VETERINARY OBSTETRICS

A COMPENDIUM

FOR THE USE OF

STUDENTS AND PRACTITIONERS

BY

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TO

ALEXANDER LIAUTARD, M.D., V.S.,

AS A TOKEN OF PERSONAL ESTEEM,

AS WELL AS FOR HIS UNTIRING EFFORTS TO ADVANCE THE

INTERESTS OF OUR NOBLE PROFESSION IN AMERICA,

IS THIS LITTLE VOLUME

Respectfully Dedicated

BY

THE AUTHOR.

PREFACE.

In offering this little volume to the Veterinary Profession of America, it is not my desire to encourage the student in the neglect of the more voluminous works on Veterinary Obstetrics, but more with the idea of aiding him, when time is an object, in reviewing his studies on the subject. It is with the hope, also, that it may be of service to the busy obstetrician, in refreshing his memory when quick reference is required, or when larger works may be inaccessible.

In the preparation of this compendium, the following literature has been consulted, and, in several of the sections, somewhat freely quoted: "Fleming's Obstetrics," "Chauveau's Comparative Anatomy" (Fleming), "Vade Mecum of Equine Anatomy" (Liautard), Friedberger & Frohner's "Pathology and Therapeutics of the Domestic Animals," "Moller's Surgery," "Journal of Comparative Pathology and Therapeutics" (McFadyean), articles in published reports of the U. S. Department of Agriculture (Law); and I am much indebted to my friend Mr. John Renfrew, M.R.C.V.S., of Glasgow, Scotland, for numerous and copious notes. I am under many obligations to Dr. George Fleming, C.B., of Higher Leigh, Combe Martin, North Devon, England, for his kindness in granting permission to use the cuts (from

his valuable work on obstetrics) for the purpose of illustrating the text.

The printer and publisher, William R. Jenkins, New York City, deserves my thanks, not only for the style and neatness with which he has executed his work, but for the promptness with which he has facilitated the reading of the proof, etc.

Should this little work seem to fill a gap, and find a modest but useful place in our veterinary literature, I will feel fully repaid for any time or trouble expended.

W. H. DALRYMPLE.

Baton Rouge, Louisiana, U.S.A.

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VETERINARY OBSTETRICS

Chapter I.

ANATOMY.

FEMALE ORGANS CONCERNED IN GENERATION AND PARTURITION:

The Pelvis, Vulva, Clitoris, Vagina, Uterus, Fallopian Tubes, Ovaries and Mammae.

The Pelvis.

This cavity is formed of bony and ligamentous walls, and contains a portion of the genito-urinary apparatus, as well as the terminal portion of the alimentary canal. It is situated towards the end of the spine, and is supported by the hinder extremities, with which it is connected by joints and muscles. It is composed of three principal bones—the two *ossa innominata*, or *coxae*, and the *sacrum*, and to some extent of the *coccygeal vertebrae*.

OS INNOMINATUM.

The *os innominatum*, or *coxa*, one on each side, is a flat bone, expanded at either extremity, somewhat constricted in the middle, and curved in two different directions. At its middle it has a wide and deep articular depression surrounded by a high rim,—the acetabulum or cotyloid cavity,—in which the articular head of the femur is lodged and moves. Above this cavity there is a roughened thin ridge, the supra-cotyloid crest or ischiatic spine, into

which the sacro-sciatic ligament is fixed. Below the cavity, and inclining inwards, is a large circular opening, occupied by the obturator muscles and known as the *foramen ovale*, or *obturator foramen.* The two *ossa innominata* are united in the middle line inferiorly and posteriorly by a solid suture—the *symphysis pubis*, or *ischio-pubic symphysis.* Above they articulate with the sacrum.

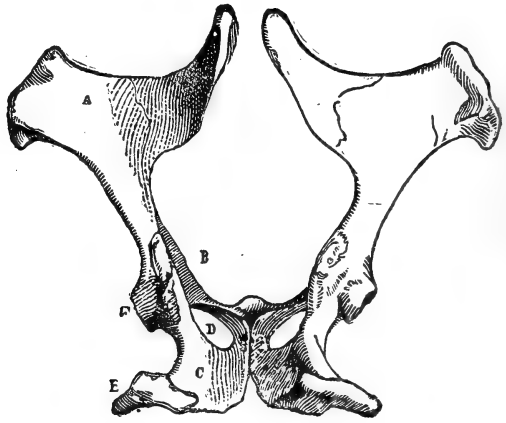

FIG. 1.

PELVIS OF THE MARE.

A, Ilium; B, Pubis; C, Ischium; D, Foramen Ovale; E, Tuberosity of the Ischium; F, Cotyloid Cavity.

The *os innominatum* is composed of three portions uniting at the acetabulum, and have received the names: the *ilium*, *ischium*, and *pubis.*

The *ilium*, *hip*, or *haunch*, is the largest of the three bones. It is irregularly triangular in shape, and is directed obliquely downwards, inwards and backwards, and has two faces, three borders, and three angles. The external face presents the external iliac fossa; the internal face the iliac surface, and an auricular

facet for articulation with the sacrum. The anterior border or crest is concave; the external has a medullary foramen and vascular grooves; the internal forms the great sciatic notch. The external angle or point of the hip has four tuberosities for muscular attachment. The internal, or antero-internal angle is a rough tuberosity curving upwards and backwards, forming, with the corresponding portion of the opposite ilium, the summit of the croup. The posterior or cotyloid angle offers a facet for the cotyloid cavity, the supra-cotyloid crest, the ilio-pectineal eminence, and some muscular imprints.

The *ischium* is the most posterior of the three bones. It is flat and irregularly quadrilateral in shape, and is composed of a solid portion (the body) and a narrow part (the neck). It is divided into two faces, four borders, and four angles. The upper face is smooth, and forms the floor of the pelvic cavity; the inferior face is roughened for the attachment of muscles, and presents the ischial crest. The anterior border forms the obturator foramen, the external the small sciatic notch; the posterior forms the ischial arch, while the internal is articular. The antero-external or cotyloid angle presents a diarthrodial facet, and the posterior extremity of the supra-cotyloid crest; the antero-internal angle is articulated with the pubis; the postero-external forms the ischial tuberosity; and the postero-internal articulates with that of the opposite side.

The *pubis* is the smallest of the three bones, and is situated between the ilium and ischium. It is divided

into two faces, three borders, and three angles. The superior face is smooth and concave; the inferior has a large groove for the pubio-femoral ligament. The anterior border is thin and rough, the posterior thick and concave, and assists in forming the obturator foramen; the internal border is thick and articular. The external or cotyloid angle forms the bottom of the cotyloid cavity; the internal and posterior angles are articular.

The *sacrum* results from the fusion of five vertebræ into a single, voluminous, pyramidal or triangular mass. It may be said to terminate the vertebral spine posteriorly. It encloses the pelvic cavity above, and articulates in front with the last lumbar vertebra, behind with the first coccygeal, and laterally with the *ossa innominata*. It is divided into two faces, two borders, a base, an apex, and a central canal. The superior face presents the spinous processes forming the sacral spine, bent backwards and diminishing in length posteriorly; it offers on each side the four supra-sacral foramina. The inferior face is smooth and shows the lines of separation of the vertebræ, and on each side the four sub-sacral foramina. The borders are thick and concave, rough posteriorly, having forward a broad, rough auricular surface to articulate with the *ossa innominata*. The base offers, on the median line, the anterior orifice of the sacral canal, and the anterior articular head of the body of the first sacral vertebra; on the sides, the articular processes and the anterior notches of that vertebra, and the outside, the two large facets for articulation with the last lumbar vertebra.

The apex presents the posterior opening of the sacral canal, the posterior articular cavity, the body of the last sacral vertebra, the vestiges of the articular processes, and the posterior notches of that vertebra. The sacral canal is a part of the rachidian canal, triangular, and diminishes in width posteriorly.

The *coccyx* is composed of from fifteen to eighteen coccygeal or caudal vertebræ, situated behind the sacrum, the first three of which may be said to belong to the pelvis.

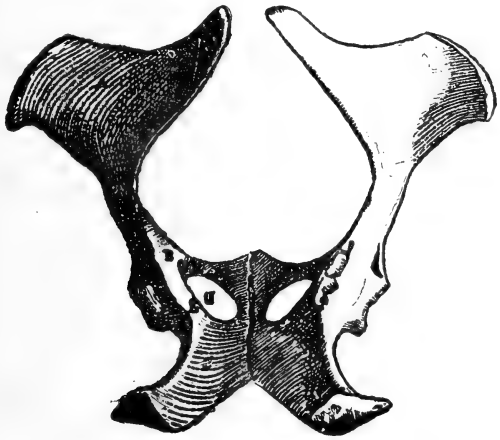

FIG. 2.

PELVIS OF THE COW.

A, Ilium; B, Pubis; C, Ischium; D, Foramen Ovale; E, Sciatic Spine; F, Cotyloid Cavity; G, Tuberosity of the Ischium.

DIFFERENCES OF THE BONES OF THE PELVIS OF OTHER DOMESTIC ANIMALS.

The *coxæ* in all the domestic animals are more or less horizontal, and the *ilium* has a vertical direction.

In the Cow, the space between the coxæ is no greater before than behind; they are less solid and

voluminous than in the mare. The iliac concavity not so wide, and is more vertical than in the mare.

The *ischium* is thinner, but has a wider surface, is more curved from before to behind, and from side to side; while the ischiatic spine is prominent and thin. There are three tuberosities on the postero-external angle.

The *pubis* is wide and thin; the upper face is very concave, and on its inferior face it has no channel. The foramen ovale is large. There is earlier ossification of the symphysis than in the mare.

The *sacrum* is longer, more curved and voluminous.

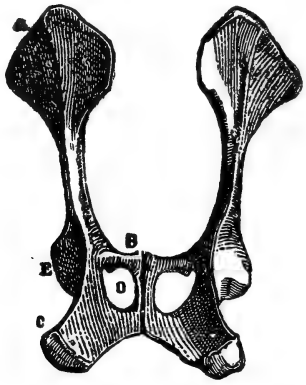

FIG. 3.
PELVIS OF THE SHEEP.
A, Ilium; B, Pubis; C, Ischium; D, Foramen Ovale; E, Cotyloid Cavity.

The caudal vertebræ are stronger and more tuberous; sixteen to twenty in number.

The *pelvis* of the Sheep and Goat resembles that of the Cow, although, on the whole, it is more horizontal and longer.

In the Bitch and Cat, the lateral diameter is greater before than behind. The *ilium* is almost

vertical. The *sacrum* is somewhat quadrangular; is composed of three bones which are consolidated at an early age. Only three vertebral foramina.

The bones of the *coccyx* are strong and tuberous, the first five or six being as perfect as the true vertebral bones.

The pelvis of the Hog (Pig) resembles that of the Sheep. The iliac crest is convex. The pubis is narrow, and the ischium has a tuberous prominence. The sacrum is composed of four vertebræ, which do not become entirely consolidated for a length of time.

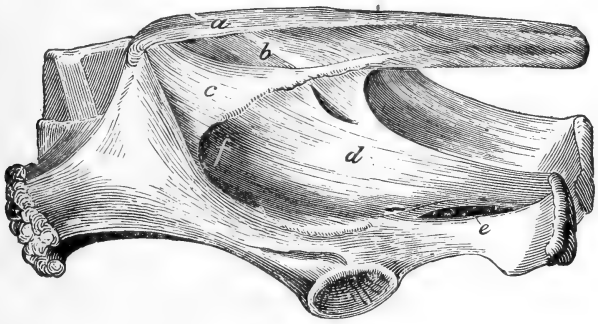

FIG. 4.

LATERAL LIGAMENTS OF THE SACRUM AND PELVIS.

a, Superior Sacro-iliac Ligament; *b*, Sacral Ligament; *c*, Lateral Sacro-iliac Ligament; *d*, Sacro-sciatic Ligament; *e*, Small Sciatic Notch; *f*, Great Sciatic Notch.

The spinous processes are absent. The spinal canal is open above, due to the neural arch being deficient on each side.

THE PELVIC ARTICULATIONS.

Five in number: sacro-lumbar, two sacro-iliac, the ischio-pubic symphysis, the sacro-coccygeal articulations and the ilio-sacral and sacro-sciatic ligaments.

With the exception of the equine species, the sacrum is joined to the last lumbar vertebra by three diarthrodial surfaces only—the head of the body and two transverse processes.

The ischio-pubic symphysis in the Cow is considerably longer than in the Mare and not rectilinear; ossification of the symphysis is less complete, and takes place much later than in the Mare.

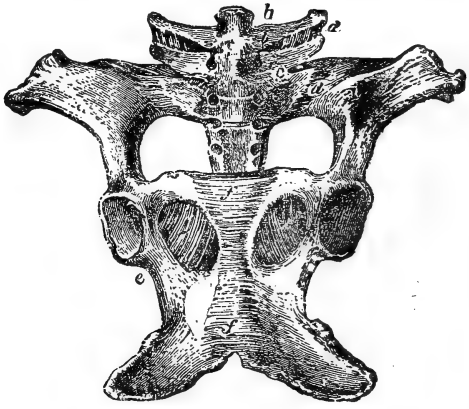

FIG. 5.

LIGAMENTS OF THE LUMBAR VERTEBRÆ, SACRUM AND PELVIS.

(*Seen from below.*)

a, Intertransverse Ligament of the Lumbar Vertebræ; *b*, Capsular Ligament of the Spinous Process of the Fifth and Sixth Lumbar Vertebræ; *c*, Capsular Ligament of the Sacrum; *d*, Inferior Sacro-iliac Ligament; *e*, Obturator Ligament; *f*, Transverse Ligament of the Ischio-pubic Symphysis.

In the Sheep and Goat, the ischio-pubic symphysis is rectilinear. Ossification very late in life, and almost never in those animals which have had many young. These remarks apply also to the Pig.

In the Bitch and Cat, the symphysis rarely ossifies.

The sacro-sciatic ligament is attached superiorly to the lateral borders of the transverse processes of the

sacrum and first two or three coccygeal vertebræ; inferiorly, to the superior ischiatic spine and tuberosity of the ischium.

The Mare's pelvis represents a somewhat cone-shaped cavity at the posterior part of the trunk continuing the abdominal cavity. It has an internal and an external surface, and two openings.

The anterior opening is termed the inlet of the pelvis, by which the fœtus enters the pelvic cavity. The posterior is known as the outlet or recto-urethral opening.

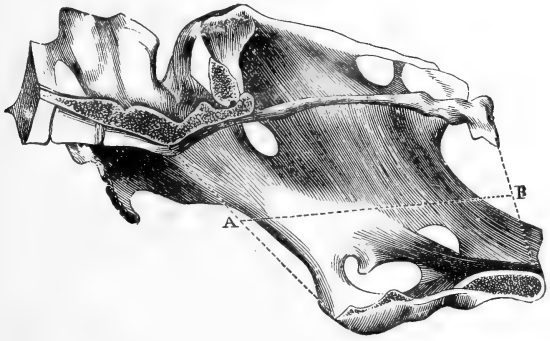

FIG. 6.

DIAGRAM OF THE MARE'S PELVIC AXIS.

A, Inlet; B, Outlet.

The diameters of the inlet are generally recognized as two: The supero-inferior or sacro-pubic, which is the width between the sacro-vertebral angle and the symphysis pubis. It varies with the size of the animal, but is usually between eight and ten inches. The transverse or bis-iliac diameter is the distance between one ilio-pectineal crest and the other. From seven to nine inches.

The outlet of the Mare's pelvis is limited above by the apex of the sacrum and the base of the coccyx, and below by the ischial arch formed by the junction of the two ischia; and laterally by the upper surface of the ischia, and posterior border of the sacro-sciatic ligaments. The diameters are usually less than those of the inlet.

The pelvis of the Cow is longer than that of the Mare, and not so vertical; the ischio-pubic symphysis is longer, and is very curved, making the floor concave

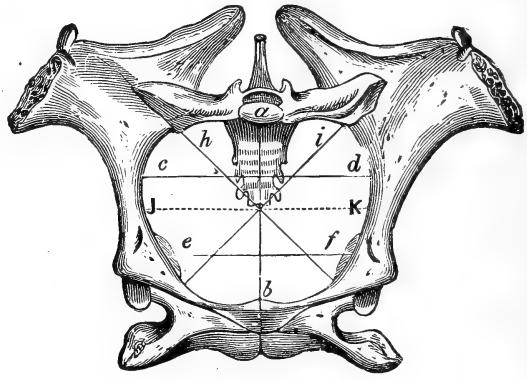

FIG. 7.

INLET OF THE PELVIS OF THE MARE.

a b, Supero-inferior, or Sacro-pubic Diameter; *c d*, Superior Bis-iliac Diameter; *e f*, Inferior Bis-iliac Diameter; *e i*, *f h*, Oblique, Ilio-sacral or Sacro-iliac Diameters; J K, Middle Diameter.

in every direction. Comparatively speaking, the bony structure is altogether more extensive. The sacral surface is more concave, and the sacro-sciatic ligaments, although narrower, are longer. Compared with its height, the Cow's pelvis is less wide.

The inlet being more oblique than in the Mare, the diameters are very unequal.

The diameters of the outlet are more equal, being about those of the transverse diameter of the inlet. The cavity is more cylindrical and less conical than that of the Mare.

In the Sheep and Goat, ossification occurring at a much later period, allows of the pelvic cavity being increased during parturition, and permits of the act being performed with fewer difficulties in these animals.

In the Pig, the general conformation of the pelvis

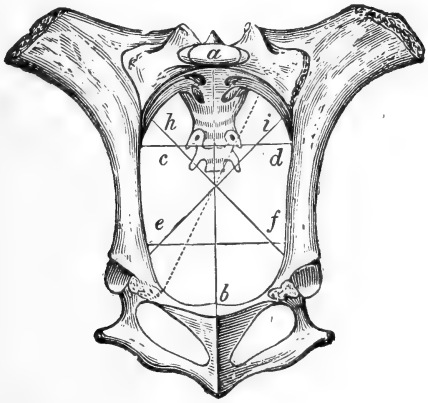

FIG. 8.

INLET OF THE COW'S PELVIS.

a b, Supero-inferior, or Sacro-pubic Diameter; *c d*, Superior Bis-iliac Diameter; *e f*, Inferior Bis-iliac Diameter; *e i*, *f h*, Oblique, Ilio-sacral or Sacro-iliac Diameters.

is not unlike that of ruminants. The promontory of the sacrum is more salient, the canal longer, the plane of its anterior circumference more oblique, and the direction of the ischio-pubic symphysis perfectly rectilinear. The cavity is very large in proportion to the size of the young at birth, hence accidents are rare during parturition.

In the Bitch and Cat, the promontory of the sacrum is still more marked than in the Pig, which diminishes notably the inlet of the pelvis; the direction of the symphysis is rectilinear, and the general outline of the cavity is nearly cylindrical, although the inlet is larger below than above. The narrowest part of the canal is immediately above the obturator foramen, where the ischium is wide and shallow, and rises abruptly to almost a right angle.

The Vulva.

This is the most external portion of the female reproductory organs, and presents posteriorly an opening situated vertically under the rectum, from which organ it is separated by a narrow space—the perineum.

The labiæ form the lateral boundaries, and, in the normal condition of the parts, are in contact with each other. They are lined on their internal surface with mucous membrane; externally with a very smooth skin devoid of hair.

The cavity of the vulva varies in length in the cow and mare, from six to ten inches. At parturition, the walls become separated to allow of the escape of the fœtus.

The cavity contains several organs accessory to reproduction, which we will now notice separately.

The Clitoris.

This organ is situated on the inferior commissure of the vulva, and corresponds to the corpus cavernosum

of the male. It is firmly held in position by a fold of ligamentous tissue, to the floor of the vulva. It is composed principally of erectile tissue, which tissue becomes congested at the period of œstrum, rut, or heat. The clitoris is covered, on its free surface, with a pigmented membrane which is arranged in folds, and is very highly endowed with sensibility; this membrane being believed to perform an important function in the act of copulation.

The Hymen.

This is a fold of mucous membrane which more or less completely separates the vulva from the vagina, and stretches across the passage at the division of these two organs. It is a very delicate mucous structure, and for a long time it was believed that this membrane was normally complete, and was only ruptured at the first act of copulation, and its presence or absence was looked upon as a sign of virginity. Even to this day some authorities hold that laceration of this membrane denotes the absence of virginity. This, however, is a mistake in all animals, as some human females have been examined who never had coition, and this membrane was represented simply by a small band; while others again have been examined and this membrane found complete after the female had given birth to several children.

In our subjects, the hymen is often well developed in Fillies, but is often absent, or only rudimentary, in Heifers

The Meatus Urinarius.

This is the external opening of the female urethra, and is found on the floor of the vulva about five inches from its external opening, but the distance varies in different animals. The opening is guarded by a fold of mucous membrane attached to the floor and sides of the vulva, having its free border placed in a backward direction. This membrane is believed to prevent the passage of urine into the vagina. In the Cow, immediately behind the opening of the meatus, there is a small fossa about half an inch in depth, also guarded by a valve, the function of which is doubtful, but it frequently causes difficulty in passing the catheter in that animal, being mistaken for the meatus.

About one inch from the external opening of the vulva in the Cow, are situated some almond-shaped conglomerate glands whose ducts unite to form a sinus, by which the secretion from the glands is thrown into the vulva about half an inch, from the external border. These glands are only active at the period of œstrum, and are believed to secrete a fluid having a characteristic odor, which seems to attract the opposite sex at this period.

In the female Pig, there is no vulvo-vaginal membrane guarding the opening of the meatus, and in this animal the clitoris is only rudimentary, and often absent altogether.

In the female Cat, there is in the clitoris a small cartilaginous body which has not been seen in any other of the domestic animals, and has been believed

by some to be the means of prolonging the act of copulation in this feline.

In the female Sheep, the hymen is often represented by a delicate band stretching obliquely across the cavity, and even this is sometimes absent.

The Vagina.

This is the cavity which connects the vulva and uterus. It varies in length from nine to twelve inches,

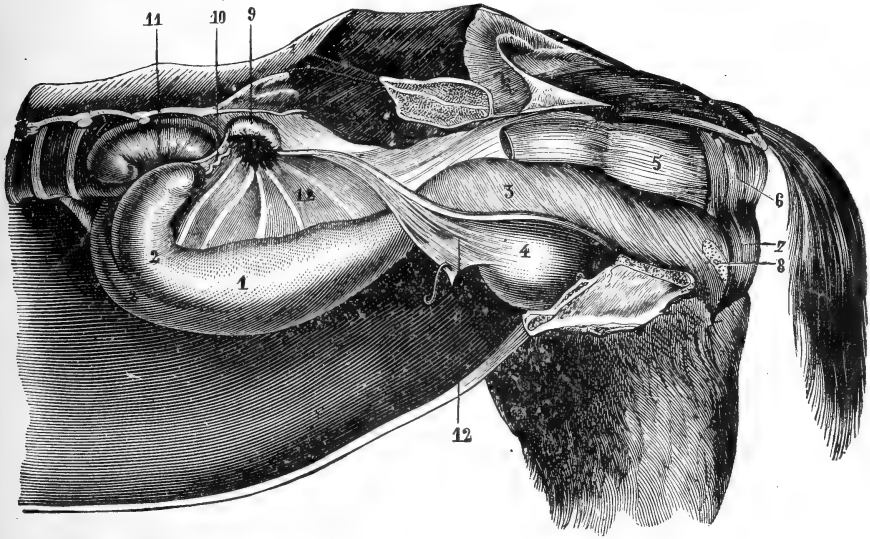

FIG. 9.

THE GENERATIVE ORGANS OF THE MARE *in situ*.

1, Body of the Uterus; 2, 2, Cornua of the Uterus; 3, Vagina; 4, Bladder; 5, Rectum; 6, Sphincter of the Anus; 7, Constrictor Muscle of the Vulva; 8, Bulb of the Vagina; 9, Ovary and Fimbriated Body; 10, Fallopian Tubes; 11, Kidney; 12, 12, Broad Ligament.

and the membrane of its walls is very loosely attached to the sub-mucous tissue. In the normal condition this membrane is thrown into folds, which in the Cow are always in a transverse direction, and in the Mare

are longitudinal. These folds assist in enlarging the cavity at the period of parturition, and become obliterated then.

Anteriorly the vagina receives into it the cervix or neck of the uterus, which is projected some distance into its cavity, and has its walls thrown into a number of folds or ridges.

In the walls of the vagina in the Cow, and sometimes also in the Mare, are found the canals of Gærtner, which are believed to perform a function in fœtal life. By one extremity these canals open into the vulva at the lateral aspect of the meatus, and by their other extremity they terminate in a blind cavity in the walls of the uterus.

The Uterus.

This is the most important female organ of reproduction, and is the cavity in which the healthy or normal development of the fœtus takes place, and where it is retained and nourished until it is able to maintain an independent existence outside of the body. This organ is divided into a body and two horns. The horns are situated anteriorly, and are slightly curved on themselves, presenting inferiorly a concave curvature in the Cow, and a convex one in the Mare. The internal cavity of the uterus, like the external, is also divided into a body and two horns, but in the non-pregnant animal, the horns are only very rudimentary, and become enlarged to accommodate the fœtus after impregnation and growth take place. The walls of the uterus and horns are formed of three distinct layers,

viz.: an internal, mucous; a middle, muscular; and an external, serous layer. The central or muscular layer has its fibres arranged in different directions, some longitudinal and others circular. The muscular fibres become considerably hypertrophied in the pregnant state, and by their contractions are largely responsible for the expulsion of the fœtus.

In the Cow, the mucous membrane of the uterus, and more especially that of the horns, is studded with a great many processes, resembling very much the appearance of the half of a large English walnut. These processes are called the maternal cotyledons. They contact with opposing surfaces on the fœtal membrane, and by means of this connection, circulation between the fœtus and parent takes place in the uterus.

In the Sheep and the Goat, these cotyledons are concave on their free surfaces, and in the Mare they are entirely absent, the connection being diffuse.

The uterus is held in position to the sub-lumbar region, by two broad ligaments which are attached to the superior border of the horns, and between the folds of these are found the Fallopian tubes.

Fallopian Tubes.

Two in number, are situated between the folds and near to the anterior border of the broad ligaments. By their posterior extremities, they communicate with the uterine horn of their own side, and by their anterior extremities, indirectly with the ovary.

The Ovaries.

These organs, two in number, resemble very much in shape and size the testes of male animals, but are always comparatively smaller. They are situated in the sub-lumbar region, being suspended at the anterior extremity by the broad ligament. Each ovary consists

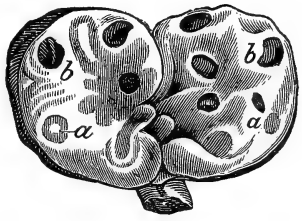

FIG. 10.
OVARY OPENED VERTICALLY.
a, *a*, *b*, *b*, Graafian Vesicles at different stages of development.

of a serous covering externally, the tunic or covering proper of the ovary, a number of Graafian vesicles, each of which contains a number of ova, and on the presence of these vesicles and the ova the life of the future animal depends.

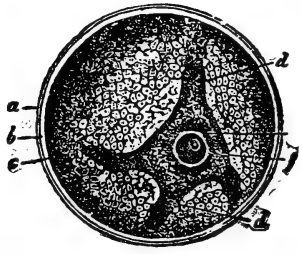

FIG. 11.
GRAAFIAN VESICLE AND OVUM.

Mammary Glands or Mammæ.

The mammæ of the Mare are situated in the inguinal region, and are formed of two hemispherical

masses, distinct from each other, and having in their centre the teat, nipple, or mammillæ. They are composed of a yellow elastic fibrous envelope, glandular tissue made up of acini, clustered in groups around the lactiferous ducts, which by their union open into the galactophorous sinuses, from which arise the true excretory canals of the glands.

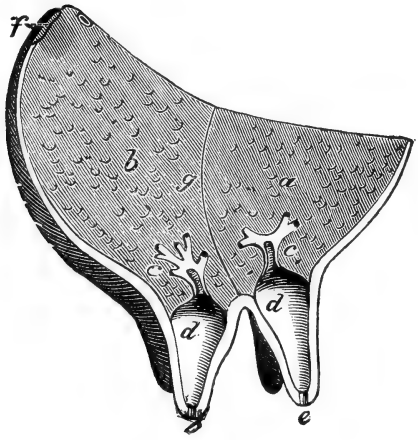

FIG. 12.

SECTION OF UDDER OF COW.

a, Anterior Quarter; *b*, Posterior Quarter; *g*, Septum between the Quarters; *c*, *c*, Section of the Lactiferous Ducts; *d*, *d*, Lactiferous Sinus or Milk Cistern; *e*, *e*, Orifice of the Teat; *f*, Large Lymph Gland in the Posterior Quarter.

In the Cow the mammæ are also inguinal, and are composed of two symmetrical halves placed one against the other. Each half is again divided into two distinct glands, each with its own teat, so that the vessel consists of four mammæ and four teats; behind this there may be two small rudimentary teats. In the centre of each quarter, just at the base of the teat, is a large galactophorous sinus, the general receptacle of all the lactiferous conduits.

In the small ruminants there are two mammæ and two teats, constructed like those of the Cow.

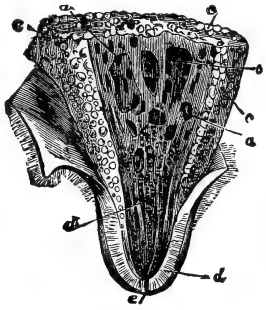

FIG. 13.

SECTION OF THE COW'S TEAT.

a, *a*, Principal Lactiferous Ducts; *b*, Lactiferous Sinus; *c*, *c*, Acini; *d*, Elastic or Dartoid Tissue of the Teat; *e*, Orifice of the Teat.

In the Pig the mammæ are ten or twelve in number, disposed by pairs in two parallel rows, extending from the inguinal region to beneath the thorax, and distinguished as inguinal, abdominal, and thoracic. They have no sinuses, the lactiferous ducts of each teat joining directly to form a variable number of excretory ducts which open at the free extremity of the teat by from five to ten orifices.

The Bitch has from eight to ten mammæ, arranged as in the Pig.

The special function of these glands is the secretion of milk.

Chapter II.

PHYSIOLOGY.

As a rule, it is necessary that before the female animal can become pregnant, copulation with the male must take place. There are exceptions to this rule, however, as it has been found possible by mediate or artificial means, *i. e.*, by collecting the seminal fluid of the male, and through the agency of an instrument (the Impregnator) injecting this fluid directly into the uterus of the female, to cause impregnation.

The age or period of an animal's life when copulation can take place with impregnation as the result, is termed the

Age of Puberty.

The appearance of puberty, and certain conditions which it gives rise to, takes place at different periods in different animals.

In the human female, this condition appears at from ten to twelve years, and in the male, from eleven to fourteen years.

In the Cow, nine months to two years, although in some exceptional cases it appears very much earlier. A case has been reported where the female gave birth to a calf at eleven months old, the sire of the calf being only twelve months old at this time.

In the Mare, about eighteen months to two and a half or three years, but where attention to improvement of breed is paid, the Mares should not become mothers till they are four years of age, as the parent and offspring are both more valuable.

Certain characteristic changes take place in the female on the appearance of puberty. These changes remain for a short time only, then disappear, to appear again with more or less regularity throughout the whole fertile period of the animal's life. When these conditions mentioned are present, they indicate what is known as the period of œstrum, rut, or heat.

Some of these changes can be recognized externally, others can not. In the Cow, we notice an irregularity in feeding, partial loss of appetite at this period; roaring occasionally; pulse irritable and accelerated; temperature slightly elevated, which may be from one to two degrees Fahrenheit. If the Cow be giving milk, the supply will be decreased, and in the Mare, which has never been in milk, the mammary glands become enlarged, congested, and sometimes secrete a fluid very much resembling healthy milk. The mucous-membrane of the vulva and vagina, in all animals, becomes injected, and red in color. The clitoris is enlarged, and frequent movements of that organ take place. There is also a discharge from the vulva of a gelatinous looking fluid, believed to come from the walls of the vulva, vagina and uterus, and in some animals, from the glands of Gærtner, already described. If the animal be at liberty, there seems to be a natural desire for her to seek the opposite sex.

The temper becomes altered. It occasionally happens that Mares which are vicious at any other period, are perfectly quiet at this; while others again are very troublesome when in this condition.

Certain changes also take place in the ovaries. These organs become congested and considerably enlarged. One or more Graafian vesicles become fully developed, find their way to the surface of the ovary, and when there, rupture, their contents escaping into the Fallopian tubes. In animals which give birth to only one at a time, only one Graafian vesicle is ruptured, and that generally in the right ovary; but in those that have several young at a birth, two or more vesicles are ruptured, the rupture taking place from right and left alternately. When these changes in the female are going on and an ovum has been liberated, if no contact with the male is allowed, impregnation can not take place (except as before stated), and the various organs resume their normal condition, and remain so for a time, which varies in the different animals.

In the Cow, the period of œstrum is present from one to four days, and then disappears, to reappear in from twenty-one to twenty-two days. In the Mare, the period lasts from three to six days, and disappears, to return again in from twenty-one to twenty-two days.

The Bitch is in heat generally twice a year, in early spring and autumn, and the period lasts from eight to fifteen days.

In Great Britain, the Sheep appears in heat about the middle of September, the condition lasting for

twenty-four hours only, but appearing again every fourteen days until the end of December.

While these periods may be accepted as the average, they are by no means definite, as some animals, more especially high-tempered Mares, appear always in heat; while others again, the closest examination or manipulation fails to detect them in this condition at any time.

In a state of nature and free from artificial surroundings, it may be accepted as a rule, that the period of œstrum is so regulated that the young animal may be born at a time of the year when its maintenance can be most suitably provided for in its surroundings.

If at this period contact with the male is allowed, certain changes take place which give rise to impregnation. The spermatic fluid of the male animal, either at or shortly after coition, finds its way to the uterus of the female, and from the uterus the spermatozoa enter the Fallopian tubes, and pass along to the ovarian termination of these structures.

While it is generally believed that contact with the ova of the female takes place in the Fallopian tube and at its ovarian extremity, still we have occasionally a fœtus developed in the ovary, and in this case at least, impregnation must have taken place in the ovary and not in the tube.

When impregnation has taken place, wherever it may be, the impregnated ovum immediately afterwards commences to descend the tube, gains the horn of the uterus, becomes attached to the mucous membrane at

this situation, and development of the embryo now commences.

The time which must necessarily elapse between the periods of impregnation and parturition has been termed the period of gestation.

The Period of Gestation.

This period varies very much in different animals, and also in the same class of animals when subjected to different surroundings and treatment.

In the Mare, the period of gestation is about forty-eight weeks, but varies more in this animal perhaps than in any other. Some brood mares foal regularly at a little over ten months, while others are pregnant nearly a year, and then give birth to a healthy foal.

Note.—Mr. John Renfrew, M.R.C.V.S., Glasgow, has furnished me with the record of two cases, one, that of a Pony Mare belonging to Mr. Mitchell, Polmont, Scotland, which had been served for twelve months and three days, and was then said to be in season; was sent to the stallion and served, and the next day gave birth to a healthy colt foal.

The other case was that of a thoroughbred Mare, the property of Mr. Stevenson, Hurlet, Scotland, which carried her foal twelve and a half months regularly.

As a rule, a Mare carrying a colt-foal (horse-colt) is pregnant several days longer than with a filly-foal (mare-colt). If the animal be kept at gentle work, it will generally give birth several days earlier, and

usually much more easily than if standing idle for some time previous.

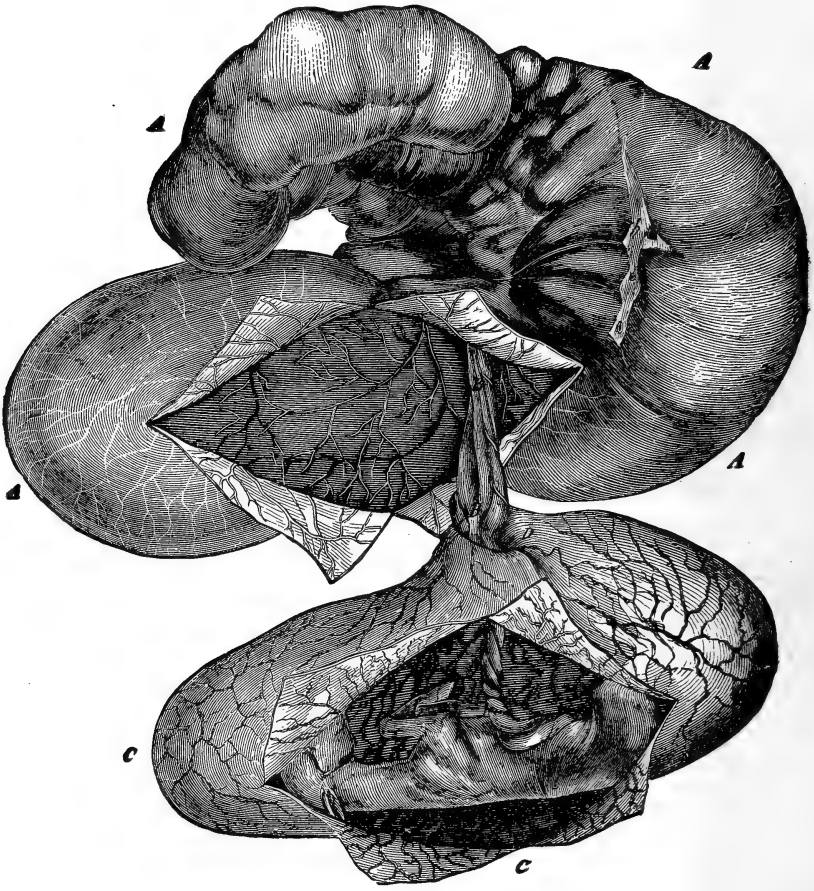

FIG. 14.

FŒTUS OF MARE AND ITS ENVELOPES.

A, Chorial Sac; C, Amniotic Sac withdrawn from the Allantoid Cavity, and opened to expose the Fœtus; D, Infundibulum of the Urachus; B, Allantoid portion of the Umbilical Cord; *b*, Portion of the External Surface of the Chorion destitute of Placental Villosities, and corresponding to the point of insertion of three pediculated Hippomanes.

A Mare with her first foal generally carries it for a shorter period than her next and successive ones.

The period of gestation in the

Cow	is	9	months, average	283	days.
Ewe		5	" "	150	"
Sow		4	" "	120	"
Bitch		2	" "	56-65	"
Cat		2	" "	55	"
Rabbit . . .		1	" "	28	"
Human . . .		9	" "	280	"

If we suppose, then, that impregnation has taken place, and the period of gestation has begun, in the interval certain structures responsible for the nourishment of the fœtus have been formed. (Fig. 13.) These are known as the "fœtal envelopes" or "placental membranes." They consist of a membrane called the "chorion," another the "amnion," the "allantois," the "umbilical vesicle," and the "umbilical cord."

The Chorion.

This is the most externally situated of the placental membranes. By its external surface it is in contact with the inner aspect of the walls of the uterus. In shape it is a regular counterpart of the uterus, which it lines. (Fig. 14.) It is a closed sac, and is principally concerned in the supply of nutrition to the fœtus, the process going on from the external surface of this membrane.

The Amnion.

This is the most internally situated of the fœtal envelopes, and, like the chorion, is a closed sac. It surrounds the fœtus, and from its internal aspect a

fluid is secreted called the "liquor amnii," or "amniotic fluid," in which the fœtus floats in the later period of pregnancy. This fluid assists in regulating the temperature of the fœtus, also, by diffusing shock, prevents injury from external violence. It also assists

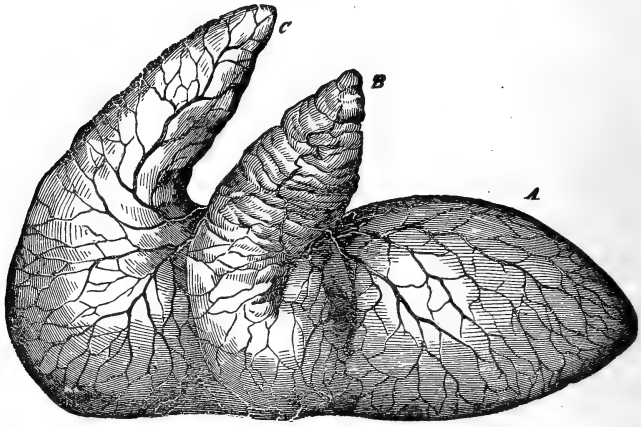

FIG. 15.

CHORION OF THE MARE AT MID-TERM (INFLATED).

A, Posterior portion occupying the Body of the Uterus; B, Left Cornu plicated and sacculated; C, Right Cornu, longer than the left, and containing a portion of the Fœtus.

in the act of parturition by dilating the passage, or cavity, and when the sac is ruptured the fluid assists in the lubrication of the vagina and vulva.

The Allantois.

This allantoid membrane is composed of two contiguous layers: a superficial one, which is applied to the inner aspect of the chorion; and an internal or deep layer, which is applied to the external aspect of the amnion. These two layers come together at the umbilical opening to form a constricted hollow passage or tube. This constricted portion passes into the

abdomen of the fœtus at the umbilical opening, and then passes backwards to join the anterior extremity of the bladder, with the cavity of which the space between the two layers of the allantois is in communication. It is believed that the allantoid sac or cavity acts the

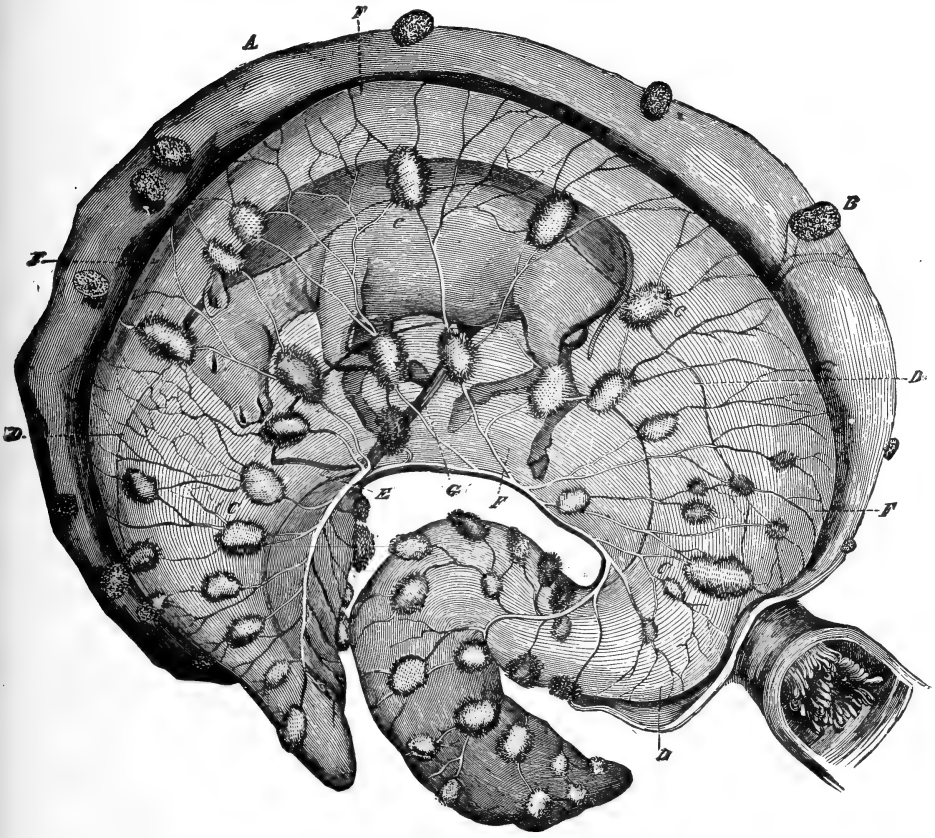

FIG. 16.

FŒTAL MEMBRANES OF THE COW AT MID-TERM.

A, Uterus opened on its left side; B, B, Cotyledons of the Uterus; C, C, Placentulæ; D, D, Allantois; E, Vesicle of the Urachus; F, Amnion; G, Umbilical Cord.

part of a urinary reservoir during fœtal life. The constricted portion, which passes in at the umbilical opening, has been called the "urachus."

The Umbilical Vesicle.

This is a small, pear-shaped structure, which is only seen in the very early stages of fœtal life. Its function is not very well understood, but it is believed to supply the fœtus with nourishment until the membranes have assumed that function. By its narrow extremity, the umbilical vesicle is in contact with the small intestine of the fœtus; and by its other or broad extremity, it is in contact with or rests upon the inner aspect of the chorion. As soon as the placental circulation is established, this structure commences to undergo atrophy, and all that remains of it at birth is a brownish colored fibrous cord.

The PLACENTAL CIRCULATION, or, as it is sometimes called, the "vascularization," varies in the fœtus of different animals.

In the Cow, as already stated, there are a large number of vascular processes in the pregnant animal, called cotyledons. These are in contact with the external surface of the chorion, and the blood of the parent is thus brought into close contact with the blood of the fœtus at these situations. There is no direct continuity of the circulation, the blood of the parent being spread out in very small vessels on the surface of the maternal cotyledons, while that of the fœtus is distributed in a similar manner, on the opposing surface of the chorion. Through the walls of these opposing vessels the exchange takes place.

In the Mare, instead of the blood-vessels being found at certain parts, they are distributed all over the

external surface of the chorion, and arranged in small vascular tufts, which are received into depressions on the corresponding aspect of the uterus, and here the exchange of nutrition takes place.

In the Sheep and Goat, cotyledons are present, but are concave instead of convex on their free surface, as in the Cow.

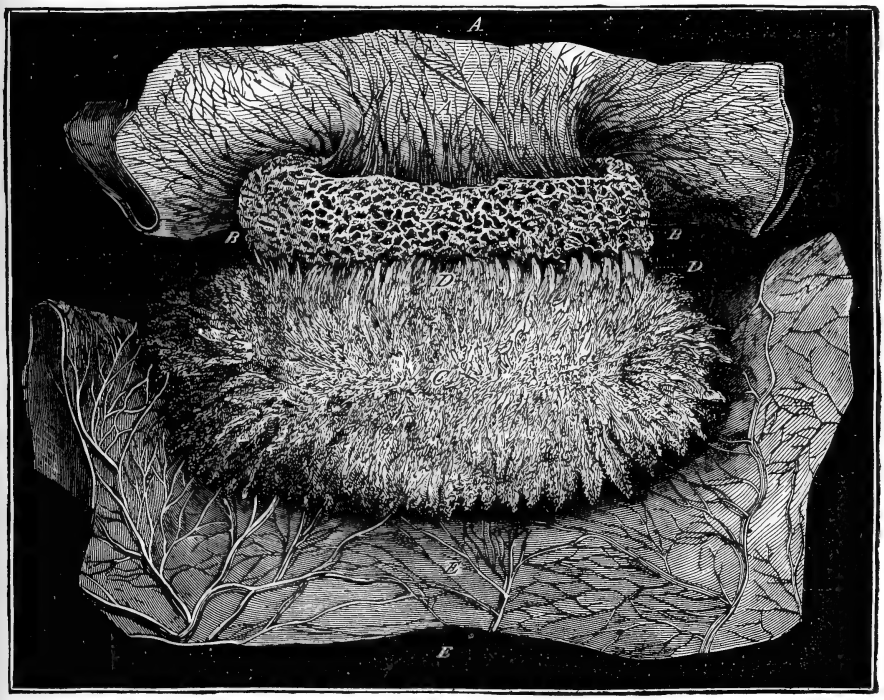

FIG. 17.

MATERNAL AND FŒTAL COTYLEDONS OF THE COW.

A, Pedicle of the Maternal Cotyledon; B, B, Maternal Cotyledon; C, Fœtal Cotyledon; D, Placental Villi; E, Chorion.

In the Pig, there are no cotyledons present, and the connection resembles that seen in the Mare, with this exception, that the vascular tufts are very

irregularly distributed, being very numerous, especially about the horns, while at other situations they may be absent.

In the Bitch, the vascular connection has been termed "zonular." The tufts are arranged in a ring or circle around the external aspect of the chorion, contacting a similar circle on the internal aspect of the uterus. This zone or circle is from one and a half to two inches broad.

In animals which give birth to more than one fœtus at a time, each fœtus may have a separate chorion and umbilical cord complete, and in this case that portion of the chorion which is in contact with another chorion, and not in contact with the wall of the uterus, has no vascular tufts. In other cases, there is one common chorion, and from it each fœtus is supplied with an umbilical cord, through which it derives its nourishment.

Umbilical Cord.

This forms the means of communication between the parent and fœtus.

In the Mare, besides the tissue proper of the cord, it consists of two arteries and one vein. The arteries are given off by the internal iliacs of the fœtus, pass along the lateral aspect of the bladder, and leave the abdomen (of the fœtus) at the umbilical opening. They then give off some small nutrient branches to the structure of the cord, pass outward, and break up into a great number of smaller vessels, which ramify between the external surface of the allantoid membrane

and the inner aspect of the chorion; finally these vessels enter into the vascular tufts found on the external aspect of the chorion. From these vascular tufts the numerous branches which meet to form the umbilical vein take their origin. These unite to form one vein, which passes along the cord and enters the

FIG. 18.

FŒTAL CIRCULATION: ADVANCED PERIOD.

A, Placentulæ; B', B', Umbilical Veins, with their Common Trunk, B; D, Vena Portæ, and its Anastomosis, C; E, Ductus Venosus, F, Posterior Vena Cava; G, Right Ventricle of Heart; H, Pulmonary Artery; J, J, Aorta; I, Ductus Arteriosus; K, Umbilical Arteries, with their Anastomosis at the extremity of the Umbilical Cord.

abdomen of the fœtus at its umbilical opening. From this situation it passes forwards, discharging its contents into the fœtal heart.

In the Cow, there are two distinct umbilical veins, and these only unite after they enter the abdomen of the fœtus.

While these structures are being developed in the uterus of the parent, certain changes are visible externally, by which we are enabled to say whether the animal is pregnant or not.

Symptoms of Pregnancy and Parturition.

The first, in the Mare and Cow, is the absence of the period of œstrum. This rule, however, has several exceptions, as it often happens that this period may be absent, or present unnoticed, and still the animal remain non-pregnant. On the other hand, the animal may show all the symptoms, except the menstrual discharge from the vulva, and may at this season allow copulation with the male, while being in a pregnant condition, and may be again impregnated.

The Mare soon becomes altered in general temperament and behaviour. If used for harness purposes, she becomes dull, lazy, and somewhat difficult to drive, and for the first three months after impregnation has a tendency to put on condition. The abdomen becomes pendulous, a well marked hollow being seen at the flank.

In the Mare, the mammæ often secrete a white, thin fluid, for a few days, about nine months after impregnation; afterwards, this secretion stops, the gland resumes its normal condition, but may again fill, and secrete this fluid, at varying intervals throughout pregnancy.

About five to six months in the Cow, and seven to eight in the Mare, the fœtus can be felt in the uterus, and positive evidence thus established. This can best be done by *ballottement*, *i. e.*, by pressing against the abdomen several times with the closed fist, so as to produce a swinging movement, when the fœtus can be felt falling against the hand.

In the Cow, this method should be practised on the right side, as the large cavity of the stomach interferes with it on the left.

In the Mare, percussion may be performed on either side, but the left is perhaps preferable. Another method adopted is to give the parent a drink of cold water, if possible, on an empty stomach. This often causes a movement of the fœtus in the uterus, which can be seen through the wall of the abdomen, by looking at the right flank of the Cow, and the left of the Mare.

An examination per rectum or vagina may be resorted to, to confirm the diagnosis. There is no objection to the examination per rectum, if it is imperative that the condition should be known, but an examination per vagina, besides considerably irritating the parent, in some cases will lead to abortion.

The method by auscultation is not satisfactory in our larger subjects.

About the eighth month in the pregnant Cow, and about the tenth in the Mare, the external positive symptoms commence.

The mucous membrane of the vulva becomes congested; the mammary glands become enlarged, the

enlargement becoming gradually more marked until the period of parturition. About two weeks before parturition, in both these animals, a mucous discharge makes its appearance from the inferior commissure of the vulva, and at the same time the lateral aspect of the croup begins to fall, owing to relaxation of the pelvic ligaments. This condition is known as "slipping," or "loosening." When all these conditions are present, the animal has arrived at the termination of the period of gestation, and the more immediate symptoms of parturition commence. The animal becomes restless, continually on the move from one hind foot to the other, lying down occasionally; and the Mare, especially if she has a hot temper, behaves much in the same way as shown in colic. The pulse, if felt in this condition, is quick, frequent, and irritable, and the mucous membrane of the eye may be injected. The uterine contractions now commence, the animal at this period apparently suffering an amount of pain. Each contraction may be accompanied by a groan, and last only for a few seconds. The interval between the contractions may be, at the primary stage of parturition, from five to ten minutes. The contractions now become more powerful and of longer duration, the interval between being shorter. The "os uteri" becomes dilated, the uterine contractions having forced the fœtal membranes through that opening. Shortly afterwards, the amniotic sac appears at the margin of the vulva, containing the "liquor amnii." This sac is sometimes called the "water bag," sometimes the "sac containing the fluids." The sac may rupture in the

passage, or it may pass outside, without rupture. In any case, it is shortly followed by the two fore-feet of the fœtus, with the head resting between them at the fetlocks. When the point of the withers of the fœtus appears at the entrance of the pelvic cavity, a few more slight contractions complete parturition.

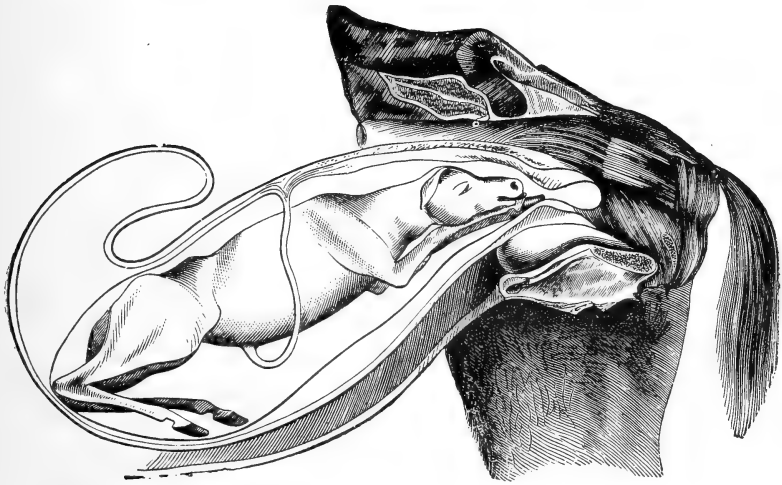

FIG. 19.

NORMAL POSITION OF THE FŒTUS IN THE MARE (THIRD STAGE). VERTEBRO-SACRAL POSITION.

Parturition is quite a normal function, when performed in the manner described. When the fœtus has been fully developed in the uterus, there is a gradual determination of its blood supply to the mammæ of the parent. A number of the vascular connections are then no longer needed between the uterus and the placental membranes, and fatty degeneration of these takes place. This alteration is believed to have some special action on the nerve filaments in the uterine walls, which (filaments) become irritated, and through them the walls of the uterus are stimulated to

involuntary muscular contractions; the longitudinal fibres, in the primary stage of the act, and both longitudinal and circular, in the later stages, contracting, and thus the expulsion of the fœtus is brought about.

The umbilical cord is ruptured at the act of parturition, or immediately afterwards. In a state of nature, the parent tears the cord with her teeth, if it is not ruptured in the act. The fœtal membranes, or envelopes, may come away with the fœtus, or may be retained in the uterus for several days, and require to be removed by hand.

Parturition in the Cow may be completed in from half an hour to one and a half hours, but sometimes may be prolonged for five or six hours, and both mother and fœtus do well. In the Mare, however, if the act is prolonged beyond two to two and a half hours, there is danger of the fœtus dying, possibly also the parent.

Parturition, as thus described, requires no assistance.

Those cases in which mechanical or other interference is necessary, is called "difficult parturition," or "difficult labor."

Chapter III.

ANOMALIES OCCURRING IN GESTATION.

Superfœtation.

By this term is meant the conception of an already pregnant animal.

Facts have been recorded, by a number of competent authorities, which go to prove that this condition is not only possible, but probable.

Cases have been observed amongst the uniparæ, one of which is where a Mare gave birth to a horse-foal and a mule-foal at the same parturition.

Extra-Uterine Gestation.

The fœtus here is developed in the abdomen, but outside of the uterine cavity. The fœtus may be healthy, and normally developed, for a certain period of its existence, but generally dies before the termination of gestation. Sometimes the fœtus is developed in the ovary ("Ovarian Gestation"); or, it may be outside the tissue, but inside the covering of the ovary. Sometimes it is developed in one of the Fallopian Tubes ("Tubal Gestation"); sometimes between the tissue of the walls of the uterus ("Interstitial Gestation"). The most common situation, however, is in the abdomen ("Abdominal Gestation"). In this case the fœtus is attached to some part of the abdominal wall, and is supplied with its membrane, and draws its

nourishment much in the same way as in the uterus, the blood-vessels in the neighborhood becoming enlarged to accommodate the new growth.

In abdominal gestation, the fœtus may undergo mummification, becoming dried up, and remaining attached to the abdomen for an indefinite period. In other varieties, the fœtus undergoes decomposition, and may destroy the parent by septicæmia, or may destroy the abdominal wall and escape, the wound ultimately healing and leaving a fistula, or causing a hernia.

In ovarian gestation, after development has gone on for some time, the mass falls into the abdominal cavity, the parent as a rule dying from hemorrhage from the large vessels in the neighborhood of the ovaries.

Spurious Pregnancy.

This is a disease which is at times seen in the human subject, and may be due to pathological, or *other* conditions; but, when seen in the lower animals, it is generally the result of the former. The history usually is, that the animal is believed to be pregnant, but at some time during the period of gestation it gives birth to a cyst, or irregular hollow mass, containing a quantity of fluid, degenerated tissues, sometimes portions of teeth, partially formed bones, etc. This cyst, as a rule, is floating in a quantity of serous-looking fluid having a disagreeable odor. It has attachment to, and draws its nourishment from, some part of the abdominal and uterine walls. The

causes are unknown. The condition is said to be oftenest observed in light, or roan-colored heifers, and most common where in-breeding is allowed.

Treatment.—Remove the cyst and its contents, and wash out the uterus with antiseptic and astringent solutions.

Hydrops Uteri.

In this case, the animal is supposed to be pregnant, but, on examination, fluid instead of a fœtus is found. It is due to some disease of the walls of the uterus, and when the fluid is allowed to escape, it may, or may not, be again secreted.

Remove any diseased product that may be found attached to the walls of the uterus, and wash the cavity out daily with antiseptics and astringents. The dietary should be easily digestible and nutritious, and a course of vegetable and mineral tonics should be administered.

Chapter IV.

SOME CONDITIONS INCIDENTAL TO PREGNANCY.

Some of the conditions may be alluded to merely by name: Pica, or depraved appetite, constipation, vomiting, colic, amaurosis, albuminuria, cough, mammitis, hysteria, eclampsia, and cramp.

Hydrops Amnii.

Here the amniotic fluid is in excess, and, by pressure or tension, may cause death of the fœtus, and sometimes also the parent, from injury to the uterine walls. This condition may be brought about by an impoverished condition of the blood, with transudation of its watery constituents, resulting in dropsy.

The membrane should be punctured with a trocar and canula, to allow escape of the excess of fluid, and if abortion supervene, the cavity should be washed out with antiseptics and astringents. It is possible, however, for the full period of gestation to be completed, after withdrawal of the excess of fluid, should the wound in the membranes close.

The dietary and medicinal *treatment* is similar to that suggested in "Hydrops Uteri."

Rachitis and Osteomalacia.

Softening or fragility of the bones has been observed, especially in young pregnant animals. The

bones are enlarged, friable and brittle. This condition has been noticed in Mares, Cows, and Ewes, as well as Bitches and Swine.

The cause is due to an insufficiency of food, or to food that is lacking in mineral and nitrogenous elements.

The *treatment* is, to supply food rich in the constituents required, and medicinally, nerve tonics and preparations of calcium. As a preventive, animals should not be bred from too young.

Œdema.

Serous infiltration into the connective tissue, at different parts of the body of pregnant animals, the Mare being the principal victim. The condition is most marked in primiparæ, and appears much later in better bred animals, than in those of coarse breeding and lymphatic temperament. The œdema commences at the lower part of the hind limbs, gradually ascending to the hocks, or higher, and may extend to the dependent parts, such as along the floor of the abdomen, mammæ, chest, and fore-arms.

The condition is said to be due to pressure of the fœtus on the pelvi-crural vessels, and to an anæmic condition of the system. The large mammary veins of the Cow, allowing of free return of blood from the hind limbs, is considered the reason why this animal is exempt.

Exercise and hand-rubbing are generally all that is necessary, the swelling disappearing a day or two after parturition.

Ante-Partum Paresis.

Paraplegia (posterior extremities) in the pregnant Cow, when near the time of parturition, is sometimes seen. It is a rare occurrence in the Mare. It has been witnessed in the Sheep and Goat. The onset of the disease is sudden, and without premonitory symptoms. The condition seems to be evident only when the animal attempts to rise, and then the loss of power is observed in the hind extremities. All the other functions of the body appear to be normal.

The cause and pathology do not seem to be well understood, but strain of the nerves and vessels of the posterior extremities by the heavy uterus, is supposed to be responsible.

Treatment.— Attention to the comfort of the patient; frequent turning over; careful dietary; laxatives and enemas, followed by stimulants, and afterwards tonics; a stimulating application to the spine may be found useful. Should the condition remain for any length of time after parturition, nerve stimulants, as *nux vomica*, or *strychnia*, the latter orally or subcutaneously administered. Galvanism may also be resorted to with benefit.

The induction of abortion has been recommended, should the paralysis continue, and parturition not due for some months.

Chapter V.

SOME ACCIDENTS OF PREGNANCY.

Abnormal Retention of Fœtus.

In this case the fœtus is not expelled at the termination of gestation. It may be due to loss of contractile power in the walls of the uterus, to a mal-presentation, or a mal-formation of the fœtus, or parent. The labor pains may be present for a time, and then cease, the fœtus being retained in the cavity for an indefinite period. It may become mummified, or undergo calcareous degeneration, and when either of these changes has taken place, the parent seems to suffer very little inconvenience. After a time, it sometimes decomposes, and may destroy the parent by septicæmia, or pyæmia. It is possible for an animal to give birth to a fully developed fœtus, while she has a mummified one in her uterus.

The *treatment* will depend upon the cause of the retention.

Metrorrhagia.

Hemorrhage from the Womb of a Pregnant Animal.

This condition is rare in our subjects, but more common in the human female. When present, should be treated on similar lines to post-partum hemorrhage (which see), avoiding, of course, any part of the treatment which would cause irritation to the parts.

and lead to abortion, which, however, frequently follows this condition.

Prolapsus Vaginæ (ante-partum).

This consists of a forcing backwards of the vagina by the gravid uterus. The condition has been observed most frequently in the Cow and Ewe; rarely in the Mare and Bitch. It is peculiar to pregnancy, and may occur in well formed animals, in which the tissues of the genital organs are soft and relaxed—animals of lymphatic temperament, with a wide pelvis, and which may be fed on bulky, but innutritious food. Falls, injuries, distension of the rumen, etc., are all probable causes of this condition in the pregnant animal.

Prolapsus of the vagina is most frequently observed after the third or fourth gestation, and at the end of the seventh or eighth month. It is rare in primiparæ.

The following case has just recently come under my observation: A Cow at pasture was noticed to have inversion of the vagina, but the lad (a colored boy) forgot to mention the fact to the owner, and when I was called to the case, the condition had been in existence at least six days. The tumor was about the size of a man's head, and in a very unfavorable condition for reduction. This, however, I accomplished, after bathing with a warm antiseptic solution (*creolin*), and lubricating. A truss was then adjusted, and no further inversion occurred.

The presumption was, that the animal had aborted, on account of some injury while at pasture, the vaginal prolapse following that accident. About a week,

however, after reduction, the Cow gave birth to a fœtus in a state of decomposition. Her pregnant condition was not suspected, and was not ascertained, on account of the callous and constricted state of the cervix, which rendered exploration of the uterus an impossibility. The Cow seemed to make a satisfactory recovery.

The prolapse may be first observed only when the animal is in the recumbent position, and may or may not disappear when she rises to her feet, depending upon the volume of the tumor. Should the condition have been in existence for some time, infiltration and inflammation will most likely have taken place, the color passing through a dark red to a dark brown, due to exposure and strangulation of the vessels.

Prolapse of the uterus may follow, which makes the condition much more serious, and the reduction more difficult.

Treatment. — In some cases, the vaginal tumor disappears after calving, without any interference being necessary. If treatment be required, the method of procedure will depend upon the condition of the everted organ. Elevation of the hind quarters; a rope or surcingle passed round the chest and tightened, to try to prevent straining. The dietary should be carefully attended to, and should be nutritious, but not bulky, and the bowels should be regulated. Should the prolapse be in a more advanced stage, with partial protrusion of the womb, return of the organ must be attempted, and the measures to be adopted, being on the same general plan as for inversion of the uterus,

reference can be made to the mechanical and medicinal means described under that head.

It may sometimes happen, that after all available methods have been exhausted, the animal still continues to strain and evert the vagina, and that death, as a result, may appear imminent, so that premature delivery has to be resorted to, to save the life of the parent, and if the 260th day of pregnancy has been reached, possibly the life of the young one (Calf) also. After the os has been dilated, the membranes may be perforated by the fingers. After delivery, great care should be exercised, for some days, to prevent subsequent inversion. In vaginal prolapse in the Ewe, similar methods can be adopted to those already described. A common custom with some is to knot a portion of wool, from each side of the vulva, together, to prevent eversion.

Hysterocele (Hernia of the Uterus).

This condition has been observed in the Mare, Cow, Ewe, Goat and Bitch. It may be due to rupture of the musculo-fibrous floor of the abdomen, the gravid uterus escaping into a sac formed by the peritoneum and skin. In the Bitch, the womb is often displaced before conception, the fœtus being developed in the hernia. With the exception of the Bitch, in which the hernia may be inguinal, it is always accidental and ventral, and usually towards the inferior portion of the abdomen.

Its cause is generally violence, although it may start from an umbilical hernia, or from natural or

spontaneous relaxation of the abdominal aponeuroses. It is rare in young animals.

In the Bitch, ventral hysterocele has been observed above the mammary glands—simulating a scirrhous enlargement—and in one of the labiæ of the vulva, beneath the skin.

Treatment.—Support of the hernia by bandaging until the contents of the uterus have been expelled. Abortion may have to be artificially induced, or hysterotomy performed.

As a mammary tumor may be mistaken for hernia in the Bitch, diagnosis should be very carefully made in this animal.

Note.—Referred to also under "Maternal Dystokia," Chapter X, page, 90.

Rupture of the Uterus (ante-partum).

This accident is not common before the termination of the period of gestation. It may occur before, and during parturition, due to injuries by the fœtus, or to ill-directed efforts to assist at the act, or in attempts to reduce the organ when eversion has occurred during the act. Other causes are attenuation of the uterine walls, hydrops amnii, and distension by the gas evolved from a putrefying fœtus, etc.

The dangers resulting from this condition are, hemorrhage from the womb, escape of the bowels through the opening, and peritonitis, from extension of inflammation from the wound, or from the septic fluids escaping into the abdominal cavity.

Symptoms of rupture of this organ may not be well defined. If due to external violence, the signs may be apparent. After straining ceases, the animal may exhibit all the symptoms of acute abdominal pain : inappetence, suspension of rumination, quickened pulse, short, hurried breathing, looking round to the flanks, etc. The presence of fluid may be detected in the lower third of the abdomen. Exploration per vagina may reveal an empty womb, and perhaps the discovery of the rupture itself.

Treatment can not be said to be very satisfactory. If the uterus has been everted, the wound can be closed by sutures, the parts made thoroughly aseptic, and the organ carefully returned to its cavity. Should the fœtus be alive, and the period of parturition close at hand, it may, under certain conditions of the parent, be advisable to destroy her, and endeavor to save the young one. Or, on the other hand, a surgical operation might be performed for the extraction of the dead fœtus, with the chance of saving the life of the mother. Should peritonitis threaten, treatment for that condition would necessarily follow.

In favorable cases in the smaller animals, the Cæsarian section might be practiced with considerable success.

Abortion.

Premature Expulsion of the Fœtus.

There are two varieties of this condition, viz.: Sporadic; and Epizootic, Enzootic, or Infectious.

In the *sporadic* form, one pregnant animal gives birth to a fœtus, some days, or perhaps months, before the normal period, and there the disease stops.

In the *infectious* form, one animal after another is affected, it may be for years, till it seems impossible to get any animal to carry her young the full period of gestation.

The disease is most common amongst cattle, much less frequent in Mares. It has also been observed in the Sheep and Goat.

The causes of the *sporadic* form are: excitement, sudden fright, either at pasture or in the stable; injuries by being thrown down, large doses of medicine, especially purgatives; injudicious feeding, as large quantities of cold food in cold weather; and some varieties of pasture are believed to cause it.

The disease may appear, or take place at any time during pregnancy.

It is now recognized by the most competent authorities, that the *infectious* form may be transmitted, either directly, or through the intervention of certain media, as infected fæces, urine, or litter; by attendants on the animals which have aborted; by the veterinary attendants, or even by the male animal in the act of coition. Abortion has been induced by the introduction into the vagina of pregnant cows, mucus from that of animals that had aborted accidently, also by inoculating the purulent vaginal discharge from a cow just aborted, and the matter obtained by scraping the surface of the chorion expelled by another animal which had likewise "lost" her calf. Whether the infective material finds

access to the system through the digestive, respiratory, or circulatory channels, or has altogether a local action, has not yet been definitely ascertained, but it is thought probable that it finds its way to the interior of the uterus through the vagina and cervix.

The first symptom may be the presence of a partially developed fœtus found on the pasture, or in the stable, but the symptoms generally are so slight as to escape observation. If the animal be very closely watched, there may be noticed a very slight relaxing of the pelvic ligaments, and congestion of the vulva for several hours before parturition, but even this is sometimes absent.

In the Mare, the condition occurs generally from the fourth to the ninth month of pregnancy; in the Cow, from the third to the seventh month.

Treatment.—Complete isolation of all animals that are affected, and thorough disinfection of the stables or houses. Attendants on the affected animals should have their duties confined entirely to those animals, and should have no connection whatever with the healthy stock. It has been recommended that pregnant animals should have antiseptics administered internally, and careful attention paid to their feeding.

Animals that have aborted should have their membranes removed as early as possible, and burnt, and the uterus, vagina, external genitals, and tail, as well as the hind limbs to the hoofs, should be carefully treated with antiseptics.

Nocard recommends the following solution for sponging the anus, tail, vulva, etc.:

Distilled, or rain water, 2 gallons.
Hydrochloric acid, . 2½ ounces.
Corrosive sublimate, 2½ drachms.

The ingredients to be thoroughly mixed.

In Denmark, after the membranes and fœtus are removed, and buried in lime, the genital cavity receives repeated washings with a one per cent. solution of *creolin*, or half per cent. of *lysol*, until all vaginal discharge has disappeared. Cows which have aborted are not again put to the bull until two or three months have elapsed, so as to prevent extension of the infection, and afford a better chance of their becoming pregnant afterwards. Even Cows and Heifers in infected places, and apparently healthy, receive a vaginal injection before copulation; afterwards the parts about the tail and vulva are carefully washed, every day, with a mild disinfectant. The Bull in an infected locality has the parts about the generative organs treated in a like manner (cleansed and disinfected) before and after service. Every precaution should be taken to prevent the introduction among healthy pregnant animals, of animals from infected localities.

Chapter VI.

DYSTOKIA.

Among the lower animals, and, in fact, among all females, a great many of the troubles and abnormal conditions met with at parturition, can be immediately traced to the habits, laws, and fashions of domestication. In the majority of cases, when a Cow, for instance, is allowed to run at pasture, and the grass not too luxuriant and stimulating, parturition takes place unattended, and both mother and young one do well.

The same law holds good in the human subject. When the female is in comfortable, but not too luxuriant circumstances, the percentage of cases of difficult parturition, or accidents after, is considerably less than it is in those who spend their time, while pregnant, in indolence and luxury.

Actual Causes, other than Hygienic Treatment, which give rise to Difficult Parturition.

FŒTAL DYSTOKIA.

The first great cause is mal-presentation or mal-position of the fœtus.

The second, mal-formation of the fœtus.

MATERNAL DYSTOKIA.

The third, mal-formation of the parent.

The fourth, disease existing in the parent at the time of parturition, interfering with or preventing the expulsion of the fœtus.

Mal-presentation of the Fœtus.

For convenience of description, all presentations met with are classified under four heads. These are:

1st, Anterior.

2nd, Posterior.

3rd, Sterno-abdominal.

4th, Dorso-lumbar.

Anterior Presentations.

VERTEBRO-PUBIC.

In this case the fœtus is lying on its back, with fore-feet up and backwards, and, if long neglected, this presentation will most likely terminate in injury to the roof of the vulva or vagina.

If the head and feet have both entered the passage, cord the fetlocks, and apply traction in a downward direction till the fore-feet are clear of the vulva. As soon as the fore-feet have escaped, elevate them, applying traction in an upward direction, until the withers have entered the pelvic cavity. If the point of the withers should catch at the brim of the pelvis, pass in the hand, and try, by leverage, to elevate it. It sometimes happens, however, that the fœtus is firmly wedged in the passage, caught at the withers, and no amount of traction can extricate it. In this case, the fœtus must be pushed back into the cavity, by placing a repeller (fig. 21) against the tissues, in front of the sternum; and when it (the fœtus) has entered the cavity, this presentation can be transformed into a normal one, when delivery can be easily effected.

VERTEBRO-ILIAC.

In this case the fœtus is lying in an oblique

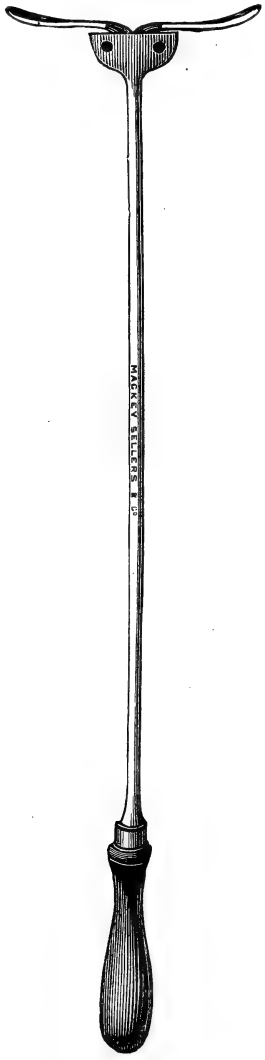

FIG. 21.
JOINTED REPELLER.

direction, the vertebral spines of the fœtus being presented to the iliac shaft of the parent. If partu-

rition has only just started, this is easily reduced to a vertebro-sacral; but, if this is not practicable, cord the fetlocks and apply traction. The fœtus may be delivered in this position; it (the position) has been divided into right and left vertebro-iliac, depending upon the direction, to the right or left.

VERTEBRO-SACRAL.

With Fore-Legs Over Neck.

If the fœtus is small, and the pelvic cavity of parent large, delivery may be effected in this position. If this fails, cord both fetlocks, also the head, then apply repeller to sternum of fœtus, push well into the uterus, and have one or more assistants applying traction to the fetlock cords in the direction most likely to bring the limbs into their normal position. By this means, the presentation is converted into vertebro-sacral, when delivery is easily effected.

VERTEBRO-SACRAL.

With Fore-Legs Flexed at the Fetlocks and the Head Normal.

This is generally a normal presentation, when parturition commences; but the fore-feet being caught at the brim of the pelvis, the fetlocks thus become flexed, and each successive labor pain only increases the abnormal condition. To deliver, cord the head, and if the fetlocks can be secured, cord them also; then pass in the hand, if possible, grasp the fore-limb at the fetlock, and, by powerfully flexing all the joints below the shoulder, try to bring it into the passage. Do the same with the other limb. If this be found impossible, then apply a repeller to the front

of the sternum, push the fœtus back into the uterus, while at the same time traction should be judiciously applied to the fetlocks, and thus convert into vertebro-sacral.

VERTEBRO-SACRAL.

With Fore-Limbs Flexed at the Knees.

This is sometimes a most difficult presentation. If the head can be reached, cord it before anything else

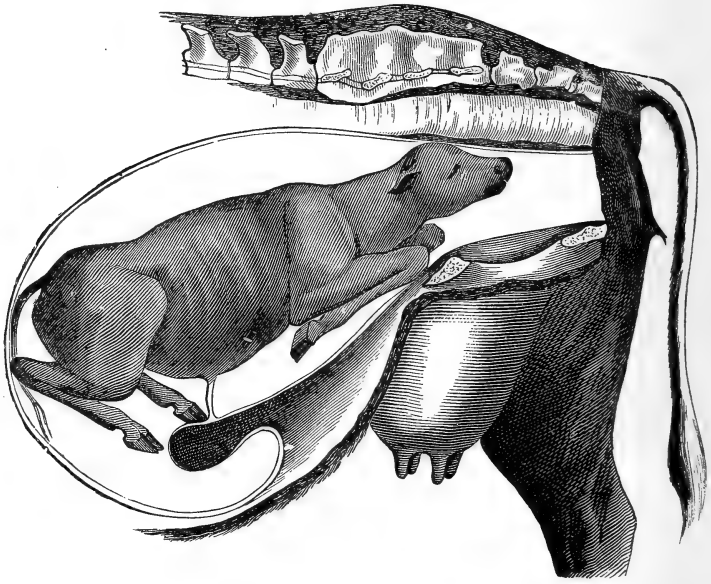

FIG. 22.

VERTEBRO-SACRAL POSITION; FORE-LIMBS FLEXED AT THE KNEES.

is done. Then elevate the quarters of the parent, and, with a repeller applied to the chest, endeavor to push the fœtus into the womb. If the fœtus has been returned, cord the fore-limbs as near the fetlocks as possible, and apply traction with the cord until the fore-limbs can be grasped at the fetlocks. If the fetlock can be got hold of, grasp it firmly, flex that joint, and all the other joints above it, and by this

means the foot will likely be got into the passage. If the parent be straining considerably, it may be nearly impossible to push the fœtus back; in this case it is advisable to inject into the passage some lubricating agent which may facilitate its movement. If, however, after this is done, the fœtus is so firmly wedged that it cannot be returned (the head having been corded, as well as the fore-limbs at the knees), the fœtus being small, delivery may be effected in this position. If this fails, remove the head, and as much of the neck as can be got at, then remove one or both fore-limbs at the shoulder, when delivery will be effected.

VERTEBRO-SACRAL.

With Head Normal, but Fore-Limbs Right Back Under the Body.

If the head be fixed in the passage, and has been so for a length of time, the fœtus will likely have perished, more especially if it is a foal. If the head is not yet fixed, elevate the quarters of the parent, cord the head, and push the fœtus back into the uterus. When this is done, cord the fore-limbs, and proceed as directed in the last presentation. If this is not practicable, cord the head and apply powerful traction. The fœtus may be delivered in this position, but will most likely be dead. If the above means prove unsuccessful, try to remove one or both fore-limbs at the shoulder, and then delivery will likely be effected.

Note.— While these mal-presentations have been described in the vertebro-sacral position, they may also occur in the vertebro-pubic and vertebro-iliac, and must

be treated on a similar plan, although in every case the treatment in the vertebro-pubic and vertebro-iliac is much more difficult than in the position described.

VERTEBRO-SACRAL.

With Deviations of the Head.

This is one of the most common causes of difficult parturition.

The feet, one or both, are presented normally, and labor goes on for some time, but suddenly stops, and on examination, the head is found to be bent backwards, downwards, upwards, to the left or right. In the Mare, when this has taken place, the fœtus as a rule perishes.

VERTEBRO-SACRAL.

With Head Bent Downwards.

If called when the head is just caught at the brim of the pelvis, and both fore-feet are presented, cord them at the fetlocks; pass in the hand between the fore-limbs, grasp the fœtus by the mouth, or under the chin, and raise the head, while traction is applied to the cords. If only one fore-limb is presented, the position is more difficult. It will be necessary to get both into position before anything else can be done.

A more serious presentation, however, is caused by the arch of the neck being presented to the pelvic cavity. In this case, cord the presented limbs, pass in the hand, and if the mouth can be reached, cord the upper jaw and push the fœtus back into the womb. Apply pressure to the neck, and at the same time traction to the cord round the upper jaw. If much traction is required, it is more than likely that the jaw

will be fractured, and if this happens, or if the fœtus be dead, traction hooks applied to the orbits are of great advantage. Sometimes a hook applied to the angle of

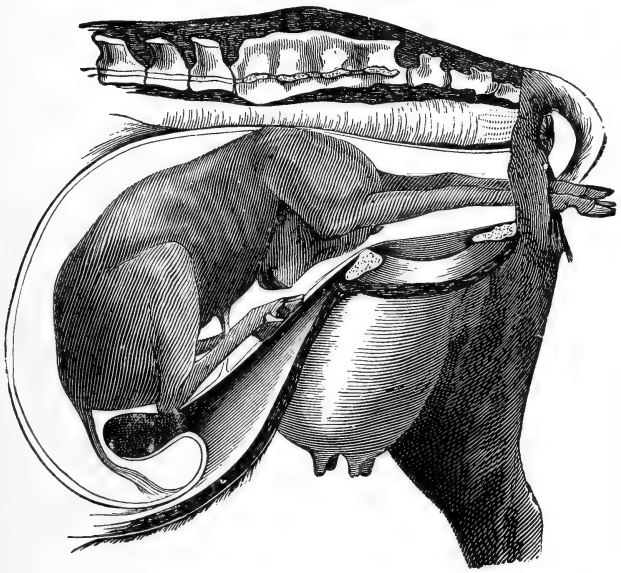

FIG. 23.
ANTERIOR PRESENTATION.
EXTREME DOWNWARD DEVIATION OF THE HEAD.

the lower jaw may be used, but it also is easily drawn away (fig. 23). If, however, the neck be completely

FIG. 24.
SHORT BLUNT CROTCHET.

doubled up, and the arch be in the passage, with or without the feet, the case is more difficult. In this presentation, good results have been obtained by

placing the parent on her back, and elevating her hind quarters while in that position.

If the vulva and vagina are hot and dry, inject some warm emollient fluid; cord the arch of the neck, or the mouth, or hook the orbits, if they can be reached, then try to return the fœtus. If this fails, cut through the neck at the portion presented, when delivery may be effected.

VERTEBRO-SACRAL.

With the Head Turned to One Side.

If one or both fore-feet are in the passage, cord them, and also the jaw, upper or under, whichever can be reached, then try to push the fœtus back into the uterus, and whilst this is being done, apply traction to the cord round the jaw. If the fœtus be dead, a crotchet or traction hook in the orbit

FIG. 25.
LONG POINTED CROTCHET.

is useful in directing the head. If, however, the neck is well in the passage, it may be impossible to return the fœtus; then cord the neck, and try, by powerful traction, to remove it (fœtus) in this position. In practice, it is often possible to remove a foal with its head bent back in front of the withers, but it is more difficult to remove a calf. If these methods fail, cut through the neck, and remove as in the last.

VERTEBRO-SACRAL.

With the Head Bent Backwards and Upwards.

This very much resembles the last, and requires similar treatment.

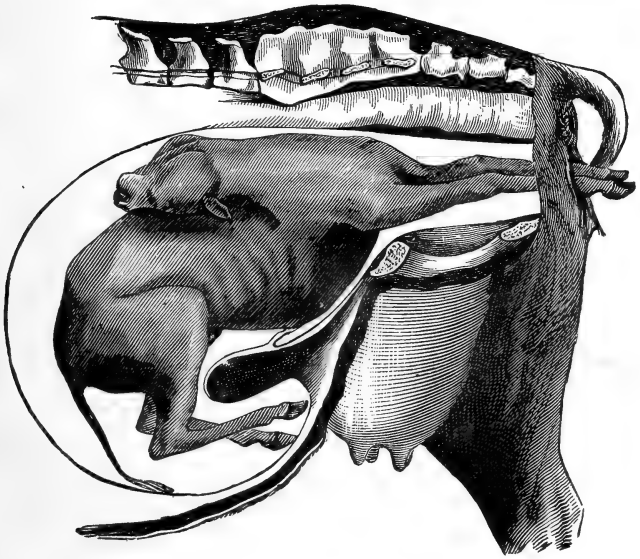

FIG. 26.

VERTEBRO-SACRAL POSITION.
DEVIATION OF THE HEAD UPWARDS AND BACKWARDS.

VERTEBRO-SACRAL.

But the Obstruction Due to the Hind Limbs.

It sometimes happens, that an apparently normal parturition suddenly becomes difficult, without any apparent cause. On examination being made, it is found that the hind-limbs have become abducted, the toes looking outward and forward, and the stifles caught at the brim of the pelvis. All that is required, is to cord the feet already out, and traction and rotation,

applied simultaneously, will most likely complete delivery.

VERTEBRO-SACRAL.

With All Four Feet Presented.

In this, we generally find the head and two fore-feet presented normally, until parturition has gone on for a time, when it suddenly stops. On examination, it is found that the hind-feet have become flexed under the fœtus, and are presented a certain distance in the pelvic cavity. If called early, pass a repeller between the fore-limbs, and, if possible, push back the hind-limbs, separately, into the uterus. If this fails, cord the hind-legs, draw them well under the body, then apply traction to all four limbs simultaneously, when delivery may be effected. If this fails, try to remove the abdominal organs, either through the chest or abdominal walls, which will allow the hind-legs to get further up under the spine, when delivery may be brought about. Failing this, remove the head and as much of the fore-limbs as can be secured, then push the remaining portion back into the uterus, at the same time applying traction to the hind-limbs, and deliver in the lumbo-pubic position.

Posterior Presentations.

LUMBO-SACRAL.

In this, the hind-limbs are first presented, and the lumbar region of the fœtus is applied to the sacrum of the parent.

Cord the hind-limbs, at the fetlocks, and see that the tail of the fœtus has entered the pelvic cavity; then apply traction downwards. The most difficult part of the act will be when the dorsal spines of

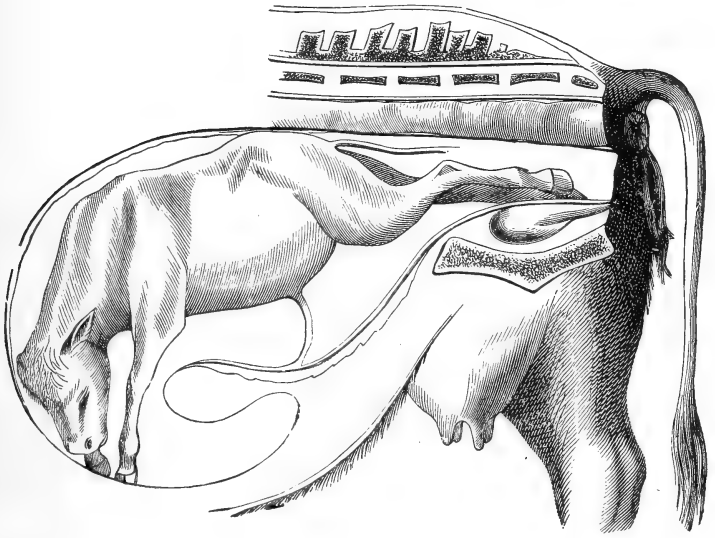

FIG. 27.
LUMBO-SACRAL POSITION.

the fœtus enter the pelvic cavity; but, in every case, by forced traction, delivery may be effected.

LUMBO-SACRAL.
With Hind-limbs Flexed at the Fetlocks.

This resembles very much the vertebro-sacral, with the fore-limbs caught at the fetlocks, and the same means must be used to bring about delivery.

LUMBO-SACRAL.
With Hocks Flexed.

In this, the hind-limbs are flexed at the hocks, and completely doubled under the fœtus. First elevate the

hind-quarters of the parent, cord any part of the hind-limbs that can be got at, as near the foot as possible, and try to push the fœtus into the uterus; then grasp the hoof, if it can be reached, in the hollow of the hand, and, powerfully flexing all the joints above, try to get the foot into the passage; do the same with the other. If the Cow is down, and cannot rise, try to elevate her quarters, by a rope passed over

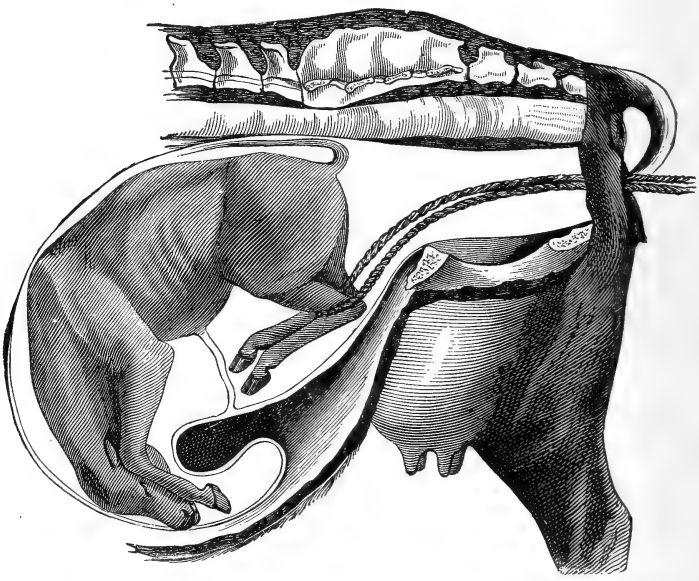

FIG. 28.
HOCK PRESENTATION: HOCK CORDED.

a pulley, and proceed as if standing. If the fœtus be dead, divide the tendons, just above the hock, when delivery will be more easily effected. If the fœtus is still alive, and these methods have failed, pass a cord round the limbs, at the hocks, and one round the body, then apply traction, when delivery may be accomplished. If this fails, disarticulate the limbs at the hocks, when delivery will be more easily brought about.

LUMBO-PUBIC.

In this, the fœtus is lying on its back, with all the limbs pointing upwards. If called early, it may be possible to push the fœtus into the uterus. Having corded the limbs, by rotation, convert this into a lumbo-sacral. If this is not possible, cord the hind-limbs, and apply traction upwards. As the hocks come to the brim of the pubis, they will likely be caught; then pass in the hand and elevate them (hocks). When the point of the withers reaches the same situation, they will also be fixed, and it may require considerable traction, still upwards, to relieve them.

THIGH AND CROUP.

Or Breach Presentation.

This is looked upon as the most difficult presentation met with in practice, and both parent and fœtus often die before delivery is completed. The hind-limbs are flexed under the body, and the hip of the fœtus is

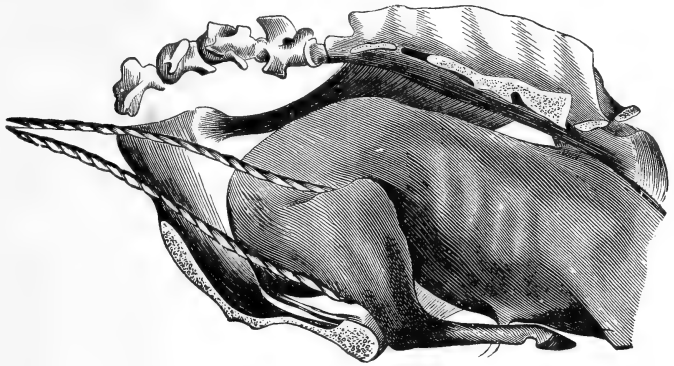

FIG. 29.
THIGH AND CROUP PRESENTATION: THIGH CORDED.

presented. If possible, push the fœtus into the womb, cording the fetlocks, and proceed as in hock presentation.

This is often not practical, however, and, as a rule, we find the fœtus so firmly wedged, that it is perfectly impossible to move it, either one way or the other. In this case, the effort must be made to deliver the fœtus as presented (fig. 28). First of all, pass a cord, in

FIG. 30.
GUNTHER'S CURVED PORTE-CORD AND BLUNT CROTCHET.

front of each stifle (which is best done by an instrument called the porte-corde), through between the hind-limbs,

bringing it back on the outside of the stifle, then hitching the two ends of the rope together. Do likewise to the other limb. Then pass a rope round the body of the fœtus, the rope having a running loop on one end; pass both ends between the hind-limbs, one up each side, there joining across its back, and, just at the lateral aspect of the spine, pass the end through the loop, and bring it backwards to the outside, then apply traction to the three ropes, when the fœtus may be delivered. If this fails, as it often does, "embryotomy" must be performed, and the fœtus brought away in pieces.

STERNO-ABDOMINAL.

An examination reveals the fœtus lying on its side; the head may be in the right or left flank of the parent,

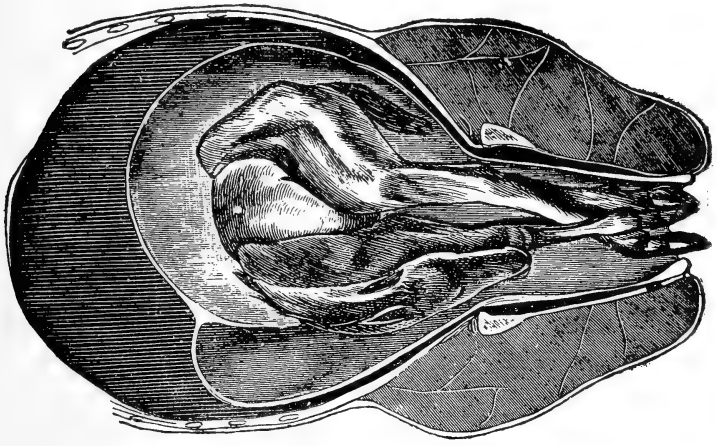

FIG. 31.
STERNO-ABDOMINAL PRESENTATION.

and there may be one, two, three, or four feet presented in the passage. In some cases, the head is also

presented; in others, it is not. Here, as in the last presentation, it must be decided at once, the position of the head and neck, and, as it is rather common to have a fore and a hind foot presented, it is necessary to be particular in distinguishing the one from the other. Cord all the limbs presented, using cords of different colors for fore and hind limbs, and if the head is in the passage, cord it also; then, when this is done, with a repeller, push into the uterus the extremities not wanted, and apply gentle traction to the limbs to be deliverd first. In this, as in the previous case, the lumbo-sacral presentation should be adopted, if both extremities can be reached. If, however, all the limbs are firmly wedged in the passage, then a portion of both fore and hind limbs must be removed, at the knee, or further up. Sometimes it is then impossible to push back the fœtus; cut into the abdomen and remove the organs, when it will be possible to return either extremity into the uterus, and complete delivery.

DORSO-LUMBAR.

In this, it is found that labor has been present for a time, and still no fœtus presented. On examination per vagina, instead of the feet of the fœtus, we find some portion of the vertebral column presented, and the head of the fœtus is found in the right or left flank, all four feet pointing in an anterior direction. Before delivery is attempted, it must be ascertained definitely the position of the head and neck, and of all the limbs; then decide whether the fœtus has to be delivered in the anterior or posterior presentation.

When both pairs of limbs can be secured, it is preferable to deliver in the lumbo-sacral position, as, by doing so, we get rid of any difficulty which might be experienced with the head and neck.

Having decided to remove the hind-limbs first, cord them, and also the fore-limbs, if they can be reached. This done, apply gentle traction to the cords round the

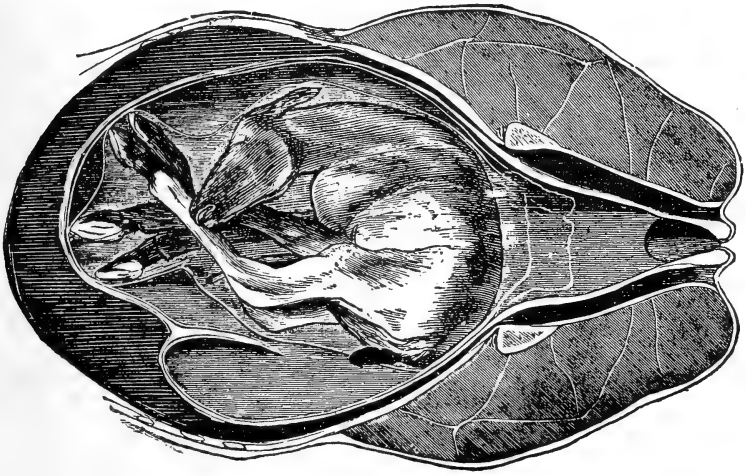

FIG. 32.

DORSO-LUMBAR PRESENTATION.

feet wanted, and at the same time, with a repeller, endeavor to push the other extremity downwards and forwards to the opposite extremity of the womb to that in which the limbs wanted are situated. Should the fetlocks be beyond reach, it will be necessary to cord the limbs as near the fetlocks as possible, and traction applied till the fetlocks can be secured. Sometimes great advantage is derived from elevating the hind-quarters of the parent, in this presentation. Sometimes casting the patient, and placing her on her

back, may cause the fœtus to change position. This should always be tried when other means fail. It occasionally happens that the fœtus is so firmly wedged in the cavity that it cannot be made to alter its position; then we must cut through the spine at the part presented, remove the abdominal organs, and if delivery cannot then be effected, transect the abdominal wall, and deliver the two portions of the fœtus separately.

Chapter VII.

EMBRYOTOMY.

A Few Operations.

Embryotomy simply means the removal of the fœtus from the uterus, through the natural opening, by a surgical operation. It might here be stated, that while the various operations are easily described theoretically, the majority of them are performed with some difficulty, and in every case the practitioner must be guided by circumstances and the surroundings, as much as by theory. If the parent be down, and in a weak condition, attend to her at once with stimulants and gruel, and, if she can stand at all, get her on her feet.

If the operation is likely to be a serious one, great advantage will be derived from placing the animal in a narrow stall, and having her hind-limbs tied forward from above the hocks, over a bar at her head, and the ends of the ropes given to an assistant to hold. The quarters can be raised or lowered according to the presentation, and, if a Mare, inclined to be ill-tempered, belt up one fore-limb, put a twitch on her nose, and, if this fails, it may be necessary to throw and hobble her. Further movements will depend on the situation of the fœtus.

Decapitation.

This is the removal of the head, which may be performed in the vaginal cavity, or in the uterus, and in various ways.

First of all, apply a hook, either to the angle of lower jaw, or to one or both of the orbits, and bring the head into the most favorable position; make a circular incision just in front of the ears, and push back the skin, either with the fingers and a spatula, or the handle of a scalpel, for one and a half to two inches all round the neck; cut through the

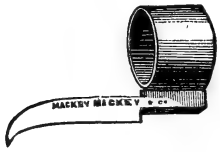

FIG. 33.
STRAIGHT EMBRYOTOM.

articulation between the atlas and dentata, divide the remaining tissues of the neck, bringing the skin together over the divided structures, using a traction hook to keep them together. With the hook, gentle traction may be applied.

Another method is by making the incision further back, and dividing the articulation between the second and third, or the third and fourth, cervical vertebræ, treating the divided borders as in the last.

Another method is by removing the skin entirely from the head, and disarticulating the head at the first cervical vertebra, bringing the skin together over the divided structures. This is by far the longest operation, and the only advantage to be derived from

it is, that the skin, when thus treated, will stand more traction.

Decapitation is at all times a difficult operation, as there is great danger of injuring the parent; if the head is firmly wedged, the operation is even more difficult.

FIG. 34.

CARTWRIGHT'S SUBCUTANEOUS SPATULA.

One or More Limbs Require to be Removed, Either Partially or Completely.

This may have to be done either in the passage or in the uterus. If a fore-limb, cord it at the fetlock, extend it in the passage, if possible, and make a circular incision through the skin above the knee or fetlock. From this incision, divide the skin, either in front, or on the inside of the limb, as far up as

possible. Remove the skin from the subcutaneous tissues, with the fingers, or small spatula; apply a repeller to the sternum, and traction to the cord, at the fetlock, and tear away the muscular structures.

Another method of removing a fore-limb, when within the uterus, is to make an incision through the skin, in front of the scapula and behind it, and, if possible, unite these incisions above and below; then an ordinary amount of traction will tear it away.

Partial Amputation of a Fore-limb.

This may occur at the knee or fetlock, and should always be performed subcutaneously. When partial amputation of a hind-limb is desired, it may be performed as in the fore. When it is to be completely removed, make a circular incision at the hock, if possible, divide the skin on the posterior or internal aspect of the limb, as far up as can be reached; separate the skin from the tissues and apply traction, a larger amount being necessary than in the fore extremity.

Detruncation.

When *division of the body* is required, it is always necessary to bring the skin together over the divided vertebræ, and it is better to put a stitch or hook through the divided surfaces to keep them in position.

Evisceration.

It may be necessary to *remove some of the abdominal organs*, either through the abdominal walls, or through the thorax. In the anterior presentation, cut into the

thorax, immediately above the sternum; rupture the structures in passing into the cavity; tear away the first pair of ribs, to allow free passage of the hand; remove the lungs and heart; puncture the diaphragm, and remove the abdominal organs through the opening.

Rotation.

Sometimes it is necessary to bring about *rotation* of the fœtus, which means a partial turning of it to right or left. If either the fore or hind limbs are out of the passage, this is not so difficult of accomplishment, by cording the presented extremities, and applying traction in the direction the fœtus is desired to take.

If all the limbs are in the uterus, it is much more difficult. Cord one pair, pass in the hand, and try to elevate the body of the fœtus, while traction on the cords is applied as directed. Failing in this, a sack or blanket, passed under the abdomen of the mother, and pressure applied, may bring about rotation.

Version.

It is sometimes necessary to cause *version* of the fœtus. This means converting a posterior into an anterior presentation, and *vice versa*. In this case, cord the limbs that are wanted into the passage, and, with a repeller, push the opposite extremity downwards and forwards into a horn of the uterus, at the same time applying traction to the cords. Sometimes great benefit is derived by elevating the body of the fœtus with the hand, or by raising or lowering the hind-quarters of the parent; the treatment depending upon the case.

Cæsarian Operation.

It sometimes happens, that it is impossible to remove a fœtus through the natural opening, and if it be considered necessary to attempt to save the lives of both mother and fœtus, the "*Cæsarian Operation*," sometimes technically termed "Hysterotomia," or "Gastro-hysterotomy," has to be performed.

There are two situations in which to operate.

When the parent is useless, it can be performed as follows, viz.: Throw the patient on her back; make a crucial incision in the inferior aspect of the abdominal wall; bring the uterus to this opening; incise its walls, and remove the fœtus.

The other situation is in the right flank. The operation is a serious one, and while it is often successful in the Bitch, it is fraught with much gravity in the case of the Mare or Cow.

Operation.—Have the animal gently and carefully cast on the left side. Take the right hind limb out of the hobble and stretch it gently but firmly backwards; give the rope attached to it a turn round some fixture, and the end to an assistant to hold; then make an incision about six inches long, beginning from about three and a half to four inches below the spine of the ilium, cutting obliquely downwards and forwards. Care must be taken to prevent injury to any part of the intestines when making the incision, and for this reason cut through the skin and muscles first; puncture the peritoneum with a probe-pointed bistoury, cutting from within outwards. Bring the uterus to the external wound, puncture it, and, with a probe-pointed

bistoury, enlarge the opening, cutting from within outwards. Remove the fœtus and its membranes; sponge out the cavity of the uterus, using every care to prevent escape of fluid into the peritoneal cavity. Wash out the uterus with an antiseptic solution, and bring the wound together with antiseptic catgut sutures. The treatment of the external wound consists in bringing it together with quill sutures, over which is applied transverse stripes of pitch-plaster, leaving a dependent orifice for drainage. Over all, apply a body-swiller, or broad bandage. If the patient is a Mare, put her in slings, and fix them so that most of the weight will be borne by the sternum. If a Cow, inclined to lie down, let her do so, but only on her left side. The dangers to be dreaded from this operation are: hemorrhage, death from nervous shock, metritis, septicæmia, pyæmia, fistula, and hernia. Of course, previous to, and throughout the entire operation, the strictest antiseptic precautions, consistent with the general surroundings of our patients, must be observed.

This operation was successfully performed by Dr. A. Babb, M.D.C., of Springfield, Mo., on April 6th, 1895, the patient being a Cow.

Chapter VIII.

MONSTROSITIES.

The most common monstrosity is a fœtus with an abnormal number of limbs. They may be too few, or many. All four limbs may be presented, and one or more rudimentary limbs attached to each.

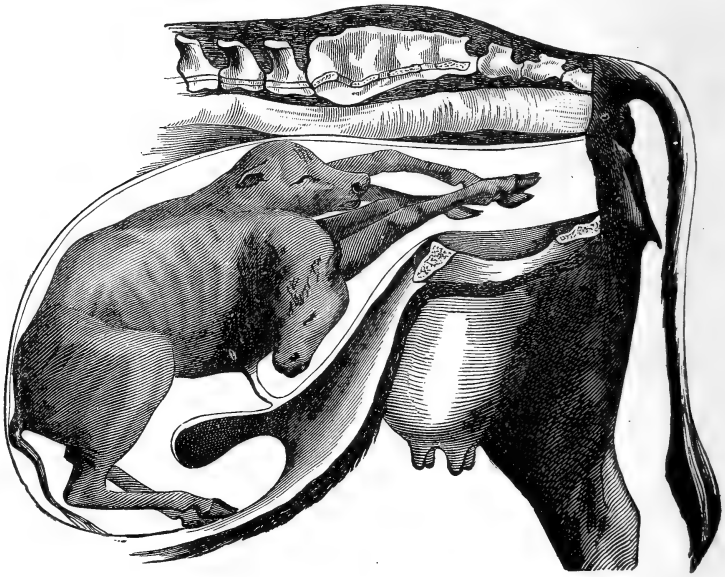

Fig. 35.

Sysomian Monstrosity: *Dicephalus bicollis* (Gurlt).

In some cases the head is only partially developed. The mouth or eyes may be entirely absent. Two heads may be present on one body, or two bodies only slightly connected to one another. In other cases, one body is present, apparently normal, with a small rudimentary fœtus attached to it,—a parasite.

The abdominal walls may be only partially developed, and the viscera floating about in the uterus. In other cases the ribs may be wanting, with only the muscular tissue of the walls present. The ribs may be curved upwards and inwards, and united above instead of below. The skin may line instead of cover the abdominal cavity. The diaphragm is often absent. A very common monstrosity amongst cattle, consists in

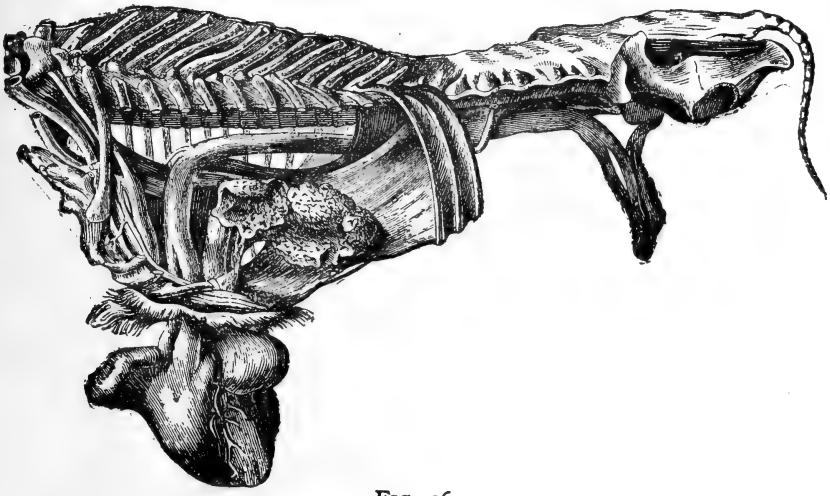

FIG. 36.

ECTOPIA CORDIS: *Schistocormus Fissisternalis.*

the spine being curved forwards, the coccygeal vertebræ terminating about the withers, and the ribs springing from the spine upwards. This condition has received the name of "*Schistocormus reflexus.*" Sometimes the sternum is cleft in two throughout its length, this condition being termed "*Schistocormus fissisternalis.*" The brain may be absent entirely, or partially, and, in some cases, is outside the cranial cavity. The sternal and thoracic ribs are sometimes absent, the heart and

lungs being unprotected. This condition is known as "*Ectopia cordis.*" Often the fœtus is born with the cranial cavity enlarged with fluid,—"*Hydrocephalus*" or "*Hydrops capitis.*" First of all, fluid collects in the ventricles, and the diseased process may go on until

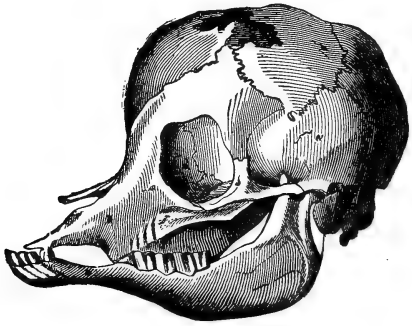

FIG. 37.

SKULL OF HYDROCEPHALIC CALF: THE CRANIAL BONES ARE PARTIALLY DESTROYED AND DEFECTIVE.

the whole of the brain structure is displaced by fluid, and only retained in position by the skin. This condition often gives rise to difficult parturition, and must be reduced by puncturing and allowing the fluid to escape.

There are several other mal-formations of more or less importance, but which may be passed over here.

Chapter IX.

DISEASES OF FŒTUS.

Abdominal Ascites.

This is rather common in large herds of cattle, and is believed to be due to some injury to the fœtus *in utero*. The abdomen of the fœtus is considerably distended with fluid, and the fœtus is often dead. Before delivery can be effected in this case, the

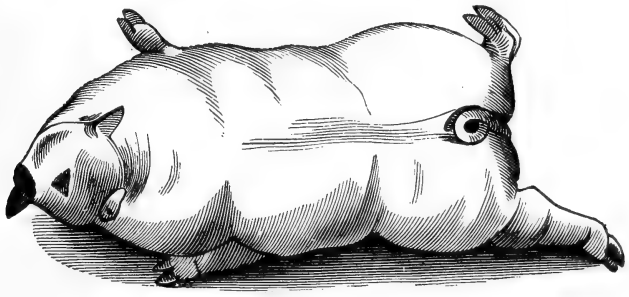

Fig. 38.
Anasarcous Fœtal Calf.

abdominal wall (of the fœtus) must be punctured, and, if this is not possible, puncture through the chest with a long trocar and canula designed for the purpose.

Anasarca.

This is not so common. The fœtus is always dead. It may be fully developed, but a collection of fluid has taken place in the subcutaneous cellular tissue. If it interferes with delivery, the skin must be freely incised, to allow the fluid to escape.

Chapter X.

MATERNAL DYSTOKIA.

Deformity of the Pelvis.

Complete deformity of the pelvis is rare in our subjects. It is most frequently observed in the Pig, due, generally, to rachitis.

Fractures.

Callosities, resulting from fracture of some of the pelvic bones, may give rise to difficult parturition.

Exostoses.

When these occur on the bones of the pelvis, and project so as to cause narrowing of the passage, they may become an obstacle to the delivery of the fœtus.

Treatment.—This will depend upon circumstances, and expediency. If delivery be impossible, without serious injury to the parent, and the latter fit for food, then it may be advisable to call in the butcher. Or, if the animal is in poor condition and unfit for butching, artificial abortion may be produced while the fœtus is small enough to easily pass through. Should parturition have commenced, it will then be necessary to resort to surgical or obstetrical measures before delivery can be effected.

The indications are: forcible extraction of the fœtus through the narrowed passage; widening of the

passage; diminishing the size of the fœtus, or making an artificial opening.

The methods of inducing artificial abortion are: irritation of the cervix by hand; puncture of the envelopes; and vaginal irrigations.

FIG. 39.
PELVIC EXOSTOSIS.

Before forcible extraction is contemplated, a very careful examination should be made, to ascertain whether such procedure is practicable. If such should be found to be the case, the parts should be well lubricated, to facilitate movement.

Enlargement of the passage is not usually practicable, unless the constriction be occasioned by a tumor, which may be removed by excision, or by the ecraseur.

Diminution of the Size of the Fœtus.

See section on "Embryotomy."

Artificial Opening for Fœtus.

Refer to "Cæsarian Operation."

Hernia of the Uterus.

This condition is seldom seen; is easily detected in the Mare and Cow, but difficult to detect in the Bitch, in which animal it is probably more common than in the other two named. It is often caused by an accident at some period of pregnancy. The abdominal

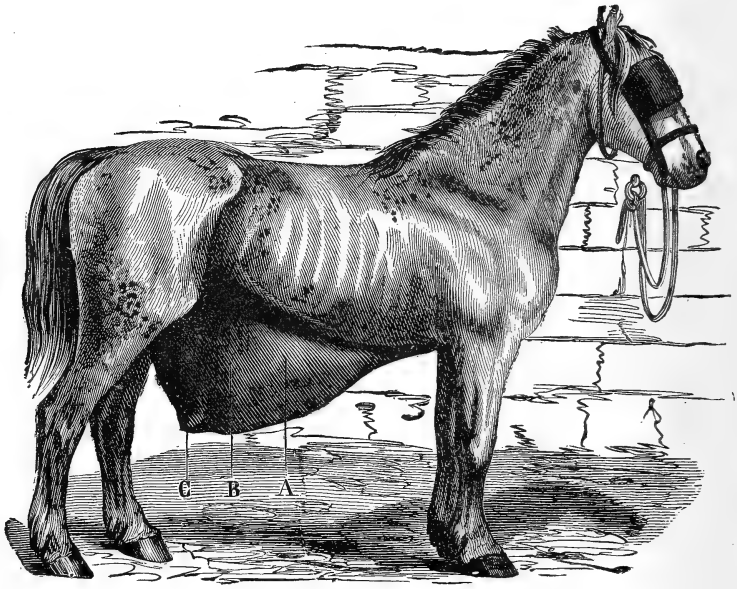

FIG. 40.

UTERINE HERNIA.

A, B, Hernial Tumor; C, Teat carried down by Tumor.

muscles become ruptured, the uterus and its contents passing through; and development of the fœtus may go on in this situation, or may be at once stopped. The condition will be recognized by the history, manipulation, and the general appearance, and the presentation of the fœtus will be ascertained in the usual way.

The best method of delivery, is to support the hernia by a broad bandage or blanket, and then proceed as usual. Sometimes this can not be accomplished, as the opening through which the hernia has passed may be constricted, and in this case "Gastro-Hysterotomy" has to be performed.

Note.—Referred to also under "Conditions Incidental to Pregnancy," Chap. IV., p. 48.

Deviation of the Uterus.

This is more common in the human subject, possibly due, in a great measure, to the use of tight garments.

The principal deviation met with in the lower animals, is the "inferior oblique," which corresponds to the anterior oblique of the human subject. In this case, the body of the uterus is directed from above downwards, and slightly forward; and, in an anterior presentation, the head of the fœtus is presented to the spine of the parent. If the amount of deviation is not great, gentle traction may bring about delivery. If this fails, then apply steady pressure to the superior wall of the uterus, and try to force it into its natural position. Should this also fail, apply pressure, through the abdominal walls, to the uterus, at the same time applying traction to the fœtus. If this is not successful, cast the animal gently, and turn her on her back, when the uterus will, in all probability, assume its normal position. This condition is seen in old and poorly nourished animals.

Torsion of the Uterus.

This condition may be seen in any of the domestic animals, with the exception of the Bitch and Sow.

The torsion may be partial or complete. As in the previous case, the broad ligaments are relaxed, and the

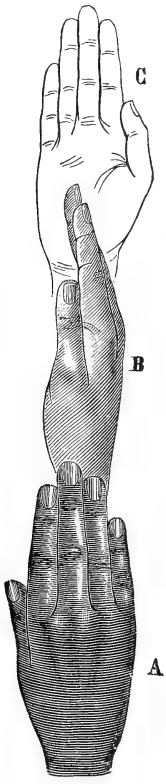

FIG. 41.
RIGHT UTERINE TORSION:
MANIPULATION.

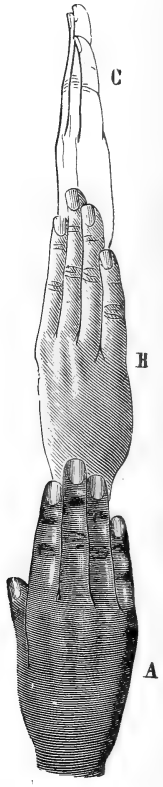

FIG 42.
LEFT UTERINE TORSON:
MANIPULATION.

body of the uterus makes a partial or complete revolution on its own axis, so that the superior wall (of the uterus) may pass to the right or left, depending on which direction the torsion has taken.

It is generally due to some accident in the later months of pregnancy, through falling or being cast. Some authorities think that the movements of a strong fœtus may bring it about. The condition is often difficult to diagnose. The labor pains may have been present for some time, and the animal apparently very

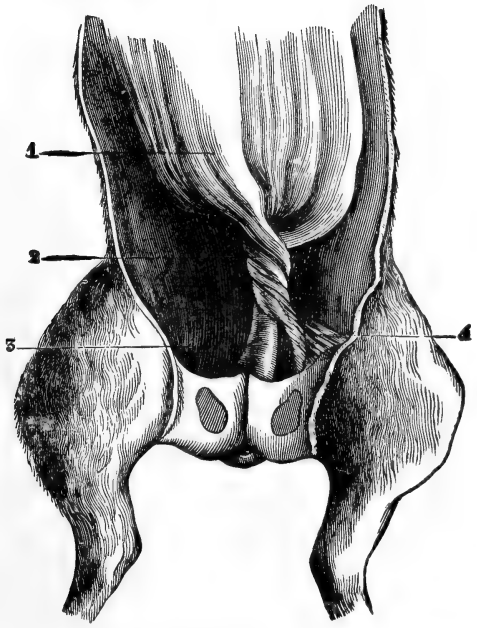

FIG. 43.
LEFT UTERINE TORSION *in situ*.
1, Body of the Uterus; 2, Twisted *cervix uteri;* 3, Vagina; 4, Left Fallopian Ligament.

uncomfortable, but still there is no appearance of the amniotic sac or fluid. If the abdomen of the patient be examined, it may be larger on one side than the other, the large side being that to which the uterus has turned. If explored per vagina, the *os-uteri* is constricted or closed. If the fingers can be passed into the os, the mucous membrane will be found to have

assumed a spiral direction, and the direction of the twist will depend on the side to which the uterus has turned. If torsion be complete, the os may be perfectly closed. If only partial, it may be possible to pass in the hand. If the left ligament has passed over the right, the condition is termed "right torsion", and *vice versa*. There are various methods adopted to reduce the torsion. When only partial, it is often possible to do so by pressure of the hand in the uterus.

Another method is, by making an incision through the flank of the parent, and at the side to which the uterus has turned; then, with a clean cloth, which has first been rendered aseptic, apply pressure to the walls of the womb, through the opening.

Another is, by making an incision in the roof of the vagina, as in oophorectomy, and applying pressure, with the hand, through the opening.

Another,—and perhaps the best,—is rotation of the parent.

When this plan is adopted, decide first which way the uterus has turned. When to the right side, cast the patient on that side; turn her over the back; gather her feet well under her, and turn her to the right. During the turning process, the hand should be kept in the vagina, with the fingers, if possible, in the spiral; and, by this means, reduction of the torsion will be detected. If left torsion has taken place, proceed in a similar way, but turn to the left.

When the torsion has been reduced, the amniotic fluid will escape, and the fœtus will be born in the usual way.

Tumors.

These neoplasms may be found growing from some part of the passage, and, before delivery can be effected, they must be removed by the scalpel or ecraseur.

Hernia of the Bladder.

If the condition is of quite recent occurrence, the bladder may be returned, but if the displacement has been in existence for some time, its blood vessels will most likely have become strangulated, and if it be deemed unadvisable to return the organ, it will be necessary to ligate and amputate it. The after treatment, of course, calls for strict antisepsis. As the sphincter will most likely have been injured in the operation, the flow of urine will afterwards be continuous.

Spasm of the Os-uteri.

This is a functional ailment, due to contraction of the muscular tissues at the neck of the womb. The labor pains may have been present for some hours, and when the fœtus fails to be presented, an examination of the os will reveal the fibres firmly contracted, so that the cavity may not admit one finger. This condition is oftenest seen in young well-bred animals at their first pregnancy, and those of nervous temperament.

The *treatment* depends on the condition of the patient. If the animal is not suffering much pain, little need be done for two or three hours, in the Cow, and half that time in the Mare; but if after that there is no improvement, try hot cloths across the quarters; warm injections per *vaginam et rectum*, to which should

be added sedatives or anodynes, as tincture of opium, tincture or fluid extract of belladonna, or chloral hydrate. To the constriction apply equal parts of solid extract of belladonna and vaseline. Internally administer chloroform, tincture of opium, or chloral, and keep the animal quiet as possible. These failing, try to dilate the os by force, as by the introduction of the fingers, which will sometimes bring about relaxation.

Another method is by inserting a dry cone-shaped sponge, and then wetting it; as it increases in size, the os may dilate.

Another is to insert a bladder into the opening of the os, and then distend it with hot water; or, insert a rubber bag, similar to a "Barnes' Dilator" (used in human practice), and inflate it with air, or distend it with hot water.

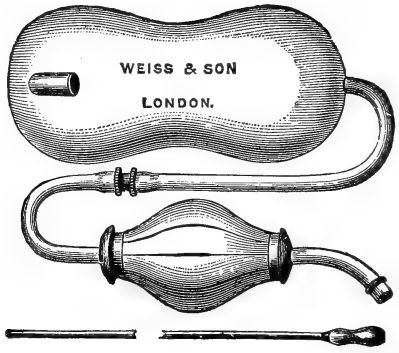

FIG. 44.
BARNES' UTERINE DILATOR.

Should all these methods fail, make an oblique or lateral incision with a probe-pointed bistoury. Be careful that the incision is not made above or below, on account of injuring the contiguous structures in those situations.

Induration of the Os-uteri.

This is a diseased condition, due to degeneration of the muscular fibres of the os, the degeneration being fibroid, or cancerous, in its nature. Sometimes there is no increase, at others there is an enlargement. On examination by vagina, a hard, scirrhous mass is found at the situation of the os. This is often seen in old animals, and is believed to be the result of an injury to the os at some previous parturition.

The only *treatment* is to incise the obstruction, as in the last case. The hemorrhage is not usually dangerous, and, if the growth is not cancerous, the parts have a tendency to heal quickly.

It is not advisable to breed from an animal in this condition, and, being believed by some to be hereditary, it is scarcely advisable to breed from an offspring.

Scirrhous Chorion.

This is due to hypertrophy of the tissues of the chorion, these being morbidly adherent to the walls of the uterus. Sometimes morbid adhesions have also formed between the chorion and the fœtus, through the other membranes.

Should this condition interfere with parturition, the adhesions between the fœtus and its membranes must be forcibly broken down; and, if the fœtus is delivered, allow the membranes to remain for a time, to prevent hemorrhage, when they can be removed.

Persistent Hymen.

This is more common in the human subject. The tissues of the hymen, after impregnation, become

hypertrophied, and must be incised before delivery can be effected.

Want of Muscular Power to Expel the Fœtus.

This condition is seldom, if ever, present at the beginning of parturition, but it is often found, that after an animal has been straining for a considerable length of time, with an abnormal presentation, that she becomes exhausted; the muscular fibres of the uterus, for the time being, being paralysed; and although the fœtus be brought to a normal position, the parent makes no effort to expel it.

In some animals, especially those in a plethoric condition, the muscular tissue of the uterus undergoes fatty infiltration. During pregnancy, in such subjects, this paralysed condition is much more easily brought about.

In this case, the animal should be allowed to rest for several hours, and stimulants and gruel judiciously administered. When her strength has been partially restored, traction, gently applied, will very often complete delivery.

Chapter XI.

SOME ACCIDENTS FOLLOWING PARTURITION.

Post-Partum Hemorrhage—Flooding.

Hemorrhage from the womb, after parturition, is quite frequently met with in the human subject, but not so often, relatively, in the lower animals. It may be due to the violent rupture of a number of vessels, in a difficult case of labor. It is sometimes seen when adhesions have taken place between the uterus and its membranes. It may also be due to an injury to the walls of the uterus at parturition, or may follow a healthy labor, but involution failing to occur after expulsion of the fœtus.

The symptoms are not always evident. While there is no difficulty in detecting it, should blood escape from the vulva, still, if the animal is standing, there may be no escape from the vulva, and only the signs of internal hemorrhage can be seen, which are a quick, frequent, and fluttering pulse, very weak heart, which may beat irregularly and intermittently; paleness of the visible mucous membranes, general uneasiness, shifting from one hind-limb to the other, sighing occasionally, the animal becomes unsteady in her gait and staggers, respirations much increased, and she ultimately falls and is unable to rise; a cold perspiration bedews the body, and death is preceded by convulsions.

Treatment.—If the fœtal membranes have not been removed, have them taken away at once. Apply cold cloths, or ice bags, to the lumbar region; inject cold water into the rectum and womb, and internally administer styptics; and if the animal is weak, give stimulants. Should these fail, pass into the uterus a soft, clean cloth, or absorbent cotton tampon, saturated with a cold styptic solution; tincture of ergot, or ergotine, orally. As a revulsive, powerful counter-irritation may be tried over the chest wall. If the animal survives the acute stage, she should have food that is easy of digestion and assimilation, and stimulants for several days.

Retention of the Fœtal Membranes.

(Retentio Secundarum.)

This is one of the commonest conditions following parturition, being often due to weakness, or to a degenerate condition of the uterine walls; it may be due to an injury to the walls of the uterus, and is common in animals that have aborted; in which case the os contracts before the membranes are expelled. It is sometimes due to morbid adhesions.

This is very easily diagnosed. A portion of the membrane may be seen hanging from the inferior commisure of the vulva, the appearance of which will depend upon the length of time it has been there. The odor is characteristic, and the mass often gives rise to an amount of irritation, exhibited by the straining and general uneasiness of the animal. In other cases, nothing can be seen while the animal is standing,

but, when lying down, a portion of the membranes may be seen protruding from the vulvar orifice. When putrefaction of the membranes has taken place, the general health of the patient suffers. She feeds irregularly; the coat is harsh and dry; there is loss of condition; the secretion of milk is decreased, or may be stopped; there is hollowness at the eyes; the pulse is small, weak, quick, and frequent; and the condition may terminate in pyæmia or septicæmia.

Retention of the membranes is seldom seen, except in the Cow.

Treatment.—The placental membranes should not be allowed to remain longer than from twenty-four to thirty-six hours after parturition.

There are a number of methods adopted to remove them. A common one is to fix a weight to the exposed part, until it mechanically brings them away. Another is to give a full dose of purgative medicine. The best, and most professional method, is to remove the mass by hand. Pass the hand into the uterus, and, with the thumb and index finger, break down the connections at the cotyledons. When these connections, or as many of them as can be reached, have been ruptured, gentle traction will often complete the removal.

In any case, after the removal of the membranes, the womb should be washed out with an antiseptic solution. If the membranes have undergone decomposition, repeated washing or douching will be necessary, and the general health of the animal should be attended to.

Inversion, or Eversion, of the Uterus.

(Procidentia Uteri.)

This signifies the protrusion of the uterine mass beyond the outside of the vulva. The size and appearance will depend upon the length of time the organ has been in that situation.

The cause is not always evident. It may be seen after a healthy case of labor, or an extremely difficult one. It is of much more frequent occurrence in the Cow than in the Mare. Sometimes it is due to lack of tone of the muscular system, the uterus failing to contract normally after parturition. It is sometimes observed in animals that have calved immediately after coming off a railway journey, and is then believed to be due to excitement or injury. Occasionally it is caused by retention of of the fœtal membranes. If the inversion be complete, the mass may be seen hanging as low down as the hocks. The color may vary from a bright, healthy red, to a dark brown, nearly black, depending entirely upon the length of exposure, and the strangulation of the vessels.

If the animal has been lying down for any length of time, the most dependent part will have the greatest amount of discoloration.

The *treatment* will depend altogether on the length of time the organ has been exposed. Ascertain exactly when it was expelled, and what treatment, if any, has been adopted in the interval, and then decide whether it is advisable to attempt to return it or not.

If the mass be dark, cold to the feel, and a number

of the blood-vessels strangulated, then the chances are that the case will terminate fatally, although reduction of the condition has been successfully performed. If the womb is cold, and the vessels strangulated, it is advisable to immerse it in a hot antiseptic solution. If œdematous, the most dependent part should be scarified, to allow of escape of the fluid. In every case, if the membranes have not been removed, this should be done before any other treatment is adopted.

When the animal is down, and it is impossible to persuade her to rise, have some clean bedding, on which should be placed a clean sheet, or piece of sacking, for the uterine mass to rest on, and when it has been satisfactorily treated, its return must be attempted. An assistant should elevate each corner of the sheet, and at the same time should press it towards the quarters of the patient, whilst the operator manipulates the mass at the lips of the vulva.

As soon as the organ is partially returned, the best mode of treatment is to press the closed hand firmly against the most dependent part of the uterus, and, doubling its walls, push the mass before the hand into the normal cavity. If called at once, the uterus may be returned; but if it has been out for several hours, or perhaps days, and the os is partly or firmly contracted, it may be impossible to return it.

If the animal can stand, the operation is much simpler, on the same plan, the only difference being that the sheet is held by the assistants, and not laid on the ground or floor. When the uterus is returned, it

may be difficult to retain it in position. Various measures may be adopted for that purpose.

The animal should have a full dose of sedative medicine, as opium, chloral hydrate, belladonna, or morphine; and, if she is very weak, it may be combined with stimulants. If this fails in preventing straining, then mechanical means must be adopted, viz.: Elevate the hind-quarters considerably; pass a surcingle, or rope, round the chest, and brace it up as tightly as possible.

Another method is by passing a piece of wood, made smooth, with a circular head on it about three and a half inches in diameter, through the vulva and vagina, the head resting against the os; and to the external end of which two ropes are attached, one passing along each side, to a roller or surcingle round the animal's chest. A similar method to this is adopted in

FIG. 45.
PAD PESSARY.

human practice, but an objection to it in veterinary practice is, that the animal is continually changing position, and, unless constantly watched, may injure herself.

Instead of a circular solid head, one in the form of a ring is sometimes used, it being covered with some soft material, which embraces the os. These appliances are known as pessaries.

Another, and one which is very common, is closing the vulvar opening by means of sutures. There are

two kinds, Hip and Labial. The former stretch

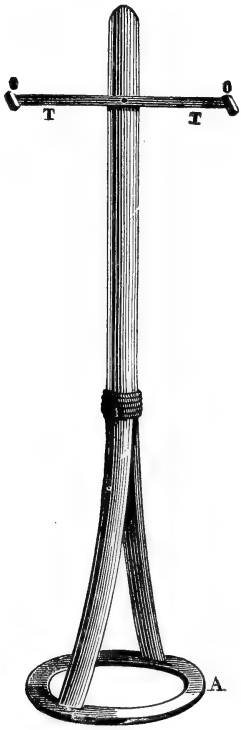

FIG. 46.
RING PESSARY.

across from the prominent part of one quarter to that

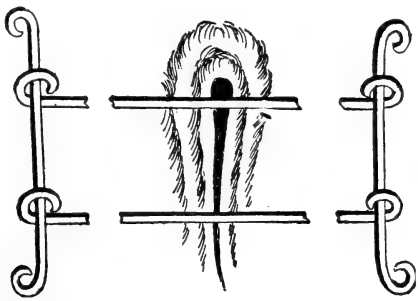

FIG. 47.
ZUNDEL'S LABIAL SUTURES.

of the other, crossing the vulva. For this purpose,

strong metallic wire, or antiseptic tape, may be used.

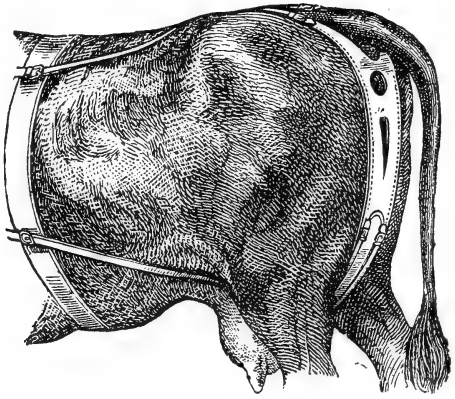

FIG. 48.
LEATHER TRUSS.

The Labial sutures simply unite the lips of the vulva. They are less subject to strain than the hip

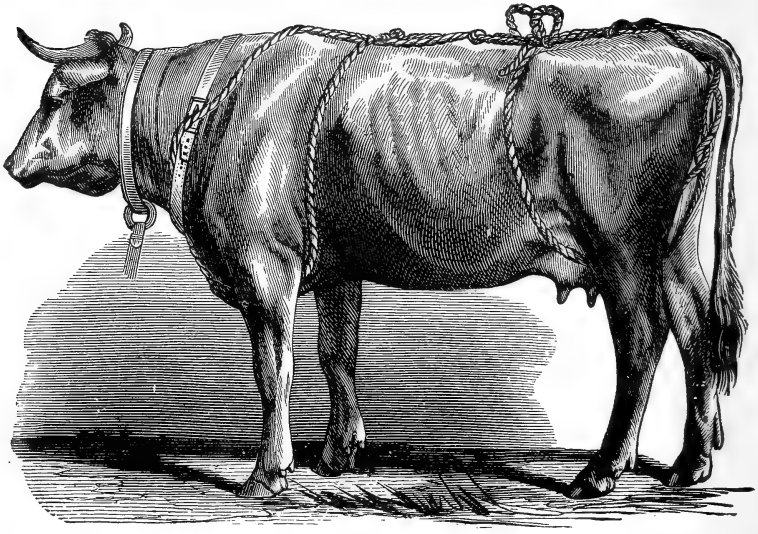

FIG. 49.
RENAULT'S TRUSS.

sutures, but the parts being more sensitive, they cause more pain and irritation, and are more liable to slough.

When sutures are adopted, it is better to use some of each; two Hip, and two or three Labial, being quite sufficient to retain the uterus in position.

Another very common method is by a truss, which may be composed of leather, webbing, or rope, and when the former of these is properly made, it is easy to affix it to a roller round the chest, or waist.

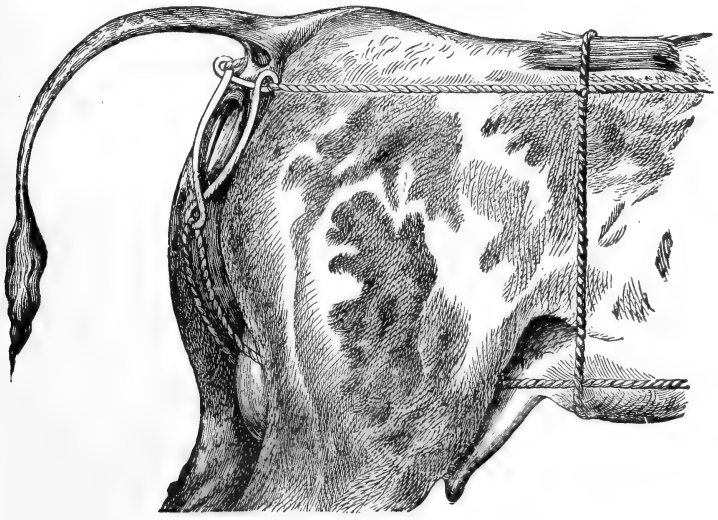

FIG. 50.
LUND'S TRUSS APPLIED.

In the absence of a truss, a rope, 25 to 30 feet long, may be used. The rope must be doubled, and one end passed over each shoulder, making a knot between the animal's fore-limbs, and another knot at the base of the neck; then passing one end on each side of the neck, joining them at the withers, and knotting them there. The ends are then passed back along the spine, making a knot every 15 or 16 inches, then enclosing the tail, and a knot at the superior and inferior com-

missures of the vulva (fig. 49). Both ends are then passed between the hind-limbs, one forward and upward on each side, to become attached to the rope passing along the spine, just behind the withers.

Another appliance is known as Lund's truss.

It sometimes happens that the uterus has been so long exposed, that it is not advisable to return it, and if saving the life of the patient must be attempted, it will be necessary to remove the uterus by a surgical operation, which is known technically as "Metrotomy."

Metrotomy.

This is always a serious operation, and the number of cases which terminate fatally is very considerable. It has been estimated at 95 per cent. It should only be attempted after the owner has been made aware of the danger.

Having decided to operate, puncture the uterine mass, and ascertain that no part of the intestine has been enclosed in the inverted uterus. This done, pass a ligature round the uterus, close up to the lips of the vulva, then pass a double ligature through the mass, and tie those ligatures so as to divide the tumor into four portions, tying the circular and transverse ligatures together. When the ligatures have been made fast, cut the mass with a scalpel; cleanse the stump with an antiseptic solution or dressing, and return it to the cavity.

The local treatment consists in keeping the parts healthy with antiseptics. The general treatment

depends on conditions. Febrifuges are generally always necessary.

Inversion of the Vagina.

This condition may accompany the last, or may occur alone. When alone, the everted mass is much smaller, and may only be seen when the animal is lying down. The color varies with the time the part has been exposed. The maternal cotyledons are absent, the inferior portion shows a groove leading to the meatus urinarius, and on the free extremity is found an opening corresponding to the os. If the hand be passed along the lateral aspects of the mass, the membrane is found to be continuous with the lips of the vulva, which will serve to distinguish this condition from inversion of the womb.

Treatment.—This is similar to that prescribed in the previous case. If the sub-mucous tissue has been torn from its connections, or otherwise injured, it often leaves the parts in an irritable condition, and it will be necessary to apply a truss, styptics, or other means, to prevent a second prolapse.

Inversion of the Bladder.

(Prolapsus Vesicæ.)

This condition is of somewhat rare occurrence, and is met with more frequently perhaps in the Cow than in the Mare. The protrusion of the bladder through a laceration in the floor of the vagina, sustained in the act of parturition, and its subsequent protrusion through the vulva, is occasionally met with. In such

a case, the bladder will be found to contain urine, which, however, could not occur in a complete eversion of the organ.

If it is found difficult and impracticable to introduce a catheter, the bladder may be carefully punctured with a small trocar and canula, the urine drawn off, and the organ replaced. The laceration in the vaginal floor should be sutured; this complication, however, is very serious, although not always fatal. As the condition may recur at a subsequent parturition, the patient—if a Cow—should be prepared for the butcher.

Amputation of the bladder may be performed, but there will be a continuous flow of urine ever after.

Sometimes the walls of the uterus get ruptured; also the bladder, intestines, diaphragm, or tissues of the perineal region;—all of which are very serious, and nearly always fatal, and the treatment must be according to the symptoms presented by the animal.

Chapter XII.

SOME PATHOLOGICAL CONDITIONS FOLLOWING PARTURITION.

Vaginitis.—Inflammation of the Vaginal Mucous Membrane.

The causes are injuries at parturition, unskilful use of instruments, large fœtus, extension of inflammation from metritis, etc.

The inflammation may lead to, or be complicated with, ulceration, gangrene, or mortification.

Symptoms.—Swelling of the lips of the vulva and their membrane, which may become dark red or lead color. Mucous discharge, which increases, and becomes whitish, purulent, and may be fetid. Ulceration may supervene, and portions of the membrane slough.

Treatment.—Simple cases may make a spontaneous recovery. Cleanliness, attention to diet, and injections of mild astringents, and anodynes, if necessary. For the more serious stages, antiseptics and general constitutional treatment.

Metritis.

This is an inflammation of a portion, or of all of the structures composing the walls of the uterus. It may be acute, or sub-acute. The causes of acute metritis are, injuries to the wall, in parturition, or injuries caused by the contractions in mal-presentations.

It is sometimes due to standing in draughts after labor, or lying on a wet, cold bed. Injudicious feeding is always a predisposing cause. The sub-acute form may be due to other, or similar causes, but often brought about by the absorption of some morbid material from the cavity of the uterus, or may extend from vaginitis, and is frequently due to retention of the placental membranes.

When caused by the absorption of septic material, it is called "septic metritis".

In acute metritis, all the tissues become involved, —the muscular, mucous, and serous coats; while in sub-acute, only the mucous coat may be affected.

Symptoms of Acute Metritis.—The animal stops feeding, and in cattle, ruminating. There is great restlessness, moving from one hind-limb to the other; straining occasionally, and frequent attempts to micturate. The mucous membrane of the vulva is congested; the visible mucous-membranes are also injected. The pulse is quick, frequent, and sometimes irregular. The Mare behaves as with colic. The Cow gets down, and is disinclined to rise. She generally lies on her side, grunting occasionally, and grinding her teeth.

In all animals there is a discharge from the vulva, which is seen several hours after the origin of the disease, and is then dark red in color, passing through a chocolate to a dark yellow.

The *treatment* depends upon the cause. If possible, have the animal made comfortable on a dry, clean bed, and avoid draughts of cold air. Elevate the hind-

quarters a little. Reduce any fever present, and give sedatives. Regulate the bowels, and give antiseptics internally. Wash out the uterus twice daily with a hot antiseptic douche. Hot blankets should be applied round the quarters, and fixed so that they cannot be easily displaced. Some recommend a blister as a revulsive. If the appetite is not lost, the food given should be of an easily digestible nature. If the patient is unable to rise, she should be turned every four to six hours. When the acute symptoms have disappeared, an astringent may be added to the antiseptic solution. Tonics and stimulants should be given internally, and exercise as soon as possible.

In the sub-acute form, the symptoms are, as a rule, confined to the uterus, and there is little constitutional disturbance.

Treatment.—Use astringent and antiseptic douches, and give antiseptic and tonic medicine internally.

In either form of the disease, if the animal appears to be suffering acutely, add an anodyne to the injections.

In Sheep, septic metritis of an acute nature is common, and is believed in many cases to be due to infection carried by the shepherd from one ewe to another at parturition.

The *treatment* is similar to that employed in cattle, but the use of hot blankets is not practicable. Remove the wool, and apply an external stimulant to the quarters.

Leucorrhœa.

This is a sub-acute catarrhal inflammation of the mucous-membrane of the uterus or vagina, or both. It

is most common in pregnant animals, but may remain after parturition, and sometimes it is only seen at that period.

The causes are, copulation with an infected male, injury to any part of the passage, a case of neglected metritis, or the morbid products from retained membranes.

Symptoms.—An almost continuous discharge from the vulva of a glary white fluid, having a creamy consistence and an offensive odor. The animal may occasionally strain, when the discharge is most plentiful; indifferent appetite; harsh, dry coat; loss of condition; hollow appearance at the eyes, and all the symptoms of anæmia are present.

Treatment.—Wash out the uterus and the passage daily with antiseptics first, and afterwards astringents. The animal should have good food, and a plentiful supply of it, and she should have a course of tonic medicine.

Parturient Apoplexy—Milk Fever.

So numerous and diverse are the opinions with regard to the nature of this disease, that we will have to refer our readers to the larger works on obstetrics and pathology, in which the different theories, both ancient and modern, are discussed

As evidence of the difference of opinion which has existed and still prevails, the following designations for the disease will go to show: vitulary fever, milk fever, parturition fever, puerperal fever; inflammatory septicæmia; nervous, paralytic, and tympanic forms of

vitulary fever; septicæmia, puerperal eclampsia, dropping after calving, parturient apoplexy, parturient collapse, etc.

Parturient apoplexy may be said to be an acute post-partum disease, observed in all the domestic animals, but especially in the Cow. Not only so, it may be said to be almost confined to the plethoric animals of the improved breeds. The disease is peculiar to the Cow in the parturient state, and to those animals that are the "deepest milkers". Indifferent milkers are almost exempt. It is exceptional for the disease to make its appearance before parturition. It usually occurs from about twelve to forty-eight hours after that act, and generally after giving birth to the third calf, the parturition being an easy one. Law says, that the two factors, plethora and parturition, may be set apart as pre-eminently the causes of this disease. The same authority remarks that the condition of the blood-globules in the suffering Cow attest the extreme richness and density of the blood, and that he has never examined the blood of a victim of this disease without finding the red corpuscles reduced to little more than one-half their usual size, due to density of the liquid in which they float.

Symptoms.—In many cases the disease sets in suddenly, and without any premonitory symptoms; running its course and terminating fatally in a very short space of time. In some instances, the lacteal secretion may be diminished or suspended before the symptoms appear. The Cow hangs her head, stops feeding, and there is an uneasy movement from one

hind-limb to the other. There are indications of cerebral excitement, exhibited by frequent spasmodic contractions of the eye-lids, pricking of the ears, and the animal has a wild, staring appearance. Lacrymation is generally excessive, the tears coursing down the sides of the cheeks. Breathing becomes accelerated. After a time there is loss of power, the animal sinking down at the hocks, and ultimately falling to the ground. In the early stage the pulse is hard and full; later, however, it becomes quick and frequent. The horns are hot. The animal may fall into a comatose condition, lying with the muzzle turned round to the flank, the pupils widely dilated, and the eye insensible to light. Or, there may be excitement, the head being thrown violently about. Tympany seems to be invariably present. When death is imminent, the more serious symptoms become aggravated. Coma becomes more and more complete. The muzzle rests upon the ground; the animal, instead of lying on the sternum, is stretched at full length on her side. The eye-lids no longer respond when the cornea is touched; the pulse becomes smaller, irregular, intermittent, and quicker, until it is imperceptible. Tympanitis increases; the mouth is open, the breathing partially oral, with puffing of the cheeks at each expiratory act, and stertor becomes more marked, death taking place apparently without a struggle, or during slight convulsions.

The ordinary duration of the disease is two or three days, but there are instances on record in which it has been less than twenty-four hours; rarely does it extend to five or six days.

Causes.—The predisposing causes may be enumerated as follows: breed or individual predisposition, high temperature, confinement, constipation, electrical disturbances, development of the lacteal function (age), and plethoric condition.

As to the actual, or exciting cause or causes, although some authorities believe that the disease is chiefly due to infection, opinions vary as much as to its etiology as they do with regard to its pathology.

The post-mortem appearances are varied in character. The digestive organs are usually normal. The rumen generally distended with gas. Gall-bladder sometimes much distended. Lungs normal, or slightly emphysematous; at other times congested, or in various stages of pneumonia from the inhalation of foreign matters. The nervous system has not exhibited any uniform or satisfactory lesions.

Treatment.—Knowing the value of prophylactic measures, too much emphasis cannot be placed upon the necessity for strict hygiene of the pregnant Cow, especially during the later months, and more particularly in those animals whose breed, age, and lacteal development predisposes to this disease. The food should be easy of digestion, and sparing in amount. The animal should, if possible, be allowed exercise, and her condition should be made as natural and comfortable as circumstances will permit. Some recommend bleeding, a few days prior to parturition, as absolutely effective; while others advise a saline purgative. A number of other agents are suggested as useful preventives.

The agents and methods recommended for the cure of this disease, are about as numerous and varied as are the theories regarding its pathology and cause. Bleeding, purgatives, stimulants, sedatives, nerve tonics, cutaneous stimulants, counter-irritants, electricity, etc. In the present incomplete state of our knowledge regarding this disease, it would be useless to attempt to map out any specific line of treatment. Cases occasionally recover where no medicine is administered, and it is possible that a great many do so, independently of the drugs given, which has the effect of deluding the practitioner into the belief that the virtue lay in his medicaments. The following are the general directions given, as to medicinal treatment, in Zuill's translation of Friedburger & Frohner's work on pathology:

"The treatment must especially consist in combating the more alarming symptoms,—the paralysis of the voluntary and involuntary muscles, and the cerebral depression. Avoid, as much as possible, giving medicinal agents through the mouth, on account of the danger of them going the wrong way, and pneumonia resulting. Subcutaneous administration is much preferable. We should counteract the general paralysis and the nervous depression with stimulants, administered preferably hypodermically: veratrine, caffeine, spirits of camphor, ether, nitrate of strychnine, sulphate of eserine (which excites also peristalsis). This last, however, like other remedies, is often absolutely inefficient.

"The principal stimulants administered internally

are: wine, essence of turpentine, ammonia carbonate, brandy and dilute alcohol. These medicines are recommended to be given in the shape of clysters. The most used external stimulants, are frictions with turpentine, camphorated oil, oil of mustard, croton oil, diluted ammonia, etc.; and frictions of stibiated ointment (1 : 4), cold and warm compresses, cold douches upon the head, the application of Mayor's hammer along the spinal cord, taking care to cover the skin with a woolen cloth, etc. Some veterinarians have used electricity with advantage. Bleeding has been found useful in some cases, and valueless in others.

"We should use drastics to combat the cessation of intestinal peristalsis, those which likewise act as derivatives upon the digestive canal, such as eserine, tartar emetic, croton oil (in mucilaginous decoction), sulphate of soda, etc. Injections, or a rectal exploration, frequently repeated, and the manual extraction of fæcal matters, have a similar action to that of these agents.

"Spasms and general excitement should be combated by morphine injections, injections of chloral hydrate, inhalations of chloroform, etc."

Personally, I have had good results from the administration of a saline purgative (if deglutition was not impaired), or the hypodermic injection of sulphate of eserine, followed by nux vomica in diluted alcohol, orally, or liquor strychnia, subcutaneously; extraction of fæcal matters, also any retained membrane, and enemas; puncturing the rumen; catheterization of the bladder; cutaneous stimulation by the application of diluted acetic acid or vinegar; the body covered with

warm clothing; and antiseptic uterine douches. (Creolin is highly recommended.) Similar treatment has also been successful in the hands of other practitioners. Dr. Perley, of St. Albans, Vt., records a number of consecutive recoveries from the nux vomica, or strychnia treatment.

When the animal is in an excited condition, it will be necessary to have her secured so as to prevent her injuring herself. When down and comatose, she should be propped on her sternum, with sacks filled with hay, or by some other means, and she should be changed from one side to the other every few hours. When convalesence, which is extremely rapid in some cases, is established, it is well that the diet should be judiciously regulated, and nerve tonics administered for several days.

As this disease is liable to recur at subsequent parturitions, the advisability of breeding again from a Cow is very questionable, unless every precaution is taken previous to the next calving period.

Eclampsia.

According to some authorities, this disease, if not identical, bears a strong resemblance to eclampsia of the human female.

Eclampsia affects the Cow, Goat, Bitch, and perhaps the Sow. In these animals, convulsions may be looked upon as a constant symptom, simulating to a considerable degree the convulsive or epileptiform attacks in woman.

Symptoms.—The disease may attack the Cow at any age; occasionally prior to, but oftener after the act of

parturition. It is said to be most frequently observed in Cows in poor condition; primiparæ often suffer. It is not always recurrent. If the pregnant Cow is attacked, it is thought to be usually about the middle of the period of gestation, when recovery may follow without premature labor being induced.

Symptoms in the cases of Mr. Clark, recorded in the "Journal of Comparative Pathology and Therapeutics," and referred to by Dr. George Fleming, are as follows:

"Foaming at the mouth, champing of the jaws, prominent, staring eyes, excited expression, head very often turned to the side; sometimes licking at the fore-leg, stall, or some imaginary object. Some Cows I have heard bellow, others do not do so; there was twitching of the body and limbs (clonic spasm), difficulty of respiration according to intensity of the attack. The convulsions generally last two or three hours, and in the majority of cases do not reach the stage of coma, although I have had cases which have done so."

Few cases have been reported in the other animals.

Opinions as to etiology and pathology differ: neurosis, due to reflex irritation of the spinal nervous system; albuminuria; acute cerebral anæmia; irritation of the vasa-motor centre, resulting from an anæmic condition of the blood, produced by the retention of effete material which the kidneys had failed to remove; renal insufficiency; reflex irritation of uterine nerve-centres; excessive lactation, etc.

Treatment.—The recommendations are: venesection, diuretics and laxatives, belladonna, chloral, etc.

Parturient Paralysis (post-partum).

This condition may be seen in any of the domestic animals, is most common in the Cow, and follows shortly after parturition.

The cause and pathology are not well understood. Some authorities believe it is due to a strain of the pelvic ligaments. Others, that the spinal cord is at fault, or, that the cord may not be affected, but the nerves supplying the hind extremities are, or that there is some derangement of the sympathetic nervous system.

Symptoms.—The animal gets down, and is unable to rise. On an examination being made at once, it will be found that all the functions of the body appear normal, but the power of motion, and sometimes of sensation, is lost,—always motion first. There may be no response to stimuli beyond the lumbar region of the spinal cord. If the animal is allowed to lie, all the other functions soon become interfered with, and in twenty-four hours afterwards it may be very easy to confound this with one of "parturient apoplexy."

The *treatment* consists in giving a laxative, to be followed by stimulants and afterwards tonics. A stimulating blister to the spine; the rectum and bladder to be kept relieved. Nerve tonics and galvanism will be found efficacious.

Phlegmasia Dolens.

This condition is more common in the human subject than in the lower animals. It appears generally a few days after parturition.

It is due to an obstruction of the lymphatics of one or more limbs, or of the femoral, or femoral and iliac

veins, and is followed by œdema of the affected limbs. The cause is believed to be pressure of the uterus; or thrombus, due to obstruction by some foreign material from the uterus.

Symptoms. — Several days after parturition the lymphatics on the inside of one or both hind-limbs become enlarged and corded, somewhat resembling "lymphangitis." This is followed by œdema of the whole limb; the animal loses the power of the limb, first at the fetlock, then all of the joints become affected, and ultimately the patient gets down. On examination the limb is found to be swollen, hot, and very painful. The disturbance is considerable, and much fever is present. The pulse is hard, quick, and frequent. There is inappetence, and the secretion of milk is much diminished. If the patient is carefully treated, these symptoms may gradually disappear; but if neglected, and the animal allowed to lie too long in one position, inflammation of the tissues of the limb generally takes place, and abscesses form, chiefly at the hock, and the animal may die from anæmia, septicæmia, or traumatic fever.

Treatment.—If the patient be a Mare, put her in slings. Give a laxative in all animals, followed by febrifuges and diuretics. Where the limb is very painful, hot fomentations may be used in the first stage, and judicious scarification if the effusion is considerable. Patients that will not permit of slinging, should be turned every three or four hours. When the acute stage has been passed, bandaging will assist absorption, and diuretics, absorbents, and tonics should be given.

Parturient Laminitis.

This disease does not appear to be very common, although it has been mentioned by several writers, as occurring in the Mare.

The cause, or causes, are imperfectly understood. The parturient state is generally recognized to be the predisposing cause, but there is wide difference of opinion as to how the condition originates.

Symptoms.—Those of ordinary laminitis. Sudden seizure on the second or third day after parturition or abortion. Complete stoppage of the lacteal secretion.

The duration of the disease is from four to eight days; symptoms most intense between the fourth and eighth. Recovery is the usual termination, although the disease may assume a chronic form. Death, in rare instances, may ensue from nervous exhaustion, or suppuration may follow the inflammation, resulting in pyæmia.

Treatment.—Similar to that employed in ordinary laminitis, and the diet should be carefully regulated.

Chapter XIII.

DISEASES OF THE MAMMARY GLAND.

Wounds and Bruises.

Wounds and bruises of the udder and teats are most frequent in Cows, and generally caused by treads; animals with large pendulous, udders may even tread on their own teats when rising. Injuries are caused by bites, or by sharp objects, like thorns.

Surface wounds are usually unimportant, and may be treated on general principles. Bleeding is sometimes considerable at the base of the teat; and should the wound open into the gland, there may be danger of milk fistulæ, which may be feared only during the period of lactation. Injuries to the teat may produce cicatricial contraction, and consequent difficulty in milking.

Bruises of the udder cause bleeding, either into the gland ducts, the milk then being mixed with blood, or into the gland tissue, the skin, and subcutaneous tissue. The blood may be absorbed, as in other soft parts, or lead to the formation of pus or to putrefactive changes.

Treatment.—In all deep wounds of the udder, the first object should be to obtain healing, by first intention, to prevent the formation of milk fistula. In a fresh wound, the edges should be carefully disinfected and sutured. The escape of milk from gaping wounds of the teats can sometimes be prevented by the

application of a rubber ring, carefully fitted, and not too tight. Similar wounds on the udder can be dressed with adhesive plaster, collodion or wound gelatine, the hair first having been shaved off. The use of the teat, or milk syphon, assists in procuring healing by primary union. In wounds which have been in existence for some time, treatment must follow general principles.

Bruises, accompanied by the passage of blood-stained milk, require strict cleanliness to prevent infection;

FIG. 51.
RING TEAT SYPHON.

blood and milk removed by catheter or milking tube, and resorption assisted by moist heat.

Mammitis or Mastitis.

INFLAMMATION OF THE MAMMARY GLAND OR UDDER.

According to Möller (Dollar's translation), the causes of acute inflammation may be divided into mechanical, chemical, thermal, and specific. In cattle, the first takes the form of horn thrusts and similar injuries, treads, etc. Chemical or thermal irritants are much less frequent, although irritant substances may produce acute mastitis. Chills may also be a possible cause. Specific irritants are the most important, and different bacteria have been described as the cause of acute mammitis.

Infection may occur by three channels: (1) Through slight injuries to the skin. (2) From the mammary

duct; a drop of milk may form a suitable medium for pathogenic bacteria, the organisms passing ultimately to the smallest divisions of the affected portion of the gland; retention of milk in the gland, through its being a suitable medium for the development of bacteria. (3) Infection through the blood stream, which is probably rare.

This author gives the following divisions of acute mammitis, viz.:

Inflammation of the Stroma, of which there are the traumatic and phlegmonous forms.

TRAUMATIC INFLAMMATION.

Only surface injuries remain confined to the connective tissue of the udder; the deeper reaching involve the true gland tissue.

PHLEGMONOUS MASTITIS.

The disease generally starts from surface injuries; the bacteria entering the skin and sub-cutis, set up inflammation, which generally extends to the capsule and the stroma of the gland. The process may extend to several quarters, or may even attack the entire udder. The skin and sub-cutis are at first œdematous; later infiltrated with plastic material. We have then an erysipelatous or phlegmonous condition, of which the skin is the special seat.

Symptoms.—Introduced by swelling and redness; generally diffuse, seldom limited. Appears suddenly; skin at first appears bright red, afterwards bluish. Swelling is then soft and doughy, later becomes hard and firm. Skin often exceedingly hot. Pain seldom

severe. Quality of milk not much changed; quantity diminishes. Slight fever at commencement; swelling of the lymphatics of udder, which spreads. Condition may disappear in four to eight days. In other cases abscesses form in or just beneath the skin; less frequently, in the superficial portions of the gland, these break and discharge pus.

Treatment.—Cold applications contra-indicated. Best results from infrictions with mild fats, like oil, or with carbolized oil, blue ointment, etc. The parts washed with lukewarm disinfectant solutions, especially if the teats are injured. Udder kept warm, and may be suspended to assist resolution. Local injuries cleansed and disinfected.

Parenchymatous Inflammation, of which there are three forms, distinguished, viz.: *mastitis catarrhalis*, *mastitis apostematosa*, and *mastitis gangrenosa.*

MASTITIS CATARRHALIS.

This condition consists of inflammation of the lining membrane of the milk ducts.

Symptoms.—Surface of udder little changed; swelling often wanting, while redness may be slight, but deep-seated pain can be detected on pressure, and by sensitiveness during milking. General condition little altered. The principal changes are found in the milk, which contains clots of varying sizes, and often drops of fat; sometimes it is slightly tinged with blood.

The disease sets in suddenly, and may attack only one, or several sections of the gland.

In most cases it disappears in a few days, the milk becoming normal. Sometimes, however, it may assume a chronic character, the milk mixed with pus, whilst the mucous membrane of the galactophorous sinus becomes thickened and feels like a firm cord; the swelling extending from the sinus to the other parts of the gland. Localized thickening and induration of the udder may result from the disease in the smaller ducts becoming chronic. In some cases the inflammation may lead to stenosis or occlusion of the milk ducts; the affected sections of the gland become changed, the induration extending as far as the skin. Abscess formation is not often seen.

Causes.—Chills, changes in the milk in the udder, causing it to become irritant; micro-organisms.

Treatment.—Instruments introduced into the ducts and galactophorous sinuses should be carefully disinfected. Withdraw milk frequently, and at the same time massage will be found to assist discharge from the finer ducts. The udder should be kept warm, annointed with some simple unguent, and protected with wadding.

In enzootic outbreaks, it is better to segregate the diseased animals, and provide against transmission by the milker's hands. Disinfectant injections can be used when the disease is clearly infectious.

MASTITIS APOSTEMATOSA (PURULENT INFLAMMATION OF THE UDDER).

In this form the inflammation also originates in the milk ducts and alveoli, but instead of remaining con-

fined to their surface, spread to the depths and to the interstitial connective tissue.

Symptoms.—Disease sets in suddenly, with pain and the other symptoms of mastitis. Swelling commences in the interior of the udder, but spreads as far as the skin, which is warm and reddened. Secretion of milk diminishes, or entirely stops, the milk is curdled, later becomes yellowish from pus, or red from bleeding; finally it may become more and more puriform, and contain curdled material, which blocks the milk ducts. Following these symptoms there is fever, inappetence, excessive thirst, and depression. Either resolution sets in, or the disease goes on to abscess formation. If the former, after four or five days, sometimes later, symptoms gradually begin to recede, while the secretion more and more becomes normal. In some cases there is no permanent disturbance left, though, as a rule, the affected section does not completely recover its functional activity until the next period of lactation. Abscesses, however, frequently form, and permanent thickening and milk fistulæ are not infrequent results of the process. Hard swellings also sometimes result. These suppurative processes may at times lead to pyæmia or septicæmia.

Causes.—Infectious materials entering through the mammary ducts, syphons, catheters, and other instruments bearing infection, etc.

Treatment.—Prevent infection, or combat it if already existing. Care in using instruments. When occurring enzootically, segregation of diseased animals, and disinfection of stables, etc. Frequent milking of

the diseased quarter. If not too sensitive, the udder should be gently rubbed and kneaded to favor discharge of diseased products from the acini. Diet should be such as to diminish secretion of milk. In Cows, saline purgatives, like Glauber's or Epsom salt, may be used. Destroy, or render innocuous, infective material in the udder, and combat inflammatory changes. Disinfectants injected are useful, but cannot reach the fine milk ducts and alveoli. Four per cent. boric acid (Nocard); 2 per cent. alum or 2.5 per cent. carbolic solution (Franck); one-fifth to one-quarter per cent. sublimate solution (Eggeling). Poultices, hot fomentations; infriction with bland oils, or ointment of mercury is useful. As soon as the abscess appears superficial, it should be opened and the cavity cleansed and disinfected.

MASTITIS GANGRENOSA, OR GANGRENOUS INFLAMMATION OF THE UDDER.

This form of the disease is commonest in Sheep, though it occurs in the Cow and Goat. The nature of the specific poison is at present little understood.

Symptoms.—The disease starts as a peracute parenchymatous mastitis. Severe general symptoms, high fever, inappetence, great weakness, severe pain, and stiff, straggling gait first direct attention to the udder. Blueish-violet soft spots on the skin, which are insensitive and often abnormally cool. These spots quickly spread. They are surrounded by an inflammatory swelling, which may extend to the lower part of the abdomen and the thigh. Back arched, hind legs strad-

dled, great pain, groaning, and after a short time there are well marked signs of septicæmia; death not infrequently takes place within twenty-four hours.

Treatment.—Similar to that for purulent inflammation. Care should be taken to prevent transmission by the shepherd. Disinfectant injections are generally too late and without effect in this form. Early incision into the necrotic parts and disinfection. If the process has made much progress, even this treatment seldom suffices, and the animal's life can only be saved by amputation of the diseased portion.

Stenosis and Occlusion of the Mammary Duct.

In Cows, there is only one opening, at which point the skin is reflected to cover the lower end of the duct. At the upper end of this canal, which is from three-sixteenths to one-quarter of an inch in length, the mucous membrane begins, and lines the galactophorous sinuses up to their termination. At a point where the skin becomes continuous with the mucous membrane, *i. e.*, about three-eighths of an inch above the end of the teat, lies the valve, which, like the greater part of the teat, consists of muscular fibres.

Stenosis of the mammary duct in the Cow results either from proliferation of the well developed epithelium lining it, or from contraction of cicatricial tissue. The former of these conditions occurs while the animal is "dry," and stenosis only appears after next calving. Occlusion of the duct is sometimes congenital in Cows (Furstenberg), or results from inflammation at the lower end of the teat. Diseases of the skin, injuries, cow-

pox, aphtha, etc., may cause adhesion and obliteration of the opening of the duct and of a considerable portion of its length.

In the upper sections, tumor formation occurs, and sometimes folds of mucous membrane fall into the lumen of the duct and produce closure. More frequently chronic inflammation, occurring during mastitis, causes stenosis or complete closure. Finally, the mammary duct and lower portion of the galactophorous sinuses may grow together.

Treatment.—Repeated introduction of bougies, or the use of small trocar. Division of the duct or amputation of the end of the teat. Where there is closure of the upper parts of the teat by indurated masses of tissue, a passage may be made by passing a thin trocar, the canula being left in position for some time, so as to prevent adhesion, whilst the milk is prevented flowing away by stopping the canula with a cork.

Mastitis Chronica.

CHRONIC INFLAMMATION OF THE UDDER.

Chronic inflammatory processes often result from acute diseases, and may give rise to localized induration, or to diffuse proliferation of the interstitial connective tissue. The latter are generally produced by bacteria, especially by tubercle bacilli, actinomyces, and other organisms. Sand discovered botryomycosis of the udder in a Mare. Tubercular enlargements of the mammary gland are commonest in Cows, and principally affect the posterior quarters, being rare in the anterior (Bang).

Tumors of the udder are seen in Cows and Bitches, but seldom in other animals. They usually take the form of warts, and are more common on the teats than on the udder.

Polypi occasionally occur on the mucous membrane of the mammary or milk ducts, and may interfere with the discharge of milk.

If these neoplasms do not seriously interfere with milking, it is best to defer operation until lactation ceases. They can generally be removed by scissors, ligature, ecraseur, or cautery. Some may require to be enucleated.

FISSURED OR CHAPPED TEATS.

This condition is chiefly caused by injuries, unimportant at first, it may be, but if neglected may lead to more serious conditions, as mammitis, or septicæmia, besides rendering the animal uneasy during the process of milking, or when she is being sucked.

Causes.—Any source of local irritation may bring about fissure.

Symptoms.—Fissures are perhaps more often seen in primiparæ having fine and thin skin. The crack appears as a more or less deep, narrow sore, running in a transverse direction round the teat, the edges being thickened and indurated. When the teat is distended with milk, the sores have a gaping appearance. When superficial, chaps may not cause much trouble, but when deep, they are very painful, as exhibited by the animal's aversion to manipulation of the teat, or to milking, or sucking.

Treatment.—Emollient dressings, and perfect cleanliness, in the milder stage. When indolent, more efficient applications have to be resorted to. Carbolized vaseline, carbolized glycerine, tannate of glycerine, etc. Iodoform, tannic, or boric acid, in the form of powder, may be applied with good effect in some cases. Where the fissures have been tardy in healing, it may be well to stimulate them with a little silver nitrate cautiously applied.

Agalactia or Agalorrhœa.

SUPPRESSION OF MILK.

The absence of milk in the mammary gland may result from debility, emaciation, chronic mastitis, atrophy of the gland from previous disease, etc.

Treatment.—This often proves unsuccessful. If due to a removable cause, have that attended to. Give nutritious food combined with aromatic carminatives. Stimulate functional activity by massage and stripping of the udder, or by the use of some stimulating application. When disease of the gland is the cause, treatment will be directed by indications.

Chapter XIV.

MILK, ITS COMPOSITION, ETC.

	Water. p.c.	Butter Fat. p.c.	Albuminoid Casein. p.c.	Sugar. p.c.	Salts. p.c.
Woman.....	87.81	4.37	1.54	5.75	0.53
Mare..... ...	88.0	1.0	1.6	8.9	0.5
Cow.....	87.0	4.6	4.0	3.8	0.6
Ewe.....	85.62	4.20	4.5	5.0	0.68
Goat.....	86.8	3.32	4.08	5.28	0.58
Ass.....	90.0	1.4	1.7	6.4	0.5
Sow.....	82.6	5.7	6.2	5.0	0.5

SPECIFIC GRAVITY.

Woman.....	1020
Cow.....	1030
Ewe.....	1035
Goat.....	1035
Ass.....	1019

Anomalies of Secretion.

Agalactia (previously referred to), *watery milk, fat milk.*

WATERY MILK.

Causes.—Too watery alimentation of poor quality, the exclusive feeding of malt, swill, turnips, etc.; stomachal or intestinal diseases, cahectic and hydræmic conditions; peculiarity of breed.

Treatment.—According to case. Change of regimen. Stomachics. Diseases of the alimentary canal, or of the blood treated according to indications.

FAT MILK.

Observed in Ewes subjected to highly nutritious alimentation. May also be observed during œstrum.

Treatment.—Regulation of the diet.

Alterations in Milk Due to External Influences.

CURDLED MILK.

Seen in the Cow and Goat.

Causes.—Diseases of the digestive organs, acid food, affections of the mammary gland, as mastitis, hyperæmia, tumefaction in advanced gestation, nymphomania overheating of the body.

As the result of external influences: great heat, electrical conditions during thunder-storms, damp stables, uncleanliness of mangers, "consumption of rusty grain" (Fleischmann), bacteria.

Treatment.—Dependent upon cause. Regulated ventilation and temperature are essentially necessary. Perfect cleanliness of dairy utensils. Refrigerant apparatus recommended, and some alkali added to milk. Alkalies administered internally. Attention to digestive irregularities, and to the udder.

Organisms observed which produce acidity and curdling of milk: Bacterium lactis, micrococcus of osteomyelitis, staphylococcus albus, S. citreus, S. cereus albus, S. cereus flavus; Streptococcus pyogenes, S. erysipelatosus, S. coli gracilis, Bacillus pyogenes fetidus, Bacterium lactis acidi, Bacterium lactis aerogenes, micrococcus ovalis, and micrococcus et Sphaerococcus lactis acidi.

MILK WHICH DOES NOT PRODUCE ANY BUTTER.

Causes.—Digestive diseases, and certain morbid conditions, poor quality of nourishment, disease of the mammæ, excessive heat or cold, and various alterations of milk (curdled, rancid, putrid milk).

Treatment.—Galactopoietics (fennel, antimony, cumin, etc.), "hydrochloric and acetic acids" (Haubner and Siedamgrotzky), "alum and chalk" (Harms). When the milk is bitter, add to these agents 15 grammes calcium chloride daily.

PUTRID MILK.

Causes.—This alteration is rare. Occasioned by introduction of agents of putrid fermentation in milk; unclean premises, and stable or dairy utensils; processes of decomposition in alimentary canal after ingestion of tainted food. Bacteria: Bacterium termo, and B. lineola.

Treatment.—Prophyllaxis; cleansing and disinfection of stables and utensils. When due to gastro-intestinal troubles, give stomachics and antiseptics internally.

FILAMENTOUS MILK.

Causes.—Invasion of microbes.

Treatment.—Thorough cleansing and disinfection of dairy and utensils. "A temperature of 65 degrees C. destroys the organisms (Schmidt-Muhlheim). Stomachics and anti-catarrhal agents internally.

BLUE MILK.

Causes.—Bacteria. The names given to the bacterium are: "Bacillus syncyanum" (Schroter), "Vibrio

cyanogenus" (Fuchs), "Vibrio syncyanus" (Ehrenberg). Milk which is very albuminous, due to nitrogenous alimentation, or very alkaline, with feeble coagulating properties, is predisposed to this alteration. "Certain diets, diseases of the udder, etc., by retarding the acidification of the milk, may have a certain influence upon its production" (Hueppe). Contamination by the medium of air and flies may be a causative factor.

Treatment.—Aeration, cleansing and disinfection of stables, dairy, and utensils. In certain cases change of diet is indicated. "Washing of the gland with antiseptic solutions to destroy organisms" (Zurn).

Other anomalies are: Red and yellow milk; foreign products in milk, such as abnormal substances, flavoring matters, coloring matters, medicinal substances, pathogenic organisms transmissible to the human subject, red blood corpuscles or hemoglobin, etc.

Chapter XV.

DISEASES AND ABNORMALITIES OF THE YOUNG ANIMAL.

Asphyxia or Suspended Breathing.

Whenever the circulation between the mother and offspring is stopped, either by rupture or occlusion of the umbilical cord, respiration in the young animal must be carried on by the lungs, or death will speedily follow. The establishment of respiration is a purely reflex act. The sudden transition, from an intra-uterine existence to that in the outer world, operating upon the skin, produces an impression which is transmitted to the respiratory nervous centres, and resulting in the respiratory muscles being called into action.

Causes.—Among the obstacles to respiration may be mentioned suffocation, before or during birth, from compression of the umbilical cord and the arrest of its circulation; intra-uterine respiration; detachment of the fœtal membranes from the womb before the birth of the fœtus; a too free communication between the cardiac auricles; envelopment of the head in the membranes; tenacious mucus in the mouth or nose, etc.

Resusciation.—Cold water thrown over body, and especially the head and chest. Inflating the lungs, performing artificial respiratory movements; rubbing of the limbs; the forcible introduction of air into the lungs; tobacco smoke blown into the nose, etc.

Umbilical Hemorrhage.

This condition is not very often seen. It ensues immediately after birth, rarely after some days.

In the Foal, bleeding may be from the artery, that vessel being firmly attached to the umbilical ring. In ruminants, the hemorrhage is from the vein, because of the existence of the *ductus Aranzi*, and the retraction of the artery within the abdomen.

Causes.—Cutting the cord off too close to the umbilicus, or laceration of the vessels during difficult parturition. The cord may bleed when torn across naturally, due to sucking at the remains by the mother, the young one itself, or some other animal.

Treatment.—If the cord is short, apply astringents or styptics, or even caustics. Should the cord be sufficiently long, it is better to ligate it. The precaution necessary here, is to see that the ligature does not include a portion of intestine. Should there be infiltration, get rid of it as much as possible before applying the ligature.

If much blood has been lost, it may be necessary to resort to the transfusion of blood, or of common salt solution, into the umbilical vein.

Persistent Urachus.

During fœtal life the urachus is the tube through which urine passes from the urinary bladder of the fœtus into the allantoid cavity. After birth this canal is obliterated, its walls becoming like a thin cord; the bladder is retracted within the pelvic cavity, the urine then passing through the urethra. It sometimes happens

that through accident, or malformation, it may be only partially closed, the urine continuing to escape from the umbilical opening or cord.

Seen oftener in Solipeds than in Ruminants, owing to the urachus,—like the umbilical artery of the former,—being firmly attached to the umbilical ring, and consequently not immediately withdrawn into the abdominal cavity. It is said to be of more frequent occurrence in males than in females, and more serious in the former.

Treatment.—If interference is necessary, ascertain if the urethra is pervious. If part of the umbilicus remains, ligate it and allow the whole to slough. Should the urachus protrude separately, ligate it. If the urachus is covered by skin, it must be secured by passing a curved needle through the skin and above the duct, and tying the ends. A cantharidin blister, or the cautery iron, will often close the orifice.

Umbilical Hernia.

(*Omphalocele, Exomphalos*).

This condition is frequently observed in young animals; more often in Foals and Puppies than in Calves, Pigs and Lambs. The hernia may appear at birth or some time after, and, if proper measures are not adopted for its reduction, may continue during the life of the animal. By union of the visceral plates in the linea alba, the abdomen closes during uterine life as far as the annulus umbilicalis, which remains open for the umbilical cord, and after birth ceases to exist on account of obliteration of these vessels. In new

born animals the umbilical ring not infrequently appears abnormally large, so that the umbilical cord does not completely fill it, in consequence of which, the skin and peritoneum either immediately, or in the first few weeks after birth, yield to the pressure of the abdominal contents, and allow the latter to pass through under the skin.

Two forms recognized, viz., congenital, which is apparent at birth ; and acquired, which appears during the first few weeks afterwards.

As a rule, a portion of the colon, or cæcum, and sometimes of the omentum, is found in the sac, which is composed of skin and peritoneum.

Symptoms. — Umbilical hernia is recognized by the presence of a swelling, varying in size from a hazel-nut to that of a man's head, and lying above the umbilicus ; is elastic, soft, sharply defined, and free from inflammatory symptoms. By pressing with the fingers or hand on the swelling, it entirely disappears. Sometimes this condition is mistaken for an abscess, so that caution is required before using the knife. Where the umbilical ring cannot be felt, and its complete closure ascertained, every fluctuating enlargement must arouse suspicion of umbilical hernia. When the tumor is not reducible, it is generally due to the accumulation of fœcal or other matters in the intestine.

CAUSES OF ACQUIRED HERNIA.

Acquired or accidental hernia may be due to severe or sudden muscular exertion on the part of the young

animal (Foal or Calf). Some authorities suggest heredity as a predisposing cause.

Treatment. — Among the varied applications recommended in umbilical herniæ are: local astringents, subcutaneous injections of solutions of sodium chloride, trusses of various kinds, caustic and blistering agents, as sulphuric and nitric acids, cantharides ointment, etc. For small herniæ, nitric acid may be employed to destroy the skin and cause such swelling as to close the orifice before the skin is separated. Some authorities recommend the application of concentrated sulphuric or nitric acid with a glass rod in the form of lines, at least three-eighths to three-quarters of an inch apart. Others use a brush, applying the acid to entire surface of the sac. Bandages, pads, simple or multiple ligation of the sac, clamps, as Combe's or Bordonnat's, herniotomy, etc.

In small herniæ, treatment is not always necessary, the enlargements frequently disappearing spontaneously.

Œdema of the Umbilicus.

This condition is due to the accumulation of serum, sometimes blood, in the connective tissue of the cord. It is usually due to laceration or contusion during birth, but may frequently be caused by sucking and tearing at the remains of the cord, by other young animals.

Symptoms.—The swelling is often of considerable size, and is always cold to the touch. In Calves it often remains for a length of time, and is said by Zundel to constitute a grave defect in young Bulls, which it mechanically prevents from copulating.

Treatment.—Cold applications and compresses; scarification followed by hot fomentations, and afterwards astringents.

Omphalitis—Inflammation of the Umbilical Cord.

This is an inflammation of the umbilical vein (*omphalo-phlebitis*), but may also involve the abdominal portion of that structure, and as a consequence of extension of infection and inflammation, the condition may become very serious. Embolic infarction of the lungs, liver, or other organs is likely to ensue, with gangrene, septicæmia, and pyæmia.

Causes.—Mechanical injury, admission of air or foreign material to the interior of the umbilical vessels, exposure, improper food to mother. Infection from a decomposed afterbirth, an abortion, a case of metritis, a fœtid discharge from uterus, a case of erysipelas, accumulations of excreta, infected litter, etc.

Symptoms.—In the normal state, the umbilical cord usually dries up and becomes separated a few days after the young one is born. When inflammation attacks it, however, the part appears moist, and projects from the abdomen as an indurated enlargement, discharging from its centre a small quantity of thin, unhealthy, purulent-looking fluid. The umbilical vein usually remains open, and can be explored by a probe, passed at first upward, and then forward towards the liver.

The general symptoms are: dulness, arched back, indifference to the teat, and to surrounding objects, constantly lying down, elevation of temperature, hurried, panting respiration. Later, great prostration,

enlargement at the umbilicus, which, if manipulated, causes great pain; eyes dull and injected, mouth hot and dry; pulse small, quick, and almost imperceptible. At first there may be constipation, diarrhœa usually supervening; urine scanty; visible mucous membranes present a yellowish appearance; swellings, containing a gelatinous, yellow fluid, are sometimes seen on various portions of the body. Colic or peritonitis sometimes occurs, and, in the majority of cases, death rapidly follows.

Sometimes a large swelling takes place at the umbilical ring, due to accumulation of pus in the canal, and which might be mistaken for hernia.

It is now recognized by the most eminent authorities, that a great number of diseases of Foals, Calves, and Lambs take their origin in inflammation of the umbilical cord. Some of these are: arthritis (pyæmic, and septicæmic inflammation of joints, — joint-ill), iritis, choroiditis, diarrhœa, adenitis, abscesses of muscle, etc.

Treatment.—Prophylactic. Absolute cleanliness, protection of the young from septic infection, dressing of the cord immediately after birth with antiseptics.

Curative.—Chiefly antiseptic. Local antiseptics combined with astringents. When general infection is probable, or has already taken place, internal antiseptics should be administered.

The most serious complication, Franck notes, is inflammation of the umbilical artery, which is more frequent in the Foal than in the Calf. General infection or pyæmia rapidly follows umbilical arteritis.

Arthritis.

This disease occurs in young animals soon after birth. Roloff has observed pyæmic arthritis in the Foal, the Calf, and the Lamb. It is much less frequently seen in Puppies and Pigs.

Modern researches, especially those of Bollinger, have led us to recognize: (1) Pyæmic arthritis, which is the most frequent form (Bollinger); it is consequent upon septic infection starting from the umbilical region. (2) Fatty degeneration of the red muscles, observed especially in young Pigs. (3) Acute articular rheumatism. (4) Acute or chronic muscular rheumatism. (5) Rachitis of young Pigs. (6) Tetanus and cerebro-spinal meningitis in Lambs. (7) Consumption (Darr-sucht), a disease of young horses which is probably only an intestinal or ganglionic (mesenteric) tuberculosis (?). (8) Various other affections of sucklings, such as intestinal catarrh, pleuro-pneumonia, general weakness of the extensors of the limbs with contraction of the flexors (Colt, Dog).

Causes.—Pyæmic arthritis is due to the introduction into the blood of putrid matter coming from the suppuration of the thrombus of the umbilical vein. The starting point of the morbid processes is infection of the umbilical wound by the products of putrid decomposition often to be found in the unclean stable, the lambing pen, etc. The disease sometimes runs an enzootic course in flocks and stud farms, where it occasions considerable loss.

Pathological Anatomy.—Besides the changes already

noticed, the articular synovial membranes are injected, thickened and tumified; the synovia, which is very abundant, is suspicious when mixed with flaky clots; later it becomes entirely purulent. The articular cartilages are ulcerated; the epiphyses may be necrosed. Purulent wasting of the tendons and neighboring muscles from peri-articular abscesses; these structures are affected by fatty degeneration. Metastatic abscesses in most of the organs and tissues (liver, lungs, brain, kidneys, muscles, and subcutaneous connective tissue). Finally the heart, liver, kidneys, and muscles have undergone fatty degeneration.

Symptoms.—Enlargement of one or more joints, which are hot and tender, general weakness, difficulty in moving, or even standing, extreme apathy; high temperature; pulse and respirations accelerated. Purulent, and often fetid discharge from the swollen umbilical region. Death may take place from coma without any alarming premonitory symptoms; at times, however, it is preceded by diarrhœa, spasms, and paralysis.

Symptoms may appear which indicate disease of other organs (already referred to).

Treatment.—Curative measures are not at all satisfactory, and the greatest hope of success is to be found in prophylaxis.

The utmost cleanliness should be observed in the surroundings of the young animals, the places thoroughly disinfected, etc., and the umbilical cord of all young animals (especially those most susceptible) should be treated antiseptically immediately after birth.

Constipation—Retention of the Meconium.

The meconium (intestinal contents), is generally expelled immediately after birth. When retained, it becomes an abnormal condition, and interferes with the function of various organs. The colostrum, being rich in albumin and salts, is Nature's laxative for the getting rid of this material from the intestines, and should never be withheld from the young animal.

Causes.—The condition is said to be observed in Foals whose dams have been fed exclusively on dry fodder during the winter. Also that the result is likely to follow when the mother has been worked right up to foaling time, her milk being then deficient in laxative properties. Depriving the young animal of the colostrum. Calves are likely to suffer from similar causes.

Symptoms.—In the Foal, there is uneasiness, straining, symptoms of colic, looks toward the flank, gets down and rolls, no inclination for the teat. Accelerated pulse and respirations, grinding of the teeth, and if relief is not given, death may take place from inflammation of the bowels.

The Calf behaves similarly to the Foal.

Treatment.—Prophylactic. The pregnant animal should receive proper aliment for some time previous to parturition. The young one ought to be allowed the colostrum (the first milk), or if this cannot be done, it should be given a dose of an oleaginous laxative, as castor oil, linseed oil (raw), sweet oil, etc.

If any portion of the meconium is within reach of the finger, it should be carefully removed; the finger should always be well lubricated. Enemas may have

to be given; glycerine in water, oil, soap-suds, are all useful. The mother should receive laxative diet. Should constipation arise in the young animal from any other cause, similar treatment should be adopted.

Gastro-Intestinal Catarrh.

"Friedberger & Frohner's Pathology" (Zuill's translati o) says: "By its etiology, its course, and treatment, gastro-intestinal catarrh of young animals differs essentially from the same affection in adults. It has often been confounded with dysentery and described under this name; but it must be distinguished from it."

Causes.—(1) Diseases of the mother, the alimentation of the mother influencing the condition of the milk; certain medicinal substances mixed with the milk, irritating the gastro-intestinal mucous membrane; over fatigue of the mother influencing the quality of the milk. Zuill remarks, that one of the most common causes of this disease among young animals on American farms is the careless and irregular manner in which they are fed. Kept for long periods without food while the mother is at work, they are allowed to take an unlimited quantity of milk furnished while the dam is overheated and fatigued. This is one of the reasons why so many of our animals are suffering from a chronic form of this disease. If the young animals are not nursing, they are allowed to take an overabundance of milk or other food, thus producing indigestion of the abomasum,—a common disease among Calves.

2. When the young animals are fed irregularly, at the time their mothers are used for work.

3. Colds (cold or damp stables, draughts, and cold udder of the mother).

4. Retention of intestinal mucus of the fœtus (meconium), when the first milk (colostrum) is not used, the result of which will be constipation and a decomposition of the contents of the stomach, the products of which irritate the mucous membrane.

Among the circumstances capable of determining catarrh in weaned animals, we must especially point out :

1. Weaning when taking place under unfavorable conditions.

2. Substitutes for milk, particularly those containing starch.

3. Cold and damp weather; also cold drinks.

4. Intestinal parasites.

The predisposing causes are : hereditary weakness of the digestive apparatus, affections of the mesenteric ganglion, etc., and also extreme sensibility of the digestive organs in very young animals.

Symptoms.—At the commencement of the disease the symptoms vary with the cause. Sometimes they appear suddenly, at other times gradually, and fail to attract attention for the first few days. In sucklings, the principal symptom—diarrhœa—is usually preceded by slight anorexia, some depression and weakness; in weaned animals (when the disease is induced by the ingestion of very cold water, or external cold), it commences with fever and general troubles; body temperature irregularly distributed ; pronounced nervous depression, both sensory and motor. Diarrhœa soon

develops, the excrements become more and more liquid and clear; they then become fetid, mucous, yellow or greenish-grey spumous, and contain more or less fibrinous flakes or clots. They have an acid, putrid odor; later they are streaked with blood or even bloody. There is ordinarily tenesmus and slight colic; back arched, and limbs gathered; skin dry, and hair erect; exhalations become fetid, and there is excessive weakness. Tympanites from abnormal fermentation, which may exist before, during, or after the diarrhœic period. Death may occur in from a few days to several weeks, and is generally produced by exhaustion, anæmia, or dropsy.

Treatment.—Ascertain the cause, suppress it, or diminish its effects. In sucklings, the mother ought to receive attention; regulation of her diet; fatiguing work should be avoided, also too long intervals of milking. Another nurse may have to be selected.

Regulation of the food and feeding of the young animal should be attended to.

The diarrhœa combated by albuminous or mucilaginous agents. A mild laxative may be necessary to clear the intestinal canal. When due to fermentation, the carbonates of soda or magnesia may be beneficial. Antiseptics, as creolin, salicylic acid, etc., have been recommended; these medicaments may also have the desired effect should intestinal parasites be the cause of the diarrhœa. Other agents recommended are: opium and rhubarb, Dover's powder, tincture of opium, chlorodyne. Styptics or astringents, and antiseptic and astringent enemas.

Dysentery.

(*Dysenteria Neonatorum.*)

Dysentery of the newly-born animal is the least known of all the infectious diseases which affect our subjects. It is observed in the Calf (white dysentery or scour), Lamb, Foal, Puppy, and Kitten. This affection and pyæmic polyarthritis are the most fatal diseases of young age.

Causes.—Generally, it is developed from the first to the third day after birth; after the fourth day it is much less frequent; young animals are often affected by it before having sucked; milk, therefore, has nothing to do with the development of the disease. Although the infectious element is yet unknown, its exciting cause is evidently infection, contained in, and carried by, the excrements. It appears to be miasmatico-contagious, and seems to be transmissible from one animal species to another. It is thought that causal relations exist between epizootic abortion and dysentery of Calves. Intra-uterine infection may probably occur by transmission to the digestive mucous membrane of young animals of an infectious product of the uterus and vagina.

Symptoms.—Very similar in the different species. The Calf stops sucking, shows symptoms of restlessness, bellows, and by violent efforts ejects excrements, which may be whitish, mixed with clots of coagulated milk, or very often with blood; later, involuntary evacuations. Exhaustion, convulsions at intervals; ptyalism; fetid breath. Death takes place often within twenty-

four hours, sometimes within three days. Mortality, 80 to 100 per cent.

The Lamb becomes depressed, weak, and the ejected excrements are of a mucous liquid, with fetid odor. Tenesmus. Elevation of temperature in the beginning (41.5 C.), which afterwards drops abruptly. Breathing accelerated; ptyalism, etc.

In the Foal, the symptoms appear during the first three days. Depression and restlessness; the excrements are mucous or liquid in appearance, and extremely offensive. The breath and cutaneous exhalations have a disagreeable odor. Eyes are sunken in their sockets; great weakness and thirst, etc.

Gastro-intestinal catarrh may be distinguished by less severity, and from occurring at a slightly later period.

Treatment.—Separation of the healthy from the sick, and disinfection of the premises, as well as the genital canals of the females both before and after parturition. When the disease exists in enzootic form, it is well to isolate, in a suitable place, pregnant animals a month or two previous to parturition.

On the first indication of sickness, a mild laxative should be given. Rhubarb and opium is recommended, also Hertwig's prescription is highly spoken of. It is the following: Pulverized rhubarb, 4 grammes; magnesium carbonate, 1 gramme; pulverized opium, 2 grammes (to be given at one time to the Calf in 100 grammes of infusion of chamomile, or in 50 grammes of whisky).

Other agents suggested are: tannin, salicylic acid,

cresol, creolin, tar-water, resorcin; mucilaginous preparations, as decoction of linseed, gum, marsh mallow, mucilage, gelatin water, etc., either alone or associated with opium. If the animal can partake of food, it should be given in small quantities, and be suitably prepared.

Cyanosis—Blue Disease.

This condition results from the mixing of the arterial and venous blood, and due to patency of the foramen ovale after birth.

It is recognized by blueness of the visible mucous membranes, coldness of the surface; and sensitiveness to cold. The condition, when due to this cause, cannot be remedied.

Eclampsia.

Eclampsia of young animals, says Hering, is specially observed in the Puppy, at the time of cutting teeth, and in young Pigs.

It is expressed by convulsions, which are similar to those of the eclampsia of children, by a turning of the eyeball in the orbit, trembling, spasms of the masseters, grinding of the teeth, ptyalism, with discharge of foamy saliva, etc.

Causes.—Abnormally nervous disposition; at other times peripheric irritations.

Treatment.—Antispasmodics.

Tetanus Neonatorum.

Tetanus of young animals seems to be confined more particularly to Lambs. It is supposed that certain

Lambs are predisposed through improper feeding and management of the Ewes. Exposure to extremes of heat and cold is thought to predispose to this disease.

Treatment.—Prophylactic. Attend to the healthy and proper condition of the mothers.

Curative Measures.—A laxative at the beginning of the disease. Chloral alternated with quinine. Friction to the limbs and spine.

Some other conditions occasionally met with, and requiring more or less surgical interference are—Imperforate Prepuce; Atresia Ani; Imperforate Vulva and Vagina; Tongue-Tie; Occlusion of the Auditory Canal; Occlusion of the Eye-Lids; Cleft Palate, etc.

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