paid for animals so slaughtered. With the object of preventing the importation of this disease from countries where it is rife, orders dealing with the use of hay, straw, or other packing material are at present in force.

CHAPTER IX

THE RESPIRATORY ORGANS

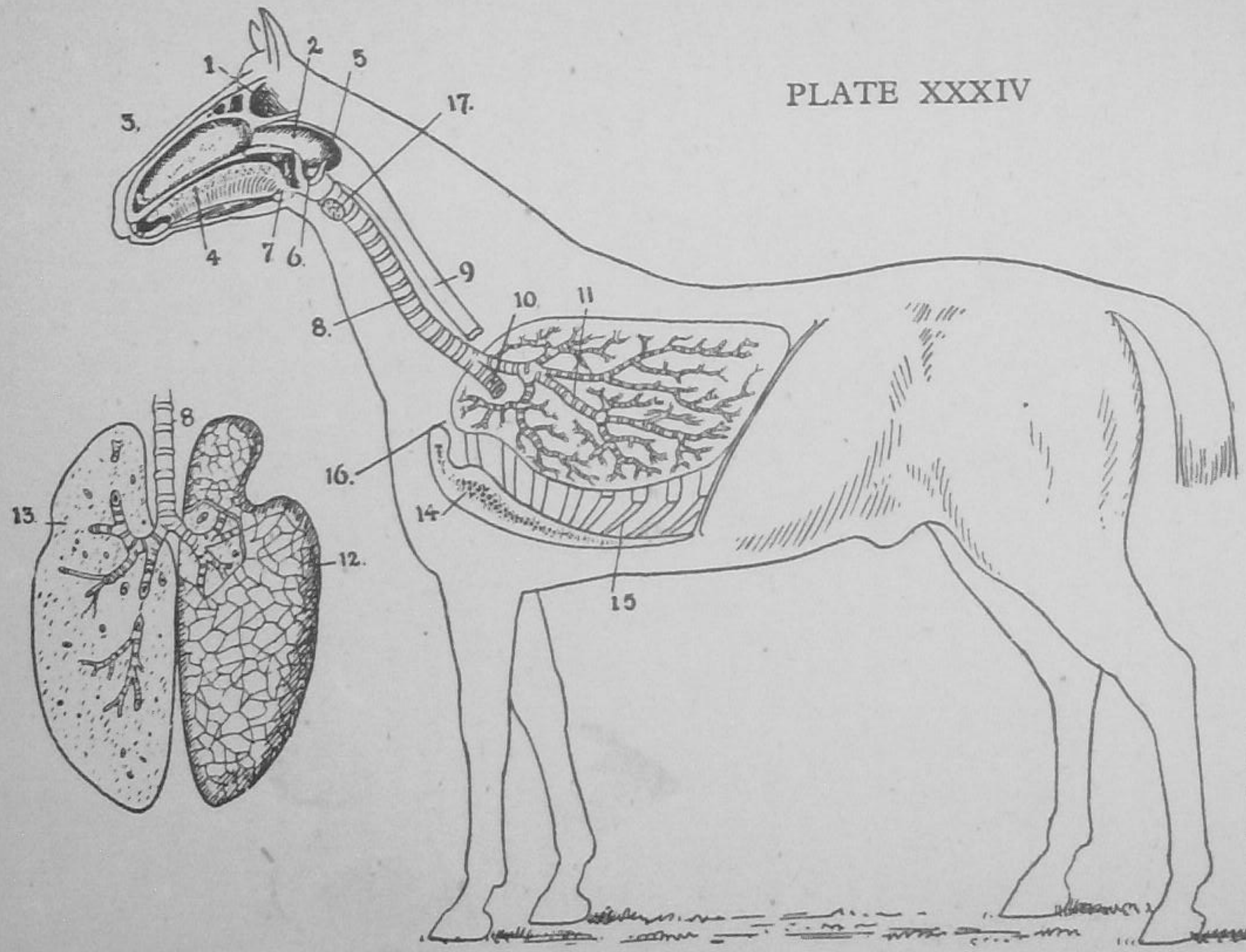
The Nose, which is divided by a bony and cartilaginous septum (*septum nasi*) into two chambers—the right and left nasal chambers; the larynx; the trachea, or windpipe; and the bronchi and bronchial tubes; the lungs; the thorax, or chest; the pleuræ; and the diaphragm.

Nasal Chambers (Plate XXXIV., No. 3).—The right and left nasal chambers of the *horse* each contains *two* bones—one above (the *superior*) and one below (the *inferior*). They are made up of very fine sheets of bone covered with mucous membrane, and rolled up like a Turk's turban, and are called turbinated bones. These bones give an extensive surface for the distribution of the nerves concerned in the sense of smell, as well as for the ramification of the bloodvessels which warm the air as it passes over their surface to enter the windpipe. The membrane covering them, being moist, and provided with ciliated epithelium, clears the air from solid particles of dust before it passes, by way of the windpipe, to the lungs. The *cow* has *three* turbinated bones in each chamber, also a canal (called 'Jacobson's canal') in the floor of the nasal chamber, which communicates with the mouth. The cavities in the horn cores of ruminants are also in communication with the nasal chambers.

Larynx (Plate XXXIV., No. 6) is situated at the back of the throat, and is composed of five pieces of cartilage, or gristle, of different shapes, which are so placed and joined that they are movable on one another, thus regulating the inlet and outlet of the air. These cartilages are named the *thyroid*, *cricoid*, *arytenoid* (2), and *epiglottis*. They are held together by ligaments, and moved by muscles. The cavity of the larynx is lined by a very sensitive mucous membrane.

Trachea (Plate XXXIV., No. 8), or windpipe, is a long tube running from the larynx to the roots of the lungs, where it divides

PLATE XXXIV



RESPIRATORY SYSTEM.

1. Cranial Cavity.
2. Guttural Pouch.
3. Nasal Cavity.
4. Tongue.
5. Pharyngeal Cavity (Throat).
6. Cavity of Larynx.
7. Epiglottis.
8. Trachea.
9. Œsophagus.
10. Section of Left Bronchus.
11. Ramifications of the Right Bronchus.
12. Right Lung.
13. Left Lung.
14. Sternum (Breast Bone).
15. Ribs.
16. Thymus Gland, Seat of.
17. Thyroid Gland, Seat of.

into two bronchi. It is made up of a number of ring-shaped pieces of cartilage, held together by elastic ligamentous tissue, and is thus capable of flexible movement. It is lined internally with mucous membrane.

Thyroid Gland (Plate XXXIV., No. 20).—This gland is ductless, and consists of two lobes placed one on each side of the trachea, near its junction with the larynx. This gland is concerned with the growth and development of the body. Attached to it are the parathyroids, small organs having different functions from the thyroid proper, their internal secretions exercising control over the mineral metabolism of the body. Removal of the parathyroids is followed by tetany, convulsions, and death, the blood-calcium and phosphorus contents being altered.

Thymus Gland (Plate XXXIV., No. 19) is a single body, found lying on the under side of the trachea at the entrance to the chest. It is large in the very young animal, but gradually disappears after birth. The functions of the thymus gland are not, as yet, perfectly understood. Although described in this place, they have nothing to do with respiration.

Bronchi (Plate XXXIV., Nos. 10 and 11) are two in number, one going to the right lung and the other to the left. They divide and subdivide, ramifying through the substance of the lungs, until they are too small to be seen by the naked eye. The smaller branches and the air cells in which they terminate form clusters called lobules. The divisions and subdivisions resemble a tree with branches, the air cells resembling the leaves.

Lungs, or **Lights** (Plate XXXIV., Nos. 12 and 13), right and left, are the principal organs of respiration. They are of a fine, soft, spongy texture, pale pink in colour, and very light and porous, owing to the air cells containing air; as a consequence, the lungs can float in water. *In the horse* the right lung is divided into three lobes, and the left lung into two, while *in the cow* the right is divided into four lobes and the left into two. The interlobular tissue is also found in greater abundance in the cow than in the horse. The *nutrient* bloodvessels of the lungs are the bronchial arteries and veins. The *functional* vessels are the pulmonary arteries and veins, which are much larger than the nutrient vessels. The pulmonary *arteries* convey the blood from the right side of the heart to the

lungs to be supplied with oxygen, while the pulmonary *veins* return it to the left side of the heart, as described in the chapter on 'Circulation.'

Thorax, or **Chest**, has a part of the backbone for a roof, the breastbone, or sternum, for a floor, the ribs and muscles for lateral walls. The diaphragm is a strong musculo-membranous partition, which separates the chest from the belly, or abdominal cavity. The inside of the thorax is lined by the *pleura*.

Pleura is a fine, serous membrane, which lines the inside of the ribs on both sides (*pleura costalis*), and covers the anterior surface of the diaphragm. From the top of the chest and under side of the backbone it descends through the middle of the chest to the sternum, dividing the thorax into two lateral halves and forming the *mediastinum*, which encloses and covers the heart. The pleura is also reflected over the outside of the lungs themselves, and is then called the *pleura pulmonalis*.

Respiration, or **Breathing**, is the act by which a constant interchange of gases takes place between the atmosphere and the blood. Two distinct movements are noticed during respiration—(1) inspiration, and (2) expiration. Inspiration is the act by which the lungs become filled with air, for the purpose of supplying oxygen to the blood, as described in the chapter on 'Circulation.' Expiration, on the other hand, is the act whereby the air in the lungs, charged with carbonic acid gas and other impurities, is expelled from the body. Each inspiration occupies about thrice the length of time taken up by an expiration. The air which passes to and fro during ordinary respiration is called the '*tidal air*'; the '*reserve air*' is that which can be voluntarily ejected after ordinary expiration; '*complemental air*' is that which can be taken in after ordinary inspiration; and '*residual air*' is that which remains after forced expiration. Horses in large towns suffer more from derangement of the respiratory organs than those in the country, and are considerably worse to treat, owing to want of good fresh air and loose-boxes.

Cubic Air-Space for Horses and Cattle.—It is said that the horse requires 1,600 cubic feet of air-space for healthy respiration. In many cases much less space than this is allowed. Again, much has been said and written respecting the cubic air-space requisite

for a cow, and it has been laid down that 800 cubic feet should be allowed. At first sight it is difficult to see why a cow should require only half the space allotted to a horse; but in each case the figures given represent a compromise between what is desirable and what is practicable. Exact figures in this connection are apt to be misleading, for the amount of cubic air-space allowed is only one of several factors which contribute to the provision of adequate ventilation in buildings for animals. Sir Frederick Smith, in an exhaustive review of this subject in his book on veterinary hygiene, has shown that the proportion of floor space to height is of greater importance than mere cubic capacity, and suggests that one-sixteenth of the cubic space is desired as floor space. Of still greater importance is the manner in which the building is ventilated, or the way in which the vitiated air in a stable is removed, and fresh air admitted. As heated air rises, there should be openings in the roof for its escape. An adequate number of windows should be provided, of the type represented by the Sherringham ventilating windows, by means of which the incoming air strikes a sloping surface, and is driven upwards. Where possible, there should be openings on both sides of the building, those on the windward side acting as inlets, and those on the lee side as outlets, for air. Nor should it be forgotten that heavy gases, like carbon dioxide, will fall to the bottom of the stable, and provision made for flushing the floor with air. This is usually accomplished by means of doors, or by air-bricks in the walls. Ill-ventilated, stuffy stables are usually warmer than those which are well ventilated, and the animals kept in the former have a sleeker and more glossy appearance; but while animals kept in well-ventilated stables may not look so shiny, they are healthier, and are better able to withstand changes in climatic conditions.

DISEASES OF THE RESPIRATORY ORGANS.

The respiratory organs, being delicate, are extremely susceptible to derangement and disease in this ever-changing climate of ours, and all sudden chills and changes of temperature, especially from cold to heat, are very liable to have a baneful effect. Apart from purely atmospheric differences, we sometimes have horses sub-

jected to what may be termed artificial changes of temperature, and these are even more prone to be accompanied by injurious results than are the natural changes. For instance, when a young horse is brought in from grass for the first time, put into the stable, and there tied up along with a number of other horses; or it may be it is turned into a small, stuffy loose-box, where the doors, windows, and ventilators (if there are any) are closed to keep out the cold. All this is done with an utter disregard of the climatic conditions to which the animal has been exposed outside, and consequently the sudden change from the cold clear air to the warm air of the stable (which the breathing of the other horses rapidly contaminates), or to the cooped-up box (the atmosphere of which is soon rendered impure by the animal's own breathing), is very apt to produce an attack of congestion of the lungs. Young horses, then, when first brought in, should be placed in a well-ventilated, airy box, say for the first ten days or so, thus making the change more gradual. Again, young green animals, when sold and taken from the country into the town, should at first be put into a separate box or stable, so as to acclimatize them to their new surroundings before they are stabled with other seasoned horses.

Nose.—Occasionally growths of a cartilaginous or fibrinous nature, also long-necked tumours, or *polypi*, are met with in the nasal chambers, firmly attached to the turbinated bones or the septum of the nose. These growths produce a peculiar snoring sound, and are generally accompanied by a fœtid discharge from the nose, particularly when the bones are implicated. The only treatment of any avail is to cast the horse and remove the obstruction by an operation, which should be performed by a professional man. Some horses are subject to small warts covering the tip of the nose, which often become very troublesome, but dressing with acetic acid twice a week will be found to answer well in most of these cases.

Broken Nose.—The bones of the nose may be broken or delved in from some injury, such as a kick from another horse, or by the horse itself running away and coming in contact with a stone wall or other obstruction. The loose pieces of bone must be removed, the bleeding stopped by the application of cold water and antiseptics, and the parts dressed as a contused wound.

Hæmorrhage, or bleeding from the nose, both in the horse and cow, may arise from other causes than injuries, or from growths in the nasal passages. The bleeding may be either from the lining membrane of the nose or from the lungs. *Treatment.*—Perfect quietness is necessary, with a plentiful application of cold water to the forehead and face, and the nostrils should be plugged with sponge, cotton-wool, etc. Give also ½-ounce doses of tincture of iron every four or six hours in 3 gills of cold water, followed with eggs beaten up in milk and water to drink. Hypodermic injections of adrenalin have a wonderful action on these hæmorrhages.

The nasal chambers and frontal sinuses of the sheep are at times infested by the larvæ of the gad-fly (*Œstrus ovis*), which resemble the 'warbles' found in the cow's back, or the 'bots' in the horse's stomach. At one time it was thought that the larvæ were developed from eggs deposited within the nostrils, but it is now stated that the perfect fly deposits the young live larva within the rim of the nostril, whence, by means of small hooks, it crawls up inside the nose, where it develops. After remaining there for about ten months to mature, it then drops out of the nose on to the ground, and buries itself in the earth for a few weeks, when it emerges in the form of the perfect insect to recommence its life-cycle, the usual time for the fly to make its appearance being during the summer months. *Symptoms.*—When the fly attacks the sheep to deposit its larvæ, the sheep hold their noses close to the ground or under the bodies of their companions, and try to get away from their tormentors. When the parasite gains its habitat, it causes sneezing and a discharge from the nose. *Treatment* is of little avail, but injecting a mixture of two parts of turpentine and four of olive oil up the nostrils or the inhalation of iodine fumes may be tried. *Prevention.*—Smear the sheep's nose once a week during the summer months with a mixture of equal parts of Stockholm tar and palm oil.

Catarrh is inflammation of a mucous surface. Commonly the term simple catarrh, or cold, is restricted to apply to irritation of the mucous membranes lining the nose, and upper air-passages generally. Such irritation may be mechanical, due to the inhalation of some material in the form of dust, or of irritating gases, but is more commonly bacterial in origin. *Symptoms.*—In such

cases there may or may not be much constitutional disturbance or rise of temperature, but the animal seems dull and languid, the coat is staring, and watery discharges come from the eyes and nostrils. There may be a cough. Immediately these conditions are observed, and the horse is noticed not to take its food freely, it should be knocked off work, put into a dry, airy loose-box, clothed well, have its legs bandaged, and be nursed for a few days. Boiled barley, a little treacle and bran, with a tablespoonful of nitrate of potash, should be given night and morning, or 2 ounces of Epsom salts in the drinking water. Carrots and green food are of great service, and hay tea should be given to drink. These apparently simple cases are always, however, to be regarded as dangerous, for if neglected, or should the horse get another chill, they may end rather suddenly in congestion of the lungs, followed by death. Again, neglected cases may run on into *nasal gleet*.

Nasal Gleet is a chronic mattery discharge from one or both nostrils. Now, the discharges from the nostrils are from so many different sources, such as chronic inflammation of the lining membrane, abscesses in the sinuses, diseased teeth, abscesses in, and affections of, the pharynx, larynx, and the lungs, and also from that formidable disease called glanders, that it is of the very greatest importance that in cases with such discharge a professional man be consulted at once to determine the nature of the complaint and to treat accordingly. *Treatment*.—In cases of abscesses in the sinuses or of a diseased molar tooth, the parts have to be opened out—for which purpose a tubular saw, termed a *trephine*, is employed—and the tooth removed, or the abscess dressed, as the case may be. Simple nasal gleet is at times successfully treated by puffing iodoform up the nostrils with an insufflator or by injecting 15 grains of chinosol dissolved in 1 pint of tepid water up the nostrils.

Glanders, or **Farcy**, is a highly dangerous, contagious disease, due to the presence of a micro-organism called the *Bacillus mallei*. It is found in the *acute* and *chronic* forms. Horses, asses, and mules are the animals affected, and it may readily be transmitted to man. A horse suffering from chronic glanders may go on working and feeding for months before anything particular is noticed about it, except that its coat looks ragged and unhealthy, and the lining membrane of the nostril may be of a peculiar leaden

hue. The animal generally has a slight discharge from one nostril, particularly the *left*, and a small enlargement under the left jaw firmly attached to the bone. The acute form may develop from the chronic, and the animal then shows more definite signs of illness; the temperature is raised, the nasal discharge more profuse and glairy, and may be blood-stained, and has a tendency to stick round the nostrils; the glands under the jaw swell and may burst, giving exit to a discharge. On examining the nostril, the *septum nasi* (or division) will be found to be ulcerated, the ulcers having a very peculiar appearance, which needs the eye of the expert practitioner to detect, and as a rule these, when once formed, rarely heal up. The lungs of a glandered horse, on post-mortem, are found to be studded all over (in clusters or separately) with small nodules, like miliary tubercles. When the skin and superficial lymphatic vessel are affected the term *farcy* is applied. In this case one (or more) of the limbs swells, with a great amount of constitutional disturbance, accompanied by a rise of temperature. The lymphatics become distended, like cords, and small buds (farcy buds) form at the valves of these vessels, and these generally in due course burst, and discharge a thin purulent fluid. Glanders (including farcy) is a scheduled disease under the Diseases of Animals Acts, and must be reported immediately on being noticed or suspected, and under the Glanders and Farcy Order of 1907 all affected animals must be destroyed. Thorough disinfection of the stable is also of the greatest importance, in order to prevent the spread of the disease. Specific regulations relating to this disease are contained in the Glanders and Farcy Order, 1929, issued by the Ministry of Agriculture and Fisheries. In all doubtful cases the mallein test should be applied. This is a reliable diagnostic test, but its use and interpretation require skill and experience, and it should be applied only by a veterinary surgeon. Mallein is a sterile preparation made from cultures of the glanders bacillus. It is applied in different ways, but chiefly by injection under the skin in the side of the neck; this is followed, in affected animals, by a characteristic swelling, a rise of temperature, and constitutional disturbance. By means of this test, together with the other methods prescribed by the Ministry of Agriculture, the disease has been banished from the British Isles.

Cough is a forcible expulsion of irspired air, and may be *acute* or *chronic*, and can only be looked upon as a symptom. It may arise from a variety of causes, such as sore throat, bronchitis, inflammation of the lungs, worms or parasites in the windpipe, disease of the heart, etc., or from foreign bodies in the throat or stomach; and also through reflex action from parasites in the stomach or liver and from irritation of the womb. Now, as all these causes produce distinct and peculiar sounds, it is therefore of the greatest importance to find out the cause before any proper treatment can be recommended or adopted. Neglected simple catarrh may cause a slight cough from irritation of the lining of the throat, in which case a stimulating embrocation, applied round the throat from ear to ear, may give some relief. For further treatment see p. 281.

Laryngitis, or **Inflammation of the Larynx**, commonly called sore throat, may result from an injury, neglected catarrh, or a chill, from the animal being exposed to draughts when heated, from the irritating effect of smoke from burning buildings, or from chemical fumes. It may or may not be accompanied by any constitutional disturbance. When simple, the application of a mild, stimulating embrocation, or of mustard, mixed with cold water to the consistency of thin cream and rubbed round the throat, along with soft food and good nursing, as recommended for catarrh, will generally set the matter right in a few days; but if the attack be acute, it may prove very dangerous, and end in the horse becoming a roarer. *Symptoms.*—At the commencement the animal is dull and weary, hanging first on one leg and then on another; the nose is poked out, the coat is on end, the temperature is elevated from 103° to 106°, the mouth is hot and there is frothing round the lips, the eyelids are partly closed, the visible mucous membranes are congested, the breathing is quickened and accompanied by a noise as the air passes over the inflamed surface, and there is a sore, frightened cough; pain is evinced when the throat is pressed, and there seems great difficulty in swallowing even small quantities of water or other fluid, a portion of these coming back through the nostrils in the act of drinking. *Treatment.*—Immediately the animal is noticed to be thus affected it should be put into a good roomy loose-box, the body well clothed, the legs bandaged, and a stimulating liniment applied to the throat.

In all throat affections it is dangerous to give draughts; yet, if 8 to 10 ounces of linseed oil, with 1 to 1½ ounces of spirits of nitre, can be administered at the start, good effects may result; but if there is any difficulty in swallowing, do not attempt to drench the animal. Steaming the nostrils, by putting a dessertspoonful of carbolic acid, turpentine, or *eucalyptus oil* (the latter for preference) on a sop of hay in the bottom of a pail, pouring boiling water on it, and holding the animal's head over the vessel for twenty minutes, doing it three or four times a day, has an excellent and soothing effect. The nostrils at the same time should be washed with Sanitas or vinegar and warm water. The inhalation and washing above noted are also to be highly recommended in cases of catarrh and bronchitis. (For this purpose, never put the head into a nose-bag.) Nitrate or chlorate of potash, in 2- to 3-drachm doses, given in bran mashes, or in cold water night and morning, with linseed jelly and milk or hay tea to drink, can be recommended. Should the case assume a serious aspect, by the internal parts becoming congested and swollen, with danger of suffocation, and the animal makes a roaring noise, then tracheotomy must be performed. This is done by cutting into the windpipe, and inserting a tube through which the animal can breathe, independently of the nostrils. This operation, which should be performed by a veterinary surgeon, should not be delayed too long, as, when the horse is much oppressed in getting breath, some of the fluid which it attempts to drink may pass down into the lungs and produce congestion, while, when the tube is in, any fluid which may trickle down the windpipe comes out at the tube. In all cases of throat affections, strange as it may seem, the horse is much fonder of dry than of soft food or fluids. Should the bowels be very costive, they can be regulated by giving, night and morning, from 1½ to 2 ounces of Epsom salts in a mash, with a little treacle. A good-sized piece of lump rock salt should be placed in the manger for the patient to lick.

Strangles is a febrile suppurative disease, most commonly seen in young horses, particularly at the age of two to three years, of an infectious nature, and caused by an organism known as the *Streptococcus equi*. It may be of a *simple* or *complicated* nature. In the latter case it is termed *irregular*, or *bastard strangles*. The

name 'strangles,' no doubt, originates from the strangling or choking sensation, which must be caused by the abscesses formed under the jaw, round the throat, and beneath the ears. It is mostly seen during the spring months, or when young horses are newly brought in from grass, and in the midst of their dentition. The simple form may pass off very mildly, without much disturbance, the small abscesses coming to a head and bursting, with no bad results following. Good nursing and ventilation are all that is necessary, and these are very essential in every case. Soft mashes, green food, and carrots may also be given with great advantage. If necessary, a small dose of linseed oil (10 to 15 ounces) may be administered, or 1-ounce doses of Epsom salts can be given in a mash or in drinking water every six hours until the bowels respond. As a preventive hypodermic injections of anti-streptococcus serum are recommended.

Bastard Strangles is the complicated form of strangles, or when abscesses develop in an irregular manner, bursting and forming again in different parts of the body, such as under the jaw, under the ears, or on the side of the face. Such cases require skilled attention, as they may result in *pyæmia*. The horse in this state becomes feverish, the temperature rises to 105° and 106°, and the pulse is quick and small; there is no appetite; the coat stands on end, and in some cases the legs swell, and the abscesses under the ears become so large that the animal is threatened with suffocation, and tracheotomy has to be performed. The bowels in such cases must be regulated with mashes or green food. Purgatives must be avoided, but, if necessary, 1 or 2 ounces of sulphate of soda in a mash, in the drinking water, or hay tea, may be given twice a day, while a good stimulating liniment should be applied to the throat; at the same time the nose should be steamed. Chlorate of potash in 2-drachm doses, given in the drinking water along with 20-drop doses of strong hydrochloric acid twice a day, also answers well; or 1-drachm doses of sulphate of quinine may be given, night and morning, with 10 drops of sulphuric acid, in 1 pint of cold water. Hypodermic injections of nuclein can also be given with advantage, whilst the injections of prepared serums is thought to have a preventive influence.

Young colts should never be castrated when cases of strangles

are prevalent, as the result of the operation may prove troublesome, for abscesses may form in the groin and neighbouring parts. Strangles frequently terminates in roaring.

Roaring is a peculiar noise made by the horse during the act of inspiration when put to heavy or fast work. It may arise from obstruction of various kinds in the air-passages. Long peacock-necked horses are more prone to it than short-necked ones. The complaint is mainly due to paralysis of the muscles, particularly on the left side of the larynx, so that they are unable to do their work of expanding the cartilages during the act of breathing. Thus the left side remains stationary, and the vocal cord inside the larynx hangs loose and limp, so that on inspiration the air, forcing itself through the half-opened passage, produces the roaring noise. The paralysis of the muscles above referred to is due to loss of nerve power. The nerve supplying them is the *inferior laryngeal*, a branch of the *pneumogastric*. The nerves on the two sides of the neck and chest are known as the *right and left recurrent laryngeals*. The latter passes down into the chest, winds round the aorta just above the heart, then proceeds up the neck with the carotid artery to supply the muscles of the left side of the larynx. It has a much longer course than the right nerve, and it is generally considered to be more liable to derangement. Thus it is thought that the left side of the larynx is more especially affected in roaring. Be this as it may, mares and ponies are rarely so much affected as the heavier stallions and geldings. Various operations have been tried for its cure, the latest being the cutting into the larynx through the crico-thyroidean ligament, and stripping the lining mucous membrane from the inside of the larynx, when the vocal cord becomes permanently attached to the side of the larynx. Good accounts are given of this operation, which in the majority of cases causes the roaring to cease, and a comparatively useless animal to become serviceable; but, unfortunately, it is not always so successful. As an alternative, tracheotomy may be performed. This has its disadvantages, but by the use of a tube a horse can be made serviceable for years, either for fast or slow work.

In an examination for soundness it is a matter of vast importance to test the wind carefully. In a strong horse particularly it is usual to put the animal against the wall and feign to strike it. If the

subject be a roarer, it will, in the majority of cases, give a long groan; but if a sharp grunt be emitted, the probability is that the horse is only a nervous grunter. Nevertheless, the animal may make no sound whatever, and yet be a confirmed roarer, and the significance of grunting as a test for roaring is doubted by many. The best plan is either to gallop the horse some distance, or to make it pull a heavy load up-hill. These trials will soon prove whether the animal is a roarer or not.

Whistling is a form of roaring, a higher note being produced. It is frequently a forerunner of the more pronounced roaring. The cause and treatment are therefore similar.

Bronchocele, or Goitre.—This is an enlargement of the *thyroid gland* (Plate XXXIV., No. 20), by no means common in domestic animals, but of frequent occurrence in human beings, especially those living in limestone districts, near high mountains—*e.g.*, the Alps and Himalayas. Iodine preparations have been found to have the best effect, such as 2-drachm doses of iodide of potassium given once a day in a mash for ten days or so, and iodide ointment applied to the enlargement once every third day. It is more common in dogs than in the larger animals. A similar treatment may be adopted, with reduced doses appropriate to the size of the animal.

Bronchitis, or inflammation of the lining membrane of the bronchial tubes in the lungs, arising from causes similar to those named under laryngitis, may be either *acute* or *chronic*, and affect one or both lungs, while either the large or small branches of the bronchial tubes may be attacked separately or in conjunction. It is a very serious complaint, for if from the inflammatory process some of the bronchial passages, particularly the larger branches, become blocked up, the blood cannot get properly oxygenated, and impure blood is therefore sent through the system, acts on the nerve centres, and causes great debility very early on in the complaint.

Symptoms.—As a rule, the horse will not lie down in chest affections. In acute attacks of bronchitis it will, in many cases, at an early stage be found leaning against the stall for support. Again, on account of the circulation of impure blood, oxidation of the tissues cannot go on, and coldness of the extremities and of the surface of the body is the result. In health there is a certain amount

of moisture always present in the mucous lining, but in the early stages of this complaint, on applying the ear to the windpipe at the lower part of the neck, a dry, crisp sound is heard in the bronchial tubes. However, as the case advances this gives way to a loose slobbery noise, while the cough, which is at first dry, hard, and sore, becomes similarly changed to a soft and loosened one. Great care must be taken at this later stage, as the inflammatory mucous material, on being thrown off, makes its way up the windpipe, to be coughed up and discharged by the nose. The causes of bronchitis are similar to those of ordinary colds, and are various, such as chills, removing from cold to hot stables, or any sudden changes of temperature, smoke, chemical fumes, parasites or foreign bodies in the bronchial tubes, etc.

Generally speaking, all derangements and diseases, more especially of the respiratory organs, are ushered in by a shivering fit. If this be noticed, the animal should be well clothed up, and a good stimulant, such as ½ pint of whisky in as much water, or from 1 to 2 ounces each of aromatic spirit of ammonia and spirits of nitre, or 3 ounces acetate of ammonia and 1 ounce of spirits of nitre, may be administered in 1 pint of cold water. A dose of nuclein given hypodermically answers well here, if given at the commencement. As a rule, however, the first thing to be noticed is that the animal is very dull and languid, with the hair standing on end. The inside of the eyelids is red, the mouth is hot, the head droops, the breathing is more or less accelerated, and there is a soft, weak pulse and an elevation of temperature from about 103° to 106°.

Treatment.—The animal should be put into a good, dry, well-ventilated loose-box, free from draughts, woollen bandages put on the legs, also warm sheets on the body, and a pailful of cold water containing a tablespoonful of nitrate of potash placed in the box for the patient to drink.

It is very dangerous to use purgatives in these cases, as great debility soon sets in, and the aperient, however slight—even 8 ounces of linseed oil—may set up superpurgation. This shows how very necessary it is to know what the chest affection really is before attempting to treat it in any way. In all chest diseases there is great danger in giving drenches, as some of the fluid might get into the trachea or bronchial tubes, causing great distress; so, if a

drench has to be administered, it must be done with great caution. Half-ounce doses of carbonate of ammonia in a ball, or in the drinking water, every six or eight hours may, however, be given with advantage, and if the cough be troublesome, 1 ounce of chlorodyne mixed with 1 ounce of glycerine can be given three times a day in mashes of bran or boiled barley containing a little treacle or sugar, or in hay tea nearly cold. Many practitioners recommend that blankets which have been wrung out of hot water be applied to the chest with a waterproof rug above. In some cases this answers well, in others it has a very oppressive and relaxing effect, and should not be carried too far. A better method is to stimulate both sides of the chest behind the shoulder with 2 tablespoonfuls of mustard well mixed in 1 pint of cold water, after which a piece of flannel, cotton-wool, or wadding should be put round the body and warm woollen clothing put over all. The steaming of the nose and air-passages as recommended under Laryngitis, is also beneficial in this complaint. Food of an easily digestible nature must be given, such as boiled barley and bran, milk and water, linseed jelly, carrots, green food, etc. It is also a good practice to feed patients (discharging from the nose) from buckets or troughs as near to the ground as possible, so as to give an easy means of exit to the discharge.

Congestion of the Lungs.—An overloading or stagnation of blood in the small bloodvessels of the lungs. This is a very common termination of many diseases, and is, in some cases, very easily produced. For example, when an animal is suffering from a slight cold, with relaxed system, a sudden chill will induce congestion of the lungs, and kill the animal in a few hours. On account of its running its course so rapidly in many cases, there is little time to combat the trouble. It is often, in fact, worse to handle than inflammation of the lungs. *The difference between congestion and inflammation* is, that in the former the blood stagnates in the tissues of the lungs like water in a sponge, but there is no visible structural change of the part; for want of tone the blood accumulates, giving the lungs a deep brownish-black appearance. Yet, when they are put into water they do not sink to the bottom, but, being loaded with blood, sink just below the surface—waterlogged, as it were. Inflammation, on the other hand, changes the structure. The

lungs become solid, similar in appearance to the liver, and, when put into water, sink to the bottom like lead, the air cells being completely blocked up by inflammatory products, whereas in congestion they are merely pressed by the congested vessels. Congestion is at times readily induced (especially in a badly conditioned horse) by a heavy, fast run with hounds, when the animal has been galloped to a standstill. When the animal is thus affected, the head is extended, the nostrils dilated; the breathing is short, quick, and panting; the legs are spread wide apart, and the muscles of the body and limbs are all in a quiver. The rider having dismounted, the girths should be slackened, and the horse's head turned to the wind; then, after it has settled down a little, the contents of the horseman's flask, or that of his companions, can be given, with an equal quantity of water. The patient should next be carefully led to the nearest box, when 4 drachms carbonate of ammonia made into a ball, with a little linseed meal and water, may be given at once, and the body sheeted and legs bandaged. A dose of nuclein may also be given hypodermically.

The after-treatment should be much the same as that recommended under Bronchitis. Any of the foregoing complaints may end in *pneumonia*, or inflammation of the lungs.

Pneumonia (inflammation of one or both lungs).—The air cells become blocked up, and consolidation of the lungs takes place, in which either a portion of a lung, or one lung, or both, may be involved. Pneumonia, arising as it does from a variety of causes (see Laryngitis), and passing through many stages, requires careful treatment, and should be placed in the hands of a skilled practitioner without delay. Whatever the original or predisposing cause, the condition most frequently is ultimately associated with a bacterial invasion. The most common form is a catarrhal pneumonia, in which the air sacs, which are found at the termination of the small bronchi, are affected with an inflammation of the lining mucous membrane. As a result there is an increase in the mucus secreted, and this, together with the inflammatory exudate, soon fills the air sacs. After a time this coagulates, and the whole of the portion of lung affected becomes solid. *Symptoms.*—The temperature is raised, commonly to 105° or 106°; the breathing is hurried and laboured, the nostrils dilated, and the under side of the eyelids red.

On listening to the sounds in the chest a gurgling sound may be heard, due to the air being forced through the liquid in the air sacs; but soon the air is unable to obtain access, owing to the consolidation of the contents of the sacs, and in this area no sound can be heard. *Treatment*.—Good nursing is essential. Plenty of air should be admitted to the box in which the patient is placed. Rugs and bandages to keep the body and legs warm. Small doses (2 to 3 ounces) of Epsom salts in the drinking water, or 10 to 15 drops of tincture of aconite (Fleming's) may be given. Mustard applied to the chest, as for bronchitis, has a good effect, and stimulants may be required, but should be given under veterinary supervision. Soft and nutritious food should be offered in small quantities, and with variety. Mashes of bran, carrots, linseed jelly, green food, and eggs beaten up with milk may all be tried in turn. Nuclein given hypodermically is useful in the early stages.

Septic Pneumonia is a form of the complaint due to the presence in the lungs of septic, or pus-producing, organisms. This form is frequently secondary to a septic condition in some other part of the body. *Treatment* will be somewhat similar to that given for pneumonia, but this form is very frequently fatal.

Pleurisy is the name given to inflammation of the pleuræ—that is, the serous membrane which lines the chest and covers the lungs. This is a very painful complaint; the animal stands still, appearing to be frightened to move. The breathing, which is very hurried, is for the most part carried on by the abdominal muscles, thus causing a ridge or line—the pleuritic line—from the elbow point to the haunch bone. If made to move, the animal groans with pain; the eyelids are red, the nose is poked out, and the pulse is full and strong. An inflammatory exudate is thrown out, and frequently a considerable quantity of watery fluid is soon found in the chest on one or both sides, producing the condition known as *hydrothorax*. On applying the ear to the chest, just above the breast bone, the fluid can generally be distinctly heard splashing in the chest. There is a tendency for this fluid to coagulate and form bands of fibrinous coagulum which cause the lung to adhere to the chest wall in places. The animal is much distressed and stands with the elbows pointed outwards; at times the limbs are swollen. *Treatment*.—When there is much fluid in the chest

relief may be obtained by tapping the chest with a trocar and canula and drawing off the fluid—but this should only be attempted by a qualified practitioner—following up the operation by the administration of iodide and iron tonics, combined with suitable diuretics, good nutritious food, and plenty of fresh air.

In all acute cases of chest affections, on account of the horse's breast bone being set vertically, the animal will not lie down for fear of suffocation, so that as the case progresses lying down is a good sign of convalescence. Cattle, on the other hand, having a flat sternum or breast bone, and joints at the lower end of the ribs as well, can lie down throughout the whole attack.

Asthma, or Broken Wind.—This is a non-inflammatory condition due to structural change in the lungs; some of the small air cells having become ruptured, the air finds its way through the tissue of the lungs to beneath the pleura, and gives the surface of the lungs a blubbery appearance, called emphysema. This condition is at times due to a bad attack of influenza, bronchitis, or pneumonia, but more frequently it is caused by bad food—particularly musty hay or corn—or by putting the animal to too hard an exertion, such as starting off full trot immediately after feeding. Such causes act not only mechanically, but also on the gastric branches of the pneumogastric nerve, which, by reflex action, implicate the lung or chest branches. As this form of complaint is incurable, the great point is to get the animal to work comfortably, and for this purpose the feeding must be regulated; nutritious diet of not too bulky a character ought to be given, and plenty of fresh air allowed. A case of this kind does best out of doors. The affected animal always has a peculiar way of breathing. The inspiration is performed with comparative ease, but the expiratory effort is double, the flank falling with a jerky motion. The cough is also noticeable, being a long, dry, droning bark, which is characteristic of the disease. On applying the ear to the lower part of the windpipe, a crackling, hissing sound is also to be heard in the lungs. *Treatment* is of little avail, but from 2- to 3-grain doses of arsenic once a day for ten days or a fortnight given in a mash answers best.

Influenza is a fever of a specific character, varying very much in degree according to the nature of the attack and the condition of

the patient, of an epizootic type. Some cases are very slight, while others are of a more virulent type, being accompanied by great prostration and general debility. Influenza in the horse has an incubative stage of about four or five days, and the duration of an attack varies from ten days to even twenty days. It is of a very infectious nature, and usually follows in the wake of traders in horses, all classes of horses being subject to its influence. It makes itself manifest in four different forms, such as (1) simple catarrhal fever; (2) catarrh, with chest complications; (3) catarrh, with bilious fever; and (4) œdematous or exudative cellulitis, recognizable by the swollen limbs or eyelids.

Simple Catarrhal Fever resembles very much simple catarrh, or common cold. The symptoms are somewhat analogous, and similar treatment can be adopted.

Catarrh, with Chest Complications, is of a more critical character, as the lungs, bronchial tubes, pleura, and the heart coverings become implicated. The breathing is very much quickened, and the temperature runs up to 106° and 107° F., while the eyes and nose discharge quantities of matter. The symptoms are somewhat similar to those seen in bronchitis, and the *treatment* should be as stated for that disorder.

Catarrh and Bilious Fever.—In these cases the distinguishing difference in the symptoms is the yellowness of the under side of the eyelids and the lining membrane of the nose and mouth. The attack may come on suddenly, with slight symptoms of colic, or it may crawl on insidiously for two or three days before making itself manifest, when the animal becomes very dejected and weak. The *treatment* is similar to that noted for the two former cases, with the addition of small doses of calomel, which will be found to answer well when given in ½-drachm doses in a little mash or in a ball every eight hours until three doses are administered.

Œdematous or Exudative Cellulitis, commonly called pink-eye, is recognizable by the legs and eyelids becoming swollen. The lining membrane of the eyelid, nose, and mouth are in such cases of a pink colour. Pink-eye is of a very variable character; at times it is so slight that scarcely anything amiss can be noticed—only the eyelids are puffed up, with a watery discharge coming from the corner of the eye, and one or more of the legs may be slightly

swollen about the joints and shanks; at other times the eyes, face, and muzzle are much enlarged, and the legs very much distended. The animal refuses its food, can scarcely stir, is very languid and much depressed, breathing becomes quick, and the temperature rises up to 105° or 106° F. The pulse is rapid and very weak. *Treatment.*—Hyposulphite of soda may be given night and morning in 2-ounce doses, with 1- to 2-drachm doses of sulphate of quinine every eight hours. In some cases chlorate of potash and iron tonics answer well. Further treatment and feeding should be as noted on p. 288. Nuclein can also be given hypodermically in any one of these cases with great advantage.

Seeing that all cases of affections of the respiratory organs are somewhat analogous at the commencement, they should be placed under the care of a professional expert without delay, and not tampered with by giving quack medicines.

PIG.

In this animal cases of laryngitis are sometimes met with, also bronchitis, and pneumonia is very commonly found, either alone, or associated with other diseases, as swine fever and swine erysipelas. The conditions of nursing and treatment as named for the dog can be followed, but the doses of medicine there noted must be doubled.

DOG.

Like all other animals, the dog suffers from derangement and diseases of the respiratory organs, such as laryngitis, bronchitis, congestion of the lungs, pneumonia, pleurisy, and asthma. When the animal is seen ailing it should at once be put into a warm, dry, well-ventilated room or kennel, with the bed well raised from the floor, which should be covered with sawdust or moss litter. Should the weather be cold and raw, an oil stove (well guarded) put into the kennel will be found very serviceable, keeping the room or kennel at a proper temperature. A mild dose of opening medicine should first be administered, such as 2 to 8 drachms each of castor oil and syrup of buckthorn, according to the size of the animal. When necessary, apply to each side of the chest, behind the shoulders,

some stimulative embrocation, over which apply a good layer of absorbent cotton-wool, and retain it in its place with a bandage round the body; or a piece of flannel three or four ply thick, wrung out of hot water, may be rolled round the body behind the shoulder, covered with a waterproof cover, and secured with a bandage. The following medicine can also be administered—*i.e.*, from 1 to 4 drachms of liquor ammonia acetatis, along with 20 to 60 drops of spirits of nitre, given every eight or ten hours in 1 wineglassful of cold water or linseed tea. When a cough is present and troublesome a cough mixture for dogs can be given twice daily, supplemented when necessary by an aperient dog pill. After the active symptoms have abated, then tonics may be serviceable. One teaspoonful each of Parrish's syrup and glycerine given in water twice a day answers well, or 2 to 6 grains of sulphate of quinine in a wineglassful of port wine may be administered. The food to be given must be of an easily digestible nature, such as beef tea, mutton or chicken broth, and milk and bread.

Asthma, or difficult breathing, is mostly seen in aged, overfed, pampered dogs. It is generally due to improper feeding, and is usually associated with liver complications. For symptoms, treatment, and feeding, see p. 207.

Distemper of the dog is a specific, infectious fever due to an ultra-visible virus. It usually attacks young dogs, but older animals are sometimes affected. The symptoms are a high temperature, with loss of appetite, lassitude, and a discharge from the eyes. In cases which have not been treated by modern methods secondary complications are common, affecting the respiratory and digestive organs, but these complications are due to other organisms. Following the discovery of the cause of distemper by Laidlaw and Dunkin, these workers devised a method of preventive inoculation which has been very successful in preventing the disease. All valuable dogs, and those which are particularly exposed to infection, such as hound puppies, should be protected by inoculation. Great care is required in carrying out the preventive treatment, and it should only be done by a qualified veterinary surgeon. In addition to the vaccine-virus method of preventive inoculation an anti-distemper serum has been produced which gives a temporary immunity, and is useful for protecting animals attending shows.

It is also curative, and given in the early stages of distemper will materially cut short the duration of an attack. In cases where no treatment or unsuitable treatment has been given in the early stages, secondary organisms frequently give rise to pneumonia or gastritis; these will require treatment as shown for these conditions, and careful and prolonged nursing will be required.

Attacks of distemper in dogs are occasionally followed by chorea. This is a derangement of the nervous system for which treatment is not very satisfactory, but 10 to 30 drops of Easton's syrup given once a day may be useful.

CATTLE.

Acute Catarrh is a watery discharge from the eyes and nose accompanied by general fever, and is occasionally met with, particularly in Irish cattle that have been brought across the water in the early spring months. The complaint is of a febrile character, and of a iow type, while it is generally accompanied by exhaustive diarrhœa. The patient stops feeding and chewing the cud, the nose is dry, there are excessive watery discharges from the eyes and nose, and great languor and depression present. As the case proceeds the eyes become red and gummy, and the secretion crusts around the nostrils. The animal lies constantly, and will scarcely get up, the case finally assuming a typhoid character. Good nursing is eminently necessary. Clothe the body well, and make the patient as comfortable as possible. Give to drink linseed jelly and milk, or hay or nettle tea, or gruel, and administer three times a day either 1 drachm of sulphate of quinine and 10 drops strong sulphuric acid in 1 pint of cold water, or 3 drachms of chlorate of potash, with 25 drops of strong hydrochloric acid in cold water night and morning, with occasional ½-pint doses of linseed oil when necessary. Aromatics, such as ginger, aniseeds, etc., given in treacle gruel occasionally, will also be found to act beneficially. Steaming and washing the nostrils, as recommended for the horse, are of great service.

Bronchitis, Congestion of the Lungs, Pneumonia, and **Pleurisy** arise in the cow from somewhat similar causes as they do in the horse, and require somewhat similar treatment.

Bronchitis and **Pneumonia** are sometimes met with in the cow following parturition, more particularly in the early spring months. These in many cases have a septic tendency. *Parturient bronchitis* in the cow is usually of a subacute nature; the animal drops off feeding and chewing the cud, secretion of milk is nearly suspended, the flesh falls off very quickly, the animal has a languid appearance, and there is a painful, sore cough, yet the breathing is not much disturbed. While the *parturient pneumonia* is of a more acute character, the symptoms are somewhat similar, only the cough is not so frequent or so painful, and on applying the ear to the side of the chest the lungs are heard to have a peculiar jerky, squeaky sound, while the breathing is also much quicker and abdominal. The following *treatment* answers well in both cases: Put the animal into a good loose-box, and apply mustard and water, mixed to the thickness of cream, behind the shoulders for about 16 inches broad (extending from the spine down to the breast bone), and over this place a piece of newspaper, covering with a sheet and girth. Also give 5-ounce doses of linseed oil and 1 ounce of spirits of nitre twice a day, following this up every eight hours with a dose of ½ drachm of carbolic acid (B.P.) and ½ ounce glycerine in milk or water, tempting the appetite with anything that the animal will eat, and giving it good nursing. Nuclein injections hypodermically are highly useful here.

Pleuro-Pneumonia (a combined inflammation of the lungs and pleuræ).—There are two kinds of pleuro-pneumonia—the *simple* and the *contagious*.

Simple Pleuro-Pneumonia (simple inflammation of the lungs and pleura).—The symptoms are analogous to those of the contagious form, but are of a more acute nature, and the cases are *solitary—i.e.*, there is not a general outbreak of the malady. The treatment recommended for the simple form is to give in water every eight hours 10 drops of Fleming's tincture of aconite, and 3 drachms of potass. nitrate, or 1 ounce sweet spirits of nitre, also when required ½ pint of linseed oil every night, and to apply the mustard mixture to the sides as recommended for acute catarrh.

Contagious Pleuro-Pneumonia is a specific inflammation of the lungs and pleura of a highly infectious character. It may be *acute*, *subacute*, or *chronic*, and part of one lung, or perhaps both lungs,

may be affected. In some cases the animal shows no symptoms of illness, feeding, chewing the cud, and milking; and the great rise of temperature may be the first thing to attract attention to the chest, where the sounds peculiar to this disease are heard. Primarily, there are crepitating murmurs, next a squeaky, jerky friction or rubbing sound; finally the lung solidifies, and no sound is to be heard over that area. On striking or tapping the chest over this part there is a dull, solid response. In an acute case the animal drops off feeding, stops chewing the cud and giving milk, stands stiff and thoughtful, with nose poked out, sides dropped in and flat. The breathing is fast and entirely done by the abdominal muscles, there is a short, dry, characteristic cough, and the temperature generally ranges from 104° to 106°. Auscultation, or listening to the sounds in the chest, with the history of the case, assists the professional practitioner in arriving at a diagnosis. As the disease is scheduled under the Diseases of Animals Acts no treatment is allowed. It has been stamped out in this country. Post-mortem examination shows the lungs to be of a variegated red and white, or purple and white, solid marble appearance, according to the stage of the disease.

Tuberculosis, or Consumption.—This is an infectious disease which is due to the presence in the tissues of an organism—the tubercle bacillus; it affects all parts of the body. It has already been alluded to under 'The Digestive Organs,' Chapter VI., as being a frequent cause of a wasting diarrhœa in cattle; animals so affected are commonly known as wasters or piners. The udder is also frequently affected, in which case the milk is infective; milk is often infective also even when no clinical signs are apparent in the udder. Tubercle of bone, joints, the liver, and spleen are fairly common, and although the muscular tissue is seldom the seat of the disease, yet in generalized tuberculosis the glands situated in their midst may be so. In the cow pulmonary tuberculosis, or tuberculosis of the lung, is very common, and this and other forms are easily spread by contagion from animal to animal, even of different species. Pigs are often infected by receiving the milk of tuberculous cows, and poultry also are very susceptible. It is in many cases transmitted to mankind, especially children. In cattle the disease may be acute or chronic; in the latter case few or no symptoms may be

exhibited. The animal may go on feeding and doing well, and may, in fact, be fat, but a post-mortem examination will show the lungs or lymphatic glands affected with tuberculous nodules. The great danger of having animals so affected in a herd is that the chronic form may at any time pass into the acute form, especially

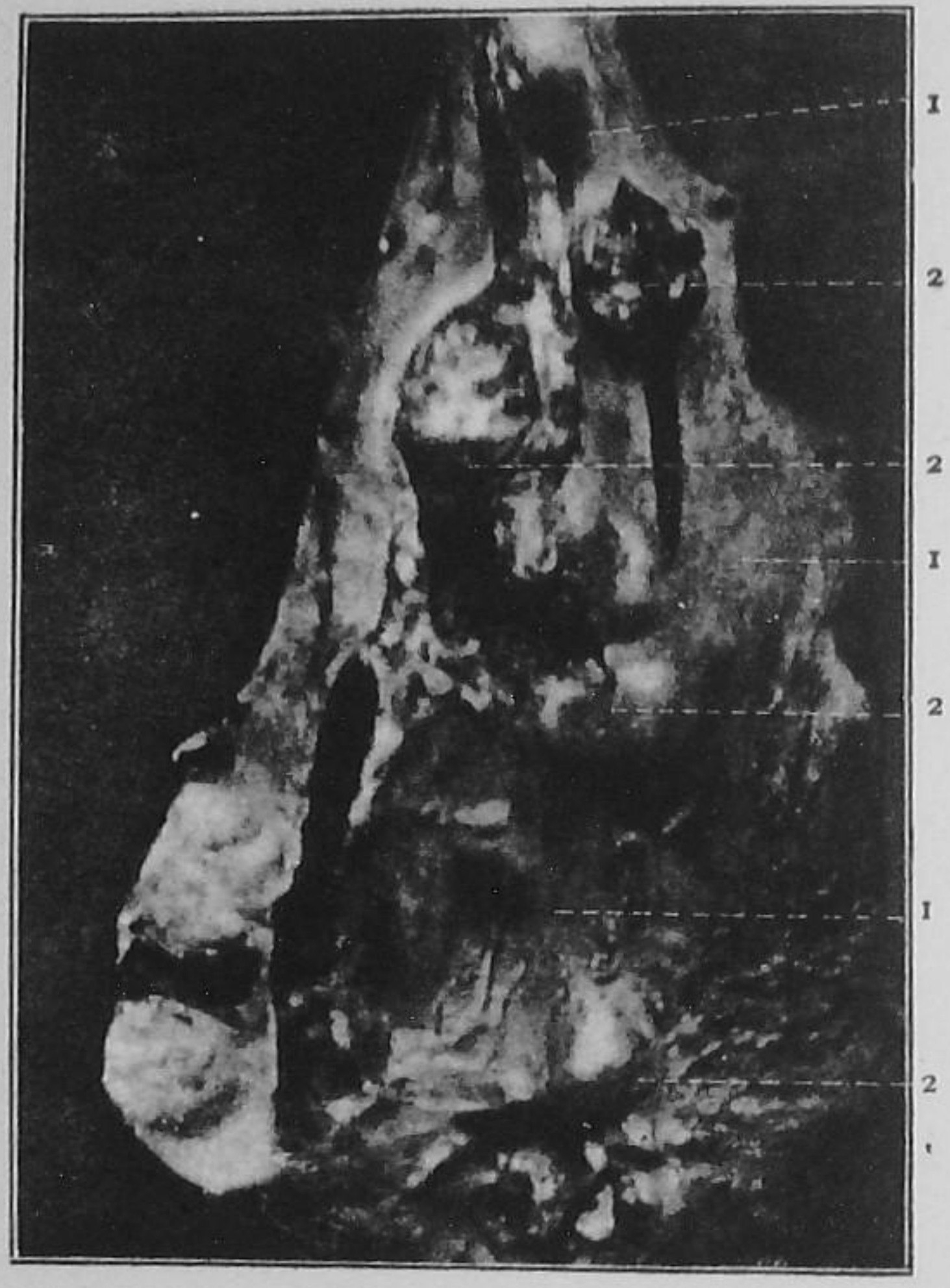


FIG. 27.—TUBERCULAR SPLEEN OF HORSE.

1, 1, 1. Spleen. 2, 2, 2, 2. Tubercular deposits.

when the resistance of the body is lowered by other diseases or injuries, and the beast may soon become actively infective, even if it were not so before. Acute tuberculosis is frequently slow in its onset; at first there is unthriftiness, a staring coat, and a hollow cough, while auscultation may reveal areas of consolidation in the lungs. As the case proceeds the symptoms become intensified,

the animal loses flesh, and the cough becomes more persistent. The temperature is variable, sometimes very high, and at times falling to normal. In the course of time other parts of the body may become affected, with symptoms varying according to the part affected. When the disease becomes disseminated throughout



FIG. 28.—TUBERCULAR MESENTERY OF HORSE.

1. Portion of small intestine.
2, 2. Mesentery.
3, 3, 3. Tubercular deposits.

the body it is spoken of as generalized. *Treatment.*—It is generally recognized that no treatment of clinically affected animals is likely to be successful. Attention, therefore, must be directed to preventing the spread of infection. It is possible and practicable to completely eradicate tuberculosis from a herd, and in many cases the expense of doing so is justified by the saving effected in prevent-

ing annual loss through death or deterioration of many animals. For this purpose it will first be necessary to ascertain which animals are affected. This can only be done by means of the tuberculin tests. Tuberculin is a sterile extract of cultures of the tubercle bacillus; being filtered, to remove all organisms, and sterilized, it cannot give tuberculosis. It can be applied either by hypodermic injection (under the skin), or by intradermal injection (into the skin). The reaction in the case of the former method consists of a characteristic rise of temperature during the ensuing twenty-four hours. In unaffected animals this rise does not take place. By the intradermal method a small dose of concentrated tuberculin is injected into the skin, and the reaction consists of a typical œdematous thickening of the skin lasting for twenty-four to forty-eight hours after injection. Both of these methods require careful application and skilful interpretation, and in the hands of experienced veterinary surgeons they give accurate results. Other methods of applying the test are sometimes used, but are not regarded as so uniformly reliable as those given above.

Having determined which animals are affected, it will now be necessary to consider the future action, which will depend on the number of reactors, the possibility of complete isolation of such reactors as may be retained with a view to gradual removal from the herd, and other circumstances. Consultation with a veterinary surgeon on these points will be advisable, and many difficulties may be overcome. If it is practicable to divide the herd into two groups—non-reactors and reactors—calves from the latter group should be removed at birth and reared on milk from free animals. Animals which are clinically affected should be removed from the farm. Thorough disinfection should be carried out, and all animals retained kept in as good hygienic conditions as possible.

Certain cases of tuberculosis are now scheduled under the Diseases of Animals Acts, and must, if suspected, be reported to the police or to an inspector of the local authority. By the Tuberculosis Order of 1925 the following must be so reported:

(i.) Any cow which is, or appears to be, suffering from tuberculosis of the udder, indurated udder, or other chronic disease of the udder.

(ii.) Any bovine animal which is, or appears to be, suffering from tuberculous emaciation.

(iii.) Any bovine animal which is suffering from a chronic cough and showing definite signs of tuberculosis.

Hoose, or Husk, in Calves.—This is an irritation of the trachea and bronchial tubes, caused by small, white, thread-like worms (*Dictyocaulus viviparus*) gaining access to the windpipe. The great cause is putting young calves in large numbers on wet, undrained pastures which have become infested with the worms during the summer and early autumn, and leaving them there after sundown. The symptoms are first noticed in September and October, when the animals are heard to have a sharp, tickling, husky cough. They lose flesh fast, and soon show a starved appearance. Next the cough increases in frequency, and finally becomes very troublesome, being accompanied by occasional diarrhœa. Although the animal may still take its milk it does not thrive, and finally it dies (worn out) from exhaustion, the post-mortem revealing large numbers of white, thread-like worms in the windpipe and bronchial tubes.

Treatment for this complaint is not at all times satisfactory. The affected animals should have good, warm, well-ventilated boxes and clean, dry beds. Medicines administered by the mouth, though commonly given, have little effect on these parasites, too little of them being excreted through the lungs to destroy the worms. Injections into the trachea of preparations containing iodine or chloroform and turpentine are sometimes effective, but such treatment requires great care and should only be administered by a qualified veterinary surgeon. Fumigation also is reputed to be useful, but this method is not without danger to the animal, and is difficult to control. The best thing is not to have the complaint at all; and where the system is carried out of keeping the calves indoors, and giving them cake, corn, bran, and a little salt, until they are twelve months old, the trouble is rarely heard of. The larval stage of the worm is passed out on to the pastures, and is picked up by grazing animals. During the hours of darkness the young worms climb up the blades of grass. If, therefore, the calves are brought in at night, and a minimum number grazed on the affected pasture, the incidence of this complaint is much

reduced. The system of affected animals should be kept up as far as possible by giving nutritious food—linseed jelly or well-boiled gruel, made of equal parts of oat and barley meals and milk, supplementing it with a mixture of crushed oats, cake, bran, and a little salt.

Broncho-Pneumonia (inflammation of the bronchial tubes and lungs).—Young calves, during the winter and early spring months, often suffer from acute bronchitis and pneumonia. The complaint is most frequently found in badly ventilated boxes, which have low-lying floors, wet, soppy beds, with bad drainage; and it is also the result of white scour, which it frequently follows, showing itself in from four or five up to ten or twelve weeks after the scour has subsided. It is considered due to disease-producing germs gaining access to the body through the navel openings. The symptoms, which much resemble hoose, are more acute, and are generally accompanied by diarrhœa; but no worms are found in the air-passages. The lining membrane, however, of the bronchial tubes is thickened, and the lungs are more or less consolidated in patches, having a reddish-blue colour. When first observed, the calves must be removed to better and more comfortable quarters, and a little mustard and water should be well rubbed into the sides behind the shoulders; also a mixture of 2 to 3 drachms each of acetate of ammonia, spirits of nitre, and syrup of squills should be given three times a day. If the cough is troublesome, a teaspoonful of chlorodyne may be added. The food should be the same as recommended for hoose.

Acute Congestion of the Lungs in calves is occasionally met with in an enzootic form, having all the appearance of being infectious. The complaint is mostly seen in raw, damp, muggy weather, and, like bronchitis, is found in badly appointed boxes. The malady runs its course in about thirty or forty hours, and on account of the tender age of the patient and the acute nature of the attack there is very little chance for treatment to be successful. The calves must be removed at once to more comfortable quarters, and the treatment to be adopted is the same as recommended for broncho-pneumonia.

SHEEP.

Sheep are also subject to derangements and diseases of the respiratory organs, similar to those of other domestic animals; but on account of their fine organization and their open-air life, they are generally too far gone before they are noticed to be ailing and for any successful treatment to be carried out—certain parasitic diseases of the lungs excepted. In stormy wintry weather, when sheep are folded on unsheltered pastures, it is not uncommon to see and hear of large numbers dying of acute congestion and inflammation of the lungs, which in some districts rages like an epizootic. When such is the case, the remaining animals should be removed to more sheltered quarters, and easily digestible and nutritious food should be supplied, such as crushed oats, bran, and cake. Lambs at times also die in great numbers from a somewhat similar cause, and must receive similar treatment.

Parasitic Bronchitis, or Hoose.—Sheep, like calves, are subject to hoose, but the worm which causes it in the case of sheep is a different one, the *Dictyocaulus filaria*. Somewhat similar symptoms may be observed, but as the bronchial worms of calves and sheep are not interchangeable, sheep may be put on pastures affected by the calf worm without danger, and it is sometimes a good practice, when calves are affected, and it is not possible to bring them indoors, to mix sheep with calves, and reduce the number of calves grazing in one field.

Parasitic Pneumonia of Sheep.—A very common affection of the lungs of sheep is caused by another thread-worm—the *Protostrongylus rufescens*. The symptoms are not so acute as those of hoose. There may be a slight cough, which becomes chronic, and some loss of condition. On post-mortem examination numerous small, greyish-looking areas are found in the lungs, somewhat resembling tubercles in appearance, and the worms will be found in these nodules. Sometimes larger patches of lung may be consolidated.

CHAPTER X

THE NERVOUS SYSTEM

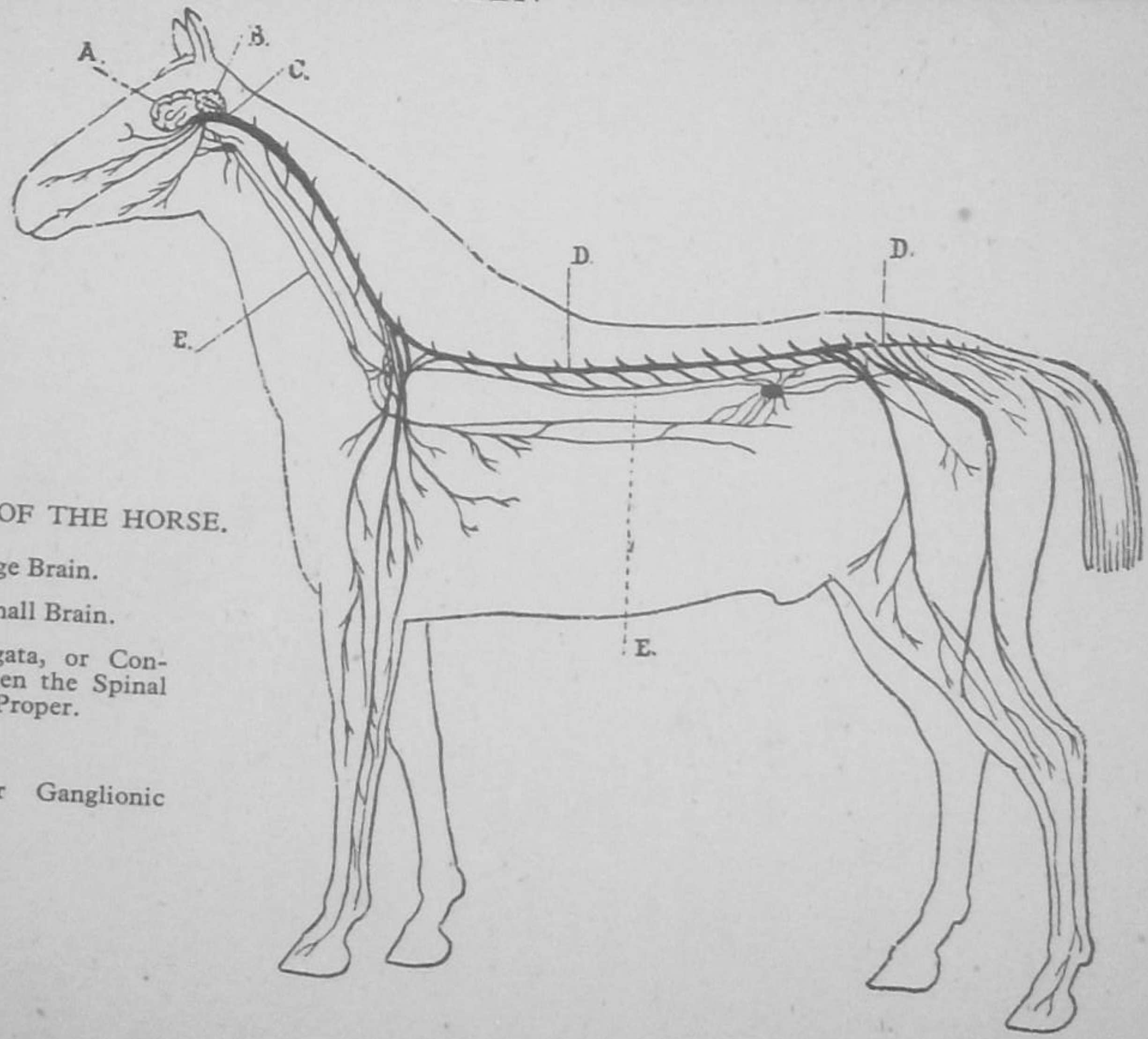
ALL the actions of the living body are governed, more or less, by the nervous system, which consists of two distinct portions—the *cerebro-spinal*, and the *sympathetic* or *ganglionic*. The brain is the great centre of the nervous system, and the special senses, such as smell, taste, etc., are connected with and controlled by it. Two of these special organs—*i.e.*, the eye and the ear—will be noticed in this chapter.

The Cerebro-Spinal System (Plate XXXV., A to D) embodies the brain, the spinal cord, and the nerves given off from each. Those nerve fibres going from the brain and spinal cord to the periphery of the body convey impulses for motion and action, and are called motor fibres; those going from the periphery to the brain convey sensations, and are called sensory fibres.

The Sympathetic or **Ganglionic System** (Plate XXXV., E), that of the nerves of organic life, are not immediately under the influence of the will, and are made up of a double chain of knots or ganglia. They run through the length of the body, on each side of the backbone, and give off fibres to control the involuntary movements of the internal organs, such as the heart and blood-vessels, respiratory and digestive organs, etc., these fibres having free communication with the spinal nerves.

The Nerve Tissue itself is composed of both a fibrous and a cellular structure. The latter (grey substance) is found in the outer portions of the convolutions of the brain, and in the middle of the spinal cord and the ganglionic nerve centres, while the fibrous substance is both white and grey, and is found in the white matter of the brain and spinal cord.

The Brain consists of soft white and grey nervous matter, and fills the irregular cavity of the skull or cranium. It is divided into four parts:



NERVOUS SYSTEM OF THE HORSE.

A. The Cerebrum or Large Brain.

B. The Cerebellum or Small Brain.

C. The Medulla Oblongata, or Connecting Link between the Spinal Cord and the Brain Proper.

D. The Spinal Cord.

E. The Sympathetic or Ganglionic System.

1. The **cerebrum**, or large brain (Plate XXXV., A), composing about three-fourths of the whole organ.
2. The **cerebellum**, or small brain (Plate XXXV., B), situated immediately behind the cerebrum.
3. The **pons varolii** (Plate XXXVI., B 4), or bridge, connecting the right and left portions of the cerebellum.
4. The **medulla oblongata** (Plate XXXV., C), or connecting-link between the spinal cord and the brain proper.

The Brain is covered by three coats or membranes, called the meninges. These are: (1) dura mater, a tough, fibrous membrane, lying in immediate contact with the bony skull; (2) the arachnoid membrane (spider-web), or middle coat, a very fine, delicate membrane; and (3) the pia mater, which covers the surface of the brain, a very fine, extensive membrane, containing a network of small bloodvessels. The last-named membrane follows and covers all the convolutions of the brain, and supplies it with blood. Between the arachnoid and the pia mater there is a space which contains the cerebral fluid.

The Cerebrum (Plate XXXVI., A 1, 1 and B 1, 1), or large brain, is divided by a fissure into two hemispheres, each of which is mapped out into numerous convolutions of grey matter, covering white fibrous nerve material.

The Cerebellum (Plate XXXVI., A 2, B 2, 2), or small brain, has a middle lobe (vermis) and two lateral hemispheres, made up of convolutions that are smaller than those of the cerebrum, and differently arranged. The grey nerve substance is abundant, and external to the white nerve tissue.

The Medulla Oblongata (Plate XXXVI., A 3, B 3).—The connective medium between the brain and the spinal cord consists of white and grey nerve matter, but differs from the brain proper in having the grey matter internally. Its functions are of vast importance to life, as it regulates and controls the actions of breathing, swallowing, etc.

The Spinal Cord (Plate XXXV., D, and Plate XXXVI., C 1 to 8) is a long, irregular, cylindrical mass of nerve matter running through the vertebral column. It is composed of white matter externally, the centre being grey, and, like the brain, it is covered

with three similar membranes. As it passes along the vertebral canal nerves are given off in pairs, and pass out between each vertebral section. The *upper root* of these nerves is sensory, conveying sensation from the part of the body to which it is distributed to the brain. The *lower root* of these pairs, on the other hand, conveys motor power from the brain to the muscles, etc., that are supplied by it, these being more or less under the control of the will.

The Cranial Nerves, or nerves given off from the brain direct, are arranged in pairs, twelve in number:

1st pair: The olfactory, which go to the nose, and give the special sense of smell.

2nd pair: The optic, which go to the eyes, and give the special sense of sight.

3rd pair: The oculo-motor, which supply the muscles of the eyeballs (with two exceptions) with motor power.

4th pair: The pathetic, which supply one muscle of each eyeball with motor power.

5th pair: The trifacial, which are mixed (sensory and motor) nerves, and supply the different parts of the face, tongue, etc.

6th pair: The abducens, which supply one muscle of each eyeball with motion.

7th pair: The facial, being the great motor nerves of the face.

8th pair: The auditory, which go to the ear, and supply the special sense of hearing.

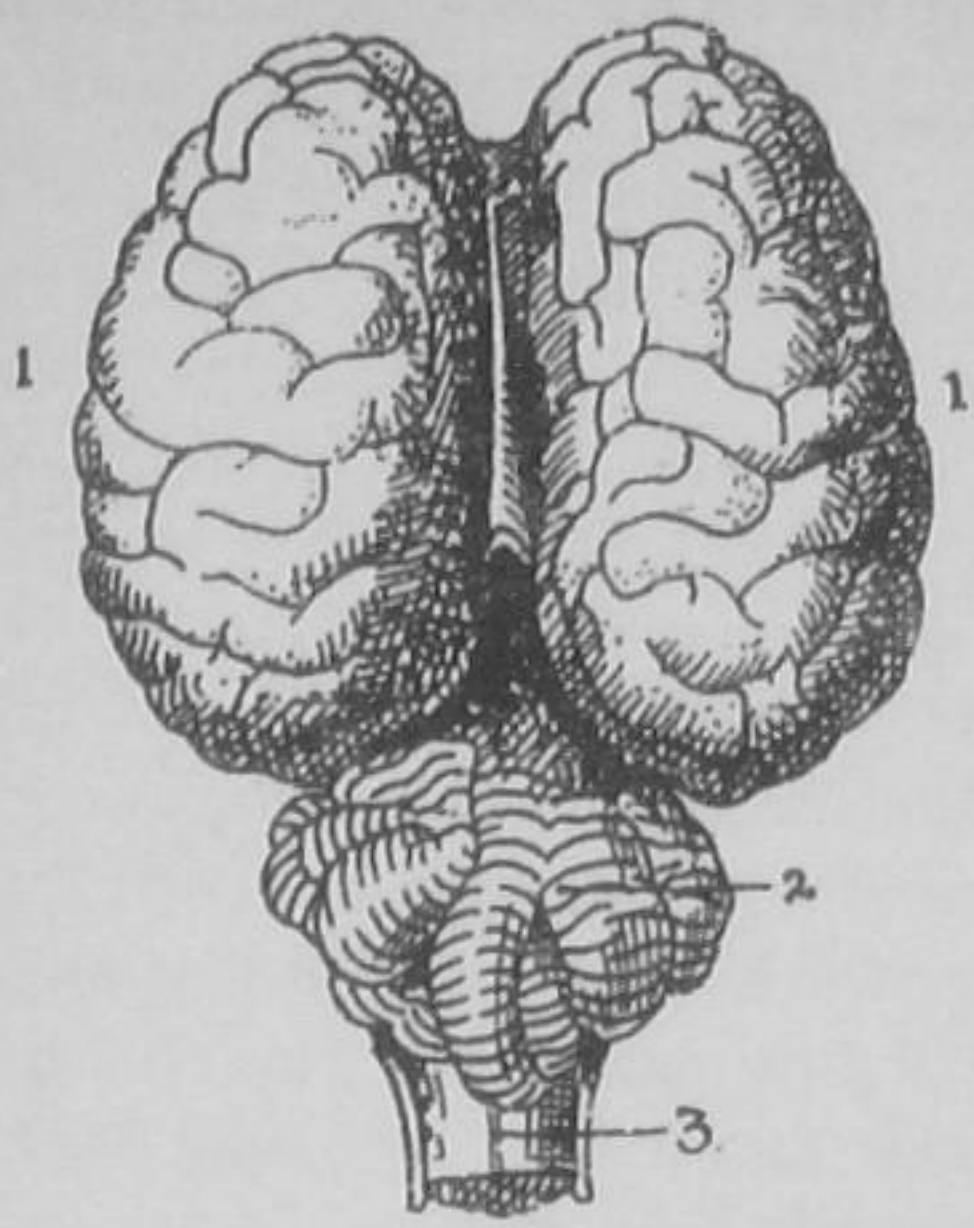
9th pair: The glosso-pharyngeal, being the mixed sensory and motor nerves that go to the tongue, pharynx, etc.

10th pair: The pneumogastric, or vagus, being mixed nerves that supply stomach, heart, lungs, pharynx, trachea, etc. These are very important nerves.

11th pair: The spinal accessory, which are motor nerves.

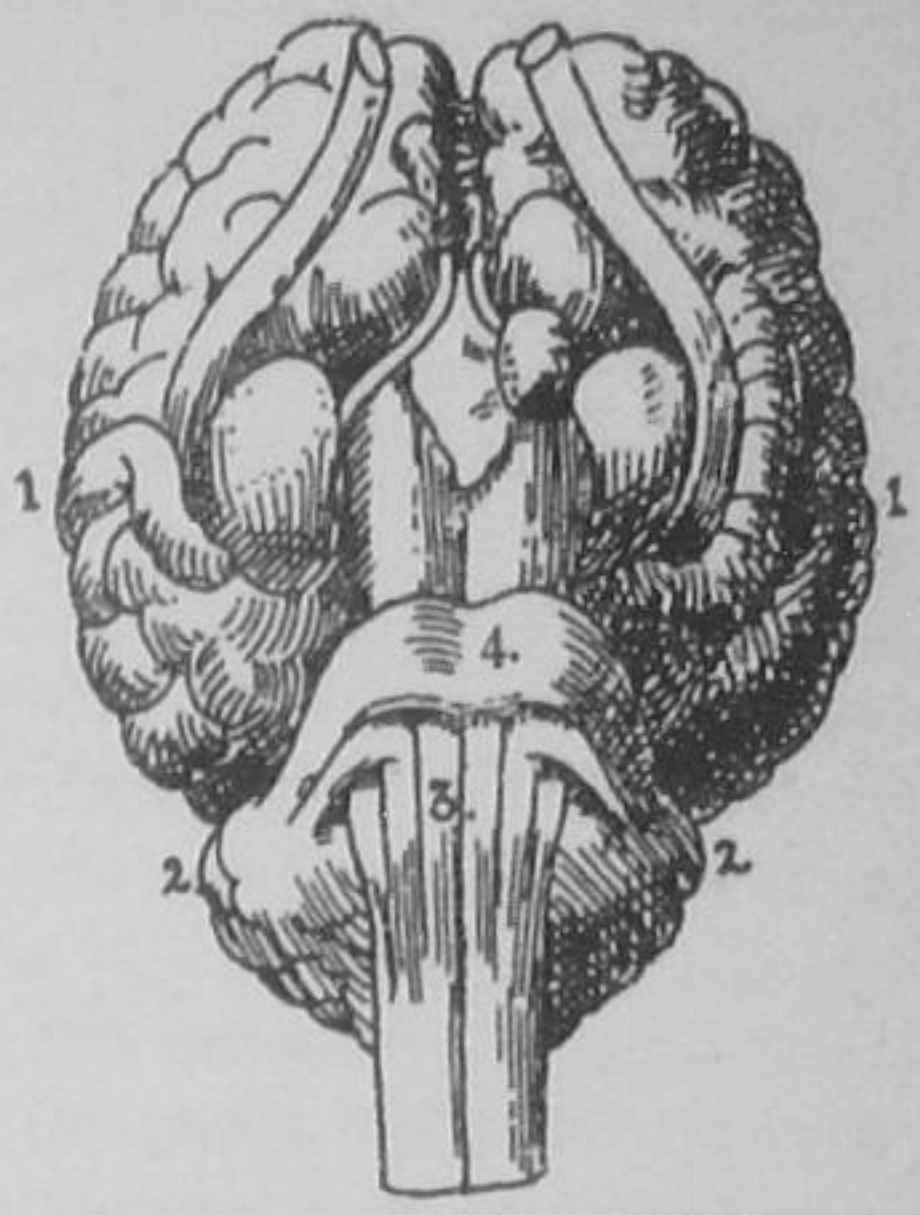
12th pair: The hypoglossal, which supply the tongue, and are also motor nerves.

PLATE XXXVI



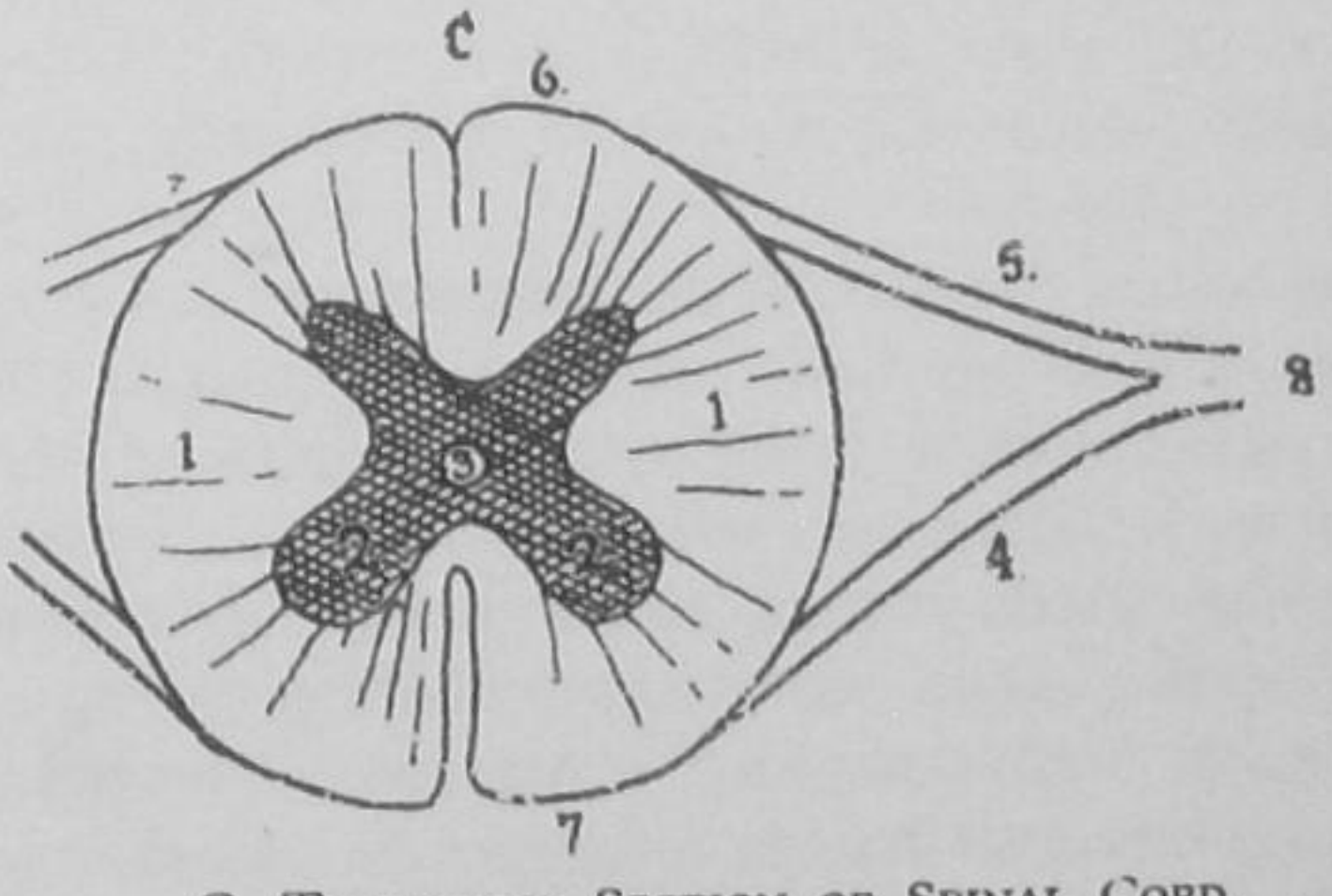
A. Brain of Horse: Upper Surface.

1, 1. Cerebrum—Right and Left Hemispheres.
2. Cerebellum.
3. Medulla Oblongata.



B. Brain of Horse: Under Surface (Base).

1, 1. Cerebrum—Right and Left Hemispheres.
2, 2. Cerebellum.
3. Medulla Oblongata.
4. Pons Varolii.



C. Transverse Section of Spinal Cord.

1, 1. White Matter.
2, 2. Grey Matter.
3. The Central Canal.
4. Motor Nerve (Under Side).
5. Sensory Nerve (Upper Side).
6. Superior Surface.
7. Inferior Surface.
8. Junction of Sensory and Motor Nerves.

DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

The Functional Derangement and Diseases of the Brain and Nervous System are not of so frequent occurrence in the domestic animals as they are in the human subject, yet, from their peculiarity and obscurity, they are most interesting, arising as they do from a great variety of causes. *Functional disturbance* is, in many cases, due to *reflex action*, the real cause being very remote from the brain—as, for instance, derangement or disease of any portion of the digestive organs, such as stomach staggers in horse and cow, or worms in the stomach and intestines; or it may arise from affections of the urinary and generative systems, such as hysteria, epileptic fits, puerperal eclampsia and parturient apoplexy, biliary and uræmic poisoning, and it also may be due to mineral (lead) and vegetable poisoning. Before, therefore, suitable treatment can be adopted, it is of the utmost importance to find the cause; failing this, the acute and most prominent symptoms must have immediate attention, and be relieved as far as possible.

DISEASES OF THE BRAIN.

Usually, when the substance of the brain is affected, the symptoms are of a quiet, drowsy nature, whereas, when the coverings are attacked, the symptoms are of a very excitable, convulsive, and spasmodic character.

Encephalitis, or inflammation of the brain and of its coverings, in the horse is, happily, very rare. In some cases there is dulness, and though the animal is easily excited, it soon resumes its listless attitude again. In other cases there is continual excitement, the animal pawing and walking round the box almost without ceasing. If the symptoms of frenzy abate, the horse will press its head against the wall or manger. *Treatment.*—Full doses of chloral hydrate or bromide of potassium should be administered to allay the excitement, and cold water applied to the head; later a dose of opening medicine should be given. The active symptoms may be reduced in this way, but hope of an ultimate recovery is small.

Organic Changes, such as abscesses in the horse's brain, may arise from complicated or 'bastard' strangles. This pyæmic

form of strangles, unfortunately, in some seasons is not uncommon. Like the commencement of all brain affections, when the abscesses are developing in that organ there is great drowsiness and dulness, the horse hangs its head in a sleepy condition, with pulse full and slow, and breathing quiet and deep, and any food that is taken is eaten in a sort of mechanical manner. As the case progresses, the animal commences to wander round the box, presses its head in the manger or against the wall, the breathing and pulse become quicker, and finally the animal hangs its head on one side, and day after day walks, so to speak, round and round its own head, making it a centre. These cases always end fatally. On post-mortem, the brain is found to be a mass of pus, or matter, thus showing, in cases of simple strangles, how necessary it is that every care and attention should be paid at the commencement, and remedial measures be adopted so as to prevent these fatal terminations.

Hydrocephalus, or water on the brain, is occasionally met with in young foals, their foreheads being, as a result, much enlarged and distended. The little animals are very dull and sleepy, yet they take milk freely. As they grow bigger and stronger the water may become absorbed, and after small doses of bromide and iodide of potassium, with a little exsiccated sulphate of iron, have been given daily, the bones of the head may flatten down into their normal condition. These cases are more frequently found in the fœtus before birth—in calves particularly—when the bones of the skull have to be broken down with knife, hook, or forceps before delivery can be accomplished.

Ectopia Cerebralis is a congenital malformation where the brain is developed outside the bones of the skull, and has been found in cases at parturition, and, although the young animals may be fully developed and born alive, they soon expire.

Tumours in the brain of adult animals are met with occasionally, and may exist for some time without causing any disturbance. The progress of the condition is usually slow. There is, perhaps, a tendency to stumble, especially after a gallop. In the stable the horse may hang its head and resent handling about the head; later symptoms may develop similar to those described under abscesses. Iodide and bromide of potassium may be given night and morning in doses of 1 to 2 drachms each, but if the presence

of a tumour is definitely diagnosed, it is better to have the horse destroyed. The most common tumour found in the brain of a horse is termed a *psammoma*, formed of a gritty or calcareous material. Tumours of bone and sarcomata, or cancerous tumours, are also found. Tumours of a tubercular nature are more commonly found in the brain of the cow, with symptoms analogous to those given under abscesses in the brain of the horse, and including loss of sight, etc.

Sturdy, Gid, or Turnsick.—This is an affection of the brain



FIG. 29.—HYDROCEPHALUS IN CALF (WATER ON THE BRAIN).

due to the presence of a watery cyst, or bleb, which is the cystic stage of the *Tænia cœnurus* or *Tænia multiceps*, a tape-worm affecting the dog. This cyst, which is known as the *cœnurus cerebralis*, is developed from the eggs in the segment of the worm, which is passed out of the bowel along with the fæces. The segment contains a large number of eggs, which are taken up and swallowed along with the herbage on which the animal feeds. On reaching the stomach, the heat therein soon sets the young embryo at liberty, and it is then taken into the circulation and

carried by the blood-stream to the brain, which, being its natural habitat, is preferred to any other part of the body, and therefore selected for its abode and further transformation. Here, by its hooked processes, it finds its way through the walls of the vessels into the substance of the brain, and there the cyst, or hydatid, is formed (Plate XVIII., Fig. *f*). Should the brain of a sheep or calf containing this cyst be given to a dog, tape-worms of this particular kind will again be reproduced, and so the cycle of life

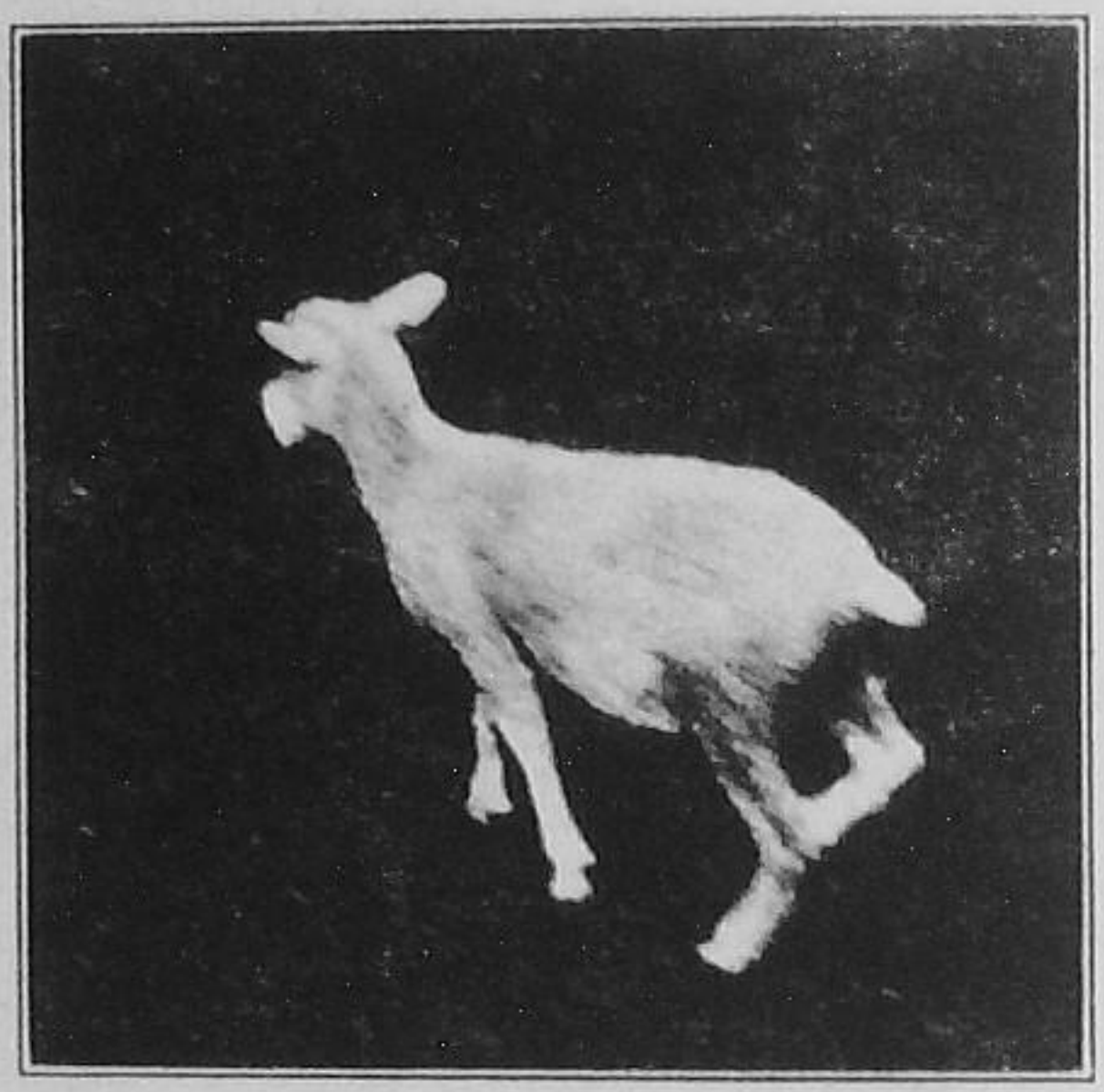


FIG. 30.—A CASE OF GID IN A SHEEP.
(From the *Veterinary Journal*.)

is carried on. Sheep are more subject to this affliction than any other animal; but it is also seen in calves.

Symptoms.—The first symptom noticeable is an unsteady gait and a gradual loss of flesh by the animal, which carries the head on one side and walks in a circular direction; or it may hold the head upwards and backwards, and walk with high-stepping, jerky action. This variation in the symptoms depends upon the part of the brain affected: if on the right side of that organ, the animal will circle to the left, and *vice versa*; while, if in the middle, the animal steps high and jerky.

Treatment.—The only effective curative treatment is to open the skull and remove the cyst. It must be apparent that such

an operation requires great care, and even when all precautions are taken, involves risk to the life of the animal. Unless, therefore, the sheep has an exceptional value it is often more economical to send it to the butcher.

Prevention.—Seeing that the disease originates from a tape-worm in the dog, the method of prevention is obvious. Dogs must either be kept off the pastures or else they ought to have periodical doses of worm medicine, and while under treatment it is well to keep them closely shut up. The heads and brains of diseased sheep should be burnt instead of being given to the dogs, as is generally the case.

Concussion of the Brain, due to a severe blow or injury to the head, is, in the horse, generally the result of the animal rearing up and falling over backwards, or of running away and coming suddenly in contact with some obstruction. When there is no fracture or displacement of the bones, the horse may lie quiet (stunned) for a short while, and then, regaining consciousness, get up and seem none the worse. In these cases care must be used, and the animal kept perfectly quiet for a few days; little or no food is to be given for the first twenty-four hours, and then feed sparingly for a few days after with easily digested food. In other cases the animal may lie motionless, with little or no sensation, the eye rolling about with the pupil dilated, pulse small and quick, and breathing slow and heavy. These symptoms may last for three or four days, after which the patient begins to show signs of consciousness by attempting to raise its head, and if assisted to a recumbent position (by the attendant placing his knee behind the horse's shoulder), it may drink a few mouthfuls of cold water. With such a case there is a chance of recovery, provided that from the time of the accident the patient has had every attention, having been carefully turned over from side to side every six or eight hours, and well bedded with clean, dry straw, the urine removed with the *catheter*, and the rectum emptied by the hand every eight hours, a good dose of opening medicine having been given at the outset—viz., 4 to 6 drachms of aloes dissolved in ½ pint of hot water. When the animal shows signs of recovery by endeavouring to rise, it should be carefully lifted on to its feet by the aid of slings and chain-blocks. After the first few minutes'

struggle in attempting to find its feet, it is astonishing how rapidly recovery ensues. Again, cases have occurred where portions of the occipital bone which articulates with the first bone of the neck (atlas) have been fractured, but not displaced, until several hours after. In cases of this kind, it is advisable to keep the animal as quiet as possible, and await results.

Apoplexy, or **Congestion of the Brain**, is extremely rare, though very sudden in its attack. It may be described as occurring in two forms—either from some organic lesion of the brain, or from reflex functional derangement. In the former it may be due to an overloaded or congested state of bloodvessels, causing pressure on the brain substance, or from rupture of a vein with *hæmorrhage*, and the formation of a clot, causing loss of power and sensation. When such cases affect the horse, sensibility and motion are completely lost, a fatal termination occurring in a few hours.

DERANGEMENTS AND DISEASES OF THE NERVOUS SYSTEM.

Milk Fever, Parturient Apoplexy, or Hypocalcæmia of Parturient Cows.—This disease is very common among dairy cows, more particularly those of the heavy milking breeds; but it is not confined to any special breeds. Many theories have been advanced as to the cause of the complaint, and although a great advance in knowledge concerning it has been made in recent years, it is doubtful whether the exact cause is known even now. The various names assigned are indicative of the confusion of thought as to its origin; the term milk fever, although incorrectly describing the condition, is probably the most widely used. Up to the year 1897 the disease was variously regarded as a digestive disorder, a brain disease (apoplexy); a toxæmia from decomposition of retained milk, or shock from sudden withdrawal of milk. During this period treatment was largely empirical and the mortality varied from 50 to 70 per cent. In 1897 Schmidt, of Denmark, definitely stated that it was due to absorption of toxins which were formed in the udder, and to combat this devised the method of treatment known by his name; this consisted of

the injection of a solution of potassium iodide into the udder. His theory as to the causation proved to be erroneous, but the treatment was to a large extent successful, for thereafter the mortality was reduced from 50 or 70 per cent. to about 10 per cent. *Symptoms.*—As a rule, milk fever symptoms are noticed from a few hours after calving up to about the fifth day. Exceptionally, they may appear before calving, or be delayed considerably beyond the fifth day. The onset is usually sudden; there is a short period of uneasiness, paddling of the hind-legs, and twitching the tail, while the animal staggers about with a spasmodic twitching of the muscles in the region of the stifle. This is followed by a period of excitement, when the animal tumbles all over the place, first on its shoulders, then on its head; or it may fall on to its side, and lie with its legs extended, breathing heavily, tossing the head about, rolling the eyes, and finally sinking into a deep coma. In this condition it may remain for many hours; in typical cases the head is resting on the side, and if pulled out straight is immediately returned to its former position. One constant symptom, which formerly appears to have been largely overlooked, is a tetanic contraction of groups of muscles in the limbs, which become quite rigid. *Treatment.*—As has already been stated, the adoption of Schmidt's treatment, although almost certainly based on a fallacy, was so successful that the older empirical methods were abandoned, and later the method of Schmidt was superseded by a modification, whereby oxygen was injected into the udder, and still later air filtered through cotton-wool, with the same, if not better, results. The most modern line of treatment, however, is based on the researches of Little, Greig, and others, who found that during an attack of milk fever the calcium contents of the blood are very much reduced. This they sought to remedy by the injection into the blood-stream of a suitable preparation of calcium salts, and the results have fully justified their contention. The mineral requirements of a cow, especially at the time of parturition, are great, and it is possible that milk fever may be the result of mineral deficiency. At the same time, it must be admitted that the inflation of the udder with air was almost equally effective, in which case no calcium was supplied—in fact, some withdrawn, for the udder was

emptied of milk previous to the inflation. Nor can the mineral deficiency theory account for the apparent immunity of heifers up to their third lactation period It would, therefore, appear that although advance has certainly been made, there is something yet to be learned concerning the cause of this disease. Whatever treatment is adopted, the animal should be kept trussed up on its breast bone and belly with bundles of straw or bags of chaff or sawdust. *Never allow the cow to lie on its side*, and, with the exception of turning it from one side to the other occasionally, leave the patient alone. The hand in some cases may be well soaped and introduced into the rectum and the hard-baked dung cleared out, and, if necessary, the catheter passed and the urine removed. In rare cases, although the cow has apparently recovered it will not get up, but will lie eating and chewing the cud for days. In such cases no alarm need be felt, for almost invariably it will sooner or later rise as if nothing had happened.

Hysteria, a nervous derangement with or without convulsions, although very rare, is sometimes met with in both the mare and the cow, but more frequently in the latter. It seizes the animal very suddenly. More particularly is this so when it is coming into service for the first time. In the mare, at times, the head is pulled upwards and backwards, the eyes are very watchful, the nostrils are dilated, and on touching, or even approaching, the patient it becomes very excited. It may kick and struggle, or rear up and fall over backwards. In the heifer the symptoms are somewhat similar to those in the mare. It is, however, more subject to convulsions, and falls down suddenly, bellows loudly, champs and foams at the mouth, and grinds the teeth. The eyes roll about, and there are strong muscular tremblings, and contortions of the limbs and neck, as if the patient was in a fit. *Treatment.*—Dash cold water over the head; and after the paroxysm has passed, ½ ounce each of chloral hydrate and bromide of potassium in a pint of cold milk should be administered. If desirable, 1 to 2 drachms of the extract of belladonna may be substituted for the chloral and bromide. From 20 to 30 ounces of linseed or castor oil should also be given, and it may be found necessary to repeat the bromide every eight hours. As a rule, however, the symptoms disappear in a few hours.

Epilepsy (**Fits**) (involuntary spasm and contortions of the muscles, with sudden loss of consciousness).—This peculiar nervous derangement may arise from a number of causes, such as retarded dentition; worms in the stomach and bowels; improper food, causing intestinal disorder; and uterine complications. The attack is generally very sudden; the animal stops instantly, trembles all over, and falls to the ground, the whole muscular system being thrown into violent contortions. There is a peculiar rocking and working of the head and limbs, and rolling of the eyeball, which turns in under the upper eyelid. The teeth are firmly held together, and a frothy discharge comes from the mouth. The heart beats fast and loud, while the breathing is suspended for a few moments, and dung and urine are involuntarily ejected. After the convulsive attack has passed, the patient frequently falls into a long deep sleep, from which it awakes, showing little or no ill effects, with the exception of a slight languor and listlessness. The pig and the dog are the greatest sufferers from this affliction. Young pigs are very often attacked, especially if fed too largely upon badly prepared maize meal. This stuff, therefore, should always be *well boiled*, and even then used very sparingly amongst young pigs under two months old. Feeding on pollards or parings answers much better, and is certainly safer. In the dog, retarded teething and tape and other worms in the alimentary canal are responsible for most cases of epilepsy. *Treatment of Fits.*—When the patient is seized every care should be taken to keep it from injuring itself, and a free access of air should be allowed in all cases. Benefit will be derived from a continual cold water *douche* on the head. If the teeth are firmly clinched together, a piece of wood or some other suitable substance must be pressed in between them, to prevent the tongue being injured. After the attack has passed over, a careful examination ought to be made to discover the cause. If the teeth are at fault, the offending ones or shells must be removed; but if worms are suspected, a dose of worm medicine, followed by a purgative, should be given. As a nerve sedative, either the bromide of soda or potassium may be administered with advantage.

Puerperal Eclampsia (an epileptic form of nervous excitement).—Occasionally cases of this occur in cows on the point of

calving as well as in cows that have been calved several days. At first the cow is noticed to be very excitable, paddling with the hind-feet, switching the tail, pointing out the nose, and holding the head upwards and backwards; the eyes are wild and staring, and the milk secretion is partially suspended—in fact, the animal shows all the early symptoms of an attack of milk fever. But by far the most prominent symptom is the extreme sensitiveness of the skin, for the moment an attempt is made to touch its body the cow will give a loud bellow, open the mouth wide, stick out the tongue, and attempt to jump to one side and kick out. The breathing is very quick, and the pulse is full and strong. *Treatment.*—From 4- to 8-drachm doses of chloral hydrate in 1 pint of cold milk is serviceable. This medicine can be repeated four or five hours afterwards, if required. The following, however, should be administered as a purgative—viz., 1 to 1½ pints of castor or linseed oil and 2 pounds treacle in 2 quarts of thin gruel. As a rule this mode of treatment, along with spare feeding on nice digestible food, is very successful.

Sunstroke (*see* Stomach Staggers, pp. 152 and 193).

Louping Ill, Trembling, or Sheep Staggers.—This malady is practically confined to sheep, although it has been transmitted to pigs experimentally. It is seasonal in its appearance, and certain places seem to be more affected than others. Unfortunately, the symptoms of brain disturbance and convulsions are somewhat similar to brain disorders of a different nature occurring in sheep, such as lambing sickness in pregnant ewes, hence a good deal of confusion has taken place in diagnosis in the past. Research in recent years has shown that louping ill is a specific disease, due to an invisible virus, the particular seat of which is found to be in the brain; the virus is also found in the blood during certain phases of the disease. It has now been shown that the tick (*Ixodes ricinus*) may be the means by which the disease is transferred from one animal to another, and as the seasonal appearance of the disease coincides with the periods at which the ticks are most plentiful, it may be assumed that they play an important part in transmission. It is seen in Scotland and the North of England, more particularly in Northumberland. *Symptoms.*—The first symptoms to be noticed are that the head is carried erect, with

staring eyes, and that there is a staggering, jerky gait, with muscular twitchings and tremblings of the body. Next the falling down and struggling of the animal will attract attention, and this will be followed by convulsions, paralysis, and death. Many of the animals die suddenly; others linger on for several days, and finally recover. *Prevention.*—As it has been shown that the subcutaneous inoculation of infective material has produced a characteristic rise of temperature, and in most cases this has been followed by the production of immunity to subsequent inoculation into the brain, it seems very likely that a practical method of immunizing sheep on these lines may, before long, be devised. The experimental results of protective vaccination at present being carried out are, in fact, very encouraging. Meanwhile, it would be advisable to keep sheep from the tick-infested pastures, at any rate at the season when the ticks are most plentiful—*i.e.*, the spring, in April, and the autumn, August and September.

Chorea, Shivering, and **Stringhalt** are peculiar derangements of the nervous system characterized by involuntary, spasmodic jerkings of muscles, particularly of the limbs. The exact nature of these is not known, but they are probably allied to one another.

Chorea.—This has occasionally been seen in horses, particularly young horses, but is common in the dog, in which animal it is a frequent sequel to distemper. It varies in degree; sometimes there is spasmodic twitching of the muscles on the top of the head, but more frequently of one or more limbs. Prognosis of this condition is doubtful; sometimes a great improvement may take place, and occasionally complete recovery, but more often it persists through life. *Treatment.*—The best results are obtained by giving alternately sedatives, such as potassium bromide, for a week, and nerve stimulants, such as strychnine—in the form of Easton's syrup—in small doses.

Shivering affects horses only, and although varying very much in degree, it is sometimes readily noticed when the animal is standing in the stable, for, on being made to move over from one side of the stall to the other, the tail is suddenly jerked upwards and quivers, while the great muscles of the thighs and quarters assume a rigid condition. It is, however, especially noticeable on pushing the animal back, when the hind-legs are moved in a

stiff, straddling manner, while the tail is held straight out and quivering, the animal backing with great difficulty. Horses thus affected, when in the stall, always stand stretched out, with the hind-legs back, and the point of the toe in the channel. The condition is incurable.

Stringhalt is known by a sudden, spasmodic clicking up of one or both hind-legs. It is at times seen when the animal is turned quickly round, or if made to stand perfectly still, and then walked smartly forward, when it is *noticed at the first step*. It is also exhibited when forcibly backed or excited, but slight cases are difficult to detect, as the clicking action is not always noticeable, the horse only showing the peculiar action at irregular intervals. Cases have been known where horses have been bred and worked on the farm until they were five or six years old; they have then been 'made up,' and sold at public auctions without any unsoundness being manifested, but after having been put on rail, and taken out at the end of the journey, they have been found to be confirmed cases of stringhalt or shivers. Whether this is due to fright on being railed for the first time, or from the jerking they get in the horse-box while shunting at the stations, is questionable, but it is a matter of great moment to both buyer and seller. It is needless to add that animals affected with these nervous disorders are classed as unsound; yet they can work for years, and carry very heavy loads *forward*, but have great difficulty in backing.

Spinitis is inflammation of the spinal cord and its coverings. This may occur in an *acute* or *chronic* form, but either is very rare. It may also arise from rheumatic affections, and injury to the backbone from concussion, etc. In the acute form the animal is suddenly attacked, showing great pain, and perspiring freely. It throws itself down, rising again with great difficulty, and strong muscular contortions are evident—in fact, the symptoms resemble an acute attack of inflammation of the bowels. *Treatment*.—Nerve sedatives, such as chloral hydrate, belladonna, or hypodermic injections of morphia, along with a good dose of opening medicine, such as linseed or castor oil, should be given. Hot water blankets should be applied constantly to the back, and the rectum must be emptied by hand, and the urine drawn off by the catheter.

From the effusion which takes place in the spinal canal, the cases usually terminate fatally, or at least in paralysis.

Paralysis, or Stroke.—This may be described as *complete*, *partial*, *local*, or *reflex*, and is a sudden loss of power, either with or without sensation. It may, however, come on gradually. *Hemiplegia* is the term employed when only one side of the body is attacked, and *paraplegia* when either the fore or hind part of the body is affected.

Complete Paralysis is the term employed when motion and sensation throughout the body are suddenly arrested, most probably due to lesions in the central nervous system.

Partial Paralysis is a term used when only part of the body is affected.

Local Paralysis means that only some of the muscles are involved. This form is frequently seen after influenza, strangles, and lightning shocks, when the muscles of the head and lips of the affected side hang loose and pendulous, the tongue also sometimes suffering. The animal, on getting food into its mouth, has no power to roll it for mastication. In these cases the food has to be removed by the hand.

Reflex Paralysis.—This may arise from impaction of the stomach and bowels of any animal. It is also caused by pressure and obstruction in the urinary and generative organs. Cattle will sometimes lie for four or five weeks before calving, without having the power to rise, and, after parturition, get up without any assistance.

Seeing that there are so many different causes, it is highly important to call in professional aid at the very beginning, and have the animal treated accordingly.

Lightning Shock.—In the majority of cases lightning shock affects the nervous system, more particularly the motor nerves, causing total or partial paralysis, while the sensory nerves become more acute. When one side is affected, the animal carries its head to one side, and has a very unsteady gait, staggering from side to side, while the muscles on the side of the face affected become pendulous and swollen, or the neck may be so affected that the animal cannot eat from the ground. The shock, however, may be such that the animal loses the use of its limbs, and cannot

get up; yet it can feed well, and, if a cow, chew the cud. These various symptoms may be noticed, but no external marks are visible. When, however, the electric current strikes the body, the skin and hair have the appearance of having had a red-hot iron run over them, while under the skin the tissues are jelly-like and full of effused material. In most cases of death from lightning the blood remains fluid, and the muscles of the body do not stiffen, but are flabby and soft, and readily decompose.

Rabies.—This malady was formerly known as *hydrophobia*, from a supposed fear of water on the part of the animal affected. Such, however, is not the case, for the animal is willing to drink, but is often unable to do so on account of paralysis or spasmodic action of the muscles of deglutition. All animals are susceptible, including mankind. The dog is more often affected than any other animal. The virus which is the cause of the disease is usually transferred from one animal to another by bites, and its particular seat is in the brain and spinal cord, some of the cells of which undergo degenerative changes. The period which elapses between the infliction of the infective bite and the appearance of symptoms is variable, but is usually long, and may be several months, or even more. *Symptoms.*—These commonly appear in stages. At first there is a period of uneasiness, there is dulness, and a tendency to hide in dark corners. The normal habits are changed: an animal that has previously been docile will become irritable, and inclined to snap, even at its best friends. The second stage is marked by greater irritation; the animal will wander away from home, will bite or snap at anything which may come in its path, but will not go out of its way to do so. The third stage is characterized by convulsions and paralysis. The dog is now a miserable-looking object. It foams at the mouth, and its eyes are bloodshot, with a peculiar sullen, far-off look. The bark, or howl, is modified by the paralysis which affects the muscles of the larynx, and death will follow shortly. Directly a bite is inflicted on a human being the parts ought to be well washed with a 5 per cent. solution of carbolic acid in water. The wound may be cauterized, and caustics in solution answer best, as they get well into the bottom of the wound; solid caustics are not so reliable. Pasteur's treatment for persons bitten by dogs affected with rabies has been most successful,

This consists of a series of injections with preparations made from the spinal cords of rabbits which have been artificially infected, the virus in the cords being attenuated by drying for a number of days. In the series, the most attenuated is used first, and so on to the least attenuated. This treatment is not available for animals. The disease is scheduled under the Diseases of Animals Acts, and all affected animals are destroyed. Rabies does not at present exist in this country, owing to the enforcement of orders as to quarantine of imported dogs, and the general muzzling and control of dogs when the disease was present.

Tetanus, or Lock-Jaw.—This is a malady that is characterized by tetanic contractions of various groups of the voluntary muscles of the body. The muscles affected become tense and rigid, and when the muscles of the face are so affected, the mouth is held tightly closed; from this common occurrence the name lock-jaw has been given. The disease may affect any animal, including man, but the horse and sheep are the most common subjects. It is due to the entrance into the body of the tetanus bacillus, which obtains access by means of a wound. The organism has its natural habitat in the soil; consequently, wounds in the extremities generally, and the feet especially, are most often followed by tetanus. The tetanus bacillus is described as an *anaerobic* organism—that is to say, it can only produce the toxin or poison which is the immediate cause of the symptoms in the absence of oxygen. On this account the wound is frequently a small one, such as a puncture in the sole of the foot, or else, if a larger wound is the point of entry, no signs of the disease are seen until the wound has partially healed over, the organism being shut in. It sometimes follows castration in lambs or colts, and in such cases also there is no appearance of the disease for a week or more after the operation, when the wound has apparently healed. Unlike many other pathogenic organisms, the tetanus bacillus does not travel in the body, but remains near the point of entry, and the toxins which are elaborated travel along the nerve trunks. *Symptoms.*—At first there is little to be seen except stiffness of gait; the horse, if in a stall, will stand with the hind-legs back, rather wide apart. On being walked out, the stiffness will be more apparent, the animal moving with a stiff wooden gait; the head is extended forward,

nose pointed out; there is straddling of the hind-limbs, the hocks of which are turned out, and the tail is raised and shaking. The animal is in a state of hyperæsthesia, very sensitive to any sudden noise. On approaching the head, the animal recedes and drags the fore-feet backwards; raising the head higher, the eyeball is drawn back into the socket, and the haw (*membrana nictitans*) is stretched across the front of the eye, giving it the peculiar appearance of a squint. The latter is looked upon as a confirming symptom, yet the jaws may still be slightly movable. But as

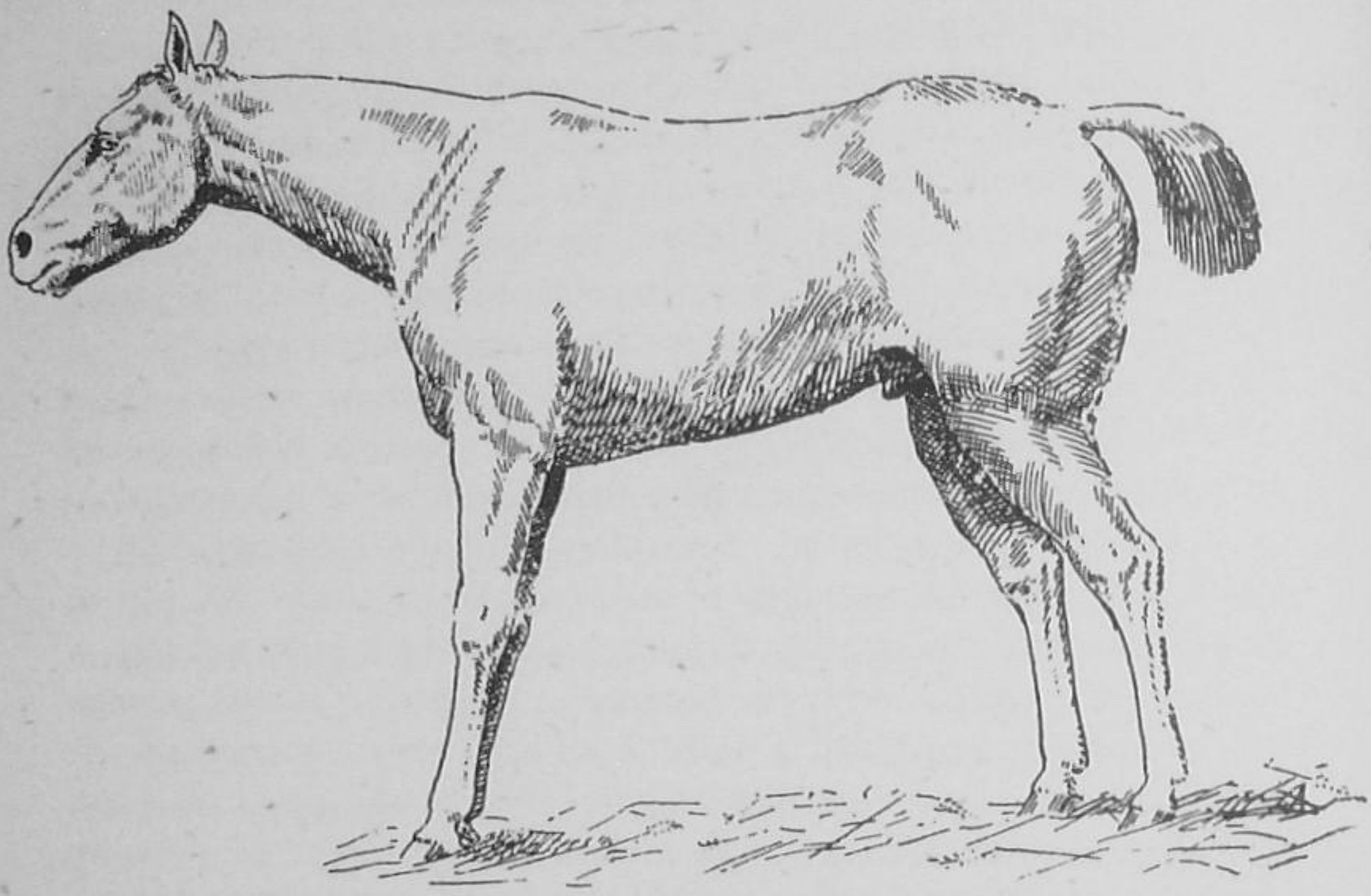


FIG. 31.—TETANUS.

the case proceeds, the symptoms become more pronounced: the muscles of the face have a tense, pinched appearance, the nostrils are wide open, and there is foaming at the mouth.

Further symptoms will depend on the particular groups of muscles affected, and special names are given: when the head and face are chiefly affected, *trismus*; if the muscles of the back, *opisthotonos*, in which case the head is drawn upwards and backwards, and the tail is raised. If the muscles of the under part of the body are contracted, the head will be drawn down

between the fore-legs, and it is called *emprosthotonos.* In all cases the animal is greatly distressed, and patches of perspiration are noticed on various parts of the body. At first the pulse is not much affected, but finally it becomes quick, hard, and oppressed. The moment the animal ceases to breathe all the muscles of the body become relaxed. *Treatment.*—Preventive treatment consists in giving a protecting dose of antitetanic serum hypodermically to all cases which are likely to be followed by tetanus, especially punctured wounds, and those about the feet and legs. This has proved most successful, and it is interesting to note that in the course of the Great War this was a routine practice for the initial treatment of wounded men, many thousands of doses being used. For curative treatment in horses antitetanic serum should be given in large doses, and as early as possible. Some doubts have been expressed as to the efficiency of antitetanic serum as a curative agent, but probably the failures are due to the disease being too far advanced when treatment is commenced, or to the dosage being too small. In addition to serum treatment, the horse should be kept perfectly quiet in a loose-box, bedded on peat or sawdust rather than straw. If the jaws are not closed, a 5- or 6-drachm physic ball may be given, and in this particular case it is permissible and advisable to use a balling gun for this purpose. Liquid or semi-liquid food should be given as long as the animal is able to drink. The wound should be looked for, and freely dressed with tincture of iodine. At one time tetanus was regarded as almost invariably fatal, but with the use of serum a fair proportion of recoveries may be expected.

THE EYE.

The Eye, or organ of vision, is of a globular shape, and consists of a fibro-membranous sac that contains transparent humours of different densities, which act as refractors. It is attached to its bony socket by various muscles, and sustained in a steady position by a cushion or pad of fat. This pad, in old age, becomes absorbed, and the upper portion of the eye sinks.

Protecting the front of the eye we have two movable curtains, the upper and lower eyelids, the upper being the larger and more

movable of the two. The eyelids (Plate XXXVII., A 5) are composed of—

1. The *skin*, found externally.
2. *Muscular fibres*, to control their movements.
3. The *tarsal cartilage*, to give stiffness and shape.
4. The *conjunctiva* (Plate XXXVII., B 1, 1), or mucous lining, which is also reflected over the front of the eye, or cornea.
5. The *Meibomian glands* (Plate XXXVII., A 10, 10), which are found on the margin of the eyelids, and secrete an oily material that prevents them gumming together.
6. The *eyelashes*, which are the fine hairs that are found on the free edges of the eyelids, and are more abundant on the upper lid than the lower, their purpose being to assist in preventing the entrance of foreign bodies.

The Lachrymal Gland (Plate XXXVII., A 6) is situated on the upper portion of the eyeball, and secretes the tears, which keep the front of the eye moist and clear. The tears pass through the lachrymal duct into the nose.

The Membrana Nictitans, or Haw (Plate XXXVII., A 3), is a cartilaginous structure situated on the inner side of the eyeball. Its function is to remove foreign bodies and shield the eye.

The Eyeball is composed of three coats—viz.: (1) The sclerotic and cornea; (2) the choroid and iris; and (3) the retina.

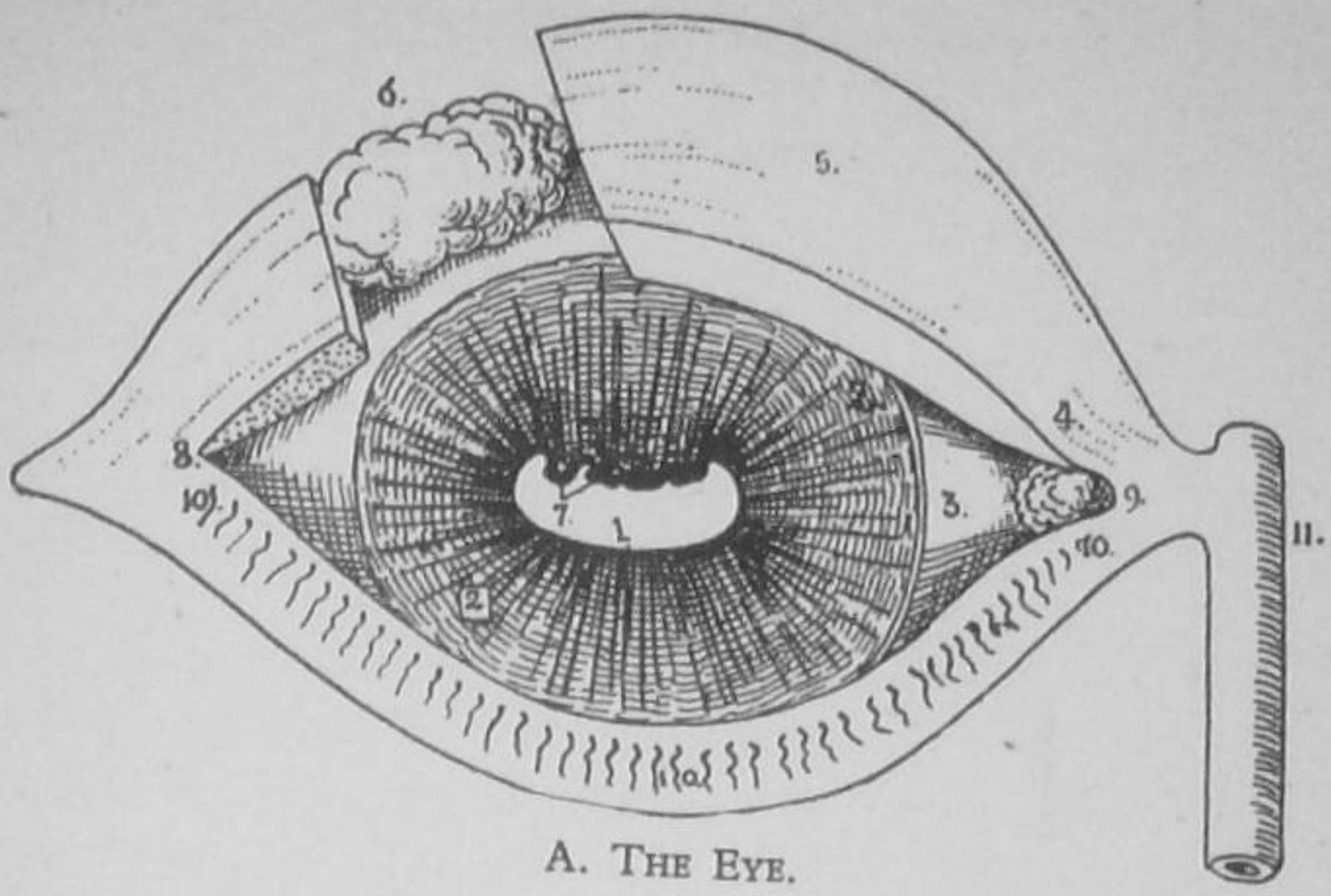
The Sclerotic Coat (Plate XXXVII., B 3, 3) is a very dense structure formed of white fibrous tissue, and to it are attached the muscles which move the eyeball. This coat forms four-fifths of the external tunic.

The Cornea (Plate XXXVII., B 2) is that transparent elliptical portion of the external coat situated in front of the eye. It fits into the sclerotic somewhat similarly to the glass in a watch, so forming the remaining fifth of the outer envelope.

The Choroid Coat (Plate XXXVII., B 4, 4) consists of three layers—*i.e.*, the external, composed principally of minute veins; middle, a plexus of small arteries; and the external, a dark brown pigmentary layer.

PLATE XXXVII

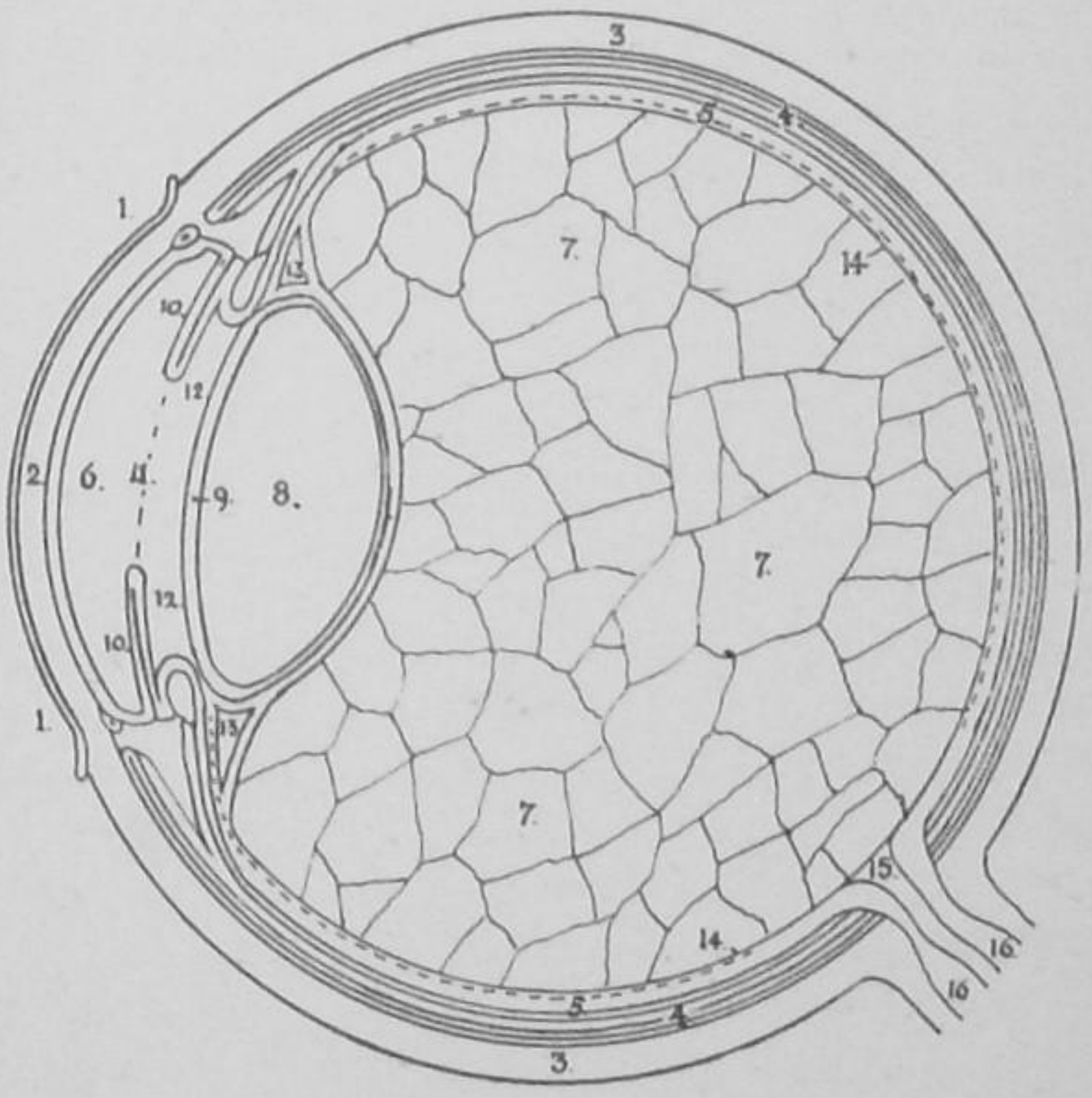
A.



A. THE EYE.

1. Pupil. 2, 2. The Iris. 3. Membrana Nictitans, or Haw. 4. Puncta Lachrymalis. 5. Upper Lid cut across, showing 6. 6. Lachrymal Gland. 7. Corpora Nigra. 8. Outer Canthus. 9. Inner Canthus. 10, 10. Meibomian Glands. 11. Lachrymal Canal.

B.



B. SECTION OF THE EYE.

1, 1. Conjunctiva. 2. The Cornea. 3, 3. Sclerotic Coat. 4, 4. Choroid Coat. 5, 5. Retina. 6. Anterior Division of Aqueous Chamber. 7, 7. Vitreous Humour—Posterior Chamber. 8 Crystalline Lens. 9. Capsule of Crystalline Lens. 10, 10. Iris. 11. Pupillary Space. 12. Posterior Division of Aqueous Chamber. 13 Ciliary Processes. 14 Yellow Spot. 15 Central Artery of Retina. 16, 16. Optic Nerve.

The Iris (Plate XXXVII., A 2, 2 and B 10, 10), or curtain, is connected with the choroid, and may be of various colourings. In the horse it is generally dark brown. The opening in the centre of the iris is called the pupil, and in horses is of elliptical shape. The muscular fibres of the iris are arranged in two directions, circular and radiating, the former contracting, the latter dilating the pupil. Some horses have a white, unpigmented iris, and are called ' wall-eyed ' or ' albinos.'

The Corpora Nigra (Plate XXXVII., A 7) are the small black bodies, of a globular shape, to be observed in front of the papillary opening, and generally seen on the upper fringe of the iris. Their use is supposed to be to modify the rays of light.

The Humours of the eye are the *aqueous* and the *vitreous*. They act as refractive media. The *aqueous* (Plate XXXVII., B 6 and 12) is in front, between the interior surface of the cornea and the crystalline lens. It is composed chiefly of water, and has an alkaline reaction. The vitreous humour (Plate XXXVII., B 7, 7) occupies the posterior chamber, which constitutes about four-fifths of the interior of the sac. It is an albuminous semi-fluid of a jelly-like consistency, and is enclosed in a structure termed the *hyaloid membrane*.

The Crystalline Lens (Plate XXXVII., B 8) is bi-convex, more flattened in front than behind. It is made up of concentric layers, like an onion, and is enclosed in a capsule. It is situated behind the iris, having the aqueous humour in front and the vitreous behind, and is held in position by a suspensory ligament. It is transparent, its use being to concentrate the rays of light to a focus.

The Retina (Plate XXXVII., B 5) is the expansion of the optic nerve. It is composed of several layers, consisting of rods, cones, etc., and is the essential part of the organ of vision. The optic nerve (Plate XXXVII., B 16, 16) enters the eyeball, in company with the *ophthalmic* artery and vein, at the back of the eye.

The muscles of the eye are the retractor, abductor, adductor, depressor, levator, and superior and inferior obliques. These muscles turn the eye in the various directions required.

INJURIES AND DISEASES OF THE EYE.

The Eye, although well shielded by a strong bony socket, cartilaginous, muscular, and membranous structure, is frequently subject to injury and disease.

The Eyelids are sometimes injured as a result of fighting, more particularly in dogs. In the horse the upper lid is occasionally torn by hooks, nails, etc. Should the piece hang down over the front of the eye, the best plan is to cut it off, and treat the place as a simple wound, or, if practicable, a suture or two may be put in and the wound covered with collodion. Warty growths, when present, can be removed with the scissors or the knife. The eyelids may become inverted or everted. When the former happens, the eyelashes turn inwards and irritate the front of the eye; when the latter occurs, they turn outwards. Both cases cause much pain and annoyance, and have to be relieved by an operation, which consists of cutting a piece out of the lid. If great pain be present, a solution of cocaine or extract of belladonna may be used. The animal should always be kept in a dark place, and fed on a cooling diet.

The Membrana Nictitans, or **Haw**, a cartilaginous structure in the inner corner of the eye (Plate XXXVII., A 3), is sometimes subject to irritation and inflammation, but is more prone to warty growths and soft, spongy, and cancerous tumours. The warts may be successfully cut off with the scissors, but in removing the soft tumours the haw in some cases has to be excised altogether. After the operation the parts should be dressed with boracic lotion. These growths are more frequently seen in the cow than in the horse.

Conjunctivitis, or Simple Ophthalmia.—Inflammation of the external coat of the front of the eye or cornea, extending to the lining of the eyelids. This is generally the result of an injury, such as a blow from a stick or lash from a whip, but extreme hot or cold weather will also produce it, more particularly in sheep and lambs during the cold frosty spring months. Bad ventilation and drainage also favour its occurrence, but perhaps the most frequent cause is the entrance of foreign bodies, such as sand, hay seed, chaff, etc. *Symptoms.*—The eyelids are more or less closed and swollen, tears flow freely down the side of the face,

and the patient cannot bear exposure to the light. The lining of the lid is very red and congested, and the front of the eye has a peculiar, pale blue, milky hue, especially at the seat of the injury. Constitutional disturbance with fever may in some cases be present, which must receive attention, and be combated with suitable medicines.

Treatment.—A careful and minute examination must be made, and if the cause is due to some foreign body, which is not buried in the exudation that usually follows, it may be removed with a camel-hair brush, a feather, or the corner of a handkerchief dipped in castor oil, or it may be possible to pick off the offending body with a pair of forceps having fine rounded points. Should the eye be very sensitive and pulled back into the socket, as is often seen in the cow, so that the object cannot be reached, a little of a 5 to 8 per cent. solution of cocaine should be put into the eye, when in the course of from fifteen to twenty minutes the offending body may be removed. On no consideration should alum or powdered glass be blown into the eye, as is too frequently done. These are highly dangerous, and cause a great amount of pain to the animal. They are, therefore, to be strongly condemned. Bathing the eye three or four times a day with cold water, and then applying boracic lotion, is all that is necessary. Sheep and lambs, when affected, should be removed to better shelter, and the eye sponged once or twice a day with the boracic lotion. These cases, if not properly attended to, may result in ulceration of the cornea, and even fungoid growths may spring up; then more heroic treatment is required, and touching the places with nitrate of silver every second or third day has a beneficial effect. In very severe cases the ulceration extends through the external coats; the humour then escapes, and the eye is lost.

Periodic Ophthalmia differs very much from simple ophthalmia. It affects the structures inside the eye, and after the primary attack has lasted for a few days, there is abatement of the symptoms, but a tendency to recur later, on account of which tendency the term 'periodic' was used. It is probable, however, that the periodic nature of the complaint is more apparent than real, for some observers have shown that the disease process continues between the periodical acute attacks, and is not at a standstill.

While the exact cause is not known, there is strong evidence that the disease is due to an ultra-visible virus, the infection being by way of the blood-stream. It has been transmitted experimentally to horses and to rabbits, the same conditions being reproduced as are seen in natural infections. *Symptoms.*—As a rule the attack is sudden, the horse is very dull, hangs its head, and has one or both eyelids closed; there is a flow of tears, and slight cloudiness of the cornea. The anterior chamber loses its transparency, and is of a yellowish-amber colour, and the pupil can scarcely be seen. The acute attack lasts from four to ten days, then abates; but recurs after a variable period, usually from three to six weeks. Frequent attacks are increasingly severe, the lens and the posterior chamber become implicated, and it may finally end in cataract. *Treatment.*—Put the animal into a roomy, well-ventilated, but darkened loose-box, keep it perfectly quiet, and administer mild doses of laxative medicine, say 2 ounces Epsom salts and ½ ounce cream of tartar, night and morning, in a mash of bran, or as a draught, until the bowels show relaxation. The eye should be sponged with a weak solution of extract of belladonna two or three times a day. This treatment in some cases may be all that is required, but in protracted cases benefit may be derived from the use of atropin and adrenalin.

Cataract is a pearly white appearance, or opacity, of the crystalline lens or its capsule, or both. It may result from external injury to the eye, or from frequent attacks of inflammation, or periodic ophthalmia; again, it may be congenital, and appear in one or both eyes. The whole or only part of the lens may be affected, and various names are accordingly given to it, such as *lenticular cataract*, when the lens itself is the seat of the affection; *capsular cataract*, when only the capsule is affected; and *capsulo-lenticular*, when both are implicated. Old dogs seem to be the greatest sufferers, and in these it generally comes on gradually. In the human subject the lens can be removed and suitable glasses substituted, but in the domestic animals treatment is of little use.

In examinations of horses for soundness it is of the greatest importance that the eyes be carefully examined, as cataract causes partial or complete blindness. The horse must be taken into a dark place, and the eye examined with a lighted candle; if the

eye is correct, the pupil will contract gradually on the light being presented, a clear, deep, black-blue, liquid appearance will be seen beyond the pupillary space, and the image of the light from the candle be reflected in three distinct places. On moving the candle to and fro, the reflected lights move at the same time; but if cataract be present, the pupil remains stationary, and a pearly white substance is seen, filling up the pupillary opening.

Amaurosis, or glass-eye—blindness without any visible cause—is, strictly speaking, not a disease of the eye itself, but a derangement of the 'optic nerve,' producing partial or complete loss of sight. The eye appears to be fuller, brighter, and more brilliant than usual, and at the first glance it seems a beautifully developed eye. When it occurs, both eyes are affected, as a rule. In the majority of cases the horse carries his head well up, and steps very high, in a hesitating, jerky manner. On carefully examining the eye, the pupillary opening is found very much dilated, and instead of being elliptical, it is nearly circular, very little of the iris being seen; whilst on being subjected to the rays of a strong light, the pupil will not contract. Detection of amaurosis is really of more importance in examination for soundness than that of cataract.

Filaria Oculi, or worm in the eye, is extremely rare in this country, but is frequently seen in hot climates—*e.g.*, India. The parasite is the *Strongylus filaria*, and measures from ½ to 1 inch long; it is found in the anterior chamber of the eye, where it moves about freely, setting up irritation, and giving to the aqueous humour a peculiar milky hue. It can be successfully removed by casting the horse, and cutting into the eye at the upper edge of the cornea, so liberating the humour, and with it the offending worm.

Dislocation of the Eyeball, a displacement of the eyeball, mostly seen in the dog as a result of fighting. When recently done it is readily reduced by pressing it carefully back into the socket with the thumbs, pulling the lids forward with a pair of forceps, and keeping it in its place with a bandage and a pad of wet lint. When it has been displaced for some time, and has become swollen and congested, it should be bathed well with tepid water or an infusion of poppy heads; and it may be necessary to slit the eyelids at the outer corner before returning it; then it

should be maintained in its place by one or two stitches of antiseptic thread, all being covered with a lint pad made wet with boracic lotion, and secured in its place with a bandage. In some cases the eyeball is so much damaged that it has to be removed.

THE EAR.

In the horse, the ears should be fine and well pointed forward, and when at work should always be on the move, first backward, and then forward, so as to catch sounds. Each ear is made up of three distinct portions—*i.e.*, the *external ear*, the *middle ear*, and the *internal ear*.

The External Ear is made up of three pieces of cartilage:

1. *Conchal*, which forms the point.
2. *Annular*, ring-shaped at the bottom.
3. *Scutiform*, triangular in form, and which acts as a lever to move the conchal.

These are all covered internally by a fine skin, containing minute glands, which secrete wax, so as to prevent insects and other foreign bodies entering the ear.

The Middle Ear, or *tympanum*, contains four small bones, named: (1) *Malleus*, or *hammer*; (2) *incus*, or *anvil*; (3) *stapes*, or *stirrup*; (4) *os orbiculare* (the smallest bone in the body).

The Tympanum cavity is separated from that of the external ear by a thin membrane known as the *membrana tympani*, or drum of the ear. Sound waves produce vibration of this membrane. These vibrations are communicated to the chain of small bones above mentioned, and by them to the internal ear. In order that the pressure on the two sides of the membrana tympani may be maintained in a uniform condition, the cavity of the tympanum is placed in communication with the pharynx by means of a tube, known as the *Eustachian tube*.

The Internal Ear is very complex. It is called the labyrinth, and is made up of *bony* and *membranous* parts. The bony part contains: (1) The *vestibule*; (2) *semicircular canals*; (3) *cochlea*, or shell. The *membranous part* is contained within the bony portion, and is specially adapted for hearing.

The phenomena of hearing are very interesting, and worth reading up. The same may be said regarding the phenomena of sight. Fortunately, we have very few diseases of the ear in horses. They may, however, get torn or wounded, and are prone to warty growths, which must be removed by operation. Dogs may suffer from deafness; this, in gun dogs, is a serious disability.

Canker is a fœtid secretion in the lower portion of the external ear. It is believed by many to be parasitic in origin. Heavy-eared dogs, as spaniels and retrievers, seem to be predisposed to it. When affected, the dog holds its head rather to one side, every now and again shaking it and flapping the ears, which it scratches with its feet. On examination, a nasty fœtid discharge is seen in the hollow of the ear. In some cases minute parasites are found infesting the ear, and cause similar symptoms. *Treatment.*—Washing with warm water seems to aggravate and extend the disease. Wipe the affected part as clean as possible with medicated cotton-wool, then put a few drops of hydrogen peroxide into the ear to assist in the cleansing process. As this is a very troublesome complaint, and opinions are very divergent as to the best treatment, it is safest to consult a veterinary surgeon on the subject.

CHAPTER XI

THE SKIN

The Skin (Plate XXXVIII., 10) is a dense and very sensitive structure, serving primarily to cover and protect the body from external injury, but it has other very important functions; amongst these are heat regulation, absorption, excretion, secretion, and the sensation of touch. It is composed of two layers:

1. External—the epidermis or cuticle.
2. Internal—the dermis, true skin, or cutis vera.

The skin varies in thickness in different parts of the body. It is fine and soft where much motion is required, and dense and thick where the parts are exposed, as the back, shoulders, etc.

The Epidermis, or **Cuticle**, is composed of layers of epithelial cells, the outermost layers being like scales, which are cast off when done with, like the scales from the body of a fish. It is non-sensitive. The deepest part of the epidermis is known as the rete mucosum, and it is to it that the skin owes its colour.

The Cutis Vera (dermis, or true skin) contains the sebaceous, fat, or oil glands; the sudoriparous or sweat glands; the hair and hair follicles, bloodvessels, and sensory nerve endings.

The Sebaceous Glands (Plate XXXVIII., 10 *e*) secrete an oil, which pours into the hair follicles for the purpose of lubricating the skin and keeping it and the hair soft.

Sudoriparous or Sweat Glands (Plate XXXVIII., 10 *b*).—These are for the purpose of perspiration, an action which is both insensible and sensible. The quantity of sweat varies very much, according to the season, condition of the animal, the work done, etc. About 14 pounds of insensible perspiration are supposed to pass off every twenty-four hours from a horse—*i.e.*, above $\frac{1}{2}$ pound every hour. Thus, besides the excretion of waste products by perspiration, the evaporation of sweat on the surface of the body causes loss of heat. The numerous bloodvessels in the skin by dilating or con-

tracting also control the loss of heat. So in all warm-blooded animals the internal temperature is kept, with slight variations, at a constant level. Cleanliness promotes the secretions of the glands of the skin, as is readily observed in the sleek coats of well-kept animals, such as hunters, race-horses, army horses, etc.

Hair (Plate XXXVIII., 10, *c*, *d*).—In the lower animals the body is covered with hair or wool, which differs very much in texture, according to the climate, season, and the breed of animal; and it also varies in this respect on different parts of the body. A hair is said to have a *point*, *shaft*, and *root*. The latter swells out into a bulb, and is fixed in the hair follicle, a depression in the true skin. The horse casts its coat twice a year, having a summer and a winter covering. Castration when the coat is being shed or cast in some cases tends to make the coat rough.

Clipping in Winter.—In late autumn, or early winter, the coat of the horse becomes very long and rough. Anyone who has driven a horse in this state must recognize the oppressive effect the long, close coat has on the animal, which begins to puff and blow, needing frequent applications of the whip, while perspiration oozes out of every pore. A horse stabled in this condition takes hours to dry, and in many cases, when put in thus at night, it will be found in the morning still wet and cold. This necessarily chills the surface of the body, tending to drive the blood from the skin, and to produce congestion of the internal organs, swollen legs, etc. Clipping makes a wonderful change. The horse becomes an entirely different animal, active on its legs, and eager in its movements. The depression has gone, the whip is no longer needed, and any little perspiration which may arise is quickly evaporated. The greatest advantage of all, however, is that, the coat being off, the animal is more easily dressed and cleaned. The surface capillaries are thus stimulated in their circulation, animal heat sustained, and the internal organs kept free from congestive disorders. From this it will be seen that clipping acts as a splendid tonic, fully equal—in fact superior—to an extra feed of corn per day.

Hoofs, Horns, and **Claws** are appendages pertaining to the skin. The hoof, or horny box, protects and shields the sensitive parts of the foot, and is secreted by the coronary band. Horns,

seen on the sides of the forehead of many animals, are modifications of the skin; they differ very much in shape, size, and colour. A horn has a *base*, *body*, and *point*, and is secreted by a fine vascular membrane, which covers the horn core, and forms a circular pad in connection with the skin at the base. The rings formed at the base of the cow's horn are looked upon by many as an indication of the age of the animal. The first ring is supposed to make its appearance about the age of three years, a new ring being formed each succeeding year. These rings are often rasped out, and rubbed down with sand-paper and oil, to give the animal a more youthful appearance. The bony projection, or horn core, is made up internally of cavities, interspersed with thin beams of bone, which give to it both strength and lightness. Claws are formed in a manner analogous to that in which hoofs and horns are produced.

Skin Diseases are numerous, and of great variety, and may be classed under three heads:

1. Inflammatory.
2. Non-inflammatory.
3. Parasitic.

INFLAMMATORY DISEASES OF THE SKIN.

Variola Equina, or **Horse-Pox,** is a specific, vesicular, eruptive, febrile disease of the inflammatory type, happily of rare occurrence in country practice, and, although of a constitutional character, manifestations of the malady are made through the agency of the skin. *Symptoms.*—The horse hangs its head in a listless manner, and is off its food, while the skin is hot and dry. In the course of a few days small vesicles are noticed cropping up on various parts of the body. Each of these contains a thin fluid, and soon bursts, forming a scab, which in time drops off, leaving a bare spot. The fever has to be combated with gentle saline medicines, but purgatives must be strictly avoided. Doses of from 1 to 2 ounces of Epsom salts and 1 ounce of cream of tartar, given in hay tea night and morning, are all the treatment that is required. When the skin is very itchy, sponging it frequently with equal parts of Sanitas and water has a very soothing and cooling effect.

Variola Vaccinia, or **Cow-Pox**, is a similar malady affecting the cow, but less virulent than either horse-pox or sheep-pox. It was in the lymph contained in the vesicles of this affection that Jenner recognized the properties of a protective agent against human small-pox, and from this lymph he prepared his vaccine. The vesicles are usually found on the udder of the cow, and accompanying them there is, as in the horse, a considerable amount of fever and constitutional disturbance. Simple alkaline medicine, good nursing, and easily digestible food constitute all the necessary treatment.

Variola Ovina, or Sheep-Pox.—A vesicular complaint, analogous to the pox of the horse and cow, which affects the sheep, but happily is very rare. Here the eruptions are first seen on the inside of the thighs and fore-arms. The affected animals should at once be removed and isolated. Sheep-pox is scheduled under the Diseases of Animals Acts.

Simple Eczema is an inflammatory eruption of the skin, which often affects the horse when at grass, particularly in the spring and summer months. It is characterized by the formation on various parts of the body of minute vesicles or bladders full of a thin fluid, accompanied by itching and irritation, which causes the animal to rub itself against anything it comes in contact with. It is common in horses imported from other countries, and somewhat resembles mange, but in this case there is no parasite present. Being very inoculative to other animals, all harness, clothing, saddles, brushes, etc., used on an affected animal must be carefully washed in some disinfectant fluid. Although the complaint is distinctly inflammatory, there is seldom any accompanying constitutional disturbance, and the first thing to be noticed is that the hair stands up on end in minute patches, which, on closer examination, are found to denote the presence of small pustules containing fluid. These soon dry up, forming scabs, which, if brushed off, leave bare places. If taken in time, washing the body with Jeyes' fluid or Little's phenyle—1 part to 80 parts cold soft water—every three or four days, and giving tablespoonful doses of bicarbonate of soda every night and morning in a mash, has a very good effect. Chronic cases, however, have to be dealt with by stronger treatment, such as arsenical preparations internally and iodine applications externally.

Mallenders is of an eczematous nature, and may be regarded as a subacute or chronic inflammation of the skin at the back of the knee-joint, with a thin, irritative, watery discharge, causing the hair to stick out and eventually fall off, leaving a scurfy thickening of the skin. It is a complaint common in cart-horses, especially when they are out of condition, notably those that have thick, gummy legs. *Treatment* is not always satisfactory. The general condition of the animal must have attention, the diet must be changed, and a mild laxative ball given (say 3 drachms each of aloes and bicarbonate of soda), followed up by tonic diuretic medicines, and dressing of the parts twice a week with a little 10 per cent. oleate of mercury, which should be well rubbed in. On no account should the affected parts be washed, as this seems to irritate them and to encourage the spreading of the complaint.

Sallenders is a complaint identical with *mallenders*; the only difference is in the situation, this being found at the front and bend of the hock. Lichen is a somewhat similar complaint, but more of a papular form, and affects the skin on the back part of the legs. Old chronic cases are known as 'rat tails.' *Treatment* for these is the same as that laid down for mallenders.

Grease, or **Seborrhœa**, is inflammation of the true skin, of an eczematous character, affecting the sebaceous glands. Cart-horses of the round, gummy-legged class are more subject to it than those of the light-legged class, while the hind-legs are more often attacked than the fore. The causes are various. Some horses have a natural predisposition to it, and then anything that irritates the lower part of the limb will induce the disease. Sudden chills after the animal has been heated; washing and not drying the legs; want of exercise, with too stimulating food; feeding on new hay or oats; standing in filthy boxes, etc., all have a tendency to produce this complaint. *Symptoms*.—The first symptoms usually noticed are swelling of the legs and stiffness on moving, but there is not that acute pain present which is characteristic of 'weed,' often misnamed 'grease.' In a short time the hair stands on end, and a thin, yellow, oily discharge is seen oozing through the skin. This runs down the limb, and irritates the parts with which it comes in contact. The leg is very painful to the touch, and in the hollow of the heel and back of the fetlock

cracks are seen in the skin. *Treatment*.—The alkaline laxative ball, mentioned under *mallenders*, should be given, followed up with saline and iron tonics. The leg should be washed with Little's phenyle (1 part to 80 parts cold water), then a hay bandage rolled round the limb, and the phenyle wash poured down it five or six times a day. This can be continued for thirty-six or forty hours. The after-treatment entirely depends on the progress of the case.

Grapes.—Grease often ends in the formation of troublesome, filthy-looking outgrowths round the pastern-joint, resembling a bunch of red grapes, from which there is a nasty fœtid discharge. In such cases the phenyle wash should be made stronger (say 1 in 40), and when the parts are dry they should be dressed with powdered alum or blue vitriol. Burning off the warty excrescences with a hot iron is sometimes necessary.

Mud Fever.—A form of erythema, or superficial, patchy, inflammatory eruption of the skin, affecting more particularly the legs of clipped horses, but it may also affect any other part of the body splashed with mud. It is most common in winter-time, when the weather is very changeable—*e.g.*, hard frosts being suddenly followed by thaws and sloppy weather, and *vice versa*. It is due to the wet mud having been allowed to dry on the skin, and then washing it off on coming into the stable at night, without drying the legs afterwards. Washing seems to irritate the parts, and it is much better to allow the mud to dry on, and then clean it off gently with a soft wisp of meadow hay. *Symptoms*.—The first thing to be noticed is the swelling of the legs; the animal appears stiff, and is not inclined to move; the hair sticks up in patches, and in the course of a few days comes off very readily when rubbed. The legs usually suffer most, but cases occur in which the whole body is more or less affected. *Treatment*.—When any constitutional fever is present, put the animal into a good, roomy loose-box, and clothe it well; the legs, however, must not be bandaged, but kept perfectly dry. The aloes and soda ball, as recommended before, may be given with great advantage, followed up with some suitable alkaline alterative medicine. Should the legs be very much swollen and painful, they may be bathed for about thirty minutes with warm water, then immediately dressed with the following lotion: Sugar of lead, ½ ounce; fuller's earth, 2 ounces; add water

up to 1 quart; to be applied with a piece of sponge. Well-boiled barley and bran mashes form the best diet. All oils and greasy dressings are to be strictly avoided, but if the heels are very much cracked, a little vaseline may be applied. As a preventive, the legs of carriage-horses and hunters should never be clipped.

Cracked Heels is a form of dermatitis, or inflammation of the skin involving the skin and its glands, in the hollow of the heels, particularly those of the hind-legs. The cause is usually washing and not drying the legs thoroughly; clipping the hair out of the hollow of the heels; and standing in filthy stalls or boxes. Horses with white legs suffer most, possibly from the extra washing that they require. *Symptoms.*—The animal is seen to go stiff and sore on first leaving the stable; it may even click up the affected leg like a horse with stringhalt, and go on the toe for a step or two, but generally improves in action after going a short distance. The pastern-joint is found to be swollen and painful, and there is soon a breaking out in the hollow of the heel, with a bloody discharge. *Treatment.*—Should there be much pain and fever present, then the soda and aloes ball should be given, and a poultice applied to the affected heel. This poultice can be made of bran and linseed meal, made wet with cold water, to which 2½ per cent. of carbolic acid has been added. After the inflammation is reduced, the following lotion should be applied night and morning—viz., 2 drachms each of sugar of lead and sulphate of zinc, mixed in a quart of cold water. In chronic cases of cracked heels, where there is little or no swelling present, dressing them with carbolized zinc ointment usually sets things right in a short time; they should never be washed or rubbed with a cloth, and any mud on them should be left until it dries, when it can be gently rubbed off with a wisp of meadow hay. If neglected, cracked heels may ultimately terminate in troublesome 'grapy' heels, or 'grapes.'

Mechanical Injuries to the Skin.—Chafing of the shoulder and back from badly fitting collars or saddles produces, respectively, sore shoulders and saddle-galls. These must have immediate attention, and the cause removed. The sores should be bathed with clean cold water night and morning, and then well covered with fuller's earth. Should the skin be much damaged, dressing with the zinc and lead lotion, as above, will have a good effect.

Scratches and Pricks from thorns and barbed wire are very common. When present, the thorns must be carefully removed, great care being taken not to break them in under the skin, as they very frequently cause a great deal of fever and pain, more particularly when in the neighbourhood of a joint. When the parts are much swollen and painful, bandages that have been wrung out of cold water should be applied when practicable, and kept constantly wet till the pain and inflammation have abated, after which dressing the parts with the zinc and lead lotion is all that is required.

Burns and Scalds may be very slight or very severe; in many cases they cause death, from the extremely exhausting nerve irritation or shock. An old-fashioned, but useful dressing is the application of carron oil to the affected parts; this is a mixture of linseed oil and lime water in equal parts, and is usually readily obtainable. An alternative dressing is a solution of picric acid, which is also efficacious. Any febrile symptoms which may arise must be treated by means of cooling and soothing medicines, but on no account must purgatives be used. Should the bowels be irregular, small doses (say 5 to 8 ounces) of linseed oil, repeated every eight or ten hours, will be found to be very serviceable. Food of a light and digestible nature ought also to be given. When the fever and acute symptoms abate, the raw surfaces of the wounds should be dressed with the zinc and lead lotion.

NON-INFLAMMATORY DISEASES OF THE SKIN.

Warts, Wens, or **Angle-Berries,** are abnormal growths, or enlargements of the scales of the outer layer of the skin, of a non-inflammatory character, and to which some breeds of animals are predisposed. They usually occur on the soft thin parts of the skin, such as the nose, sheath, thighs, etc. Sometimes they are well defined, with broad, thick necks deep through the skin, or are even encased in a sheath, just like the kernel of a nut in the shell. In many cases they become very troublesome, on account of their persistence, growing again with great rapidity after it is thought that they have been successfully removed. Pulling or twisting them off quickly with the fingers usually answers best;

at other times, a pair of strong scissors, knife, ecraseur, or hot iron may be used in their removal. A dressing of green tar should be applied to the bare surfaces the day subsequent to the removal of the warts. Warts and tumours are often found on the penis of the horse and bull. These are extremely troublesome, and when large interfere with the act of urination, and in the bull especially with that of serving, after which bleeding often occurs. *Treatment.*—In the horse, the penis must be drawn out and washed with some antiseptic, the offending growths removed with the knife or scissors, and the wounds dressed with tincture of iron. It may be necessary to cast the animal before operating. In the bull, the penis is difficult to draw out even when the animal is cast. One method of procedure is to allow the bull to raise himself on to a cow's back, when, with a loop in a piece of broad tape held in the left hand, the penis is seized and retained until the warty excrescences have been clipped off, and the parts dressed with tincture of iron. These growths occasionally involve the substance of the organ, and then amputation has to be resorted to. The cow also suffers very much from these excrescences, and as they materially affect the health and thriving of the animal, they should be immediately removed.

Horn Overgrowths and Injuries.—The horns sometimes turn and curve in so much that the overgrown points press tightly on the forehead, giving the animal so much pain that it ceases to feed and thrive. Such cases must be attended to, and, if necessary, the surplus horn removed with a saw. Again, the horns sometimes stand out with very sharp ends, in which case the points have to be cut off with the saw, or protected with wooden balls, to prevent the goring and wounding of other animals. When the horns are very large, it is found necessary to remove them by an operation termed 'dishorning'—an operation regarded by many as very objectionable, and looked upon as cruel. However this may be, it is better to prevent the growth of horn when the animal is very young, in cases where it is undesirable for them to possess these weapons. Occasionally a cow may become fixed by the horn, and in endeavouring to liberate itself the horn may be stripped off without injuring the horn core; when this happens, the parts must be dressed with carbolic oil and tow or cotton-wool, and above

this should be a layer of tar and tow, all being secured with a light bandage, and fastened to the other horn. When the horn and horn core are fractured, the rough projections and broken fragments of bone must be removed and sawn level, the bleeding stopped with a hot iron, and the parts dressed as above.

Abscesses are at times met with in the cavities of the horn, arising from an injury done to the parts, and causing extreme constitutional disturbance. The animal breathes quickly and pants, the eyes are injected, perspiration rolls off the body, and the pulse is full and bounding. The most noticeable symptom is that the animal holds the head low and to one side, giving it an occasional shake; if pressure be put on the root of the horn, the animal may bellow out, and fall over on to its side, as if in a fit, rolling its eyes, and breathing in a heavy and spasmodic manner. *Treatment.*—Bore into the base of the horn with a small trephine or a ½-inch gimlet, and after the pus has been liberated, roll cold water bandages round the horn, keeping them constantly moist, and at the same time administer a good dose of purgative medicine.

PARASITIC DISEASES OF THE SKIN.

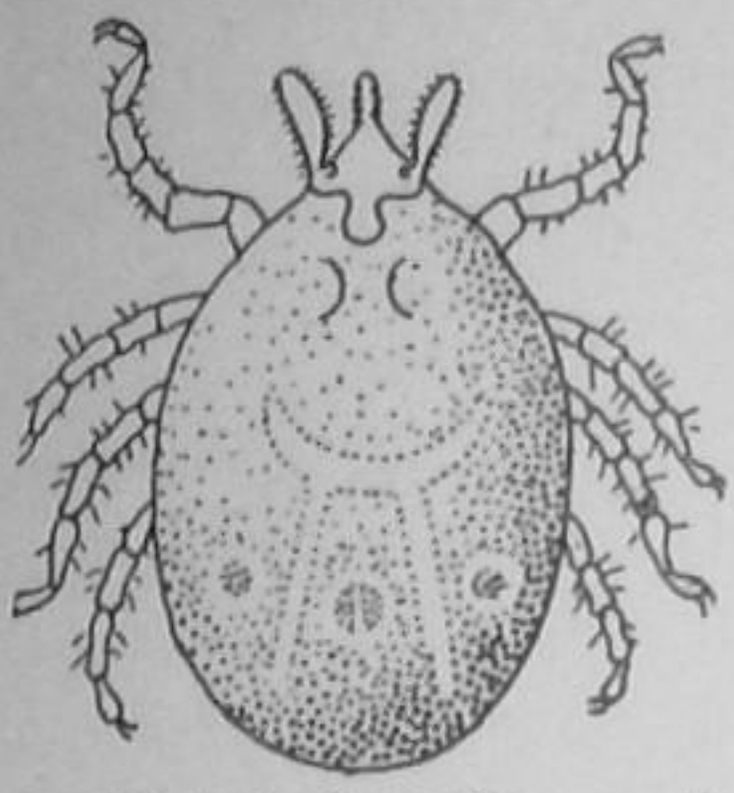
Mange, or **Scabies**, affects the horse, cow, sheep, dog, cat, etc., and also the human being. This troublesome disease is due to the presence of small parasites developed from eggs, which are deposited in vast numbers on or in the skin.

These parasites are of three principal families—viz.:

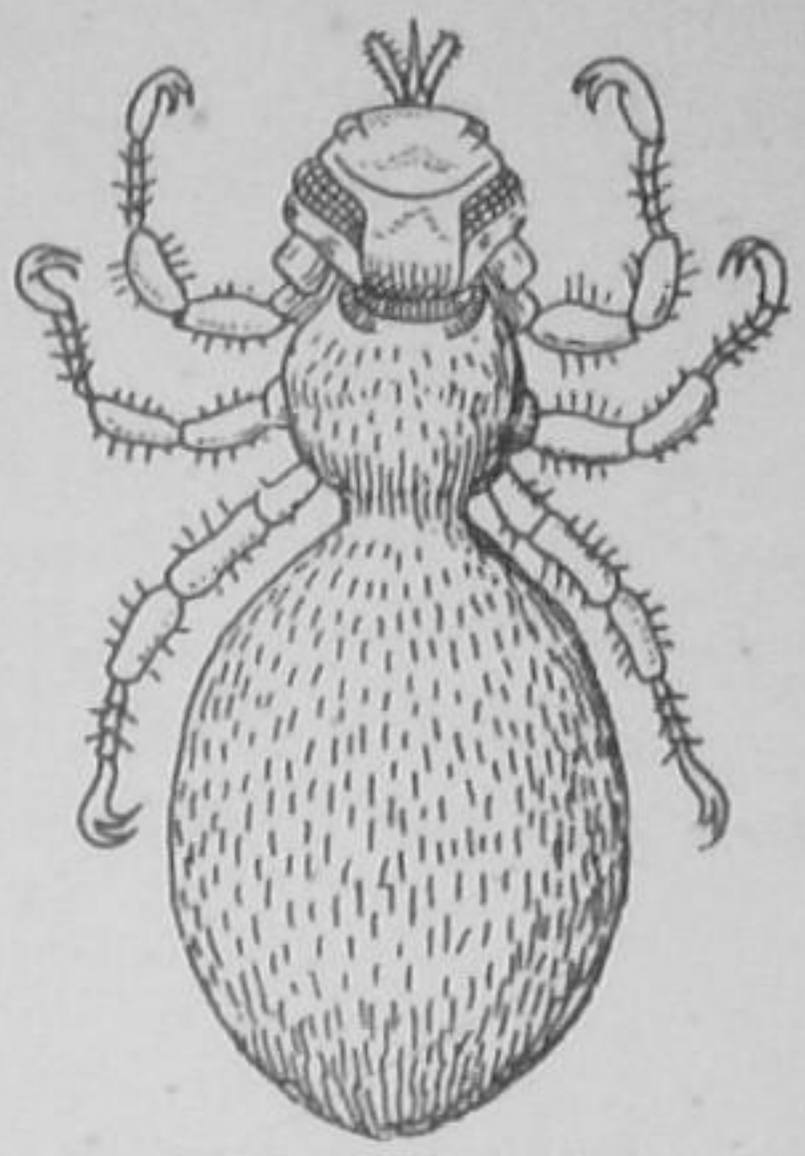
1. Symbiotes—the parasites that live on the skin.
2. Psoroptes or Dermatodectes—those boring into the skin.
3. Sarcoptes—those burrowing through the skin.

These differ in size and form in the various animals—as may be seen by the illustrations (Plate XXXVIII)—and they also differ in a like respect according to the situation they occupy on the skin of the various animals. Thus, mange must be considered under the three heads: (1) *Superficial*, (2) *Middle*, and (3) *Deep-seated.* From this fact it may be easily understood how some attacks of mange readily yield to treatment, whilst others verge on the incurable. It is, therefore, necessary to ascertain what class of

PLATE XXXVIII



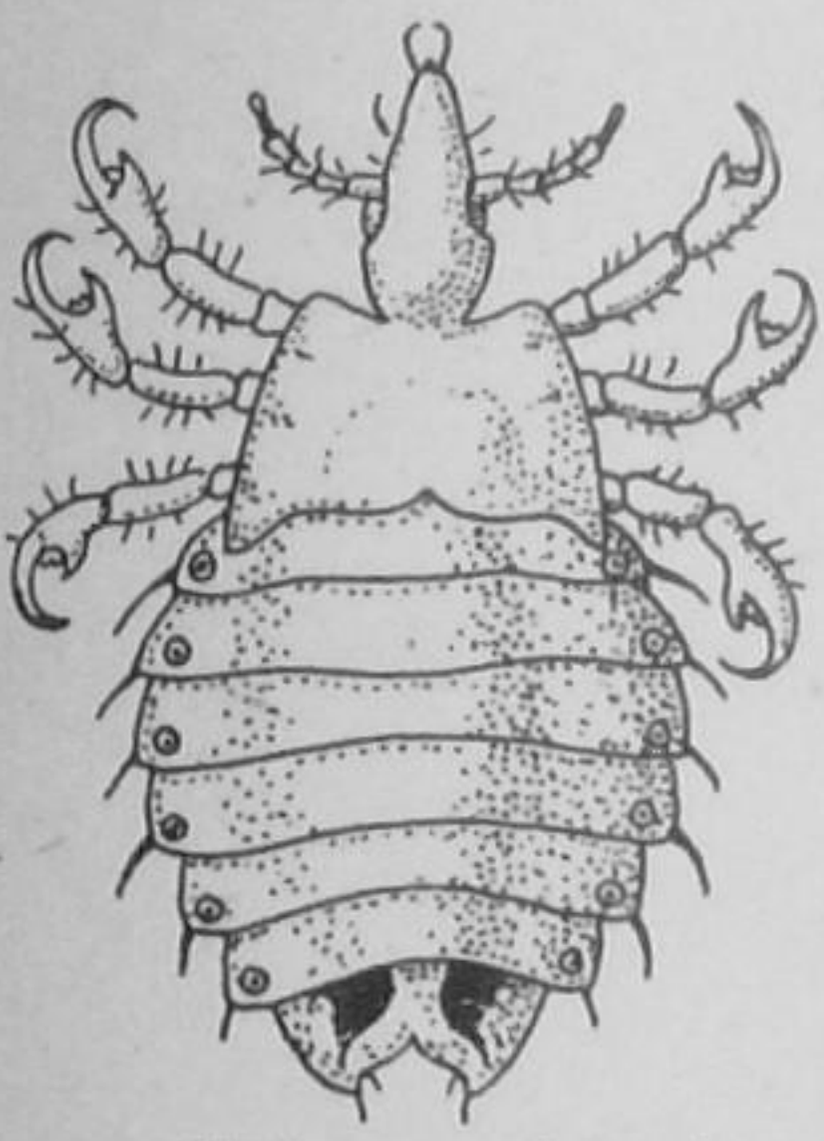
1. Tick, infests Dogs and Sheep, enlarged.



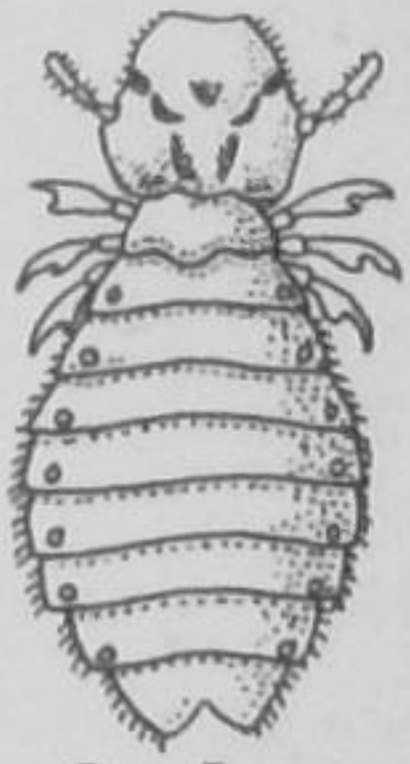
2. Tick, or Ked of Sheep, enlarged.



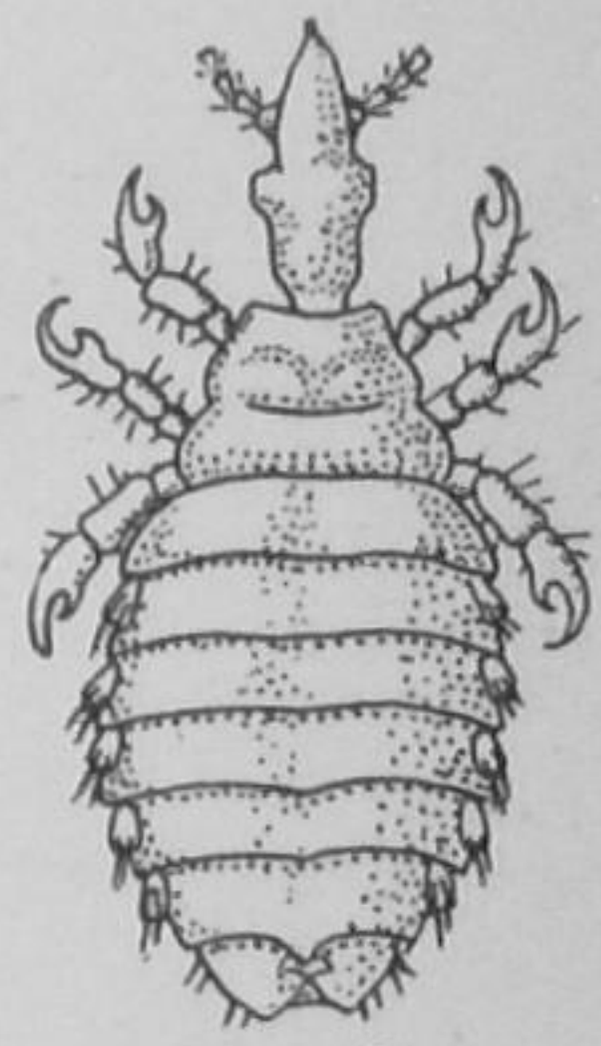
3. Sheep Louse, enlarged.



4. Pig Louse, enlarged.



5. Cow Louse, enlarged.



6. Horse Louse, enlarged.



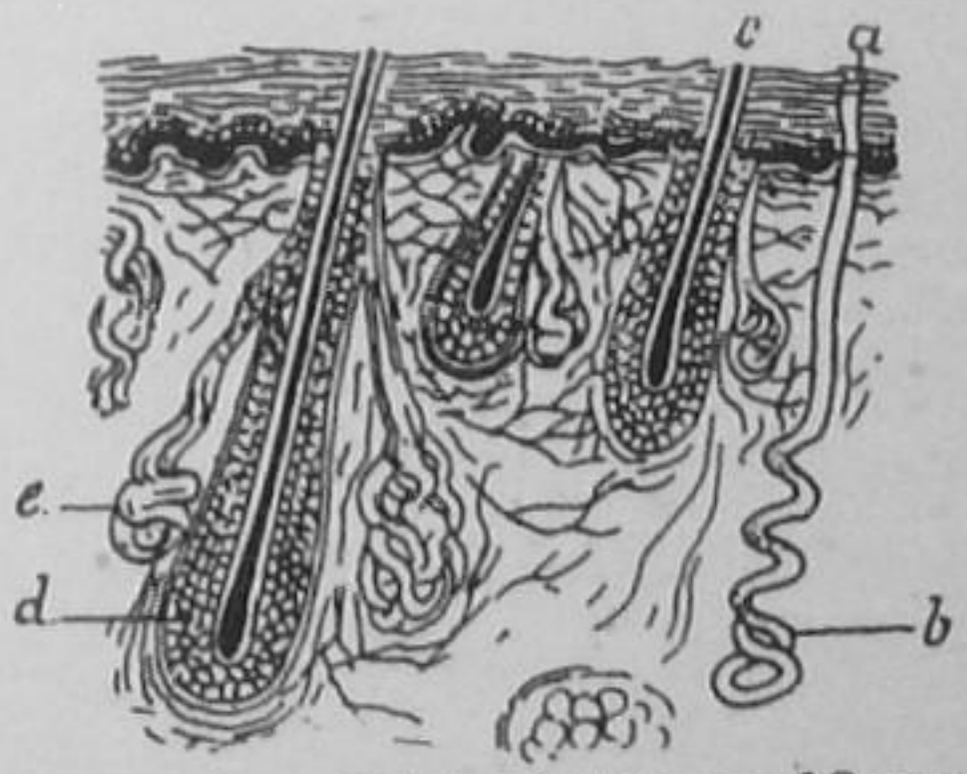
7. Ox Warble Fly.



8. Ox Warble Maggot.



9. Ox Warble Chrysalis.



10. Section of Skin: (*a*) Duct of Sweat Gland; (*b*) Sweat Gland; (*c*,*c*) Hair Follicles; (*d*) Hair Bulb; (*e*) Sebaceous or Oil Gland.

carefully and thoroughly washed with some parasiticide. Any of the non-poisonous dips may be used, but dips containing arsenic must not on any account be used where the skin is at all excoriated or broken. Dressing with a mixture of whale oil, black sulphur, and spirits of tar may be attended with good results. Also a lime and sulphur mixture, made by boiling together 9 pounds lime, 18 pounds sulphur, in 10 gallons of water, is a useful parasiticide. It is important that the parasiticide used should be applied at intervals in accordance with the development of the acarus. Thus, the

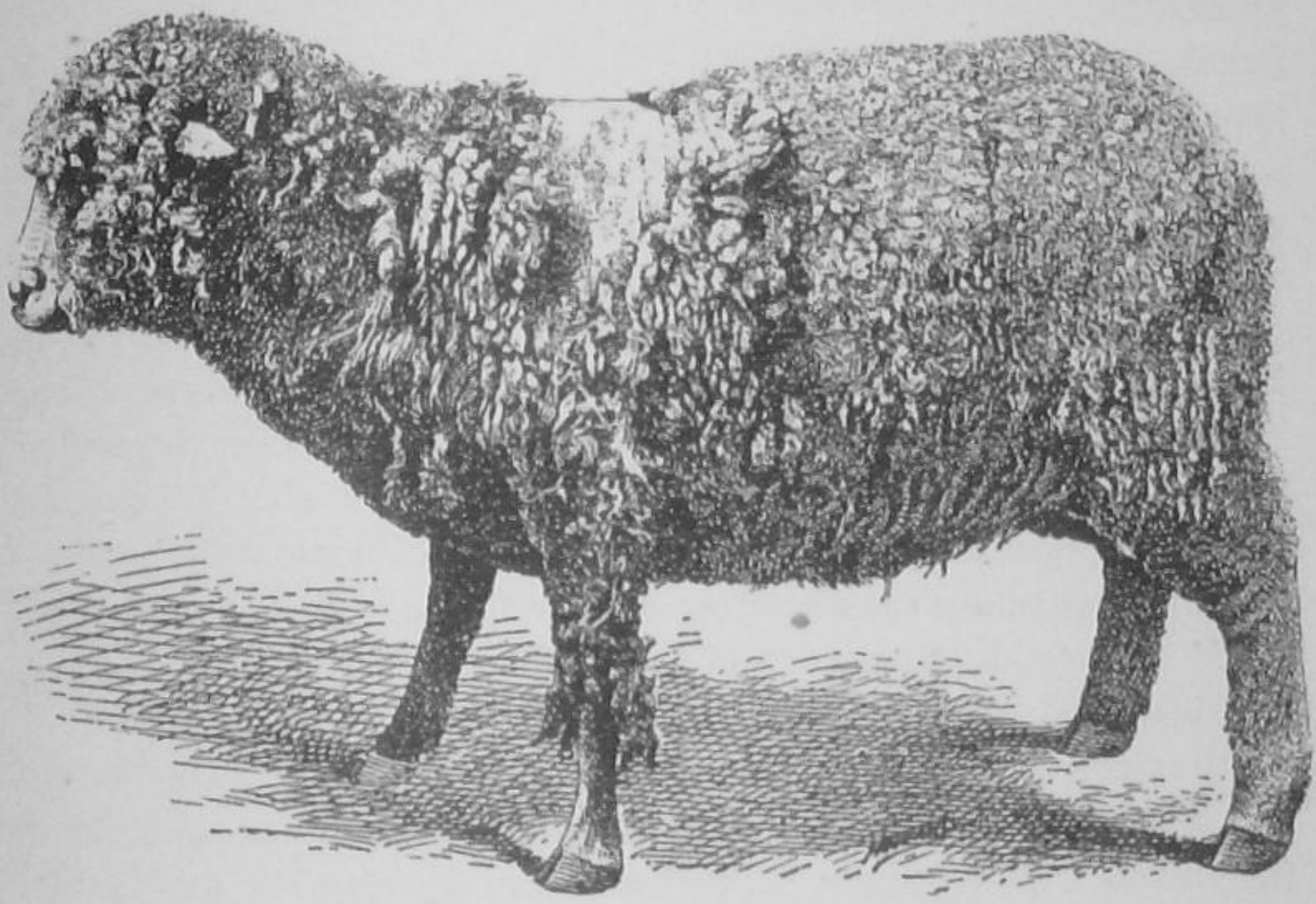


FIG. 33.—SCABIES OF THE SHEEP, OR SHEEP SCAB.

(From Mossu and Dollar.)

first dressing will kill the adult parasites but not the eggs. The second dressing should therefore be applied as soon as the eggs hatch out, but before they produce new eggs—*i.e.*, about seven days after the first dressing; further dressings at the same intervals may be necessary to ensure that all the parasites are destroyed. The stables, boxes, clothing, harness, etc., used by the infected animals must also be carefully washed and thoroughly disinfected. Should any constitutional disturbance be present, it must be attended to, and the bedding, which ought to be of pitch-pine

shavings or sawdust, changed every three or four days. Carbolic acid, strong mercurial ointments, or tobacco wash should never be used on the dog, as these have a dangerously depressing and sickening effect, and may even cause fatal poisoning. Scab in sheep is an affection of the skin due to the presence of similar parasites, mites, or acari, known as *Dermatodectes ovis*, or *Psoroptes communis*, and developed from tiny eggs about $\frac{1}{800}$ part of an inch in length. The female parasite is intensely prolific, lays its eggs and dies. It has been estimated that from the first to the sixth generation, in about the space of ninety days, no less than 1,000,000 female and 500,000 male parasites are born. The complaint is thus extremely contagious. The symptoms are great uneasiness and itchiness of the parts, the sheep continually biting, scratching with the hind-feet, and rubbing against posts or any other object; tufts of wool become pulled out, and the sheep soon have a ragged and dirty appearance. Both the remedy and prevention is to dress the parts with some of the many sheep-dip preparations approved by the Ministry of Agriculture and Fisheries, dipping at least two or three times at intervals of seven days. It should be noted that two forms of mange in horses—namely, sarcoptic and psoroptic—are notifiable under the Parasitic Mange Orders of 1911 and 1918, issued under the Diseases of Animals Acts. Sheep scab is also a scheduled and notifiable disease under the same Acts.

Warbles (Plate XXXVIII., 7, 8, 9).—These are small elevations about the size of a lady's thimble found on the backs of cattle between the shoulders and loins. They may vary in number up to fifty or more, and cause great loss, not only in the value of the hides, but to the flesh immediately beneath as well. The swellings contain larvæ developed from the eggs deposited by the female bot-fly, or ox warble-fly (Plate XXXVIII., 7, 8, 9), in the months of July and August, and they make their appearance between the following February and May, or perhaps later. There are two common types of bot-fly, or gad-fly, as they are sometimes called, by reason of the fact that when on the wing they cause cattle to rush about a field. They are called the *Hypoderma bovis* and the *Hypoderma lineata*. The manner in which the grub reaches the position in which it is found on the back is, according to present-day knowledge, as follows: The eggs are laid on the hairs of the

animal, chiefly on the legs, being attached to the hairs at the base of the egg, which is grooved. Presently these hatch, and the young grubs, which are then very small, enter the skin near to where they were hatched. Assisted by the spines which are found round the grub, they work their way through the body and finally reach their predilection seat under the skin of the back. Here, as they grow larger, the familiar swellings appear, and finally, in the spring, they make their exit through a hole made in the skin and fall to the ground, where the larva changes first into a pupa and then into the fly, ready to recommence the cycle of life in the summer months. As warbles cause a great loss to tha farmer, as many as possible should be squeezed out and destroyed. The most effectual remedy for warbles has been found to be the application of preparations containing powdered derris root. This has been shown by experiments in this country and in America, and confirmed by application in large-scale demonstration in Worcestershire in 1930. The dressing used in the latter demonstrations consisted of a mixture of a derris-root preparation, soft soap, and water; and four dressings were applied at intervals of a month in March, April, May, and June. For a small number of animals an ointment of somewhat similar composition may be used.

Ringworm is due to a micro-fungus (*Trichophyton tonsurans*) infesting the skin of domesticated animals, is very contagious, and communicable to man. It is most commonly seen in winter amongst young cattle folded in courts or boxes. It attacks the face, head, and neck, and gives rise to round patches, devoid of hair, and covered with a greyish-yellow scurf. On many occasions the attendants become badly affected, having acquired it from the infected animals. *Treatment.*—Dressing with a mixture made up of 1 part of creosote and 8 parts of olive oil answers well, as also do preparations of iodine. For persistent cases, solutions of corrosive sublimate, or sulphate of copper, have good effects, as has also a mixture of spirits of tar, whale oil, and sulphur. Whatever dressing is used, it is necessary first to remove as much as possible of the crust which is found on the bare patch, either by scrubbing with hot water and soda or even by scraping.

Fly Maggots.—The larvæ of the blow-fly—the *Sarcophagus carnariæ*; Order, *Diptęra*. When sheep are attacked with these

pests they are described as being 'fly-blown' or 'struck,' and as many as 20,000 maggots may be produced viviparously by one female fly on one animal. The perfect insect much resembles the common 'blue-bottle,' but has a black speckled abdomen. In close, muggy weather, particularly in the vicinity of plantations, sheep are frequently infested by these grievously troublesome pests, which are deposited in the soft, wet, dirty parts of the body, especially round the base of the tail. When the animal is seen to be affected, it should be got hold of at once, the wool clipped off

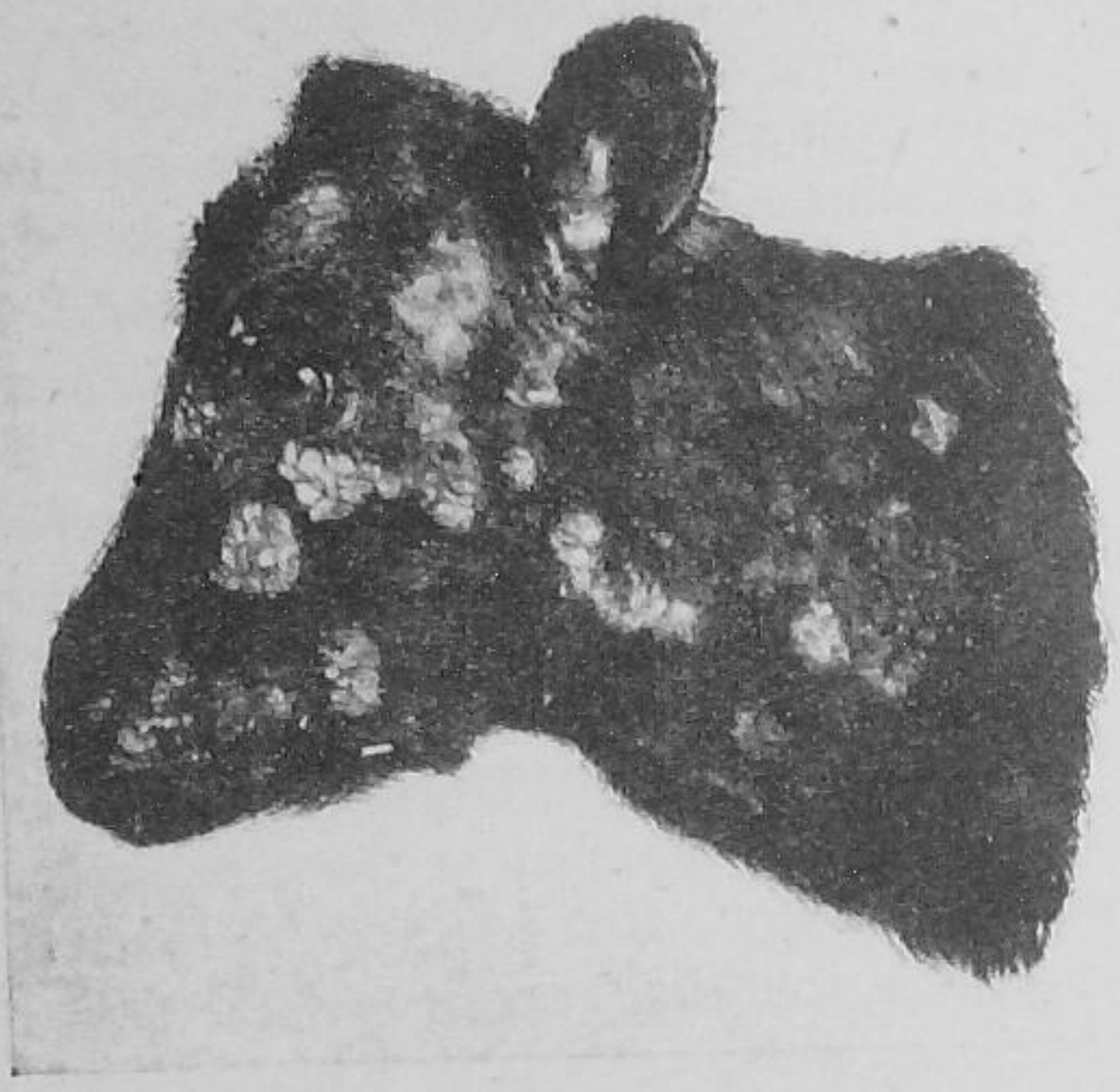


FIG. 34.—RINGWORM IN A CALF.

(From Wooldridge's 'Encyclopædia of Veterinary Medicine.')

if necessary, and the parts dressed with the following mixture Corrosive sublimate 1 drachm, common salt 4 drachms, dissolved in 1 pint of cold water; or with Jeyes' fluid (1 part in 30 of water).

Lice (Plate XXXVIII., Nos. 3, 4, 5, 6).—These troublesome parasites are hatched from tiny eggs, and are of two principal varieties —namely, those which live on the surface of the skin, and those which are blood sucking. They attack the cow more frequently than the horse, and are chiefly seen during the winter months infesting the stall-fed animal, particularly if in a poor condition—in fact, they

seem to be the great friends of poverty. The parts they most frequent are the head, neck, brisket, along the spine, and the root of the tail. The best dressing is ½ to 1 ounce *stavesacre* seeds put into a quart of boiling water and left to stand for twelve hours. This quantity is sufficient for one animal, and should be applied to the infested areas, repeating the wash in ten days' or a fortnight's time. A tablespoonful of soft soap added to the mixture improves it very much. Mercurial ointments, arsenical sheep-dips, and tobacco washes are to be strongly condemned, as numerous instances of poisoning as a result of their use have occurred.

CHAPTER XII

THE URINARY AND GENERATIVE SYSTEMS

THE urinary system consists of the kidneys, ureters, bladder, and urethra, and by these organs the urine is extracted from the blood and expelled from the body.

The Kidneys are reddish-brown, glandular bodies, situated in the under part of the loins—one on each side of the backbone. They are supported and held in position by their vessels, aided by a quantity of fat—the suet—in which they are embedded. The right one lies a little further forward than the left, being found beneath the two last pairs of ribs. There is a marked difference between the shape of the kidneys in the horse and cow. In the former, the right is shaped like the heart of playing-cards, the left being more like a bean in shape. In the cow they are more elongated and distinctly lobulated.

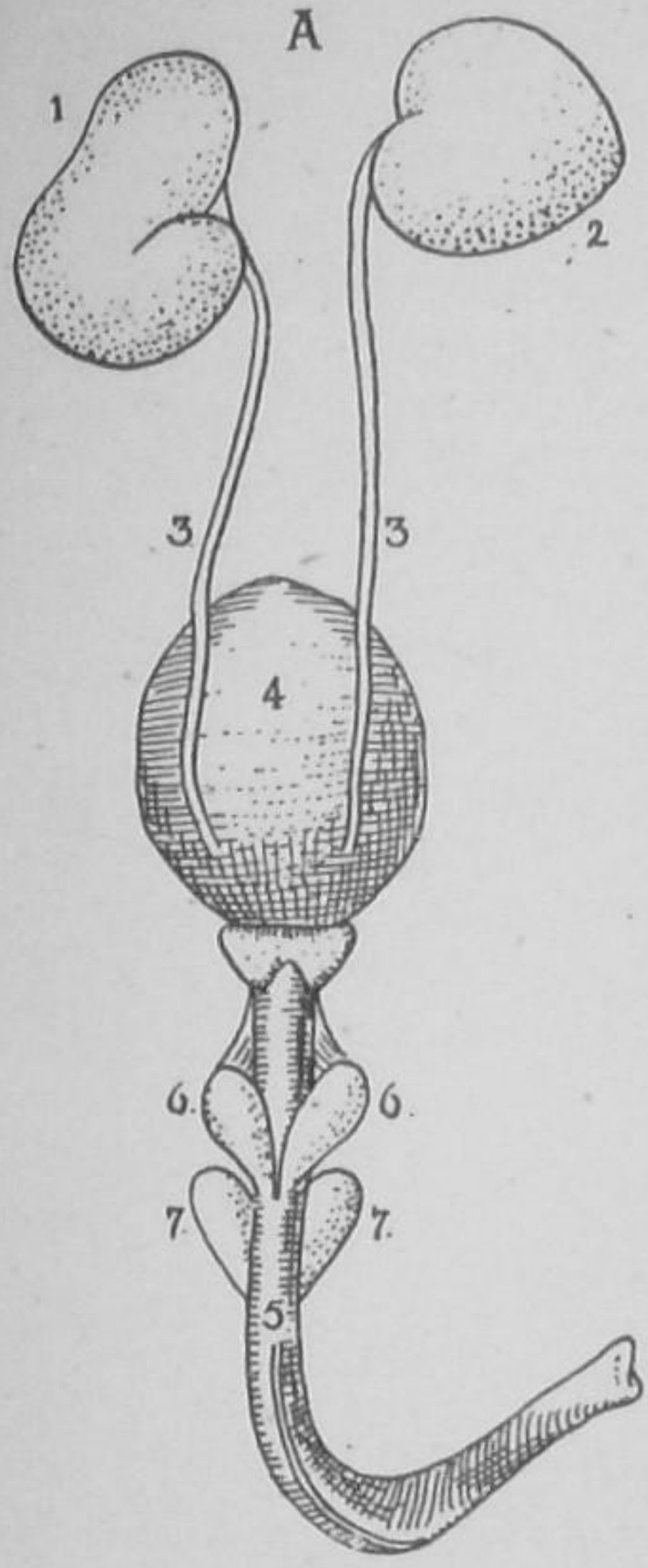
Structure of the Kidney.—The organ is made up of tubes (*uriniferous tubes*), bloodvessels, nerves, and connective tissue, the whole being invested by a fibrous capsule. On making a horizontal section of the kidney, it is found to consist of two distinct substances separated by a well-defined line, which is dark in colour, and known as the *boundary layer*. The external portion is known as the *cortex* of the kidney, the most internal part being the *medulla*.

The Cortex.—On examination, a vast number of little red spots, called the *Malpighian bodies*, are seen; each of these consists of a tuft of capillary bloodvessels (given off from the *renal artery*), enclosed in a membranous capsule known as the *capsule of Bowman*.

The Medulla is paler in colour than the cortex, and on the whole is more dense in its structure. It consists of cone-shaped masses, the points of which are directed towards the centre of the gland, where an irregularly shaped cavity, known as the *pelvis* or *basin* of the kidney, is found. These cone-shaped bodies are, in reality, bundles of uriniferous tubes.

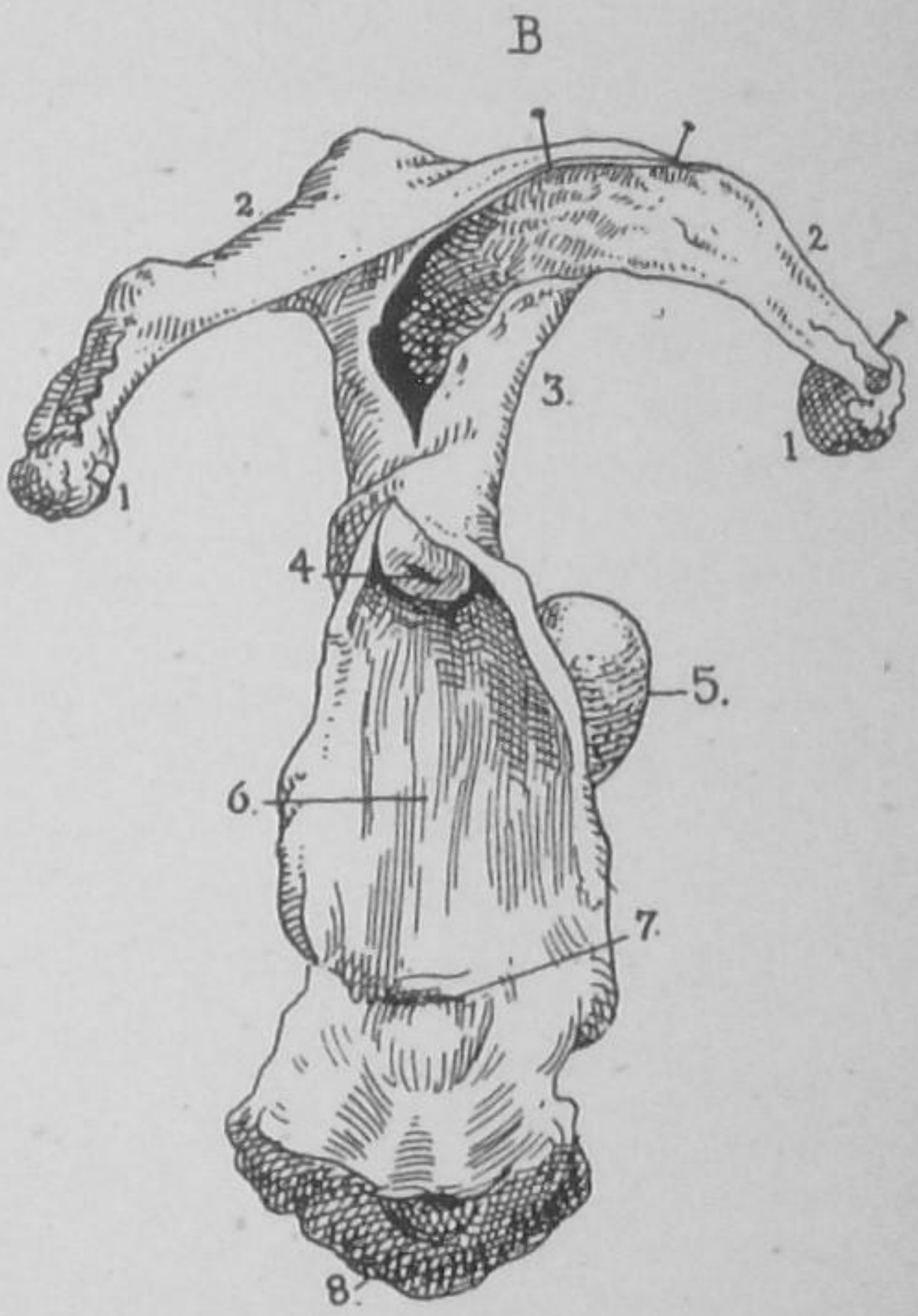
Briefly, the urine is secreted by the Malpighian bodies and

PLATE XXXIX



A. Male Urinary and Generative Organs.

1. Left Kidney.
2. Right Kidney.
3, 3. Ureters.
4. The Bladder.
5. The Urethra.
6, 6. The Prostate Gland.
7, 7. Cowper's Glands.



B. Female Urinary and Generative Organs.

1, 1. The Ovaries.
2, 2. The Fallopian Tubes.
3. Uterus or Womb.
4. Os Uteri, or Neck of the Womb.
5. The Bladder.
6. The Vagina or Passage laid open.
7. Meatus Urinarius, or Neck of Bladder.
8. The Clitoris at External Opening.

certain portions of the uriniferous tubes from the arterial blood supplied by the renal artery; it then passes through these uriniferous tubes into the basin of the kidney, and thence into the ureters, which convey it to the bladder.

Suprarenal Capsules.—These are two little glandular bodies attached to the front borders of the kidneys; they are ductless The internal secretion produced has a controlling effect on blood-pressure. An extract of these bodies, known as adrenalin, is very frequently used for controlling hæmorrhage.

The Ureters (Plate XVII., *i*, *i*, and Plate XXXIX., A 3, 3) are two tubes running from the basin of each kidney to the bladder, and, as before stated, their function is to carry the urine from the kidneys to the bladder. They enter the bladder obliquely at the upper and back part, and in this way a kind of valve is formed, by which urine is prevented from flowing back from the bladder into the ureters.

The Bladder (Plate XVII., *k*, and Plate XXXIX., A 4 and B 5) is a musculo-membranous sac or bag found in the pelvic cavity. Its function is to receive and retain the urine until a sufficient quantity has been collected for expulsion. In this way a constant dribble of fluid is avoided. Structurally, it is made up of three coats, and consists of a *fundus*, *body*, and *neck*, and it is held in position by means of ligaments. The bladder, when distended with urine, is pear-shaped, and extends into the abdominal cavity. On the *fundus* a scar or cicatrix is seen, which is all that remains of the *urachus*, the tube by which the urine is carried, by way of the umbilical cord, to the placenta during fœtal life. The neck of the bladder passes backwards, and terminates in the urethra.

The Urethra (Plate XVII., *p*, and Plate XXXIX., A 5) is a tube which, in the male, acts as an excretory duct for both the urinary and generative systems, and is contained within the penis. In the female, however, it has only one use, and that is for the passage of urine.

Urine.—This is a fluid which may be either acid or alkaline in its reaction, according to the class of animal from which it is excreted. In herbivorous animals it is alkaline, and of a rather muddy appearance. The horse excretes, on an average, about 8 to 10 pints of urine per day, but the quantity and quality can be

greatly altered by various conditions. These are chiefly variation in food and work, housing, the drinking of large quantities of water, and the action of certain drugs and medicinal agents, such as nitre, resin, turpentine, juniper, cantharides, and the various balsams.

MALE ORGANS OF GENERATION.

The male organs of generation are the testicles, spermatic cord, the accessory glands and ducts; the penis, containing the urethra; the inguinal canals, the scrotum, and the sheath.

The Testicles (Plate XVII., *m*, *m*) are two oval bodies situated in the scrotum and attached by the upper border to the spermatic cord. The testicles are the organs which secrete the seminal fluid containing the spermatozoa. This fluid is carried by one of the accessory organs or excretory ducts—the vas deferens—to the reservoirs near the neck of the bladder, where it accumulates.

The Spermatic Cords are two in number, and are made up of various tissues, including bloodvessels, nerves, muscular fibre, and the *vas deferens*, or seminal duct. These cords pass up the inguinal canal and hold the testes in position in the scrotum.

The Accessory Organs are the *epididymis*, *vas deferens*, *vesiculæ seminales*, the *ejaculatory ducts*, the *prostate*, and *Cowper's glands*.

The Penis (Plate XVII., *o*), or external organ, consists principally of erectile tissue, and through it runs the urethra.

The Urethra (Plate XVII., *p*, and Plate XXXIX., A 5) is a canal or passage which runs from the neck of the bladder to the anterior end of the penis. The urine passes through it, and it also acts as a passage for the transmission of the seminal fluid during the act of copulation.

The Inguinal Canals are the short passages between the abdominal cavity and the scrotum, and through them the vas deferens, bloodvessels, and nerves pass.

The Scrotum is the purse or sac which holds the testes, and is placed between the thighs, and is made up of a series of layers of integument.

The Sheath is situated in front of the scrotum, and is a loose fold of skin investing the front and free portion of the penis, and having its anterior end open.

FEMALE ORGANS OF GENERATION.

The Female Organs of Generation consist of the ovaries, right and left; the two Fallopian tubes; the uterus, or womb; and the vagina, or passage communicating externally with the vulva.

The Ovaries (Plate XXXIX., B 1, 1) are situated behind the kidneys in the sublumbar region of the abdomen, and are in connection with the fimbriated or free ends of the *Fallopian tubes.* They are analogous to the testicles of the male, as in them is formed the ovum or egg, which is the essential reproductive element of the female.

The Fallopian Tubes (Plate XXXIX., B 2, 2).—These canals run in an irregular manner from the uterus to the ovaries. Their anterior extremities are fringed and free, and their function is to seize and carry the ovum, or egg, to the womb.

The Uterus, or Womb (Plate XXXIX., B 3), is a musculo-membranous structure, lying partly in the abdominal and partly in the pelvic cavity. It is sac-shaped, and made up of a body with two horns and a neck, with an opening known as the os uteri (Plate XXXIX., B 4). It has three coats—viz., (1) external—serous; (2) middle—muscular; (3) internal—mucous. The *middle* or *muscular coat* is made up of several sets of fibres, which, by their contractions, assist in expelling the fœtus at the time of birth.

The Vagina, or Passage (Plate XXXIX., B 6), is composed of two layers, an outer consisting of muscular and connective tissue, and an inner of mucous membrane, the latter being arranged in folds, thus enabling the passage to dilate during parturition.

The Vulva, or external part, made up of two lips, is situated immediately below the anus, and is that portion of the female generative system presented to view. About 4 inches from the outside on the floor is the opening of the urethra (*meatus urinarius*, Plate XXXIX., B 7) or duct from the bladder. In the virgin animal, a corrugated fold or doubling of the mucous membrane is found—the hymen.

URINARY DISEASES.

Nephritis (Inflammation of the Kidneys).—This occurs in three forms—viz., *acute*, *subacute*, and *chronic*; and generally the two last-named forms are most often seen, though it is a rather uncommon disease in the domesticated animals.

Symptoms.—At the onset of the acute form in the horse the symptoms very much resemble those of colic, or inflammation of the bowels, only the pain is not nearly so violent; the animal frequently lies down and gets up again, perspires freely, and breathes hurriedly; there is a quick pulse, and a great rise of temperature; when lying, the patient attempts to put its nose on to its loins, while, if standing, it constantly stretches into a position to urinate, and small quantities of urine, very highly coloured and occasionally tinged with blood, are passed. Cases have been seen where the urine, when collected in a vessel and allowed to stand for a time, coagulated. In the subacute and chronic stages very little pain is manifested, but the animal is very dull, has a tucked-up belly, a staring coat, hurried panting breathing, a quick, small pulse, and a high temperature of from 105° to 106°. If these cases are not early relieved, they may terminate in *uræmic poisoning* or in the formation of *abscesses* in one or both kidneys.

When only one kidney is affected, as a rule the other has to do the work of both, and becomes hypertrophied, or enlarged. During the time the sound kidney is comporting itself to the double duty all the symptoms of uræmic poisoning are manifested. After a time the abscess in the affected kidney may become encysted, and then the animal appears to get well, doing its work with only one kidney. Again, the abscess may burst, and its contents pass along in the urine to the bladder; there the solid portions of the pus or matter may coagulate and, passing into the urethra, block up the passage, so that the case may end in rupture of the bladder, from the continual strain in attempting to void the urine.

The causes of inflammation of the kidneys are various. Some writers hold that the too frequent administration of fancy condition balls and powders, containing potash, balsams, turpentines, resins, etc., is a cause; but if this were so the complaint would be of more

frequent occurrence than it is. Bad food, of a mouldy and heated nature, and too severe blisters containing cantharides and turpentine, may in some cases be blamed.

Treatment.—As the complaint is not readily diagnosed, great care should be taken not to administer quack medicines of a turpentine or balsamic character; for, although they may answer in spasmodic colic, they are extremely dangerous in cases of kidney affections. From 15 to 25 ounces of linseed oil, with 2 to 4 ounces of laudanum, should be given at once, and to relieve the kidneys of some of their work the skin should be excited by a large hot poultice, made of maize or oatmeal, put into a flannel bag and laid over the loins; or by a blanket, six or eight ply thick, wrung out of hot water and laid over the back, with dry woollen rugs on the top and a waterproof covering over the whole; whilst a good mustard poultice over the loins may also prove beneficial. Warm water injections should be given every four or six hours, and the legs be well bandaged; while hypodermic injections of *pilocarpine* and *physostigmine* are also very useful. Fly blisters, however, must not be used on any account, as the cantharides and turpentine which enter into their composition act strongly on the kidneys; nor should aloes balls be given for the same reason. When the active symptoms have been relieved, easily digested food of a simple character should be offered, such as linseed jelly and milk, or milk and water, and well-boiled barley and bran.

Hypertrophy, or enlargement, of one or both kidneys is sometimes met with on making *post-mortem* examinations, no indications of such having been observed during life. Some cases are recorded where the kidney has weighed from 50 to 112 pounds. When one kidney is abnormally enlarged, the other is generally atrophied, or much smaller than it should be; enlarged kidneys are, as a rule, very soft and flabby.

Polyuria, Diuresis, Diabetes Insipidus, or Profuse Staling.—In the horse this complaint—considered a dietetic disease—is characterized by the passing of enormous quantities of urine, and in one case as much as 38 gallons is recorded to have been passed in five hours. Horses in towns seem to suffer more from this malady than those in the country. The cause in many cases is due to bad food, such as mow-burnt hay, or kiln-dried oats, ship-

damaged or mouldy corn and beans, or to drinking an excessive quantity of impure water; it also follows debilitating diseases, such as influenza, strangles, etc. *Symptoms.*—The animal attacked loses flesh very fast, is very dull and languid, has the belly tucked up, a staring coat, and shows great weakness, manifested by the plaiting of the hind-legs. The patient also has an unabating thirst, and can scarcely be satisfied with water, while the appetite is very irregular. There is, further, an almost continuous flow of urine; in some cases the penis hangs pendulous, while clear urine continually dribbles from it, and if not speedily relieved the patient dies from exhaustion or inanition. *Treatment.*—The animal must first be taken off work. Inquire into the quality of the food, and if it be found faulty, change it at once to a good sound nutritious diet; next, allay the thirst—and for this purpose nothing has such a radical effect as 1-drachm doses of iodine, given every night in a ball; while for a tonic, 25 to 30 drops of strong hydrochloric acid should be given every morning, mixed with the drinking water.

Suppression of Urine.—This takes place when, from some cause or other, the urine is not secreted by the kidneys. It may arise from fever, an inflammatory attack, or functional derangement of the kidneys. *Symptoms.*—The animal is very dull, and makes frequent attempts to stale, but only succeeds in passing very small quantities of urine; on examination (by the rectum) the bladder is found to be empty. Before any treatment is adopted, it is necessary that the real cause be ascertained. If it arises from the effects of inflammation of the kidneys, strong diuretics are dangerous, whereas, if from the sluggish action of those organs, then diuretics may be given.

Retention of Urine.—This is very different from *suppression*, as in this case the urine is properly secreted by the kidneys, and passed along the ureters to the bladder in the natural way, but is not ejected. There are many causes for this condition, of which the following are the chief: Extreme muscular contraction, or spasm of the neck of the bladder (strangury), due, perhaps, to the application of a fly blister to any part of the body; paralysis of the muscles of the bladder; enlargement of the glands near the neck of the bladder; the presence of calculi in the bladder, or in the urethral passage; or the coagulation of the solid portions of pus discharged

from an abscess in the kidneys or bladder. Again, another great cause of retention is the habit which a horse acquires of refusing to stale except in a box, or stall, with straw under it. On coming in from a long journey, the urine has been retained such a length of time that, even when anxious to urinate, only small jets of the fluid are passed. In these cases the neck of the bladder becomes inverted, and the body of that organ overlaps and presses on the passage or urethra, thus preventing a free flow. *Symptoms.*—The animal is very uneasy, groans, has colicky pains, draws the penis, and makes frequent attempts to stale. The hind-legs are stretched backwards and held wide apart, while the tail is rolled about in various directions, and perspiration bedews the body. *Treatment.*—The hand and arm should be well oiled or soaped, and carefully introduced into the rectum, and the dung removed, after which the bladder will be felt like a distended bag underneath the hand. By the aid of gentle pressure with the hand, and warm water injections thrown into the rectum, the animal may then urinate; if not, the urine must be removed by the catheter.

Cystitis, or **Inflammation of the Bladder,** is seldom seen either in the horse, cow, or sheep, except after cases of difficult parturition. The most prominent symptoms are that the animal continually passes small quantities of urine, and has colicky pains. *Treatment—Externally.*—Hot applications should be applied to the loins according to the rules laid down for inflammation of the kidneys. *Internally.*—Sedative medicine should be given: for the horse and cow, from 2 to 4 ounces of laudanum, with 15 to 25 ounces of linseed oil; for the sheep, 2 to 4 drachms of laudanum in from 5 to 10 ounces of linseed oil. Warm water injections should also be given by the rectum.

Abscess in the Bladder is the formation of pus, or matter, in the bladder, and sometimes occurs in the cow from injury done to that organ in difficult cases of calving, more particularly if there has been a breech presentation. *Symptoms.*—The symptoms are continual paining and straining, with dribbling of urine. On examination (by the rectum) a swelling is felt, and on further examination (by the vagina) it is found to be in the bladder. The neck of the bladder is usually very relaxed, so much so that the fingers can be readily passed through it, and the abscess can be felt with the

tips of the fingers of the left hand, aided by the right hand in the rectum. The operation for the liberation of the pus is rather tedious: first, the catheter is passed into the bladder, to act as a director for the insertion of a canula; the catheter is next withdrawn, and a trocar introduced into the canula, which is pressed into the abscess; then the trocar is withdrawn, and the matter escapes by the canula; while pressing the abscess with the right hand in the rectum greatly helps the removal of the matter. The operation being completed, the bladder is washed out with tepid water and a small quantity of tincture of iron. Should any constitutional disturbance arise, it must be combated with fever medicine, and, if necessary, hot water blankets or porridge poultices can be applied to the loins (see Inflammation of the Kidney).

Calculi, or **Stones**, are occasionally found in the bladder, urethra, and kidney; they may form in the kidneys and pass down the ureters into the bladder, or they may accumulate in the bladder itself. One or more stones may be found sticking in the neck of the bladder, or in the urethra, causing retention of the urine, and, if not removed, may probably cause rupture of the bladder. The horse and dog are most often affected with these troublesome concretions. *Symptoms.*—These are somewhat like those of retention of the urine. In some cases the animal may be urinating fully and freely, when all at once the flow is arrested, the horse making frequent attempts to stale, groaning and straining, but only managing to pass a few drops. On examination by the rectum, calculi are at times found crowding around, especially in the neck of the bladder; these, by manipulation with the fingers in the rectum, may be displaced, and the animal relieved. Sometimes a calculus gets into the urethra, where it sticks a few inches below the anus; it can be seen and felt at the point of stoppage, the parts above bulging out, while the urine trickles down the thighs. With a little labour the stone may be worked back into the bladder, the action being assisted by gently passing up the catheter, or it may get so far down near the end of the penis that it can be cut down upon and removed. When calculi in the bladder of the horse give rise to pain and inconvenience, they have to be extracted by an operation called lithotomy. In this operation the animal is cast and tied much in the same way as for castration; the passage is cut into below

the anus, and with suitable instruments the stones are removed, either whole or crushed.

Bulls, Rams, and Wethers, when too largely fed on mangold-wurzels, or turnips grown with superphosphate alone, suffer from accumulations of white crystals—the *ammonic magnesium phosphates*—in the bladder and urethral passage. When a bull is fed to excess on mangolds, it invariably proves unfruitful. This is probably due to crystals, which have lodged in the barrel of the penis, being transmitted along with the semen at the time of service, interfering with fruitful conception. In the ram the passage and *vermiform process*, or worm, on the end of the penis is often entirely blocked with these concretions. When thus affected the animal suffers great pain; it strains and presses very much, the hind parts swell up, and the urine, if not liberated, gets into the body, producing uræmic poisoning, and causing death. *Treatment.*—Cutting in at the base of the worm, or removing it entirely, sometimes gives relief; the latter has been done on many occasions, both in the ram and wether, and it in no way affected the former as a stock-getter. When wethers folded on turnips suffer from this complaint, the best preventive is to place over the field branches of the common fir-tree; the sheep will eat the bark off them readily, and by its action the formation of the crystals is avoided.

Incontinence of Urine.—An inability to retain the urine, which may arise from a common cold (catarrh) attacking and causing irritation of the lining membrane of the urinary organs, or from loss of nervous energy in the bladder alone. Both conditions give rise to a continuous dribble of urine, which must be treated according to the cause.

Paralysis of the Bladder is a want of nerve power in the organ. It may be the result of local or general paralysis, milk fever, injury, or overdistension with urine. In the last case the muscles of the body of the bladder become so stretched that they lose their tone, and are unable to contract and assist in expelling the fluid in the usual way. Although the urine is constantly dribbling away, on examination (by the rectum) the bladder is found to be full of water, which must be drawn off with the catheter. If the complaint is simply due to loss of nerve power, without other complications, a tonic, such as 1 drachm each of sulphate of iron and nux vomica,

should be given daily, along with a liberal and nutritious diet; should it, however, occur as the result of some other disease or injury, special treatment is required.

DISEASES, ETC., OF THE MALE GENERATIVE ORGANS.

Orchitis, or Inflammation of the Testicle.—This occurs in the male species of all our domestic animals, but, generally speaking, the ram is the greatest sufferer. It arises from some injury, such as a kick, and as a result the parts undergo inflammation, which is manifested by heat, pain, and swelling, the pain being very great if the animal is made to move; there is also a great amount of fever and constitutional disturbance present. *Treatment.*—An aperient (such as linseed or castor oil) and warm water enemas are required, followed up by doses of nitrate of potash in the drinking water. The parts should be well fomented for an hour, then smeared over with the extract of belladonna, and covered up with cotton-wool. The testicles ought then to be supported by a broad bandage secured round the loins, behind the legs, and over the quarters, and for this purpose a long netted window curtain answers best. These cases, if at all severe, may end in dropsy of the scrotum, termed hydrocele, which has to be relieved by tapping.

Injuries to the Penis.—These are due to many things, the chief of which are the following: A kick, a blow with a whip or stick, and a mishap while jumping a stone wall, stake, or wire fence. At the seat of injury there is much pain and swelling, accompanied by feverish symptoms generally. Sometimes the swelling is so great that the organ hangs loose and pendulous, and cannot be retracted again into the sheath; this is called paraphymosis. When this condition is met with, scarification must be resorted to; this is done by a lancet, the point of a clean penknife, or a darning-needle being stabbed into the most prominent parts of the swelling. Follow up with fomentations for forty or sixty minutes, and apply the suspensory bandage as recommended for inflammation of the testicles. As a laxative give a draught of from 15 to 20 ounces of linseed oil, or from 2 to 3 ounces of Epsom salts, and ½ ounce of cream of tartar in a mash night and morning. In recent cases this treatment soon

sets matters right, but in chronic cases a tonic treatment has to be adopted. Swelling of the penis may also arise from protracted strangles, influenza, and other debilitating diseases.

Excoriation of the Penis (vesicular and abrasive sores on the penis).—This is mostly seen in stallions as a result of excessive service in hot weather, particularly when the grooms are not sufficiently careful to wash the parts well with cold water immediately after service. It may also arise both in the stallion and bull from having communication with a female suffering from chronic inflammation and ulceration of the vagina or from whites (leucorrhœa). *Treatment.*—Take the animal off service, and wash the parts, and also the sheath, night and morning with a mixture of 1 part phenyle and 80 parts water. Afterwards dress with the following lotion: Sulphate of zinc, 2 drachms; fluid sanitas, 5 ounces; cold water, 1 pint.

Sebaceous Accumulations in the Urethral Sinus (Plate XVII., *r*) are collections of solid, clay-like matter in the cavity round the opening of the urethra at the point of the penis of the horse, which occasionally cause lameness in one or both hind-legs. In four recorded cases the animals could not pull their hind extremities forward, but stood with them stretched backwards, as if in the act of staling. On washing the penis and removing the hard matter, they pulled themselves together as if nothing had been amiss. In three other cases the horses had a peculiar lameness in one hind-leg, without any apparent cause; but on examining and removing the collected material from the penis the lameness disappeared. *Prevention.*—Wash the parts with soap and warm water once every five or six months, and remove any accumulation that may be present.

Castration (the operation of removing the testes).—One of the oldest operations on record. The main object of its performance is to render animals more docile and easy to manage, and although it has a marked quietening effect in the horse, yet the stallion, when trained, worked, and fed in the same way as a gelding, generally does its work with equal ease and docility. Of all the animals subjected to the operation, the best results are seen in the bull—as witness the calm, quiet appearance of the eye and head, and the easy comportment of a big three- or four-years-old bullock

compared with the rugged forehead and fierce eye of a bull of the same age. Although castration can be performed with ease and success, the operation, at the best, is not one of a pleasant nature; but when the safety of mankind is at stake, the end justifies the means. In the horse the time selected for castration is when the animal is rising one year old—in the spring months, April and May, just before it is turned out to grass—but the operation can be performed at any age and at any time.

The Horse.—There has always been a good deal of difference of opinion as to the best method of performing this operation. They are mainly differences of detail. It is desirable both for preventing unnecessary suffering to the horse and for the greater ease of operating that the animal should be given an anæsthetic. Having secured the animal in a recumbent position and administered chloroform, or such other anæsthetic as may be used, the scrotum is either washed with an antiseptic or painted with tincture of iodine. Next press the testicle tight into the scrotum, holding it firmly there by the left hand; then by one quick sweep of a sharp knife make a bold opening, and expose the gland, which is seized and pulled gently up; next the cord has to be severed in such a manner as to prevent hæmorrhage from the large spermatic artery. Many instruments have been devised for this purpose and most of them serve the purpose admirably. Each operator usually favours the one that he is accustomed to use.

An old method was to place a metal clam across the cord and, with a hot iron, sever the cord by burning. This method, though crude, and necessitating the provision of fire for heating the irons, was effectual and antiseptic.

Some veterinary surgeons advocate the castration of the colt in the standing position, and in many cases the operation is thus quickly and successfully performed. There does not appear, however, to be much to recommend this method, which has sometimes been marred by accidents, and in any case rules out the possibility of administering an anæsthetic, which, as has been stated, is most desirable for performing what must in any case be a most painful operation.

The Rig is a horse in which one or both testicles have failed to come down into the scrotum. In ordinary castration, should one

testicle only be down at the time of operating, it is usual to take it away so that the other may develop, and subsequently descend. With a few exceptions this has taken place, removal following in the ordinary way. Should this not happen, the best time to operate on a rig is when it is rising three years old. Several members of the veterinary profession have made a speciality of this operation, which they perform very successfully. Generally the testicle that is retained in the abdominal cavity is of a morbid character.

The Bull.—As a rule, the young calf is castrated when about five or six weeks old. At this or at a later age the operation may be performed in a manner somewhat similar to that for the horse. It has not been the usual practice to give an anæsthetic to these, or indeed any farm animals other than the horse.

The Pig.—An attendant usually holds it firmly by the hind-legs with the back towards the operator; the testicle is pressed up behind close to the tail root, and cut down upon with a sharp knife; the testicle is then pulled up, and the cord quickly twisted and scraped through with a knife.

The Lamb.—The ends of the scrotum are usually cut off, the testicles pressed out and removed by one of the methods used for the horse.

Another method which is becoming increasingly popular for lambs is the bloodless castration whereby the cord is crushed within the scrotum, and as a result the testicle atrophies. With some practice this is quite an effectual method and may be used also for young bulls.

After-Treatment for Castration.—If the colt has been indoors before the operation, keep it in a box till the parts are healed. If out at grass, bring it in, and keep indoors until the day after the operation; after which, if the weather be fine, let it out daily for a few hours. Some make a practice of allowing the colt to stay out immediately after the operation, with no ill-results. As a result of castration, swelling to a greater or lesser extent occurs; this drops down into the sheath, and, if left alone for five or six days, usually disappears. Should the sheath be very big and pendulous, stabbing with a small lancet, a darning-needle, or the point of a *clean* penknife, allows the escape of the collected serum. *Precautions.*—Before operating it is of the utmost importance to ascertain

that there is no cold, influenza, strangles, or the like, amongst the animals on the farm, or even on the neighbouring farms. Furthermore, the operator must see that his hands and person are thoroughly clean and aseptic, as it is highly dangerous to operate after removing cleansings, making post-mortems, and the like. The owner should also take every care that the box is thoroughly cleaned and disinfected, and the bedding should be of clean straw. Often when blood-poisoning follows the operation the operator is blamed, when the real cause is the dirt and filth in the box in which the animal has been placed. *Complications.*—There are many matters of a serious nature that may arise after castration, particularly in the horse, even when the operation has been performed with skill and dexterity, and without any fault on the part of the operator, such as hæmorrhage (bleeding), protrusion of the omentum (net) or bowels, septicæmia, peritonitis, tetanus, abscesses, scirrhous cord, etc.

Bleeding may take place immediately after the operation, but by walking the animal about and dashing a few pails of cold water under the tail matters will probably be set right. When the hæmorrhage comes on a few hours after, the opening must be plugged with tow well saturated with tincture of iron and water. This plug should be removed in twelve or twenty-four hours, and the opening re-dressed, if necessary. Bleeding more often happens in the young bull than in the horse, and in some cases it is necessary to cast the animal again, get hold of the cord, and tie a ligature round it.

Protrusion of the Omentum, or Net.—This, like bleeding, may occur at the time or a few hours after the operation; but the protruding part can be cut off with a knife or the scissors close up to the body, without any bad effects following.

Escape of the Bowels through the incision is, however, very dangerous, and generally due to the animal having had scrotal hernia, or rupture. Should the bowels escape immediately the animal gets on to its feet; they must at once be secured in a large bed-sheet, which is then tied up round the loins, brought under the tail and over the quarter; the horse should be then re-cast, and the protruding bowel returned, and the opening secured by a wooden clam.

Septicæmia, or **Blood-Poisoning**, may result from the animal not being in a fit condition for the operation, also from the use

of dirty instruments, or from the operator having unclean hands, or from dirty and filthy surroundings.

Abscesses.—These may form in the scrotum after castration, and give rise to a great amount of trouble. Hot fomentations must be used, and the parts opened when ready—that is, when the swelling is soft and doughy to the touch. This complication is more frequently seen in bulls than in horses.

Scirrhous Cord.—This is a thickening of the end of the cord, which sometimes follows after castration; it is generally of the nature of a hard swelling, in which small abscesses may gather, burst, and become very troublesome. As to its origin, it is commonly due to infection with the *Discomyces* organism, a form of bothryomycosis. The best and most radical treatment is to cast the animal and dissect the diseased portion out, though some cases recover under the administration of 2 drachms of iodide of potassium given daily for two to three weeks.

Peritonitis, or inflammation of the covering of the bowels, and tetanus may also supervene.

DISEASES, ETC., OF THE FEMALE GENERATIVE ORGANS.

Ovarian Diseases.—The ovaries of the mare and cow may become enlarged, diseased, or affected with dropsy; happily, however, such cases are uncommon in these animals. When present they are extremely difficult to diagnose, but the ovaries may be felt with the hand in the rectum, and abnormalities distinguished by an expert.

Ovariotomy, commonly called spaying, is an operation frequently performed on heifers and she-pigs in many districts, particularly in the Midland counties. It is analogous to the castration of the male, and the benefits claimed to be derived from it are the convenient housing together of both sexes, and the tendency of spayed animals to speedily lay on fat, and, if milking, to give a larger and longer supply. The operation is also the best preventive for mares and cows that are continually coming into season.

Leucorrhœa, or **Whites**, is characterized by the discharge from the vagina of a glairy, milky-looking, often bad-smelling, fluid,

which is sometimes so extensive as to run down the thighs and tail. This complaint generally affects old animals, the cow particularly. It may arise from too long retention of the after-birth or cleansing, or from chronic inflammation of the vagina or womb. The parts are in a very relaxed condition, and the hand can be readily passed up the vagina to the neck of the womb, which is generally found to be thickened, and open enough to allow the passage of two or three fingers. After an attack of this kind an animal seldoms breeds again. *Treatment*.—Wash the womb out every second or third day with 2 ounces of tincture of iron or tincture of iodine mixed in 1 gallon of cold water previously boiled; also give iron tonics with nux vomica, or preparations of arsenic.

Genital Erythema.—A catarrhal irritation of the lining membrane of the vagina. In extreme hot weather both the mare and cow suffer from this affection, but it is more common in the cow, at times running like an enzootic. The *symptoms* are a great itching of the parts, a discharge of glairy fluid, slight swelling of the external parts, and constant whisking of the tail. When a female is affected in this way, the male should have no connection, as it might contract the same complaint, for it is inoculative; and yet in many cases the male can convey the complaint from one female to another without himself showing any signs of derangement. In the cow the malady is such that it can be conveyed by an affected animal rubbing its hind-quarters or by whisking the tail against the external parts of another animal, so that the tail of an affected animal should also be looked after, washed, and disinfected. The *treatment* is the same as noted for metritis.

Coital Exanthema.—A vesicular, pustular, and suppurative affection of the generative organs, commonly known as the ' disorder.' It is highly contagious and inoculative, and affects both male and female, and varies very much in degree of severity. Some cases are very slight, and resemble very much at the onset genital erythema, causing little or no constitutional disturbance, while in others it assumes a more aggravated form. When it makes its appearance in the male, numerous vesicles or small blebs are noticed on the penis, which finally burst and form little ulcers. In the female the external parts of the genital organs are swollen and inflamed. The passage internally is studded with small ulcers

and spots of matter, causing an irritative discharge from the parts. There is a great deal of itching, the tail is constantly on the move, and also great inclination to urinate. In the mare it at times assumes an epidemic form, showing all the symptoms of a slight attack of pink-eye. The animal drops off its food, is very feverish, stiff, and dull, with swollen eyelids and limbs. These symptoms are noticed in from seven to ten days after service. Should the mare have a sucking foal following her, it as a rule contracts the complaint shortly after the symptoms appear in the mother. For further particulars and treatment see Septic Metritis.

Obstructions in the Vagina.—False membranes and cords are often formed in the vagina by a doubling of the lining membrane. They may run from side to side, or from roof to floor, and before parturition can take place they have to be cut with a knife, or broken down with the fingers. They usually cause some pain, the animal getting up and lying down as if in colic; but, as a rule, no constitutional disturbance results. Long-necked tumours are not infrequently found in the passage; these have to be either twisted or cut off. Abscesses are also sometimes formed in the walls of the vagina, generally in the lower part, between the floor of the passage and the roof of the bladder, but they are also found in the sides or in the roof. They may result from bruises caused during parturition, especially in breech presentations, or from injuries done by mischievous boys pushing sticks up the passage. The most prominent symptom is continual straining. An examination must be made and the abscess opened, as described under Abscess in the Bladder; but this should only be done by the expert practitioner.

Protrusion of the Vagina.—The vagina is frequently found protruding or everted to the extent of 8 to 10 inches. This is most often seen in cattle that have been on board ship, and it is sometimes very troublesome in summer weather when they are out at grass, for if it happens once, it has a tendency to recur about every three weeks. If the vagina remains out too long it becomes swollen and congested, and before it can be returned it has to be pricked in several places with a lancet, and the congested fluid pressed out; it should then be anointed with carbolic oil, returned, and kept in its place by stitches of leather or tape, put through the skin close to

the rump bone with a packing-needle, and carried across to the other side; but on no account must the stitches be put through the lips of the vulva. Aged cows that have had a number of calves are very subject to this protrusion, it being usually noticed five or six weeks before calving, but only while the animal is lying down, as it recedes on rising. The best preventive of this is to heighten the floor behind the animals with firm green turf, which, by raising the hind-quarters, mechanically prevents the protrusion. As a rule it is rarely seen after calving.

GESTATION, ABORTION, ETC.

Average Periods of Gestation:

MARE: Eleven months, but varies from 11 to 12 months.

COW: Nine months, also varies.

SHEEP, GOAT } Five months, or from 20 to 22 weeks.

PIG: Four months, or from 15 to 17 weeks.

BITCH: Nine weeks, or from 58 to 65 days.

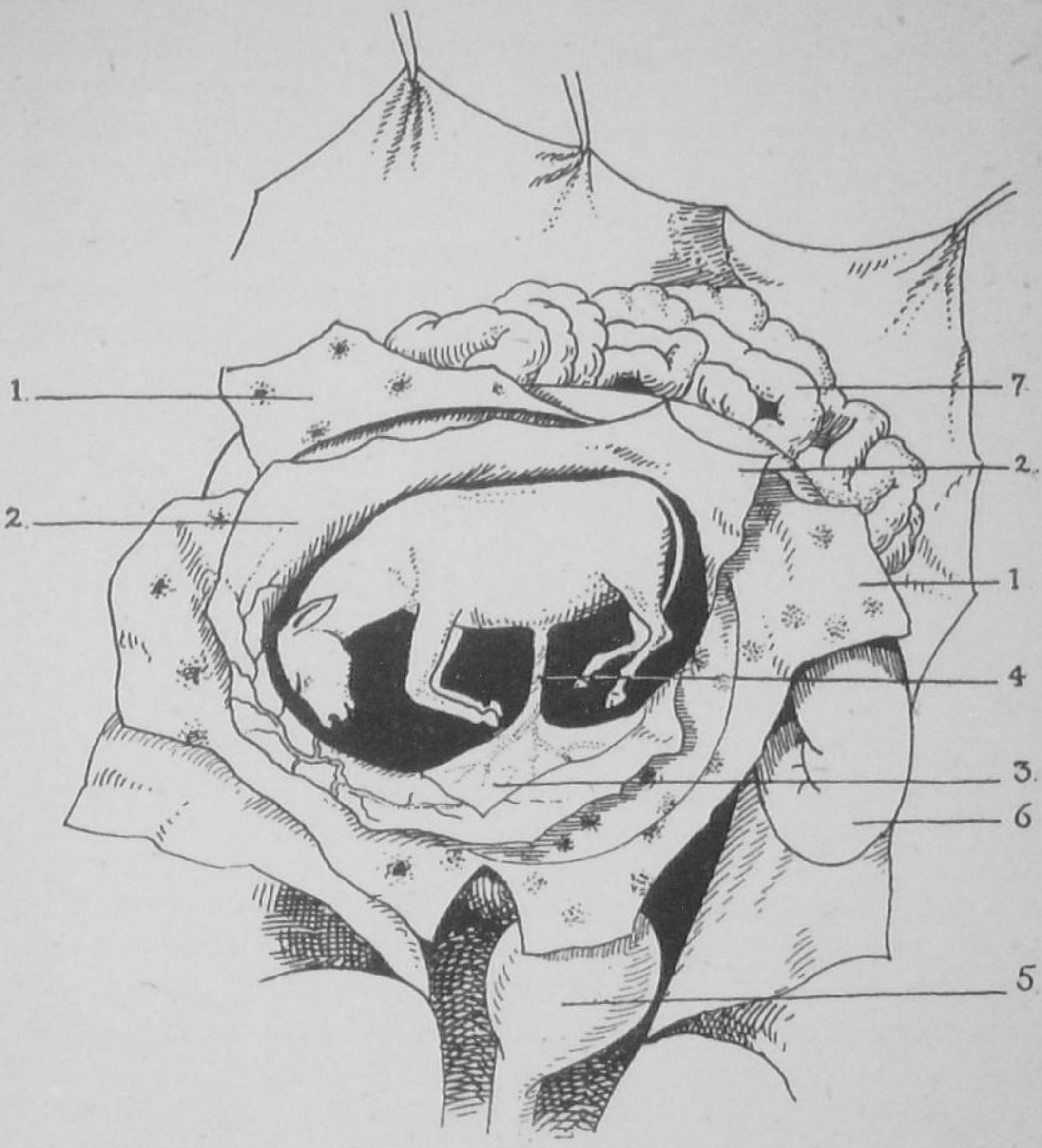
CAT: Eight weeks, or from 50 to 60 days.

Impregnation of the ovum of the female takes place when it meets the *spermatozoa* contained in the *spermatic fluid* of the male; to do so it usually travels from the ovary to the womb by the action of the fringes of the Fallopian tubes, which grasp the ovum, and convey it along one of these tubes into the womb. Impregnation may also take place in the Fallopian tube itself. When impregnation occurs, a series of changes begin in the womb. The segmentation of the ovum and development of the fœtus and its membranes are of too complex a nature to be dealt with in this chapter, but the placenta, or cleansing, is deserving of a short description.

The **Fœtal Membranes** (**Placenta**, or **Cleansing**, Plate XL., Nos. 1 to 3) are three in number—namely, the amnion, allantois, and chorion.

The Amnion, or **Slime Bag**, is thin and transparent, and in it floats the fœtus, surrounded by slime. The allantois, or water bag, is situated outside of the amnion, and between it and the chorion. The chorion is situated next the womb, and is the vascular coat. A

PLATE XL



CALF IN UTERO.

1, 1. Chorion, Outer Covering of Placenta, showing Cotyledons by which it is attached to the Womb.

2, 2. Allantois, or Water Bag—the Middle Coat of the Placenta.

3. Amnion, or Slime Bag—the Coat next the Fœtus.

4. The Umbilical Cord or Navel String.

5. The Bladder.

6. Large Intestine.

7. Small Intestine.

marked difference is seen in the attachment of this coat in the mare as compared to those of the cow and sheep. In the latter there are a large number of cotyledons, or rose-buds, consisting of ramifications of fœtal bloodvessels, which are intimately connected with similar structures on the womb. In the mare, however, the attachment is brought about by villi—small sprout-like projections—which are found all over the outside of the placenta, and are received into corresponding depressions in the mucous membrane of the womb.

The fœtus is connected with the placenta by means of the umbilical cord, or navel string (Plate XL., 4), which is made up of—

1. **The Umbilical Vein,** carrying blood charged with oxygen and absorbed nutriment from the placenta to the fœtus.
2. **Two Umbilical Arteries,** conveying venous blood back to the fœtal membranes.
3. **The Urachus,** a tube which connects the allantois with the bladder.

The blood of the mother does not circulate in the body of the fœtus directly, the offspring being nourished by the aid of the villi on the outer coat of the placenta, which absorb nutrient material from the blood of the parent supplied to the womb.

Abortion, Slinking, Slipping, or Casting the Calf.—Of all the diseases that infest the stock of the farm and fold, that of abortion may be looked upon as the most serious. This malady has been known from time immemorial, reference being made to it in Biblical history, for, according to Gen. xxxi. 38, Jacob seems to have known the secret of its prevention; it is, therefore, a great pity he did not leave it behind him for our benefit in these latter days. Abortion, however, is not very common in the mare, and when it does occur it is generally the result of an accident. Sheep are more susceptible to its baneful influence, but nothing to the same extent as cows, among which the condition is very prevalent, and the cause of much loss to owners of dairy herds.

It has been unfortunately common in the past for stock-owners to regard a case of abortion as most probably due to accident. Such cases may occasionally occur, but they are far less common than is generally supposed. The most common cause of abortion is infection with an organism known as the *Brucella abortus.* This

is what is known as epizootic or contagious abortion. Infection, which is usually by the animal eating contaminated material, does not produce noticeable symptoms.

The organisms are eventually found in the uterus, in the milk, and in the intestines of the calf. One common, though not invariable, result of infection is that the consequent catarrh of the uterus causes a separation of the membranes and slipping of the calf. This may take place at any time, but most commonly at the sixth or seventh month.

Seeing that there are few or no signs of infection until the calf is slipped, should that take place, it becomes of great importance to ascertain if possible what animals are infected. This can be done by a blood agglutination test, for which a sample of blood must be sent to a laboratory. In this way one can find out at an early date which animals are infected.

By far the best means of dealing with the complaint, where at all practicable, is by separation of the herd into two groups, and admitting none to the clean herd except those which have passed the agglutination test. In this way the disease can be completely eliminated, and if at the outset only a few animals have proved to be infected the expense and trouble will be amply justified. At the same time thorough disinfection should be carried out where any animal has aborted or is discharging, and the calf and all other infected material destroyed.

A method of vaccination is sometimes practised, but this does not eradicate the disease and should only be done under expert advice.

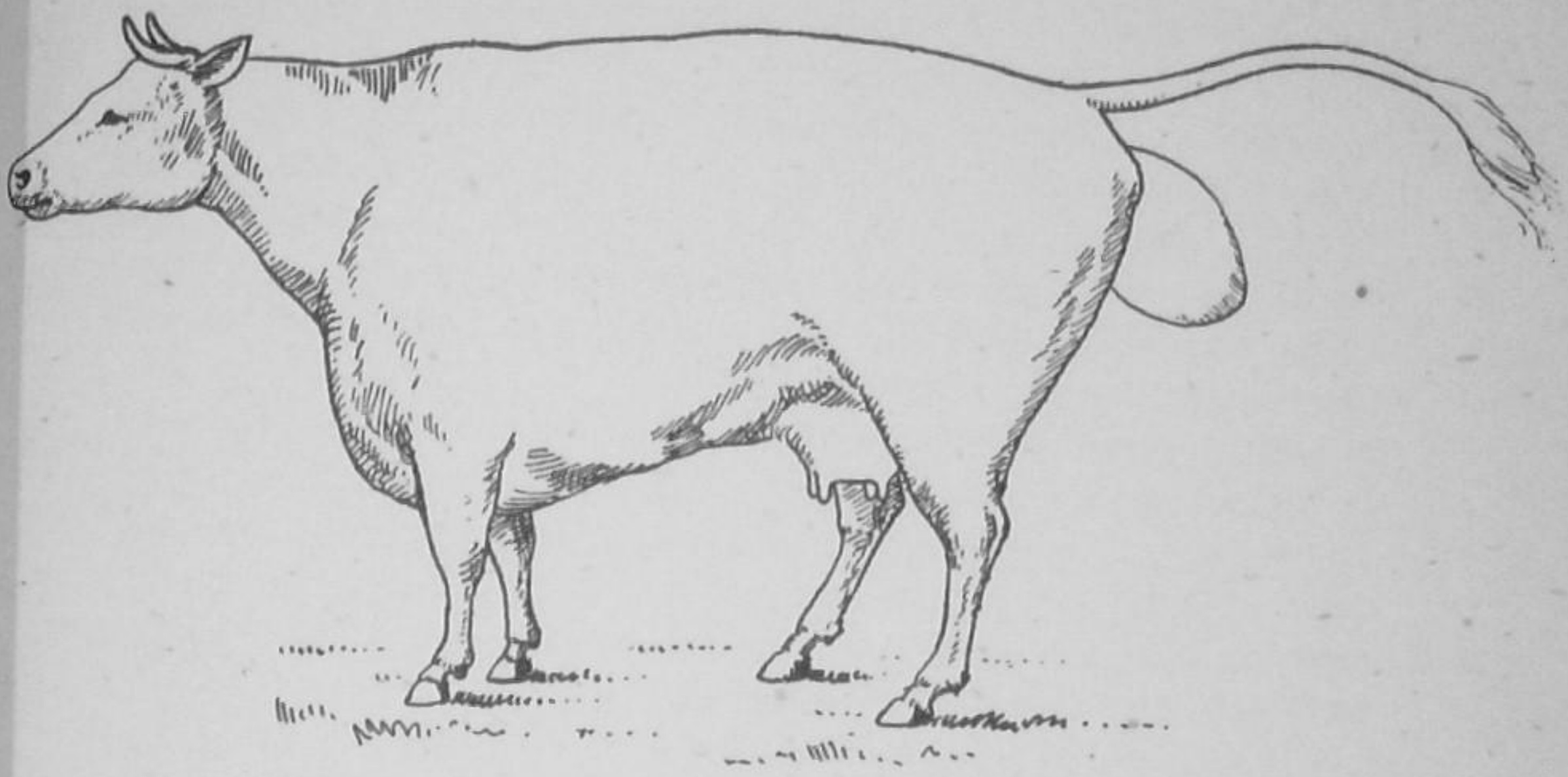
By the Epizootic Abortion Order of 1922 a cow which has aborted may not be exposed for sale in open market for a period of two months, nor may such an animal be sold privately without notice of the fact given to the intended purchaser.

Aborted animals may not similarly be grazed on highways or on common land.

Imperforate Hymen (known as impervious os uteri).—In the virgin heifer in perfect health the vagina is very much corrugated and constricted immediately in front of the neck of the bladder, but beyond its external opening. In this complaint the vaginal passage is entirely obliterated by these corrugations. Strange

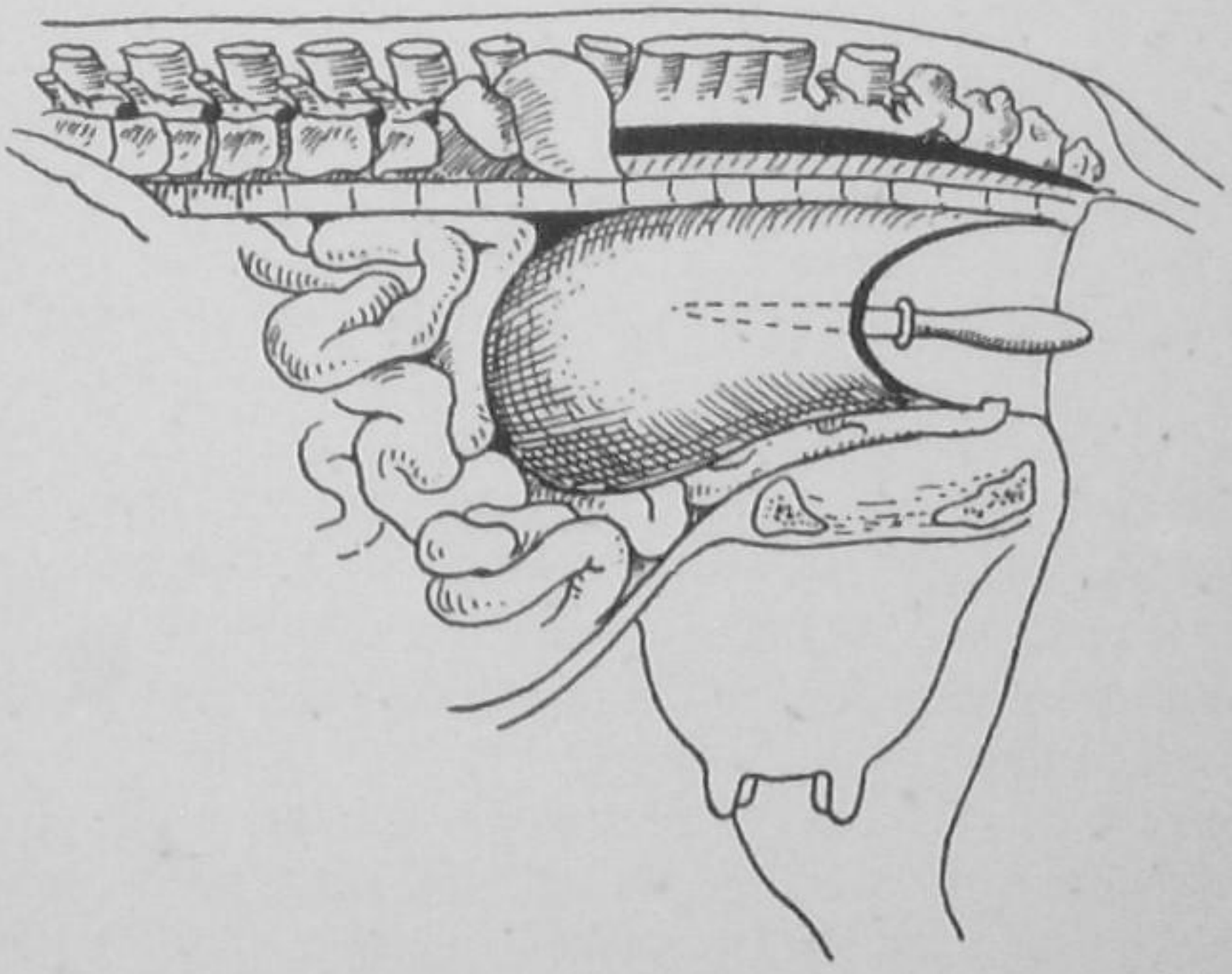
PLATE XLI

A



A. Cow—Commencement of Parturition, showing Water Bag.

B.



B. Imperforate Hymen, showing Trocar in Position.

to say, this lesion is mostly seen in white heifers, very rarely in coloured animals. The animal seldom shows any indications of the complaint until it has been served; then the symptoms are developed in a period varying from twelve hours to six weeks, the principal portion of the cases occurring in from twelve to twenty days, when the patient is noticed to erect its tail, and strain and press as if about to calve. Any fæces which may be in the rectum is forcibly ejected, and in severe cases the rectum is turned out, and bloody mucus is discharged from the vagina.

After learning the history of the case, the operator should oil his hand and introduce it gently into the rectum. Immediately the hand is passed through the anus a tense, more or less distended body is felt beneath the floor of the bowel. By passing the hand further forward this bladdery distension is found to extend into the cavity of the belly. Understanding what is amiss, he should withdraw the hand and pass the forefinger of the left hand into the vaginal passage, when, immediately in front and above the neck of the bladder, the obstruction will be found and a roughening felt, a result of the penetration of the male organ in the act of serving. *Treatment.*—For relief, an operation is necessary. A trocar and canula (the latter being 10 inches long and ⅜ inch in diameter) is passed up along the vagina and guided by the forefinger of the left hand (the point of the trocar being withdrawn into the tube) until the roughening in question is reached, when both are forced through the obstruction into the bladdery tumour (Plate XLI., B). The trocar is then withdrawn, the fluid passing through the canula, while its escape is very much assisted by passing the hand into the rectum. The parts are next washed out with a gallon or two of tepid water containing 1 ounce of tincture of iron. It sometimes occurs in animals that have not been served; the fluid in these cases is like dirty milky whey with a very fœtid smell, while in those who have been served the fluid is of a dirty brown colour, with a 'stink' resembling that of a decayed cleansing.

PARTURITION IN THE MARE, COW, ETC., AND ITS AFTER-EFFECTS.

Plate XLII., Fig. 1, shows the natural presentation seen in the domestic animals, the nose being between the knees and the fore-feet protruding through the vulva. At a cow's first calving all the pelvic ligaments may be well relaxed, yet in some cases there is a constricted band round the vulva, or outer opening, for about 1½ inches, with little or no relaxation of the parts. The owner or attendants usually seize hold of the two fore-feet and pull until the shoulders and the head of the fœtus are jammed tightly in the passage, when, owing to the constricted condition of the vulva, the head recedes and is pressed back against the shoulders, rendering delivery more difficult; but at last, by main strength, the fœtus is forcibly extracted, causing extensive laceration of the vaginal passage and fatal hæmorrhage. In these cases the hand ought to be introduced into the passage, and the head of the fœtus and its surroundings carefully examined; a strong cord should be passed over the head, behind the ears of the calf, and brought along each side of the calf's face, the ends being knotted outside. Thus a loop is formed (Plate XLII., Fig. 1), when, by traction on this cord and manipulation with the other hand, the head is delivered, and by carefully pulling *first one leg and then the other* the fœtus is extracted.

Plate XLII., Fig. 2, represents a case of dropsy of the belly of the calf. The presentation is natural, and though there seems to be plenty of room, all the force which the owner or attendants can use fails to accomplish delivery. By passing the hand over the head, neck, and shoulders of the fœtus, the cause of the obstruction is found in the distended belly of the calf. Some practitioners press a large trocar through the breast or between the ribs of the calf, whichever is the easier of access. Others prefer passing the ordinary parturition hand-knife between two ribs of the fœtus, when it and the water come away readily.

Plate XLIII., Fig. 3, represents the head presented, with the feet back and down. In some cases the head may be pressed back and the feet got up, especially in the mare and ewe, but in the majority of cases it is necessary to dissect the skin back and cut the head off by the first joint of the neck (*atlo-axoid articulation*), tying

PLATE XLII

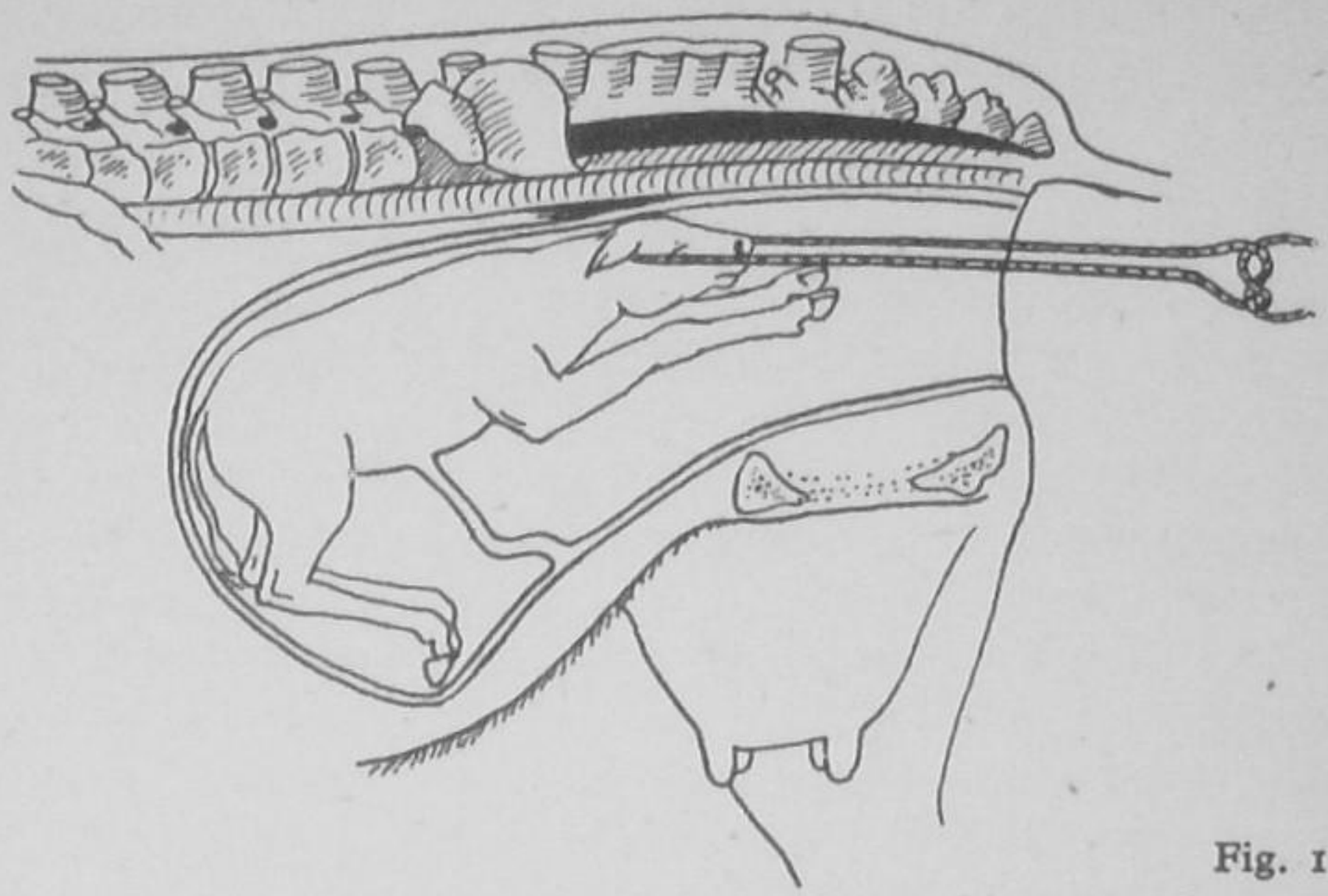


Fig. 1

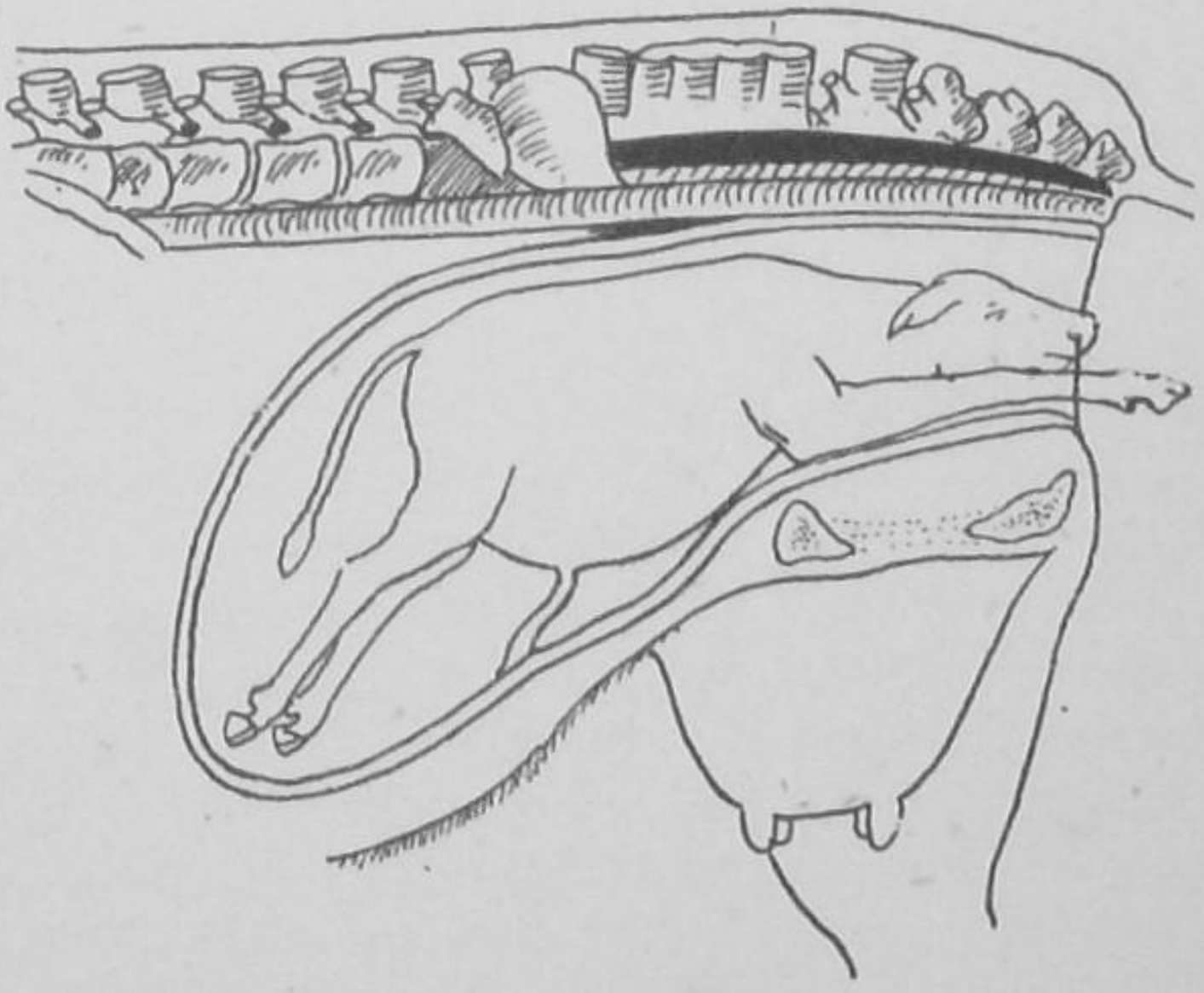


Fig. 2.

PLATE XLIII

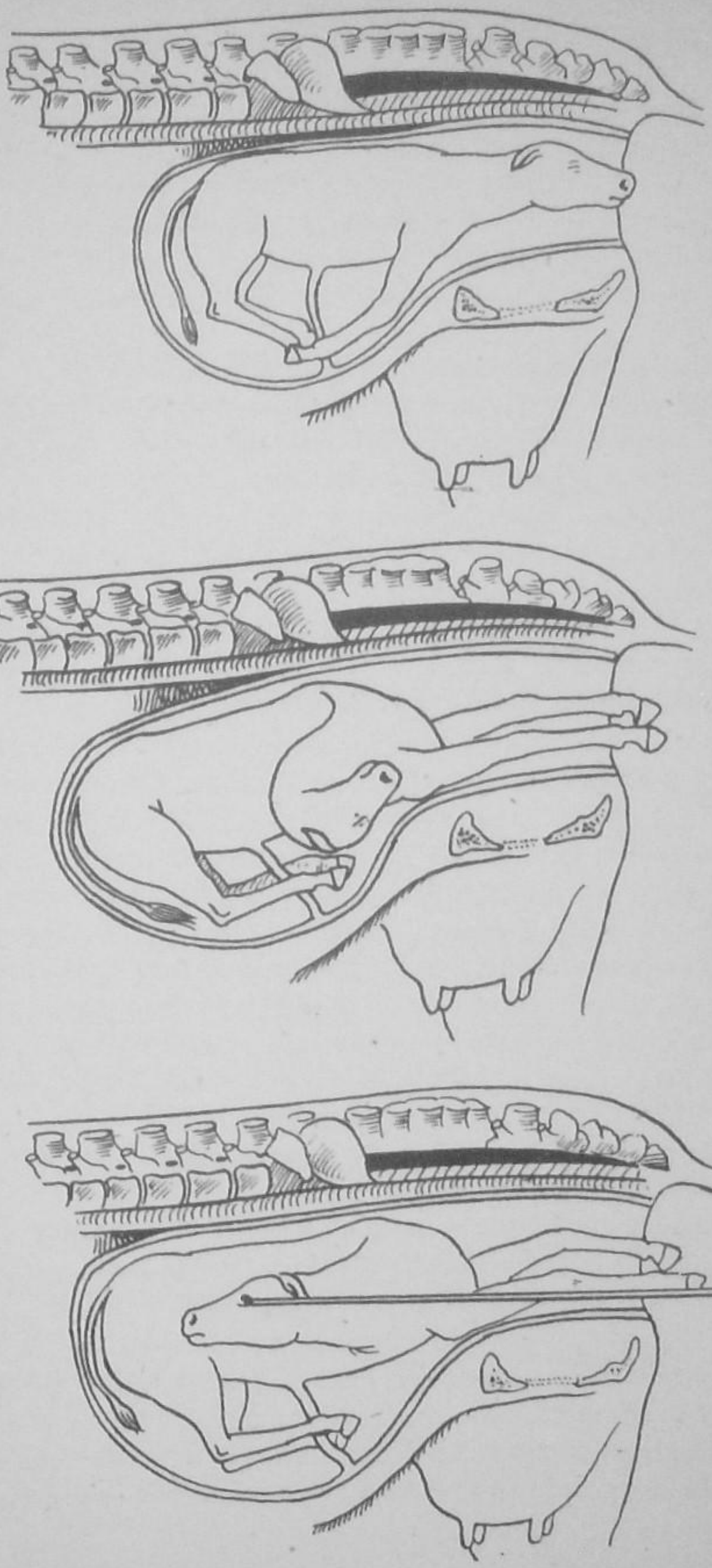


Fig. 3.

Fig. 4.

Fig. 5.

the skin firmly round the end of the bone, and leaving the end of the cord outside; then, by pressing the neck back into the womb and getting up the feet, delivery is accomplished.

Plate XLIII., Fig. 4, shows a very common but troublesome presentation. In this we have both fore-legs protruding, while the head is bent back, with the nose pointing forward behind the elbow.

Plate XLIII., Fig. 5, is a somewhat similar presentation to the last, but the nose is pointed backwards towards the flank.

Plate XLIV., Fig. 6.—The fore-legs in this case are presented as in Figs. 4 and 5, but the head is turned over on to the back of the fœtus. These cases are generally made more difficult by the attendants seizing the fore-legs and pulling them, without examining the position of the head. The feet should be got hold of with cords, and the head secured either by putting a hook into the eye-socket (Plate XLIII., 5) or the angle of the jaw, or by fastening a strong cord round the under jaw; the fœtus must then be pressed back into the womb, and the head manipulated into position. A great deal of trouble is caused by persons tinkering with cases too long before sending for veterinary aid; for, when all the natural waters have been expelled, and the uterine pains exhausted, the uterus will be found to have contracted on the fœtus as tight as a glove on a lady's hand. When a case like this is met with, the best mode of procedure is to make 8 to 10 quarts of linseed jelly, strain it through a cloth, and with Read's patent enema syringe pump it into the womb over the body of the fœtus. The linseed jelly not only distends the womb and floats the fœtus, but acts as a lubricant in place of the natural waters. If the head cannot be got into position after this (which is often the case), the finger-knife or large embryotomy knife must be introduced and carried as far on to the shoulder as possible, and then the skin should be cut and divided down the whole length of the limb to the fetlock. Previous to cutting, a cord ought to be fixed round the pastern-joint, which an assistant should pull steadily outward. The skin is next detached from the shank bone and secured by a small cord; then with the fingers the skin is separated from the rest of the limb, up and well over the shoulder, as far as can be reached. The knife is again introduced, and the muscles between the shoulders and the

body (pectorals) are divided. Strong traction is then applied to the rope round the fetlock or above the knee, when the limb generally comes away. The head may then be got into position, but if this is not yet possible the other fore-limb must be removed in like manner, when the fœtus loses its support and drops into the bottom of the womb, thus allowing the head to be got round by means of hooks and cords, after which delivery follows.

Plate XLIV., Fig. 7.—Both fore-legs are presented, and the head is thrown back on to the hind-quarter—a very common occurrence in the mare—the bones of the face of the fœtus being developed to correspond with the convexity of the quarter. The feet are usually seen outside the vulva, but only the tips of the ears can be reached. In this case the operator should waste no time in trying to turn the head round, but proceed at once to remove the fore-legs and turn the head as already described in the preceding case. This last presentation in the mare is considered to be one of the most formidable to be met with.

Plate XLIV., Fig. 8, represents the fœtus on its back, with the ears and back of the head presented, and the feet back. This is most readily put right by casting the patient, rolling it on to its back, elevating the quarters with trusses of straw, and bringing the head of the fœtus round by hooks or cords, when the feet may be placed in position by the hands or secured with ropes.

Plate XLV., Fig. 9, is a presentation with the hind-legs coming in proper position for delivery, and this may take place without any inconvenience to mother or offspring, but in many cases where the fœtus is large it dies in the birth.

Plate XLV., Fig. 10, is a case where the points of the hocks are presented at the brim of the pelvis. Delivery may be accomplished (as is shown in Plate XLV., Fig. 11, and Plate XLVI., Fig. 12) by repelling the fœtus into the womb, and pressing its quarters against the spine of the mother, steadying it there by the repeller or crutch, while the disengaged hand works the foot by pressing the toes into the hollow of the heel, bringing it round over the brim of the pelvis of the mother and into the passage. Both limbs having been manipulated in this fashion, delivery ensues.

Plate XLVI., Fig. 13, shows the tail and breech presented and pressed tight on to the brim of the pelvis. In the cow, delivery

PLATE XLIV

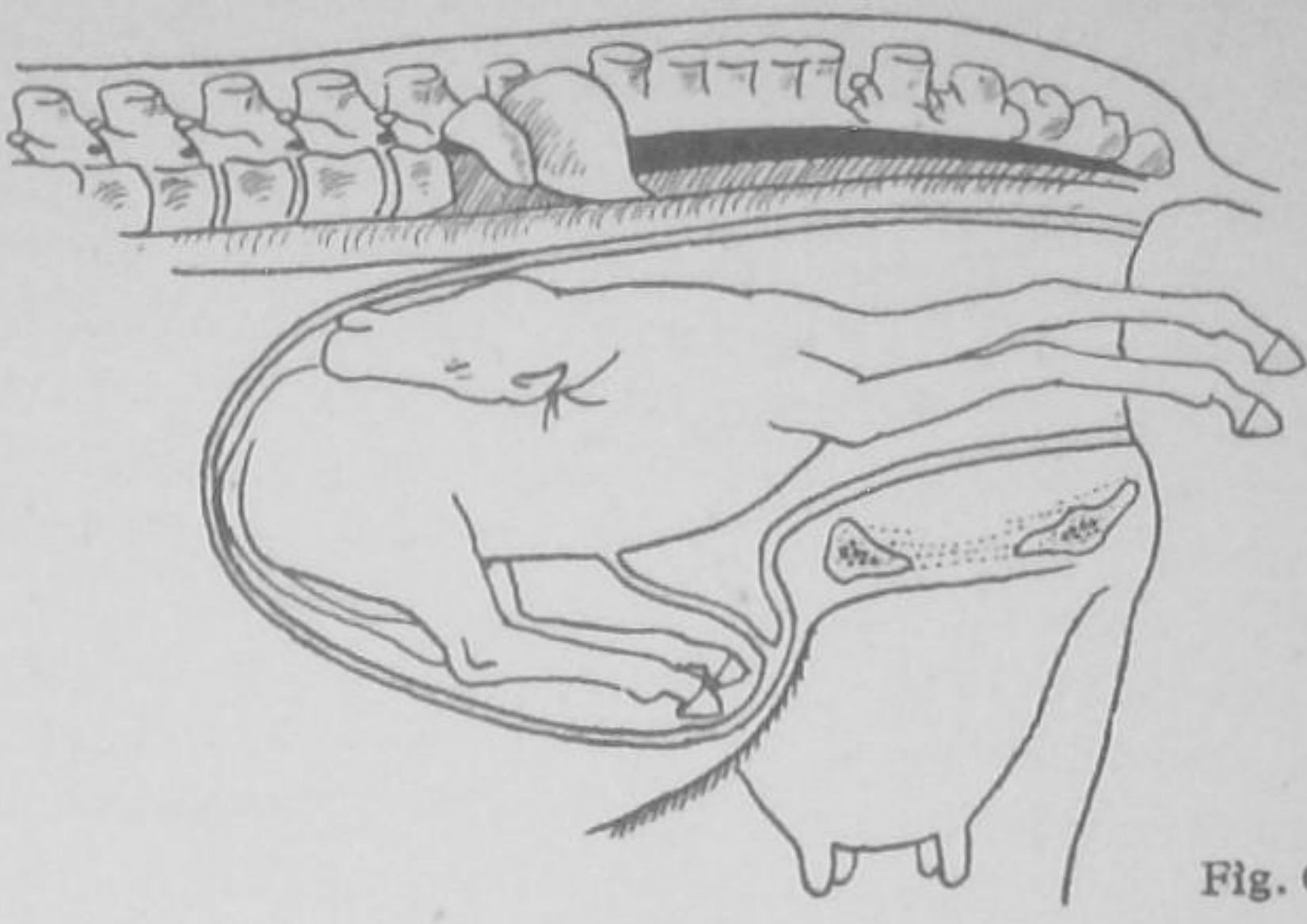


Fig. 6.

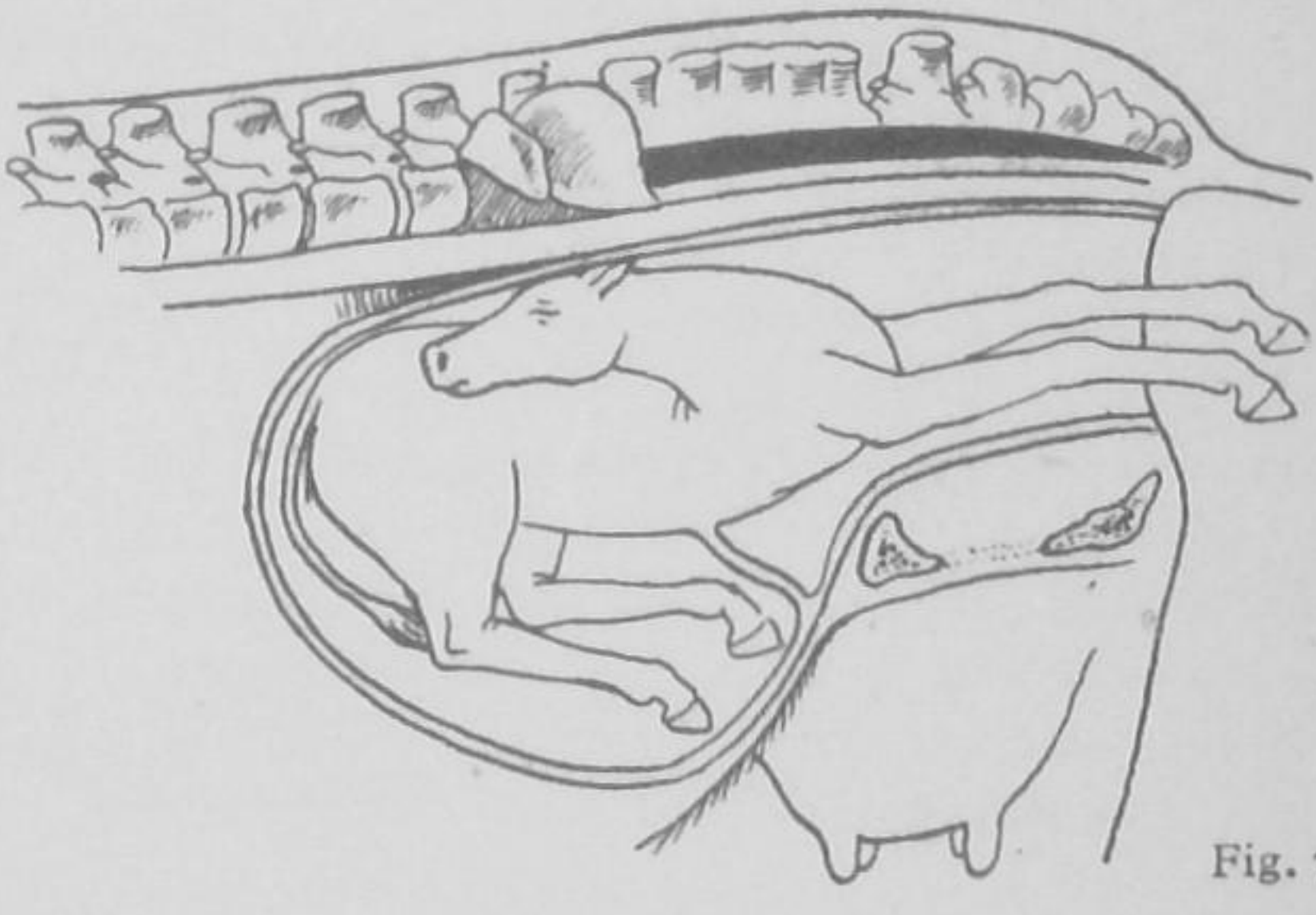


Fig. 7.

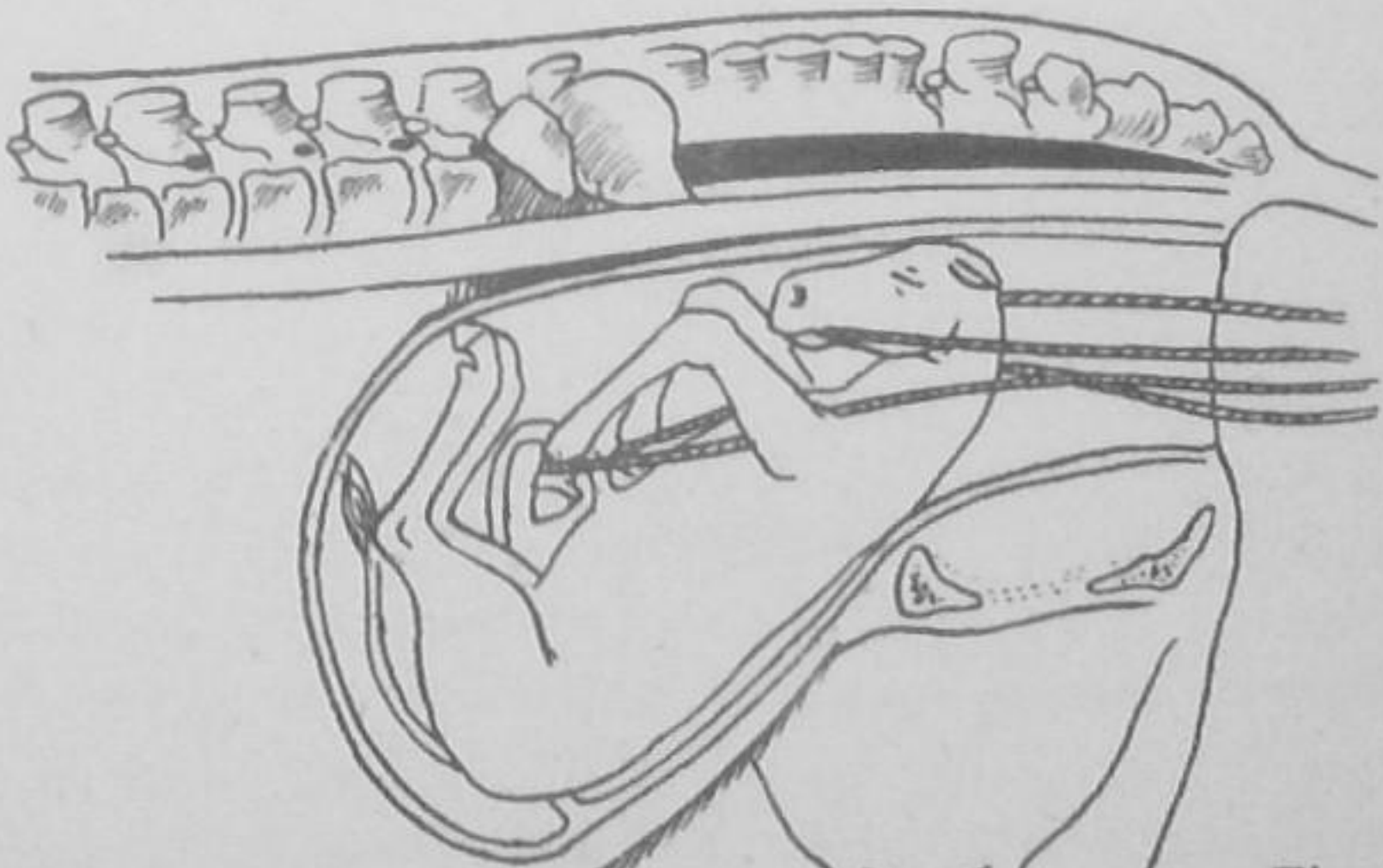


Fig. 8.

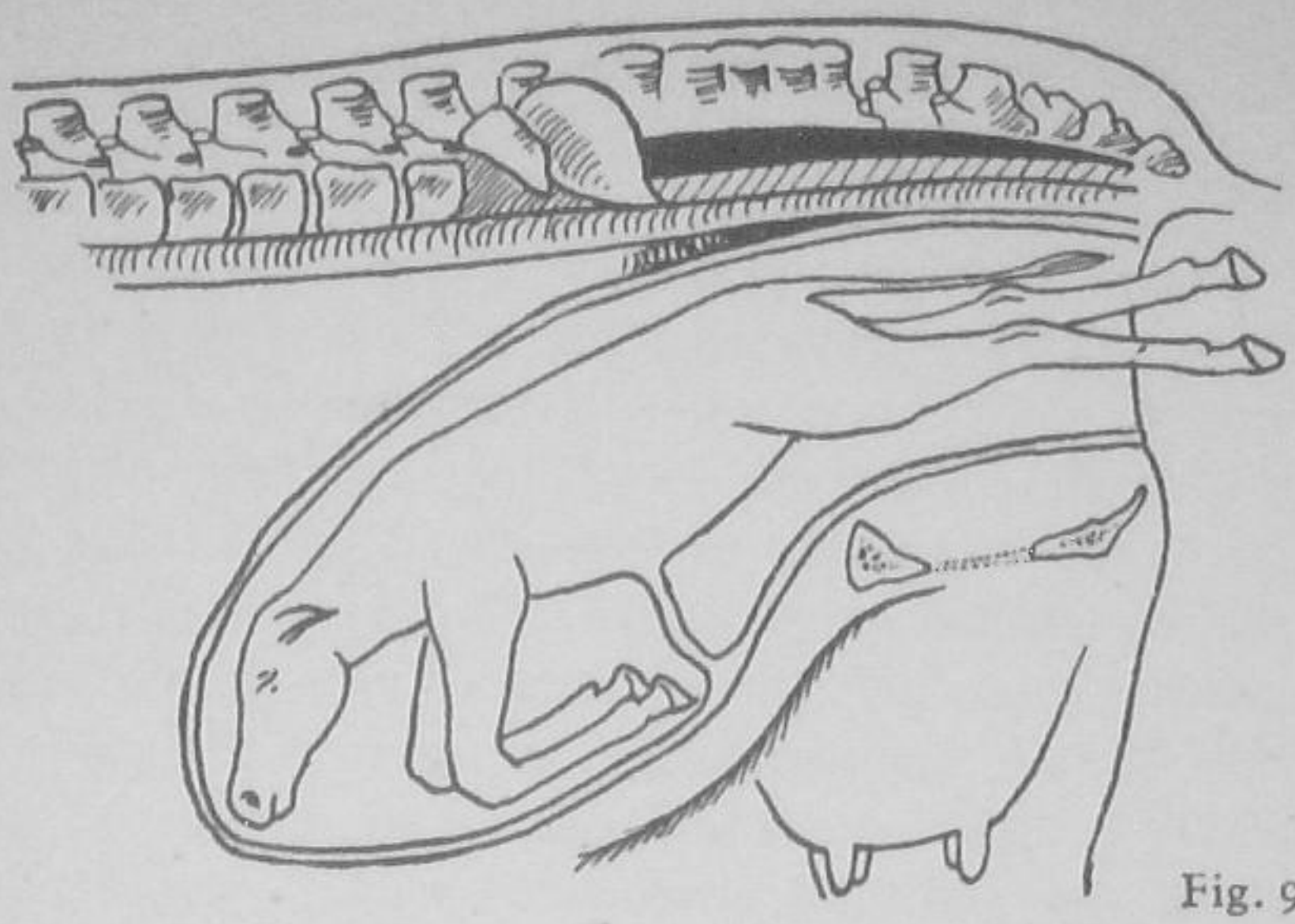


Fig. 9.

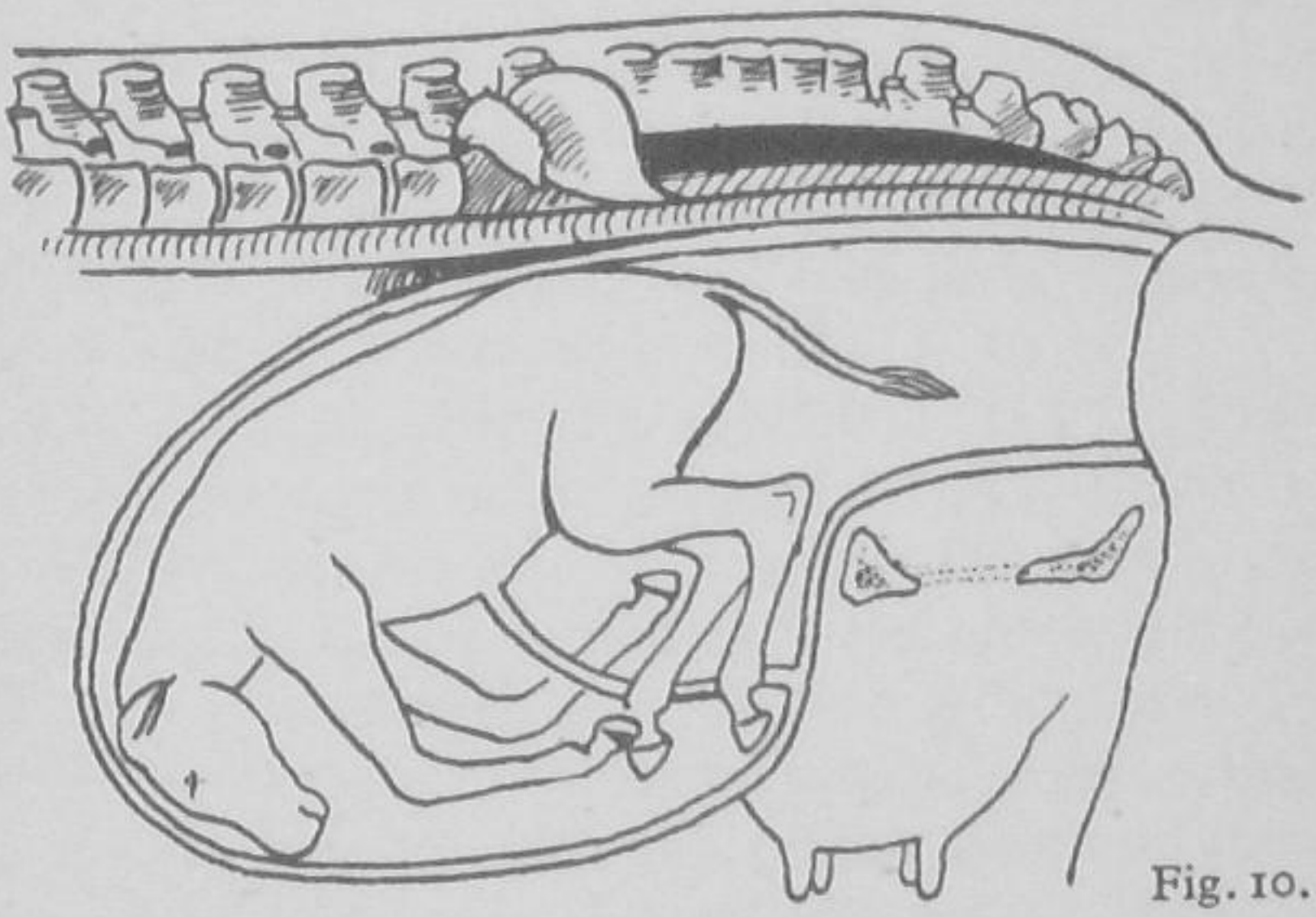


Fig. 10.

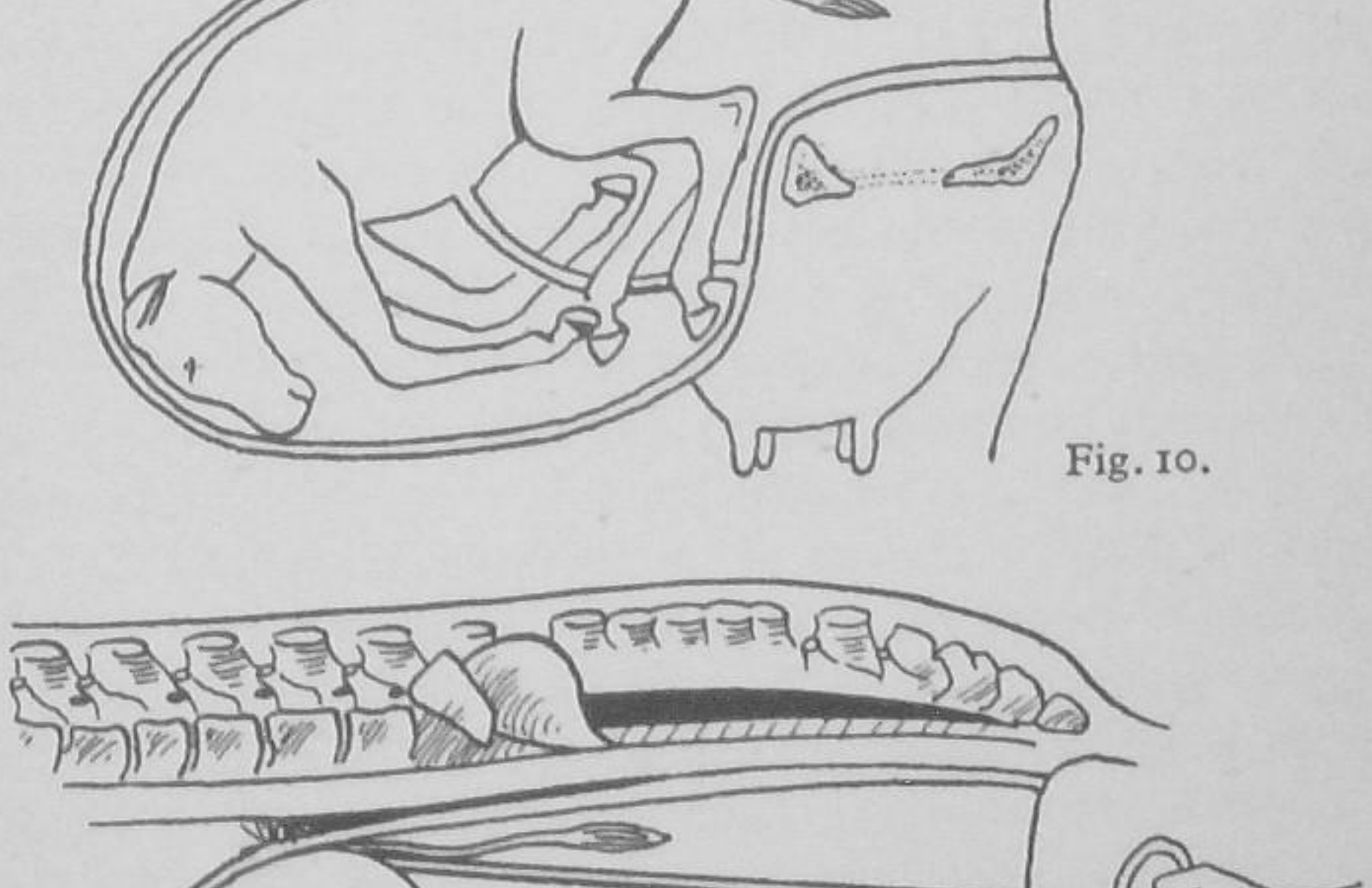


Fig. 11.

may be managed as described in Plate XLV., Fig. 10, but in the mare, if the points of the hocks of the foal cannot be reached—which is generally the case—the only operation, with safety to the mother, is to remove a hind-leg of the fœtus by cutting from the stifle through the hip-joint to the rump bone (*ischium*), liberating the head of the femur—not an easy task—and to this attaching a cord, which is pulled outwards by an assistant, while the operator with a knife cuts through the muscles on the inside of the thigh. The leg is thus extracted thigh foremost. After this the abdomen of the fœtus must be opened, and the contents of the belly and chest pulled away. Then break through the large openings on the floor of the right and left sides of pelvic bones (*obturator foramina*); through these openings pass a stout rope in the form of a loop, and while the operator presses the remaining hind-limb against the walls of the empty abdominal cavity of the foal, this cord must be steadily and forcibly pulled, and delivery will take place. Sometimes, however, both hind-legs have to be removed.

Plate XLVI., Fig. 14, and **Plate XLVII., Fig. 15**, show all four feet presented in the passage, the latter also showing the head turned back on the side or quarter. These cases are of frequent occurrence in the mare, and each can be made either a very easy operation or a most difficult one. It is the latter if someone has pulled the fore-feet outside the passage as far as the knees, while the head is beyond reach and pressed back into the uterus (as in Plate XLIV., Fig. 7). This presentation is rendered more difficult through having the hind-feet in the passage. But, if seen early, or before any interference has taken place (as shown in Plate XLVI., Fig. 14), the case may readily be adjusted by attaching strong cords to the *pasterns* of the *hind-limbs*, and while the cords are pulled alternately by assistants, the operator presses the fore-feet back into the womb and delivery is accomplished. The hind-quarters thus come into the passage, and, by careful and steady traction, delivery is soon over. When the fore-legs are jammed in the passage (Plate XLVII., Fig. 15), then, for the safety of the mother, press the hind-feet back over the brim of the pelvis, remove the fore-legs (as described under Plate XLIII., Figs. 4 and 5, and Plate XLIV., Fig. 6), and bring the hind-feet forward (by the cords attached prior to their being repelled); the operator then presses the breast of the

fœtus back into the uterus, while assistants pull it away, hind-legs first.

Plate XLVII., Fig. 16, represents a case with the back of the head and neck presented, the fore-legs bent back, and the pastern-joints doubled round the thighs, while the hind-pasterns are pressed against the brim of the pelvis of the mother. The fœtus is as rigid as if all the joints were anchylosed. In one such case, after many attempts had been made to straighten the head (resulting in failure), it was at last cut off, and a strong cord was fixed round the neck, close down to the breast, yet the body of the foal could not be stirred; the fore-limb at the shoulder was with great difficulty cut off, and a cord passed round the humerus, and with strong pulling the leg came away. The sternum (breast bone) was then detached on each side with the knife and extracted; the first four ribs were removed by passing the knife between the ribs up to the backbone, and twisting them off; the contents of the chest and belly were torn out, and the remaining fore-leg and the two hind-feet were pressed towards the spine of the eviscerated fœtus, while assistants pulled on the neck cord, and extraction followed. The operation lasted four hours, and the mare afterwards did well.

Plate XLVII., Fig. 17, is a transverse presentation, where the fœtus is lying crosswise in the womb, with the points of the hocks presented towards the *os uteri*, and the quarters pressing to the off-side of the mother, with the hind-feet pressed firmly against the near side; the point of the tail is within reach, but the feet and pastern-joints cannot be touched. The best mode of procedure in this case is to cut through the hamstring (*tendo Achillis*) above the point of each hock, bringing the latter outwards with the hook; put a loop of good strong cord round the joint, press the front of the shank bone against the front of the tibia or leg bone, and pull the hind-legs into the passage, when extraction of the fœtus follows.

Plate XLVIII., Figs. 18 and 19, represent twins. It is necessary in all cases of parturition, before any cords are attached or any pulling attempted, that a careful and minute exploration and examination be made, more particularly so in cases of double or triple birth, in order to make perfectly certain that the legs seen or felt belong to the head and neck of the fœtus presented.

PLATE XLVI

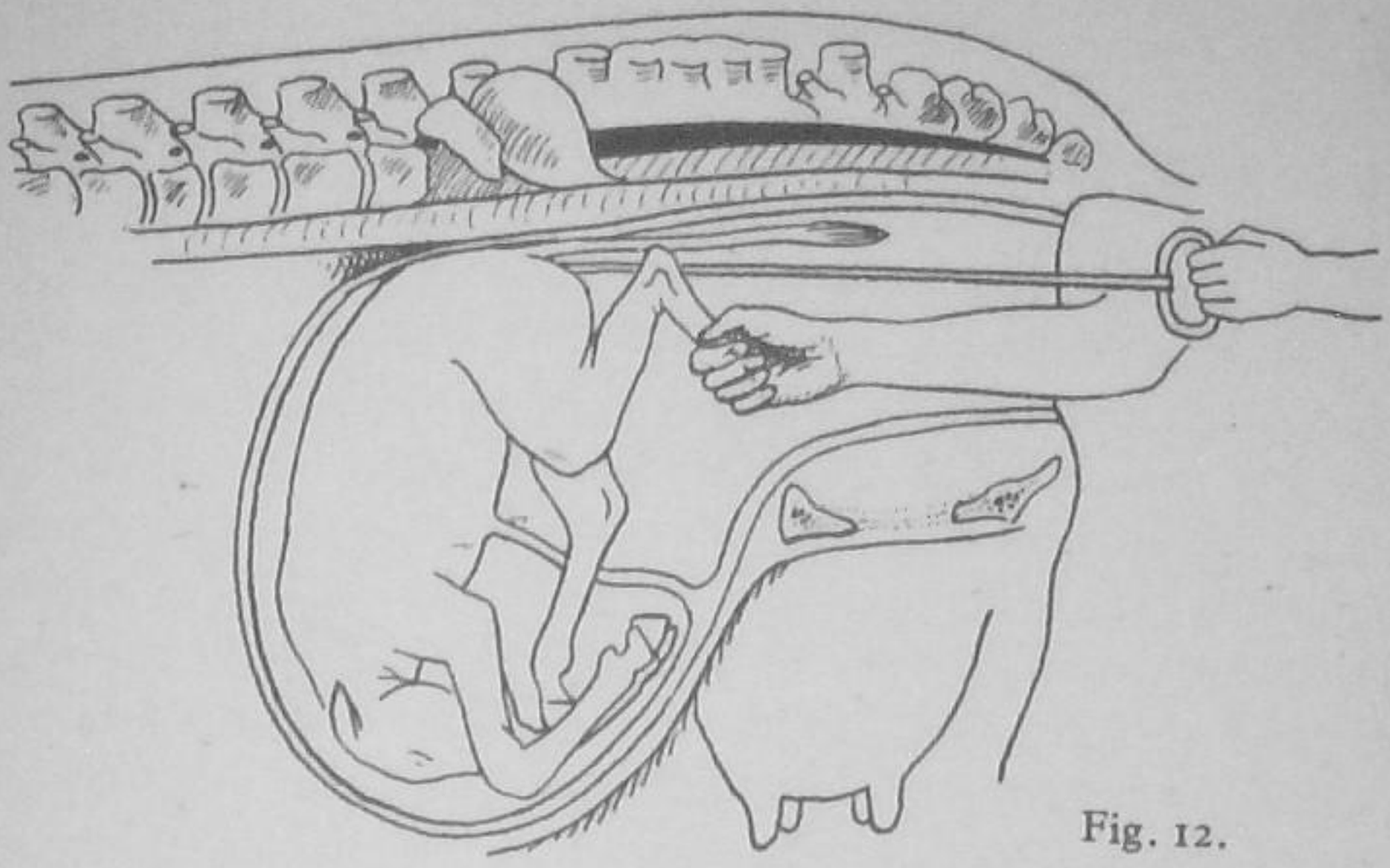


Fig. 12.

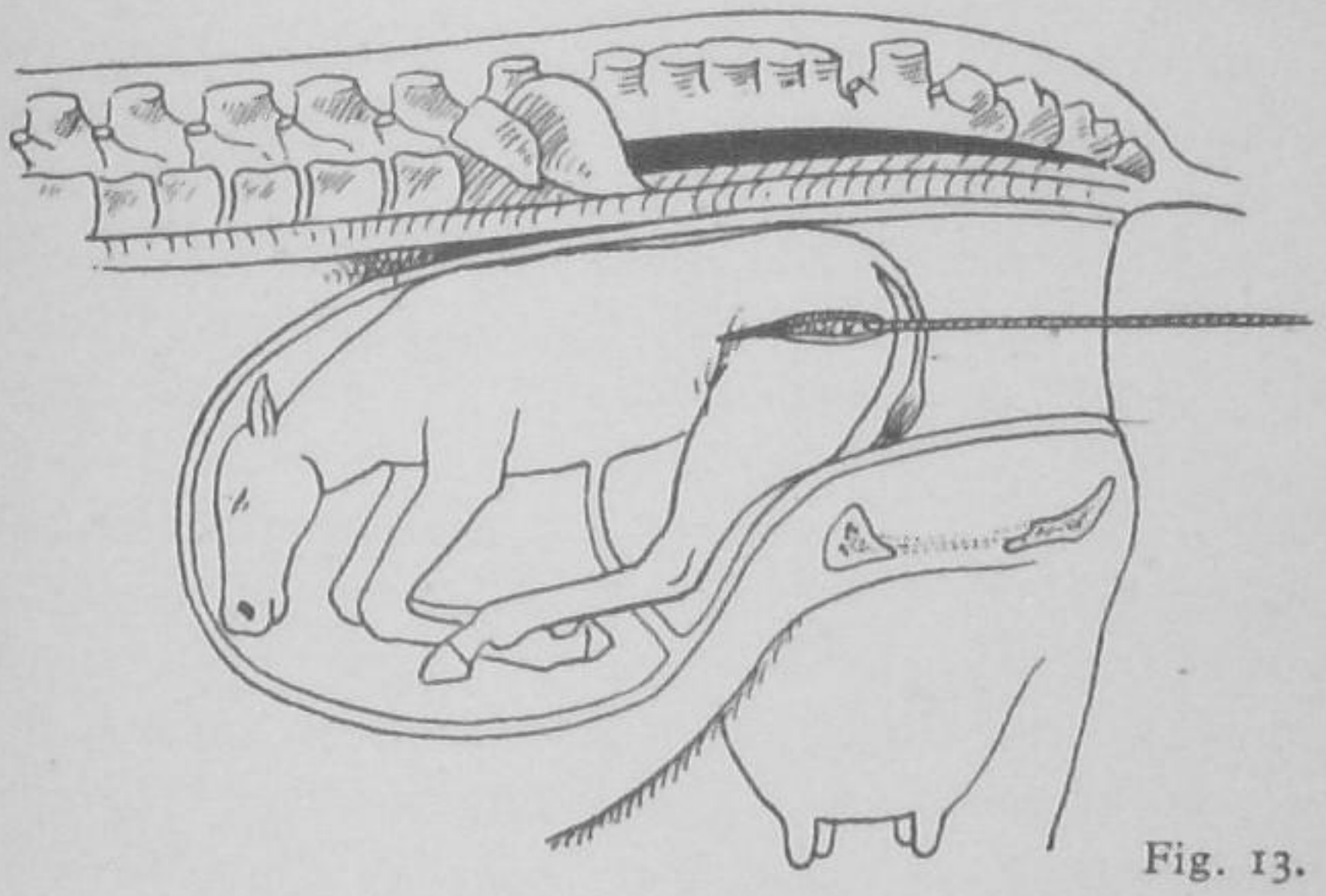


Fig. 13.

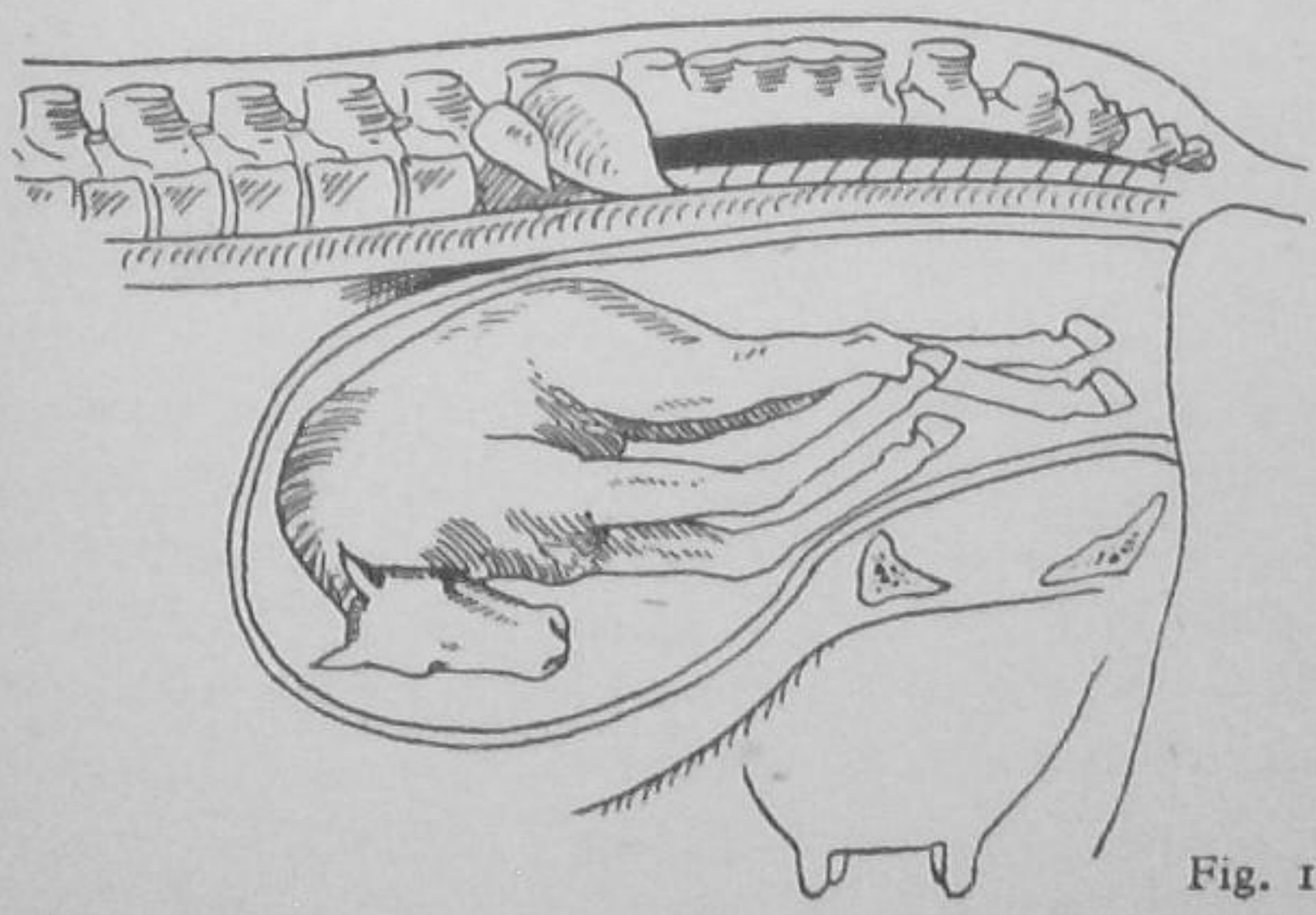


Fig. 14.

PLATE XLVII

I.

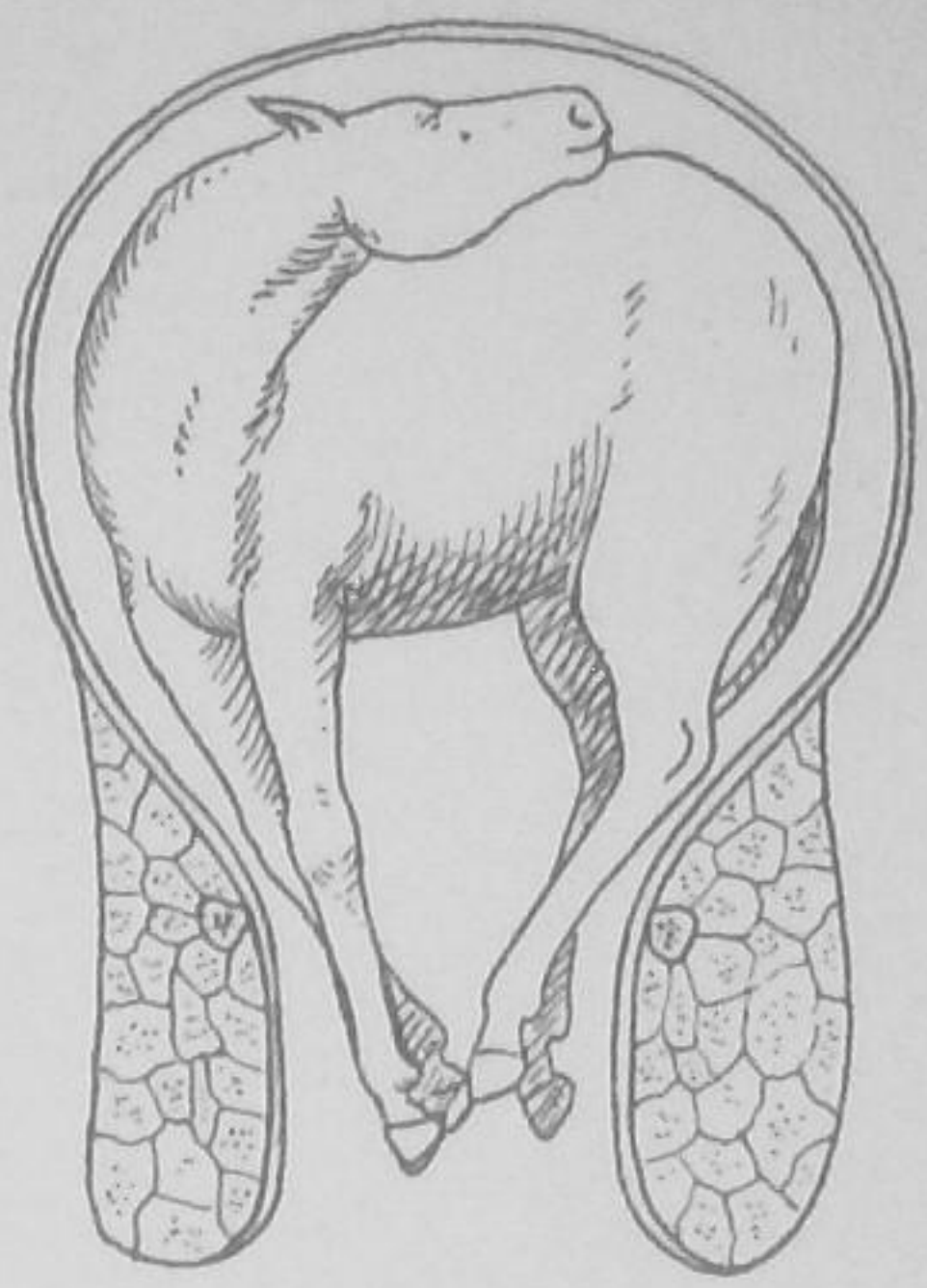


Fig. 15

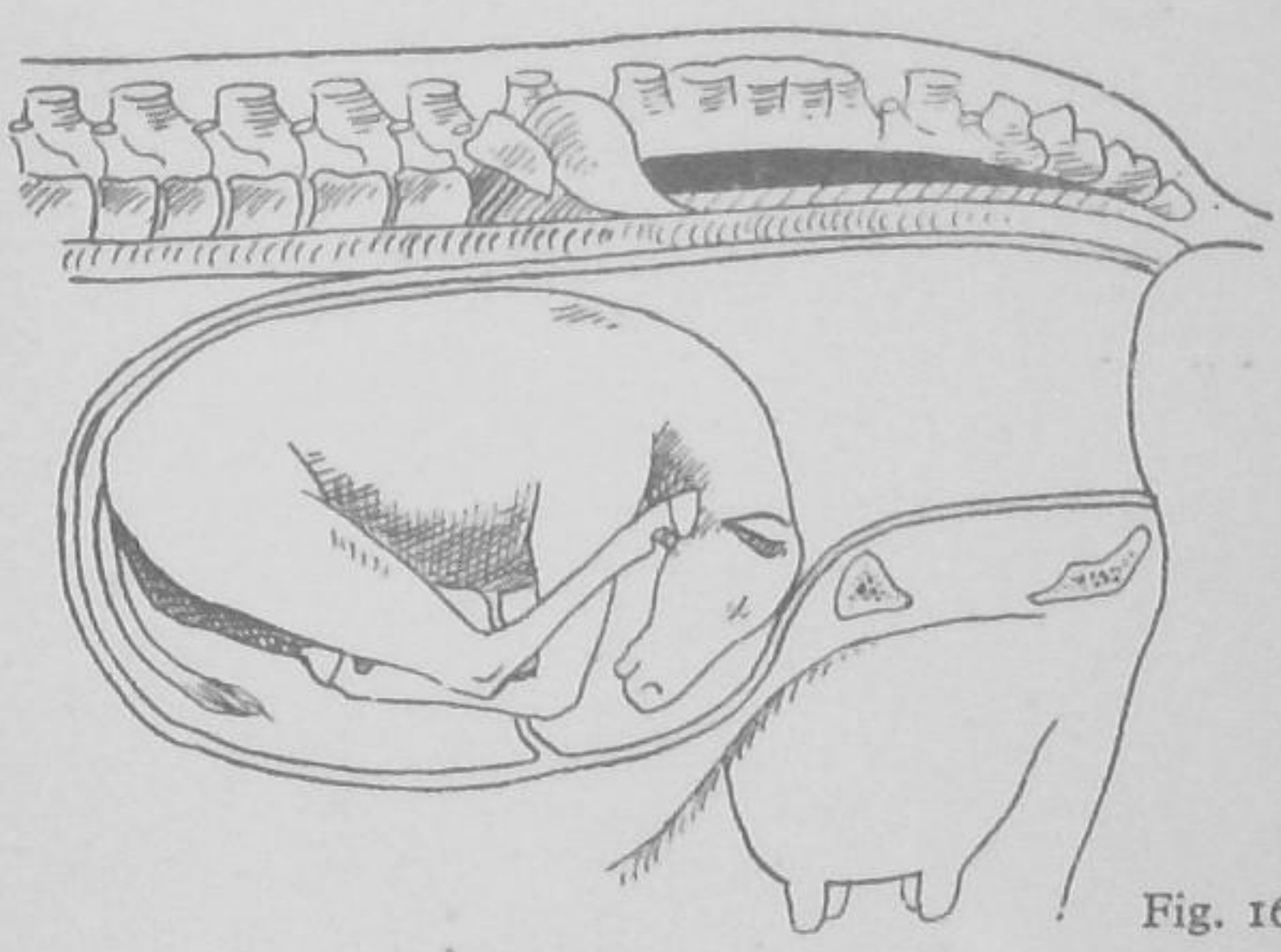


Fig. 16.

II.



Fig. 17.

Plate L., A, represents a case of a monstrosity, in which the hind-legs are doubled over the shoulder and the fore-legs under the chin, while the walls of the belly are reflected over the hind-legs, with the bowels floating loose in the womb of the mother. When the bowels are presented first, after careful examination they must be removed; then with a knife (horse-shoeing knife for preference) cut through the backbone at the most convenient point and extract the portion readiest to hand by passing in the large hook. When the head and feet are first presented, the case is more serious; sometimes one or both of the fore-legs may be extracted, and by putting a cord round the head, with strong pulling, the backbone may be broken through. After removing the front portion, the rest is got away with hooks, while the viscera follows. Sometimes these monstrosities are double-headed, and when the heads are presented they are very difficult to manipulate. When the hind-legs are presented first there is a chance of the fœtus being got away, providing the mother is well developed, big-boned, and has plenty of room. The double-headed calf (Plate L., B) was removed through a breech presentation, the hind-feet coming first. In the case of the enlarged head—*hydrocephalus*, or *water on the brain* (Fig. 29, p. 311)—the skull was cut into with the embryotomy knife and all the water pressed out, when the bones of the head collapsed and the calf was removed by putting a strong cord round its neck.

Plate LI., Fig. 20, represents torsion of the vagina, or twist in the neck of the womb. The twist is more often partial than complete. The animal may show signs of parturition, paddling with the feet, screwing the quarters, and whisking the tail, while the pelvic ligaments and vulva are relaxed, but there are no pronounced labour pains. On introducing the hand into the passage, about three-quarters of the way up, a distinct corded thickening is felt on the lower part of the passage, running from right to left, or *vice versa*, resembling half a screw. After passing the hand over the screw-like parts a pouch is found just in front of the neck of the womb (*os uteri*). On reaching the womb the fœtus may be felt. If lying in the position represented in the figure, the head and feet must be secured with ropes and hooks, brought gently forward, and jammed as far into the passage as possible. In some cases, when this is done,

the animal drops suddenly on to its side, and thus undoes the partial twist, the result being ready delivery. In other cases the patient has to be cast and rolled: if the twist is to the left, the operator must get a firm hold of the fœtus and press it to the right, or *vice versa*, when the animal is directly on its back; then, steady traction being put on the ropes, the uterus may suddenly right itself, and delivery be accomplished.

Constriction of the Os Uteri in the cow is known in Cumberland as 'horny lyer.' On introducing the hand, the neck of the womb is found closed up, is very hard, and will only admit of one finger; when the pains are very strong, a good dose of opium (2 or 3 drachms suspended in hot water) or from 6 to 8 drachms chloral hydrate should be given, while the *os uteri* ought to be smeared with a drachm of extract of belladonna; the patient should be kept perfectly quiet and left alone, when in the course of from twelve to twenty-four hours it may calve all right. Sometimes a cartilaginous ring round the neck of the womb is met with, through which the hand cannot be passed; this ring has a kind of flange, from about $\frac{3}{4}$ to 1 inch in breadth, and about $\frac{1}{8}$ to $\frac{1}{4}$ inch in thickness. This must be cut on the upper portion, and also on each side. Smear well with extract of belladonna, give a good sedative (opium or chloral), and wait patiently. But sometimes relaxation does not take place, when delivery has to be attempted by cording the feet and head, and pulling them into the passage, and by taking plenty of time and care extraction may be accomplished.

The Cæsarean Section is the opening into the side or the belly of the parent, and removing the fœtus. This operation may be performed where the offspring is alive and of more value than the mother. This has been successful on many occasions in saving the lives of foals, calves, lambs, and pigs, but at the sacrifice of the mothers. In the smaller animals, especially the bitch, the operation is frequently successful and without the loss of the mother.

Retention of the Fœtus is sometimes seen in cattle. At the end of the period of gestation the cow shows all the signs of approaching parturition—the udder is distended, the teats pointed, etc.—but there are no direct labour pains, and the animal, though feeding, loses flesh; a few months after it begins to pass various bones by the rectum. In some cases when the cow is a few months gone

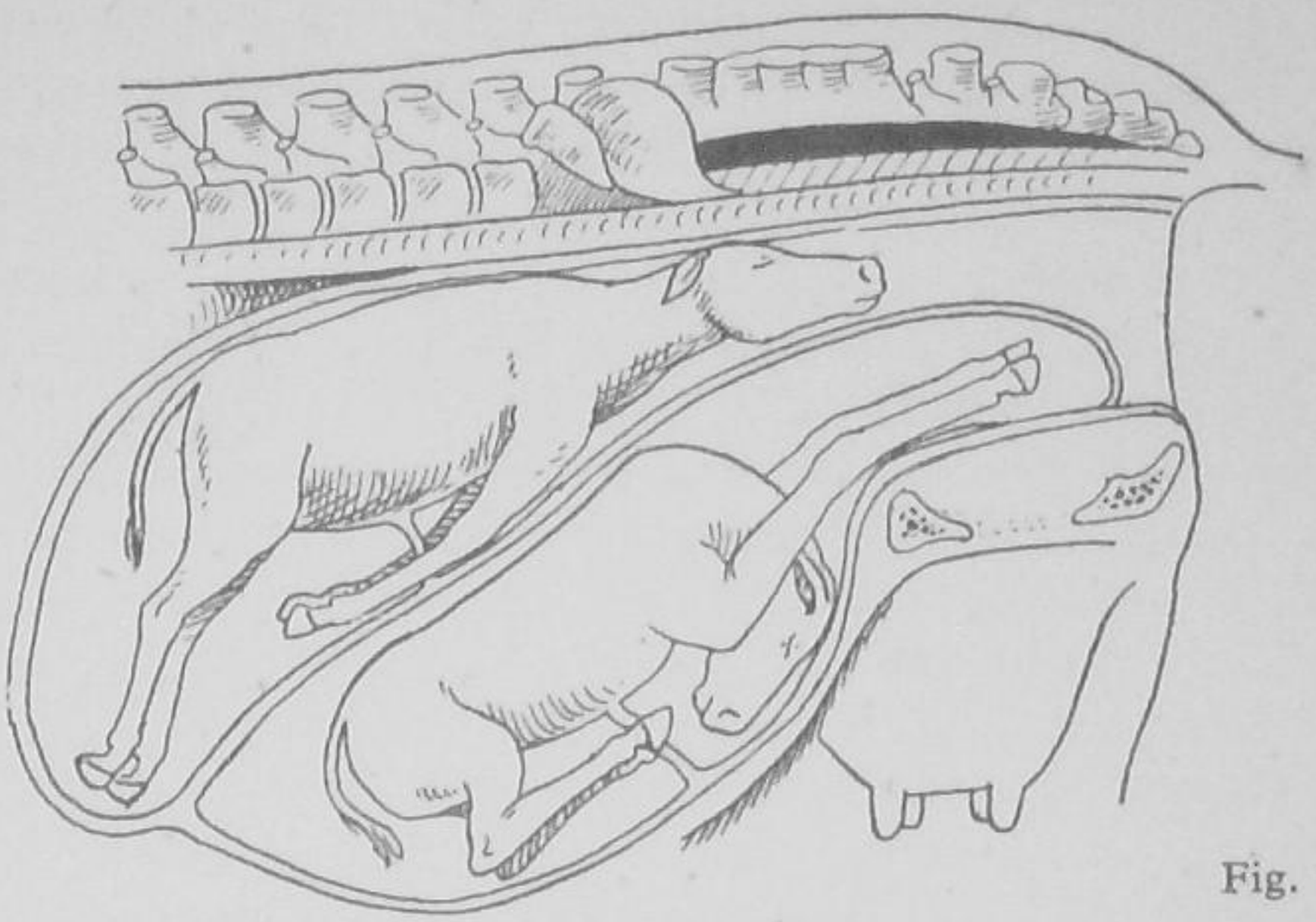


Fig. 18.

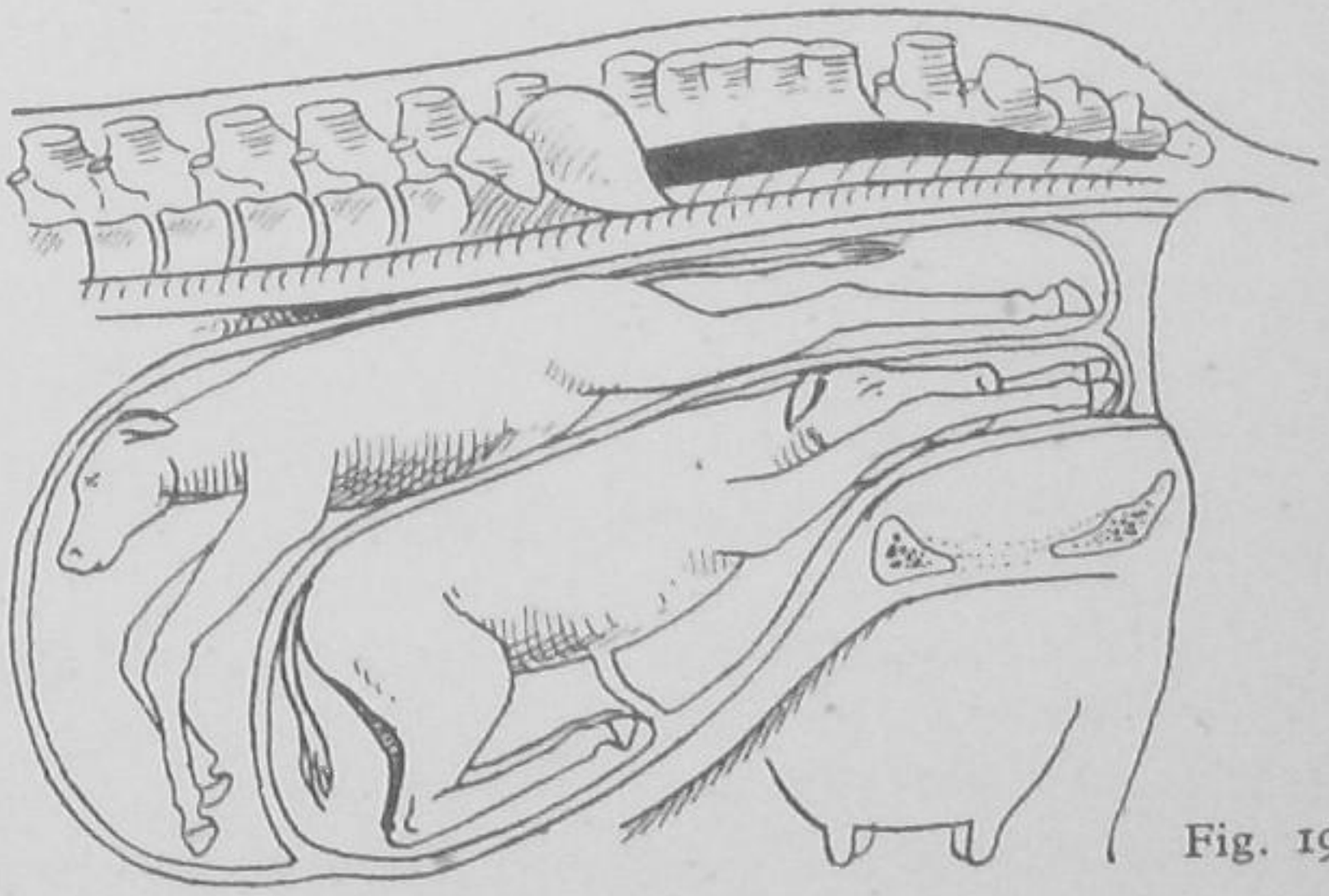


Fig. 19.

PLATE XLIX

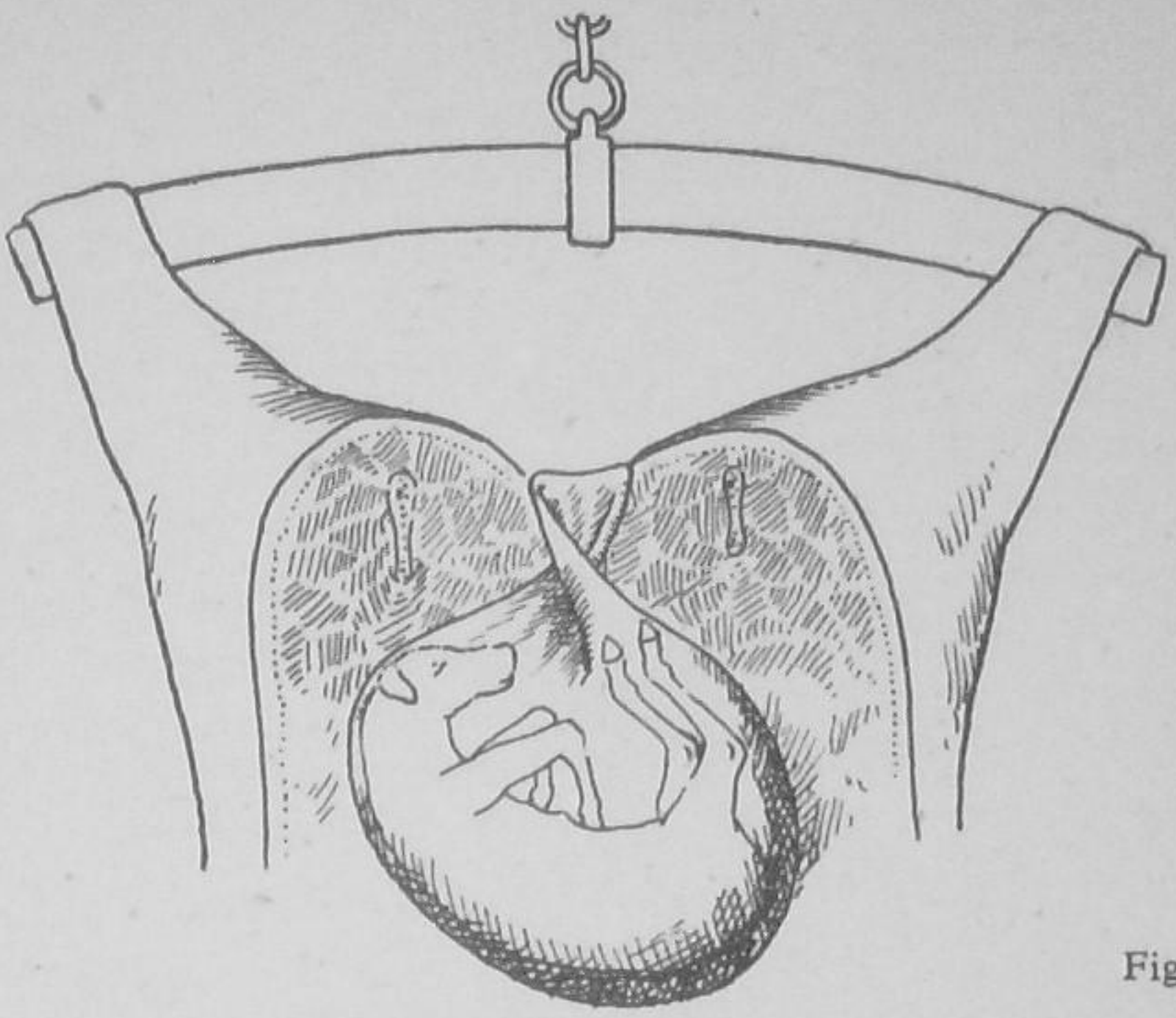


Fig. 20

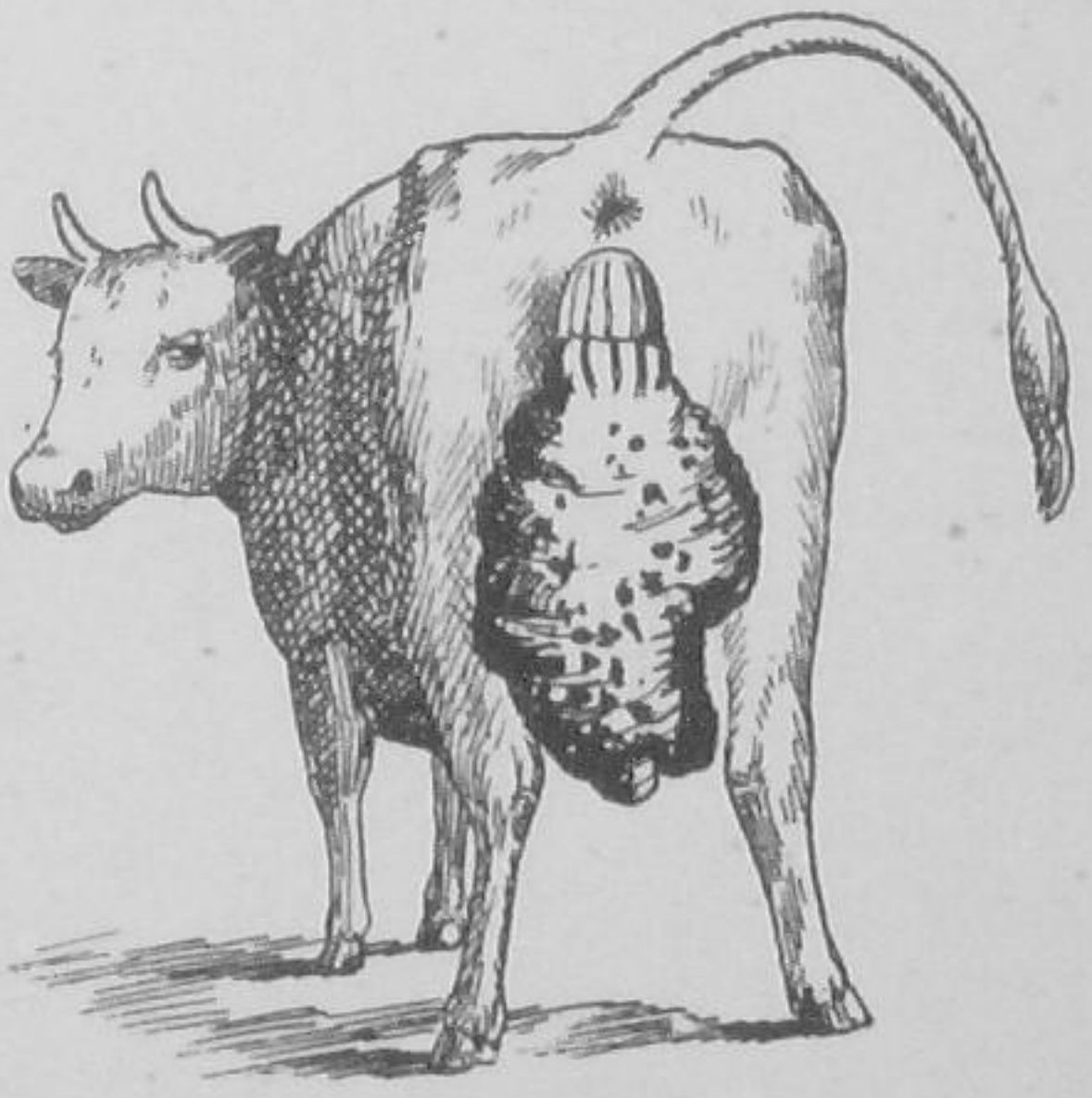


Fig. 21.

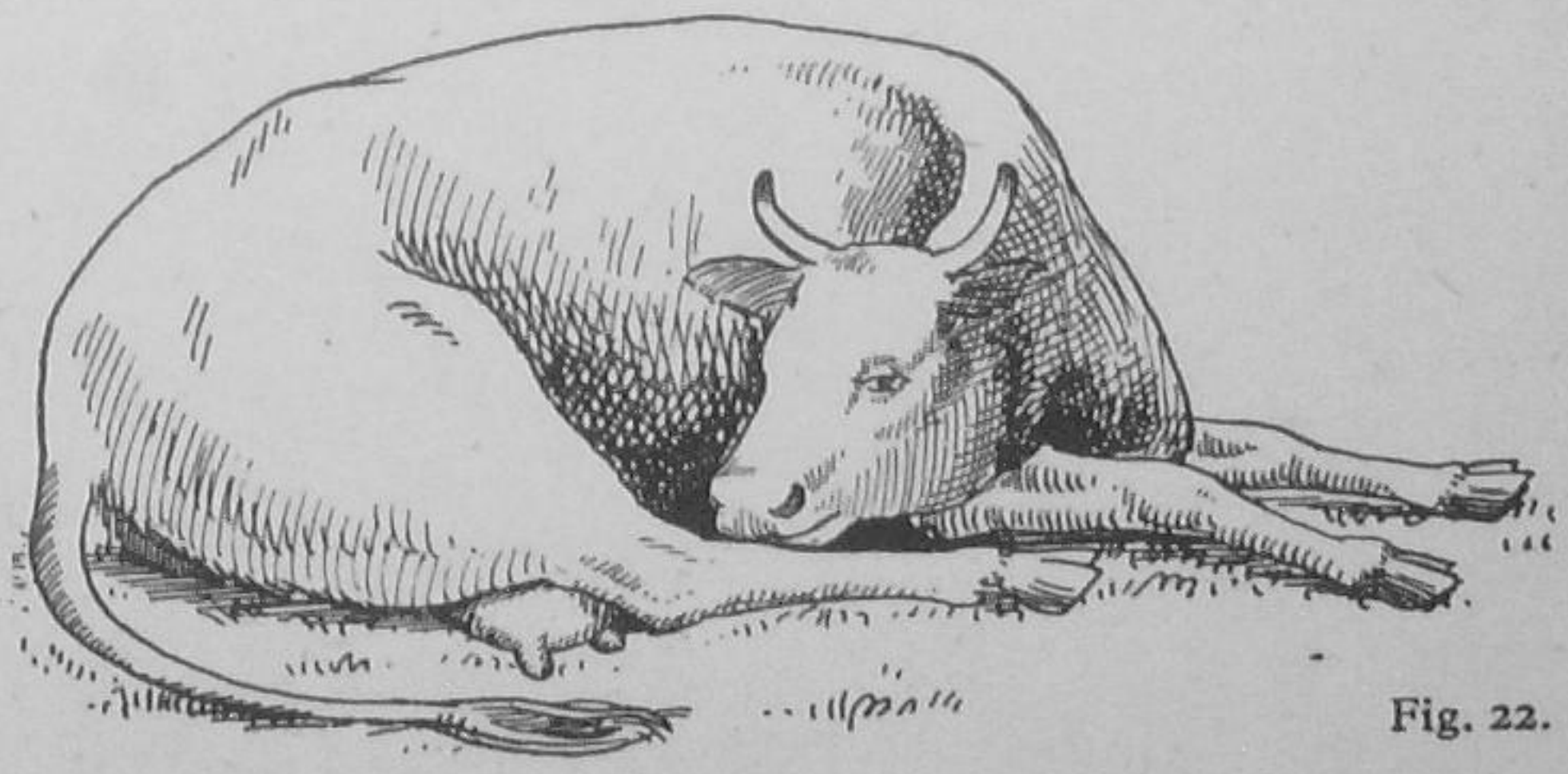


Fig. 22.

in calf she will show all the signs of aborting, but no fœtus appears; she will then tighten up, and the bones of the quarters will resume their normal position, and the animal continue to feed and do well until about the full period of gestation, when the after-birth or cleansing will be noticed hanging from the passage, and on examination a mummified calf will invariably be found in the vaginal passage. In other cases the mummified fœtus is only discovered after slaughter.

Eversion of the Vagina is the turning of the passage or vagina inside out, with the os constricted, and is occasionally met with in ewes in lamb in frosty weather, giving rise to severe straining pains. In such cases apply extract of belladonna, and return the vagina to its position, keeping it there with stitches across the vulva till the os dilates; give also 8 to 10 ounces of linseed oil, with 4 drachms of laudanum. If the weather is mild, these cases may do well; but if the frost continues, they generally terminate in inflammation and gangrene.

Inertia of the Uterus.—The want of power or tone in the womb and vagina, which may be intensely dilated, or in a collapsed condition, with the fœtus lying in a natural position, without any attempt being made by the mother to expel it. I have had most success in such cases by simply introducing the hand into the womb, seizing hold of the fœtus, and drawing it slowly and gently into the passage. Extraction is generally effected without any assistance from the mother. Pituitrin, which is one of the prepared extracts of pituitary gland, is frequently of considerable service in promoting the contractions of the uterus in these cases.

Placenta Prævia (or the after-birth coming first).—Cases are met with in the cow and ewe where the greater portion of the afterbirth comes away prior to the birth of the offspring. This is very troublesome, and has to be cut or torn away before delivery can be accomplished. Great care has then to be used in manipulating the fœtus into proper position for delivery.

Hydrops Uteri (or dropsy of the womb before parturition).—This is often seen in the cow and sheep, and occasionally in the mare. As the animal nears the end of its period of gestation, the belly gets to a big size, oppressing the patient, rendering it very weak and languid, and also causing wasting of the flesh. For

support, a good broad bandage should be rolled and secured round the body, and good, nutritious food given, waiting patiently until parturition sets in, when, as a rule, an enormous quantity of water comes away, accompanied by a small ill-nourished fœtus.

Abnormal Conceptions are recorded, where the young ones were developed in one of the horns of the womb, or in the belly, outside of the womb altogether (extra-uterine conception). In all cases of difficult labour, although a great amount of patience, perseverance, and manual labour is required, success mainly depends on the judicious use of both hands and instruments, or, as the late Professor Williams tersely used to put it: 'Difficult calving and foaling are accomplished by the exercise of the brain.' Lord Bacon has well summed up the relationship between science and practice in the following sentence:

> 'Neither the naked hand, nor the understanding, left to itself, can do much; the work is accomplished by instruments and helps, of which the need is not less for the understanding than the hand.'

Post-Partum Hæmorrhage, or flooding after calving, is mostly seen at the first calving, and is generally due to too hasty and rough usage. This dangerous and often fatal hæmorrhage requires prompt attention. The animal must be kept perfectly quiet, and cold water sheets applied to the loins and quarters; if the bleeding is profuse, a cotton bed-sheet must be put into a pail of cold water —to which has been added 1 ounce of tincture of iron—and after being wrung partly out, it should be packed carefully and quietly into the vaginal passage, and left there for three or four days, or until it comes away by itself; at the same time five or six eggs beaten up in ½ pint of whisky or brandy, in 1 pint cold water, should be given every five or six hours. In many cases, after the bleeding has stopped, the animal will go on doing well, feeding, chewing the cud, milking, etc., for about twelve or fourteen days, when the bleeding may break out again, and before anything can be done the patient bleeds to death. The greatest care and watchfulness is therefore needed from the tenth to the twentieth day. Adrenalin can be given either by the mouth or hypodermically.

Rupture of the Womb (mostly seen in the mare).—This may occur from the strong labour pains of the mare forcing the foot of the fœtus through the walls; or the womb may be torn and

PLATE L



A



B

ruptured in manipulating a malpresentation of the fœtus, when the bowels of the parent sometimes protrude. These cases are usually fatal. Again, one of the fore-feet of the fœtus may be so forced through the roof of the womb and the floor of the rectum as to come out at the anus; or the anus and vulva from the same cause may be made into one common opening. Extensive sloughing usually takes place in these cases.

Eversion of the Uterus (womb turned inside out).—This is not of very frequent occurrence in the mare, but often happens in the cow, ewe, and sow. When it happens in the mare, if the animal is in a standing position, immediately the womb is in sight, every care should be taken to keep her on her feet. The womb must then be supported by a large tablecloth held by two assistants, one on each side, and the patient led on to a good incline, with its hind-feet on the top. An attendant should stand by with a jug, pouring warm water and milk continuously over the everted organ, and attempts must be made to return it as quickly, yet as carefully as possible. If the patient is lying, it should be kept down and its legs tied, for if it makes an effort to get up, the weight of the everted organ drags the animal back on to its hips, and the womb is in great danger of being burst, or so damaged that the patient rapidly bleeds to death. Before attempting reduction the uterus must be lifted, by means of a large cloth, into a vessel containing warm water and milk; the hind-quarters of the mare should be elevated by means of pulleys, and bags of chaff or bundles of straw packed under the quarter; the neck of the uterus must then be pressed back, and the body carefully kneaded in, particularly at its lower side. As soon as the body of the organ is within the pelvic bones, the hand must be placed on the everted end of the horn of the womb, and pressed gently forward, thus returning the horn to its proper position. If the point of the horn is not properly returned, the whole uterus is soon expelled again.

Eversion of the Uterus in the Cow (Plate XLIX., Fig. 21).—The same course must be adopted as in the mare, except when standing, in which case, before attempting to return the organ, the fœtal membranes, if attached, must be removed; the hind-quarters can be elevated by putting a few barrow-loads of farmyard manure under the hind-feet, or by arranging bundles of straw on each side,

in case the animal lies down. If the animal is lying down, proceed in the same way as for the mare. Cases are frequently met with where the womb has been out for five or six hours, causing the mucous membrane to become much congested, jelly-like, and very stiff, from infiltration of fluid in the submucous tissue. Before attempting reduction in these cases, the uterus should be scarified (pricked) in several places with the point of a lancet, and kneaded and pressed with the hands to make it pliable. Pressure should never be applied when the animal is straining—always yield to it. After reduction, if 5 or 6 quarts of tepid water, containing 1 ounce of tincture of iron, be injected into the womb, it acts as a good antiseptic, and causes the uterus to contract, closing up any lacerations which may have been caused in reduction. Stitches may or may not be put across the vulva, or a truss may be put on to prevent recurrence. Should the animal strain and press a great deal after the operation, a good sedative draught, composed of 1 to 2 wineglassfuls of laudanum and 1 pint of linseed oil, may be administered. In some cases the womb is torn to such a degree that it has to be cut off—a formidable operation, yet successful cases are recorded.

Eversion of the Bladder (or bladder turned inside out) also occasionally happens. It is easily known by its bluish-green colour and the constant dribbling of water down the thighs, while a portion of the bladder is seen hanging outside. On careful examination of the parts, the *meatus urinarius* (neck of the bladder—Plate XXXIX., B 7) is found. By gentle pressure it can be readily returned; but it is very difficult to keep in its place, though on driving the animal about, and dashing a few quarts of cold water against the vulva, it will usually retain its position.

Rupture of the Bladder has been met with, where the mare had begun foaling during the night without assistance, and it always has terminated fatally.

Vaginitis, or **Inflammation of the Vagina**, like inflammation of the womb, is mostly due to damage done during difficult parturition. *Treatment.*—Irrigate the passage with water containing a mild antiseptic, and give fever medicine as recommended for metritis; but should there be a great amount of swelling externally, and extensive swelling and inflammation internally, the hand must not be introduced, as it does much more harm than good.

Metritis, or **Simple Inflammation of the Womb**, in the mare, cow and ewe occasionally follows difficult parturition, when it may result from too long retention of the fœtus after the labour pains have set in, or from extreme force having been exercised in extraction of the young one. The inflammation, as a rule, commences in the lining membrane of the womb, but soon extends to the walls of that organ. It generally makes itself manifest within a few hours after parturition, and is usually fatal. In the mare the *symptoms* are at first slight colicky pains, the animal walking round the box and sniffing the ground, at intervals standing still, hanging the head, breathing quickly, nostrils dilated, greatly depressed, and the secretion of milk totally suspended, with a fœtid, chocolate-coloured discharge from the womb, the pulse small and quick, with a temperature of 106° to 107° F. In some cases the inflammation leaves the womb (metastasis) and goes to the feet, producing laminitis, or founder. *Treatment.*—Inject into the womb once a day 4 to 6 quarts of water that has been boiled and allowed to cool down to 90° F., and to which has been added a teacupful of Condy's fluid or Sanitas. Give also 1 to 2 ounce doses of hyposulphite of soda every eight hours. For further *treatment*, see Septic metritis.

Septic Metritis in the Mare occasionally occurs, and may be due to some septic matter having gained admission at the time of parturition, or to retained cleansings. These cases are frequently fatal; sometimes they become complicated, and turn into pyæmia, when large abscesses form in various parts of the body. *Treatment.*—First inject the womb as in metritis, and give small doses of aperient and antiseptic medicine, such as hyposulphite of soda in 2-ounce doses every eight hours, dissolved in water and given as a drench, supplemented with 1-drachm doses of sulphate of quinine, dissolved in 10 drops of strong hydrochloric acid, given every eight hours in cold hay tea to drink, or in 1 pint of cold water as a drench. Good nutritive and easily digestible food—green food if it can be procured—must be given. When a case of this kind occurs, all in-foal mares on or near the premises should at once be removed to other quarters which are not less than two miles distant, while the buildings and utensils should be thoroughly washed and disinfected. Mares recovering from

this malady should not be put to breeding for at least twelve months.

Septic Metritis in the Cow (infectious inflammation of the womb) shows the following *symptoms*—viz.: Great dulness, prostration, quick breathing, fever, straining, swelling of the external genital organs, and discharge of a dirty brown, blood-coloured fluid from the passage. *Treatment.*—If, on careful manual examination, no rupture or rent in the womb is discovered, wash it out by means of an enema syringe with warm water and fluid Sanitas or Condy's fluid, and give as a drench 15 to 20 ounces of raw linseed oil; and if much pain be manifested, add from ½ to 1 wineglassful of laudanum or 15 drops of Fleming's tincture of aconite. As a fever medicine, 2 to 3 ounces of Epsom salts, and 3 drachms of nitrate of potash in a mash of bran, or in water as a draught, may be given every eight hours. Warm water enemas thrown into the rectum also have a soothing effect.

Simple and Septic Metritis in Sheep.—The simple form of metritis is rarely seen in the sheep, but in cold, frosty spring weather lambing ewes often suffer extensively from septic metritis, which by its severity causes great loss to stock-owners. Sheep show similar symptoms to those described in the cow, great prostration and a dirty brown, coffee-coloured discharge running from the womb and trickling down the legs being the prominent characteristics. This disease is highly contagious, and immediately it makes its appearance all the pregnant ewes must be at once removed from the place of infection, and be attended to by another shepherd. *Treatment.*—Wash the parts night and morning with a lotion made of one tablespoonful of phenyle and 1 pint of cold water, which, after being mixed, should be made warm by the addition of 1 pint of hot water. Give internally twice a day 1-drachm doses of chlorate of potassium and 5 drops of hydrochloric acid in ½ pint of cold water.

Retention of the Placenta, or After-Birth.—In the mare the placenta ought never to be allowed to remain more than from six to ten hours after the birth of the foal, more particularly when the mare is on dry food in the stable, as it oftens brings on laminitis (inflammation of the feet); in some seasons this complaint almost resembles an epidemic. It may be avoided by the timely removal

of the membranes, which must be carefully done, as the smallest piece left is quite sufficient to cause a great deal of constitutional disturbance, and in some cases septic poisoning and death.

Retention of the Placenta, or Cleansing, in the Cow.—The attachment of the after-birth to the womb in the cow is quite different to that of the mare. As a rule the after-birth comes away naturally a few hours after calving, yet the cow can retain the fœtal membranes for several days without any constitutional disturbance being set up; and in some instances they may be successfully removed at any period during the first two or three days. But where there is inertia, or the want of tone in the walls of the womb to contract and expel the contents, so long as the cow takes its food, chews the cud and milks fairly well, the membranes may be left alone until the fifth or sixth day in summer, and the sixth or seventh day in winter, when they are, as a rule, extracted without interfering with the general health of the animal. The forcible tearing away of the after-birth from the womb of a newly calved cow is to be strongly condemned, as in the majority of cases it produces great nervous prostration and general debility. Various medical agents have been tried to assist in the expulsion of the cleansing, but nothing answers as well as 2 to 3 ounces of hyposulphite of soda, 1 ounce of ground ginger, and 2 drachms of powdered nux vomica, mixed and given every night for a week as a drench in 1 quart of thin treacle gruel. In removing the retained cleansing, it is advisable to inject into the uterus 8 or 10 quarts of tepid water containing a small portion of Condy's fluid or Sanitas; then, on introducing the hand, by gentle traction and twisting of the membranes, they are removed. It is inadvisable to cut small pieces off the portion of the membranes that may be hanging outside, and there is still more objection to farmers tying a horse-shoe or other weight to them. The membranes which are hanging outside can, however, be rolled up into a knot to be out of the milker's way, and then taken away as described above. After removing the placenta from the mare and cow it is useful to inject into the womb 5 or 6 quarts of tepid water containing 1 ounce of tincture of iron, which is a good antiseptic. Notwithstanding the decayed and fœtid condition of the cleansings at times seen hanging from cows, they are seldom struck with fly or maggot.

Dropping from Retention of the Second Cleansing (partial paralysis after calving).—Cases are met with where the after-birth comes away all right a few hours after calving, but in the course of from two to six days the animal is found lying down and unable to rise, yet it feeds, chews the cud, and milks fairly well; the breathing is quick and heavy, and the temperature is normal, but still the patient cannot get up. The vulva is puckered up and quite dry, and no discharge is seen from the passage. This condition is considered by many to be milk fever. There are, however, no head symptoms or unconsciousness. The loss of power is through reflex nervous action, and due to the too sudden closing of the neck of the womb, behind which the debris or second cleansing collects and is retained. *Treatment.*—Give a good dose of opening medicine, say 1 pound of Epsom salts and 2 ounces of ginger, in a quart of treacle gruel, to which add 1 pint of linseed oil, and further apply a strong mustard poultice over the loins and clothe the body, when, in the course of twenty-four hours, the animal will probably discharge from the womb a quantity of bloody, slimy fluid, after which it becomes all right. At times the retention of the second cleansing sets up septic fever.

Parturient Septic Fever in the cow is due to retention of morbid matter (second cleansing) in the womb. About three or four weeks after calving the cow is noticed to be losing flesh and getting into a low and debilitated condition, with tucking up of the belly, falling off in milk, having little or no appetite, and only occasionally chewing the cud, while the bowels are constipated, the dung being hard and dark-coloured; the lips of the vulva are also puckered up, and of a dirty yellow appearance, and the patient has a peculiar fusty smell. In some cases it is associated with parturient bronchitis or pneumonia. *Treatment.*—Antiseptic tonic medicines are necessary, such as sulphite of soda, iron, quassia, and vegetable cordials given in treacle gruel, with the addition of a quart of beer or ½ pint of spirit; small doses of linseed oil should also be given every other day, and the appetite tempted with different kinds of food, such as sliced mangold and potato, sprinkled over with a little salt, though grass or other green foods answer the best. Frequent washing out of the womb in these cases is very objectionable, for it appears to retard recovery.

Pelvic Hæmatomata, or **Blood Tumours**, are found in the pelvic cavity; they are generally caused by injuries to the parts in cases of difficult parturition. *Symptoms.*—A few weeks after calving the animal commences to strain as if in labour, and urine dribbles from the vulva. The patient has a very irregular appetite, and a tucked-up belly. On examination of the parts (made by introducing the hand into the rectum), a doughy swelling is felt, either at the bottom or on the sides of the bowel. *Treatment.*—The clotted blood must be removed by cutting into the tumour through the side of the vagina, after which dress the parts with antiseptics and tow.

Mammitis, or Inflammation of the Mammary Glands or Udder (sometimes called Garget).—All animals of the female sex are subject to this complaint. It is occasionally seen in the mare, involving one or both sides of the udder, and may appear a week or two before foaling, but more often happens afterwards, especially if the mare is in good condition and has lost its foal. Sometimes it occurs when the animal is not pregnant, usually in animals with gummy legs that are predisposed to weed or grease. It may also arise from a bad wound in the leg or foot, the irritation from which extends up the inside of the hind-leg, thus implicating the udder. It causes a great amount of constitutional fever, the udder being hard and painful, while the patient walks with a stiff, straddling gait. *Treatment.*—If the fever be very high, the head hanging, with quick breathing and dilated nostrils, relief results from giving 15 to 20 ounces of linseed oil, and from 1 to 2 ounces of spirits of nitre, with a tablespoonful of saltpetre in the drinking water; the udder should also be fomented with hot water three or four times every twenty-four hours, and the teats drawn at the same time, after which they should be well dried with a soft cloth, and a little carbolic oil applied. Sometimes the udder gathers and bursts in several places; the case then becomes troublesome. When this happens, the foal (if there is one) should be taken from the mother and brought up by hand.

Mastitis, or **Inflammation of the Udder**, in the cow is very common, when one or more of the quarters may be involved. It is due in all cases to bacterial infection, and the different forms which are observed are due to different groups of these organisms.

The most common form is seen in milking cows. The onset is slow, and the condition may be unnoticed for a day or so; then a slight curdling of the milk may be seen, and soon one or more quarters will become swollen, hard, and painful. Great difficulty may now be experienced in withdrawing the milk, which becomes clotted in the glands. *Treatment.*—It should be recognized that this is a bacterial disease which may easily be spread by the hands of the milker or by other indirect means. If possible, therefore, the animal should be separated from other milking cattle. If this should be impracticable, the affected animal should be milked last. She should not be milked on to the ground, but into a special bucket containing a little disinfectant. The affected animal should be kept in and the udder bathed with warm water, after which the udder should be dried and gently massaged with an ointment of belladonna. It is important that the contents of the udder should be milked out as often as four or five times a day, if possible. If there is difficulty in withdrawing anything from the teats, it may be more easily accomplished after the massage mentioned above. An injection of hydrogen peroxide into the teats may also serve to break down the clotted material. As a last resort a teat syphon may be used. This must be boiled before and after use. If there is constitutional disturbance, the cow should be treated with cooling medicines, such as 2-ounce doses of hyposulphite of soda, or 4 ounces of Epsom salts and $\frac{1}{2}$ ounce of saltpetre, which may be given night and morning.

Another form of mastitis is frequently seen in heifers and dry cows. In this case the disease is probably spread by flies lighting on the teats and passing from one animal to another. In this way a number of cases may appear almost simultaneously.

Neither of the above forms is usually fatal, but there is great loss to the owner, because one or more quarters may become permanently indurated or hard, and cease to function. In a few cases the indurated quarter may resume its functional activity at the next period of lactation.

A third form differs from the two preceding in that the onset is rapid, and instead of clotted milk there is a quantity of dark, blood-stained fluid which comes easily from the udder. Symptoms

are very acute, and the disease will in all probability end fatally within forty-eight hours.

Blind Teats.—Numerous cases are met with where the animal has milked all right, and been perfectly correct up to the time of drying, prior to having its next calf; but after calving one or more of the teats are found 'blind,' and on examination a small, hard knot is felt at the end or in the middle of the passage of the teat. The milk may be liberated with a syphon, but owing to the instrument having to be introduced night and morning, local inflammation is generally set up and the quarter lost. Such cases cause a great deal of unpleasantness and litigation when the animals have changed owners between the time of drying and calving. The cause seems to be that a portion of milk has been secreted after the last milking, the watery portions of which have become absorbed, leaving a small piece of curded milk in the teat, which becomes organized into a small knot, thus blocking up the passage. In these cases, when the teat syphon is used, the instrument should be boiled for five or ten minutes, thoroughly disinfected before introduction into the teat, and well cleaned after use, or inflammation will be set up in the gland and the quarter be lost.

Paralysis of the Milk-Secreting Cells.—Cases occur where a heavy milker that has been noted for its large milk- and butter-giving qualities previous to calving having an udder which was congested and much enlarged, yet after calving there was an entire absence of milk in the gland. Sales of animals so affected often cause unpleasantness between buyer and seller.

Relaxed Teats.—Occasionally the teats lose tone, and become unable to retain the milk, which runs off immediately it is secreted. The best treatment for this is to paint the ends of the teats after each milking with *flexible collodion*, or to apply a suitable indiarubber ring round the teat.

Inflammation of the Udder in Sheep.—The ewe suffers very much from inflammation of the udder, especially when the teats are chapped and sore. The derangement can also be produced when the young lambs are affected with *stomatitis pustulosa* and aphtha, or thrush, and the inside of their mouths are ulcerated, and therefrom irritation and inflammation is set up in the teats and udders of the mothers. The udder is much swollen and painful

to the touch, and on pressing the teat a quantity of straw-coloured watery fluid escapes. *Treatment.*—Good nursing, drawing the teats, and rubbing the affected parts with the carbolic oil are recommended. Hot fomentations, if the parts are not thoroughly dried with a soft cloth when finished, only aggravate the complaint. If the case runs on to gangrene, the udder becomes first red in colour, next purple, and finally black; and to guard against this, a careful examination should be made twice daily. The lambs must be taken off, the ewe isolated, and carbolic oil or Stockholm tar smeared over the gland, the latter being preferable. If the animal be left alone, it is astonishing to see how soon nature can assert her influence, the physiological action of the healthy parts throwing off the diseased portions; and in the space of a few weeks the remains of the gland hang from the belly in the form of long fingers of flesh, which can be removed by the clam and hot iron, the ecraseur, or ligature.

CHAPTER XIII

POULTRY DISEASES

ONE of the changes in our national life that have followed the Great War has been the development of the poultry industry. It has been stated that this industry now ranks next in importance to milk and live stock in the agricultural world.

As a result of this rapid development, it has become necessary to study more exactly the diseases of poultry. Formerly, the value of individual birds being small, but little attention was paid to their diseases, which were, for the most part, left to poultry breeders, who recognized various symptoms, but whose knowledge of pathology was not such as would enable them to ascertain the real cause of disease. Not only has the increased value of the poultry industry as a whole focussed attention on their diseases, but, owing to the large numbers kept by poultry breeders, infectious diseases spread rapidly and caused very great loss. Since the war trained pathologists in several institutions have carried out research in poultry diseases, and a great deal has already been learned. Space will not allow of an exhaustive account of poultry diseases in this work, but mention will be made of a few of the most important which have become better known as a result of recent research.

Tuberculosis in Poultry.—This disease, which is a specific, contagious disease, has long been recognized among laboratory workers as prevalent among poultry, both poultry and turkeys being commonly affected. Among poultry keepers it has been alluded to as going light,' and other terms have been used describing certain of the symptoms. It is due to infection by the particular form of tubercle bacillus common to birds, and known as the avian form. Other animals may be infected by the same organism, and for this reason it is inadvisable to allow poultry to run with other animals, especially pigs, which are particularly susceptible. The principal symptom is a gradual wasting, frequently associated with lameness. As a rule the disease is well

advanced before the symptoms are noticed. The chief lesions are found in the liver and intestines, the former being studded over with whitish nodules. Tubercles similar to those found in tuberculosis of other animals may be found in the intestines and other organs of the body.

It is now possible, by means of the intradermal tuberculin test, to ascertain at an earlier stage whether birds are affected with this disease. This test, as in the case of other animals, requires careful interpretation, and should be carried out only by an expert. The disease is easily spread, as the droppings of affected birds are infective, so food and water become contaminated. For this reason, together with the usually slow progress of the disease, it is difficult to eradicate without a complete change of birds and disinfection of the places where the diseased have been, a new stock being built up on clean ground.

Bacillary White Diarrhœa, also called pullorum disease, is due to infection by the *Bacillus pullorum*. This disease has caused great loss among chickens, especially since the intensive methods of incubating and rearing in brooders became common. The infection is frequently brought about through infected eggs, and on being hatched the disease rapidly spreads among the young chicks, many of which may die within a few days. Those that survive may be carriers of the disease, and it is not infrequent to find adult birds thus proving to be carriers on being tested. These birds may produce eggs which are infected, as well as causing direct infection through fæces. *Symptoms.*—A persistent diarrhœa, light coloured in appearance, is regarded as a characteristic symptom; the birds are drowsy and moping. These symptoms are not, however, diagnostic. A reliable diagnosis can be made by laboratory examination. For carrier birds the agglutination test is sufficiently reliable, and is being carried out extensively in order that adult carrier birds may be detected and eliminated. The survivors of an outbreak should not be kept for breeding, but should be fattened, and a clean flock built up on fresh ground. Disinfection should be practised. The organism is killed fairly easily by the ordinary disinfectants.

Fowl-Pox.—Recent research has given us much clear knowledge concerning this disease, which formerly was confused by a multitude

of names which alluded to certain forms and symptoms. The names roup, diphtheria, diphtheritic roup, and canker all were familiar, and, as is so common, each had its 'remedy' readily supplied by the patent medicine vendors. Some of these names are now applied to other conditions, but it has been shown that, as formerly applied, they referred to various forms and clinical manifestations of one disease—fowl-pox or chicken-pox. These manifestations take three principal forms: (1) the scabby excrescences



FIG. 35.—HEAD OF A COCKEREL AFFECTED WITH FOWL-POX.

(From a photograph taken by Mr. A. A. Mackay, and published by kind permission of the Director, Poultry Pathological Research Laboratory, Goring.)

on the comb and head generally; (2) the yellow, diphtheria-like deposit in the mouth; and (3) the discharge from the eyes and nose. This disease can now, as a result of recent research, be prevented to a considerable extent by vaccination. As in the case of vaccination against human small-pox, the virus of an allied, but less virulent, form is used. In this case the virus is that of pigeon-pox. Should the disease make its appearance in a flock, and only a few birds at first appear to be infected, it will be economical to kill these, and disinfect the places likely to be infected.

Fowl Cholera.—This infectious disease has been known for many years, but in this country outbreaks have not been common. Most of the domestic birds are susceptible, and in a recent outbreak in 1933 ducks were chiefly affected. In these outbreaks the mortality has been very high, but it has been stated by some poultry pathologists that, although acute outbreaks are not common, cases occur periodically where the disease assumes a more chronic and less fatal form. In the acute form, birds are sometimes found dead before the disease is suspected. The incubative period is short. Birds mope, and separate themselves from others; they are unsteady in gait, the comb becomes dark in colour, and finally they roll over and die. In such acute outbreaks there is little chance of those affected recovering. The healthy should be removed from those affected, the dead cremated, and the place where the infection has been left vacant for two or three months. The fowl-houses should be disinfected, and, as a precaution, birds which are imported, or which come from a district where the disease has existed, should be isolated for fourteen days.

Blackhead in Turkeys.—This is a popular name given to an infectious disease which chiefly affects young turkeys. It is also called *entero-hepatitis*, indicating that the lesions are found both in the intestine and in the liver. Other birds may be affected, including game birds, which may spread the disease. It is believed to be due to a protozoan parasite, which is found in the intestine, particularly in the cæcum, and the droppings being infective, the disease is easily spread. The mortality among young birds is very high. The affected bird is very dejected, the head and wings drooping; the comb in some cases assumes a purple hue. Appetite is lost, and the droppings are greenish-yellow in colour and offensive. Very characteristic lesions are found in the liver, which is swollen and covered with spots of a greenish-yellow colour. The lining of the cæcum, or blind gut, is thickened. Of the many remedies tried for the treatment of this disease, the best results are reported from the use of arsenical preparations. Neosalvarsan and also a proprietary preparation have given good results; but such preparations are not without danger, if not carefully handled, and it would be wise to consult a veterinary surgeon skilled in poultry diseases before using them.

Coccidiosis.—This is a parasitic disease affecting the intestinal tract of birds of various species. Rabbits are also frequently affected, but the parasite in this case is a different member of the same family, and the lesions are commonly seen in the liver.

The disease is of the greatest economical importance affecting young chickens. Old birds are affected, but are more resistant to the ravages of the parasite. There is some difference of opinion as to the amount of loss resulting from infection. Some observers hold that birds may, and often do, harbour a few coccidia without much damage being done, but there is little doubt that much loss does occur as a result of infection; and if some prove resistant, they may pass the parasite to others, which will succumb.

The cause of the disease is a single-celled (protozoan) parasite, known as a group by the name coccidia. There are several members of this group, affecting different species of birds and other animals. These have two stages in their life-history: one in the intestine, during which no spores are formed; and the other on the ground, when, some time after being voided, a time varying with the conditions of moisture and warmth, probably from twenty-four hours to ten days, the coccidial cyst produces spores. The procedure is somewhat complicated, but finally the spores, which are contained within an envelope, are picked up by chickens, which thereby become infected.

The lesions are mainly found in the intestine, especially the cæca, the mucous membrane of which becomes thickened. The affected birds show listlessness and diarrhœa. Such symptoms being common to other diseases, it is advisable, when they are presented, to send a dead bird for examination and diagnosis to a laboratory, where scrapings from the mucous membrane of the intestines will reveal the parasite, if present. It should be remembered that infection is only by the droppings of infected birds soiling the ground. It has been suggested that other conditions affecting the health and condition of the birds will materially assist in intensifying the results of infection. This is probably true, but the safest plan is to avoid all infection by rearing chickens on clean ground, and either removing the droppings or moving the birds frequently. The older birds, which may not themselves show symptoms, may be the source from which the ground becomes infected.

Fowl Paralysis.—This condition has become increasingly serious to poultry breeders of late years, and has caused great loss to many. Diagnosis in the early stage is difficult on account of the frequency with which muscular weakness is found in various diseases of poultry. In this case, however, there is not only weakness of the muscles, but true paralysis, and as a result of this there is eventually muscle waste. This disease is the subject of much careful research at the present time, both in this country and in America, and while it would be premature to mention the preliminary reports which have been published, there is every hope that light will soon be thrown on this obscure condition.

Parasites.—Poultry, like other animals, harbour many internal and external parasites. These cause loss to the owners, and in some cases death of birds, especially young birds. Round-worms and tape-worms affect the intestinal tract and the crop. The gape-worm, or *Syngamous trachealis*, is a small red round-worm which is found in the trachea, or windpipe, giving rise to gapes in chickens, and causing great irritation to the windpipe and air-passages. In young birds from ten days to a month old it frequently causes death by suffocation. The birds affected cough, and shake their heads in attempts to dislodge the parasites; they stretch their necks and open their beaks wide, from which symptom the name of 'gapes' is derived. Treatment of affected young birds is not very satisfactory, but prevention should be practised by keeping them on clean ground until they are old enough to withstand the parasites.

Lice, Fleas, and **Mites** are common external parasites affecting poultry. They cause much loss of condition, and not only retard growth, but birds so infested become more easily the victims of other diseases.

Those interested should consult the special works on poultry diseases for details only briefly referred to here, and in the case of diseases which appear to be infectious, advice may usually be obtained from one of the various institutions dealing with poultry diseases.

The number of practising veterinary surgeons who have studied poultry diseases has considerably increased, and they too may be consulted with advantage.

CHAPTER XIV

SYNOPSIS OF DISEASES, THEIR RECOGNITION AND 'FIRST AID' TREATMENT

ABORTION.

Casting the fœtus; premature birth.
Mainly contagious, rarely accidental.
Have blood agglutination test applied, and if contagious consult veterinary surgeon as to eradication.

ABSCESS.

Circumscribed swelling containing matter or pus.
Hot and cold water dressings; poultices and blisters.
Open with knife when ready.

ACARI—MITES.

Parasites causing skin irritation and itching, like mange and scab.
Wash with solution of phenyle or carbolic preparations.

ACIDITY OF THE STOMACH.

Sour stomach.
Give alkalies.
Bicarbonate of soda, potash, lime or chalk.

ACTINOMYCOSIS.

Wooden tongue, caused by the ray fungus; affects tongue and jaw.
To be scarified and dressed with iodide preparations.

AFTER-PAINS.

Heaving or straining after parturition.
Give dose of laudanum, chloral hydrate, and mild laxatives.

AMAUROSIS.

Blindness; paralysis of optic nerve, with dilated pupil.
Incurable.

ANGLE BERRIES.

Warts.
Remove with knife, hot iron, or ligature; dress antiseptically.

ANTHRAX—CHARBON.

Splenic apoplexy; blood disease due to anthrax bacillus.
Attack and death sudden.
Plug all external openings, as nostrils, etc. Report to police.
Bury deep or burn without opening carcass.
Isolate and disinfect premises.

APHTHA.
Thrush; vesicles or blebs in the mouths of calves and lambs.
Dress with boracic acid lotion, or chlorate of potash solution.

APOPLEXY.
Brain derangement.
Cerebral, associated with stomach staggers.
Parturient apoplexy.
Give chloral hydrate and bromide of potassium.

ARTHRITIS.
Inflammation of the joints.
Rest; hot and cold applications; blisters.

ASCITES.
Dropsy of the abdomen.
Broad bandage round the body.
Give saline purgatives (salts), iron tonics and diuretics.

ASTHMA.
Broken wind; spasm and rupture of bronchial tubes.
Steam nostrils with medicated watery vapour.

ATROPHY.
Wasting.
Attention to diet, with iron tonic preparations.

AZOTURIA.
Blood derangement.
Attack sudden; profuse sweating.
Discharge of bloody-coloured urine; great pain.
Dose of physic.

BLACKLEG, OR BLACK-QUARTER.
Lameness; crackling swellings on parts affected.
Affects young stock, mostly under two years old.
Preventive inoculation to those unaffected.

BLEEDING FROM WOUNDS.
Ligatures, pressure, styptics, or application of hot iron.

BOG-SPAVIN.
Distension of the synovial sac in front of hock-joint.
Pressure, blistering and firing.

BONE-SPAVIN.
Bony enlargement on the front and inner section of the lower part of hock-joint.
Rest; cold applications; blisters and firing.

BOTS IN HORSES.
Larva of bot-fly in stomach.
Turpentine and linseed oil.
Salt and iron; green food.

BROKEN KNEES IN HORSES.
Wash and dress with antiseptics.
Apply cold water bandages.
Caustic lotions; dry dressings.

BRONCHITIS.
Acute and chronic inflammation of bronchial tubes.
Place in well-ventilated box; give nitrate water to drink.
Steam nostrils with medicated watery vapour.

BRUISES.
Cold and hot water applications; embrocations.

BRUSHING.
Striking one leg with the other; faulty action and bad shoeing.
Cold water bandage to injured part; attention to shoeing.

BURNS AND SCALDS.
Protect part from the air.
Equal parts lime water and oil, or solution of picric acid.
Cover with cotton-wool.

CALCULI, INTESTINAL.
Dust-balls in large intestines.
Laudanum and chloral hydrate to relieve pain.
Strong purgatives to be avoided.

CALCULI, URINARY.
Gravel—dogs, sheep.
Operation necessary.

CANKER IN HORSE'S FOOT.
Degenerate horn on sole of horse's foot.
Dress with powdered alum or sulphate of copper, carbolic acid, formalin, etc.
Keep thoroughly dry.

CANKER OF EAR.
Fœtid discharge from lining of dog's ear.
Wipe clean with cotton-wool.
Do not wash; dress with iodoform.

CAPPED HOCK, KNEE, AND ELBOW IN HORSE.
Collection of fluid underneath the skin.
Hot and cold applications; stimulating lotions and pressure.

CATARACT.
Opacity of the crystalline lens in horses and old dogs.
Treatment of little avail.

CATARRH.
Cold in the head, bowels, or bladder.
Irritation of mucous membranes, with watery discharge.
Steam head with medicated watery vapour.
Give chlorodyne and small doses of linseed oil.

CHOKING.

Obstruction in the gullet.
Try to remove with hand, or pass the probang.
When left side (cow) much distended, puncture with trocar or knife.

CHOREA.

Involuntary spasmodic movement of the muscles.
Give nerve sedatives—chloral and bromides.
If in dogs from distemper, give Fowler's solution.

COLIC.

Gripes, spasm of intestine.
Give linseed oil and turpentine.

CONJUNCTIVITIS.

Inflammation of the outer covering of the eyeball.
Remove irritant; bathe with tepid water; apply boracic acid lotion.

CONSTIPATION.

Torpidity of bowels.
Mild laxatives; warm water and glycerine injections.

CORNS IN HORSES' FEET.

Bruise of sensitive sole, inner heel.
Rest; remove shoe, and put on poultice made of cold water and bran.
Bar shoe, or indiarubber bar pad.

COUGH.

A forcible expulsion from the respiratory organs due to many causes.
Give equal parts of chlorodyne and glycerine.

CRIB-BITING AND WIND-SUCKING.

Feed on the ground; iron stable fittings; put on muzzle.

CURB.

Sprain of ligament or tendon back of hock-joint.
Rest; hot or cold applications; blistering and firing.

DEBILITY.

Weakness.
Stimulating tonics, with easily digested food.

DIABETES INSIPIDUS.

Great thirst; passing large quantities of urine.
Peculiar to the horse.
Iodine preparations.
Good nutritious diet.

DIARRHŒA.

Scouring; profuse discharge of fluid fæces.
Small doses of linseed oil and laudanum, and tincture of ginger or spirits.
Well-boiled gruel and milk, or linseed jelly, to drink.

DISLOCATIONS.

Bring bones into natural position; splints and bandages.

DISTEMPER IN DOGS.

Febrile disease common to young dogs.
Antidistemper serum; as a preventive, Dunkin and Laidlaw's serum and virus inoculation.

DROPSY (*see* Ascites).

DYSENTERY.

Fluid discharge of fæces mixed with blood.
Give carbolic acid or creosote, or oil of cloves in glycerine or linseed oil.
Well-boiled gruel and milk or linseed jelly to drink.

ECLAMPSIA.

Reflex nervous affection about period of parturition.
Give chloral hydrate and bromide of potassium.

ECZEMA.

Skin affection.
Wash with izal, phenyle, Sanitas, or chinosol solutions.

ELEPHANTIASIS IN HORSES.

Chronic thickening of hind-shanks.
Iron tonics, with diuretics; cold water bandages.

EMPHYSEMA.

Subcutaneous air swelling underneath the skin due to wounds.
Puncture with point of sharp knife, and apply pressure.

ENTERITIS.

Inflammation of the bowels.
Give linseed oil, laudanum, chloral hydrate, morphia hypodermics.
Hot applications to belly.

EPILEPSY.

Fits in dogs.
Keep animal steady; douche head well with cold water. If possible, ascertain cause.
If from worms, give worm medicine.

EPISTAXIS.

Bleeding from the nostrils.
Apply cold water to head; plug nostrils with cotton-wool.
Give tincture of iron in water to drink.

ERYSIPELAS.

Diffusive inflammation of the skin and connective tissue.
Keep perfectly quiet; give repeated doses of quinine.
Offer generous diet.

EXOSTOSIS.

Bony tumour.
Hot or cold applications and counter-irritants.

FALSE QUARTER.

Defect in the horny wall of the hoof from injury.
Apply bar shoe; blister coronet.

FARCY (*see* Glanders).

FEVER.

Various.
High temperature; quick breathing; dullness.
Put into well-ventilated, dry loose-box.
Bandage legs; put on clothing; give nitrate water to drink.

FISTULA.

A tubular ulcer.
Operation necessary; dress with antiseptics.

FLATULENCE (*see* Colic).

FLEAS.

Wash with phenyle, izal, or chinosol solutions.

FLY-BLOW.

Common to wounds in sheep.
Wash as for fleas; dip as a preventive.

FOOT-AND-MOUTH DISEASE.

A contagious, eruptive fever affecting cows, sheep, and pigs.
Discharge from mouth; smacking of lips.
Report at once to police.

FOOT-ROT IN SHEEP.

Contagious inflammation of the feet with ulcerative sores.
Remove loose horn; dress with antiseptics and caustics.

FOUL IN FEET OF CATTLE.

Inflammation and ulcerations between the digits.
Wash clean; dress with antiseptics, and poultice.

FOUNDER—LAMINITIS.

Inflammation of the feet.
Remove shoes; put on poultices.

FRACTURE.

Broken bones.
Put bones in position; splints and bandage.

GANGRENE.

Mortification, or death of a part.
Dress with antiseptics; give quinine; nutritious food.

GASTRITIS.

Inflammation of the stomach.
Small dose of linseed oil and laudanum; morphia hypodermics.
Hot blankets rolled round the body.

GLANDERS IN HORSES.

Specific contagious disease.
Nasal ulcers and discharge from the nose.
Isolate and disinfect; *dangerous*. Report to the police.

GLOSSITIS.

Inflammation of the tongue.

Wash with boracic acid or chlorate of potash solutions.

GRAPES IN HORSES.

Inflammation of the skin of horses' heels, with enlarged growths.

Wash with antiseptic solutions; dress with powdered alum or blue vitriol.

GREASE.

Inflammation of the skin of horses' legs, with fœtid discharge.

Wash with disinfectants; dust with boracic acid, iodoform, and charcoal.

GROGGINESS (*see* Navicular Disease).

HÆMATURIA.

Bloody urine from the urinary organs, due to disease or injury.

Keep quiet; give salt and sulphate of iron combined.

HÆMO-ALBUMINURIA OF RUMINANTS.

Red-water (muir-ill).

Give Epsom salts or common salt in water.

Iron and vegetable tonics.

HÆMOPTYSIS.

Bleeding from the lungs.

Perfect quiet; cold compress round the chest.

Give spirits in water when necessary.

HÆMORRHAGE (*see* Bleeding).

HÆMORRHAGE, POST-PARTUM.

Bleeding after parturition.

Dash cold water over loins and pack wet cloths into the womb.

Give tincture of iron in cold water as a drench.

HEPATITIS.

Inflammation of the liver.

Saline aperients, with sedatives and small doses of calomel.

HERNIA.

Rupture; displacement of bowels.

Bandage and operation.

HOOSE.

Thread-worms in windpipe.

Keep indoors in comfortable quarters; dry beds.

Turpentine and oil; fumigations; nutritious diet.

HOVEN.

Distension of the paunch.

Give linseed oil and turpentine.

Puncture with trocar and canula, or knife.

HYDATIDS ON BRAIN—STURDY.

Cœnurus cerebralis.

Watery tumour on the brain from tape-worm of the dog.

Operation.

HYDROPHOBIA.
Rabies.
A specific febrile disease produced by a virus, principally seen in the dog.
Destroy. Report to police.

HYDROTHORAX.
Water in the chest.
Operation; iron tonics.

INDIGESTION.
Dyspepsia, injudicious feeding.
Mild aperient medicine, combined with vegetable tonics.
When acute, hot cloths to the belly.

INFLAMMATION.
Acute, subacute, and chronic.
Local treatment: cold or hot applications to the part.
Constitutional treatment: mild laxatives and fever medicines.

INFLUENZA.
Specific infectious febrile complaint of horses of epizootic character.
Isolate patient; warm, comfortable box; bandage legs and clothe body
Nitrate water to drink; steam nostrils.

INTUSSUSCEPTION.
Telescoped gut (*see* Enteritis).

JAUNDICE.
Yellows; derangement of the liver.
Give saline laxatives, and small doses of calomel.

KENNEL LAMENESS (*see* Rheumatism).

KERATOMA.
Horny tumour on foot.
Operation.

LAMINITIS (*see* Founder).

LARYNGITIS.
Inflammation of the larynx.
Comfortable box; warm clothing.
Steam nostrils; apply stimulating embrocation to throat.
Nitrate water to drink.

LEUCORRHŒA.
Whites; chronic inflammation of the vagina and womb.
Antiseptic injections and tonic medicines.

LICE.
Wash skin with phenyle, izal, or chinosol solutions, or with decoction of stavesacre.

LOCK-JAW.
Continuous muscular spasms due to a microbe.
Put in dark loose-box; keep perfectly quiet; offer cold hay tea.
If from a wound, dress with antiseptics. Antitetanic serum.

LOUPING-ILL in SHEEP.

Derangement of the nervous system.
Isolate; give bromide of potassium.
Apply salt to pastures as a preventive.

LUXATION.

Partial displacement of patella generally.
Replace; keep quiet, and blister.

LYMPHANGITIS.

Weed.
Cold water bandages to leg.
Give linseed oil, followed by diuretics.

LYMPHATICS, INFLAMED.

From pricks and injuries.
Foment parts with hot water, or apply cold water bandages.
Give saline aperient medicines.

MALADIE DU COÏT OF HORSES—DOURINE.

Covering disease.
A specific disease of the male and female genital organs of a chronic nature.
Communicated at time of service.
Wash with disinfectants.
Give chlorate of potash and quinine, or arsenic.

MALLENDERS AND SALLENDERS.

Chronic inflammation of the skin, back of knee, and front of hock-joint.
Apply oleate of mercury.

MAMMITIS—GARGET.

Inflammation of the udder.
Draw teats; apply camphorated oil.
Give small dose of antiseptic laxative medicine.

MANGE (*see* Acari).

MEGRIMS.

Giddiness.
Perfect rest and quietness, and laxative medicine.

MELANOSIS.

Tumour of a cancerous nature, seen in grey horses.
Operation.

MENINGITIS.

Inflammation of the coverings of the brain.
Put into dark box; keep perfectly quiet.
Give laxative medicine and nerve sedatives.

METRITIS.

Inflammation of the womb.
Inject warm water containing disinfectants.
Give linseed oil and laudanum.

MYOSITIS.
Inflammation of the muscle.
Rest; fomentations; alterative laxatives.

NASAL GLEET—OZÆNA.
Discharge from the nostril.
Inject with chinosol solution, also iodoform; give iron tonics.

NAVICULAR DISEASE.
Grogginess; ulceration of the navicular bone.
Apply cold wet swabs to feet; shoe with indiarubber pads.

NECROSIS.
Death of bone.
Operation.

NEPHRITIS.
Inflammation of the kidneys, various forms.
Perfect rest; hot clothes to the loins.
Give small doses linseed oil and laudanum.

NETTLE-RASH—URTICARIA.
Howks, or blains.
Give carbonate of soda in water and spirit, or turpentine and oil.

OMPHALITIS.
Inflammation and suppuration of the navel cord.
Open with a knife, and apply antiseptic dressing.
Put on a cloth wrung out of hot water, and support with a bandage around the body.
Give mild aperients.

OPEN JOINT.
Rest; cold water irrigation; blisters.

OPHTHALMIA.
Inflammation of the eyes; simple and periodic.
Remove foreign body, if one.
Apply boracic acid lotion; keep in dark box; give saline laxatives.

ORCHITIS.
Inflammation of the testicles.
Hot fomentations; belladonna applications; saline alterative medicine.

OSTITIS.
Inflammation of the bones.
Cold or hot applications; perfect rest; blistering and firing.

OTORRHŒA (*see* Canker of the Ear).

PARALYSIS.
Loss of sensation and motion.
Mainly due to lightning shock.
Keep quiet; give bromide of potassium.

PATELLA, DISLOCATION OF (*see* Luxation).

PERICARDITIS.

Inflammation of the covering of the heart.
Put in loose-box; keep perfectly quiet.

PERIOSTITIS.

Inflammation of the covering of the bone.
Perfect rest; cold or hot water applications; blisters.

PERITONITIS.

Inflammation of the lining of the belly.
Give laudanum and linseed oil; morphia hypodermics.
Woollen rugs, wrung out of hot water, round the body.

PHARYNGITIS.

Inflammation of pharynx; sore throat.
Put into well-ventilated box; steam nostrils.
Apply stimulating liniment to throat.
Give chlorate of potash in drinking water.

PHLEBITIS.

Inflammation of a vein.
Apply blisters; dress with antiseptics.

PHRENITIS.

Inflammation of the brain.
Purgative medicines; nerve sedatives.
Cold applications to the head.

PLEURISY.

Inflammation of the lining of the chest.
Laxatives; hot cloths to the chest.

PLEURO-PNEUMONIA (COW).

Specific contagious inflammation of the lungs.
Treatment not allowed, under the Diseases of Animals Acts.

PNEUMONIA.

Inflammation of the lungs.
Put in well-ventilated loose-box.
Apply hot blankets to the chest.
Give linseed oil, spirits of nitre, and tartar emetic.

PUMICED FOOT IN THE HORSE.

Convexity and weakness of the sole.
Shoe with bar shoe and leather soles.

PURPURA HÆMORRHAGICA IN THE HORSE.

A febrile affection accompanied by extensive swellings on limbs and body.
Purple patches on the lining of the nose.
Well-ventilated loose-box; warm clothing.
Give chlorate of potash in drinking water.

PYÆMIA.

Blood-poisoning.
Formation of abscesses in various parts of the body.
Wash with antiseptics and give quinine.

QUITTOR.
A fistulous sore in coronet of the horse's foot.
Wash with antiseptic agents; caustics; blister.

RHEUMATISM.
A painful malady of the muscles, tendons, and joints.
Apply stimulating applications.
Give salicylate of soda and bicarbonate of potash.

RICKETS.
Softening of the bone.
Nourishing diet; cod-liver oil; lime water; Parrish's syrup.

RINDERPEST.
Cattle plague.
Treatment not allowed.

RINGBONE.
Bony enlargement on pastern-joint.
Rest; cold applications; blister; put on bar shoe.

RINGWORM.
Itchy, scaly and hairless patches on different parts of the body.
Isolate animals and wash with phenyle and water.
Apply carbolic oil, or tar ointment and sulphur.

ROARING.
Wasting of the muscles of the larynx, giving rise to peculiar noise.
Operation in bad cases.

SADDLE-GALLS.
Sores, the result of badly-fitting harness.
Relieve pressure; wash with antiseptics; apply white lotion.

SAND-CRACK.
Fissure in horn of hoof.
Remove pressure; dress with tar ointment, and put leather strap round hoof.
Operation.

SEPTICÆMIA.
Septic blood-poisoning.
If from wound, wash with antiseptics; give quinine and generous diet.

SARCOMATOUS TUMOURS.
Cancerous tumours, generally on the face.
Operation.

SCAB IN SHEEP.
Due to parasites.
Dip sheep in non-poisonous dip.

SEEDY TOE IN HORSES.
Secretion of degenerate horn in the walls of the hoof.
Remove shoe; operation and special dressing.

SHIVERING.

A nervous affection and twitching of the muscles.

Give bromide of potassium.

SHOULDER SLIP.

Sprain, with wasting of the external muscles of shoulder-blade.

Blister; long rest, and a run on grass.

SIDE BONE.

Ossification of the lateral cartilages.

Cold applications; remove pressure; put on bar shoe; blister.

SORE SHINS.

Inflammation of shin bones.

Long rest; cold or hot water bandages.

SPEEDY CUT (*see* Brushing).

SPLINT.

Bony exostosis on shank bones.

Rest; cold water bandages; blister.

SPRAINS.

Laceration of tendons and ligaments.

Rest; high-heeled shoe; cold water bandages; blister, and firing.

STOMATITIS PUSTULOSA.

Inflammation and ulceration of the lining of the mouth and skin of face.

Wash with boracic acid lotion; give chlorate of potash.

STRANGLES.

Febrile suppurative disease, with abscesses between jaws and throat.

Apply mustard and water to the parts.

Give chlorate of potash in drinking water.

Steam the nose with medicated watery vapour.

STRINGHALT.

Nervous affection and twitching of the muscle, with sudden clicking of one or more legs.

STURDY (*see* Hydatids).

SWINE FEVER.

An infectious disease accompanied by great depression and discoloration of the skin.

Isolation; report to police.

SYNOVITIS.

Inflammation of membranous sac covering joints.

Treatment same as for arthritis.

TAPE-WORM (*see* Worms).

TEATS OBSTRUCTED.

Pass teat syphon; draw off milk.

THOROUGH-PIN.

Bursal distension on sides of hock.

Rest; high-heeled shoe, and pressure by indiarubber bandage and truss.

THROMBOSIS.
Clot of blood in artery or vein.
Rest; mild apericnts.
Iodide of potassium.

THRUSH (*see* Aphtha).

THRUSH IN HORSE'S FROG.
Fœtid discharge from cleft.
Wash with antiseptics or salt and water.

TICKS.
Dip with non-poisonous dips.

TREAD.
Bruise of the coronet.
Cold applications; if skin broken, use antiseptics.

TUBERCULOSIS.
Specific disease, local or generalized, due to bacilli.
Test with tuberculin and gradually eradicate from dairy herd.

TYMPANITES (*see* Colic, Hoven).

ULCERS.
Various.
Astringent antiseptic dressings.
Good nourishing diet, with iron tonics; blister.

URTICARIA (*see* Nettle-rash).

VAGINITIS.
Inflammation of the vagina.
Inject antiseptic solutions; give linseed oil and laudanum.

VARIOLA OVINA.
Small-pox in sheep.
Isolate animals.

VOLVULUS.
Twist of the bowel (*see* Enteritis).

WARTS (*see* Angle Berries).

WEED (*see* Lymphangitis).

WHISTLING IN HORSES.
Modified form of roaring.

WORMS.
Great variety infesting various parts of the body.
Nematoda (round- and thread-worms), as ascarides, oxyures, strongyli.
Trematoda (flat-worms).
Cestoda—tænia, tape-worms.
Give turpentine and linseed oil.
Salt, sulphate of iron, and flowers of sulphur.

WOUNDS.
Wash with antiseptics; stop bleeding with pressure; stitch up.

CHAPTER XV

SIMPLE FORMULAS REFERRED TO IN THE VARIOUS PARAGRAPHS

THE following medicines and doses are for adult animals, therefore other doses must be regulated according to age and size of animal:

ALTERATIVE POWDER FOR HORSES (GENERAL).

I.	Epsom Salts	from 1 to 2 oz.
	Saltpetre	„ 2 to 4 dr.
	Flowers of Sulphur	„ 3 to 6 dr.
	Carbonate of Iron	„ 1 to 2 dr.

Mix together and give in a mash two or three times a week during winter.

ALTERATIVE TONIC MEDICINE FOR HORSE OR COW.

II.	Chloride of Sodium (Common Salt)	3 dr.
	Powdered Nux Vomica	1 dr.
	Exsiccated Iron	1 dr.

Mix for one dose, to be given once a day in the food.

ALTERATIVE COUGH MEDICINE. HORSE.

III. *Fowler's Solution of Arsenic.*

In doses from 1 to 2 tablespoonfuls given once a day in the food.

ANTISEPTIC WASHES AND DRESSINGS FOR WOUNDS.

I.	Phenyle, or Jeyes' Fluid	1 oz.
	Cold Water	2½ pt.

Mix, and apply to the wound with cotton-wool.

Or—

II.	Chinosol	45 gr.
	Water	1 pt.

Mix, and apply with cotton-wool.

CARBOLIC MIXTURE.

III.	Carbolic Acid	1 oz.
	Olive Oil	9 oz.

Mix, and apply with a feather to the wound.

ANTISEPTIC OR BLACK OIL MIXTURE.

IV.	Turpentine	1½ oz.
	Sulphuric Acid (strong)	2 dr.
	Linseed Oil	10 oz.

Put the turpentine into a large jar, and add the acid very carefully, as a strong chemical action takes place when the two meet; then add the linseed oil. Apply to wounds with a feather.

WHITE LOTION.

Caustic Antiseptic Healing Lotion, for wounds generally, such as broken knees, sore backs, shoulders, etc.

V.	Sulphate of Zinc	2 dr.
	Sugar of Lead	2 dr.
	Cold Water	2 pt.

Mix, and apply to the wound once a day with a clean sponge.

CAUSTIC POWDER FOR WOUNDS AND RAW SURFACES.

VI.	Finely Powdered Blue Vitriol... ...	1 oz.
,,	,, Charcoal	1 oz.
,,	,, Iodoform	1 dr.

Mix, and dust over wounds as required.

IODOFORM DRESSING.

VII.	Iodoform	1 dr.
	Oak Varnish	1 oz.

Mix together, and apply to the wound with a brush, over which place a layer of cotton-wool, and secure with a bandage.

CHARGE FOR JOINTS.

Black Pitch	3 lb.
Green Tar (Stockholm)	1½ lb.

Melt over a slow fire, stir well together, and smear over joint when nearly cold.

COLIC OR GRIPE DRAUGHT FOR HORSES.

I.	Linseed Oil	15 oz.
	Laudanum	2 oz.
	Spirits of Nitre, or Turpentine	2 oz.

Mix, and give as one dose.

The following may also be given:

II.	Carbonate of Ammonia	4 dr.
	Chloral Hydrate	4 dr.
	Carbolic Acid	30 dp.

Mix with a little linseed meal, and make into a ball.

COOLING DIET FOR FEVERS.

Green food (grass, tares, vetches, clovers, lucerne, sainfoin), carrots, turnips, and potatoes; warm mashes of bran or boiled barley and bran; also cold water, Hay tea, milk, linseed jelly, and milk to drink.

COUGH MIXTURE FOR HORSE (GENERAL).

I.	Chlorodyne	4 oz.
	Glycerine	4 oz.

Mix, and give 2 tablespoonfuls night and morning in the food.

COUGH BALL FOR HORSE.

II.	Powdered Carbonate of Ammonia	2 dr.
,,	Camphor	1 dr.
,,	Squills	1 dr.
,,	Digitalis	½ dr.

Mix, and make into a ball with a little honey or treacle; give one each night.

COUGH PILLS FOR DOGS.

III. Carbonate of Ammonia ... ... 36 gr.
Powdered Squills ... ... 30 gr.
„ Camphor ... ... 30 gr.
„ Digitalis ... ... 18 gr.

Mix into a mass with a little honey, and divide into twelve pills; give one every day.

DIARRHŒA MIXTURE FOR HORSE OR COW.

I. Carbonate of Magnesia ... ... 4 dr.
Carbonate of Soda ... ... 4 dr.
Aromatic Spirits of Ammonia ... ... 4 dr.
Tincture of Ginger ... ... 4 dr.
Chlorodyne ... ... 4 dr.

Mix, and give in 3 gills cold water, and repeat every eight hours if necessary.

For DYSENTERY, from 30 to 60 drops of oil of cloves, creosote, or carbolic acid can be added to this mixture.

DIARRHŒA MIXTURE FOR PIG AND DOG.

II. Subnitrate of Bismuth ... ... 10 gr.
Carbonate of Soda ... ... 40 gr.
Carbonate of Magnesia ... ... 40 gr.

Mix and give in warm milk.

GREGORY'S MIXTURE, FOR CALVES IN WHITE SCOUR.

III. Carbonate of Soda ... ... 2 oz.
Carbonate of Magnesia ... ... 2 oz.
Powdered Rhubarb ... ... 1 oz.
Ginger ... ... 1 oz.

Mix, and give 1 tablespoonful night and morning in milk.

EMBROCATION, OR LINIMENT.

I. Gum Camphor ... ... 2 dr.
Turpentine ... ... 2 oz.
Colza Oil ... ... 5 oz.
Strong Liquid Ammonia ... ... 3 dr.
Liquor Potassæ ... ... 3 dr.

Dissolve the camphor in the turpentine, then add the other ingredients, and shake well together and apply externally.

BLISTERS FOR GENERAL USE: LIQUID FLY BLISTER.

II. Powdered Cantharides ... ... 2 dr.
Turpentine ... ... 4 oz.
Colza Oil ... ... 4 oz.

Mix, and heat in a water-bath. To be shaken up and well rubbed into the parts where required. This can be made weaker by adding together equal parts of this liquid blister and colza oil. When so diluted, it makes a good counter-irritant for sore throats.

BINIODIDE OINTMENT.

III. Biniodide of Mercury ... ... 1 dr.
Lard or Vaseline ... ... 7 dr.

Mix well together.

FEVER DRENCH FOR HORSE OR COW.

I.	Acetate of Ammonia, Dilute	3 oz.
	Spirits of Nitre	1 oz.
	Sulphuric Æther	½ oz.
	Infusion of Gentian	½ oz.

Mix, and give in 1 pint of cold water as a drench twice or thrice a day.

SALINE APERIENT FEVER MEDICINE FOR HORSE OR COW.

II.	Epsom or Glauber Salts	2 oz.
	Nitrate of Potash (Saltpetre)	3 dr.
	Cream of Tartar	3 dr.

Mix, and give as a drench in 1 pint of cold water, or in drinking water or cold hay tea two or three times a day.

ANTISEPTIC FEVER DRAUGHT FOR HORSE OR COW.

III.	Sulphate of Quinine	1 dr.
	Hydrochloric Acid	20 dp.

To be mixed in 1 pint cold water, and given as a drench twice a day with 2 drachms of chlorate of potash in the drinking water.

ANTISEPTIC FEVER POWDERS FOR COW.

IV.	Hyposulphite of Soda	2 oz.
	Exsiccated Iron	1 dr.
	Mixed Carminatives	3 oz.

Mix, and give in 1 quart of thin gruel night and morning.

FEVER POWDERS FOR RHEUMATISM, FOR HORSE AND COW.

V.	Salicylate of Soda	2 dr.
	Bicarbonate of Potash	3 dr.

Mix, and give in the food night and morning.

AMMONIA NITRATED WATER.

VI.	Carbonate of Ammonia	3 dr.
	Nitrate of Potash	3 dr.

Dissolve in a pail of cold water, or cold hay tea, and offer animal to drink for general fever purposes.

LIVER OR ALTERATIVE PILLS FOR DOGS.

Blue Pill Mass	1 dr.
Powdered Aloes	1 dr.
Powdered Rhubarb	1 dr.

Mix, and make into twelve pills, and give one every third day.

LOTIONS, REFRIGERANTS.

A simple refrigerant can be readily made as follows:

I.	Saltpetre	1 oz.
	Common Salt	1 oz.
	Cold Water	1 pt.
	Vinegar	1 pt.

Dissolve the salt and saltpetre in the water, then add the vinegar. Shake well, and apply a little to the affected parts, after hot fomentations.

An *Antiseptic Lotion* for sore and ulcerated mouths can be made as follows:

II. Condy's Fluid ... ... 1 tablespoonful.
Cold Water ... ... 1 pt.

Or—

III. Boracic Acid ... ... 2 dr.
Hot Water ... ... 1 pt.

The mouth may be washed out night and morning with a little of either of the above.

EYE LOTION.

IV. Boracic Acid ... ... 1 dr.
Wine of Opium ... ... 2 dr.
Rose Water ... ... 2 oz.
Distilled Water ... ... 6 oz.

Mix, and apply a little night and morning with a clean sponge.

IODINE LOTION OR SOLUTION.

V. Iodine ... ... 1 dr.
Iodide of Potassium ... ... 2 dr.
Cold Water ... ... 1 pt.

To be applied with a feather.

PURGING OR PHYSIC BALLS FOR HORSES.

I. Powdered Barbadoes Aloes ... ... 4–8 dr.
Powdered Ginger ... ... 1–2 dr.

Mix, and make into one ball with a little honey. As a laxative or aperient, from one-quarter to one-half can be given.

PURGATIVE MEDICINE FOR COW.

II. Epsom or Glauber Salts ... ... 16–20 oz.
Mixed Carminatives ... ... 4 oz.

For a laxative from one-quarter to one-half to be used.

Mix, and give in thin gruel.

RINGWORM MIXTURE FOR HORSE AND COW.

Flowers of Sulphur ... ... 4 oz.
Spirits of Tar ... ... 8 oz.
Whale Oil (Train Oil) ... ... 1 qt.

Mix together, and apply with a brush.

TAR OINTMENT.

Hard Fat or Palm Oil ... ... 3 lb.
Green Tar ... ... 1 lb.

Melt over a slow fire, and stir well together.

TONICS AND TONIC DIURETICS FOR HORSE.

For one Ball:

I. Nitrate of Potasn ... ... 4 dr.
Powdered Resin ... ... 2 dr.
Powdered Digitalis ... ... 1 dr.
Sulphate of Iron ... ... 1 dr.
Oil of Juniper ... ... 1 dr.

Make into a ball with soft soap, and give daily for four to six days.

Or a simple *powder* can also be made up with:

II.	Nitrate of Potash	4 dr.
	Carbonate of Iron	2 dr.

This may be given in a mash each night for six nights.

IODINE AND IRON TONIC POWDERS FOR HORSE AND COW.

III.	Iodide of Potassium	2 dr.
	Exsiccated Iron	1 dr.
	Nux Vomica	1 dr.

Mix, and give once a day in the food.

ALKALINE TONIC POWDERS FOR HORSE AND COW.

IV.	Carbonate of Soda	4 dr.
	Carbonate of Iron	2 dr.
	Powdered Nux Vomica	1 dr.
	Powdered Fenugreek	2 dr.

Mix, and give each night in the food, or as a drench in 1 pint of water.

WORM MEDICINES.

I. WORM DRAUGHT FOR HORSE OR COW:

Turpentine	2–4 oz.
Raw Linseed Oil	1 pt.

Mix, and give as a drench in the morning once a week until four doses have been given.

II. WORM POWDER FOR HORSE OR COW:

Flowers of Sulphur	½ oz.
Common Salt	½ oz.
Sulphate of Iron	1 dr.

Mix, and give in the food once a day for a fortnight.

III. WORM POWDER FOR AN ADULT SHEEP:

One-fourth of the foregoing quantities can be given.

IV. WORM POWDER FOR THE PIG:

Santonin, from 3 to 10 grains in the food, can be given three times in a fortnight.

V. WORM POWDER FOR THE DOG:

Powdered areca nut, ½ to 1 drachm, to be given in milk after twenty-four hours' fasting, and follow with—

Syrup of Buckthorn	½ oz.
Castor Oil	½ oz.

VI. For FLUKES in the liver of cattle and sheep, extract of male fern, or carbon tetrachloride.

VII. For PARASITES in the respiratory organs, fumigations of sulphur chlorine, and iodine are resorted to.

A LIST IN TABULATED FORM OF SOME OF THE MEDICINES AND THEIR DOSES COMMONLY USED FOR THE HORSE, COW, SHEEP, PIG AND DOG.

The doses are for ordinary adult animals, and can be increased or diminished as the case may be. For younger animals the doses must be regulated according to age. Thus, for a horse three years old and upwards, cow and sheep two years, pig one and a half years, dog one year old give full doses as per table; for an animal half the above ages give half the quantity of medicine, and so on, as example :

Horse three years old	...	... Give full dose.
,, one and a half years old		... Half the dose.
,, nine months old	...	... One-fourth the dose.
,, four and a half months old		... One-eighth the dose.

For the cow, from a quarter to half as much more as that named in the first column for the horse.

The terms used in the annexed columns may be understood as follows:

Oz. stands for ounce; dr. for drachm; gr. for grain; dp. for drop.

Medicines.	*Horse.*	*Sheep.*	*Pig.*	*Dog.*
Æther, Sulphuric ...	½-1½ oz.	—	½-1½ dr.	20-60 dp.
Aloes	2-8 dr.	—	2-4 dr.	15-60 gr.
Alum	2-4 dr.	½-1½ dr.	20-60 gr.	10-20 gr.
Aniseed	½-1½ oz.	1-2 dr.	½-2 dr.	15-30 gr.
Antimony, Black ...	1-3 dr.	10-30 gr.	7-20 gr.	3-10 gr.
Antimony, Tartarized (Tartar Emetic)	Worms, 1-3 dr.	—	Emetic, 4-12 gr.	Emetic, 2-6 gr.
	Febrifuge, ½-2 dr.	2-6 gr.	1-3 gr.	1-2 gr.
Areca Nut	½-1½ oz.	1-3 dr.	½-2 dr.	½-2 dr.
Aromatic Spirits of Ammonia	½-2 oz.	1-2 dr.	½-2 dr.	20-60 dp.
Assafœtida	2-6 dr.	1-2 dr.	15-60 gr.	5-20 gr.
Belladonna Extract ...	½-2 dr.	5-10 gr.	2-6 gr.	1-4 gr.
Bicarbonate of Soda ...	½-1 oz.	1-2 dr.	1-2 dr.	20-60 gr.
Bicarbonate of Potash	½-1 oz.	1-2 dr.	1-2 dr.	20-40 gr.
Boracic Acid	1-3 dr.	10-30 gr.	10-20 gr.	5-10 gr.
Bromide of Ammonia	1-3 dr.	10-30 gr.	10-20 gr.	5-10 gr.
Bromide of Potassium	2-6 dr.	½-2 dr.	¼-1 dr.	10-20 gr.
Carbonate of Iron ...	1-3 dr.	15-30 gr.	10-20 gr.	5-10 gr.
Carbonate of Ammonia	2-8 dr.	15-30 gr.	10-20 gr.	5-10 gr.
Carbonate of Magnesia	1-6 dr.	30-60 gr.	20-60 gr.	10-20 gr.
Castor Oil (purgative)	½-1½ pt.	2-8 oz.	1-3 oz.	½-2 oz.
Calumba Powder ...	2-6 dr.	½-2 dr.	15-60 gr.	10-20 gr.
Calomel	15-60 gr.	4-10 gr.	2-7 gr.	½-2 gr.
Caraway	½-2 oz.	1-2 dr.	½-1½ dr.	10-30 gr.
Cantharides	5-10 gr.	2-6 gr.	1-4 gr.	½-2 gr.

Medicines.	*Horse.*	*Sheep.*	*Pig.*	*Dog.*
Camphor	1-3 dr.	10-30 gr.	8-20 gr.	3-10 gr.
Carbolic Acid	½-2 dr.	10-20 dp.	6-15 dp.	4-8 dp.
Cayenne Pepper ...	1-4 dr.	½-2 dr.	15-60 gr.	8-30 gr.
Chalk	½-2 oz.	1-2 dr.	½-2 dr.	½-1 dr.
Chloride of Ammonia	2-6 dr.	½-1½ dr.	15-60 gr.	10-20 gr.
Chloride of Lime ...	2-6 dr.	15-60 gr.	10-45 gr.	6-20 gr.
Chinosol	½-1½ dr.	8-20 gr.	5-12 gr.	3-6 gr.
Charcoal	½-1½ oz.	1-2 dr.	½-2 dr.	½-1 dr.
Chloride of Sodium (Common Salt) ...	½-2 oz. Cow, 8-16 oz.	1½-3 dr.	1-2 dr. Emetic	20-60 gr.
Chloral Hydrate ...	2-8 dr.	½-1½ dr.	15-60 gr.	8-30 gr.
Chloroform	1-2 dr.	10-30 dp.	8-20 dp.	3-10 dp.
Chlorodyne	2-8 dr.	10-60 dp.	10-30 dp.	3-15 dp.
Chlorate of Potash ...	1-3 dr.	10-30 gr.	10-20 gr.	3-10 gr.
Cocaine	2-8 gr.	1-3 gr.	½-2 gr.	⅛-1 gr.
Cod-Liver Oil ...	2-8 oz.	3-8 dr.	2-6 dr.	1-5 dr.
Coriander Powder ...	½-1½ oz.	1-2 dr.	½-1½ dr.	20-60 gr.
Croton Oil	5-10 dp.	2-4 dp.	5-10 dp.	½-2 dp.
Cream of Tartar ...	1-3 oz.	2-5 dr.	1-3 dr.	½-1½ dr.
Easton's Syrup ...	½-2 oz.	2-3 dr.	1-2 dr.	½-1 dr.
Epsom Salts (Sulphate of Magnesia)—purgative	½-1 lb.	1-4 oz.	½-2 oz.	1-4 dr.
Ditto	1-3 oz. as Febrifuge for Horse and Cow.			
Ergot of Rye	½-1 oz.	½-1½ dr.	½-1 dr.	10-30 gr.
Eucalyptus	½-1 dr.	10-20 dp.	8-12 dp.	2-6 dp.
Gentian (powdered) ...	2-8 dr.	½-2 dr.	15-60 gr.	7-20 gr.
Ginger (powdered) ...	2-8 dr.	½-2 dr.	15-60 gr.	7-20 gr.
Glycerine	2-5 oz.	3-8 dr.	2-5 dr.	1-3 dr.
Glauber Salts (Sulphate of Soda)—(purgative)	½-1 lb.	1-4 dr.	—	½-1½ dr.
Ditto	1-3 oz. Febrifuge for Horse and Cow.			
Hydrochloric Acid (dilute)	1-3 dr.	10-30 dp.	10-20 dp.	4-10 dp.
Hyposulphite of Soda	½-4 oz.	1-4 dr.	½-1½ dr.	15-45 gr.
Iodine	10-60 gr.	2-5 gr.	1-3 gr.	½-2 gr.
Iodide of Potassium ...	½-2 dr.	10-30 gr.	4-20 gr.	2-10 gr.
Iodoform	1½-2 dr.	15-30 gr.	10-20 gr.	6-10 gr.
Jalap	—	—	1-3 dr.	½-1½ dr.
Juniper Berries ...	½-2 oz.	1-3 dr.	½-2 dr.	15-60 gr.
Laudanum (Tincture of Opium)	1-4 oz.	1-4 dr.	½-2 dr.	10-25 dp.
Liquor Ammoniæ, Acetatis (dilute) ...	2-6 oz.	½-1½ oz.	2-8 dr.	1-3 dr.
Linseed Oil (purgative)	½-1½ pt.	3-10 oz.	2-6 oz.	1-2 oz.

Medicines.	*Horse.*	*Sheep.*	*Pig.*	*Dog.*
Male Fern (Liquid Extract)	½-1½ oz.	1-3 dr.	½-2 dr.	15-35 dp.
Morphia	5-10 gr.	1-2 gr.	½-1½ gr.	⅛-¼ gr.
Mustard	½-1½ oz.	1-2 dr.	½-1½ dr.	14-20 gr. Emetic, 2-5 dr.
Nitrate of Potash (Saltpetre)—febrifuge ...	1-4 dr.	10-35 gr.	8-20 gr.	3-10 gr.
Ditto (diuretic) ...	Twice the above doses.			
Nitric Acid (dilute) ...	1-3 dr.	12-35 dp.	8-20 dp.	4-10 dp.
Nux Vomica	20-60 gr.	3-15 gr.	2-10 gr.	1-3 gr.
Oak Bark (powdered)	2-5 dr.	½-1½ dr.	15-60 gr.	8-20 gr.
Oil of Juniper... ...	½-1½ dr.	8-20 dp.	5-16 dp.	2-5 dp.
Oil of Mint	20-60 dp.	5-10 dp.	4-7 dp.	1-3 dp.
Opium (powdered) ...	1-2 dr.	6-30 gr.	5-20 gr.	1-5 gr.
Pimento Powder (Sweet Pepper) ...	2-6 dr.	½-1½ dr.	20-60 gr.	8-20 gr.
Pepper (black) ...	1-3 dr.	15-30 gr.	8-20 gr.	4-12 gr.
Pepper (white) ...	1-3 dr.	15-30 gr.	8-20 gr.	4-12 gr.
Quassia Powder ...	3-6 dr.	½-1 dr.	20-30 gr.	8-20 gr.
Quinine (Sulphate) ...	¼-2 dr.	5-15 gr.	3-10 gr.	2-5 gr.
Resin	½-1 oz.	1-1½ dr.	½-1 dr.	15-30 gr.
Rhubarb (powdered) ...	½-1 oz.	2-3 dr.	1-2 dr.	15-30 gr.
Santonin	15-40 gr.	3-15 gr.	2-10 gr.	1-5 gr.
Salicylate of Soda ...	2-4 dr.	25-45 gr.	15-30 gr.	7-20 gr.
Spirits of Nitre ...	½-3 oz.	2-4 dr.	1-3 dr.	20-60 dp.
Subnitrate of Bismuth	1-2 dr.	10-30 gr.	7-20 gr.	3-10 gr.
Sulphur (Flowers) ...	½-1½ oz.	1-2 dr.	1-4 dr.	20-60 gr.
Sulphate of Iron ...	1-3 dr.	15-30 gr.	8-20 gr.	5-10 gr.
Sulphuric Acid (dilute)	1-3 dr.	15-30 dp.	8-20 dp.	4-10 dp.
Sulphate of Copper ...	½-2 dr.	10-15 gr.	5-10 gr.	1-3 gr.
Sulphate of Zinc ...	½-2 dr.	8-15 gr.	4-10 gr.	1-3 gr.
Sugar of Lead ...	½-1½ dr.	10-25 gr.	4-15 gr.	1-3 gr.
Syrup of Buckthorn ...	—	—	—	½-2 oz. Cat, 1-2 dr.
Syrup of Squills ...	1-2 oz.	1-3 dr.	1-2 dr.	½-1 dr.
Tannic Acid	½-1½ dr.	10-20 gr.	8-16 gr.	2-6 gr.
Tincture of Aconite (Fleming's)	10-25 dp.	2-8 dp.	2-6 dp.	1-3 dp.
Tincture of Arnica ...	½-1½ oz.	1-1½ dr.	½-1 dr.	10-20 dp.
Tincture of Benzoin ...	½-2 oz.	1-3 dr.	1-2 dr.	15-35 dp.
Tincture of Catechu ...	½-2 oz.	1-4 dr.	1-3 dr.	1-1½ dr.
Tincture of Ginger ...	½-2 oz.	2-4 dr.	1-1½ dr.	15-25 dp.
Tincture of Iron ...	½-4 dr.	10-60 dp.	5-20 dp.	3-10 dp.
Turpentine	½-2 oz.	1-4 dr.	½-1 dr.	20-50 dp.

WEIGHTS, MEASURES, AND OTHER SUBSTITUTES:

One small Dessertspoonful	One-quarter of an ounce.
One small Teaspoonful	One-eighth of an ounce (or one drachm).
Sixty Grains or Minims (Drops)	One drachm.
One small Tablespoonful	One half-ounce.
Two small Tablespoonfuls	One ounce.
One small (sherry) Wineglassful	Two ounces.
One Teacupful	Six ounces
One Breakfastcupful	Ten ounces or half-pint.

As spoons and glasses vary very much in size, the smallest must be used to represent the above.

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