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Contributors

Gamgee, John, 1831-1894.
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Publication/Creation

Edinburgh : T.C. Jack, 1861.

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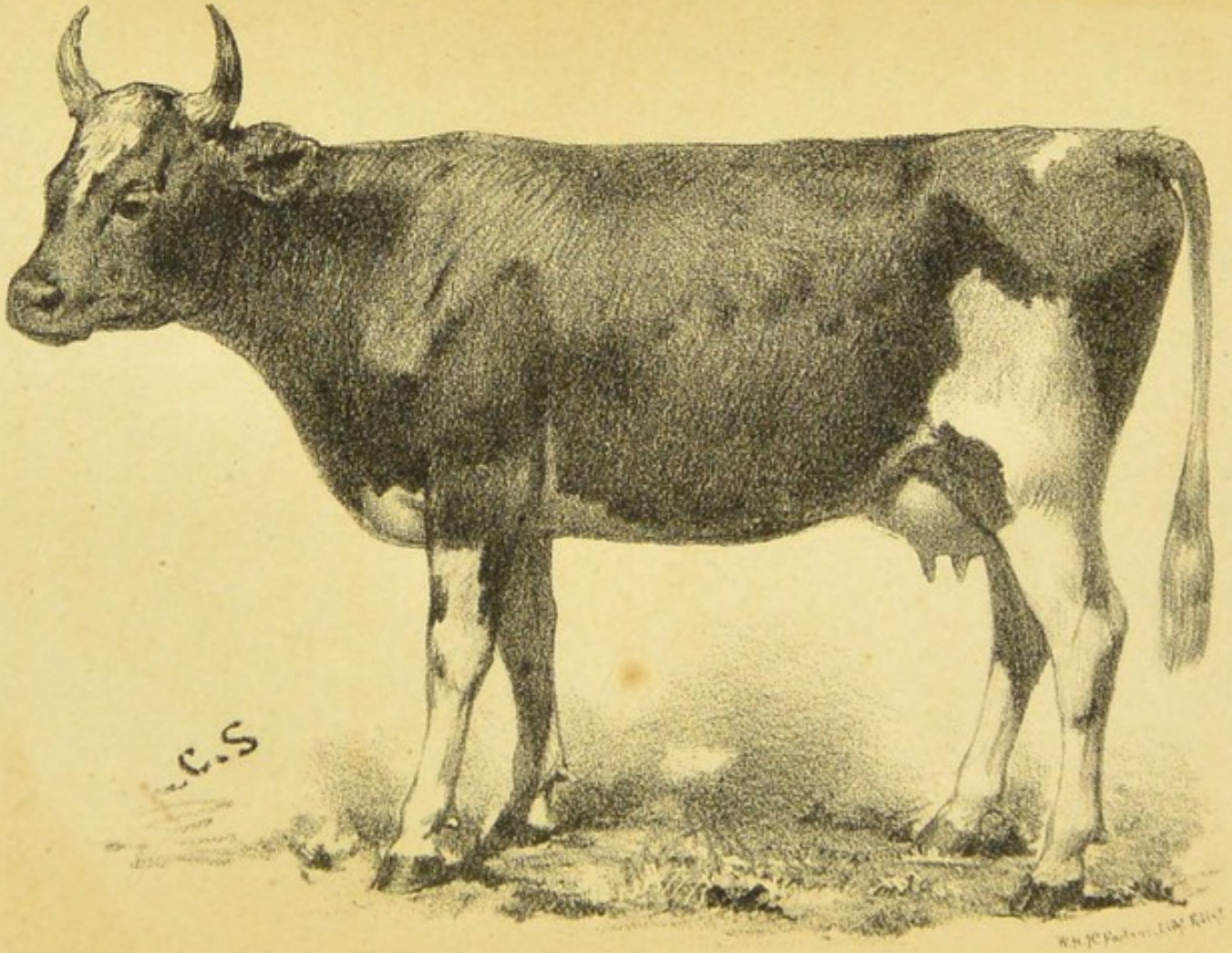

Brittany Cow.

DAIRY STOCK

ITS SELECTION, DISEASES, AND PRODUCE

WITH A DESCRIPTION OF THE

BRITTANY BREED.

BY JOHN GAMGEE

PROFESSOR IN THE NEW VETERINARY COLLEGE, EDINBURGH,
ETC., ETC., ETC.

With two Plates in Lithography, and Numerous Woodcuts.

EDINBURGH:
THOMAS C. JACK, 92 PRINCES STREET.
LONDON: HAMILTON, ADAMS, & CO.
1861.

85

EDINBURGH: PRINTED BY R. AND R. CLARK

TO THE MOST NOBLE

THE MARQUIS OF TWEEDDALE, K.T., C.B.,

ETC. ETC. ETC.

THIS LITTLE VOLUME IS

MOST RESPECTFULLY DEDICATED,

IN GRATEFUL ACKNOWLEDGMENT OF GENEROUS PATRONAGE

AND POWERFUL SUPPORT IN HUMBLE EFFORTS

MADE TO ADVANCE THE CAUSE OF

VETERINARY EDUCATION,

BY THE AUTHOR.

PREFACE.

THIS small volume is devoted to the elucidation of a variety of subjects connected with the selection and management of dairy-stock, which are of acknowledged interest to agriculturists, as well as to the Veterinary Profession.

A work on the diseases of cattle has been long a desideratum, and though the Author has not attempted to exhaust the subject, he trusts the limits to which he has confined himself, may not be regarded as altogether insufficient for present purposes.

On the use of the Roman Bath, the Spaying of Dairy Cows, and the changes induced in milk under a variety of circumstances, the Author has stated received opinions, and advanced his own with all freedom, and, he trusts, with fairness.

The recent introduction into Britain of a new breed of diminutive milch cows, has led to the two concluding chapters being devoted to remarks upon the animals themselves, and the country from whence the breed is imported.

For assistance in the preparation of this work, special acknowledgment is due to Peter Maclagan, Esq. of Pumpherston, who kindly revised some of the proof-sheets, and to Clark Stanton, Esq., for the excellent lithographs and designs.

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PART I.

CHAPTER I.

ON DAIRY STOCK IN GENERAL.

Breeds of excellent milch cows are very numerous, and to be found in every country. In some they are indigenous and unimproved; in others civilization has tended to modify and fit them for special purposes. Such changes are not brought about by mere accident, but in great measure guided by the experience of practical men. That experience has not always been applied to the best advantage, and few can estimate the extent to which the country, and more particularly the proprietors of dairy stock, would be benefited by the constant use or application of rules which the knowledge hitherto obtained enables us to establish.

It is remarkable how much prejudice retards improvement in all things, and in the dairy we observe routine in full force opposed to the best interests of all. Guénon, in his Treatise on Milch Cows, to which we

shall often refer in the following pages, commences his Introduction by a trite old saying, "L'erreur se propage avec la rapidité de l'éclair"—*Error spreads with the rapidity of lightning;* and it is certainly discouraging that truth often gains favour with so great difficulty. However successful Guénon has been in France, his discovery regarding the test of milking qualities in a cow has not been so widely diffused and conscientiously tried as it certainly deserves, and if his simple rules had been followed out we should observe in Britain well-stocked byres of rich milkers far more frequently than we can at present.

Nevertheless, even rude experience has ensured some progress, but it has been dearly bought. Before entering on the subject of the points of a good milch cow, it is expedient that we should refer to the animals that are commonly chosen for dairy purposes, and I do not intend to describe the different breeds, but to allude in general terms to the varieties of stock found in different dairies. They may be classed under three heads, the Country Dairy Cow, the Town Dairy Cow, and the Family Dairy Cow.

Country Dairy Cows.—In many counties dairies are stocked to a certain extent, and sometimes entirely, with a home breed of greater purity than in the dairies for the supply of our large towns. In Ayrshire, for instance, none but Ayrshire stock is held in repute,

and the much admired cow of this breed has displaced many others in adjoining counties. Lanarkshire, it is well known, is as famed as Ayrshire, for the cattle which derive their name from the latter county; and the extensive dairies of Glasgow are all supplied with milkers from the west. I hesitate not to say that this is a mistake, and prejudice, coupled with much just admiration for a most useful animal, causes the Glasgow dairyman to believe that his Ayrshires cannot be superseded. It is no doubt very desirable to retain breeds in all their purity, and agricultural shows prove annually of great service in instigating able and ambitious men to ensure perfection and purity of blood in animals exhibited. But, as every practical man knows, all essential qualities are not combined in the most perfect specimen of any kind, and it is not unfrequently observed that, at a distance from its native county, any animal is subject to degeneration. Thus, the Ayrshire cow does not thrive so perfectly elsewhere as in Lanarkshire; and, however sound in constitution, under many circumstances it sinks under disease more rapidly than other breeds. That the Galloway is not a first class dairy cow is matter of notoriety, but occasionally crosses with Galloways turn out almost unrivalled, both for richness and quantity of milk, and in its purity the Galloway is only used in its native county. The Polled Suffolk, however, is derived from

Galloway, and is much esteemed, indeed many of this breed are met with in dairies in the south of England, and some very valuable crosses are occasionally met with between it and other breeds.

In some parts we observe probably a wise provision against importation of animals in order to preserve a breed. This is the case with Jersey, though the laws there are insufficient, as importation from England is not prohibited, and it is only the French cow that is doomed to have its throat cut if landed on the island.

Youatt, whose purely veterinary writings are far inferior to that section of his works devoted to the breeds of animals, has very carefully collected information regarding the stock of every county, and mentions the mongrel breeds which are very numerous, often difficult to be described, and not always to be traced—neglected enough, yet suited to the soil and to the climate. In referring to what may be considered pure breeds, he says :—

"The breeds of cattle, as they are now found in Great Britain, are almost as various as the soil of the different districts, or the fancies of the breeders. They have, however, been very conveniently classed according to the comparative size of the horns :—the *long-horns*, originally, so far as our country is concerned, from Lancashire, much improved by Mr. Bakewell of

Leicestershire, and established through the greater part of the midland counties ;—the *short-horns*, originally from East York, improved in Durham, mostly cultivated in the northern counties and in Lincolnshire, and many of them found in every part of the kingdom where the farmer attends much to his dairy, or a large supply of milk is wanted ;—and the *middle-horns*, not derived from a mixture of the two preceding, but a distinct and valuable and beautiful breed, inhabiting principally the north of Devon, the East of Sussex, Herefordshire, Gloucestershire ; and, of diminished bulk, and with somewhat different character, the cattle of the Scottish and the Welsh mountains. The Alderney, with her *crumpled horn*, is found on the southern coast, and, in smaller numbers, in gentlemen's parks and pleasure-grounds everywhere ; while the polled, or *hornless* cattle, prevail in Suffolk and Norfolk, and in Galloway, whence they were first derived."

As I have already stated, my object is not to treat specially of every breed, and for the moment I have simply to mention that pure Ayrshire, Alderney, and even Yorkshire stock, with the Irish Kerry cow, constitute the varieties most prized in many country dairies. Of crosses, or, as Youatt calls them, mongrel breeds, the produce of short-horns and Galloways, short-horns and Ayrshires, short-horns and Alder-

neys, are of great value, as well as crosses between the improved Durham breed and the cattle of Cheshire, Gloucestershire, and other counties.

The admixture of foreign blood into our dairies has proved of incalculable value, and the much esteemed short-horns are supposed to have been derived from the western coast of the Continent of Europe, extending from Denmark to the confines of France. But without attempting to determine the crosses of a breed at present recognized as British, in order to establish the fact that importations have been useful, we may simply refer to the influence of one or two Alderney or Jersey cows, amongst ten or a dozen animals of English or Scottish breed. The quality of the milk is far superior, and amply repays for the keep of a cow which gives but a scanty quantity.

It will probably be found that the Brittany breed will serve the purpose of delicate and expensive Channel Island cows; and the reader is referred to subsequent chapters in this book devoted to that breed.

With regard to country dairy cows therefore, we limit ourselves to stating that soil, climate, and system of culture, influence very considerably the breed; and, according to the uses to which the milk is applied, are certain cows preferred. Thus, in some cases, the dairyman attends to quantity, and others to quality, though both attributes should be observed,

inasmuch as milk cows can be had that are rich and abundant milkers; but we may turn our attention for a moment to

Town Dairy Cows.—The notion that a cow having passed several years in a country dairy, given birth to several calves, and attained a venerable age, was fit for town, to yield milk for a time, and then to be slaughtered, is thoroughly exploded. Best healthy stock is now invariably purchased, though not too young. From five to six years, when, indeed, the cow is at its prime, is considered the proper age for a town dairy cow. The essential points of a town dairy cow are, proper age, good temper, hardy constitution, excellent milking qualities, good size, with great aptitude for fattening. All these points are met with to an extraordinary extent amongst the many cross breeds taken to the markets of our large towns. Many worthless specimens are undoubtedly tied up by the poor who pay little, and suffer severely for their poverty, or by the inexperienced ill qualified to judge. The dairy cows supplied for Edinburgh, the weekly market of which is as full of excellent animals as probably any other in the world, are derived from Yorkshire, Cumberland, Westmoreland, the southern and western counties of Scotland. A dozen years back the Ayrshire cow was as constantly kept here as in Glasgow, but since the prevalence of pleuro-pneumonia, to which the Ayrshire

was found to be more subject than other breeds, a cow of large size has been preferred, and the qualities of the beautiful cows which have been bred for the dairies of London and other English towns being made known, by some animals imported by enterprising dealers, the Ayrshires have gradually lost ground. Occasionally a dairyman obtains amongst others, what he calls one of the "old Scotch or Dutch cows," and considers it a prize. It possesses many of the qualities of the short-horns, usually red and white, with middle-sized turned up and rather strong horns, good head, neck rather thick, good fore-quarters, "well down at the fore-brisket," body much like a crossed short-horn, and sometimes as large. Limbs well proportioned, rather heavy boned; the udder well made, and large though not "fleshy." I have known a cow of this description fetch as much as £28.

The many English cows sold in Edinburgh chiefly belong to one of two kinds, either the smaller fell or hill cow from Lancashire and the adjoining counties, and the large lowland variety from the same districts. Many are very handsome and of great size, well proportioned, rich and abundant milkers. They are often represented as pure short-horns, but they are crosses between short-horns and a great variety of good cows, the short-horn blood prevailing. Their udders are well-shaped, coming well forward under the belly, with

large milk veins passing towards the chest, well back and well up behind. The surface of the udder, as well as the perineum, is often studded with a rich net-work of large veins, and the marks of excellent milking properties, according to Guénon's system, are very generally met with. These cows have long been preferred in London, and Mr. Morton, in his very able little Handbook of Dairy Husbandry, says—"In Gloucestershire there was, and still is to some extent, a dark red, or brindled cow, with almost black extremities, though generally with a streak of white along the back, of medium size, and midway in its character between the Hereford and Glamorganshire breeds, but it is now becoming rare. All the principal dairies of that county, by repeated crosses, are acquiring the character of short-horns. In Cheshire also there was a native breed more or less resembling the Lancashire and midland counties long-horned breed, but either by substitution or by crossing, the Yorkshire cow, essentially a short-horn, is displacing it. This therefore is at present peculiarly the milk-producing breed of the country. In the midland counties the long-horned breed does indeed still retain its place in dairy herds, and yields well enough to justify its retention. But elsewhere the Devon, a much smaller animal, yields but a small quantity of milk; the Hereford, an animal of nearly equal size, is also deficient in its yield, and in neither of these

counties does the prevalence of a peculiar breed produce anything like a general dairy husbandry. The short-horn is more especially perhaps distinguished for its precocity and excellence as a meat-producing animal—but many of the strains of even the pure bred short-horn are also remarkable for their yield of milk—and its crosses with other native breeds, together with that more ordinary style of short-horned animal known as the Yorkshire cow, surpass all others for their yield of dairy produce, whether milk alone, or the butter and cheese made from it. The London milk dairies are thus almost exclusively supplied with this short-horned Yorkshire cow, and excepting Suffolk, Ayrshire, and the Channel Islands, it is extending more or less into every dairy district of the country. It has the advantage over all other sorts, that its calves make more valuable oxen, and its cows, after five or six years' milking, are more easily turned into beef. The milk, compared with that of other smaller breeds, is remarkable rather for quantity than quality, and therefore it is adapted either for direct consumption, or for the production of cheese, rather than of butter."

My remarks on the Ayrshire cow may appear above rather disparaging, but no one can more admire the excellence of this animal than myself. It is too well known to need description from me, though many varieties of this breed met with wherever it is kept,

lead to a far greater difference between individual specimens than could *a priori* have been supposed. Without in any way impeaching the excellence of the Ayrshire, we can state safely that there are more profitable animals for the town dairy. They are often delicate, and a much larger number than the short-horn crosses must be kept, involving greater trouble and expense. It is doubtful if a more profitable breed could be found for the farmers in the uplands of Ayrshire and Lanarkshire where the climate is indifferent, and the soil and herbage none of the best. An Ayrshire in such a situation will thrive and pay for its keep, while a heavy short-horn would starve and cause bankruptcy to its owner. A good Ayrshire is an excellent cow for the purposes mentioned under the next head.

Cows for Family Use.—Under this head we include every variety of animal which may adorn the nobleman's park or occupy a corner in the cottar's garden. "Utile au riche, providence au pauvre." Such should be the qualities of the cow of this class, and we hold that in the very highest degree is the object fulfilled by the Brittany cow that is almost unknown amongst us, though it is unmistakeably the parent of our much vaunted Ayrshires. In the second part of this little work is afforded ample evidence that the Brittany cow is essentially an animal for family use, and she proves

how utterly wrong are those who, in speaking of the Jersey cow, say that milk-producing qualities are incompatible with a tendency to fatten. We cordially admit that whilst an animal is giving much milk, an abundant deposit of fat cannot occur; but we do not believe, that yielding milk and yielding flesh in its turn constitute two natures that are incompatible, and that to have the best meat, we must get rid of every tendency to butter; and to have the best butter, we must obviate every disposition to fatten. Some town dairy cows, but more particularly the Bretonne cow, so famed in France for the butter it yields, proves such an assertion to be decidedly false.

A most accomplished agriculturist, Mr. Maclagan of Pumpherston, says, in his Report on the Universal Agricultural Exhibition at Paris, in the Journal of Agriculture for 1856, at page 417, that the Ayrshires received the impress of the approval of the foreign agriculturist, by the rapidity with which they were bought up,—a rapidity unequalled by that of any other breed, *excepting the Bretons;* and at page 418 he adds, "There was no class of animals in the Exhibition which met with as ready a sale as the Bretons; they were the admiration of every one who saw them. Small and beautiful, with a neat head, a full large gazelle eye, amiable countenance, and quiet disposition, they gained the favour of the ladies, and are as much

prized by them as pets, as for their milking qualities which are good."

On the subject of compatibility between milking and fattening qualities, Mr. Maclagan says in a note to myself, "I agree with you in your remarks about the compatibility of the fattening and milking qualities in the same breed. I may add that nothing will fatten faster than well-bred Ayrshire queys. I have known them prove more profitable than short-horn queys, as feeders,—that is, they feed as rapidly, and consumed less food than the latter; in fact, produced a stone of beef cheaper than the short-horns did. The food was turnips, straw, and a little linseed cake." At page 114 of the Highland Society's Transactions for October 1859, Mr. Maclagan says,—

"The value of pure short-horns to Scotch farmers generally, is for crossing with their native breeds; and here purity of blood and fineness of points is as necessary, because as profitable, as if pure herds were to be kept. They are used principally for producing crosses for feeding; but we see no reason why they should not also be used for producing crosses for giving milk. It is generally thought that improved short-horns are bad milkers; but this is the fault of the breeders, not of the breed. It has been their anxiety to develop the fattening, to the neglect of the milking qualities of the animals, and to bring them forward at

the Shows in such condition as to prove their aptitude to fatten. The originals of the improved short-horns were noted milkers ; and that the two qualities are not incompatible in the same animal, we have abundant evidence from the fact of one of the most celebrated herds of the improved breed—viz., that of Mr. Bates—possessing also milking properties ; and from the cows in the London dairies, many of which are almost pure short-horns, being valuable for the dairy, and at the same time having great aptitude to fatten. By the proper selection of those short-horn bulls, whose progeny were good at the pail, and crossing some of the milking native breeds with him, an animal would be obtained which would retain the milking properties, be more easily fattened when of no further use in the dairy, and attain a larger size than the original native breed ; and such an animal, we have no doubt, would be found far more valuable in our town dairies, and on most of the low country dairy farms. If wished, the crossing may be carried back to the pure short-horn breed ; but, for general purposes, we believe that the first cross will be the most profitable. We need not remark how valuable the short-horn is to the Scotch farmer for crossing with his native breeds to produce grazing animals. It improves for fattening every breed it crosses with. This is universally admitted.

The foregoing remarks on the aptitude for fattening

in a dairy cow apply to a question of considerable importance, even to the owner of a "fancy cow for family use." If ladies of the description of the authoress of "Our Farm of Four Acres," who prized her little Welsh cow, have a fair opportunity to test the Brittany cow, they will undoubtedly prefer her as a "good doer" to the Jersey breed which will not lay on flesh. The Channel Island cows have long held a foremost position amongst fancy stock, but however beautiful in form some are, they are extremely delicate; however rich the milk, it is scanty in quantity, and very few specimens of the imported Guernseys and Jerseys are worth the exorbitant sums paid for them. In Scotland they suffer severely from cold, and everywhere are they very subject to disease, and indeed only do well in the hands of their purchaser for a twelvemonth or little more. The greatest attention has for some time been paid to these animals. As Mr. Milburn, referring to the Alderney breed, says, "until within the last twenty years a more mis-shapen animal it is difficult to conceive. The Channel Islanders, possessing cattle superior to others for the richness of their milk, and well sustained by the inferior herbage the land produced, were satisfied with their ungainly form. The breed might be thus described:—Large cheeks, thin hollow neck, hollow back, thin hams, flat sides, long between hip and ribs,

crooked legs, high shoulders, drooping rump, and tapering chest."

M. Le Cornu says, in his report of the agriculture of the Channel Islands, published in Royal Agricultural Society's Journal for 1859:—"A great improvement has taken place in the breed of cattle within the last twelve or fifteen years, which is attributable to the formation of agricultural societies in the island; by this means the farmer has received instruction, and has had pointed out to him the real merits of his stock." The form the Jersey stock should possess, may be best understood by referring to the following points, which are those that guide the judges at the different exhibitions held under the auspices of the Royal Jersey Agricultural Society:—

"*Scale of Points for Bulls.*

Article	Points.
1. Pedigree on male side	1
2. Pedigree on female side	1
3. Head fine and tapering	1
4. Forehead broad	1
5. Cheek small	1
6. Throat clean	1
7. Muzzle fine and encircled with a light colour	1
8. Nostrils high and open	1
9. Horns smooth, crumpled, not too thick at the base, and tapering, tipped with black	1
10. Ears small and thin	1

Article	Points.
11. Ears of a deep orange colour within	1
12. Eye full and lively	1
13. Neck arched, powerful, but not too coarse and heavy	1
14. Chest broad and deep	1
15. Barrel hooped, broad, and deep	1
16. Well ribbed home, having but little space between the last rib and the hip	1
17. Back straight from the withers to the top of the hip	1
18. Back straight from the top of the hips to the setting on of the tail, and the tail at right angles with the back	1
19. Tail fine	1
20. Tail hanging down to the hocks	1
21. Hide mellow and moveable, but not too loose	1
22. Hide covered with fine and soft hair	1
23. Hide of a good colour	1
24. Fore legs short and straight	1
25. Fore arm large and powerful, swelling and full above the knee, and fine below it	1
26. Hind quarters, from the hock to the point of the rump, long and well filled up	1
27. Hind legs short and straight (below the hocks), and bones rather fine	1
28. Hind legs squarely placed, and not too close together when viewed from behind	1
29. Hind legs not to cross in walking	1
30. Hoofs small	1
31. Growth	1
32. General appearance	1
33. Condition	1
Perfection	33

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"*Scale of Points for Cows and Heifers.*

Article	Points.
1. Pedigree on male side	1
2. Pedigree on female side	1
3. Head small, fine, and tapering	1
4. Cheek small	1
5. Throat clean	1
6. Muzzle fine and encircled with a light colour	1
7. Nostrils high and open	1
8. Horns smooth, crumpled, not too thick at the base, and tapering, tipped with black	1
9. Ears small and thin	1
10. Ears of a deep orange colour within	1
11. Eye full and placid	1
12. Neck straight, fine, and lightly placed on the shoulders	1
13. Chest broad and deep	1
14. Barrel hooped, broad, and deep	1
15. Well ribbed home, having but little space between the last rib and the hip	1
16. Back straight from the withers to the top of the hip	1
17. Back straight from the top of the hips to the setting in of the tail, and the tail at right angles with the back	1
18. Tail fine	1
19. Tail hanging down to the hocks	1
20. Hide thin and moveable, but not too loose	1
21. Hide covered with fine and soft hair	1
22. Hide of a good colour	1
23. Fore legs short, straight, and fine	1
24. Fore arm swelling, and full above the knee, and fine below it	1

Article		Points
25.	Hind quarters, from the hock to the point of the rump, long and well filled up	1
26.	Hind legs short, and straight below the hocks, and bones rather fine	1
27.	Hind legs squarely placed, not too close together when viewed from behind	1
28.	Hind legs not to cross in walking	1
29.	Hoofs small	1
30.	Udder full in form, *i.e.*, well in line with the belly	1
31.	Udder well up behind	1
32.	Teats large and squarely placed, being wide apart	1
33.	Milk veins very prominent	1
34.	Growth	1
35.	General appearance	1
36.	Condition	1
	Perfection	36

"No prize shall be awarded to bulls having less than 25 points. Bulls having 23 points, without pedigree, shall be allowed to be branded, but cannot take a prize. No prize shall be awarded to cows having less than 29 points. No prize shall be awarded to heifers having less than 26 points. Cows having obtained 27 points, and heifers 24 points, without pedigree, shall be allowed to be branded, but cannot take a prize. Three points shall be deducted from the number required for perfection in heifers, as their udders and milk-veins cannot be fully developed; a heifer will therefore be considered perfect at 33 points. N.B. 'Pedigree' means the offspring of a prize or decorated male or female stock.

"In order to derive the greatest possible advantage from his cows, the Jersey farmer endeavours to arrange for them to calve during the first three months of the year; that is, when vegetation speedily advances. In the winter cattle are always housed at night; when they come in (about four o'clock in the afternoon) they are milked, after which each receives about three-fourths of a bushel of roots and a little hay; they are then left until eight o'clock, when a bundle of straw is given to each one. The following morning they are attended to at six o'clock, or even before that hour; having been milked, they again receive the same allowance of roots and hay as before-mentioned, and at nine o'clock are turned out, if fine, in some sheltered field or orchard; then the stables are cleaned out, and the bedding renewed if required. Cows are dried one month or six weeks before calving; bran mashes are given to them about the time of parturition, and continued for a fortnight after the calf is born: at no other time do they receive this food. Bull calves intended for the butcher receive the cow's milk for about a month or six weeks, then they are considered fit for sale. A good calf will sell for about fifty shillings, some for more, but many for less. If the calf be a heifer she is always reared, and kept in the island until she is two years old; when, if not required, she is sold for exportation. Returning to the cow: two weeks or so after calving, if the

weather be very fine, she is turned out to grass in the day-time ; it is the custom in all the Channel Islands to tether cattle ; the tethers are made of small chain ; a spike about one foot long is attached at one end and driven into the ground ; the other end is tied to the cow's halter, the latter being made fast at the base of her horns ; the length of these tethers is altogether about four yards. During the day cattle are frequently moved, generally every three hours, and sometimes oftener ; drink is given to them in the morning on leaving the stable, and at noon ; if it be summer-time, they receive it also in the evening. About the month of May they are allowed to remain out at night, and continue so until the end of October, when the system of housing above described recommences. During summer, cows are frequently milked three times a day ; and when the weather becomes very warm they are brought into the stable for a few hours, else they would be tormented by the flies. At this period (height of summer), a great diminution takes place in their milk ; but as the heat ceases towards the fall, it rapidly springs up again to what it was in the spring ; this is the time when butter is crocked for winter supply. A cow is in her prime at six years of age, and continues good until ten years old ; many are kept that are much older, but then they begin to fall off. In general, cows have their first calf much too

young; at two years old is the usual time, but then their produce is small, and continues so for at least a twelvemonth, when it gradually increases until it arrives at maturity."

However gratified the wealthy may be in possession of an animal which the poor cannot purchase, it is satisfactory for the poor man to know that he can obtain one equally good, if not better, at a moderate price. A good Ayrshire, a hardy Kerry cow, or a well-bred Brittany, offer him advantages which the Jersey certainly does not. The poor man's cow is the cow which will yield the largest amount of rich milk, and it should be remembered by the farm-servant, the labourer, and indeed all who can obtain the privilege of keeping a cow, that with very little difference in the price, and none in the keep, he can obtain a far greater return by making a good choice of whatever breed he may select, than by purchasing an inferior animal. I often feel for the ignorance of the poor men whose miserable cows are to be seen on many farms, side by side with those of their masters. It is true that many of those of the latter may be inferior, but the poor man's cow is often little more than worth keeping.

It is therefore of the greatest importance to know *how to choose a good cow.*

CHAPTER II.

ON THE SELECTION OF A COW.

A GOOD cow not only yields much good milk, but almost in proportion to the quantity given daily is there a long continuance of the secretion between the periods of calving.

How much milk will a cow yield? In general terms it may be said that a cow yields far more than she needs to rear her offspring, and in some counties two calves are made to suckle one cow, or the milk of one cow is given even to more than two calves when these are reared exclusively by the hand. It is extraordinary how much a young animal will drink, and no doubt the function of the udder is most active when the natural stimulus—the act of sucking—is in full operation.

Some cows yield enormous quantities, and I am really inclined to regard the very extraordinary drain occasionally occurring by the udder of a poor lean cow as unnatural and unhealthy. It is not unfrequent to see in large dairies an emaciated animal, with every

indication of great constitutional weakness, and even the unmistakable signs of phthisis, yet yielding gallons of blue watery milk. We frequently observe secreting organs, from some cause or other unusually active much to the injury of the animal's health, and sometimes fatal effects result. This is the case in different forms of diabetes, and the persistence of a poor milk secretion to the last moments of an animal's life, months and months after it should naturally have ceased, may really be regarded as an abnormal state. At all events, this view of the subject is worthy of consideration.

Long continuance of mammary secretion may depend on the system adapting itself with difficulty to a great constitutional change. When a cow is in calf, the development of the fœtus calls for blood which is drawn from the udder, and the function of the latter ceases. If, on the other hand, a cow that is not pregnant lays on flesh, the deposition of fat necessarily restrains the production of milk. But the transudation of principles from the blood in the mamma becomes in the course of time little more than a mechanical process ; and provided the materials entering the blood are not stored up in some other form, they are very readily transformed into the elements of milk, from the system having become long habituated to the peculiar changes essential in this process. Accordingly, some good

milkers, and particularly old cows in which vital activity is constantly decreasing and systemic reaction becoming progressively more and more difficult, acquire a sickly appearance, the defective lymph is deposited in the form of the masses of tubercular matter so constantly found in the chests of old cows, the animals become phthisical, the organs of procreation become unhealthy, and with more or less constant irritation of the ovaries the cow becomes barren. With this irritation there is a periodic check to the secretion of milk; nevertheless a very considerable flow continues, notwithstanding the obvious waste of every tissue in the animal's body.

The fact that the system is more capable of undergoing natural, though very marked changes, in early life without danger, renders a young animal indispensable for the dairy, either to breed from or to prove profitable to the town cow keeper.

To DETERMINE THE AGE OF A COW is therefore a matter of importance, and this can be done with great precision by examining the teeth and horns.

The horns do not furnish us with such certain indications as the teeth, and great facilities are offered in some animals to destroy the marks of growth and age.

According to the breed does the length, thickness, and shape of the horn vary, but in all there is an

annual mark left of continued development. In castrated animals the horns sometimes attain extraordinary proportions, but this in no way affects the appearances I have to describe.

Shortly after birth the development of the frontal processes on each side of the head indicate the position of the future horn, which appears through the skin within the first month. At the age of four or five months the little horn is firm, and protected by a scaly cuticular covering, which exfoliates when an animal is about a year old. At this period the base of the horn becomes knotty, and a circular depression between the skin and the bulging horn is the sign that the animal has fully attained its first year. A second bulge forms, and a depression below it, by the second year, a third by the third, and so on as long as the animal lives.

But, in calculating the age of a cow at five or six, an error may be incurred by supposing that the first marks formed can be readily perceived. It is only the third year's circle which is very distinct, and consequently in the annexed horn we should count from the circle nearest the point, and finding six, one of which represents the third year, the animal would be

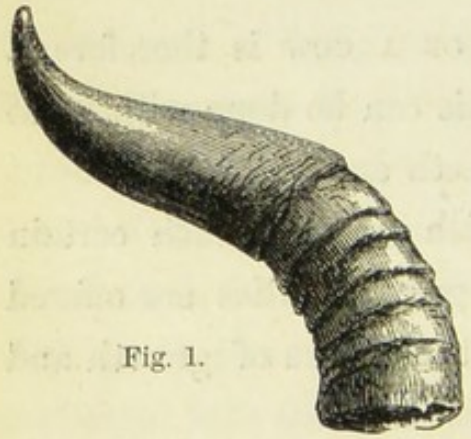


Fig. 1.

eight years of age. More reliance is usually placed in the peculiarities of the teeth.

The teeth of animals develop with great regularity, and indicate, by periodical changes, how long they have been growing. So universal are these marks of age amongst the lower animals, that an attempt has been made to determine by the teeth the age of human beings. But an artificial existence, with circumstances occasionally favouring a tardy development, and at others a very rapid growth, completely set at naught any tables which may be framed, and the exceptions are too numerous to admit of accuracy in calculations.

The age of the ox cannot be determined with so much precision as that of the horse, from the diversity in the precocity of different breeds, as well as the very various methods of management they are subjected to.

Professor Simonds, in his interesting work on the Age of the Ox, Sheep, and Pig, upsets much that has long been taught, but we must not imagine that the periods of eruption and change set forth in his tables are applicable all over the world. Thus, in examining the herds of Brittany cows recently sold in Edinburgh, I found that the whole indicated a more tardy development of the teeth than is observed in the finest breeds of this country, and the tables framed by Girard and others were substantially correct according to my observations on these animals. Professor Bouley, in com-

menting on Girard's work on the Teeth, says very justly —" In rendering animals more precocious in order to hasten the day of their death, and to furnish more rapidly their flesh for the growing exigencies of human consumption, agricultural enterprize has succeeded in accelerating the development of all the organs and the teeth, which, by their periodic appearances as by the modifications in form which they undergo, enable us to measure the duration of life, participate also in the rapidity of growth. Thus that which was perfectly true in the days of Girard, is not so to-day for those animals which art has improved."

The obvious changes of the teeth have been divided into two epochs. The first consists in the eruption and wear of the temporary teeth, and the second the eruption and wear of the permanent teeth.

First Epoch.—There are two periods in this epoch, —the one from birth to thirty days, and the second up to eighteen months. A calf is usually born with four incisor teeth through the gums. In t rdy animals the four appear within the first four days, the next two about the fifteenth day, and the fourth pair from the fifteenth to the twenty-fifth day. The second period of the first epoch consists in the wearing down of the temporary teeth, which occurs successively from the centre to the corner teeth, so that all are much worn by eighteen months.

The engraving below indicates the position of the front teeth which are usually the only ones examined, and

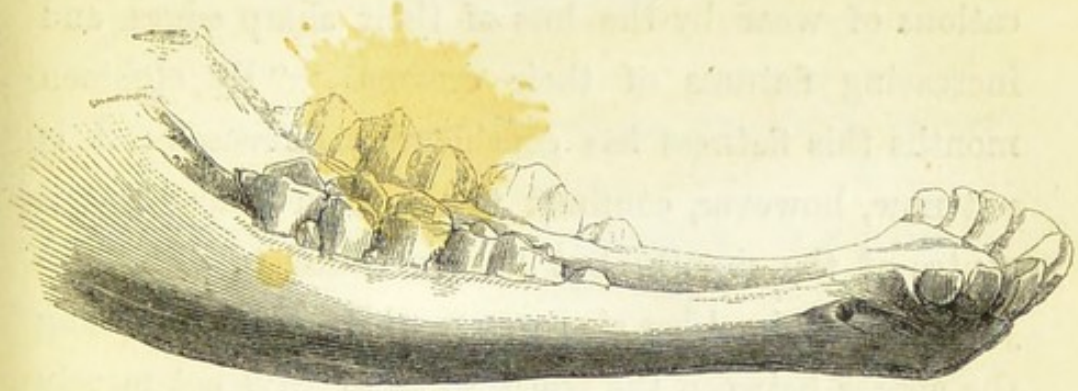


Fig. 2.

also that of the temporary grinders or molar teeth, which are in their place at the same time as the incisors.

Professor Simonds says, "The putting up of the temporary incisors and molars at about a month, completes 'first dentition;' and as there is now a given number of teeth, so any addition to them will make an important stage in the further process of teething. When this addition takes place, the temporary teeth, merely by their number, cannot avail in our inquiries, nor can they be said materially to do so up to that period by the slight wear they may have undergone. The general appearance of the young animal for the first few months suffices to form a fair estimate of its age."

The second epoch, or "second dentition," includes three periods. The first consists in the successive eruption of the permanent teeth.

In referring to the ox's mouth at eighteen months,

Mr. Simonds says it has been shewn that at a year old the four middle placed incisors, in particular, give indications of wear by the loss of their sharp edges, and increasing flatness of their crowns. "By eighteen months this flatness has considerably increased; it is not now, however, confined to the teeth placed in the centre of the mouth, but has extended to all. The jaw of the animal has also grown wider, thus increasing the spaces between the teeth, so as to leave not merely their fangs apart but likewise their crowns. To compensate in part for their diminished length, the teeth have likewise risen in their sockets; and as some of them are soon to be renewed by the permanent incisors, the powers of absorption have commenced in their fangs. These various causes, more or less modified in different animals, give to the mouth an appearance which is quickly recognized."

I may remark that the indications of age here given for eighteen months I have seen in backward breeds at twenty or twenty-two months, and, as Girard says, the middle permanent incisors are then out at two years; the next two, between two and three; the next two, between three and four; and the next, between four and five, when the full complement of permanent teeth is observed in the mouth. But undoubtedly this eruption often occurs far more rapidly, and the contrast is shewn in the accompanying table:

Simonds. Table of Early Average Improved Breeds.			Simonds. Table of Late Average Improved Breeds.			Girard. Table of Late Average (Unimproved Breeds).		
Yrs.	Mo.	No. of Teeth.	Yrs.	Mo.	No. of Teeth.	Yrs.	Mo.	No. of Teeth.
1	9	2 permanent incisors.	2	3	2 permanent incisors.	2	3	2 permanent incisors.
2	3	4 do.	2	9	4 do.	3	0	4 do.
2	9	6 do.	3	3	6 do.	4	0	6 do.
3	3	8 do.	3	9	8 do.	5	0	8 do.

The subjoined cut represents the worn temporary incisors. In the accompanying plate, the appearance

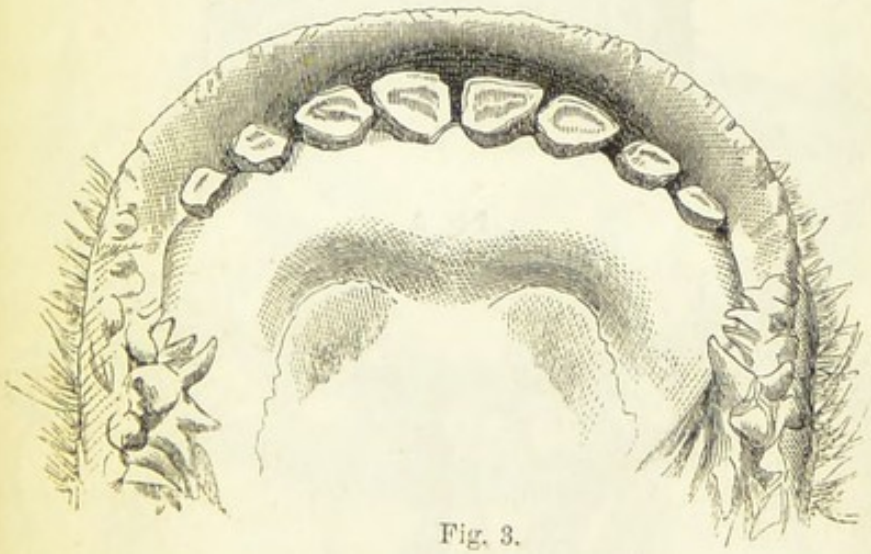


Fig. 3.

of the first pair of permanent incisors is shewn at fig. 4, of the second pair at fig. 5, of the third pair at fig. 6, and of the fourth pair at fig. 7.

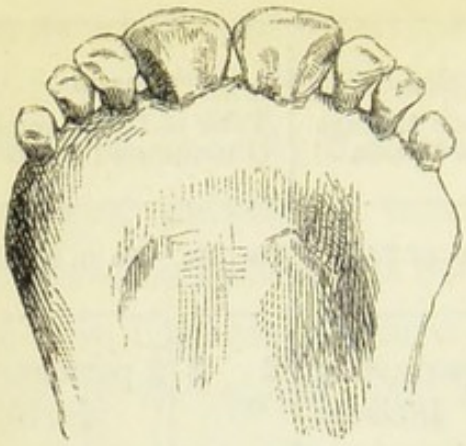


Fig. 4.

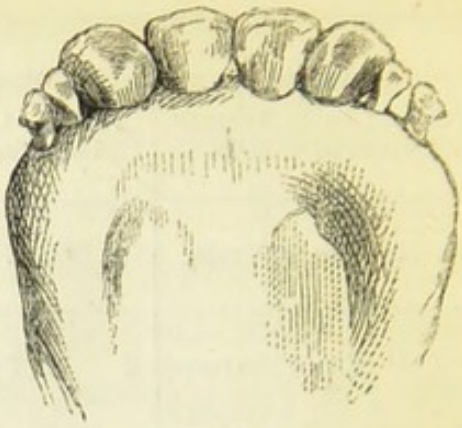


Fig. 5.

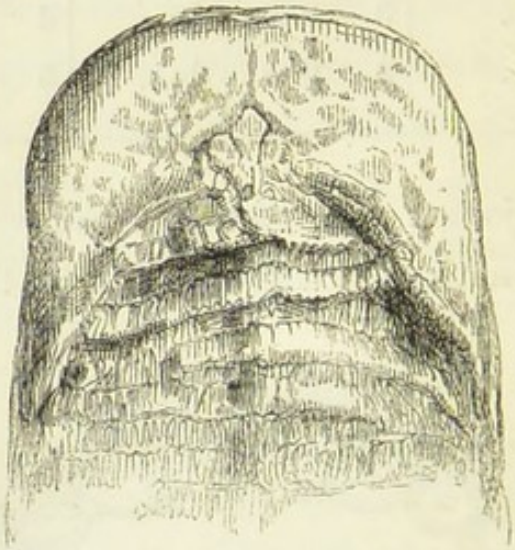


Fig. 8.

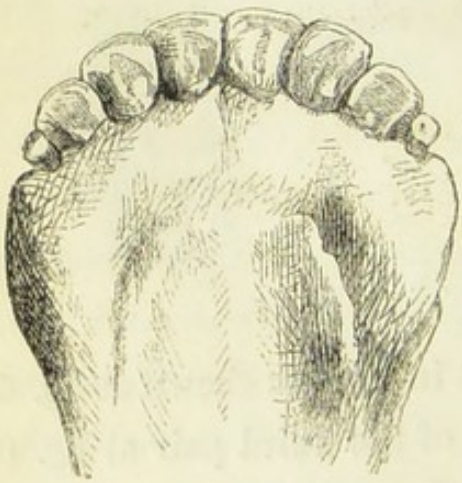


Fig. 6.

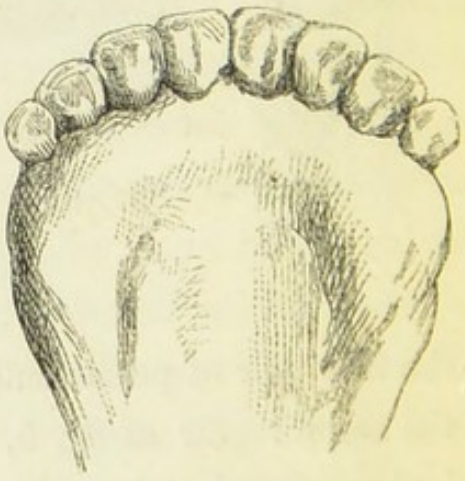


Fig. 7.

Though the molars are rarely examined, I may mention that Professor Simonds has observed that the first permanent molars, that is to say, the fourth in position on each side of each jaw, are put up when the calf is six months old; the fifth in position at fifteen months, and the sixth at two years, an interval of nine months elapsing between each.

The second period of the second dentition is that in which the incisor teeth undergo a manifest change in their wearing aspect, whereby the age of a cow can be told. This period extends from five to nine years of age, and annually each succeeding pair is observed worn down, acquiring the aspect drawn below.

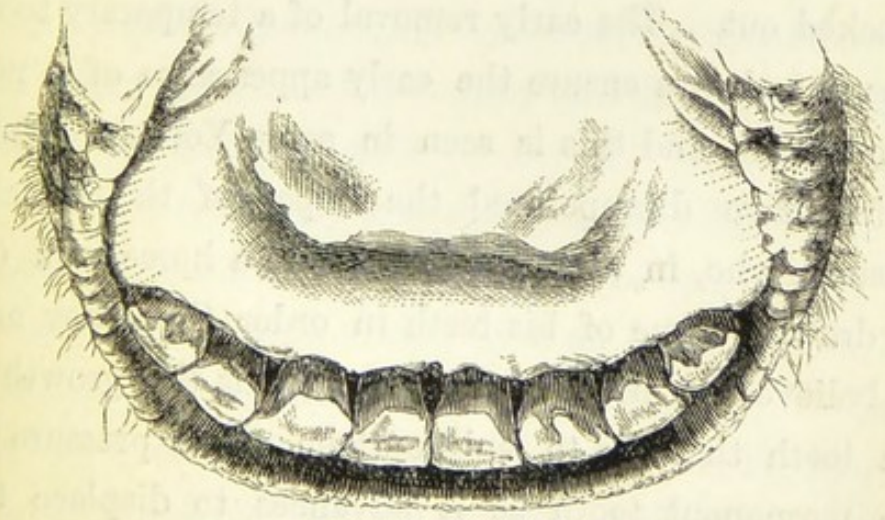


Fig. 9.

In the third period of the second dentition the form of the teeth completely alters; the upper surface becomes progressively narrower and flatter. The teeth

become very short and detached from each other, until in extreme old age they fall out.

In the upper jaw, the ox tribes possess no teeth, but a pad to apply against the incisors. In early life the rudiments of teeth are observed springing from the intermaxillary bone, but a tough fibro-elastic cushion, covered by the firm mucous membrane, as seen at fig. 8, page 32, becomes consolidated as the animal acquires age.

I have not referred to many accidents which affect the regularity of growth and eruption of the worn teeth of cows, but they are very common. Thus a temporary tooth may be prematurely removed when an animal is biting some tough root, or a tooth may be knocked out. The early removal of a temporary tooth does not always ensure the early appearance of a permanent one, and this is seen in some Yorkshire colts which have disappointed the hopes of their tricky masters, who, in attempting to make a horse look old by drawing some of his teeth in order that they may be believed to have been shed, retards the growth of the teeth that are to replace them. The pressure on the permanent tooth as it advances to displace the temporary, produces a certain degree of irritation, and a determination of blood to the parts favourable to the development of the former.

Mr. Simonds says, "Among the anomalies which

are met with in the teething of oxen, the cutting of one tooth of a given pair four or five weeks before the other is the most frequent. The tooth thus put up out of regular order is likely to lead to an error with reference to the animal's age. My own observations go to shew that in most instances it is a premature cutting of the one, and not a delay in the coming up of the other tooth, which produces the anomaly ; and consequently that the animal is younger than he appears to be at first sight. I have noticed that this irregularity applies far more frequently to the third and fourth pairs than to either the first or second."

To Determine the Milking Qualities of a Cow, many important points have to be considered. We shall classify them under two heads :—Constitutional or rather Systemic Characters, and Local Peculiarities of the Mammary Glands.

We have already touched upon the subject of breed, and the characters at present to be established may consist in any kind of cow from an Ayrshire to a West Highlander — a short-horn to a Devon. Whether destined for the production of flesh or milk, the cows of any breed may possess the distinguishing features of milkers—the comparison as to superiority or inferiority being instituted between animals of the same breed. Nevertheless, the good dairy cattle possess such a development of good milking points, that, regardless of

other tests, we can from these determine to a great extent if belonging to a milking breed.

The points mentioned in a scale printed at page 16, and which refer to Jersey cattle, may all be necessary in recognizing the types of a breed; but when, regardless of purity of blood, we require a milker, the indications are afforded by a very limited number of signs.

The form of body is of course a most important point, yet some of our best milkers are far from admirable as regards proportions. The description given in the second part of this book, of the Brittany cow, really embodies all that can be said regarding perfect symmetry in a cow.

The head should be clearly distinguished from that of a bull by lightness, sharpness of outline, clean bone, well developed skull, with broad forehead and well mounted horn. I do not like a long-faced cow with narrow cranium, heavy brow, and thick prominent muzzle. Magne says, a cow should have a "large mouth, thick and strong lips." This by no means accords with my notions of a good mouth, which must necessarily accompany a good head.

The neck varies very considerably in different breeds. It should be light, of moderate length, with a nice curve, so that the head when raised appears prettily held.

From the withers to the root of the tail, the spine

should be straight and broad. The withers round and broad, the loins wide, and, according to some, the spinous processes of the lumbar vertebræ should bend well forwards, so as to leave space between them and the spinous process of the sacrum.

Magne says,* "The cows we recommend as milkers are those whose chine, instead of being all of one piece, shews, towards its centre, a space occupied by a kind of shrivelling, the effect of the distance between the spinous processes of the vertebræ; the process of the last dorsal vertebræ is strongly bent forward.

"In some cows we have observed that this distinguishing mark is owing to the processes of the last dorsal vertebra being shorter than those of the preceding vertebra. In that case, the back has at its middle, instead of a wrinkled or shrivelled part, a depression which is continued to the rump.

"When this mark exists, the chine is often double on its posterior half; the ridge of the vertebræ is large and wide, and seems forked, and a slight depression prevails along the median line of the body, and is more especially visible near the rump.

"This mark is much looked for in Flanders, where great importance is attached to it; and among the

* "How to Choose a Good Milk Cow." By J. H. Magne. With a Supplement by John Hunter. Blackie and Son, Glas gow, 1857.

dairymen of Paris, as well as the south of France, where a common saying is, that a cow will be productive of milk, 'especially when, towards the middle of the spine of the back, the processes stand apart so as to leave two spaces of two fingers' width.' (A. Rodat.)

"If the chine is double the vertebræ are thicker, the haunches more apart, and the loins and rump of greater width; in this case the hind-quarters are more largely developed, the pelvis more ample, and, consequently, the organs lodged in the cavity, and even the milk-vessels, of larger dimensions.

"The dairymen of Paris call these interruptions of the vertebral column, '*fontaines de dessus*' (upper springs), in contradistinction to the '*fontaines de dessous*' (under springs) or those opening where the veins of the stomach sink into the flesh."

With regard to the value of the so-called springs as tests of milking qualities, Mr. Magne states—"They say that, in good cows, these upper and lower *fontaines* correspond with each other, and are equally large. We may observe that they never correspond, since those above are on the median line of the body, and the others on the lateral parts of the belly; and that the name of springs (of milk) is not proper even for the lower one, although they are traversed by veins. The name thus given to the space left between the vertebræ proves that it is a false analogy which has

caused it to be considered as the sign of a good milker."

I have referred to this point at some length, because I have repeatedly known persons rely much on the breadth of space between the last spine of the lumbar vertebræ and that of the sacrum as a sign of a good milker. The Marquis of Tweeddale, who is renowned as an excellent judge of a milk cow, has told me that he learnt this sign from an old man who implicitly relied on it, and was long known to be a great judge of a good milk cow, always possessing the best cows in the country. His Lordship has still adhered to it, and certainly the cows he possesses, according to Guénon's system and every other sign, are very fair cows indeed, one or two excellent. No doubt the peculiar conformation of the spine is coupled with a corresponding shape of pelvis and peculiar attachment of the hind limbs, and good shape in these parts is almost invariably associated with a well-placed and well-developed udder. That the word *spring* is an improper one no one possessing the smallest amount of physiological knowledge can doubt, but it is interesting to observe peculiarities of form, even of the osseous framework, coupled with characteristic properties of the milk-secreting organs, and the most sceptical must place some reliance on the evidence they afford.

A good back is usually seen with a good body, deep

and prominent ribs well back towards the ileum, and not only allowing free play for the heart and lungs, but room for the digestive and reproductive organs.

The belly in young animals should be neat and round. It droops with age, especially when a cow has borne several calves.

The limbs should be well proportioned, the fore ones light, especially towards their upper part, and the hind ones broad, with full flat thighs, broad clean hocks, straight and short legs.

The skin should be free, thin, and may be covered with hair of any colour, according to the breed. In some, as in the Jersey cattle, a light colour is preferred. Amongst Brittany cows the light-coloured cows are usually coarse, wild, and unproductive. The black and white cows are preferred. Amongst Ayrshires a good reddish brown and white cow is considered the best. Colour is of little value to determine quality, especially in comparison with the nature of the skin. I have never seen a cow with a really good skin a bad milker. It is as certain a sign as most of the more generally reputed ones. In some instances the hide is fine, and feels thicker than it really is, from the unhealthy condition of a cow. I know of no fault I dislike more than really thick skin.

The tail is by some much looked to, and it is believed that when fine, and reaching down to the

hocks, with a fine tuft of hair, it is associated with other good milking points.

It is an essential quality in a cow that she should be good tempered, lively, and in such constitutional vigour as to feed well, ruminate much, and thrive well. The perfect state of the digestive system is a very important matter. And we have before said that a good conformation of chest, indicating great power of the respiratory organs, is much to be desired. All these qualities render an animal constitutionally strong, and enables it to yield milk to the full extent of its milking qualities.

We conclude a description of the general forms and properties of a cow, by quoting a scale of points given for short-horn cows, in the "Farmer's Journal and Transactions of the Board of Agriculture of Lower Canada, for February 1859:"—

Scale of Points for Short-Horn Cows.

Article		Points.
1.	Purity of breed on male and female side; sire and dam reputed for docility and disposition, early maturity and aptitude to fatten; sire a good stock-getter, dam a good breeder, giving a large quantity of milk, or such as is superior for making butter and cheese . .	7
2.	Head small and tapering, longer and narrower in proportion than that of the bull; horns fine, and gradually diminishing to a point, of a flat rather than a round shape at the base,	

Article		Points.
	short and inclined to turn up, those of a clear wavy colour to be preferred, but such as are of a transparent white, slightly tinged with yellow, admissible; ears small, thin, and well covered with soft hair, playing quick, and moving freely; forehead of good breadth between the eyes, and slightly dished; eyes bright, placid, and rather prominent than otherwise, with a yellow rim round them; the lower part of the face clean, and well developing the course of the veins; muzzle small; nose of a clear orange or light chocolate colour, the former much preferred; nostrils wide and well opened; lower jaw thin; teeth clean and sound . . .	5
3.	Neck fine and thin, straight, and well set on the head and shoulders, harmoniously widening, deepening, and slightly rounding, in a delicate feminine manner, as it approaches the latter point; no dewlap	2
4.	Shoulders fine and well placed; fore-legs short, straight, and well spread apart; fore-arm wide, muscular, slightly swelling, and full above the knee; the bone fine and flat below; knees well knit and strong; foot flat, and in shape of an oblong semicircle; horn of hoof sound, and of a clear wavy colour . .	2
5.	Chest broad, deep, and projecting; the brisket in a lower line than the belly . . .	5
6.	Barrel round, deep, and well ribbed to the hips	4
7.	Back short, strong, and straight from the withers	

Article.		Points.
	to the setting of the tail; crop round and full; loin broad; huckle-bones on a level with the back; tail well set, on a level with the back, or very slightly below it, fine, and gradually diminishing to a point, and hanging without the brush an inch or so below the back, at right angles with the back . . .	4
8.	Hind-quarters from the huckles to the point of the rump long and well-filled up; twist well let down, and full; hind-legs short, straight, and well-spread apart; gradually swelling and rounding above the hock; the bone fine and flat below; foot flat, and in shape of an oblong semicircle; horn of the hoof sound, and of a clear wavy colour; legs not to cross each other in walking, nor to straddle behind	3
9.	Udder broad and full, extending well forward along the belly, and well up behind; teats of a good size for the hand; squarely placed, with a slight oblique pointing out; wide apart; when pressed by the hand the milk flowing from them freely; extra teats, indicative of good milking qualities; but should never be milked, as they draw the bag out of shape. Milk veins large and swelling; milk excelling either in quantity or quality for making butter or cheese	5
10.	Skin of a medium thickness; movable and mellow; a white colour admissible, but a rich cream or orange much preferable. (We speak of a bare skin beneath the hair.) It is be-	

Article.		Points.
	lieved as a rule, that cows with a cream-coloured skin yield the richest milk. Hair well-covering the hide, soft and fine, and if under-coated with soft thick fur in the winter, so much the better. Colour pure white; red roan; bright red; red and white; spotted roan, or reddish yellow and white. (A black or dark-brown nose, or rim round the eye; black or dark-brown spots on the skin and hair, decidedly objectionable, and indicative of coarse meat and bad blood) . . .	3
11.	Good handler	4
12.	Sure and good breeder	4
13.	General appearance	2
	Perfection	50

I have in the next place to consider the local peculiarities indicating milking qualities, and the remarks made in the above scale of points regarding the proper shape of the udder are very correct.

The udder of the cow is constituted by four or six mammæ, two or three on each side. Rarely do we find more than four secreting, and they are therefore called the quarters of the udder. The whole of the quarters are in the cow enveloped by a common fibrous tunic, tough and elastic, connected with the abdominal fascia by similar fibro-elastic textures. This outer envelope is closely adherent to the skin, and on its

glandular aspect is connected with numerous prolongations or septa intersecting the gland and supporting its different lobes and lobules. The tube passing through the teat or nipple may be regarded as the stem connected with a considerable cavity, and from which spread many branches; these traverse the substance of the organ in every direction, and are connected with clusters of gland vesicles. Like all compound racemose glands, they may be compared to bunches of grapes, the acini or grapes being connected by areolar or connective tissue, which constitutes the framework or skeleton of the organ, and is transformed into or continuous with the outer fibro-elastic envelope.

The teat itself, composed of the outer skin, of a fibro-vascular and partly erectile tissue, possessed also of considerable muscular contractility, is traversed through its centre by the milk duct, communicating, as I have before said, with a milk reservoir, and through it with every other tube in the gland. The tubes which converge towards the milk reservoir have received the name of Galactophorus ducts.

The different quarters of a cow's udder are supplied by separate arteries with blood. In company with these arteries are numerous veins, the development of which is very marked in some cows. The udder veins discharge their blood in great part into the thigh vein,

but also in the abdominal vein, which sometimes attains such a considerable size.

The udder of a cow may be very large, from an abundance of the areolar or connective tissue above mentioned. This constitutes a "fleshy" udder, and is not a desirable quality. If the gland be firm and rich in gland vesicles, with a nice fine skin, it is much to be preferred.

The fore-quarters of the udder should advance well under the belly, and the teats pointing obliquely outwards. The back-quarters well up behind and broad.

With regard to the veins as indications of milking quality, we can rely less on the so-called "milk vein" than is often supposed. If large and tortuous, with a considerable opening through the muscles of the belly to admit of its passage onwards, it is frequently connected with a rich udder; but far greater reliance can be placed on the network of veins seen beneath the skin over the fore-quarters of the udder. This characteristic is little noticed by authors, and I have rarely heard dairymen or dealers in cattle speak of it. But both the veins and the udder itself, and those which pass upwards behind towards the tail, in fact over the perinæum, when large, are sure tests of a competent milker. Magne has noticed this mark more than other persons, though our own numerous observations

which agree with Professor Magne's date several years back. I cannot refrain from quoting his remarks.

"*Veins of the Udder and of the Perinæum.*—The veins of the udder and the perinæum, to which hitherto sufficient importance has not been given, are able to furnish valuable indications. They should, in both cases, be highly developed, large and varicose; that is, exhibit inflations and nodosities.

"The veins of the udder have no definite direction. They present themselves very irregularly, under the form of zigzag lines, knotted, and more or less oblique. They are never of very large size, except in cows which give great quantities of milk.

"The veins of the perinæum directed from above downwards, forming a winding line, interspersed with knots, resemble those of the udder, in not being visible either in heifers or in beasts of middling quality. We cannot ascertain their presence in any but very good cows.

"In the cow on which we saw the vein of the perinæum for the first time, in the vicinity of Lille, in 1847, in company with MM. Delplanque and Pommeret, this vein formed a very large knotted and winding line. The Dutch cow which had it, though not of large size, gave seventy pints daily, and did not become dry while in calf. All the surface of the udder was varicose, interspersed with transverse veins.

"Since that particular case drew our attention to this mark, we have had opportunities of observing it on a very great number of cows. M. Collot also gives this vein as one of the marks of excellent milkers.

"The veins of the perinæum, in the best milkers, form a network beneath the skin, which it raises up in a greater or less degree. In some of the best cows, these veins mark their position by a large knotted line, but most frequently, in order to make them visible, it is necessary to use pressure across the skin at the base of the perinæum. The pressure causes them to swell, and makes them discernible both by sight and touch. It is even easy, by making the blood flow back towards the *vulva*, to produce very apparent undulations.

"We should always pay attention to these movements of the blood, in order not to mistake the folds, sometimes exhibited by the skin of the perinæum, for veins. Error is especially to be feared in the case of fat cows, on account of the fatty inflations which appear in the perinæum. The veins buried in fat cannot be distinguished by the motions of the blood, which often are by no means apparent.

"In some cows, the vein is found between two folds on each side of the perinæum; it is there much less prominent than the folds, and becomes perceptible only by the fluctuation of the blood.

"At other times (this is when the perinæum is

united, when the skin is thin, and the cow old), the veins, though little developed, are apparent, or easily become so, without being very bulky. It is necessary to have regard to their size; though they may be very easily detected, still, if they are small, the cows are not very good.

"It is not always on the upper part of the perinæum, near the *vulva*, that the vein is most visible; sometimes it is discernible only in the lower part of this region, near the udder; it there appears under the form of knots, which are, at times, very large, and are observed on the perinæum and the udder, and the space between them.

"Of all the marks of abundant milk secretion, the best, and indeed the only infallible marks, are furnished by the veins of the perinæum and of the udder. But, although the surest, they are not absolutely decisive.

"To estimate them, it is necessary to take into account the state of the cows in respect of flesh, the thickness of the skin, food, general activity, fatigue, journeys, heat; all the circumstances, in short, which cause variations in the general state of the circulation, and in the dilatation of the veins. It is necessary, moreover, to recollect that in both sexes all the veins are larger in the old than in the young; that the veins which encircle the udder are those which, if the cows are in milk, vary most according to the different periods

of life; though scarcely apparent in youth, they are of considerable size, when, after several calvings, the operation of milking has given the gland its full development.

"This proportion between the size of the veins and the milk secreted, is observed in all females without exception. The largeness of the veins and their varicose state being a consequence of the quantity of blood attracted by the activity of the milk glands, is not only the sign, but also the measure of this activity; the connection between the two phenomena is such, that, if the glands do not give an equal quantity of milk, the larger veins are on the side of the gland which gives the larger quantity."

There remains for me to notice the most valuable of all methods to determine the milking qualities of the cow. It is Guenon's system. Francois Guenon, risen from the humbler classes, and from his boyhood being amongst milk cows in his native country in the vicinity of Bordeaux, narrowly observed the relation between the amount of milk secreted, and the development of the patch of skin, covered with upturned hair, extending from the udder upwards, and laterally over the thighs. He determined from this that it is possible with great accuracy to determine the value of a dairy cow.

For long was Guenon's system a secret. His career

has, however, been most fortunate, and the substantial manner in which he established his claims as a discoverer in this very important matter has insured him much distinction.

"The Agricultural Society of Bordeaux appointed a committee, in 1837, to test Guenon's capabilities, and they reported that, although the mode by which he ascertained these qualities was a secret, he had succeeded in satisfying them of the reality of the system he pursued. They subjected his process to an experimental test, which was very effectual. Separate cows were brought from strange dairies, and he wrote down the characteristics and qualities of each. These were compared with the separate statements given by the owners of the animals; and, in cases of more than sixty head, he succeeded in stating all their peculiarities exactly, excepting a very slight difference in appraising the quantity of milk—a difference the committee attributed solely to the quality of food given to the animal.

"The Central Society of Agriculture of Cantal also reported upon his system with equal favour. They thus describe the process of investigation pursued:—'He accompanied the members of your committee to the farm of Verac, belonging to the president of the society. He examined with scrupulous attention the fine dairy cows of this domain, which is composed of

one hundred milch cows of the best kind in the country. . . . M. Guenon gave upon each of them separately precise indications as to the quantity of milk each of them give per diem, and the length of time they would hold their milk after being again in calf. We must avow to you, gentlemen, that they have almost in every instance agreed with the declarations of the owners of the cows.'" *

M. Magne tells us, that from time immemorial the inhabitants of Mont d'Or, in the Lyonnais, of the communes of St. Cyr, St. Didier Conzon, etc., have considered the tufts or fringes on the lateral parts of the belly, and at the base of the flank, as indicating the milking qualities of goats. Guenon has founded a system on a similar basis, applicable to the cow; and all animals bear similar indications of aptitude for the secretion of milk.

It is not very easy to denote intelligibly the whole system, in order to adopt it without further guide; this, however, applies to all matters of observation, in which a single practical demonstration proves more instructive than the perusal of a considerable volume. It has been stated, in disparagement of Guenon's system, that no one has attained his proficiency in selecting cows according to his method. We very much doubt this, as we have seen it applied with the happiest success

* The Cow. By M. M. Milburn. London: 1859.

by several of Guenon's countrymen. All seem to think his classification too complicated ; but it may be so for those who will not take the trouble to study it thoroughly. I confess, however, that I am inclined to give weight to this objection to Guenon's treatise.

In introducing his subject, Guenon says, " I affirm without fear of erring, that with an accurate knowledge of the new characteristic signs of my method, the animals which will give most milk, and continue longest yielding it when in calf, can be chosen even a few days after their birth ; the quality of the milk, whether it will be rich or poor in cream or butter, can also be determined."

The distinctive signs which Guenon makes use of are, the *tufts* or *épis*, and *scutcheons* or *écussons ;* they are visible in all animals of the bovine race, without exception ; are situate over the perinæum, and inner surface of the thighs, and can only be examined thoroughly during the animal's movements. These signs characterize the classes and families which only differ from each other in the variable form of the scutcheon ; Guenon, moreover, says, that the names he has used are purely conventional, having relation to the form of parts employed as signs, and he has especially avoided Greek and Latin compounds.

Ten forms of scutcheons have been described and constitute the basis of Guenon's classification.

The surface of the scutcheon is distinguished by the hair turned upwards, and opposite in direction to

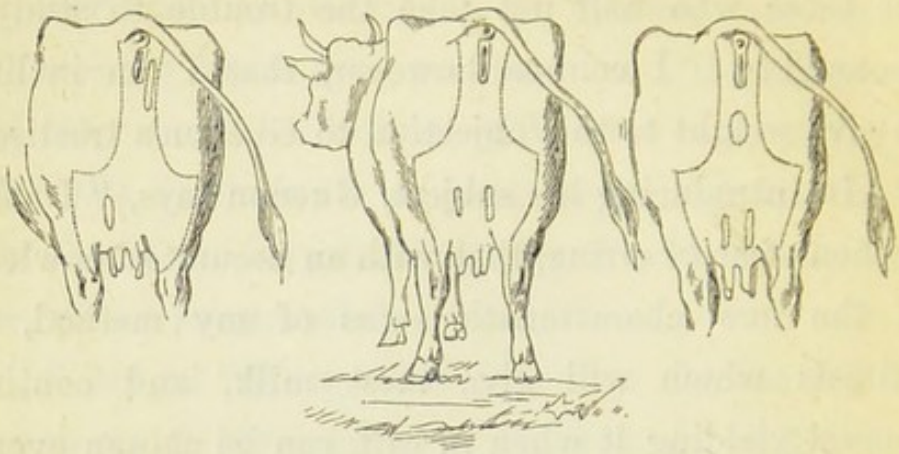


Fig. 11. Fig. 10. Fig. 12.

that covering other parts of the animal's skin. This hair differs from all the rest in colour, and is fine, soft, and close.

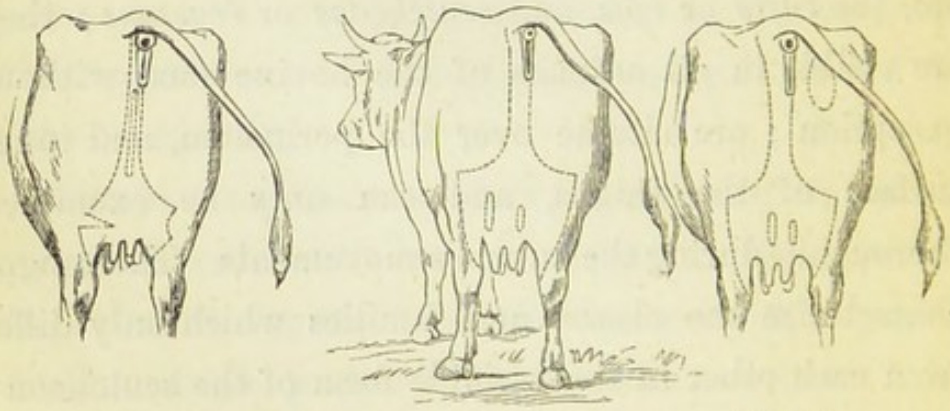


Fig. 14. Fig. 13. Fig. 15.

The scutcheon springs from the middle of the four teats, whence a portion of its hair springs, and extends towards the navel, whereas the other part rises towards the inner and upper part of the hocks to the middle of the posterior surface of the thighs ; then rising over the

udder on the perinæum, it extends, in some classes, to the upper angle of the vulva, as seen at figs. 10 or 12.

Fig. 16.

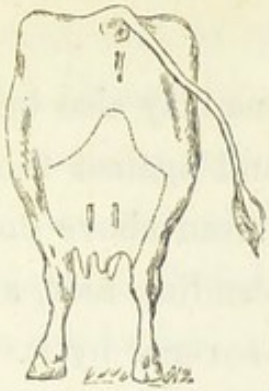


Fig. 17.

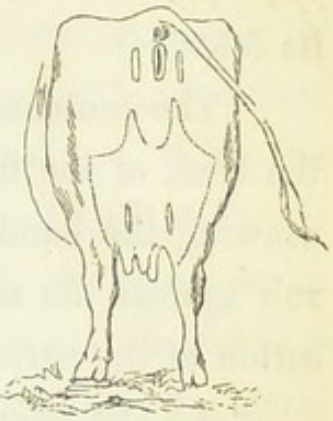


Fig. 18.

The surface or extent of the scutcheon denotes the milking capacity; its form and outline indicate the class —the fineness of the hair and the colour of the epidermis, the quantity and quality of the milk.

In examining scutcheons, Magne says—

"For the most part, it is very easy to distinguish the scutcheons, by the upward direction of the hair which forms them. They are even sometimes surrounded by a line of bristly hair, turned backwards, and formed by the meeting of the upward and the downward hair.

"Still, when the hair is very fine and very short, and mixed with long hairs, when the skin is much folded, and when the udder is of large size and pressed by the thighs, it is necessary, in order to be able to distinguish the part enclosed between the udder and

the legs, and perceive the full size of the scutcheons, to examine them attentively, to place the limbs of the cow apart, and even stretch the skin in order to efface its folds.

"The scutcheons may also be perceived by leaning the back of the hand against the perinæum, and then drawing the hand from above downwards. The nails rub against the ascending hair, and give sensible indication of the parts covered by it.

"As the hair of the scutcheon has not the same direction as the surrounding hair, it may sometimes be distinguished by a difference in the shade reflected by it; but, for the most part, it is thin and fine, and allows the colour of the skin to be seen. Were we to trust only to the eye, we should often be deceived.

"In some countries dealers shave the buttocks of cows. Immediately after this operation, it becomes impossible to discern the tufts, either by sight or touch; but the inconvenience ceases after some days. We ought to add, that this shaving, intended, as the dealers say, to beautify the cow, is resorted to most frequently for the single purpose of destroying the scutcheon, and depriving buyers of one method of determining the milking qualities.

"It is superfluous to add, that the cows most carefully shaven are those which were ill marked by

the tuft, and that it is therefore prudent to assume that cows with the perinæum shaved are bad."

Guenon says, that the importance of the scutcheon is sometimes diminished, and at others increased by the different tufts which are usually met with, according to their form, nature, position, and extent. With the exception of the oval ones, seen at fig. 10, all tufts encroaching on the scutcheon diminish its value, or in other words indicate a diminished aptitude for yielding milk. Another tuft serves to distinguish the good from the bastard* cows. It exists on either side of the vulva, as seen in fig. 11.

When the scutcheon is well formed and fine, the individual bearing it belongs to the first or second order of its class; but when the scutcheon is occupied over a portion of its surface by certain *épis* or tufts, the animals descend one or more orders in the classification.

Fig. 19.

Fig. 20.

* By *bastard*, Guenon means cows which differ from a certain class, only in a deviation in the natural form of the scutcheon, or position of tufts.

If the scutcheon be wider about the vulva than below, the medium width through its whole extent is estimated, and this represents the value of the scutcheon and the order of the cow.

All variations in the hair of the scutcheon are tufts which constitute irregularity or indicate a fault in the interior which affects the secretions of milk. The fault is in relation to the superficial extent of the tufts. As Magne says, "the tufts being valuable, in proportion to the space which they occupy, it is of much importance to attend to all the rows of descending hairs which lessen its size, whether these occur in the middle of the scutcheon or form indentations on its edges. These indentations, partly concealed by the folds of the skin, are sometimes perceived with difficulty. It is of much importance, however, to take them into account, for in a great number of cows they greatly lessen the size of the scutcheon. We often find cows, which at first sight appear to have a very large scutcheon, and yet are only middling, because lateral indentations greatly lessen the part of the skin covered with ascending hairs. Many blunders are committed in estimating the worth of cows, because sufficient attention is not paid to the real size of the scutcheon."

Guenon, moreover, says, "in general when a tuft is seen on the scutcheon, either on the right or left of

the thigh, we know that the veins situated beneath, on either side of the belly, have a peculiarity ; the one on the side of the tuft where the scutcheon is contracted is small, and there is also a small opening for it where it pierces the abdominal muscles.

Fig. 21.

Fig. 22.

The tufts and scutcheon are best seen, and appear to open out at the time of calving, and become contracted again shortly after the cow has been delivered. They are best seen also on fat cows.

Sometimes there is an intermingling of two forms of scutcheons. This depends on the crossing between a cow of one class and a bull of another. There are difficulties to encounter, then, in precisely estimating the value of the animal.

Before stating the varieties of scutcheons described by Guenon, I must mention that the tufts, or encroaching patches of hair, which modify the scutcheon, have been classified. There are two species ; those on which

the hairs ascend, and those on which it descends. Those with ascending hairs are simply traces which

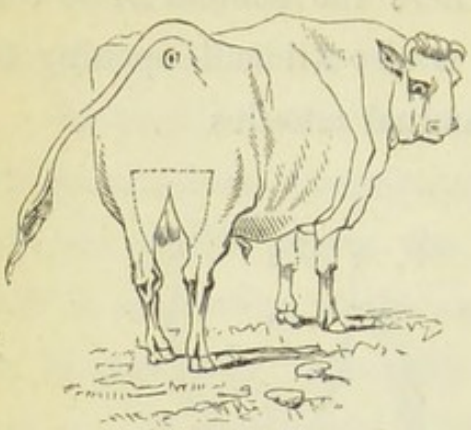


Fig. 23.

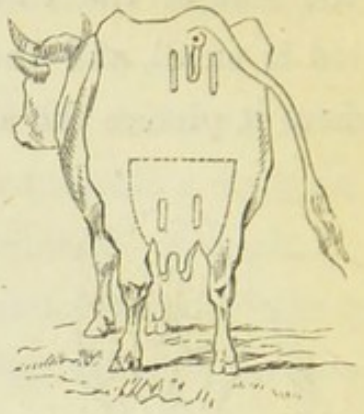


Fig. 24.

encroach on the descending hair outside the scutcheon, either on one side or beneath the vulva. Those with the descending hair are on the scutcheons, and are five in number.

The seven tufts or patches of hair which Guenon thus mentions, are placed as represented below.

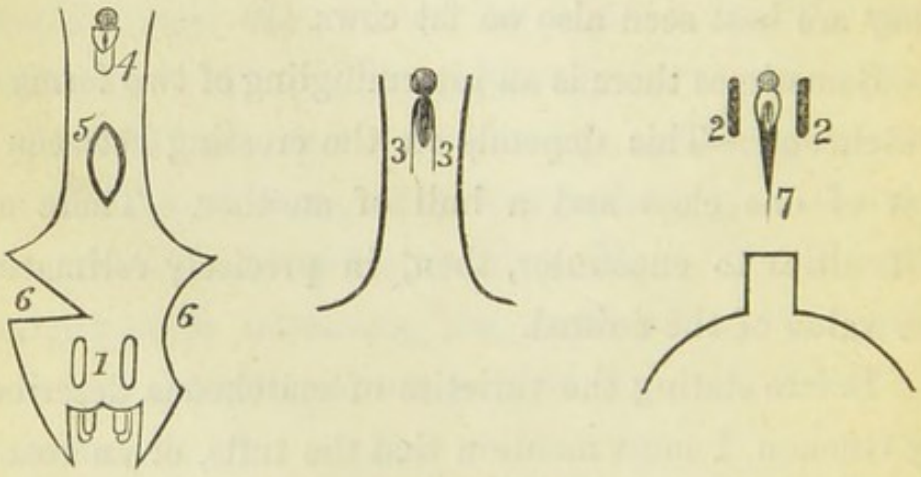


Fig. 25.

The names given to them are very peculiar, and

for some we must substitute another in English, taken from the position or form of the tuft.

Thus, 1. *Epi ovale*, oval tuft; 2. *epi fessard*, ischiatic tuft; 3. *epi babin*, lip-shaped tufts; 4. *epi vulvé*, vulvan tuft; 5. *epi batard*, perinæal tuft; 6. *epi cuissard*, thigh tufts; and 7. *epi jonctif*, mesian tuft.

The oval tufts are good signs if small, regular, and covered with fine hair. They are seen in all the best cows, but they are also met with in some of the lower orders.

The thigh tufts of ascending hair are never seen in the first class cows, but in all others to a limited extent.

The 3d, or lip-shaped tuft, is only seen as a sign of deterioration in the two first classes; it is constituted by descending hairs, and is an indication of defect, in its special class, so far as milking qualities are concerned.

The 4th is likewise a deteriorating sign.

The perinæal tuft may exist in cows otherwise well-marked, but it indicates that the animal will have a great diminution in the amount of milk it yields, so soon as it becomes pregnant.

The thigh tufts indicate a diminution in the yield of milk, proportionate to their extent.

The mesian or dart-like tuft, with soft silky ascending hair, is rarely seen, and only in those classes in which the scutcheon does not ascend to the vulva.

Regarding the varieties of scutcheons as characterizing different classes of cows, it is almost impossible, and I think not necessary, to translate Guenon's inappropriate names. The ten classes are represented each by its most perfect specimen, in the foregoing woodcuts. The first class has a scutcheon, the outline of which is shewn at figs. 10, 11, 12. Cows thus marked have been termed by Guenon, Flandrines, simply because the breed of cows in Flanders excels all others for its milking qualities, and many of that breed bear a similar mark. I shall confine myself to mentioning the other names of classes, stating the numbers of the figures representing them. Flandrines à gauche, figs. 13, 14, 15. Lisières, fig. 16. Courbes Lignes, fig. 17. Bicornes, fig. 18. Double Lisières, fig. 19. Poitevines, fig. 20. Equerrines, fig. 21. Limousines, fig. 22. Carrésines, figs. 23, 24.

In conclusion, I have to repeat that I am inclined to regard the above names and sub-divisions into classes as to a great extent superfluous; but in giving a complete series of cuts indicating the outlines of the principal scutcheons, it has been my object to do full justice to Guenon and his valuable method of determining the milking qualities of cows.

CHAPTER III.

THE DISEASES OF DAIRY STOCK.

The limited extent of this little work prevents me entering into minute details on the diseases of dairy stock, and I do not wish to render it simply a veterinary treatise. But, when I look back to the very little that has been written, I venture to hope that this chapter may throw some light on the subject. It was meant as accessory to all the rest, and it has turned out the longest. This is not surprising when it is remembered that to see and to treat disease has been my occupation for a number of years. I first worked hard in the London dairies, and witnessed there a great variety of maladies. I next had a very favourable opportunity to practise amongst sick cows in Yorkshire. After that, I carefully investigated the maladies of animals in the large dairies of Italy, Switzerland, Southern Germany, and France; and lastly, my position here and travels through Scotland have enabled me to develop my views on many important subjects. I might therefore be tempted to fill four times the space occupied by the whole of this volume, but as the object

of the latter would then be superseded, and being engaged on a large work on the diseases of the lower animals, I shall confine myself to general practical remarks on the maladies of cows and calves. Those who wish more details as to the treatment of the diseases of cows may consult the "Veterinarian's Vade Mecum."

GENERAL DISEASES.

Plethora—*Fulness of Blood.*

A healthy cow or calf, if over-fed, thrives too rapidly, and makes blood too fast,—in fact becomes plethoric. This is the origin of many serious diseases, such as diarrhœa, fever after calving, splenic apoplexy, joint ill in calves, all of a fatal nature, rendering it imperative on the part of the cow-keeper to attend to moderation and regularity in diet. This is not always sufficient to prevent plethora, because occasionally food, rich in nitrogenous constituents, as rich grass grown on heavily manured land, strong meals, very nutritious artificial foods, such as rapecake, oil-cake, etc., may, even in moderate quantities, induce the plethoric state. A proper admixture of a variety of food, coupled with sufficient exercise, ventilation, cleanliness, and indeed all circumstances which will keep the system active, and carry off superabundant material, are essential in avoiding this condition.

The symptoms consist in blooming health at first, indicated by mellow skin, bright eye, and general cheerfulness. Suddenly the eyes become bloodshot, the appetite diminished, the mouth is bedewed with drivelling saliva, and the animal is seized with an apoplectic or inflammatory disease, which is speedily fatal, much to the surprise of all around it, and indeed suspicions are soon excited that *poison* has been the cause of death. Many samples of the finest oilcake have been sent to analysts with the firm conviction that an action of damages against its vendor might indemnify the owner of the cows for his loss. But the constant answer is — "No evidence of poison; a rich cake." Judgment in regulating the quantity and kind of food consumed preserves these animals from plethora.

Medical treatment consists in the use of salines, such as Epsom salts, Glauber's salts, nitre, and any purgative, with restricted diet for a day or two. The salines should be given in small doses, such as four ounces of sulphate of magnesia three or four times in the course of twenty-four hours. When the animal has had a couple of pounds, it should be stopped. Nitre may be given regularly once a week in ounce doses, and if the evil results of plethora are feared, half an ounce should be given every three hours for one or two days. Plethora is a condition which can best be prevented by activating the secretions; and

whereas purgatives and diuretics are apt to irritate considerably, we should greatly prefer action by the skin, favoured by the use of the Roman bath, described in the fourth chapter of this little volume.

Such injunctions should be given by every veterinarian to the proprietor of stock, medical aid being generally too late in these cases. Farmers like to learn to bleed, because they think they can do much in any disease by that means. A veterinarian may, in a case of plethora, taking an animal in time, deem it fit to bleed, but an amateur should *never* deal in dangerous remedies which call for well-guided skill in their application. It is a remarkable fact that occasional bleeding is one of the most potent causes of plethora, habituating the system to a rapid and abundant production of blood.

Anæmia—*Want of Blood.*

Want of food—a drain of the system by extraordinary milking—sudden loss of blood in considerable quantity from some accident, and a variety of minor causes, may induce the anæmic or bloodless state.

Symptoms.—We must carefully distinguish from the simple cases of anæmia those that are complicated by a decidedly unhealthy state of the animal. The skill of a veterinary surgeon is required for this. Emaciation, whiteness of the membrane lining the mouth, of the conjunctiva or white of the eye, coupled

with a small weak pulse, languor and debility, are the leading symptoms of anæmia.

When an animal is recovering from some severe disease, and regains its appetite, it is at first anæmic, and requires considerable nursing. If the constitution has suffered much, there is no chance of restoring the nutritive or assimilative powers, and in spite of medicine or nursing, the creature wastes gradually, and dies perhaps months after its original attack. This condition is termed "*hectic.*"

Treatment.—In anæmia, the veterinary surgeon is too apt to give preparations of iron, which are astringent, and dry up a milch cow in a very short time. It is only in extreme cases, when the preservation of life cannot be ensured but by ferruginous tonics, that he is justified in so doing. The owner of a cow should confine himself to vegetable tonics, mixed with good food, or bitters, given an hour before meal time.

A good aromatic tonic to mix with food, contains equal parts of coriander and caraway seeds finely bruised, an ounce of the mixture being given with a tablespoonful of salt in a wet mash—not too sloppy. Of bitters, none can be better than half an ounce of gentian, and a similar quantity of ginger given in beer, as above directed.

In simple cases the above are quite sufficient, but in severe ones, some of the mineral tonics must be used, under the guidance of a qualified *practitioner.*

Judicious diet, allowing an animal the more readily digested and nutritious foods, with fresh air and exercise, are indispensable in the treatment of this condition.

Fever.

Every animal, and none more than a cow, is occasionally subject to a general disturbance of the system, and this particularly after calving. Every function is disordered, and a great variety of causes may, singly or combined, induce such a state. Thus, indigestible food, sudden atmospheric changes, exposure, dirt, irregularity in milking, being worried by men or animals, may put an animal "out of sorts."

Symptoms.—Appetite diminished or lost, rumination suspended, dung hard and dry, urine scanty, skin hard and dry, milk secretion checked, pulse full and accelerated, and the breathing somewhat disturbed. Usually the early stage of fever is attended by shivering and followed by burning heat, dry and hot mouth, with considerable prostration.

Treatment.—Low diet and a purgative should be tried, if a veterinary surgeon be not at hand. The purge should consist in a pound of Epsom salts and four ounces of sulphur. Warm water clysters are of the greatest service, repeated at intervals. In Scotland large quantities of train oil and treacle are used. If oil be employed, give a bottle or two of linseed or olive oil.

So soon as the purgative has acted, the secretions are restored, and the animal convalescent. If otherwise, a complicated case may be expected ; the unskilled need not attempt further treatment, and should rather leave the cure to chance, relying on simple care in nursing, unless a veterinary surgeon be at hand.

I remember having many cases of the above description in Yorkshire, where they receive the name of "Felon."

Rheumatism—Rheumatic Fever.

This is a specific constitutional disease, in which every part of the body may be affected, though inflammatory action especially seizes white fibrous tissues and serous or synovial membranes.

It is commonly observed in the cow in the chronic form, though it occasionally assumes an acute type, and may prove fatal in the course of a few days.

Acute rheumatism is ushered in by general uneasiness, loss of appetite, dryness of skin, constipation and apparent rigidity of the joints of the body. One of the joints more particularly swells, becomes stiff, and painful. In the course of the disease, other joints become affected, the acute symptoms usually subsiding in the part first implicated. The sudden transition of the disease from one part to another, an occurrence which is technically termed metastasis, is characteristic of acute rheumatism, in which there is also a great ten-

dency for the serous membranes in large cavities to become inflamed. The pleura, but more particularly the serous membranes covering the inside and outside of the heart, become affected, and it is usually from heart disease that a rheumatic animal is disabled or killed.

In chronic rheumatism one of the joints becomes chiefly affected, and is the seat of structural changes. This is seen in young animals not unfrequently, but also in milk cows. Sometimes a tendency to scrophula encourages a deposit of lymph, which has a tendency to invade the bone and remain unorganized, sometimes softening so that abscesses form. The knee joint is most frequently affected with this form of disease, and may assume enormous dimensions, as seen from the annexed woodcut, which represents only the skeleton of the joint, the soft tissues having been removed by maceration.

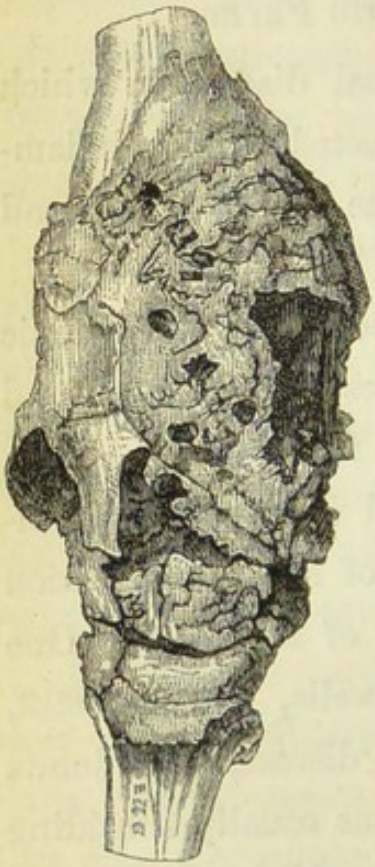


Fig. 26.

Treatment in the acute form consists in the use of purgatives and salines—nitre, liquor ammoniæ acetatis, sulphate of soda in small and oft repeated doses, besides vegetable diuretics, such as colchicum and digitalis, constitute the internal remedies. The

local treatment, which is applicable in both acute and chronic forms, consists in perfect rest to the joint, the use of stimulating liniments, especially the ammonia liniment, and in some cases blistering.

Milk Fever—*Parturient Fever.—Dropping after Calving.*

Healthy cows, within the first ten days after calving, are seized with this fearful disease. It is of a protean character, in some cases consisting in apoplexy and paralysis, in others in inflammation of the abdomen and womb, coupled with serious prostration; in others, it is a fatal blood disease, assuming the character of typhus, but in reality consisting in purulent infection, when inflammation of veins, and deposits of pus or matter occur in different parts of the body.

The most prolific cause of all these diseases, is over-feeding before and after a cow calves. The desire for a large supply of milk immediately after calving, often destroys the finest cow in a herd.

The premonitory signs of the malady are very few. Loss of appetite, wild look, staggering gait, obstinately lying, check to the secretion of milk, may all be observed, and are sufficient to alarm, and a veterinary surgeon must be immediately called in.

No treatment can be guided by an inexperienced person in such a case. Perhaps the only means he

should resort to, are mild purgatives and warm injections with friction to the cold limbs, enveloping the body in cloths ringing wet, and then covering over with any amount of woollen cloths, etc. When the animal has thus steamed for three or four hours, the coverings must be removed, the body rubbed vigorously, and dry clothing put on.

Above all things, avoid strong internal remedies and bleeding.

Varieties of Fever.

Many fevers may be discerned by the veterinarian, and descriptions have been given of simple and malignant catarrhal fevers in cows, remittent and intermittent fevers, of typhus and typhoid diseases, which I do not think can be justly brought in amongst the common disorders of cattle, and to the latter I particularly wish to confine my attention in this little book. Reference will be made to some under the head epizootic disorders.

BLOOD DISEASES.

I have already spoken of defect and richness in quantity and quality of blood as morbid states, and I have incidentally alluded to complications arising either from plethora or anæmia.

It is difficult to decide in many instances whether symptoms arise from a primary blood change or from

functional disturbance of some particular organ, but amongst blood diseases I am disposed to class,

Red Water in Cows.

The elements of blood occasionally appear in the secretions, most commonly in the urine, and sometimes in the milk. If pure coagulable blood passes from the bladder it may certainly be ascribed to accident or disease of the kidneys, but independently of injury, certain elements of blood transude with the elements of a secretion. This is the case in that very common malady, since the introduction of turnip husbandry in these realms, *red water in cows.*

The cause is almost invariably feeding on turnips that have been grown on damp ill-drained land, and very often a change of diet stops the spread of this very troublesome disease in a byre. Other succulent foods grown under similar circumstances may produce the same symptoms, tending to disturb the digestive organs and blood-forming process.

In the course of my investigations as to the cause of various cattle diseases, and red water in particular, I have found that it is unknown on well-drained farms and in dairies where turnips are used only in a moderate degree. The lands of poor people furnish the roots most likely to induce the disorder; and I can confirm the statement of the late Mr. Cumming of

Ellon, who, in his very interesting essay on this subject,* says, particularly in reference to Aberdeenshire, that it is "a disease essentially attacking the poor man's cow; and to be seen and studied requires a practice extending into the less favourably situated parts of the country. On large farms, where good stock is well kept, and in town dairies, where artificial food is used to supplement the supply of turnips, it is seldom now seen."

Symptoms.—General derangement attracts the dairyman's attention, and on looking at the urine the cow has passed, it is observed red or of a reddish brown or claret colour, sometimes transparent at others clear. The colour increases in depth, other secretions are checked, the animal becomes hide-bound, and the milk goes off. Appetite and rumination are suspended, the pulse becomes extremely feeble and frequent, though, as in all debilitating or anæmic disorders, the heart's action is loud and strong, with a decided venous pulse or apparent regurgitation in the large veins of the neck. In some cases, if even a small quantity of blood be withdrawn, the animal drops in a fainting state. In red water the visible mucous membranes are blanched, and the extremities cold, indicating the languid state of the blood's circulation and the poverty of the

* On Puerperal Red Water in Cows, by Mr. M. Cumming, V.S., Ellon, Aberdeenshire. Transactions of the Highland and Agricultural Society of Scotland, vol. iv. page 9.

blood itself. Constipation is one of the most obstinate complications; and many veterinary surgeons, knowing that if the bowels can be acted on the animal is cured, have employed purgatives in quantities far too large, inducing superpurgation, and even death. Occasionally diarrhœa is one of the first, and not an unfavourable symptom.

Peculiarities of the Urine.—We are indebted for a faithful examination of the urine in red water to Mr. Cumming of Ellon, of whom I have heard the late Professor George Wilson say, that he was the best student of chemistry amongst veterinary students this accomplished teacher had ever known. Without reproducing here the details of the analyses, it will suffice to print the following table shewing the

COMPARISON OF ANALYSES.

	Analysis of healthy urine—original.	Analysis of red water urine—Hughes.	Analyses of red water urine—Cumming.	
	No. 1.	No. 2.	No. 3.	No. 4.
Water and indeterminate matter	963.25	974.74	962.44	960.29
Dry colouring matter	—	—	13.28	17.42
Dry animal matter in urine	12.85	15.15	14.43	9.00
Inorganic matter soluble in water	21.30	7.27	9.10	12.11
Inorganic matter soluble in acid	2.60	2.84	0.75	1.18
	1000.00	1000.00	1000.00	1000.00

"The above comparison affords us several points worthy of attention. The most remarkable is the great diminution of inorganic matter, both alkaline and earthy, from the healthy standard. Of the three analyses of red water urine, the average gives only 11.05 of inorganic matter in 1000 parts; while in the healthy fluid we have 23.90 parts, or something more than double. Neither is the healthy proportion, as found in this instance, likely to be high, it being only about half the quantity stated by Boussingault."

Post-mortem appearances.—The emaciated body of a cow that has died of red water is throughout devoid of blood, the cavities of the heart itself are almost entirely empty, whilst the condition of the blood vessels would lead any one to suppose the animal had been bled to death. Frequently, like in other blood diseases, there are spots of extravasated blood or ecchymoses on the serous membranes, and particularly within the heart, beneath its inner lining or endocardium. Occasionally, the tissues of the body are yellow, the gall-bladder is often full of bile, and the large intestine is distended by dry hardened excrement.

Treatment.—Large quantities of good linseed tea. Warm water clysters should be persevered with. If the discharge of urine be very abundant and very much discoloured, half a drachm of powdered opium may be given twice, with an interval of six hours.

The second day a bottle of linseed oil may be given. When the animal recovers, give her a complete change of diet. By all means avoid bloodletting, and indeed rather use stimulants than depressing agents.

Black Water in Cows.

This malady may consist in an aggravated form of *red water;* the urine being very dark in colour, but there is a totally different disease which is known by the name of *black water.* It is the Wood evil, Pantas, or Darn of many districts in England and Scotland, and though far more severe in milk cows it nevertheless affects oxen and even horses. In Germany it is known by the name Holzkrankheit—Wood-disease—and in France as the Maladie des Bois.

Causes.—It has been believed due to the wild anemone by some, by others it is ascribed to the poisonous influence of *Lolium temulentum,* but my experience proves that it constantly occurs on pasture in the immediate vicinity of woods, and where cows can partake of the astringent shoots of young trees, especially of the oak.

Symptoms.—These are very similar to simple red water, but we sometimes find discharge of blood by the bowels. There is constipation at first, but diarrhœa towards the latter stage, generally colicky symptoms and evident indications of intestinal irritation.

There is great tenderness over the loins; the urine is deeply tinged with blood, the general disturbance is very considerable, particularly when diarrhœa with hæmorrhage from the bowels set in. The secretion of milk emits a bad odour and is scanty in quantity. Occasionally convulsions occur and the animal dies in from three days to a fortnight, in a state of great prostration.—See *Gastro Enteritis.*

Treatment very similar to red water with more active recourse to purgatives. Camphor may be used as a stimulant when the prostration is great.

Black Quarter—*Quarter Evil. Joint Felon.*

This disease, which I have rarely observed in aged cows, is very common in some districts amongst young stock. I remember but one instance in an aged cow amongst the numerous cases of other diseases I treated in the London dairies.

Causes.—The same as those mentioned for plethora, the food, however, which causes it, usually being grown on undrained land. I never knew drainage fail to stop the disease. It may originate from contagion when once developed in some member of a herd.

Symptoms.—One of the finest animals on a farm, bearing every appearance of blooming health, suddenly appears lame, and a fetlock, hock, or knee is observed swollen and painful; severe irritative fever sets in;

the swelling extends upwards towards the haunch or shoulder; the animal falls helpless to the ground, and unless destroyed dies usually within forty eight hours; occasionally it lingers on in great pain for several days. The swollen extremity appears blueish or black where its colour can easily be seen, and if incisions are made into it, black blood flows which is seen to infiltrate and tinge the whole substance of the limb.

Post-mortem appearances.—These vary in importance, according to the severity of the case. The limb chiefly affected is gorged with semi-coagulated blood, and in parts with yellow lymph. The whole vascular system is distended by black semi-fluid blood, and the flesh is of a dark colour. The serous membranes all over the body, not excluding the arachnoid, are spotted with ecchymoses. Frequently the intestine gives evidence of a state of irritation during life—may be the seat of erosions, but more usually of ecchymoses, as on the serous surfaces. The lungs are gorged with dark blood.

Treatment.—I must refer the reader to the treatment in cases of plethora. The exhibition of mineral acids, of liquor ammoniæ acetatis, and recourse to the knife, in order to afford local relief wherever painful swellings are formed, constitute the most apparent remedial means. Drainage and the periodical use of evacuant salines are the surest preventatives.

Black Quarter in warm weather, and in hot climates, is attended with the development of a peculiar poison—the anthrax poison—which contaminates the flesh and blood of these animals, and is communicable to all warm-blooded creatures, giving rise to a very fatal disease, malignant pustule.

Splenic Apoplexy.

A blood disease incidental to the plethoric state, in which apoplexy and rupture of the spleen occur.

I first observed this affection in the cows of the Grand Duke of Tuscany in 1851. It has long been known on the Continent, and in France it has claimed considerable attention. It is there termed Maladie de sang—blood disease—and under that name Professor Delafond has published a most elaborate work. I have observed the disease in feeding stock in Northumberland, and have received accounts of the malady from Aberdeenshire, and various other counties of England and Scotland. I may here reproduce a short statement regarding it, published by me in the Edinburgh Veterinary Review, vol. i., page 488.

This disease broke out in the winter of 1857-58, on a farm, characterized by extreme richness of soil, in the north of Northumberland. In the month of January 1859 it reappeared, and did not cease until twenty-three head of cattle had been seized.

Splenic apoplexy is a malady that has hitherto not been observed in the north of Britain, and its occurrence recently is evidently to be attributed to the special method of high farming and feeding stock where it has for the last two years proved so destructive.

The farm above referred to is a peculiarly dry and healthy one. About 300 head of cattle are annually fattened on it. One lot made ready by Christmas, and sold as fat beef in Newcastle; a second lot kept rather back until January, when they are allowed an abundance of turnips, especially Swedes, meals, and the best oat straw. The cattle affected are three-year-olds; and it would appear that those fed on the Swedish turnips, especially from one field, have suffered most; but some fed on yellow or white turnips have been affected, and we would regard the meals, and perhaps the oat straw, as more likely to have produced the disorder. According to Delafond's researches, leguminosæ or forages very rich in nutritive principles and deficient in water, are frequent causes of splenic apoplexy. The farmer in Northumberland suspected the artificial manures last year, and therefore dressed his land chiefly with home manure; but the properties of the last crop have proved as deleterious as those of the preceding one.

The malady stopped suddenly about the middle of February, and this was probably due to the cattle suffering only when the system was taxed by change

from rather moderate to very high feeding. It is an interesting fact, that, in cows, the disorder only affects those which are approaching the period when the secretion of milk is stopped, and when there is a tendency to lay on flesh. Being then liable to plethora, cows fed on food capable of producing splenic apoplexy die from it. Change of diet proved of no avail at the farm above referred to, and common salt had been recommended as a preventative. But, as Delafond has shewn, it is not a remedy in such cases, rather the reverse, and thus it proved in the above instance. The malady stopped spontaneously, and the point now to settle is prevention of the disease during future seasons.

In splenic apoplexy there are no premonitory signs —the animals apparently enjoying the best health early in the morning may be dead some time before noon. Occasionally there are symptoms of excitement—the eyes are prominent and the visible mucous membranes injected. Uneasiness suddenly manifests itself, and colicky pains indicate abdominal disorder. The urine voided is high coloured and red, and there may also be blood in the fœces. The back becomes arched, and the animal fixes itself, hanging on to anything by which it may be tied in a stall, or pressing back into a corner of the curtain or shed into which it is. The pulse is quick and hard, then feeble and small—the

breathing is accelerated and short. The animal soon drops, and is seized with convulsive twitchings. In addition to the discharge of fœces and urine tinged with blood, there is a red frothy liquid which escapes from the nostrils ; the animal bellows, moans, and soon dies.

The duration of the disease varies from 4 to 24 hours. If the animals have been bled very early, they are not cured, nor can the disease be prevented by bleeding, but life may be prolonged. It would appear that an animal seized with splenic apoplexy dies quicker if left quiet, than if excited by a drive or a journey per train ; and the farmer who has sustained the above serious losses has never known an animal die in a railway truck, though it may have been moved from the farm when seized, and detained for several hours on the journey.

Post-mortem appearances.—The skin being removed, it is obvious from the turgid state of the blood-vessels that a great accumulation of blood has occurred in the system. Blood extravasations are seen in many parts—on the serous membranes in the form of ecchymoses, in the lungs, liver, and other vascular organs, but more especially the spleen. The latter organ is found enormously enlarged and distended by semi-coagulated blood, which has burst from its delicate vessels. Not unfrequently the spleen is found ruptured, and the blood discharged into the abdomen.

In addition to the above, I have only to say, that the treatment laid down for *plethora* again holds good, and should be followed out. With improvements in agriculture new diseases are produced, and dairymen may expect a more general spread of this fatal malady. Fortunately its prevention is quite possible, particularly by moderating the diet.

EPIZOOTIC DISORDERS.

These are the general diseases spreading by epizootic influence, but chiefly by contagion, over whole countries.

Glossanthrax or Blain.

This is not a common affection amongst dairy stock in Britain, especially since the days of thorough land drainage. It is very common in Italy and France, and breaks out occasionally here in a district. A few years ago it was very rife in Aberdeenshire, and proved destructive. It is closely allied to Black Quarter, and though the tongue is the seat of the local manifestations, the malady is constitutional, and is distinguished by a blood poison.

It is a contagious disease, though developing spontaneously under the combined influences of heat, moisture, and putrefactive emanations from the soil. Little more definite is known regarding its causes.

Symptoms.—A cow refuses food, is observed languid, with saliva flowing freely from the mouth, and if food be grasped with the lips, she is unable to chew it, the tongue being rendered almost motionless from pain. The animal becomes very rapidly worse, the lips swell, the cheeks and neck swell, breathing becomes very laboured, suffocation threatens, and the discharge from the mouth becomes offensive, tinged with blood, and of a greenish colour. The tongue, which is swollen and raised, is at first observed covered with vesicles which exist also on the lips and gums, and which enlarge rapidly, become opaque, filled with matter, and ultimately burst or are broken, leaving behind a sloughy and ulcerating surface. The typhous constitutional symptoms are very severe, and the animal dies in from twenty-four hours to three days.

Treatment.—Locally the vesicles must be opened, and the mouth freely and repeatedly washed with chlorine water, or vinegar and water. A strong purgative should be given, and if the local ulceration be severe, active caustics, such as the nitrate of silver, should be applied. Many cases need support with wine, beer, and mineral acids.

Epizootic Aphtha—*The Murrain.*

This disease, commonly known in Scotland as the murrain, and in England as the epidemic, or foot and

mouth disease, is very troublesome in the dairy, and even fatal where calves are reared. It is a vesicular eruption in the mouth, on the teats, and on the feet. Professor Simonds has named it epizootic eczema. It affects all warm blooded animals.

Causes.—Contagion induces the spread of this malady, and not only does it extend from cow to cow, but to all other animals approaching those diseased. The saliva from the mouth of suffering cattle may infect a large quantity of food injurious to other quadrupeds, and in milking a cow with vesicles on the teats, the poison becomes mixed with the milk, and if drunk warm by human beings will not only produce inflammation of the throat, but also eruptions on the skin. I have known calves and pigs die, when fed on the milk of affected cows.

Symptoms.—On the introduction of a newly bought cow into a byre, it is found that her teats are sore, or she is slightly lame, or she experiences difficulty in feeding, from irritation of the mouth. On one or all these parts, when examined, an eruption is observed, consisting in many vesicles raised on the inflamed membrane or skin. The vesicles, if not broken, become filled with pus, and sometimes dry, a scab forming. More commonly the irritant discharge excites inflammation, and a raw sore surface is the result. Affecting either the mouth or teats, the local symptoms gradually

subside, and the disease disappears; but when the feet are affected, unless great attention be paid early, the discharge burrows between the hoof and vascular structures, causing a separation of the horn, which is in the course of time thrown off. A new hoof developes again in all cases in which the structures of the foot have been carefully protected. The constitutional symptoms in this disease are occasionally very severe, and a whole row of cows may be seen lying in great pain, breathing heavily, with a rapid pulse, feeding but little if at all, and visibly wasting. It is from loss in the condition of cows, and diminution in the quantity of milk, so long as the disease lasts, that the dairy keeper suffers.

Treatment.—A mild purge may be given to the affected animals, but attention must chiefly be paid to the local eruption, and either of the following lotions may be used :—

Chlorine water . . . 1 part,
Water . . . . . 12 parts.

Mix, and use freely to affected parts, or

Sulphate of zinc . . . 2 drachms,
Water . . . . . 1 pint,

or a solution of alum, etc.

Vinegar and water, or water strongly acidulated with sulphuric or hydrochloric acid may be employed.

Prevention.—From the certainty that all the cows will take the disease, and that the longer it hangs about a place the worse for the owner of stock, I have usually recommended to communicate the disease to all the animals at once by inoculation. It is readily controlled by judicious treatment and nursing, and in a week or two all the cows are free from disease, and only slightly susceptible of a second attack. Recently considerable discussion has gone on in France as to the recurrence of the malady in animals that have been once affected, and the weight of evidence is in favour of the repeated seizure of cows by the affection.

Calves, if attacked by inflammation of the throat from drinking the milk, are very likely to die. They evince great difficulty in swallowing; sometimes cough and saliva drops in large quantities from the irritated mouth. The whole alimentary canal may be affected, attended by much irritative fever. They should be allowed small doses of alum whey, and be kept on linseed tea or thin oatmeal gruel, with milk of healthy cows.

COW-POX (Variolæ Vaccinæ).

This very simple affection is not often noticed, and so many forms of eruption are observed on the teats that it is somewhat difficult to detect the true from false varieties of cow-pox, at certain stages of the erup-

tion. This disease has claimed a very large share of attention on the part of scientific men, from Jenner's discovery in the dairies in Gloucestershire, where he observed that the people milking cows with the cow-pox suffered from an eruption on their hands, but never had the malignant small-pox of the human being. This was the origin of vaccination.

The cow-pox, like other forms of variola, is a contagious pustular eruption of the skin, running a very regular course, accompanied by slight fever. It is communicable between animals of different species.

Causes.—The primary cause of cow-pox is unknown. The majority of cases occur in spring and summer, shortly after cows have calved. The state of congestion of the udder at this period favours the development of the disease, and it has never been observed spontaneously to arise in bulls, oxen, or heifers, before calving. It is chiefly seen in cows from four to six years of age. Mr. Ceely makes the following sensible remarks on the causes and origin of the disease. Referring particularly to the Vale of Aylesbury, he says:—

"The *variolæ vaccinæ* seem to have been long known in the vale and neighbourhood. They have been noticed at irregular intervals, most commonly appearing about the beginning or end of spring, rarely during the height of summer; but I have seen them at all periods from August to May, and the beginning of June. By

some it is presumed that cold and moisture favour their development ; by others that the hard winds of spring, after a wet winter, are supposed to have the same influence. I have, however, seen the disease in the autumn and middle of winter after a dry summer. The disease is occasionally epizootic, or prevalent at the same time in several farms at no great distance, more commonly sporadic or nearly solitary. It may be seen sometimes at several contiguous farms ; at other times one or two farms, apparently under like circumstances of soil, situation, etc., amidst the prevailing disease, entirely escape its visitation. Many years may elapse before it recurs at a given farm or vicinity, although all the animals may have been changed in the mean time ; I have known it occur twice in five years in a particular vicinity, and at two contiguous farms, while at a third adjoining dairy, in all respects similar in local and other circumstances, it had not been known to exist for forty years. It is sometimes introduced into a dairy by recently purchased cows. I have twice known it so introduced by milch heifers. It is considered that the disease is peculiar to the milch cow—that it occurs primarily while the animal is in that condition—and that it is casually propagated to others by the hands of the milkers. But considering the general mildness of the disease, the fact of its being at times in some individuals entirely overlooked, and that

its topical severity depends almost wholly on the rude tractions of the milkers, it would perhaps be going too far to assert its invariable and exclusive origin under the circumstances just mentioned; yet I have frequently witnessed the fact that sturks, dry heifers, dry cows, and milch cows milked by other hands, grazing in the same pastures, feeding in the same sheds and in contiguous stalls, remain exempt from the disease. Many intelligent dairymen believe that it occurs more frequently as a primary disease among milch heifers; but I have not been able to confirm this remark by my own observation. It does not appear to be less frequent on the hills than in the vale. It has been seen primarily on the stall-fed as well as on the grazing animal.

"*Origin of the Disease.*—I have met with several intelligent dairymen whose relatives had seen good reason to ascribe its occurrence to the contagion of the equine vesicle, communicated by the hands of the attendant of both animals; but very little of that disease has been noticed of late years, though I know of several farriers who have been affected from the horse, and resisted subsequent variolation or vaccination, and have seen a few who distinguish between the equine vesicle and the grease, a recurrent disease—eczema impetiginodes—as it appears to me. For many years past, however, the spontaneous origin of the variolæ vaccinæ in the cow has not been doubted here.

In all the cases that I have noticed I never could discover the probability of any other source.

"There is much difficulty in determining with precision, at all times, whether the disease arises primarily in one or more individuals in the same dairy; most commonly, however, it appears to be solitary. The milkers pretend in general to point out the infecting individual; but as I have more than once detected the disease in a late stage on an animal not suspected of having it, I am not very prone to confide in their representations, unless my own inspection confirms or renders them probable." *

Symptoms.—There are general symptoms of a mild fever, and the characteristic signs are purely

* An early conviction of the necessity of almost entire self-dependence in these dairy investigations soon led to the adoption of the following rules:—

1st.—Not to be too fastidious in my footsteps.

2d.—To be on the best possible terms with the milkers.

3d.—To obtain all possible information from them, and believe nothing important which could not be confirmed.

4th.—To inquire into the temper and habits of every animal to be inspected.

5th.—To inspect with gentleness and caution, remembering that there was danger from behind as well as before.

6th.—Never to be without a small pocket-lanthorn, glazed with a thick plano-convex lens, wax candles, and the means of ignition, either to explore in the absence of daylight, or to obtain a perlustration of parts on which daylight can rarely impinge.—*Trans. of the Prov. Med. Ass.*, vol. viii.

local. The teats become painful and slightly swollen. In about three or four days, red hard spots are seen, which soon appear circumscribed. They attain the size of a horse bean, and milking becomes generally very painful to the animal. They rapidly increase in

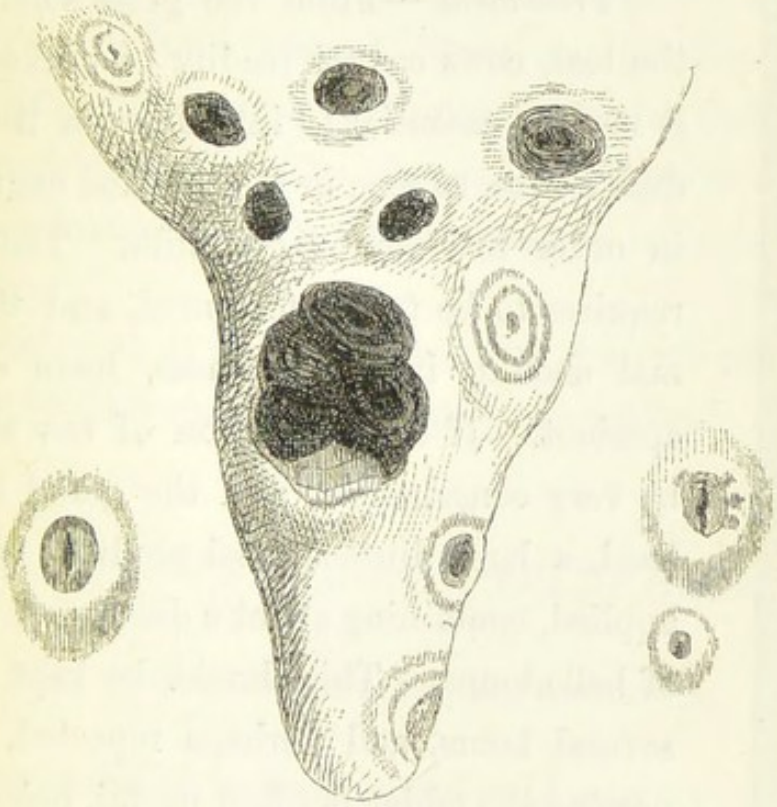


Fig. 27.

size and tenderness, and become charged with a limpid fluid, and are surrounded by a red base or areola. The limpid fluid becomes opaque and purulent, and the distinctive feature of the pustule is, that it has a depression on its summit as seen in the above woodcuts. It is technically termed "umbilicated." It is most perfect about ten days after its first appearance.

Mr. Ceely has carefully examined the structure of the pustules, and finds the fluid enclosed in meshes, formed by fibres, which intercept the vesicle. A scab forms over the spot, which is thrown off within the third week of the eruption.

Fig. 28.

Treatment.—From the great soreness of the teat, cows cannot readily be milked, and it may be essential to introduce in the milk duct a tube, as seen in the annexed engraving, in order to draw off the milk. The udder requires to be freely fomented, and the animal should, in severe cases, have a mild aperient. If the congestion of the mamma be very considerable, and the gland become hard, a large linseed-meal poultice must be applied, containing about a drachm of extract of belladonna. This should be kept on for several hours, and perhaps repeated. Supporting the udder is often useful, holes being made in the bandage used for this purpose, in order to pass through the teats, so that the milk may be often withdrawn.

Varicella Boum.—Chicken Pox of Cattle.

Various authors have discovered a severe pustular eruption of the teats of cows, occurring when they are

fed on vine leaves, which are often given to them on the continent, or other green food.

Symptoms.—Some constitutional disturbance though slight. Pustules form either round the coronet of the hind feet, rarely on the fore-feet or on the lips, but very constantly on the teats, commencing in the shape of very small hard inflamed knots on the skin which suppurate. The matter is discharged, and a scab forms over each pustule. The disease lasts from twelve to fourteen days. Gellé has compared it to acute ecthyma in man.

Treatment is very simple, and indeed precisely similar to that suggested for epizootic aphtha.

PLEURO-PNEUMONIA EPIZOOTICA.

THE EPIZOOTIC LUNG DISEASE OF CATTLE.

No malady can be more terrible and ruinous than this amongst dairy stock, and its spread all over the country; its continuance, with scarcely any abatement, must be attributed to the combination of various causes. The chief are—*Firstly,* the very contagious or infectious nature of the disorder; *secondly,* inattention on the part of Government to the importation and subsequent sale of diseased animals; *thirdly,* the recklessness of purchasers of dairy or feeding cattle.

This disease may be defined an acute inflammation of the organs of the chest, with the development of a peculiar and characteristic poison, which is the active element of infection or contagion. It is a disease peculiar to the cattle tribe, notwithstanding occasional assertions regarding observations of the disease amongst horses, sheep, and other animals, and which have not been well attested.

The contagious nature of this virulent malady is incontestably proved by an overwhelming amount of evidence, which I cannot adduce at full length here, but which may be classified under the following heads :— *Firstly*, The constant spread of the disease from countries in which it rages to others which, previously to the importation of diseased animals, have been perfectly free. This may be proved with regard to England, where it was carried in 1842 by affected animals from Holland. Twelve months after, it spread from England to Scotland by some cattle sold at All-Hallow Fair, and it was only twelve months after, that cattle imported as far north as Inverness took the disease there. Lately, a cow taken to Australia from England was observed to be diseased on landing, and the evil results were limited to her owner's stock, who gave the alarm, and ensured the effectual check to further spread. Lastly, the recent importations of pleuro-pneumonia into the United States from Holland seems to have

awakened members of the agricultural press here, and convinced them of the stubborn fact that our cattle have been decimated by a fearfully contagious and probably preventible plague. In a letter from America we find on this subject:—"Its contagious character seems to be confirmed beyond a doubt, though some of the V. S. practitioners deny it, which is almost as reasonable as it would be to deny any other well-authenticated historic fact. Every case of the disease is traceable to one of two sources—either to Mr. Chenery's stock in Belmont, into which the disease was introduced by his importation of four Dutch cows from Holland, which arrived here the 23d of last May, or else to one of the three calves which he sold to a farmer in North Brookfield last June.

Secondly, Apart from the importation into countries, we have the certain proof, to which I drew special attention several years back, that cattle-dealers' farms, and public markets constitute the busy centres of infection. Most anxious and careful inquiries have proved to me that in breeding districts where the proprietors of extensive dairies, as in some parts of Dumfries, etc., abstain from buying, except from their neighbours who have never had the lung disease amongst their stock, pleuro-pneumonia has not been seen. There is a wide district in the vicinity of

Abington, and in the parish of Crawford, which has not been visited by this plague, with the exception of two farms in which market cattle have been imported and carried the disease.

Thirdly, In 1854 appeared a Report of the researches on Pleuro-pneumonia, by a scientific commission, instituted by the Minister of Agriculture in France. This very able pamphlet was edited by our esteemed friend Professor Bouley of Alfort. The members of the commission belong to the most eminent veterinarians and agriculturists in France. Magendie was president; Reynal, secretary; besides Rayer, the renowned comparative pathologist; Yvart, the Inspector-General of the Imperial Veterinary Schools; Renault, Inspector of the Imperial Veterinary Schools; Delafond, Director of Alfort College; Bouley, Lassaigne, Baudemont, Doyére, Mauny de Morny, and a few more representing the public. If such commissions were occasionally appointed in this country for similar purposes, how much light would they not throw on subjects of paramount importance to the agricultural community.

The conclusions arrived at by this Commission are too important to be overlooked here. I must refer the reader to the Report itself, if he needs to satisfy himself as to the care taken in conducting the investigations; but the foregoing names sufficiently attest the indisputable nature of the facts alluded to.

In instituting its experiments, the Commission had in view to solve the following questions :—

1*stly*, Is the epizootic pleuro-pneumonia of cattle susceptible of being transmitted from diseased to healthy animals by cohabitation ?

2*dly*, In the event of such contagion existing, would all the animals become affected, or what proportion would resist disease ?

3*dly*, Amongst the animals attacked by the disease, how many recover, and under what circumstances ? How many succumb ?

4*thly*, Are there animals of the ox species decidedly free from any susceptibility to be affected from the contagion of pleuro-pneumonia ?

5*thly*, Do the animals which have been once affected by a mild form of the disease enjoy immunity from subsequent attacks ?

6*thly*, Do the animals which have been once affected by the disease in its active form enjoy such immunity ?

To determine these questions, the Commission submitted at different times to the influence of cohabitation with diseased animals forty-six perfectly healthy ones, chosen from districts where they had never been exposed to a similar influence.

Of these 46 animals, 20 were experimented on at Pomeraye, 2 at Charentonneau, 13 at Alfort, and 11 in the fourth experiment at Charentonneau.

Of this number, 21 animals resisted the disease when first submitted to the influence of cohabitation, 10 suffered slightly, and 15 took the disease. Of the 15 affected, four died and 11 recovered. Consequently the animals which apparently escaped the disease at the first trial, amounted to 45·65 per cent, and those affected to 21·73 per cent. Of these 23·91 per $\frac{o}{o}$ recovered, and 8·69 per cent died. But the external appearances in some instances proved deceptive, and 6 of the 11 animals of the last experiment which were regarded as having escaped free, were found, on being destroyed, to bear distinct evidence of having been affected. This, therefore, modifies the foregoing calculations, and the numbers should stand thus :—

15	enjoy immunity	or 32·61	per $\frac{o}{o}$
10	indisposed	„ 21·73	per $\frac{o}{o}$
17	animals cured	„ 36·95	per $\frac{o}{o}$
4	dead	„ 8·98	per $\frac{o}{o}$
46		100·27	

Of the 42 animals which were exposed in the first experiments at Pomeraye and Charentonneau, and which escaped either without becoming affected or recovering, 18 were submitted to a second trial, and of these 18, 4 were subjected to a third.

Of the 18 animals, 5 had, in the first experiment

suffered from the disease and had recovered, 5 had never become affected and 4 had been indisposed. The 4 animals submitted to the influence of contagion a third time had been affected on the occasion of the first trial. None of the 18 animals contracted the disease during these renewed exposures to the influence of contagion.

From the results of these experiments the Commission has drawn the following conclusions :—

Firstly, The epizootic pleuro-pneumonia is susceptible of being transmitted from diseased to healthy animals by cohabitation.

Secondly, All the animals exposed do not take the disease—some suffer slightly, and others not at all.

Thirdly, Of the affected animals some recover and others die.

Fourthly, The animals, whether slightly or severely affected, possess an immunity against subsequent attacks.

These are the general conclusions which the Commission has deemed itself authorized to draw from their experiments. The absolute proportion of animals which become affected or escape the disease, or of those which die and recover as a general rule, cannot be deduced from the foregoing experiments, which, for such a purpose, are too limited. The Commission simply states the numbers resulting from their experiments. From these it transpires that 45 of the animals became

severely affected with pleuro-pneumonia, and 21 per $\frac{0}{0}$ took the disease slightly, making in the whole 66 per $\frac{0}{0}$ which were more or less severely attacked. 34 per cent remained free from any malady. The proportion of animals which re-acquired their wonted appearance of health amounted to 83 per cent, whereas 17 per $\frac{0}{0}$ died.

Many minor points might be insisted on, but it will suffice for me to say, that the most careful analysis of all facts have proved to practical veterinarians, to experienced agriculturists, and must prove to all who will calmly and dispassionately consider the point, that pleuro-pneumonia is pre-eminently a contagious malady.

Symptoms.—From the time that an animal is exposed to the contagion to the first manifestation of symptoms, a certain period elapses ; this is the period of incubation. It varies from a fortnight to forty days, or even two months. Some faith may be relied on reports of even longer periods of incubation. The first signs, proving that the animal has been seized, can scarcely be detected by any but a professional man ; though, if a proprietor of cattle were extremely careful, and had painstaking individuals about his stock, he would invariably notice a slight shiver usher in the disorder, which for several days, even after the shivering fit, would limit itself to slight interference with breathing, detected readily on auscultation. Perhaps a cough might

be noticed, and the appetite and milk secretion also diminish. The animal becomes costive, and the shivering fits recur. The cough becomes more constant and oppressive, the pulse full and frequent, usually numbering about 80 per minute at first, and rising to upwards of 100. The temperature of the body rises, and all the symptoms of acute fever set in. A moan or grunt, in the early part of the disease, indicates a dangerous attack, and the alae-nasi, or nasal cartilages, rise spasmodically at each inspiration; the air rushes through the inflamed windpipe and bronchial tubes, so as to produce a loud coarse respiratory murmur; and the spasmodic action of the abdominal muscles indicate the difficulty the animal experiences also in the act of expiration. Pressure over the intercostal spaces, and pressing on the spine, induce the pain so characteristic of pleurisy, and a deep moan not unfrequently follows such an experiment. The eyes are bloodshot, mouth clammy, skin dry and tightly bound to the subcutaneous textures, and the urine is scanty and high-coloured.

On auscultation, the characteristic, dry, sonorous râle of ordinary bronchitis may be detected along the windpipe and in the bronchial tubes. A loud sound of this description is, not unfrequently, detected at the anterior part of either side of the chest, whilst the respiratory murmur is entirely lost posteriorly, from consolidation of the lung. A decided leathery, friction

sound is detected over a considerable portion of the thoracic surface. As the disease advances, and gangrene, with the production of cavities in the lungs ensue, loud cavernous râles are heard, which are more or less circumscribed, occasionally attended by a decided metallic noise. When one lung alone is affected, the morbid sounds are confined to one side, and on the healthy side the respiratory murmur is uniformly louder all over.

By carefully auscultating diseased cows from day to day, interesting changes can be discovered during the animal's lifetime. Frequently the abnormal sounds indicate progressive destruction; but at other times portions of lung that have been totally impervious to air, become the seat of sibilant râles, and gradually a healthy respiratory murmur proves that, by absorption of the materials that have been plugging the lung-tissue, resolution is fast advancing. I have seen some very remarkable cases of this description.

Unfortunately, we often find a rapid destruction of lung-tissue, and speedy dissolution. In other cases, the general symptoms of hectic or consumption attend lingering cases, in which the temperature of the body becomes low; the animal has a dainty appetite, or refuses all nourishment. It has a discharge from the eyes, and a fœtid sanious discharge from the nose. Not unfrequently it coughs up disorganized lung-tissue

and putrid pus. Great prostration, and indeed, typhous symptoms set in. There is a fœtid diarrhœa, and the animal sinks in the most emaciated state, often dying from suffocation, in consequence of the complete destruction of the respiratory structures.

Post-mortem appearances.—In acute cases the cadaveric lesions chiefly consist in abundant false membranes in the trachea and closure of the bronchial tubes by plastic lymph. The air vesicles are completely plugged by this material, and very interesting specimens may be obtained by careful dissection, in the shape of casts of the bronchial tubes and air vesicles, clustered together like bunches of grapes. On slicing the lungs in these cases, hæpatization is observed, presenting a very peculiar appearance, which is in a great measure due to the arrangement of the lung-tissue in cattle. The pulmonary lobules are a deep red or brown colour, perfectly consolidated, and intersected or separated one from the other by lighter streaks of reddish-yellow lymph, occupying the interlobular areolar tissue. In the more chronic cases the diseased lobes and lobules are found partly separated from the more healthy structures. This occurs from gangrene and putrefactive changes, or in some instances from the ulcerative process so constantly observed in the segregation of dead from living tissues. Abscesses are not unfrequently found in different parts of the lungs, some-

times circumscribed, at others connected with bronchial tubes, and not unfrequently communicating with the pleural cavity. True empyema is not often seen, but at all times the adhesions between the costal and visceral pleura are extensive, and there is much effusion in the chest. In dressed carcasses of cows that have been slaughtered from pleuro-pneumonia, even though the disease has not been far advanced, it will be found that the butcher has carefully scraped the serous membrane off the inner surface of the ribs, as it would be impossible for him to give the pleura its healthy, smooth aspect, from the firm manner in which the abundant false membranes adhere to it. The diseased lungs sometimes attain inordinate weights. We have known them as high as 60 pounds.

Treatment.—The veterinary profession is regarded by many who have sustained heavy losses from pleuro-pneumonia, as deeply ignorant, because they cannot often cure this disease. Persons forget that there are several epidemics which prove equally difficult to manage on the part of the physician, such as cholera, yellow fever, etc. The poison in these contagious epizootic diseases is so virulent that the animals may be regarded as dead from the moment they are attacked. Its elimination from the system is impossible, and medicine cannot support an animal through the tardy, exhausting, and destructive process of clearing the

system of so potent a virus. All antiphlogistic means have failed, such as blood-letting and the free use of evacuants. Derivatives, in the form of mustard poultices or more active blisters, are attended with good results. Stimulants have proved of the greatest service; and the late Professor Lessona of Turin strongly recommended, from the very onset of the disease, the administration of strong doses of quinine. Maffei of Ferrara states having obtained great benefit from the employment even of ferruginous tonics and manganese in the very acute stage of the malady—supported by alcoholic stimulants. Recently the advantages obtained from the use of sulphate of iron, both as preventative and curative, have been extolled in France. It would appear that the most valuable depurative method of treatment yet resorted to is by the careful use of the Roman bath. Acting like all other sudorifics in cases of fever and blood diseases, it carries off by the skin much of the poison without unduly lowering the vital powers.

Prevention.—The rules laid down in Denmark, and indeed in many other places, appear the most natural for the prevention of the disease. If they could be carried out, the disease must necessarily be stopped, but there are practical and insuperable difficulties in the way of enforcing them. Thus, as Dr. Warneke says, prevention consists in "the avoidance of con-

tagion ; the slaughter of infected beasts ; the prohibition of keeping cattle by those whose cattle have been slaughtered, during ten weeks after the last case occurring ; the disinfection of stalls vacated by slaughtering ; the closing of infected places to all passage of cattle ; especial attention to the removal of the dung, and of the remains of carcasses of slaughtered beasts ; and, finally, undeviating severity of the law against infringement."

Dr. Willems of Hasselt suggested and carried out, in 1851, the inoculation of the virus of pleuro-pneumonia, in order to induce a mild form of the disease on healthy animals, and prevent their decimation by severe attacks due to contagion.

Dr. Willems met with much encouragement, and perhaps more opposition. Didot, Corvini, Ercolani, and many more, accepted Dr. Willems' facts as incontestable, and wrote advocating his method of checking the spread of so destructive a plague. The first able memoir which contested all that had been said in favour of inoculation appeared in Turin, and was written by Dr. Reviglio, a Piedmontese veterinary surgeon. This was supported by the views of many more. Professor Simonds wrote against the plan ; and in 1854 the French Commission, whose Report we have before mentioned, confirmed in part Reviglio's views, though from the incompleteness of the experiments further trials were recommended.

Inoculation is performed as follows :—A portion of diseased lung is chosen, and a bistouri or needle made to pierce it so as to become charged with the material consolidating the lung, and this is afterwards plunged into any part, but more particularly towards the point of the tail. If operated severely and higher up, great exudation occurs, which spreads upwards, invades the areolar tissue round the rectum and other pelvic organs, and death soon puts an end to the animal's excruciating suffering. If the operation be properly performed with lymph that is not putrid, and the incisions are not made too deep, the results of the operation are limited to local exudation and swelling, general symptoms of fever, and gradual recovery. The most common occurrence is sloughing of the tail ; and in London, at the present time, dairies are to be seen in which all the cows have short tail stumps.

Dr. Willems and others have gone too far in attempting to describe a particular corpuscle as existing in the lymph of pleuro-pneumonia. All animal poisons can be alone discovered from their effects. In structure and chemical constitution there is no difference, and often the most potent poisons are simple fluids. The Belgian Commission appointed to investigate the nature and influence of inoculation for pleuro-pneumonia very justly expressed an opinion that Dr. Willems had not proved that a specific product, distinguished by

anatomical characters, and appreciable by the microscope, existed in this disease.

The all-important question—"Is Inoculation of service?"—has, in my opinion, been solved. I cannot encroach, in the pages of this little work, with the large amount of conflicting evidence on the subject. The Belgian and French commissions, Reviglio's, Simond's, Hering's, my own observations, and those of many more, prove that a certain degree of preservative influence is derived by the process of inoculation. It does not arrest the progress of the disease. It certainly diminishes to some extent, though often very slightly so, the number of cases, and particularly that of the severe ones. This effect has been ascribed to a derivative action, independently of any specific influence, and indeed similar to that of introducing setons in the dewlap. I cannot speak very favourably of the latter process, as indeed I cannot recommend the inoculation of cattle. In London, some dairymen have considerable faith in this operation, though its effect is uncertain, and its *modus operandi* a mystery. I should counsel the keeper of dairy stock to select his own animals from healthy herds, and strictly avoid public markets. In many instances, to my knowledge, this has been sufficient to prevent the invasion of this terrible disease.

CONTAGIOUS TYPHOID PLAGUE—STEPPE DISEASE—TYPHUS CONTAGIOSUS BOUM—CATTLE PLAGUE—RINDERPEST—LÖSERDURRE, ETC. ETC.

This, the most fatal epizootic observed amongst cattle, is peculiar to the bovine species, and is a very contagious fever attended by inflammatory action of the alimentary canal, and ulceration of the intestines.

The contagious typhoid plague invariably originates in the East, and particularly in Southern Siberia. Its spontaneous origin, regarding which as little is known as with other epizootic maladies, is evidently due to conditions of soil or atmosphere, though some have thought the cattle of the Russian Steppes could alone be primarily effected. Doubtless this is an error, and as the disease spreads in the lines of communication between different countries, particularly in times of war, when cattle are used in the transport service as well as to supply food for the soldiers, no breed of cattle is spared, and all succumb in the most rapid and fearful manner.

Regarding the history of this disease, we have precise accounts of its disastrous effects at repeated intervals for the last 1400 years. It is doubtful if it be the same murrain which affected the cattle of Egypt in the days of Moses. Youatt, in his work on cattle, speaks of the pestilence as it raged amongst the cattle of the Greeks during the siege of Troy;

the plague referred to in Homer's *Iliad* is evidently the bubonic pest, and not the contagious typhus, as it spared not mules, dogs, nor men. Virgil, too, in his *Georgics*, does not refer, as is believed by Youatt, to the true cattle murrain, but to the epizootic form of malignant anthrax, affecting horse, ox, dog, or pig.

Whatever the plague of old might have been is comparatively unimportant, and beyond the object of this memoir. The plague, respecting which we have authentic records, spread westward from the banks of the Don and the Wolga towards the Danube, at the period of the migration of people, when the Goths descended towards Constantinople, and were so repeatedly repulsed by Theodosius. It stretched over the whole theatre of the war in the course of time, decimating the cattle of Illiria, Northern Italy, France, and Belgium. When Charlemagne attacked the Danes, he was followed back into his country by the murrain, which created immense havoc amongst the herds of France. A few years afterwards, in 817, the cattle of Hungary were again destroyed by the disease which found its way across the Drave, and extended to the west.* Though it is probable that rarely as long as fifty years elapsed without a visitation of the murrain

* See Spinola Handbuch der Speciellen Pathologie und Therapie, fur Thierarzte, Berlin, 1855.

over part or most of the European Continent, still authentic accounts of general attacks of pestilence amongst cattle are not to be obtained from between 817 and 1223, when it again passed from Hungary into the western countries. With the exception of another period of mortality amongst cattle about twenty years later, we step to 1625; of the intervening period there are but indefinite records. In 1625 the plague entered the north of Italy; it extended along the banks of the Po, and was the cause of discord between the inhabitants of Padua and Venice; Dalmatian cattle-merchants introduced it into the first of these two cities, and thence it spread through the Venetian territory. The mortality amongst cattle all over Europe, from the year 1710 to 1717, has perhaps never been equalled. In 1709, the plague passed from Tartary through Muscovy, into Poland, Bessarabia, Kroatia, and Dalmatia, into Upper Italy and France—from Hungary into the south of Germany and Switzerland, and from Poland it spread north and south into Silesia, towards the shores of the Baltic. Ramazzini wrote his "Dissertatio de Contagiosa Epidemica" at this time,* in which he laid great stress on the eruption which occurred in the mouth of the animals on the sixth and seventh days; this eruption was only a symptomatic aphtha, but from it Ramazzini styled the malady the "cow-pox plague."

* Padua, 1711.

The pestilence found its way through the Papal States into the kingdom of Naples, where, in a short time, the mortality more than doubled that which occurred in the north; 70,000 head of cattle perished. Many thousands during this time died in Silesia; the malady found its way into the Netherlands, with the effect of destroying 200,000 head of cattle in Holland alone. It was especially fatal in Denmark, Holstein, and Finland. It crossed the Channel into England in 1713, and was as destructive as elsewhere. Lancisi's injunctions respecting the immediate slaughtering of affected animals were fully carried into execution, and upwards of 6000 animals were killed in the counties of Essex, Surrey, and Middlesex alone. The plague, it appears, was thus stayed in a few months.

Very stringent measures were adopted in Germany, as they had been in England, but the destruction of cattle was so fearful, that according to Paulet, only in the three first years of this attack, 1,500,000 head of cattle perished in Europe. Schrock,* Ramazzini,† Kanold,‡ Lancisi,§ Genf, and many other physicians, wrote upon it. Kanold says, that from 1713

* L. Schrock, Constit. epidem. August, an. 1711.

† Loc. cit.

‡ Historischen Relationen von der Pestilenz des Hornviehs von Johannes Kanold, Breslau, 1714.

§ Lancisi Dissertatio historica de bovilla peste. An. 1711 te Genevae 1768.

to 1730 it appeared here and there, but not as a general scourge over Europe. Indications of it were manifested in 1723, 1724, 1728, and 1729. It found its way again across Wallachia, Podolia, Volhynia, Hungary, Austria, Prussia, Saxony, crossing the Palatinate, and following the war, it entered Piedmont in 1739. In 1740, Hungary and Bohemia again suffered, and the pestilence extended over the whole of Germany—through the south into Switzerland, Piedmont, Franche Comté, and Dauphiné—northward from Poland to Courland, Livonia, Denmark, Sweden, Holland, and England. Youatt thus speaks of it:—"In 1745 it laid Holland waste a second time. More than 200,000 cattle now perished. In the same year it again found its way to the coast of Britain. It seems to have been clearly brought to us from Holland, although there are two versions of the story. Dr. Mortimer says that it was imported by means of two white calves which a farmer at Poplar sent for, in order to cross his own breed; and that it spread into Berkshire by means of two cows that were brought out of Essex. The other account is, that one of our tanners bought a parcel of distempered hides in Zealand, which were forbidden to be sold there, and should have been buried, and thus he transplanted this dreadful disease here. "Thus by one man's unlawful gain," says Mr. Layard, "if by this way it was conveyed, the ruin of many graziers

and farmers was effected." It is certain, however, that the pest first appeared in the immediate neighbourhood of London, and on the Essex side of the river, and that thence it gradually spread through Essex and Hertfordshire, and the whole of the kingdom.

"For more than twelve years it continued to lay waste the country. The number of beasts that were actually destroyed by it was not, and perhaps could not be ascertained; but in the third year of the plague, when the Government had so seriously taken up the matter as to order that every beast that exhibited the slightest mark of infection should be destroyed, a remuneration being made to the owner, no fewer than 80,000 cattle were slaughtered, besides those which died of the disease, and which formed, according to the narration of one of the commissioners, nearly double that number. In the fourth year of the plague they were destroyed at the rate of 7000 per month, until, from the numerous impositions that were practised, this portion of the preventative regulations was suspended.

"In the year 1747, more than 40,000 cattle died in Nottinghamshire and Leicestershire, and in Cheshire 30,000 died in about half a year."

The plague wore itself out in the course of ten years in some parts, but it lasted for more than thirty in others, and in spite of the wisest counsels proffered

by the learned of all Europe, 3,000,000 head of cattle were cleared off.* Twenty more years past over, and cattle breeders prospered; they accumulated stock to feed the pestilence of 1770. The disease which Youatt refers to as appearing in France in 1757 is not the contagious typhus; it spread from west to east instead of from east to west, and was not limited to the ox. In 1770 and 1771 the true cattle plague again entered Holland, and the ravages it committed are described as terrible in the extreme. In 1769 and 1770 it carried off 98,000 animals in the one province of Frisia, and in the south of Holland during one year 115,665 head of cattle met with the same fate. During the same period, and in the north of Holland the disease attacked 225,831, of which 162,276 perished, so that the total loss in Holland alone during one year amounted to 375,441.

From Holland the disease penetrated Austria and French Flanders, reaching Laon, and only the provinces of Artois and Picardy, where 11,000 animals also died. Paulet says, scarcely had Flanders and Picardy repaired the loss of their cattle, when in 1773 the murrain manifested itself in Hainault, and with renewed vigour in Holland. The epizootic destroyed the cattle of Flanders, Picardy, Soissons, and Champagne, but the loss, says Delafond, was not estimated at this period.

* Delafond, Police sanitaire. Paris 1838.

From the year 1740 the southern provinces of France, stocked with cattle as at the present day, were spared the bovine pest, when in the month of August 1774 this malady, which was devastating Holland and Picardy, broke forth on the borders of the ocean at Bayonne and its environs, and almost exterminated the cattle of many French provinces. The number of animals that succumbed was 150,000, and these worth 15,000,000 francs.

The contagious typhus followed Napoleon into Italy in 1793, 1794, and 1795, and Buniva tells us that in three years Piedmont lost from 3 to 4,000,000 head of cattle. In 1796 it broke out amongst cattle of the French army's escort on the borders of the Rhine, and as it was not looked upon as contagious, it spread with fearful rapidity to all the horned beasts of the Lower Rhine provinces. It entered Switzerland and returned into France by Burgundy, reaching near to the gates of Paris. Only in the circle of the Lower Rhine the mortality amounted to 11,047 and in the 27 departments of France to which it spread, 130,000 animals died, and their worth in money amounted to 12,000,000 francs.

Faust* calculated that from 1713 to 1796, 10,000,000 head of cattle perished in France and the above mentioned parts of Belgium.

* Feuille du Cultivateur, No. 28, page 173—1797 and 1798.

During the ever memorable period in history, from 1792 to 1815, when war and rebellion, invasions and usurpations, were accompanied by misery and famine, pestilence was one amongst the calamities befalling man, and the cattle plague—constant associate of wars in which the Russians or their nearest neighbours took part—broke out. It spread through the Danubian principalities to the south of Germany in 1795-96, and continued its devastation here and there in an uninterrupted manner up to the year 1801. Walz wrote on it as it occurred in Wurtemburg;* Will observed it in Bavaria; Keith and Schaller in the vicinity of Erlangen. From the Grand Duchy of Baden it entered Switzerland. The ravages it created, and the misery it induced in various regions of Austria, Bohemia, Saxony, Prussia, Poland, Hungary, Silesia, and France, are beyond description. A few years of respite were at hand, and whilst the operations of war were in a great measure confined to the west, the cattle plague returned to the Russian steppes. But in 1806, when the Cossacks of the Don mustered on the Vistula, in obedience to an urgent appeal of Alexander, the cattle plague spread from the desert lands into the agricultural districts of Lithuania, Prussia, Silesia, and Kurland. Napoleon's retreat after the battle of

* Walz, Untersuchungen über die Natur and Behandlung der Rinderpest.

Eylau favoured the extension of the contagious typhus, and it exterminated the cattle of the above and adjoining provinces for two whole years. When the grand army advanced to Moscow, and penetrated the heart of Russia to meet with defeat and famine, all conditions favoured an extension of disease and a spread of pestilence. Though so few returned to France to recount the hardships they had undergone, this epoch was marked by another extension of the disease of the steppes. In 1813-14, when the allied forces under Schwartzenberg invaded France, the Rhine provinces, Switzerland, and France suffered immensely from the losses occasioned by the contagious typhus. The most stringent sanitary measures, slaughtering the diseased, and isolating the healthy, soon put a stop to it, and no more was heard of it in the western half of Europe until 1827.

The wars in Europe and Asiatic Turkey were carried on with such vigour and valour, that the call on the people in Western Russia and the Danubian Principalities for labour and provisions exhausted all internal resources, and led to disease in man and beast. The repeated invasions of Turkey were cause of very extensive requisitions in the Principalities; but the Russians had passed the Pruth, General Geizmar reached Aluta, and his Cossacks had penetrated Little Wallachia without opposition, and, in

consequence, the Sultan obtained only 500 head of cattle and 1000 sheep from Wallachia, whereas Moldavia yielded nothing. "The Russian declaration of war, however, was accompanied by a demand for 250,000 loads of corn, 300,000 tons of hay, 30,000 barrels of brandy, and 123,000 oxen, in addition to the forced labour of 16,000 peasants, who were to be employed in making hay on the banks of the Danube. The loss occasioned by the payment for these requisitions in bills instead of cash was not the only disadvantage to which the unfortunate people were immediately exposed; for as the local supplies were soon exhausted by such an army, it became necessary to transport provisions from Bessarabia, by means of forced labour. The peasants, also, soon exhausted their own supplies, and were reduced to such extreme want in consequence, that they died in great numbers in the wood, as did also their cattle, in consequence of a murrain. The serious extent of the disease covered the roads with carcasses, which, by their putrefaction, coupled with the want of cleanliness in the Russian soldiers, gave rise to typhus fever in its very worst form—that of the plague. This fearful scourge first appeared at Bucharest, and it continued to afflict the Russian army, as well as the inhabitants, during the whole of this and the succeeding campaign."*

* Col. Chesney.—The Russo-Turkish Campaigns. London, 1854.

Bessarabia, Wallachia, and Moldavia, were not the only provinces over which the cattle plague extended, producing such terrible disasters, but it again found its way into Podolia, Volhynia, and thence to Prussia, Saxony, Hungary, and Austria. The losses continued great for some time, notwithstanding all efforts to check the disease, and in 1830 it appeared in various parts of the Austrian territory, especially in Illyria. At this period excellent memoirs were published on the contagious typhus, especially by Lorinser* and Jessen.† Annually indications of the plague continued to be manifested here and there in the steppes and adjoining countries, but deaths were few so long as the indigenous cattle alone were affected; as soon, however, as the herds of Austrian cattle, belonging to German colonists, were attacked, few survived, not even ten per cent, and the losses were severely felt. At all times the German colonists suffer from this scourge, their cattle being infected by the herds which are driven laden with salt from the Crimea, and the remaining portion of the steppes of saline base between the Caspian and the Baltic, and which are supposed to have once formed the bottom of

* Lorinser, C. J. Untersuchungen über die Rinderpest. Berlin, 1831.

† Jessen, J. Die Rinderpest mit besonderer beziehung auf Russland dargestellt. Berlin, 1834.

the waters when the seas just mentioned were united. The German colonies which thus suffer are in Moloshna and in the vicinity of Mariopol. It is said that the neat cottages, and the well-built barns and out-houses, surrounded by trees and gardens, and by highly cultivated fields, bear the signs of wealth and comfort, and of the care bestowed on them by an industrious population. The German colonies form a striking contrast to the dreary country in which they are situated, and to the miserable Russian villages, and the still more wretched Tartar aouls around them. Their situation is always well chosen on some sloping ground, on the border of one of the few rivulets that water the country.*

My object in dilating on the features of the German colonies has been to point out the interesting fact that, although surrounded by steppe land, the colonies, their people, and their cattle, exist under very different conditions to those pervading the countries, the herds, and the habitations of the Cossacks, the Tartars, and the Calmucks ; and although ,as I shall hereafter shew, the cattle of the steppes, accustomed to hard living, withstand the steppe murrain, it is perhaps no special breed that presents this immunity, but cattle in general reared in the most inauspicious manner, and

* H. D. Seymour, M.P., Russia on the Black Sea and Sea of Azoff. London, 1855.

brought by habit to counteract injurious influences of a peculiar nature.

The next account of a special attack of contagious typhus is to be found in the twelfth volume of the *Bulletin of the Academy of Sciences of Paris.* It is spoken of under the head typhus ; and, as Hering and others have shewn, the outbreak was one of the ordinary pestilential fever affecting cattle. Towards the end of the year 1841, a ship going from Caramania—Asia Minor—to Alexandria, lost one out of two hundred oxen which constituted its cargo. On the arrival of the ship at Alexandria, the whole of the surviving animals were affected. In order that they might be treated with better effect, they were landed, and driven to a village close at hand, with orders that they should be kept in strict quarantine. This injunction was not attended to, and in 1842 the plague had extended to the Egyptian cattle ; and the proprietors, in order to get rid of the affected beasts, drove them to the important market of Tantah, a village in the Delta. In a short time the plague extended over the whole of Egypt ; but in the spring of 1843 it disappeared, most of the animals having fallen its victims. Towards the close of the same year, large numbers of cattle passed from Nubia into Egypt, especially towards Ghizeh, where the pestilence had first committed the greatest havoc. The disease, which had perhaps not been com-

pletely extinguished in the spring, broke out again, and destroyed every animal, notwithstanding many precautions taken. Ninety per cent of the whole of the cattle of Egypt, at one time or other, caught the contagious fever, and the losses in 1842 amounted to 300,000 head; on the second invasion in 1843, to 35,000; and in its third, 15,000—that is to say, in three years 350,000 head of cattle fell a prey to the malady.

Dr. Pruner, in his work on the Diseases of the East, describes the same attack of the cattle plague in Egypt which Hamont has spoken of in Paris. According to him, it broke out amongst oxen which were taken from Adana and Stursus, in Syria, into Egypt; and its chief cause is believed by Pruner to have been improper food, especially deteriorated and unwholesome beans, which were given to the cattle; and the same time the animals were cooped up and crowded to an unjustifiable extent. Hering believed it most probable that the real cause was the contact of these animals with others affected by contagious typhus, the improper food and deficient ventilation simply favouring the development of the disease.

In the autumn of 1844, the cattle plague threatened many of the countries adjoining Russia. From official reports, we find that it spread to Bohemia in the month of September, and it first penetrated

Königsgratz and the circle of Bidschow, where extensive trading in cattle is carried on. The veterinary surgeons in Bohemia recognized the disease, and their observations led them to look on it as the true fever of the steppes. Medical authorities at Prague argued that the pestilence had arisen spontaneously in Bohemia from a combination of causes, analogous to those which had given rise to typhoid diseases in man, and similar epizootics; this opinion, accepted by Government—it being supported by Madherny and others—was the cause of much laxity in the adoption of sanitary measures, and in the meantime the plague extended rapidly throughout the whole of Bohemia, and the sixteen districts of this kingdom were completely invaded; the whole of the countries in Western Europe were alarmed at its fearful advances. Dr. Eckel, director of the Vienna Veterinary School, repaired to Bohemia to make investigations into the real nature of the then existing malady. He found that it was truly the "rinderpest;" which could never have arisen from unfavourable states of weather, or combination of other prejudicial influences of local origin, such as deteriorated food, development of the miasmata, etc., but that it absolutely depended on the extension of disease from the steppes, which would alone account for the enormous mortality amongst the cattle. Gallicia at this time suffered in consequence of the importation or

simple transit through of oxen from Podolia and the adjoining Prussian provinces, and from all appearance it may be admitted as certain that the malady at first originated in Bessarabia. During the first half of September, it spread from Gallicia into Moravia, and one after the other, it attacked twenty-four districts, throughout which 1065 animals caught the distemper, and out of the whole only 163 recoveries were reported; of those that died, 129 were slaughtered. Instances of the disease were observed only in a few districts of Hungary, but the symptoms presented by the cattle were indubitably those of the typhus.

In the south of Austria some cases were witnessed as early as during the first half of October 1844; from this time to the 15th of December of the same year, the whole of the deaths were confined to three districts, and in all probability this depended on the fact that as soon as the disease was recognized to be the veritable cattle plague by the delegates of the Vienna College, all appropriate measures to stop its progress were speedily projected, and carried into execution. According to Eckel's investigations during his stay in Moravia, 5224 head of cattle from Podolia were bought at the cattle market of Ollmür by thirty-two cattle merchants, and they constituted 119 lots, which were driven into Bohemia; of these, 5008 travelled on the high road to Prague, and the others were driven in

various other directions. The outbreak of the disease in Bohemia occurred in different parts corresponding to the directions in which it was afterwards found the cattle had been driven. In conformity with the opinions of Eckel, orders were issued in Prague on the 6th of December, that certain sanitary measures should be stringently carried into execution. From this time the plague speedily diminished in virulence and extent, so that towards the end of January 1845, it was looked upon as having completely disappeared from the Austrian empire.

On the 19th of January, a statistical report was drawn up, indicating the losses sustained in Bohemia in consequence of the cattle plague, and the result was, that on the whole, 2197 animals had been infected, of which 115 had recovered, 1122 died, 945 had been destroyed, and 6 were still on the sick list.

From 1849 to 1851, various parts of Austria suffered from invasions of the contagious typhus, and the professors at the Veterinary College of Vienna were called upon to keep up a correspondence with persons qualified to institute inquiries and collect information wherever it had been reported that the pestilence raged. As the disease advanced, and local authorities were opposed to the enforcing rigid sanitary measures, Eckel and Röll proceeded in different directions, with he object of making such arrangements as would best

tend to check the ravages occasioned by the "Rinderpest," and in this manner, Dr. Eckel accumulated abundant materials for an extensive and remarkably accurate report on the history of the plague during the above mentioned period. This report is published in the *Quarterly Journal of Veterinary Science* of Vienna for 1851, and it is so very suggestive, that I do not hesitate to draw largely from it for the benefit of my readers.

On the 3d of January 1849, the Galician Government was informed by Dr. Goldschmidt of Brody (a frontier town of Austrian Galicia which has trade with Russia, Poland, and Turkey), that he had heard from two travellers that in the summer of 1848, the cattle plague had spread extensively over Russia, and that during the winter months it had passed into Podolia, Volhynia, and Poland, having therefore reached the Galician frontier. Custom-house officers and other authorities on the confines were made to report on the real facts of the case, but they were so ignorant of them, that it was proposed even to abolish the ten days' quarantine already imposed on cattle imported from Russia. The Russian authorities in Volhynia, however, confirmed the statements of Goldschmidt, and it was ascertained that fifteen villages of the last-named province were devastated by the murrain. The quarantine for cattle brought from various infected dis-

tricts was increased to fifteen days. It was reported by the Galician Government on the 5th of April that the plague had appeared in the district of Zloczow, bordering on Volhynia, and that on the 20th of February it had shewn itself in the little town of Radzichow. A veterinarian, Josephu, was sent to investigate the matter, and he stated that in the month of January the murrain had shewn itself at Barytow, Wygoda, and Podmanasterek, all on the frontier. It was said that it was not the true cattle plague which had broken out at Barytow, and respecting the two last-mentioned places no particular statement had been made. Josephu suggested that cattle should not be imported, that the fact of the outbreak of the murrain should be made generally known, that a strict inspection of cattle in every part of the country should be instituted twice every week, and further tidings should be collected respecting the state of the plague in Russia.

The Professors of the Vienna Veterinary College had received the above information through the Minister of the Interior, and weekly reports were furnished with great regularity. In the year 1849 four circles and twenty-five communities were infected in Galicia. Information of the spread of the murrain was also obtained from Transylvania, and, from the movements of troops, it had been carried there as early as the begin-

ning of August, and in consequence of the miseries of war it had extended over the greater part of the province by the end of December.

On the 4th of March 1850, the Galician Government announced the outbreak of a typhous dysentery among the cattle in the district of Zolkiew, and further information from consuls and agents disclosed the appearance of the true plague in Wallachia, Bessarabia, Podolia, Volhynia, and Poland. Satisfactory news were received from Moldavia, and the Governor of Transylvania reported that on the 25th of March the pestilence had been completely stayed in several districts. On the 5th of April reports reached Vienna of new outbreaks in Galicia, but on the 8th of June the malady had almost entirely subsided, only seven animals being at that time affected. Transylvania was also clear, but a district on the Moldavian frontier began to suffer, and the greater part of the province was quickly overrun.

On the 8th of August Dr. Eckel, Director of the Vienna Veterinary School, with another veterinarian, Dr. Langenbacher, proceeded to Hungary, to the Banat (that portion of South Hungary between the Maros and the Danube), and the Vayvode where the contagious typhus had made great havoc. Professor Röll proceeded for the same object to Cracow, as the murrain had extended far into the countries on the

borders of the Vistula, and was therefore approaching the Moravian frontier.

On the 6th of August some cases of "Rinderpest" had been observed near Vienna in two herds of cattle coming from Hungary. These herds had on their road been brought in contact with cattle leaving the pastures, so that in Riegelsbrunn, in Simmering, and in the Vienna cattle market, nine oxen died, bearing unmistakeable symptoms of the "Steppe disease." Professor Hayne was engaged to institute sanitary measures at Wolfsthal and Riegelsbrunn, where the disease had broken out. Professors Müller and Pillwax, Büchmüller and Brühl were all actively co-operating either in or near Vienna, or at a distance.

At no time was the contagious typhus so well studied, and its progress so well followed out, as by the number of learned Professors whose names have just been mentioned, and the details connected with the origin, progress, and extension of the murrain through the Austrian dominions from the month of January 1849 to March 1851, have been recorded with the greatest exactitude. I repeat what I have said before, that accurate historical notices are the most difficult to gather, but the most instructive to peruse, when referring to such a disease as the cattle plague, which may be prevented, but may almost be laid down as incurable.

In 1849, Austria was invaded by the plague for

the eighth time during the present century, and the malady broke out at two distinct points of the eastern frontier of the empire. It spread in one direction from the north-west, and this may be called the Volhynio-Galician line, and from the south-west, or in the Wallachio-Transylvanian line. The first line of communication extended to lower Austria, the countries on the Danube, and the Leytha—and the second or Wallachio-Transylvanian crossed the level country of Temesvar, the town of Baja, Zombor, Stutlweissenburger, and into the district of Oedenburg, where it stopped to extend no further.

The Austrian dominions were not quite clear of typhus until after March of 1851. A very interesting pamphlet on the rinderpest in Kamionka Woloska, in Galicia, was published by a Dr. Weber. A farmer had bought at the market in Olaszkowce (in the circle of Zalsczik, on the Russian frontier) 101 oxen which came from Bessarabia. The whole herd appeared healthy, but *eight days after the purchase*, one animal was taken ill, and the symptoms consisted in loss of appetite, diarrhœa, and discharge from the eyes. It had only been three days amongst the other live stock of the farm, but seven days later, the two animals that had been standing near the diseased one, took the malady, and one of them, a cow, died on the third day from the time she was observed

to be unwell. The disease spread through the farm and adjoining portions of the village of Kamionka, so that on the 18th of August 1851 (one month after one of the cows of the places had become affected), 25 beasts had taken the plague; on the 25th of August, 56 animals; and by the 28th of September, 158 head of cattle had caught the distemper; and of these 93 died and 65 were cured. It is most interesting to remark, that of the imported herd no other animal suffered besides the one above mentioned, and which communicated the disorder to the farm.

The cattle murrain was almost confined to Russia through 1852 and 1853. It was peculiarly fatal during the summer of 1853 in the south of Russia, and it has been described in a Russian medical journal, as it was observed on one estate during intensely hot weather, when sheep died of the Siberian bubonic pest and men of fever; great mortality also prevailed amongst swine and birds. The disease in its very dangerous form lasted only eight weeks on the estate alluded to.

From the month of October 1853 to April 1854, we can trace the steppe disease into Galicia through Moravia, Bukowina, Silesia, Bohemia, Lower Austria, and Hungary. The first signs of a pretty general outbreak of plague in cattle were observed on the 4th of October in the circle of Przemysl at the village of

Bucow. Some fat cattle from Poland were stationed at Bucow for the purpose of being fed and rested, and they carried the disease with them. The neat stock of a farm Starrawa was grazing on some pasture land at Bucow, and it took the disease. Hides were bought at the last mentioned place and taken to Lackawola, thus transporting the contagious element, and communicating the disease, either directly or indirectly, to the animals of fourteen villages.

During the eastern campaign considerable alarm was excited in the Crimea, and the attention of the French and British Government was directed to the possibility of all provision of fresh meat being stopped, as the cattle of the steppes were dying of the murrain. The amount of preserved meat sent from Great Britain to the Crimea did away with any fear of approaching starvation which might have existed, but I cannot forbear speaking strongly against the abominable practices to defraud Government, which were more to the injury of the poor soldier in the field, and which consisted in the pickling the carcass of every diseased beast. Tons of such vile food were shipped alone from Aberdeen; and all because no person of sufficient authority and with adequate knowledge was there to check operations, and bring the men to justice who thought *anything would do for the soldiers.* Mr. Mayer, Veterinary Surgeon to the Royal Engineer Field Equip-

ment, says in the *Veterinarian* for April this year, that about the end of August 1855, the murrain "was destroying immense numbers of cattle in Asiatic Turkey. By degrees," says Mr. Mayer, "we heard of its nearer approach; and as it was just at this time that we were purchasing bullocks, and, knowing that they had been driven some 600 miles from the interior, we became doubly cautious in our dealings. The French, who were also purchasing about the same time as ourselves, and whose camp was a few miles from ours, first received the contagion. I was very suspicious about a lot which we bought the week following, and which I wished, consequently, to have rejected; but we were obliged to have them, and in a few weeks the disease made its appearance in our camp also."

In the early part of 1855, it appears that the rinderpest was in Poland, but by the month of September it had completely disappeared from the Grand Duchy of Posen, where it had been very rife. At the commencement of the year the orders against importation instituted by the Prussian Government for the Grand Duke of Posen were withdrawn. In the city article of the *Times* of the 12th of February 1857, it was said that "advices from Königsberg give unfavourable accounts regarding the cattle disease, which during the past two years has manifested itself in Poland, and other parts of Russia, and which now threatens to

spread to Germany. For a short time during last autumn, there seemed to be some abatement in the distemper, but it has again become very virulent."

For the fourth time since 1844, the cattle plague entered the Austrian dominions; and on the 14th of April it was announced at Berlin that the disease had spread to the Cracow district, in Galicia, and into Austrian Silesia. In the Hamburgh *Börsen Halle* for the 25th April, a report dated Berlin the 24th is given, to the effect that the rinderpest was making great ravages towards the Carpathian Mountains, and that troops had been sent there to stop its extension, establishing, in fact, a military *cordon sanitaire.* The disease had not made its appearance in very many places* in Galicia, though only one district had remained free.

On the 30th of April the *Augsburg Gazette* appeared with a paragraph in its columns, purporting that the cattle plague had almost disappeared from Middle Silesia, but still existed in several places of the upper part of the same province. All preventive measures were stringently enforced.

* The term place, which I have been compelled to use so often in this article on the Cattle Plague, is a very unsatisfactory one. The only word which might have been used in its stead was community, but it does not in reality mean the same thing, and is equally vague. A district is divided into several places, and a place is a collection of ten or twenty, or even more farms.

In the *Hamburgh Börsen Halle*, for Friday, the 8th of May, I find that in the district of Tost-Gleiwiz, in Prussian Silesia, the plague was almost extinguished, but it continued in the aforementioned provinces, and the troops were still in activity, attempting to limit its ravages as much as possible. On the 13th of May the *Börsen Halle* reported news of the 8th of the month from Austrian Silesia. In the district of Teschen the rinderpest was making much damage; indeed, clearing out the stables. Less mischief than would otherwise have resulted, was anticipated from the means resorted to as preventives, and especially the slaughtering of animals, being carried into execution without restriction. The loss sustained by the province is enormous, when it is considered that cattle are very dear, the markets closed, and the Polish herds prevented from entering on Austrian territory. On the 12th of May it was announced that the disease was at Lemberg, and the *Times*' correspondent wrote from Vienna on the 16th, saying that "the murrain has made its appearance at Olschau, near Olmutz, where there is one of the largest cattle fairs in Austria. In two farms, seven animals fell sick, and five of them died; the other two were knocked on the head, as were three more which had a suspicious look about them."

Since the above period, when the malady was exciting great interest in Great Britain, the cattle-plague

has made inroads into Poland, Austria, and Prussia; but I need not lengthen my historical remarks on the subject, as the true lesson the past outbreaks of the steppe disease can teach us may be gleaned from all I have stated in the foregoing pages.

To the British stock-owner and veterinarian, the history of this disease furnishes as much information as he is directly interested in. The vigorous measures adopted in the countries bordering on Russia to arrest the plague effectually prevent its spread; nevertheless, European wars, which it is hoped may never again prove as general as during the last century, may lead to another invasion of this most disastrous epizootic.

Symptoms.—A period of incubation, varying in duration from four to fourteen days, during which the poison effectually imbibes the system, passes without observable symptoms. A short husky cough, with considerable dulness and prostration, are first seen. The loins are tender, the back arched, the legs drawn under the body, rumination occasionally continues uninterruptedly, the teeth grinding against each other, and the animal yawning as in the early stage of most febrile diseases. A fever shiver then usually indicates transition into the second stage, when the characteristic features of the disease are observed. The secretions are checked, the pulse becomes frequent and full; the breathing laboured, and the temperature of the body

very changeable. Not unfrequently, there is a watery discharge from eyes and nose, a painful cough, total loss of appetite, and a craving for cold water. The scanty excrement, high coloured urine, stiffness of extremities, and dry unhealthy looking skin, all indicate a prostrating and rapidly advancing fever. The lining membrane of the mouth becomes the seat of a vesicular eruption, and erosions are left behind, which occasionally bleed. These are observed on the nose, and even in the clefts of the feet ; the last stage is usually attained when the erosions are spreading, and there is then discharge from the nose, salivation, discharge from the eyes, diarrhœa, and progressive emaciation with increasing stupor, and, indeed, all the symptoms of speedy dissolution. Death occurs in from three to twelve days. It is most rapid in pregnant animals which abort, and in young animals exhausted by fatiguing journeys.

Ramazzini has described a particular skin eruption, which he has termed symptomatic cow-pox, and observed by him during the spread of the cattle-plague in Italy. Frequently some organs are more particularly affected. The intestines chiefly, as proved by the erosions so constantly discovered on post-mortem examinations, but the lungs may be inflamed, or the joints and other structures of the body become the seat of exudations and swellings, as in the common cases of anthrax or

black-quarter. Jessen has spoken of the disease, as occasionally associated with the lung disease, or contagious pleuro-pneumonia, and Dr. Headlam Greenhow, in his report on murrain, says, "Steppe murrain probably existed in this country about the middle of last century, side by side with pulmonary murrain; for whilst some of the descriptions of the disease then prevalent, very exactly accord with the symptoms of pulmonary murrain, as that disease presents itself now, other accounts agree more nearly with the description of Steppe murrain, given by continental writers of the present day."

The post-mortem appearances of contagious typhoid are not unlike those of typhoid or enteric fever in man. In addition to the general evidence of emaciation, all the tissues being found wasted, there is a tendency to gaseous accumulations in the areolar tissue all over the body, and a fetid gas escapes on opening the belly, and especially when the intestines are punctured. There are spots of extravasated blood or ecchymoses, on the whole of the alimentary canal, and urinary organs. In the third stomach the food is hard and dry, closely packed between the ample folds of this organ, and in consequence of this, a very common appearance after death from any disease in the ox, it was declared by persons in Scotland, on the occasion of Professor Simonds going to Prussia to study the

disease, that it might be seen any day at home, that it was not contagious, not a plague, and, indeed simply impaction of the third stomach, probably due to animals not getting enough salt with their food. We should not have noticed these extraordinary views, but for the acceptance with which they were received in the Highland Society, from the lectures delivered by Mr. Dick. We observe that the fourth stomach and small intestine become the seat of inflammations. There is an exudation of yellow or plastic lymph beneath the mucous membrane of the intestine, particularly in the seat of the solitary and agminated glands, which afterwards become the seat of ulceration. These constitute the characteristic lesions of the disorder.

Treatment—Little can be done in the way of treatment beyond purging the animals, exhibiting salines, and acid or refrigerant draughts; employing clysters, and supporting the system by stimulants; tincture of asafœtida and sulphuric ether, a drachm of each have been injected in the jugular veins, but all treatment appears futile.

As a preventative inoculation has been tried, but greater reliance is placed on strict supervision, to prevent contagion, or stopping the importation of animals, or of the produce of animals, from countries where the disease exists.

EPIZOOTIC GANGRENE OF THE TAIL.

Gangrena Caudæ Epizootica.

Cows more frequently than oxen suffer from this curious disease, which has spread occasionally as an epizootic over different parts of the continent. Hering refers to it as it appeared in Württemberg in 1817, and Rychner has furnished us with a good description of the symptoms. Without any general or internal affection, the tail becomes paralyzed, and its skin soft and œdematous, particularly towards its end. On opening it, a fœtid ichor is discharged. The disease spreads towards the root of the tail, where separation usually occurs, and the animal remains tailless.

The cause is unknown, and the treatment adopted consists in amputating the tail at the point first noticed, where the disease is limited, and then applying the actual cautery to the stump.

Siberian Boil Plague.

This malady, not confined to cattle, but seizing men as well as animals, is observed, as its name implies, in Siberia, and according to some, only on the Steppes. It is sometimes slow and chronic, and at others malignant and rapidly fatal. It bears a close analogy to black quarter, and is doubtless a form of anthrax.

LOCAL DISORDERS.

Inflammation.

Of the many animals supposed to have died of inflammation, very few have really been the subjects of an inflammatory disease. When severe pain is observed, particularly if abdominal, it is ascribed to inflammation; and in attempting recently to draw up a list of the relative frequency of different diseases in animals, I found in cattle insurance registers, simply "inflammations" stated so frequently as a cause of death, that I had some difficulty in arriving at tolerably accurate data. When the term is used alone, without any organ being specified, the case turns out to have been one of intestinal obstruction and colic.

The inflammatory process is, however, connected with many maladies the nature of which is frequently little suspected. Every tissue in the body may become inflamed, and the symptoms are local, if the part implicated is not extensive, and comparatively unimportant; general symptoms, however, set in when any internal organ or very sensitive structure is involved.

Pain, heat, redness, and swelling, are observed in any superficial part which may be inflamed. The pain varies in intensity according to the part affected, and is usually most severe when the latter is inelastic and

swells but slightly. It varies in intensity according to the sensitiveness of the animal, and its seat, when internal, cannot be determined with the same precision in dumb animals as in man. No doubt, referring pain to a particular spot, a patient considerably assists a physician in his diagnosis; but it is remarkable to what extent collateral circumstances facilitate the veterinarian in discovering what organ is inflamed. The pain is partly due to pressure on the nerves in the tense tissues, and partly to a structural or functional change which the nerves suffer from, in common with the other constituents of an inflamed structure.

Heat is a valuable symptom, especially when general, and due to the constitutional excitement attendant on any local inflammation. It is then coupled with dryness of skin and mouth, quick and strong or hard pulse, constipation, and, indeed, all the indications of fever or general disturbance. The redness is not often seen in hairy animals, and the swelling may be due to simple accumulation of fluid and not to inflammation.

It is not easy to define inflammation. Some regard it as differing from congestion or stagnation of blood by the material—lymph—which is exuded. Professor Bennett says, "When congestion is active, or arises from irritation of the textures, it may, if excessive, terminate in the exudation through its coats of

liquor sanguinis. This is inflammation ; an expression still used very vaguely by some physiologists, but which, thus defined, separates the morbid state accurately from congestion or fever on the one hand, and from dropsy or the processes of growth on the other." The great objection to this definition is, that it entirely disregards the essence of the disease, and which consists in the impaired vital powers of structure rather than in simple changes in its material condition.

The results of inflammation vary according to the severity of the cause which induces it, the nature of the structure involved, the constitutional peculiarities of the animal affected, and the treatment to which it is subjected. Mortification is the most dreaded consequence, but fortunately it is more frequent to observe resolution, or the gradual disappearance of all inflammatory phenomena. Persistence of superficial inflammation produces a solution of continuity, and constitutes *ulceration.* The history of most of the results of inflammation consists, in a great measure, in the history of the change which the exudation undergoes. It may gradually become absorbed, and the tissues regain their normal state—*resolution.* It may undergo a certain degree of development, cells forming which retain their vesicular form without further change, and floating in liquid, constituted by the liquid elements of the lymph ; this is pus, and the transformation is termed the act of

suppuration. The cells may, from the condition of the adjoining textures, and the lymph itself favouring it, undergo a further development into elongated cells and fibres; fibrous tissue is formed; this is the adhesive process. In some instances this tissue replaces material destroyed during the inflammatory process, and *reparation* is consequently brought about. In other cases the solidified exudation remains in the substance of a soft texture, hardening it, and constituting that result of inflammation which has been termed *induration.*

In the treatment of inflammation, recourse may be had to blood-letting, generally or locally, in the early or premonitory stage. A cow supports a very copious abstraction of blood in severe cases of inflammation. Six quarts is usually an ample loss for her to sustain. Locally, blood may be removed by scarifying, viz., puncturing the tissue in various parts, or by opening some of the smaller veins. Evacuants, such as purgatives, diaphoretics, and injections, are of essential service. When an animal cannot be bled from the tendency to low constitutional symptoms, it can be purged mildly, or a safer plan is to rely on salines, which act on the plastic blood, favour exhalation, induce considerable depression, and allay the fever. Of these, the best are the liquor ammoniæ acetatis, given in four ounce doses, in twice as much tepid water, every three hours; nitre, in half ounce doses, in solution, at short intervals;

sulphate of soda, acetate of soda or potash, and other neutral salts. We recommend all non-professional persons not to meddle with mercurials, antimonials, sedatives, and narcotics, which often do more harm than good, and at all times call for skill in their prescription. Of the many remedies which may be employed in inflammation, we may revert to *cold*. Cold water, applied constantly in the early stages, occasionally checks an inflammatory attack. In an advanced inflammation, it produces pain and even gangrene. Warm water in the shape of fomentations and poultices should then be used. Hot water baths, so useful in the treatment of inflammatory diseases in man and the smaller animals, can be but little used in the larger quadrupeds; but the Roman baths recently introduced, may certainly occupy their place with great advantage. Sudden variations in temperature are very prejudicial to a patient suffering from inflammation, and a uniform temperature, about 62° Fahrenheit, is very favourable to recovery. Next to heat and cold we must revert to the use of *rubefacients*, which draw the blood to the skin, and subdue the inflammation. The best of these are the ammonia, soap, or turpentine liniments.* Blisters are of great service, either in the form of the mild mustard poultice, or the active preparations of cantharides, croton oil,

* See the Veterinarian's Vade Mecum.

tartar emetic, biniodide of mercury, and a few others. Many formulæ for blisters will be found in the Veterinarian's Vade Mecum.

Abscess—This is one of the results of inflammation, and consists in deep-seated suppuration, the pus having always a tendency to attain the surface. The symptoms in the early stage may be limited to indications of severe pain, a circumscribed hard and tender swelling soon appears, and in the course of a few hours, or, in some cases, after many days, the tumour feels soft, fluctuates, and perhaps bursts spontaneously. The approach of the matter to the surface is termed the process of pointing, which occurs by the advancing abscess pushing aside important structures, and leading to the removal of tissue by absorption. The pointing of an abscess should always be favoured, and when from the elastic and fluctuating feel of the tumour matter proves to have been collected, it should be evacuated at once by puncturing the abscess. Sometimes the formation of an abscess is prevented by a stimulating liniment or a blister. If suppuration has actively set in, these remedies expedite the process, or, in order to hurry it, fomentations and large bran or linseed meal poultices must be applied. In cows many different abscesses are met with, the most severe is the *milk abscess,* which we shall consider under the head diseases of the udder.

Fistula.—When an abscess forms between tough and inelastic tissues, the pus burrows in various directions to obtain an outlet. Channels are thus formed, termed sinuses or fistulæ. In some cases an abscess points without obstruction, but its closure is afterwards impeded by secretions flowing through it, as in milk abscess, or from other causes, and the cavity is transformed into a narrow sinus. The wall of the abscess, which is constituted by the lymph progressively exuded and being transformed into pus, becomes firm and horny, though not usually organized. It is the wall of the sinus which constitutes the "core," a removal of which is speedily followed by disappearance of any fistulous tract. The treatment of a fistula is chiefly surgical, and consists in slitting up the wall with a knife, or causing it to slough out by active caustics. Sometimes an astringent lotion of alum, diacetate of lead, or sulphate of zinc, may prove sufficient, but at other times, solutions of nitrate of silver, chloride of zinc, and bichloride of mercury are called for.

Ulceration.—An ulcer not only owes its origin to inflammation, but cannot continue without persistent inflammatory action. It is a superficial destruction of tissue, going on more or less rapidly, with a greater or less discharge, and having no tendency to heal spontaneously. Cows are rather often subject to ulcers;

they are seen about the lips, tongue, and different parts of the skin. They usually yield to the application of astringent lotions, such as six grains of sulphate of zinc to the ounce of water, or they need the application of caustic, the nitrate of silver, or burning with the hot iron. The last operation requires to be very carefully performed, but in many cases is most efficacious. On the limbs, pressure, and the frequent use of cold water tends to the cure of ulcers. In many superficial ulcers, the oxide of zinc ointment is invaluable.

Diseases of the Digestive Organs.

In all herbivorous quadrupeds in a state of domesticity, the diseases of the alimentary canal are the most common and fatal of all sporadic affections, that is to say, of all diseases irrespective of plagues and closely allied affections. A functional disturbance of the digestive organs may be observed in almost every serious malady affecting the system. Thus increased, diminished or perverted appetite, as frequently indicate diseases of other organs as of the digestive apparatus itself, and I shall often have occasion to refer to them as symptoms.

Diseases of the Mouth.

The mouth is the seat of various diseases, but I need at present only refer to the two more common

affections. The first is inflammation of the lining membrane of the mouth, and of the tongue, due to irritants or hot and caustic liquids which an animal may introduce, or have poured into its mouth. The nature of the accident is indicated by great pain and uneasiness, with a frothy discharge of saliva, swollen tongue, and discoloured internal surface of the mouth, and sometimes with much fever. The local destruction is generally very slight, but a cow is prevented from feeding for several days, and the secretion of milk is stopped. This may give rise to considerable inconvenience. Treatment consists in washing the mouth often with water, or a lotion, containing a wine-glassful of vinegar, and a tablespoonful of honey to the pint of water. A mild laxative should be given, and in some severe cases a more active astringent lotion, consisting of half an ounce of alum to the quart of water, may prove of great service.

Aphtha or Thrush.—A vesicular eruption in the mouth, which is sometimes mistaken for the malignant Glossanthrax, described under the head Epizootic Diseases, and at others with Epizootic Aphtha, which disease it most resembles. It is, however, rarely produced by contagion, and is only an indication of irritation in the mouth of young animals during the whole period of dentition. The inflammation of the mucous membrane of the mouth, and the vesicular eruption

which ensues, may, in some instances, extend through the alimentary canal, induce considerable fever, great prostration, diarrhœa, and even death. Usually the malady is localized in the mouth, and is readily checked by mild purgatives and the local application of vinegar and honey, or alum-lotion.

Ulceration of the Tongue.

Sometimes, as one of the consequences of Glossitis, or inflammation of the tongue, and at others from causes not easily determined, such as accident or constitutional predisposition, the mucous membrane of the tongue becomes the seat of ulceration. The symptoms vary much, according to the severity of the disease. Sometimes there is but slight inconvenience produced by a slowly spreading ulcer, which may invade the back of the tongue, and even extend towards the throat. At others, considerable irritation and fever attend a sloughing ulcer, which may manifest a malignant character. The benignant form of the disease is most common, and I have seen ulceration extend from the tongue on to the cheeks, palate, and nose. This I observed in a young ox, during my stay in Berne in Switzerland.

Treatment consists in the local use of caustics, varying in activity, according to the disposition manifested in the ulcer to heal. Internally, we find in the

milder cases, ferruginous tonics of great service. In the malignant cases, acid mixtures, liquor ammoniæ acetatis, and other salines, may be used freely.

Abscess of the tongue, and induration of this organ, are both results of inflammation, and require treatment on surgical principles. The abscess should be opened as soon as possible; and in the event of any hardening of the tissues of the tongue, preparations of iodine given internally, or applied between the jaws, in the form of the compound iodine ointment, may prove of great service.

Diseases of the Jaws and Teeth.

Cows are not often subject to diseases of their teeth, but occasionally the jaws become affected, implicating the teeth as well. This malady has not received a very appropriate name, and the common term, "osteo-sarcoma," applied to many bone diseases, has been used in this. I would prefer the name, "fibro-plastic tumour of the jaw," or, from the peculiar appearance of the bony texture in its transformed state, "spongy tumour of bone." A tumour is observed usually between the ages of three and six, and it occupies either the upper and lateral parts of the face, over the region of the upper grinders, or one of the sides of the lower jaw. The swelling is small at first, and painful. It gradually increases, until it attains an enormous size; sometimes not less than that of an infant's head.

So long as the tumour is not touched, the skin remains loose and pliable over it, but by the common measures of treatment adopted, ulceration is induced, the subjacent tissues become hard, and acquire great thickness. On examining one of these tumours after death, it is found to be composed of a heavy mass of fibro-plastic tissue, intersected in every way by bony plates. Fig. 29,

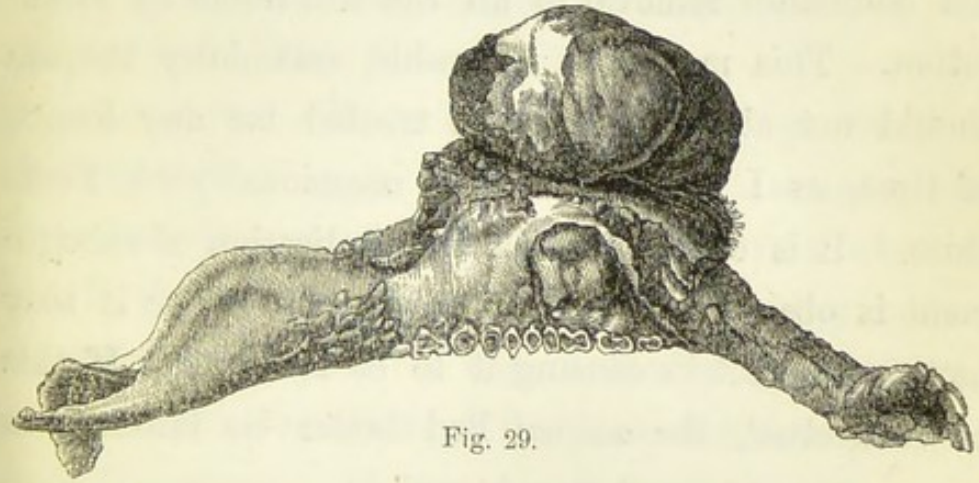


Fig. 29.

shews how extensive the deposition of material may

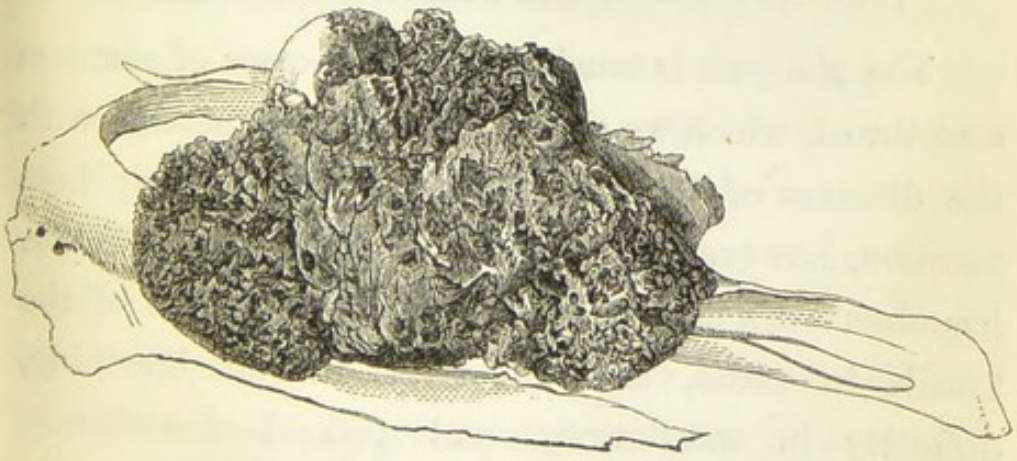


Fig. 30.

be, which towards the outer surface of the tumour is

tough and fibrous. Here and there a circumscribed yellow deposit indicates where the lymph cells have remained unchanged. There is a fatty deposit and granular matter intermingled with imperfectly developed and degenerate lymph cells, wherever the tissue appears friable. In the tougher parts, fibro-plastic cells and fibrous-tissue are easily discerned. Fig. 30 represents the bone after removal of all the soft-tissue by maceration. This malady is incurable, and dairy keepers should not allow cows to be treated for any length of time, as I have seen them occasionally in Yorkshire. It is only when the first indication of enlargement is observed, that a blister applied over it may have any effect in causing it to be removed. If this be ineffectual, the animal had better be fattened as soon as possible, and slaughtered.

Inflammation of the Pharynx or Throat.

The pharynx is usually affected in cases of common sore throat, which we shall consider in connection with the diseases of the respiratory organs. I may here mention, however, that a German veterinarian, Sticker, has observed a dangerous form of inflammation of the tonsils in cattle, attended with difficult breathing, difficulty in swallowing, and general disturbance, accompanied by obvious wasting. The enlargements rarely suppurated. In such cases, besides general

remedies, the best medicine would be an astringent electuary.

Choking.

This accident is very common in cows, and is usually due to a piece of turnip, a potatoe, or other large body. Sometimes a sharp pointed object becomes fixed in the gullet, and at others, but very rarely, in cattle, dry farinaceous food, imperfectly salivated, fills up the passage and chokes the animal.

Symptoms.—There are some general symptoms of choking which apply to all cases, and some special symptoms dependent on the precise seat of the obstruction in the course of the gullet. The general symptoms are uneasiness, more or less difficulty in breathing, involuntary movements of the jaws, and flow of saliva from the mouth. If the animal drinks, the liquid is ejected from the mouth and nose. Cows soon become hoven, and, indeed, the distention of the paunch by gas, which is so constant a symptom of choking, is the most serious complication, and calls for immediate relief. The special symptoms in the event of the obstruction being in the pharynx, consist in protruded head, abundant salivation, occasional spasmodic cough, great difficulty in breathing, haggard countenance, and bloodshot eyes. By manipulation, either externally or through the mouth, the foreign object is detected in its true position. If the obstruction exists in the gullet,

in its course down the neck, there is always a swelling on the left side, indicating its presence. The symptoms are usually not so severe as in pharyngeal choking, with the exception of the swelling of the paunch. When the foreign object is lodged in that part of the œsophagus which runs through the chest, the general symptoms are not very urgent at first, and the most important special symptom is the animal drinking a little, indeed, as much as the œsophagus will contain, and then, by a spasmodic effort, as if in the act of vomiting, the fluid being thrown back out of the mouth. This form of choking is more rare than the others, from the fact that the gullet widens as it approaches the paunch.

An accident incidental to choking, and occasionally due to the abuse of instruments in dislodging the obstruction, is laceration of the œsophagus, whereby the obstructing mass passes into the surrounding areolar tissue, and the animal then can swallow. If, however, it is allowed food, and especially of the nature of gruel or a sloppy mash, a considerable quantity passes through the lacerations into the pouch formed outside the gullet. An abscess may then form, and the materials gradually thrown out, but there is much danger attending this accident, the offending mass requires to be removed, and the wound afterwards treated on surgical principles.

In all cases of choking, give the animal a little water or oil. If the fluid be returned, try and remove the obstacle with the hand, if it exist in the throat. If, however, it has stuck lower down, the probang, first suggested by Monro, is used, as described in the Veterinarian's Vade Mecum. The annexed fig. 31 *a*, shews the shape of a probang, which is hollow, in order to allow of the escape of the gas contained in the paunch, so soon as the latter is penetrated. In some cases a pair of forceps, constructed as represented at fig. 31 *b*, may be of service in withdrawing a piece of turnip or other hard substance. The instrument should be used with great care. Sometimes we have known a cow-feeder pass the handle of his whip or a stiff cart rope, down the gullet of a cow, to thrust onwards a bit of turnip. Care should always be taken not to lacerate the œsophagus, and sometimes with a little patience the obstacle is removed, without much

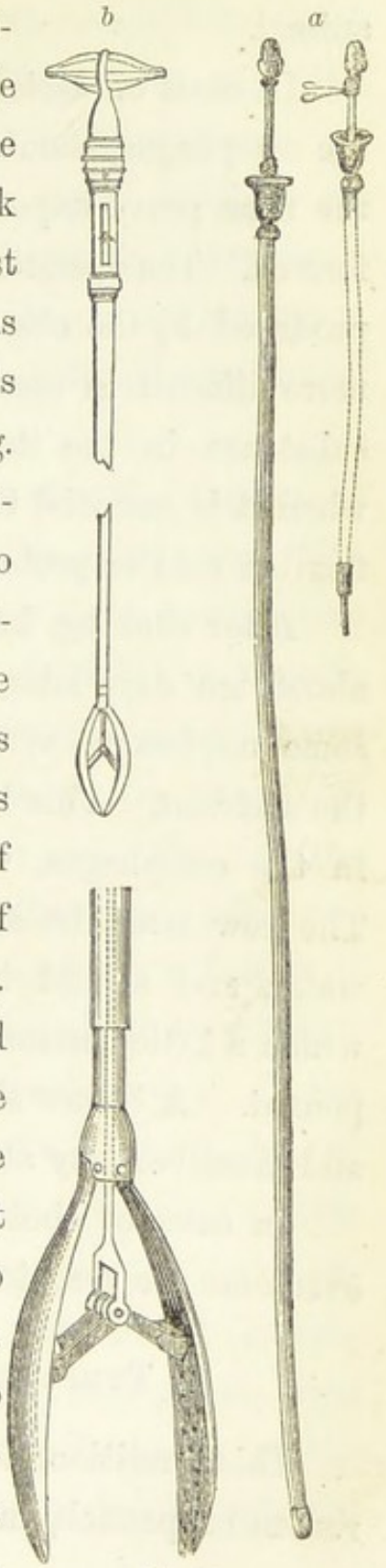


Fig. 31.

interference on the part of the attendant on the animal.

In cases of obstruction in the cervical portions of the œsophagus, should the pressing down or removal of the mass prove impossible, œsophagotomy must be performed. The operation is very simple when the swelling produced by the obstruction is apparent, but it is much more difficult in cases of choking, with the offending substance in the thoracic portion of the œsophagus, when it is essential to open the latter tube, and pass a flexible reed or probang down to push on the obstacle.

After choking, keep the animal on sloppy diet, and about ten days later, it is not uncommon to witness some unpleasant symptoms, and even a recurrence of the accident. This is due to irritation and ulceration in the œsophagus, which requires careful treatment. The cow must be allowed frequent draughts of tepid water, and should be drenched with thin gruel, in which a little tincture of myrrh may be advantageously poured. A blister should be applied along the throat, and laxatives may also be exhibited.

In cases of choking, great care must be taken to overcome the symptom of—

Tympanitis, Hove or Blown.

This condition, due to an accumulation of gas in the rumen or paunch, invariably occurs if the œsophagus

be obstructed; but it is likewise seen under other circumstances, such as when cows are fed on damp grass, or luxuriant clover; and, indeed, on any food which may ferment rather actively in the stomach.

The symptoms of tympanitis are a swelling on the left side of the belly, which, if struck, proves resonant like a drum. The animal has a very anxious look, breathes heavily; and, indeed, suffocation is threatened.

In all these cases, a stimulant should be given at once. The best is hartshorn, an ounce of which may be mixed with a quart of cold water and administered. This tends to neutralise the gas evolved in the paunch. Gin, whisky, or brandy, may be given in ounce or two ounce doses, but more reliance is to be placed on neutralizing agents and evacuants; so that, if the ammonia does not answer, a purgative must be given; and if several hours have elapsed, and the animal still unrelieved, chlorinated water may be administered with advantage. Clysters should be used freely. If the case prove obstinate, and the animal's life be in danger, the paunch must be punctured with a trochar. This operation is performed by choosing a spot midway between the last rib and prominent point of the haunch, or antero-inferior spine of the ileum, and about eight or nine inches below the transverse processes of the lumbar vertebrae; a small cut is made through the

skin, and then the point of the trochar is applied to the wound, and thrust or struck into the paunch, when the stilet is removed and the tube allows the escape of gas, and admits of the introduction of liquid or medicines into the rumen.

There are chronic cases of tympanitis which consist in the recurrence of symptoms at intervals, and, indeed, daily, if the cow be fed on green food. This chronic dyspepsia or debility of stomach, may depend on lesions of the reticulum, and inability to ruminate. More commonly, however, it arises from a severe attack of indigestion, which, to a certain extent, paralyses the stomach. Vegetable tonics, aromatics, and other stimulants should be used in all these cases, and artificial food should be resorted to.

Impaction of the Rumen.

Similar symptoms to those of hove are witnessed when the paunch is impacted with food; but in these cases, by pressing with the hand into the side, an indentation is left which gradually disappears. No drum-like sound is emitted on striking the side. The disturbance is often greater than in simple hove, and the animal appears weighed down by the overloaded stomach. Rumination is suspended and constipation exists. The latter symptom may be relieved, and yet the rumen remains surcharged. Copious draughts of

tepid water and the injection of the latter by the stomach-pump, in order to dislodge the solid mass, and clysters are of service in favouring the peristaltic movement of the whole intestine. Stimulant and laxative remedies are occasionally of service. If a purgative does not answer in such a case, the paunch has to be opened into. This operation is described in the Veterinarian's Vade Mecum.

Diseases of the Reticulum.

The second stomach of the cow, the reticulum or honeycomb bag, participates in the morbid conditions peculiar to the rumen, and it is very rarely observed the seat of any important disease. Concretions are apt to form in it, by the matting of hair into the shape of round balls, and in some instances cows swallow dirt, and many strange bodies, which are apt to become fixed in the meshes of the reticulum. Knitting needles, nails, bits of wire, etc., are frequently swallowed by cows; and they become fixed in the second stomach, afterwards finding their way through the sides of the body, but more frequently pushing forward into the chest and towards the heart, which may be punctured, and the animal instantaneously destroyed. The presence of these foreign objects is rarely discovered during life.

When cows swallow irritant poisons they are apt

to accumulate in the reticulum, and the latter becomes inflamed, giving rise to very serious disturbance. Ulceration of the reticulum has been seen under these circumstances, and a fistula formed, so that most of the material an animal swallowed dropped out through the abdominal wall, and as a necessary result the cow became emaciated, and was destroyed. *

Vertigo. Stomach Staggers in Cows. Fardel Bound.

The third stomach, manyplies or omasum, is apt to become impacted with food, usually with rich grass, and the cow may continue to eat voraciously for a while, but suddenly stops, has a wild haggard look, lifts her head, trembles, foams at the mouth, and if loose, dashes at full speed forwards until stopped by a paling or wall, or falls, striking its head on the ground, rolling on its side, and for a few moments convulsively contracting its limbs. The symptoms are sometimes very violent, and the animal dies within a very short time. In the Veterinarian's Vade Mecum, I have given the history of a form of lead poisoning which is due to bits of lead, thrown on land, in police manure, and which, being swallowed by cows, lead to impaction of the third stomach, and all the foregoing symptoms. That the police manure was the cause of

* Edinburgh Veterinary Review, vol. i., page 202.

such a disease was first shewn by Mr. Cumming of Ellon, whose researches on the subject were most complete.

Treatment in these cases consists in applying cold water to the head, and giving a pound and a-half of sulphate of soda in solution. This should be followed up by antacids, such as carbonate of soda, and small doses of chalk. All food should be removed from the affected animal. Linseed oil may occasionally be given to it, and injections frequently resorted to.

Dyspepsia — Impaired Digestion and Nutrition — Cachexia Ossifraga — Malacia — The Stiffness — "The Cripple."

Cases of hove and impaction of the third stomach must necessarily be regarded as forms of indigestion or dyspepsia, chiefly implicating the ample reservoirs which fit the food for digestion in the fourth or true stomach. There are, however, many circumstances under which the fourth stomach alone, or with the intestine, indicates functional disturbance, independently of the three first gastric cavities.

The Germans have given the name Lecksucht or Schlecksucht, which means inordinate desire to lick, to a disease of cows, which consists in morbid appetite and an irresistible propensity to lick, particularly alkaline

or saline substances. The most extraordinary objects, such as clothes and stones, are sometimes swallowed by cows in this state.

The causes of this affection are various, occasionally it occurs as an enzootic or epizootic, spreads far and wide, seizing chiefly weak, pregnant, or abundant milking cows. It is seen in winter, and when food is poor and bad. It is also most common during wet seasons, and in marshy districts.

Symptoms.—At first the appetite is simply diminished, or a desire is evinced for dirty straw, dung, and other filth. The animal's coat stares, there is a mucous discharge from the eyes and mouth ; the dung is dry and covered with mucus. The secretion of milk appears almost increased at first, but soon diminishes ; is very watery, blueish, and contains no cream. The cow licks up lime, and even clay. At this stage a cachectic state is induced, which is characteristic of the disease. The animal becomes anaemic, the heart's action is loud and strong, the pulse frequent and feeble, rheumatic symptoms appear, and the cow becomes stiff, evidently suffering from pains in the joints, and growing progressively weaker. The joints swell, and the tissues of the body waste ; the bones grow friable and break, or the limbs become paralyzed. This disease has also been termed "Cripple," "Fragility of bone," or in German "Knochenbrüchigkeit," but the changes

in the structure of the osseous system are evidently secondary to the gastric disturbance. The disease lasts for several months, and as long as one year.

After death the body appears much emaciated; poor, watery blood imperfectly fills the vascular system. Mucus abundantly coats the mucous membrane of the alimentary canal, and often worms, probably the Amphistoma Conicum, are found in the stomach. A watery fluid, of a peculiar sour odour, exists in the alimentary canal. Various tissues are soft and dropsical; the bones are soft, enlarged in parts, fragile, and at the seat of the spontaneous fractures are stained with blood, and crumble on the slightest pressure.

Treatment.—Change of food and change of situation are of most service. Salts of lime and potash, with bitter tonics, may be given. Water acidulated with sulphuric acid should be allowed as a beverage; rock-salt kept before the animal to lick; and, with highly nutritious food, small doses of sulphate of iron may be given. Rychner recommends preparations of iodine internally, particularly when there are rheumatic complications.*

* Since the above has been in type, the disease has been described by one of my students, Mr. Thorburn, as occurring in Lanarkshire, and another of my students, Mr. Sarginson, of Appelby, informs me that it is very prevalent in Westmoreland, and is there named "The Cripple."—See *Edin. Vet. Review.*

Gastritis—Gastro-enteritis.

Inflammation of the Stomach, or of the Stomach and Intestines—Wood-evil, Moor-ill.—As an idiopathic or primary disease, this is exceedingly rare in cows. Like in all other animals, however, the alimentary canal becomes inflamed under the influence of irritant poisons, whether vegetable or mineral. Though the common white skit or diarrhœa in calves has been described as gastro-enteritis, I can affirm, from numerous post-mortem examinations, that there is no inflammation in such cases, which consist simply in acute and severe indigestion.

Of the irritants most commonly productive of gastritis and gastro-enteritis, we have all the non-metallic irritants which are commonly employed as purgatives, besides the alkalies and acids. Of the metallic irritants, arsenic is the most commonly productive of injurious results, but the vegetable irritants are numerous—the anemone, bryony, mercurialis annua, ranunculus, savin, common heather, common oak branches, ergotized grasses, if eaten in quantities by cows, or if any of the ordinary vegetable purgatives are given to them, in excessive doses, the stomach and intestines become violently inflamed.

If the symptoms induced by one of these poisons, the mercurialis annua, are mentioned, I need not particularize further. They consist in loss of appetite,

suspended rumination, dullness, hot and dry mouth, dry skin, tympanitis, pain in the abdomen, great sensibility of the loins, stiff back, cold extremities, bloody urine, diminished secretion of milk, accelerated breathing, small contracted pulse, dilated pupils, and reddened mucous membranes; in some cases, plaintive cries, the mammæ become indurated, the teats waste, and diarrhœa occurs with very offensive excreta. Abortion is observed when pregnant cows are affected.

The wood evil which I have noticed under the head Black Water or Darn and dependent on cows eating the astringent shoots of trees, such as oak, is doubtless attended by much irritation of the alimentary canal, but the discoloured urine, referred to in the foregoing paragraph, occurs in the wood evil or black water, so as to class the disease amongst those affections in which there is a fundamental blood change and irritation of the kidneys.

Treatment.—In all cases of irritation of the alimentary canal, the irritant must be neutralized, if possible, by an antidote, as in the case of arsenic, by the exhibition of lime water, magnesia, or the hydrated peroxide of iron. The substance then is dislodged by a purgative, or the mucous membrane of the alimentary canal is protected by emollient substances, such as mucilage, linseed, tea, etc. Emollient clysters, fomentations to the abdomen, and in some cases external

irritants are employed. Animals require the most careful nursing, and often succumb before sufficient can be done to restore them.

Colic.

Any affection attended by abdominal pain may be termed *colic*, but true colic is a spasmodic affection of the large intestines, the pain being induced by the inordinate action of the bowel in dislodging some offending agent. Colic is more rare and not so fatal in cattle as in horses.

The symptoms of colic consist in uneasiness, striking the belly, crouching, lying down and springing up again, loss of appetite, suspended rumination, tympanitis, and scanty, if any, discharge of dung.

Treatment consists in giving clysters and administering a purgative.

Invagination or Strangulation of the Intestine.

From the peculiar arrangement of the intestine of a cow it is almost impossible that one portion should become inserted into another, or that it should be strangulated by forming hernia through the mesentery. Nevertheless, however impossible such an accident may at first sight appear, it has occurred and necessarily proved fatal.

Diarrhœa.

Cows are often subject to looseness of the bowels, and particularly if turned out on soft wet pasture with young grass. This, however, is a simple form of diarrhœa which is checked by allowing the animals hay or other dry food. Obstinate forms of diarrhœa may result from either of the following causes :— 1*stly*, Indigestible and irritant food. 2*dly*, Derangement of the system, leading to imperfect secretion of gastric juice, and consequent passage of undigested food into the intestine. 3*dly*, The presence of a poison in the blood, which nature eliminates by the excreting organs. 4*thly*, From the mucous membrane of the intestine becoming habituated to free discharge, from any of the foregoing causes.

The symptoms of diarrhœa are too commonly known to need any lengthened description. I must mention, however, that the condition of the fœces chiefly indicate the cause of the diarrhœa, and when the cause is constitutional there is usually great fœtor of the excrement, and great prostration of the animal affected.

Treatment.—In the first variety, the best remedy is low diet and a purge ; in the second, low diet, the use of carbonate of soda given with food, or giving an artificial gastric juice prepared with the rennet of the calf. Antacids are of great service, and the intestine must

be kept clear of irritant substances by clysters. In the third variety of diarrhœa, the constitutional state has to be treated according to circumstances. In the fourth variety, farinaceous foods, starchy principles, astringents, such as chalk, catechu, lime, opium, and other similar substances, are employed.

Diarrhœa or White Skit in Calves.

This malady, which destroys thousands of calves annually, has been noticed several times in the foregoing pages. It is a disease which depends on the weak constitution of the young animals, and the inappropriate nature of the milk given to them. The milk may be very good, but instead of the young creature being allowed to suck, it is made to drink large quantities of cold milk at long intervals, such as at morning and at night. In some districts sucking calves have the malady, but this depends on not being allowed to suckle their own mother, or the cows being fed on improper food and their milk becoming unfit for their calves to suck. White skit in calves has been supposed by some contagious, but it is not, though many young animals die simultaneously.

Symptoms.—Voracious appetite, languor, abdominal pain, tendency to swelling of the abdomen, frequent discharge of fetid flatus and yellowish or white excrement, which is the unchanged milk drank by the animal.

Treatment.—Clysters; a little chalk or wheaten flour in the milk; small doses of calcined magnesia or carbonate of soda, particularly if there is any tendency to hove; the best remedy is the common rennet, a table spoonful of which may be given after the calf has taken a little milk, and thus aiding the natural action of the stomach.

Dysentery.

This common disease amongst cows, consists in inflammation of the large intestine, with diarrhœa, discharge of blood per rectum, and rapid emaciation. It may be acute or chronic, and occurs frequently towards the latter stage of some other prostrating disease, as the system gets worn out, and is in that state, referred to in the foregoing pages, termed hectic.

Youatt's description of dysentery is perhaps the happiest of his attempts in relating the history of any disease of cattle. I am tempted to quote what he says regarding the causes of dysentery:—

"Dysentery may be a symptom and a concomitant of other diseases. It is one of the most fearful characteristics of murrain; it is the destructive accompaniment or consequence of phthisis. It is produced by the sudden disappearance of a cutaneous eruption; it follows the cessation of chronic hoose; it is the consequence of the natural or artificial suspension of every secretion. Were any secretion to be particularly se-

lected, the repression of which would produce dysentery, it would be that of the milk. How often does the farmer observe that no sooner does a milch cow cease her usual supply of milk than she begins to purge! There may not appear to be anything else the matter with her, but *she purges,* and in the majority of cases that purging is fatal.

"It may sometimes, however, be traced to sufficient causes, exclusive of previous disease. Unwholesome food—exposure to cold—neglect at the time of calving—low and marshy situations—the feeding on meadows that have been flooded (here it is peculiarly fatal)—the grazing (according to Mr. Leigh, and our experience confirms his statement) upon the clays lying over the blue lias rock—the neighbourhood of woods, and of half stagnant rivers—the continuation of unusually sultry weather—overwork, and all the causes of acute dysentery may produce that of a chronic nature—or acute dysentery neglected, or badly, or even most skilfully treated, may degenerate into an incurable chronic affection. Half starve a cow, or overfeed her; milk her to exhaustion, or dry her milk too rapidly, dysentery may follow."

Though we not unfrequently see a cow affected with dysentery standing for weeks and months amongst a lot of healthy cows in a byre, nevertheless it is often epizootic.

Symptoms.—The acute form is attended with severe symptoms of general disturbance, often ushered in by shivering fits. The temperature of the body is very variable; the animal becomes hidebound and its coat stares; the back becomes slightly arched and the loins are sensitive. The eyes are dull and occasionally the seat of discharge. The mouth is clammy and the tongue furred and dirty looking. The animal yawns and grunts, and at short intervals discharges a variable quantity of thin watery excrement and mucus, often tinged with blood. The straining is generally violent and distressing. The animal draws its limbs together, arches its back, extends its tail, and the anus appears sore and red. The urine discharged is often of a dark red colour. The amount of abdominal pain varies considerably; sometimes there is severe colic, and at others general tenderness. Gaseous distention of the paunch not uncommonly complicates the disease.

The constitutional symptoms are commonly those of a low typhoid disease. The animal becomes dull, emaciated, suffers from thirst. An aphthous eruption in the mouth indicates the condition of the intestinal mucous surface, where in some cases there is severe ulceration, whence the blood is discharged, or abscesses. Unless by judicious treatment the symptoms are made to subside, they increase in severity, and in a fortnight from the commencement of the disease the animal is

dead. If the chronic type of the disease declares itself, the animal may linger on for a prolonged and indefinite period of time.

In the chronic cases the general symptoms are very severe and faithfully enough portrayed by Youatt, who says—"The beast is sadly wasted—vermin accumulate on him—his teeth become loose—swellings appear under the jaw, and he dies from absolute exhaustion; or the dejections gradually change their character—blood mingles with the mucus—purulent matter succeeds to that—it is almost insupportably fœtid—it is discharged involuntarily—gangrenous ulcers about the anus sometimes tell of the process that is going on within; and, at length, the eyes grow dim and sunk in their orbits, the body is covered with cold perspiration, and the animal dies.

"In some cases the emaciation is frightful; the skin cleaves to the bones, and the animal has become a living skeleton; in others there have been swellings about the joints, spreading over the legs generally, occasionally ulcerated; and in all, the leading colour of the membranes, the rapid loss of strength, the stench of the excrement, and the unpleasant odour arising from the animal itself, announce the approach of death."

The post-mortem appearances of dysentery are:—Ready removal of the epithelium over the three first stomachs, which are usually pretty empty; the third

may contain some solid food. The fourth stomach is the seat of reddish discoloration of its mucous membrane, which is occasionally œdematous, and at others the seat of exudation of lymph, which has been said to give to it the appearance of jelly. The small intestine, distended by fluid material, is occasionally injected, but often presenting no abnormal appearance. The cœcum, colon and rectum are obviously inflamed. The mucous membrane, red with abrasions or ulcerations, varying in extent, and sometimes perforating the intestine. In some cases abscesses exist in the submucous tissue. Ecchymoses, and even spots where sloughing is going on, are apparent in the large intestine.

Treatment.—In some acute cases of dysentery, advantage is said to have been derived from bloodletting. Greater reliance is to be placed in the use of mild aperients and emollient clysters. Calomel and opium, of each a scruple, given thrice daily for one or two days, has been attended with great benefit. The severe inflammatory symptoms having subsided, styptic and stimulating remedies, which act copiously on the mucous membrane of the intestine, can be prescribed. Acetate of zinc, acetate of lead, and turpentine, all given in small doses rather frequently, and in large quantities of thin gruel and decoction of linseed, prove of service. Some veterinarians have obtained benefit from employing drachm doses of sulphate of copper.

Chloride of lime, a drachm to the quart of water, proves beneficial. Chalk, alone or combined with opium, has been much used, and with advantage when the acute symptoms are subdued. Other astringents, such as lime and catechu have been employed ; but as a general rule, great care should be taken not to load the intestine with many medicines which are apt to irritate. Judicious diet is of great service in assisting an animal towards convalescence.

Intestinal Worms.

The strongylus radiatus and ascaris lumbricoides are amongst the most common round worms to be met with in the intestine of the ox. Ascarides abound in the small intestine of weakly calves within a very short time after birth, and the system suffers very severely, as indicated by great emaciation, and when the animals are killed, the flesh has a peculiarly disagreeable mawkish odour. The best remedy in these cases is iron, either in the form of iron-filings or powdered sulphate of iron, given in treacle as an electuary. The worms are rapidly discharged, and the young animal acquires strength and condition. Cows are not often troubled with tapeworm, though two kinds, tænia expansa and tænia denticulata are occasionally met with in their intestines. The only symptoms of their presence during life, are the discharge of rings of the

worms, attended by a little intestinal irritation. The best remedy is turpentine in mucilage or thick linseed tea.

DISEASES OF THE LIVER.

Jaundice—Icterus.

The disease causes the yellow discoloration of the tissues of the body by the colouring principles of the bile circulating in the blood. It is not unfrequently seen in cows as an idiopathic affection, though more commonly as a symptom of other diseases.

Symptoms.—When jaundice occurs as an idiopathic malady, it is detected by the yellow colour of the visible mucous membranes and the skin. There is usually loss of appetite, a slimy furred tongue, dry, hard dung covered with mucus. The digestive organs are most disturbed, and the colouring principles of bile are discharged by the kidneys, as proved by the manner in which it tinges paper when dipped in the urine and dried. If jaundice is not relieved, the animal completely loses its appetite, becomes anæmic, its limbs are occasionally œdematous, and the temperature of the body becomes very low. These symptoms then continue, notwithstanding active measures being directed for their removal.

Post Mortem appearances.—In cases of jaundice which terminate fatally, the gall-ducts are found indu-

rated or obstructed by gallstones, hydatids, abscesses, or other enlargements which form on them.

The nature of jaundice, and particularly that form which many regard as dependent more on functional inactivity and changes in the blood, than due to any active cause in the liver, have given rise to considerable discussion. Frerich's views of the cause of jaundice in these cases, are given by Dr. Murchison in the following terms :—

"The author endeavours to explain certain obscure forms of jaundice, where there is no mechanical obstruction to the excreting ducts of the liver, such, for instance, as the jaundice which has been observed in pyæmia, typhus, and after snake bites, on the supposition of an arrested consumption of the biliary acids which have been re-absorbed into the blood, either from the intestines or directly from the liver. Arguments are brought forward which render it probable that even in a state of health, all the bile formed in the liver does not pass into the bile ducts, but that a portion of it enters the hepatic veins, along with the sugar, the quantity which thus enters, varying with the distribution of the blood in the gland, and with the relative degrees of pressure exerted by the contents of the veins, and of the minute bile ducts upon the secreting cells, being largest, when the pressure on the sides of the veins is least, and when that on the ducts is greatest.

The biliary acids which thus enter the blood, or which are re-absorbed from the intestines, are supposed to undergo certain changes from oxydation, and may thus account for the large quantity of taurine which has been found in the healthy lung, and for the pigments which are naturally voided in the urine. When, however, anything interferes with these normal metamorphoses in the blood, as when this fluid becomes contaminated by the purulent infection, or by any other poison, it is supposed, that the complete metamorphosis of the colourless bile into urinary pigments is arrested, and that the intermediate substance, bile-pigment, is formed in the blood, so as to colour the various tissues and secretions. The arrested metamorphosis of the biliary acids, under such circumstances, is thought to be analogous to the arrested metamorphosis of the sugar formed in the liver which leads to Diabetes."

The treatment of jaundice consists in the internal use of aloes and saline purgatives. After these, if jaundice continue, a dose of calomel may be given, but perhaps greater reliance can be placed in continuing with neutral salts, such as nitre and sulphate of soda, in two or four ounce doses daily. Turpentine in linseed tea, either alone or combined with aloes, has been recommended, besides the external use of rubefacients. Clysters prove of great service in the treatment of this disease.

Congestion of the Liver—Inflammation of the Liver.

Both these conditions are observed in cows, and probably occur far oftener than they are diagnosed. This is proved by the frequent discovery of indurations and purulent deposits in the livers of cattle slaughtered, when apparently in perfect health.

Symptoms.—Congestion of the liver, especially incidental to plethora, is indicated by dullness, loss of appetite, constipation and jaundice. When fever sets in, and there is decided tenderness over the right side of the abdomen, particularly behind the last rib, hepatitis or inflammation of the liver may be suspected. Rychner has spoken of this disease in cattle as attendant with typhous symptoms, slow respiration, yellow urine, and milk of the same colour and bitter taste. Usually hepatitis runs a rapid course, especially if the peritonæum becomes inflamed, when colicky symptoms constitute a leading feature of the disease.

Causes.—Heat is one of the most potent causes of congestion and inflammation of the liver. Hence it is a disease more commonly seen in hotter climates than our own, where, indeed, it occurs as an enzootic, and the liver becomes hypertrophied, attaining the weight of forty or fifty pounds. Lessona speaks of the disease in its enzootic or epizootic form in Italy in 1827.

Treatment—Very much the same rules for the treatment of congestion and inflammation of the liver may be applied as for the treatment of jaundice. Mustard poultices or blisters applied over the region of the liver should however be vigorously resorted to, besides the internal use of purgative salines, calomel, clysters, etc. In chronic cases, external friction with mercurial and iodine ointment are of service.

Apoplexy and Hemorrhage of the Liver—Hæpatirrhœa.

This accident far more frequently occurs in overfed horses than in cows. On the continent it is occasionally seen in cases of anthrax, and attended with the well-known symptoms of that very fatal malady.

Fatty Liver.

Cows are affected with a fatty degeneration of the structure of the liver under a variety of circumstances, and particularly when the system is undermined by the plan of overfeeding in order to produce much fat and a round form. High bred animals are therefore those in which the morbid condition is to be seen, and the various ailments to which a very fat cow is subject are connected, to a great extent, with this morbid state of the liver. Dullness, constipation, loss of appetite, jaundice, are premonitory signs of the system giving

way, and tubercles are then probably deposited in different parts of the body, particularly in the sub-pleural areolar tissue, ending in decided consumption.

This disease can only be palliated during life by the periodic administration of purgatives and diuretics, and by judicious feeding. It is however incurable.

PARASYTIC DISEASES OF THE LIVER.

The Fluke—Distoma Hæpaticum—Rot.

This parasyte abounds in the livers of cattle under a variety of circumstances, and induces a weak and dropsical condition of the system, termed *cachexia aquosa*, and generally known by the name of Rot.

Rot is an affection more commonly seen amongst sheep than cattle, and it is almost unknown amongst the latter in Great Britain, but it is the cause of very serious loss on marshy lands on the continent of Europe.

The parasyte, which belongs to the order of the trematode or sucking worms, is subject to various metamorphoses, being met with in the liver only, in its completely developed state, surrounded by an abundant deposit of eggs. These pass out of the body and undergo a stage of development in other animals, probably mollusca, which exist in myriads in damp pas-

tures, and find their way with the herbage into the stomachs of cattle. Probably the watery and innutritious condition of the grasses grown on damp pastures favours the anæmic and dropsical condition, and it is only when the system has suffered that the parasytes multiply without limit in the gall ducts. Indeed, the fluke is not the only parasyte which preys on animals subject to the debilitating effects of pasturing on boggy lands. The filaria lachrymalis, a small thread worm, lodging in countless numbers in the eye-socket, is seen leisurely crawling over the delicately sensitive and transparent structures of the globe without apparently inducing any pain or inconvenience. Ascarides, strongyli, not excluding animal and vegetable parasytes on the skin, multiply with almost incredible rapidity in systems thus undermined.

Symptoms—Amongst a herd of cows on low damp ground, some are observed to thrive better than others, their skin is sleek and the forms rounded by an ample subcutaneous deposit of fat. These animals, however, soon indicate languor and torpidity, which increases, and a rapid change in condition occurs. The skin and visible membranes become pallid, the body wastes, the eyes become sunken, and not unfrequently a hollow cough sets in; the limbs occasionally swell, and sometimes serum distends the connecting tissue beneath the chest and belly. Cows in milk yield a thin watery se-

cretion in spare quantities; they soon become very helpless and scarcely able to stand. The appetite continues, however, until within a short time before death. The signs of an approaching fatal end are accumulations of fluid round the throat, in the chest, and belly, with great predisposition to derangement of digestive organs, diarrhœa, and total failure of strength, so that the animal drops, and slowly dies. The progressive emaciation, notwithstanding the most careful treatment, is characteristic of the condition already described, and termed "hectic."

Post Mortem appearances.—These consist in all the signs of wasting of the tissues. Displacement of fatty matter by yellow serum, which distends the fat cells, particularly round the kidneys. A yellow turbid serum exists all over the body, indicating the dropsical condition of the animal during life. The parasytes above mentioned are found in the organs they usually inhabit, particularly the fluke or distoma hæpaticum, which plugs the hepatic ducts, distending these into pouches. The ducts are occasionally encrusted by calcareous and biliary principles, so that by a little maceration, perfect casts of the diseased biliary ducts are obtained. All the pouches or cul de sacs formed along the curves of the tubes are occupied by flukes and their ova.

Treatment.—Removal to a dry, sound pasture.

Exhibition of common salt in food, and of tonics, both vegetable and mineral, but particularly the latter. Sulphate of iron is probably the most useful preparation to administer. And, if possible, cows should be allowed water impregnated with iron, which is readily obtained from a smith's shop, by using that in which much iron has been cooled.

Biliary Calculi—Gallstones.

These concretions may be frequently found in the livers of slaughtered animals. They rarely give rise to any symptoms during life, though they may obstruct a hepatic duct, induce abdominal pain, and general symptoms of jaundice.

The gallstones of cattle are characterized by an odour of musk, which becomes very distinct by acting on them with caustic potash, or ammonia. They may be distinguished as—

1. *The dark green.* These attain considerable size, and are found in the gall-bladder or in distentions of the gall ducts. Their form is irregular. They are of a dark green colour, and grooved on their surface. They are sometimes perforated, and appear rather as indurations of the walls of hepatic ducts. They are sometimes hard, and at others soft and brittle. Their forms depend on the manner in which their elements are held together by the tenacious mucus of

the gall ducts. They contain bile, colouring principles, mucus of the biliary ducts, water, and sometimes fat.

2. *The yellowish brown gallstones* are round, and sometimes polyhedral. They contain no cholesterine.

3. *The white gallstones* adhering to the hepatic ducts, rough on their surface, and of a dirty white colour, though yellowish brown in their interior. They contain phosphates and carbonates of lime, carbonate of magnesia, organic matter, and water.

Treatment is rarely, if ever, required in cases of gallstones. The internal use of glycerine, alkaline draughts, etc., have been recommended.

Diseases of the Spleen.

There are no diseases of cattle of common occurrence and any importance attacking the spleen, with the exception of splenic apoplexy, which has been described amongst blood disorders. This affection has been spoken of as splenitis, but it is not inflammation of the splenic organ. The spleen is liable to atrophy—a condition unattended by constitutional symptoms—and to hypertrophy, which, as in man, is probably due to a fever of an intermittent type, demanding the use of quinine as an antiperiodic.

Diseases of the Pancreas.

In a few years much light will doubtless be thrown on the functional disorders of this most important

gland. Already more information on the subject relating to the human subject has been obtained, and by care in observing different forms of indigestion, diarrhœa, and other intestinal derangements, we may trace specific forms to derangement of pancreas.

Pancreatic calculi, or small white concretions, varying in size from a millet seed to a common pea, are often found in large numbers in the pancreatic ducts of cows after death, but we are not aware of any symptoms being induced by them during the life of the animal.

Diseases of the Organs of Circulation.

Many of the maladies of the circulatory system in cows pass unnoticed until the heart and vessels are exposed to view by the butcher. The quiet state in which these animals are kept prolongs their life even when very great obstruction to the circulation exists, though in some countries, as in Italy, sudden deaths from heart disease are far from rare.

Carditis, Endocarditis, and Pericarditis—Inflammation of the Heart.

It is usually the serous membranes covering the heart externally—the pericardium—or internally, the endocardium—which are inflamed when a cow is said to have inflammation of the heart. That the muscular structure can inflame we cannot doubt, though such a

condition would materially or totally interfere with the heart's action, and be speedily fatal. In rheumatic disorders in cows, endocarditis or pericarditis may be observed as in any other animal, and extensive adhesions and exudations may occur, both in the pericardial sac and beneath the inner lining of the heart. As mentioned under the head of diseases of the reticulum, the heart may be wounded by an object passing from the stomach through the diaphragm into the chest. Sometimes the foreign object induces pericarditis, effusion, adhesion, and ultimately death.

Symptoms.—In acute cardiac inflammation there are symptoms of fever, loss of appetite, difficult and sometimes very painful breathing, with an absence of pulmonary lesions, as discovered by auscultation. The pulse becomes very frequent, but small and thready. A loud friction sound indicates the presence of adhesions between the layers of pericardium. If much fluid has been effused, the sounds of the heart are distant and indistinct. In fatal cases, the embarrassment to the heart's action and the constitutional debility rapidly increase. In chronic cases a defect in action, indicated by an irregular and feeble pulse, is especially noticed when the animal is excited. In other instances the symptoms gradually subside, and the cow is restored to perfect health.

Treatment.—In all but traumatic cases in the early

stage, appropriate treatment is of great service. It consists in giving purgatives, clysters, diuretics—applying mustard or more active blisters on the surface of the chest. The animals must be very carefully dieted and kept very quiet.

Polypus Cordis—Heart Concretions.

Either as the result of inflammation, or from other causes, tumours or fibrinous concretions are formed outside and within the heart. Not unfrequently chronic lesions, such as the development of a tumour formed chiefly by imperfectly organized lymph, indicate the pre-existence of cardiac inflammation. I have seen several cases of polypi attached either to the auricles or ventricles, and only discovered after death, without any suspicion of their existence during the animal's lifetime. My brother described a very interesting specimen, from a case of this description, in the second volume of the Edinburgh Veterinary Review, at page 30.

I have seen parasytic tumours formed by a mass of echinococchi attached to the heart's apex or connected internally with the valves.

Morbid Changes in the Form of the Heart.

Under the influence of various causes the substance of the heart may become thickened, or in other cases it may become wasted, the cavities at the same time dilat-

ing. The history of these diseases is somewhat beyond the province of this little treatise.

Ectopia Cordis—Deviation in the Position of the Heart.

This is a malformation which the veterinarian meets with in calves at birth. The heart may be lodged outside the chest, either at the root of the neck or through a fissure in the sternum below the chest, or in the abdomen. These deformities are necessarily incurable and destroy the animal.

Degeneration of the Heart.

The substance of the heart in over-fed cattle is very apt to undergo fatty softening, the muscular fibres breaking up and being replaced by oil globules. This may so weaken the heart as to favour its rupture under sudden effort—an accident more common in man than in the ox tribe. Another but more rare form of degeneration is that of ossification, which may invade even a great portion of the structure composing the ventricles, and consequently interfere much with the circulation.

Diseases of the Blood-Vessels.

The arteries in old cows are occasionally the seat of atheroma or fatty degeneration and incrustation. More rarely they undergo a spontaneous plugging termed

embolismus—the fibrinous concretions formed within the heart in inflammation become detached in particles, which may plug important arteries, or the latter may inflame and cause the coagulation of lymph on their inner coat. Virchow has given the name of embolia to these fibrinous obstructions, which may be either arterial, capillary, or venous, and which are not only seen in cases of endocarditis, but also in parturient fevers and other disorders of the vascular system.

Phlebitis, or inflammation of a vein, may occur in a cow after the operation of bleeding. It is a dangerous disease, which requires active treatment. Any source of irritation must be removed, the parts at first fomented, and afterwards a fly blister may be applied on the skin over the seat of the inflammation.

Diseases of the Absorbents.

Cows rarely suffer from diseases of the lymphatic system. Lymphangitis may attend inflammation arising from a wound or attaching important structures, such as those composing a joint, but it is rarely seen as a primary affection.

The symptoms of lymphangitis are a corded state of the vessels communicating with any source of irritation. The lymphatics may become knotty, and even suppurate at different points. This is a condition similar to that of farcy in the horse, but never attended

by the development of the specific poison peculiar to this disease of the equine race.

Treatment. — Evacuants, poultices, fomentations, stimulating embrocations.

Diseases of the Respiratory Organs.

From the prevalence of epizootic pleuropneumonia, great importance is attached to all acute disorders of the respiratory organs, and a common sore throat in a cow is often looked upon as more serious than other dangerous maladies. The proper diagnosis of these diseases is therefore of the highest value to the stock-owner who may be alarmed unnecessarily, or prematurely destroy or remove a valuable animal. In the article on the epizootic pleuropneumonia, considerable attention has been devoted to the causes of the disease, and both professional and non-professional persons will better determine from the history of a case, than from any series of symptoms, the nature of a disorder accidentally observed amongst an otherwise healthy stock. As the disease advances, unmistakeable symptoms arise, but it is in the very early stages that a very dangerous case may pass comparatively unnoticed, or a simple disease believed to be the commencement of an attack of a fearful epizootic. In order to avoid this, it is advisable that newly-bought animals should, if possible, be placed in quarantine, and kept at a dis-

tance from the home stock for a period of a month or forty days. It is by this process that several short-horn breeders who need cows to nurse their calves, have guarded themselves against the introduction of the disease. But where circumstances prevent this, or by pure accident an affection of a doubtful nature is observed, it should be remembered that in the certain absence of communication with infected beasts, the epizootic pleuropneumonia cannot occur. Local causes must be examined, and it is often found that an animal has been exposed to influences capable of producing catarrh or some more serious affection of the respiratory organs; or that the malady is chronic, but only recently indicating doubtful complications. In fact, the history of every case should be examined with great minuteness, and then the symptoms, particularly those revealed by auscultation, must be investigated.

Nasal Catarrh—Coryza, or Catarrhus Nasalis.

Cows are not subject to nasal catarrh as frequently as other domestic animals. The disease consists in inflammation of the membrane lining the nose, and discharge of a muco-purulent or purulent matter. It is sometimes attended with considerable fever, and at others with no perceptible systemic change.

Causes.—Any circumstance which tends to check

secretion from the skin or mucous membranes, in combination with a cause operating more or less directly in the respiratory passages, may give rise to a nasal catarrh or "common cold." It is a disease peculiarly prevalent in exposed situations, and along a bleak sea coast. It is more rarely seen in well-sheltered pastures and properly constructed cowhouses. Sudden changes in the weather, and particularly in temperature, induce the disorder.

Symptoms.—The cow sneezes, coughs, and indicates uneasiness. The eye and nasal membranes are red, and at first dry. A watery mucous discharge occurs at first, and this increases in density, opacity, and quantity. It is in the early stage that febrile symptoms, if present, are most apparent. Then a feverishness, followed by a hot dry skin, constipation, scanty and high-coloured urine may be observed in severe cases. When the nasal discharge is abundant the fever diminishes, though in some cases the animal becomes weak and languid, and is peculiarly liable to further complications in the disease affecting it. This is usually referred to as "a repetition of colds which may afterwards settle on the lungs," and accordingly the inflammation may extend from the nose to the throat, and down the windpipe to the lungs. These complications we must refer to under separate heads. In favourable cases the fever subsides, the nasal dis-

charge gradually passes off, and the cow regains her wonted health.

Treatment.—Low diet; clysters, and sometimes a saline purgative. Usually a few doses of cream of tartar and nitre, one ounce of each, given in solution; or two ounce doses of sulphate of soda, repeated twice or thrice daily, are quite sufficient to act upon the system. The local treatment consists in steaming the nostrils in the early stage, and if the case proves obstinate, injecting a weak astringent lotion into the nose. It is rare that cases of chronic catarrh, of the incurable description observed in the horse, are seen in the cow.

Malignant Catarrh—Catarrhus Sinuum Frontalium.

Many writers on the diseases of cattle have referred to a malignant catarrh, which has been mistaken by some as glanders. The ox species is not liable to glanders, especially in its idiopathic form. Its transmission by inoculation is quite possible, but propagation by ordinary contagion from horse to cow of true glanders is unknown. Just as glanders is peculiar to the horse, so is this malignant catarrh peculiar to the ox. It is a very dangerous disease, with tendency to gangrene in the parts affected, and not unfrequently accompanied by disorder of the brain.

Causes.—This disease occurs both in elevated and

in low situations. It prevails chiefly in spring and autumn, especially when these seasons are very wet. Young cows and oxen are most commonly affected. Old cows are usually exempt.

Symptoms.—The premonitory signs are very similar to those of simple catarrh, though there is more constitutional disturbance, and not unfrequently the alimentary canal is much deranged, and severe diarrhœa sets in. The fever runs very high, though the temperature of the body soon becomes very variable. The second stage of the disease is attained the second day, when the nasal discharge becomes ichorous and tinged with blood. The matter accumulates in the nasal sinuses, and its presence there is indicated by the dull deadened tone emitted on percussion. Red spots appear on the buccal membrane, and over these the epithelium becomes detached. Petechiæ are observed not only on the mucous membrane, but also on the white portions of skin. The appetite is totally lost, fœces hard and scanty, micturition painful, and the limbs become stiff. Pregnant cows abort. In the third stage, a fetid greenish or brown discharge flows from the nose ; the horns drop off ; and Professor Anker of Berne has seen the hoofs of cows also separated by gangrene of the vascular parts beneath them. The animals are seized with convulsions, the diarrhœa increases, and death soon supervenes. The disease

lasts from five to twelve days, and is very acute in young animals.

Post-mortem Appearances.—The body is found more or less emaciated, and with a yellow serum infiltrating many structures. On opening the cavities of the body, the serous membranes are all found ecchymosed. This condition is particularly observed in the pericardium and within the ventricles of the heart. The arachnoid, both in the cranium and spinal canal, is also the seat of blood extravasations, which have been erroneously considered signs of inflammatory action. They are usual lesions of blood diseases.

Treatment.—The system must be acted upon by neutral salts, or the mineral acids largely diluted. In some cases, attended with much prostration and diarrhœa, the following prescription may be given :—

℞

Magnesia sulphatis . . .	℥vi
Ferri sulphatis . . .	℥i
Acidi sulphurici . . .	℥ss

This should be dissolved in a gallon of water and given in two doses, with an interval of four hours, and repeated for two or three days. The eyes, the nose, and base of horns, should be frequently washed with cold vinegar and water. Pounded ice and salt may be applied to the head when this is very hot, and attended with much distention of the sinuses. An

aloetic purgative has been recommended by Berthollet, and in all cases advantage may be derived from clysters. The sinuses have sometimes to be trephined. As the disease advances, carbonate of ammonia, camphor, and other stimulants, must be prescribed; and throughout the progress of the disease great attention must be paid to diet, ventilation, and keeping the animal's body suitably covered in cold weather, etc.

Laryngitis—Sore Throat.

Either in connection with coryza, or independently of it, the larynx or throat may become inflamed, and this is indicated by a sharp, loud, and frequent cough, pain on pressure, and difficulty in swallowing.

The treatment of this simple disease consists in the exhibition of a mild laxative, and the application of an ample mustard poultice, or an active rubefacient over the throat. Great benefit is often derived from the use of an electuary. Many forms are mentioned for the latter in the Veterinarian's Vade Mecum. There are two kinds to be recommended. In the acute inflammatory stage a mild saline and sedative electuary, containing nitre and a small quantity of extract of henbane, may be employed. In the earlier or congestive stage, and in the later or catarrhal stage of the malady, an astringent electuary may be used, containing, alum two ounces, camphor one ounce, treacle one pound. A tablespoon-

ful of this mixture smeared over the tongue occasionally, induces a speedy revolution of any laryngeal inflammation.

CROUP.

This is extremely rare in the lower animals, but it has been observed in most of them, and particularly in the cow. It is an inflammatory affection of the larynx and trachea, with a tendency to the development of false membranes on the surface of the mucous membrane of these parts. The characteristic symptoms are, intense irritative fever, loud and rough respiratory murmur, with a tendency to suffocation, indicated by offensive cough, blue colour of visible mucous membranes, and swollen appearance of the veins over the different parts of the body.

This disease is very fatal. Treatment consists in blood-letting in the early stages, and the free use of active blisters. In some cases tracheotomy may be recommended as an early measure. In the later stages, when much debility exists, stimulants must be used.

BRONCHITIS.

Inflammation of the trachea and bronchial tubes occurs rather frequently, especially in our own climate, and towards the eastern coast. It is in the months of March and April that attacks are most common, and are frequently mistaken for pleuro-pneumonia.

Symptoms.—A loud sonorous râle heard on listening at the passage of air through the windpipe and bronchia. The lungs are tolerably clear, though the respiratory murmur is very clear over the greater portion of the lungs. The cough is painful, short, and frequent. The symptomatic fever is often considerable.

Treatment.—Bleeding in the very early stage, purgatives, mustard poultices over the neck and chest, the exhibition of doses of nitre, or acetate of ammonia, and in the catarrhal stage, of astringent ferruginous tonics.

Pneumonia.

Inflammation of the substance of the lungs may result from a case of bronchitis, or originate spontaneously. It is caused by similar influences which give rise to the foregoing diseases.

Symptoms.—An active shivering fit, followed by considerable heat and dryness of skin, a clammy mouth, redness of the visible mucous membranes, and a short painful cough. On auscultating, one or both lungs may be observed to be at first the seat of a crepitating or moist murmur, which soon ceases in some parts where the lung tissue becomes consolidated, and increases in others into which the air rushes. The absence of respiratory murmur most commonly commences towards the base of either lung, but I have seen some

instances in which the anterior and posterior portions of a lung were pervious, and the central portion wholly consolidated, though admitting of some air through some open bronchial tubes. As the consolidated portions became pervious, in the process of cure, a creaking sound is heard, which gradually gives way to a healthy respiratory murmur.

In pneumonia death often occurs from suffocation, and at others from the constitution giving way under a severe and prostrating disease. This is particularly seen in cases in which abscesses form in the lung tissue, and in which there is a very exhausting cough.

Treatment.—Venesection in the congestive stage. Large mustard poultices kept on for three or four hours over the chest. Blisters, should the mustard act imperfectly. Salines, coupled with other remedies, referred to as useful in other inflammatory diseases of the respiratory organs.

Pleurisy—Hydrothorax, *or Water in the Chest.*

The serous membranes covering the lungs are actively inflamed in the epizootic pleuro-pneumonia. Sometimes the pleuræ are independently attached, and the lungs are not involved in the disease. The causes are very similar to the causes of inflammation of the bronchia or lungs, though pleurisy is most likely to occur in animals with a predisposition to rheumatic

fever, etc. Animals exposed to cold and other deleterious influences, become severely affected with fever, and a considerable interruption with the action of the thorax and expansion of the lungs. The breathing is quick, short, and painful. Pressure between the ribs, or the rapid movements of an animal, are attended with pain. The respiratory murmur is diminished in intensity, but is perceptible over the whole surface of the lungs. There is dulness towards the lower or most dependent part from the occurrence of effusion. Over other parts of the thorax there is a grating leathery friction sound.

The acute febrile symptoms may suddenly subside, the animal for a short time regains her appetite, and, on auscultating the chest, it may be found that towards the upper part the murmur is audible and sound. But on percussing and auscultating the lower part of the chest, dulness and absence of healthy murmur are perceived. This indicates effusion, which may increase, interfering considerably with the freedom of the lung, and producing great dyspnœa. The animal becomes weak, languid, and sometimes exhausted by the disease, or suffocated by compression of the lungs.

Treatment.—In the acute inflammatory stage the treatment is very similar to that practised in cases of pneumonia. When effusion commences, evacuants should be freely used, such as aloetic purgatives and

vegetable diuretics. I have witnessed the best effects from diuretic doses of digitalis, with resin and nitre repeated frequently. If much fluid has accumulated in the chest, the cavity must be punctured with a small trochar, and this operation often requires to be repeated. When the fluid is removed mechanically, astringent and tonic remedies must be given, in order to prevent if possible, the renewed accumulation of liquid. It is bad practice to use depletives, and in any way to lower the system, when effusion occurs.

Tubercular Consumption.

In certain conditions of the system, both in man and the lower animals, the lymph, which in a normal state nourishes the tissues, is thrown out in large quantities, unfit for the process of nutrition, and becomes aplastic. It accumulates in masses in certain parts, undergoing but very slight development, remaining for an indefinite period as a solid unchanging substance, and having a tendency to degenerate. The degeneration consists in some animals in liquefaction, and in others a fatty or calcareous transformation ensues. In man the tubercular deposition occurs chiefly in the substance of organs, and particularly in the substance of the lungs. In the cow it is chiefly seen beneath and in connection with the serous membranes. Large masses accumulate beneath the costal pleura,

over the diaphragm, and in different parts of the peritonæum. The omentum is often the seat of a very extensive deposition of tubercle.

Tubercular matter accumulates in circumscribed deposits, varying in size from the head of a pin to a hazel nut. Many of these flattened or rounded tumours, joining to form a very voluminous and slightly vascular mass, which by increasing in size compresses the lung, and induces considerable derangement.

Cause.—Hereditary taint is not always so obvious a predisposition in the lower animals as in the human subject. Nevertheless cows, with a well marked tubercular diathesis, give birth to calves possessing a similar constitutional tendency. It is a disease induced by peculiar conditions affecting the milk cow. It prevails most amongst aged animals, and generally amongst abundant milkers. It is associated, or it may be the cause of irritation of the ovaries, inasmuch as most of these animals are "bullers," or affected with nymphomania. It appears to me that this complication arises often from an imperfect development of the ova in the ovaries, and cysts periodically form without maturing the ovule. This imperfect action may essentially depend on the weakened state of the constitution, and the aplastic nature of the material usually destined for nutrition.

The symptoms of the disease are in the early stage

simple cough, with dainty appetite, dulness, weak pulse, though loud heart beats, as in anaemia. Emaciation sets in, the animal becomes hide-bound, its coat stares. The cough is peculiarly oppressive at times. The lymphatic glands of the body are not unfrequently swollen, and the seat of tubercular deposition. Their enlargement is observed in the maxillary, and towards the cervical regions. Cows with this disease stand obstinately, with an arched back, and dejected look. They yield often a large quantity of blue watery milk, and from this circumstance they are often retained in dairies till a period when the disease is very far advanced. Discharge by the eyes and nose, with diarrhoea, and a fatal hectic, constitute the concluding features of this deadly and lingering malady.

Treatment.—Animals with this disease require food rich in starchy and fatty principles. Linseed cake, oils, and easily digested meals, often effect more good than medicines which may be employed. Ferruginous tonics are of use, given cautiously, and by careful nursing the condition of the animal may be much improved, and its life considerably prolonged.

Parasytic Lung Diseases — Phthisis Pulmonalis Verminalis.

This is a malady confined almost entirely to calves and heifers. It is sometimes very fatal and very

common, particularly during some seasons. It is due to the development of a thread worm—strongylus micrurus—in the respiratory passages, which induces cough, emaciation, and so much obstruction, as to give rise to symptoms of suffocation, and even death from apnœa.

Symptoms.—A frequent and spasmodic cough, associated with oppressed breathing and irritation about the nose, indicated by the animal rubbing it against any object, constitute the leading symptoms of this disease. Emaciation soon follows; the appetite continues, but nutrition is imperfect or suspended, and there is a tendency to dropsical effusion in different parts of the body. The cough becomes more and more troublesome, until at last, from the parasytes completely obstructing the trachea, suffocation ensues. Michels and Fischer have both seen the disease in old cows.

The parasyte which pervades the lung tissue, and accumulates in the bronchial tubes and trachea of calves and heifers, deposits ova, and masses of the germs and partially developed animals are found imbedded in the lung tissue, surrounded by a semi-gelatinous material, which is granular, and contains pus cells.

Treatment.—The internal exhibition of small doses of turpentine, lime water, inhalation of chlorine or tobacco smoke, mineral and vegetable tonics.

DISEASES OF THE URINARY ORGANS.

The Urine.

I cannot enter on the consideration of disorders of the urinary apparatus without expressing a regret that so very little has been done, on the examination of the urine of the domestic animals, by the veterinarian. Not only is it difficult to diagnose some nephritic disorders without such examination, but in many constitutional states the condition of the urine is absolutely and alone diagnostic. In proof of the latter, particularly in reference to dairy stock, I have to refer to red water in the cow, a blood disease, the principal feature and leading symptom of which is the modified secretion of the kidneys.

It is not complex quantitative analyses, such as the one published at page 175, that the practitioner needs to determine the nature of any disorder attended by a change in the condition of the urine. The healthy urine of the cow is strongly alkaline, it has a specific gravity of 1·030, and when allowed to cool, a sediment is deposited. This is often very abundant, and its character may be of signal use in detecting the existence and progress of a disease. On adding a strong acid to the urine of the ox or cow, effervescence takes place, owing to the decomposition of the carbonates

which it contains in large proportion. The tests most commonly employed for determining the condition of the urine are test papers for ascertaining its acid or alkaline reaction, the urinometer for determining its specific gravity, and nitric acid and potassa, aided by the action of heat. *The specific gravity* offers most valuable information; and this can be ascertained by the urinometer, which should be as constantly in the pocket of the veterinary practitioner as the lancet and fleam in former days. The urinometer furnishes the difference between the specific gravity of urine and distilled water. If it be less than in the normal state, it may indicate the introduction into the system of a large quantity of fluids; this is not of great importance, though in many cases it may indicate the defect in the nutritive functions as in phthisis or hectic, and in others the injurious operation of bad food having a diuretic action, and rendering the secretion very watery. An unusually low specific gravity should make us suspicious of the presence of albumen, whereas a very high specific gravity should cause us to inquire whether sugar be present or not. The information obtained by these means is most valuable, for although albumen in very minute amount exists in the urine in various constitutional states, its presence in large quantity generally points to important structural changes of the kidneys. The presence of sugar

in the urine is a matter of great importance, as it is supposed to indicate a disease of very serious nature, diabetes.

On applying heat to healthy urine no change takes place ; a white sediment may in certain cases be thrown down. This may consist of phosphates or of albumen ; to determine which of the two is present, a few drops of nitric acid should be added, when the precipitate, if it consist of phosphates, will be dissolved, if of albumen, it will be increased.

If a small amount of healthy urine be boiled in a test tube with an equal bulk of liquor potassæ, no marked change takes place. If, however, sugar be present, the liquid assumes a yellowish colour, rapidly changing to brown, and ultimately assuming a more or less marked claret colour.

The colour of the urine is of great value, though a microscopical examination is sometimes necessary to determine the nature and condition of the colouring principle. The redness of ordinary hæmaturia associated with flocculent masses of clotted blood, distinguishes hæmorrhage from the kidneys from the many varieties of morbid urine which owe their colour not only to the colouring principles of blood but to other causes.

Examining the urine microscopically, it is easy to acquire sufficient proficiency to detect the urinary casts

in albuminuria. The abundant epithelial scales in some cases indicate irritation of the mucous membrane of the urinary system. Pus globules indicate suppuration either in the kidneys, bladder, or urethra.

The veterinarian may rest satisfied in the majority of instances with ascertaining the quantity of urine voided in a given time; the reaction, specific gravity, colour and sediment; lastly, determining whether or not albumen is in the urine by heat.

The difficulties, apparently, in the way of such examinations, are the collection of the urine; the difficulties of measuring the large quantities obtained; the time and trouble which the examination takes. The first obstacle must be overcome by requesting the attendants on animals to procure the urine. The second is unimportant; and the third, though perhaps the greatest, should never be allowed to interfere, in the same way that the physician feels bound to devote care and attention to his cases. Besides which, a very few minutes often enables the practitioner to ascertain most important facts. I know of no investigation which will more amply repay the inquiring practitioner.

Diabetes.

This disease consists in an increase in the quantity, and modification in the quality of the urine.

Symptoms.—The amount of secretion daily is very

large. The urine is clear at first, becomes greenish afterwards, and has a peculiar oily appearance. It is said to be charged with sugar, and this is determined by adding liquor potassæ to the urine, and boiling. The change in colour from a yellow to a brown and crimson, with a characteristic colour of burnt sugar, indicate the presence of the latter. The animal is dull, weak, costive, and loses flesh.

Treatment.—Rychner recommends tonic and astringent remedies. Careful diet is of the greatest importance—fresh meals and oilcake, with sound green food.

Hæmaturia.

I have before stated that the effusion of blood occurring in injuries to the urinary apparatus, may readily be distinguished from the ordinary discolorations of urine.

The cause is usually an injury to the lumbar region, though in some cases organic disease of the kidneys or bladder lead to the discharge of blood. Sometimes the hæmorrhage is passive, and attended with slight constitutional disturbance and no pain. At others there are severe symptoms, similar to those of nephritis.

Treatment.—In the passive hæmorrhage, doses of alum, acetate of lead, and laudanum may be given. In the active disease the treatment must be varied according

to circumstances, and sometimes antiphlogistic remedies, with perfect rest and low diet, are to be recommended.

Nephritis—Inflammation of the Kidneys.

This disease is not unfrequent in the cow, and may be caused by bad food, by the abuse of diuretics, by improper administrations of cantharides, &c.

Symptoms.—Very great systemic irritation, scanty and painful discharge of urine, tenderness over loins, great prostration and weakness of the hind-quarters, urine high coloured and albuminous.

Treatment.—Warm fomentations and poultices to the loins, warm water clysters, linseed tea in large quantities, and an aloetic purge. Calomel and opium may be given in small and repeated doses in severe cases.

Cystitis—Inflammation of the Bladder.

In conjunction with inflammation of the kidneys, and sometimes alone, we have inflammation of the urinary bladder. This is not unfrequently due to local causes, such as the presence of vesical concretions, but at other times it is brought about by irritants with which the urine may be charged.

The symptoms are very severe; the cow evinces great abdominal pain, a tendency to void urine frequently, but at each attempt a few drops alone pass.

The pulse is full and frequent, the nose hot and dry, the mouth clammy, the eyes bloodshot, and unless speedily relieved, the animal sinks from exhaustion.

Treatment.—The bladder must be examined, and any local cause removed. Local and general antiphlogistic treatment is called for. Bleeding may be had recourse to, and the free use of demulcent draughts. The occasional injection into the bladder of a weak solution of gum-arabic will relieve.

Prolapsus Vesicæ—Protrusion of the Bladder.

After and even during difficult labour, a membranous bag is observed between the lips of the vulva. I have known practitioners puzzled with this appearance. It is due to the laceration of the vagina and protrusion of the distended bladder, which being twisted at its neck, becomes filled with urine, and cannot be emptied. This accident is attended with great inconvenience, and calls for considerable skill in replacing the organ, and closing the wound in the vagina by metallic suture.

Various other disorders of the urinary organs may be observed in the cow, but I have referred to the most important in the foregoing summary.

DISEASES OF THE SKIN AND CELLULAR TISSUE.

Hide-Bound.

This is usually a symptom of febrile diseases. It is a functional disorder of the skin, and subcutaneous areolar tissue, consisting in suppressed secretion, deficient moisture, and a remarkable rigidity of texture. It is frequently seen in cows, and commonly cured by the exhibition of a purgative.

Particular attention must be paid to the great difference between different animals in the thickness and pliancy of the skin. Some coarse bred animals appear always hide-bound when lean. It is a bad sign, and should be sufficient to condemn a cow in choosing for a dairy.

Lice.

In the dairy three species of lice may be observed, two on the cow, and one, a distinct species, on the calf.

I. *Hæmatopinus Eurysternus*—the common louse of the ox. Very frequently met with, especially about the neck and shoulders, giving rise to great irritation and loss of hair. The number of insects is very great, and the young ones are much more agile than the old, according to Denny, differing in nothing except

a want of proportion, the limbs being much thicker as compared with the bulk of the body than when an adult.

II. *Hæmatopinus Ani et Vulvæ.*—Davaine and Rayer have described a peculiar form of louse which infests the anal region of the cow, and may be found on the thighs, tail, sides of the vulva, and perinæum. It is a distinct species.

III. *Hæmatopinus Vituli*—Louse of the Calf.—Denny says, in his Monographia Anoplurorum Britanniæ, "The only two examples of this species which I have examined were kindly forwarded to me by the Rev. L. Jenyns, who found them upon a calf. Mr. J. named them *vituli*, and I have no doubt they are the same species so named by Linnæus and Fabricius. It may appear somewhat strange that a young animal should have a distinct species of parasite which is not found upon its parents; but, as far as we are able to judge, such is the fact. I have examined numbers of the lice from oxen, but never detected a single specimen of this species amongst them, though there were of Trichodectes Scalaris, which lives upon cattle, and in society with the Hæmatopinus Eurysternus."

Trichodectes scalaris is another of the lice, belonging to a different genus from the above, and, as already stated, found associated with them.

Symptoms.—Lice are exceedingly troublesome, and occur in large numbers on ill-fed and dirtily-kept animals. They induce great irritation, and spread through a herd with great rapidity. They accumulate in large quantities on special parts of the skin, depositing their ova, which remain firmly adherent to the hair and induce a constant production of lice, notwithstanding repeated dressings, which destroy any that are born and living.

Treatment.—Cleanliness. Weak mercurial ointment. A wash, containing one drachm of corrosive sublimate to every ten ounces of water. The wash should be rendered very bitter by aloetic decoctions. Ointments and oils are usually most effectual in clearing animals, but the poisonous lotions, if carefully applied, are very useful.

Warbles—Wornils—Oestrus Bovis.

A dipterous insect—Oestrus Bovis—which, like other parasites of its kind, is probably incapable of taking nourishment in its perfect state, lives in its larva condition in or beneath the skin of cattle. The fly pricks its victim, and deposits its egg, which grows into a larva, protected by a layer of lymph, and imbedded in a purulent deposit. Cows that are confined in pastures during the summer months become covered all over their backs with tumours varying in size from a

hazel nut to a walnut, and if any of these tumours are forcibly squeezed, the larva shoots out with much force, and the liquid surrounding it follows. No treatment is required in these cases.

Spring Eruption of Cattle—Prurigo Vernalis.

This disease, characterized by much irritation of the skin, occurs in cows from changes in keep, especially when they have been stinted during the winter. It is also connected with the change in the coat. The surface of the body, and even the limbs, become covered with inflammatory spots, hard pimples form, which are broken by the rubbing, and a scab or crust forms. In a few days the scabs drop off and the skin remains without hair. The animal is hidebound, and its coat stares and looks unhealthy.

Treatment.—A purgative. A hot air bath if possible, but a thorough washing with soft soap and water often relieves. With good food and attention to cleanliness the disease speedily subsides.

Ringworm of Cattle—Herpes.

This disease has been termed psoriasis, eczema, and herpes. It has been most carefully studied by Gerlach, who has discovered the same fungus on cattle which produces herpetic eruptions in man. I should say, from the character of this disease in cattle, that its

technical designation should be herpes circinatus, or tonsurans. This malady is characterised by a change in the production and structure of the epidermis, induced by the intra-epidermic development of the tricophyton tonsurans. The tricophyton is a vegetable formed exclusively of round or oval spores, which are transparent, smooth, colourless, and homogeneous in their internal structure. These spores, as Robin describes them, appear in the interior of the roots of the hairs, forming a rounded mass, from which spring articulated filaments, formed by enchained spores or moniliform filaments. These, in developing, rise in the substance of the hair. The hairs break off when thus affected at a short distance from the mouth of the hair follicle. Thus this parasitic vegetable leads to depilation, the formation of scabs or crusts covering the sore skin where the trichophyton spreads its ravages. The extremely contagious nature of the malady depends on the facility with which the spores spread, are carried to and fro and develop. Various diseases, apparently different, because in different situations, are due to the same fungus. It is especially destructive in parts covered with hair, and hence it effectually invades the heads of cattle. A number of animals congregated together are observed to suffer from considerable irritation about the eyelids, forehead, and face. On looking at the part, circum-

scribed patches of stumpy hairs, scales, and imperfect scabs are observed. The attendants on these animals are very apt to take the disease, but as the fungus drops on their nearly hairless hands and arms, it soon ceases to torment them, though it produces for a time considerable pain and uneasiness from severe circumscribed inflammation of the skin. Horses and dogs will take the disease, and Gerlach tells us that sheep and pigs do not.

Treatment.—Oxide of zinc ointment. I have never found this ointment fail to cure this purely local disease, which should be cleared from stock the moment it is observed.

Mange—Scabies of the Cow.

The mange, or scabies of cattle, is an extremely contagious malady, due to the presence of parasites on the skin. It chiefly affects the back and neck, and is indicated by rubbing and scratching, with the hair dropping off after the production of small bladders, which break. A discharge flows, which is often irritant; at other times the epidermis is hard and dry. The moist mange, according to Rychner, is observed in cattle in good condition, and the dry in lean stock.

Gerlach has described two parasites as occurring in two different forms of mange in the ox—the one, Symbiotes Bovis, and the other Dermatodectes Bovis; the

first parasite fixes itself about the root of the tail and anus, whereas the Dermatodectes Bovis infests the skin along the back, from the head to the tail. The two parasytes vary in their habits. The Dematodectes is found in applying the scales or crusts which form on the diseased skin to the skin of the arm, when they pierce the skin, and may readily be procured. They cannot live on the human skin. The Symbiotes are readily procured beneath the scales by laying the latter in the sun, where they are found next day in small clusters.

Treatment.—Washing with soap and water, and using much friction. The application of oils or grease to the skin, and the use of creasote, largely diluted by spirit and water. If you destroy the parasite the disease is cured, and a good dressing with creasote mixture sometimes suffices to clean the skin.

Erysipelas—Inflammation of the Skin.

Rychner has described a form of erysipelas in cows which he calls "œdematous." Meyer refers to it as erysipelas boum. It occurs chiefly about the hind limbs, the udder, and surface of the belly. It may occur after an attack of epizootic aphtha, and extend from the feet to the knee or hock joints. The swelling occurs rapidly, chiefly about a joint; it is circumscribed, shiny, very painful, and pits on pressure.

The animal is very feverish, and is sometimes only relieved after several days' suffering. The disease often lasts fourteen or twenty days.

Treatment.—Purgatives, diuretics, and the use of active embrocations. In some cases the inflammation may be very acute, and diacetate of lead or arnica lotion should be applied.

DISEASES OF THE NERVOUS SYSTEM.

The disorders of the nervous system observed amongst dairy stock are not numerous, and I have already referred to one of the most common, which is sympathetic derangement or vertigo, incidental to distention of the third stomach, and to lead poisoning.

Sturdy.

In some countries young cows are often affected with *sturdy*, a parasitic disease due to the development of the cœnurus cerebralis in the brain. Within the last two months I have received the head of a young ox from Fife, in which I found, as anticipated by Mr. A. C. Muir, veterinary surgeon, then at Auchtermuchty, a well developed cœnurus. Occasionally cases of this disease are observed in Britain. The cause is invariably the accidental introduction of the germ of a

tapeworm, which is met with in the dog, into the system of the ox, or in the sheep, and the development of the hydatid from this germ.

The symptoms in this disease are, dullness, awkward gait, peculiar position of the head, and not unfrequently blindness on one side. A heifer thus affected may turn round and round like a giddy sheep, and in some cases indicate great cerebral excitement.

Treatment.—The seat of the hydatid must be ascertained, and the skull trephined, in order to remove the hydatid. This operation in cattle has been performed with great success by some of the German veterinary surgeons.

Osseous Tumours in the Cranium.

The cranial bones of aged cows are not unfrequently found hypertrophied, or with bony growths forming from their inner surface and pressing into the brain. These tumours attain a great size, and have a smooth globular character, with fissures and depressions on their surface, which have led them to be compared in shape to the brain, and a professor in the Milan school has described one of these tumours as a specimen of an ossified brain.

It is very remarkable that some of these large tumours, which lead to the wasting of a great portion of the brain, may exist without the animal indicating

their presence by any symptoms whatever, and they are only accidentally discovered after death. Sometimes they may induce congestion and irritation of the brain.

Apoplexy.

The cow is not very subject to congestion of the brain and apoplexy, except in connection with parturition. I have referred to parturient fever as varying much in character at different times, and one of the most remarkable varieties, is undoubtedly the apoplectic, to which special attention has been directed by Professor Simonds. This is characterised by coma, and is speedily fatal. The seat of the apoplexy or blood effusion is usually towards the medulla oblongata and upper portion of the spinal cord, though it might occur anywhere on the nervous centres.

Phrenitis—Inflammation of the Brain.

The cases of mad-staggers or vertigo, due to overfeeding or poisoning by lead, are often believed to be connected with inflammation of the brain but phrenitis is very rare, and characterised by very different symptoms.

Causes.—The most interesting case of phrenitis in the cow I have ever heard of, resulted from the presence, within the externally auditory meatus, of a mass of concrete cerumen or wax, represented in the accom-

panying cuts, and which induced inflammation of the

Fig. 32.

Fig. 33.

ear, communicating with the brain, and killing the animal by phrenitis.

Symptoms.—In the early stage of phrenitis the animal is dull and listless, with a full bounding pulse, stertorous breathing, and variable temperature of the extremities and body generally. The signs of delirium occasionally manifest themselves, and the animal sinks after them exhausted. The head is hot, the temporal arteries throb, the eyes are bloodshot, and the expression of the animal is that of extreme suffering. Unless early relieved, the stupor increases, and the cow falls unconscious, to rise no more.

Treatment.—A brisk cathartic. Bleeding from the jugular vein. Application of ice and salt, or a refrigerant lotion to the head. Mustard or turpentine liniment to the neck and limbs, etc.

Paralysis.

It is rare to observe any well-marked form of paralysis as a disease amongst dairy stock; and for information on the general history of paralytic diseases in the lower animals, I have to refer the reader to other treatises on veterinary medicine.

DISEASES OF THE GENERATIVE APPARATUS.

It is my intention shortly to publish, in a separate treatise, information relating to utero-gestation, and the disorders or accidents incidental to pregnancy and parturition. I shall therefore only refer to some of the principal maladies which come under the veterinarian's notice.

Abortion.

I consider this accident, in the first place, inasmuch as it is the most important and perhaps the most serious interference with the normal condition of the cow, that we usually observe. Amongst valuable stock, and in extensive dairies, we not unfrequently find that if one cow aborts, a number soon follow. This has been attributed to sympathy, and abortion has in a sense been regarded as contagious, but the real cause of the concomitant abortions in different

animals, is one operating alike on all, and the more susceptible first suffer, and then those that are least so. I think I cannot do better than reproduce here a short but most interesting article on this subject which Professor Tanner of Birmingham contributed to the first volume of the Edinburgh Veterinary Review.

"This is a peculiar form of disease, which occasions considerable loss to the breeder of stock. Some seasons are very much worse than others, and some districts are remarkably liable to it. Its importance is manifestly great, from the number of calves which are lost; but this does not reveal the full loss; for the heifer or cow is injured as a *breeding* animal. This is a loss which few can fully estimate, especially when it occurs in first-class herds; for, as I have elsewhere shewn, we must not value breeding animals simply as producers of their own weight of meat, but as the communicators of hereditary characters, which render them of *very* much greater value. Unfortunately, we find these losses prevailing amongst our high-bred stock much more freely than any other class; indeed, we often notice common-bred cows exposed to similar influences—frequently forming part of the same herd, and treated in the same manner—yet, whilst those of inferior breed escape, the high-bred stock suffer. This is, doubtless, referable to the naturally weak condition

of the breeding organs in all high-bred stock, rendering them more susceptible of exciting influences.

"I shall not go into any notice of the general subject of abortion, but rather restrict my remarks to a cause which is very much overlooked, and yet is probably more influential than all other causes combined. I refer to the growth of ergotised grass seeds in our pastures. The action of ergot of rye (*Secale cornutum*) upon the womb is well known as an excitant to powerful action, which usually terminates in the expulsion of the fœtus. We have a similar disease appearing on the seeds of our grasses, but especially on the rye-grass, and thus we have an ergot of the seed of rye-grass produced, possessing similar exciting powers upon the womb to those produced by this ergot of rye. Two conditions are necessary for the production of this ergot upon the seed of rye-grass. The first is, the grass must be allowed to run to seed; and the second is, that the climate must be favourable for encouraging the development of the ergot. In practice, we find that on land which has been fed on during the summer, unless it has been grazed with unusual care, much of the grass throws up seed stalks, and produces seed. In districts where the climate is humid, and rain abundant, as well as in very wet seasons, these seeds become liable to the growth of this ergot. Cattle appear to eat it with a relish, and the result is, that

abortion spreads rapidly through the herd. Heifers and cows, which, up to the appearance of the ergot, have held in-calf, are excited by consuming it in their food to cast their calves. The abortion having once commenced, we know that the peculiarly sensitive condition of the breeding animal will cause its extension, even where the original cause may not be in operation, but their combined action renders the loss far more serious. If we add to this the tendency which an animal receives from her first abortion to repeat it when next in-calf, we see how seriously the mischief becomes multiplied.

"A somewhat extended observation, added to my own experience, has led me to the conviction, that very much of the loss arising from abortion in our cows may be traced to the cause I have named. I feel assured the influence is even more extended than I have stated; for not only would the fœtus be thrown off in an advanced stage, but also during its earlier growth, thus causing great trouble to breeders of high-bred stock—the repeated turning of cows to the bull, and at most *irregular* intervals. The remedy differs in no respect from the ordinary mode of treatment, except that it compels a removal of the stock from the influence of the cause. Much, however, may be done by way of prevention, and this I shall briefly notice. It simply consists in keeping breeding cows and heifers

upon land free from these seeds. Grass, which has been grazed during the summer, will very generally (in a humid climate) have some of this ergotised seed; but I have not observed any produced before the end of July, or early in August; and I doubt its existence to any injurious degree up to this time—we may, therefore, consider such ground safe up to this period. If the breeding stock are then removed to grass land, which having been mown for this operation is a guarantee against any seeds remaining, it will seldom, if ever, happen, that any injury will result from the production of ergotised grass later in the season. I will not venture to say, that such will not appear in some cases where the grass has been cut early, and has been followed by a rapid growth; but, at any rate, we have grazing land free from this excitant from July until September; and in the grass which has been mown *late*, I do not consider there is the least fear of ergot being again formed in that season. In this manner a farmer may keep grass land for his breeding stock entirely free from ergotised grass; and, consequently, so far as this cause is considered, they will be free from abortion. It is also worthy of attention, how far young heifers may not be prejudicially influenced, before they are used for breeding, by an excitement of the womb. This appears to me a sub-

ject worthy of some interest on the part of the veterinary profession."

Retention of the Placenta.

A cow is said not to be cleansed until the membranes are voided, and the womb has properly contracted. This is indicated by the condition of the cow, and the existence of membranous shreds in the vagina, which constantly appear at the vulva. In various parts of the country, and particularly in England, the owner of a cow does not think his animal can do well without a cleansing drink, and this whether the placenta be retained or not. A dose of purgative medicine is usually given to satisfy the veterinarian's employer. In cases, however, in which the cleansing is retained, it is often desirable to introduce the hand, dilate the os uteri, which is often closed, and remove the placenta by separating the cotyledons one by one. Hering recommends the administration thrice daily of half an ounce of carbonate of potash in a pound of infusion of savin. Others recommend ginger and other aromatics to be given in beer with stimulants.

Vaginal Catarrh.

Cows several weeks after calving may be seized with a fever shiver and considerable constitutional disturbance, with irritation of the urinary organs, as

indicated by pain in micturition. The vagina is at once seen to be red and inflamed; a glary secretion flows, which afterwards becomes purulent, and is very abundant in old and weak animals.

In the early stage this disease has to be treated by purgatives, diuretic doses of nitre, and warm fomentation. In the later stages, astringent injections and tonic medicines are essential.

LEUCORRHŒA.

This is a chronic discharge of mucus or muco-purulent secretion from the womb and vagina, with signs of debility and a cachectic state.

The secretion is first odourless, thick, opaque, of a dirty white colour, or yellowish, greenish, and purulent. The discharge smears the vulva, tail, and perinæum, varying considerably in quantity at different times. The mucous membrane is pale, and there are no signs of pain or fever. The appetite diminishes, the milk secretion is checked, and emaciation ensues. The animals do not indicate any desire for the male, though they sometimes conceive, but are very apt to abort. Hering gives us a very happy, though brief, description of this disease, and refers to the altered character of the discharge as the malady advances. Diarrhœa often increases the debility and accelerates the emaciation.

Treatment.—Aromatic and tonic remedies, with

good food, fresh water, and open air exercise. Locally, injections of solution of alum or sulphate of zinc are of great service.

Prolapsus Vaginæ.

In Scotland, dairy cows that are subject to the very troublesome accident of protrusion of the womb or vagina through the vulva, are called "thaners." It is a condition often coupled with œstromania, but it is not always seen in "bullers," and is occasionally observed in very healthy cows when they are laying on fat very rapidly. In some cases the uterine irritation and spasmodic pressure which causes prolapsus is due to a tumour in the womb. This must be ascertained by physical exploration. Should the accident be due to disease of the ovaries, these must be removed by the operation of spaying. In some simple cases, raising the ground behind on which the cow lies in the byre is sufficient to prevent a recurrence of the protrusion. In uterine diseases, appropriate operations and remedies have to be employed to remove the cause of the recurring prolapsus.

Œstromania.

A buller is the dread of the dairy-keeper. This disease is usually connected with ovarian cysts, etc. It is attended with great inconvenience, from the cow

roaring and disturbing other animals, besides diminishing her own supply of milk during the periods of excitement. The milk is often bad, and is apt to deteriorate any with which it may be mixed. Œstromania is always associated with sterility, and very commonly it is connected with tubercular disease. I have stated this in a former part of this work. The only treatment to be pursued is castration.

Diseases of the Udder.

In referring to cow-pox, I have spoken of the eruption on the teats, which lead to accumulations of milk in the udder, to congestion and inflammation of this gland. Independently of any eruption, we may in a plethoric animal observe

Mammitis or Garget.

The absurd process of hefting is not unfrequently the cause of mammitis, and particularly when a cow-dealer, in order to shew a cow well off, feeds her very highly, and causes a very abundant secretion, of which he does not relieve the poor animal.

The udder appears much congested and red, with prominent teats, jetting forth the milk at every step the animal takes. The cow being milked is for a time relieved, but she is observed not to feed well, to shiver and grow dull. The udder swells, and becomes so

tender that the milk secreted is not removed. In this early stage the disease is readily treated, but it is usually overlooked, and soon one or more quarters of the udder become firm, hard, and much swollen. No secretion follows, and if the inflammation runs very high for a time, an abscess forms, which is indicated by a circumscribed, hard, and hot swelling, in which there is soon decided fluctuation. In other cases the udder becomes and remains simply indurated. The abscess discharges its contents by pointing through the skin or opening into the milk ducts. In the latter case pus is observed in the milk, and often blood with it.

Treatment.—In the early stage, a purgative, and abundant warm fomentations to the udder. If the tension be great, the udder must be supported, and a large linseed meal poultice should be applied, with a drachm or two of extract of belladonna in it. If there be any tendency to chronic induration an active stimulating embrocation must be applied at intervals, with considerable friction. If abscess forms, it must be opened, and the teat-tubes must be used to draw off the milk.

CHAPTER IV.

The Roman Bath.

The thermæ of Rome which are at present attracting so much attention in Great Britain, were not employed formerly for the treatment of disease, and were indulged in as luxuries by human beings alone. It is the therapeutic value of the Roman bath which has led to its adoption, though as yet in a very imperfect and unsatisfactory manner, in the treatment of the diseases of cattle. Such use has been suggested and partially carried out by Dr. Barter, at St. Ann's, Blarney, and I think great credit is due to this gentleman for the spirit with which he has carried on his experiments.

In drawing attention to the subject at present, I have to state that so far as my inquiries have extended, I believe dairy stock-owners, whether in town or country, may find the Roman bath the cheapest, safest, and most desirable appendage to their premises that has yet been suggested, if only as a mere cleansing apparatus. To the veterinary surgeon as an adjuvant in the treatment

of disease, it will undoubtedly prove of great value. We may consider in succession, the construction of a Roman bath for cattle, the method of using it, its position amongst therapeutic agents, and the diseases in which it may be tried with every prospect of benefit to milk cows.

Construction of the Roman Bath for Cattle.—Dr. Barter, aiming at the general adoption of the Roman bath and the necessity of rendering it inexpensive, has recommended the following plan :—

"The foundations are laid in the usual way of either brick or stone, and the outside walls carried up to a height of about 12 inches over the surface, and at a thickness of from 15 to 18 inches, the whole of the work being laid level. Upon this foundation a frame-work of upright deals is raised, cut $4\frac{1}{2} \times 1\frac{1}{2}$ (or four out of a 3-inch deal), about 9 feet high to the wall plate, and placed at intervals of about 15 inches from centre to centre, the uprights being set with their greatest depth in the thickness of the wall. The intervals are then filled with a wall built with one brick on edge, care being taken to range the work with the outer face of the uprights, by which means from half-an-inch to one inch of each upright will project on the inner side of the work beyond the finish of the brick-work. Across these uprights the laths are nailed, and the plastering finished in the

usual way; the outer portion of the brick-work being either rough plastered with a mixture of clay and lime or rough-cast.

"The roof is constructed of a single joist laid flat from one side to the other of the span of the building, cut 4 inches by 1½, a sufficient fall for the rain being obtained by taking from 1 to 1½ inch off the outer edge of the roofing joist at either side next the cave, this being gradually reduced to nothing as the cut reaches the centre. Upon these thin sheeting boards are nailed, and over them the ordinary roofing calico, on which a coat of mineral paint or boiled tar is applied, which renders the work perfectly waterproof. The whole is then ceiled with lath and plaster under the joists in the usual way. On each of the sides of the hot room, opposite each other, and as high up as the building will allow, are placed two air holes or windows, through which a free current of air always passes, thereby keeping the air in the bath (no matter to what number of degrees heated) as pure and fresh as the outside air.

"The heating apparatus consists of an ordinary boiler grate, with a flue carried back from it into the hot room, and running three sides of it, returning along the opposite side of the outer room, and carried up a chimney placed outside the square of the building, as indicated on the plan. The flue is constructed on the

ordinary plan of a hothouse flue, about 20 inches every way externally, the whole being raised off the ground

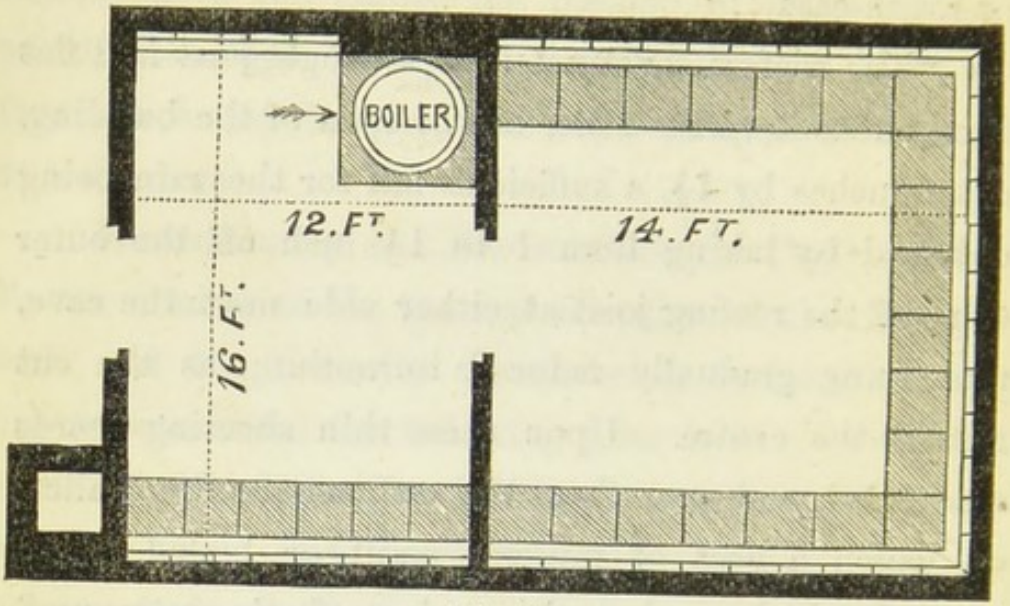


Fig. 34.

about 3 inches by bricks set as blocks, and the bottom of the flue being formed of large tiles, bridged from one brick to the adjoining one, placed about 18 or 20 inches asunder. By this means the air of the chamber circulates freely around the flue, and a considerable saving of fuel is effected.

"The ordinary heat for a cattle bath, and beyond which it is generally undesirable to raise it, is from 110 to 120 degrees.

"Where economy is an object in the construction, turf, being a non-conductor of heat, may with great advantage be substituted for brick in the outer walls, the other portions of the plan remaining unaltered."

Provision should be made in connection with a

Roman bath for the effectual ablution of animals. Washing a cow's skin with soap and hot water during the period of active sweating, and then dashing a quantity of cold water over the body, is a very essential part of the process in using the bath. The beneficial reaction preserves the cow from cold or other disturbing influence, and every attention must be paid to the comfort of the animal.

In any shed or stable can a Roman bath for horses or cattle be erected, by raising close wooden partitions with appropriate ventilation, and carrying a brick flue, protected by wooden covering, round three sides of the chamber. There should be ample provision for draining off water, which may be used in washing the animal whilst in the hot chamber; and outside the latter, provision might be made with a common hose, for a very effectual cold water douche.

Method of using the Roman Bath.

Any animal should be tolerably warm before being subjected to a very high temperature. This is not essential—but desirable. The chamber should not be raised above 120° or 130° Fahr. An abundance of fresh water should be provided for the animal to drink. The purity of the air in the hot-air chamber should be insured by good ventilation; this I hold to be of the very highest importance; moreover, if the animal uri-

nates, a pail of water should be at hand to clean off that which in an apartment with an elevated temperature would soon diffuse itself through the atmosphere where the animal is breathing, and which should be as free as possible of noxious gases. Any excrement voided should be at once removed.

When the cow is freely sweating, scrapers should be used, and an alkaline wash, composed of a little washing soda in a pailful of warm water, may be poured over the skin. If it be a parasitic skin disease for which the bath is used, an abundance of soft soap may be smeared over the skin, especially where diseased.

After twenty minutes stay in the hot chamber, the animal may be taken out, and receive at once a complete shower of the coldest water. This operation should not last above a minute or two, and then scrapers and rubbers should be used to dry the animal; the latter may be kept comfortable with a loose cloth over its body for an hour or two.

When an animal has once had a Roman bath, its repetition need not be attended with quite so much loss of time and trouble, but with valuable cows, in high condition, approaching the period of parturition, or when slightly disordered, every attention must be paid to the thorough management of the operation.

As a therapeutic agent the hot-air chamber holds

an intermediate position between evacuants and stimulants. It is undoubtedly a general tonic, because it fits important organs for the free and healthy exercise of their functions, and this operates beneficially on the blood, on the function of nutrition, and hence invigorates the body. That it is evacuant no one can doubt, who has witnessed the kind and quantity of cutaneous secretion whether in man or animals.

With regard to the action of a thermal temperature applied to the skin, Dr. Erasmus Wilson has summed up that it induces—

I. An improvement of organic structure.

II. An improvement of secreting functions.

III. An improvement in circulation and respiratory power.

IV. An improvement of innervation and sensation.

Dr. Wilson has very wisely said "that the thermæ is not to be trifled with; it is a medicine—a great and a powerful medicine; and can only be applied with safety and advantage by those whose vocation it is to study the physiology of man (or animals, I may say), and to treat its diseases." So sanguine is this orthodox and learned physician of the advantage of the hot-air bath, that he says—"In the judicious hands of the essentially practical medical men of Britain, I look to see thermotherapeia occupy a useful and a dignified place; and I trust that in a short time, in every small village and

hamlet in England, wherever a medical man is found there also will be found a British thermæ."

Viewing the subject as a veterinarian, I unhesitatingly say that we have in the thermæ the most effectual diaphoretic, the most active depurant, and the most effectual means of inducing a healthy reaction, that we have yet had at our disposal. It is a great addition to our therapeutic means. We needed a satisfactory means of acting on the skin of the lower animals in febrile and other diseases, and we here have it. I think its simplicity and value is alone approached by warm water clysters, which, by evacuating the large intestine, activating the peristaltic movement of the alimentary canal, ridding the system of a source of irritation and infection by noxious principles, accomplishes much that is perhaps even more effectually obtained by the thermæ. I trust no one will advocate the universal adoption of the thermæ for the treatment of all diseases and to the exclusion of medicines. This would speedily bring it into disrepute.

As yet we have not statistical data to shew the absolute value of the hot air bath in the treatment of any of the disorders of cattle. A committee was appointed in Ireland to inquire into the utility of the Turkish bath for the cure of distemper in cattle. I have elsewhere said that "there is reason for regret that the committee appointed by the Royal Agricultu-

ral Society of Ireland should not have been composed of a mixed number of agriculturists and veterinarians. The evidence they afford of the therapeutic value of the bath is much weakened by the imperfect description of the cases in which it was tried. We cannot admit for granted that an animal has pleuro-pneumonia because a non-professional person states it had the lung disease: indeed, none but the best professional men are fit for positions on committees who have to decide a weighty question in therapeutics. As an instance of how little reliance can be placed on the diagnoses of unskilled persons, we may mention that, last year, being called upon to examine the stock of a proprietor in Fife, who suspected he had pleuro-pneumonia amongst his cattle, we found a case of simple bronchitis, which no doubt would have been cured in great measure by the Roman bath; and a second case of consumption in a cow. No pleuro-pneumonia existed, and none has since appeared. These are common cases now-a-days. We are disposed, under the circumstances, to attach far less importance to the conclusions arrived at by the above-mentioned committee, than if their evidence had been indisputable. At the same time, intelligent and conscientious men have a right to be heard—and the report is carefully drawn up. The most remarkable features of it are the statements regarding the treatment of pigs with the black distemper.

This is usually typhus; at all events, it is a blood disease, and the purifying and invigorating effect of free action by the skin seems to have had a potent influence in curing the disease. Though we cannot admit that the committee has succeeded in proving that 'the proportion of deaths to recoveries, in the treatment of the cattle distemper with the Turkish bath, does not appear to exceed one in ten,' yet we are disposed to regard it as of more use than active blistering, setons, purgatives, and other means that most signally fail to afford relief.

"We think Messrs. Wade and Ball had sufficient reason for saying, 'that in the treatment of several of the well-known serious diseases of the inferior animals, its use has been attended with the most favourable results.' These gentlemen adopt a very safe course when they go no further than saying that they 'have seen and heard quite enough to warrant them in commending the subject to the calm and serious investigation of those most vitally interested in the subject.' We can simply re-echo this statement, and add that we trust the hot-air bath, as an adjuvant in the treatment of disease, will be availed of by veterinarians, and not allowed to remain in the hands of a few, who, in extolling its supposed all-curative influence, render it subservient to quackery."

The Diseases in which the Roman Bath may prove of service.

Cows are very subject to blood disorders, to fevers, functional disturbances of the skin, and other secreting organs; to organic cutaneous diseases which are apt to become chronic, to rheumatic affections, and a large number of inflammatory disorders. In the long category of diseases included under the foregoing heads, we shall find one and all pertain to the kind likely to be much benefited by the thermæ. But it is to ward off disease, and to preserve health, that amongst dairy stock, particularly in large towns, the Roman bath might prove of great service.

I have to quote again from Dr. Erasmus Wilson's admirable paper on the Heat Cure.* After alluding to many states of the system in which it may be adopted, he says, "I might add very materially to the long list of conditions to which the thermæ might be applied with advantage, but I limit myself to a single one more; it is that of extensive works, employing a large number of men, either in operations in themselves unsalutary, or in unhealthy localities. The importance

* Thermo-Therapeia (or the Heat Cure); or the treatment of disease by immersion of the body in heated air. By Erasmus Wilson, F.R.S.—From the *British Medical Journal*, October 13, 1860.

of preserving a body of working men in a state of health, and in the best condition for the performance of their duties, must strike every one, and is an object worthy a moderate sacrifice, on the part of proprietors or owners. There are many localities in which miasmatic fevers abound, and constantly incapacitate the working force of large operative establishments. I believe that a few pounds expended in thermæ, would correct this evil, would put men into condition to resist the miasmatic force, and to eject the poisonous elements from the blood, when they had already found admission into the organism." I might repeat the same words in referring to the congregation of cows in dark and confined localities in our large towns. Better ventilation, a more liberal supply of light, and the adoption of the thermæ, might perhaps increase the purity of the milk supplied by our town dairies, and diminish the losses, from disease and death, which materially affect the dairyman's income and the public health.

CHAPTER V.

ON THE ADVANTAGES OF SPAYING DAIRY COWS.

THE removal of the ovaries, or castration of dairy cows, has received a certain amount of attention for a considerable length of time. Indeed, according to Gourdon,* it was already amongst prohibited operations with the Jews, as proved by the Talmud. More is known of the subject since the sixteenth century, during which, as Olivier de Serres has stated, cows and goats were spayed. Thomas Bartholin, in his work "De Testibus fœminarum," which appeared in 1641, refers to the castration of sows, mares, and cows. Since that period it has been practised in Germany, Styria, and Prussia. In heifers, and even cows, it was long ago employed in Britain, and to a certain extent is practised now. But the limits to which attention to this subject were restricted were very narrow, until Thomas Winn,

* Gourdon—Traité de la Castration des Animaux Domestiques. Paris, 1860.

farmer at Natchez in Louisiana, performed some successful experiments in 1831. The results which Winn obtained were published by a traveller, who casually visited Natchez, and the operation was at once adopted in America and some parts of Europe.

Levrat, veterinary surgeon at Lausanne, performed the operation on five cows in 1833 ; and he says that "the removal of the ovaries causes a continuation of the secretion of milk for several years, just as it was at the time of the operation ; the quantity may even augment by one-third, and the quality is better." The operation is, therefore, a comparatively old one ; but it has not been much practised, inasmuch as it is attended with considerable danger if performed after the original method. It is, however, an undoubted fact, that under auspicious circumstances, if a good cow be spayed she continues to give an abundance of milk for a much longer time than cows in other conditions ; and as ultimately she realises a full price, if sold for slaughter, so attempts have been made to render spaying more simple and harmless, and to insure the good results required. M. Charlier, formerly of Rheims, has so far succeeded that he is enabled to insure the life of every animal he operates upon, and the cases he has published, and reports which have appeared in veterinary journals, prove that we may expect to derive

from the practice of the modified operation all the advantages that can be afforded by spaying dairy cows.

Charlier has unquestionably laboured with great success in simplifying and generalizing the use of this operation. In Paris, the spayed cows have received the name of *beuvonnes*, to distinguish them from the oxen *bœufs*, whose peculiarities, so far as the production of meat is concerned, are very similar.

My attention was more especially drawn to this subject in 1857 by Mr. Stephen, who received a letter from Count de Gourcy, in which it was said that we might perhaps benefit in Scotland by that which seemed so thoroughly to succeed in Paris. The method of spaying, which has in a measure failed, because a dangerous one, is that of removing the ovaries by making a large incision in the flank.

This was the operation practised by Levrat, and, though modified even successfully by various practitioners, it has necessarily fallen into disuse. The difficulty of the operation, the accidents which were incidental to it, the doubtful healing of the peritonæal wound, and an average mortality of 15 or 18 per cent, has led to this result. Nevertheless, heifers are spayed to this day in Scotland, England, and particularly in Australia. The deaths are not so frequent in young animals before bearing young, as in cows after parturi-

tion ; and the great advantage of Charlier's operation is, that it is very safe under any circumstances. From the smallness of the vagina in very young animals, it cannot be practised on them, and whenever heifer-calves have to be spayed, Winn's or Levrat's method must be adopted.

Spaying Heifers under One Year Old.

Charlier has made some valuable suggestions on the spaying of yearling heifers. If older, they can be spayed by the vagina, but between three and twelve months the flank operation is indispensable. The animal is held standing, and an assistant causes it to arch its back, thus rendering the skin over the flank tense. An incision from above, downwards, and near the rim of the pelvis, is made into the left flank, and the hand introduced downwards, and backwards, beneath the rectum, where the uterus and ovaries are found. The latter are seized, one after the other, and being brought as nearly as possible to the external opening, without dragging much on the broad ligaments, they are divided off with spring forceps, such as are represented at fig. 36. The wound is brought together and fixed, by twisted sutures, or metallic ligatures, and the animals recover readily. Low diet and careful nursing are mentioned as requisite in stall-fed animals ; but in countries like

Australia, the animals are cut in large numbers, and allowed a free range, without endangering the success of the operation.

Spaying Dairy Cows by the Vagina.

The originator of this important method of removing the ovaries is unquestionably Charlier, though Prangé has claimed priority in suggesting such a procedure. Prangé's more recent modifications have certainly not been of much value; and though Charlier's method has been simplified by Colin, it always had the advantage of efficacy and absence of danger, which are the great requisites. To be brief, I shall refer to the operation as practised by Colin, though mentioning the mode of using the vaginal dilator which I consider essential in some cases.

Presuming that the cow to be operated on is a healthy animal, the best period for the operation is about six weeks after calving. There must be no signs of œstrum, and should the animal be one affected with nymphomania it is indispensable to operate during the time that there is least ovarian irritation, and as soon as possible after the manifestations of the disease.

During the operation the cow must be held by the nose by an assistant, who must draw the head round, and, applying his back against the animal's shoulder,

prevent any movement. Another assistant, required to hand the instruments, holds the cow's tail, and in some cows that have been "bullers" for many months, or are subject to prolapsus vaginæ, it may be requisite that the second assistant should press the animal's back to prevent straining. All the instruments should be warmed in water above blood-heat. Having well greased his arm, the operator passes his hand into the vagina. This should be done carefully, particularly in heifers, and in a few seconds the muscular walls of the vagina yield, and the passage proves of ample width for every manipulation. The os uteri having been felt, the hand is drawn back to receive in its palm a bistouri such as the one drawn here. The hand is turned upwards, and the guard of the knife being drawn back and held by the action of the thumb, the blade of the knife is made to tranfix the wall of the vagina in the middle line above, and about three inches from the mouth of the uterus. If the point of the knife be inserted immediately above the mouth of the womb, the angle formed by the uterus and vagina above, and which is occupied by loose areolar tissue, is penetrated, and it is with difficulty that the peritonæum can be cut, and the abdomen entered. The incision should not be more than

Fig. 35.

one inch or an inch and a half in length. There is no objection to its dilatation by the fingers, but no more than two fingers should be admitted through it. With these the ovaries are grasped. It is this part of the operation which indicates whether the incision has been rightly made, because, if the vagina has not been cut in the middle line, there is always difficulty in seizing the ovary which is most distant from the incision. To find the ovary, the operator turns his fingers downwards and laterally, and feels for the broad ligament with its fallopian tube. In tracing the latter, which feels like a round cord under the finger, the ovary is reached, and then brought into the vagina. The spring forceps, first discovered by Charlier and represented in the annexed cut, are passed into the vagina and placed over the ovary on to the broad ligament, being firmly held by closing the forceps tightly. The thumb stall of German silver (fig. 37) is then passed over the thumb and carried in to press on the broad ligament. With a few twists the ligament is cut across. Colin has devised a pair of small clams, acting on a hinge, with

Fig. 36.

two eyes to receive the thumbs, as shewn at fig. 38;

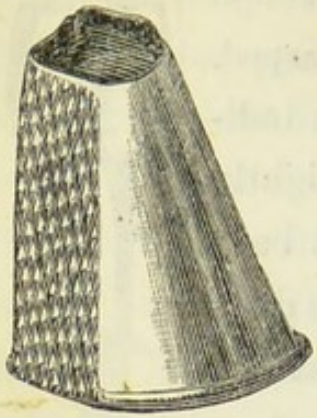


Fig. 37.

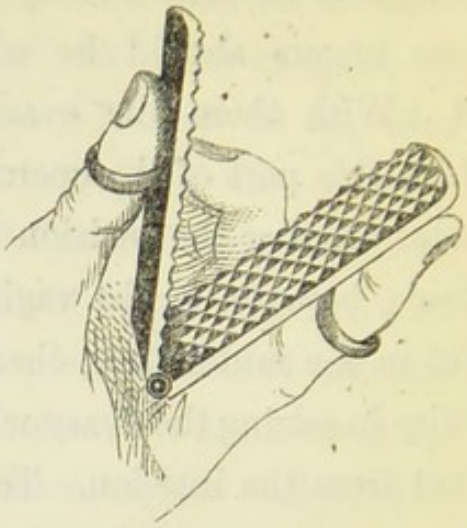


Fig. 38.

but I have not found them preferable to the thumb-guard.

Charlier first constructed a vaginal dilator, as shewn in the annexed cuts. I have only spayed one cow without the dilator, and regard it as a useful instrument, though not essential. Great care in introducing it is required, and this is accomplished by holding the point of the instrument towards the lower angle of the vulva, and by a careful turn upwards, forwards, and inwards, it is pushed in, in its closed state, as at A. The operator then introduces the projecting director *d* into the os uteri, and the shield *e*, which is somewhat movable, is placed in the middle line against the upper part of the vagina. By a turn of the blades they are fairly opened, and then screwing round the handle, the

outer elastic steel springs *b b* open from the inner fixed ones *b′ b′*, and render tense the vaginal parietes. Charlier uses a somewhat clumsy hidden bistouri, as drawn at Fig. 40, and the manner in which it is held is indicated by cut 41.

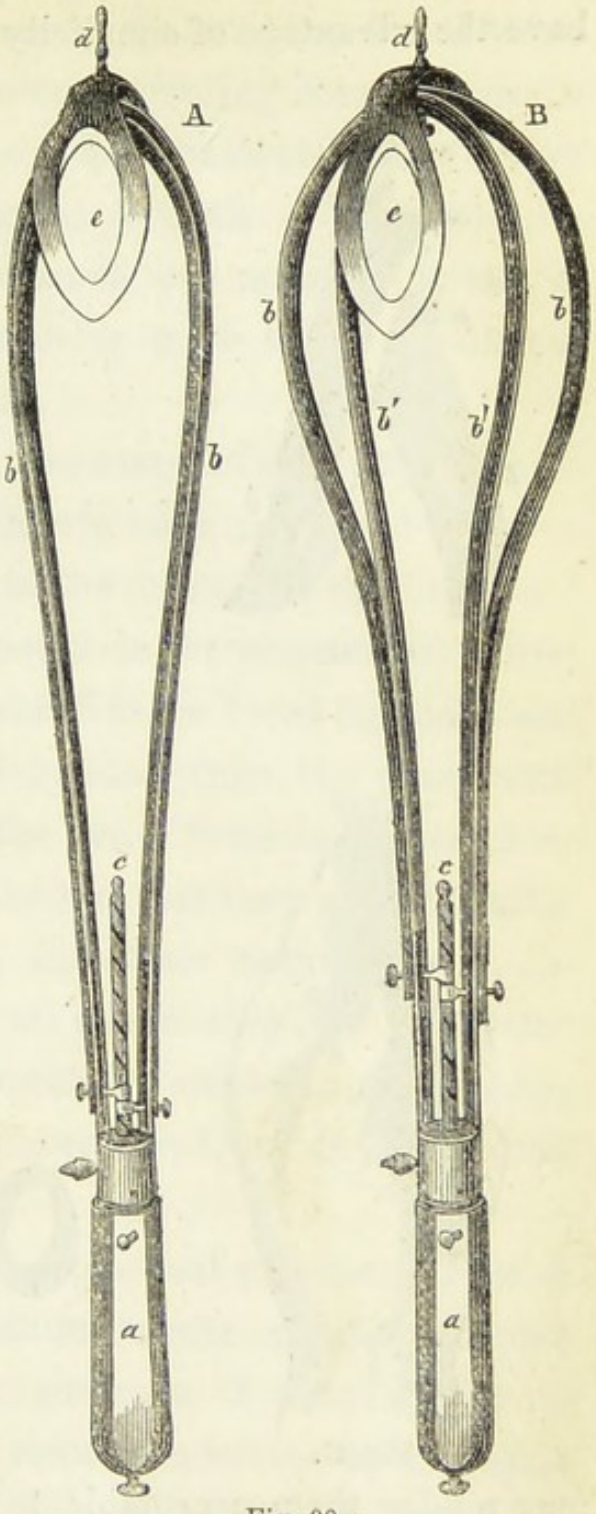


Fig. 39.

Though I have used this form of knife in the way directed by Charlier, I have found Colin's preferable, and especially when spaying several cows. By immersing the knife in water or simply in the ordinary manipulations during the course of the operation, the wooden handle swells and the blade moves stiffly, even though it might be too loose when the handle was dry. Char-

lier's original forceps are represented at Fig. 42, and have the advantage of simplicity of construction which

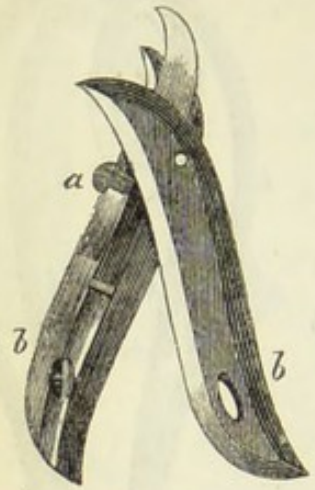


Fig. 40.

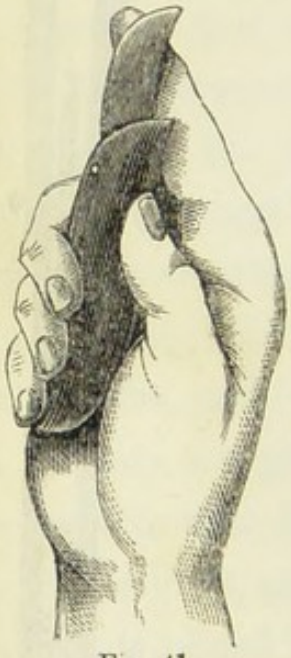


Fig. 41.

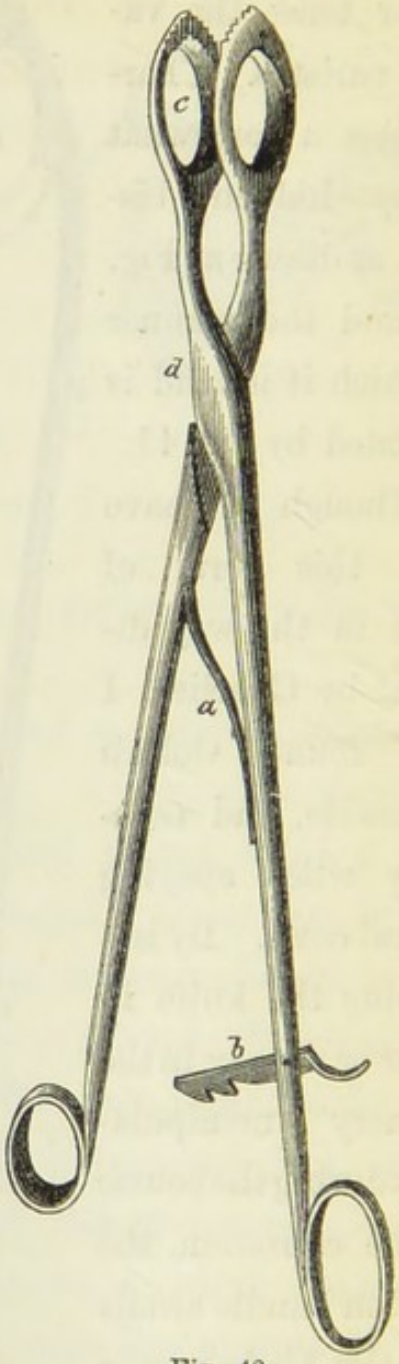


Fig. 42.

may render them acceptable to many country practitioners.

Recently the écraseur has been suggested as a useful instrument to separate the ovaries, but I think none better than Charlier's twisting forceps can be used. I usually perform the operation in four or five minutes, and have occupied as little as three minutes and a half in its performance, and as much as ten in one case. The cause of delay in the latter was disease and atrophy of the ovary.

I have experienced one source of difficulty in three cases, which has not hitherto been mentioned so far as I can learn. Indeed, in the first cow I operated on I met with it, and it consists in the presence of a firm spherical mass of fat attached to the broad ligament, and which cannot be distinguished from the ovary until examined carefully by the eye. Sometimes these fatty masses are so lightly attached that they come off without using the forceps, and their nature is then instantly detected, but at others they are connected firmly. The operator must be careful in determining that it is the ovary he has removed, and in this he will have little difficulty.

As it would serve no practical purpose to refer at length to many modifications in the operation adopted by different veterinary surgeons, I have simply to speak of the ordinary recommendations in managing cows operated on.

The many rules laid down as important to insure

the success of the operation are in a great measure useless, such as bleeding or purging shortly before or after the operation. It is expedient to keep the animal on low diet, and to withhold all food for about twelve hours prior to the operation. The only indication of disturbance after the operation that I have observed, is slight tympanitis, which speedily subsides. Not only is there very little danger of traumatic peritonitis, but there is scarcely any likelihood of minor accidents which might accompany any surgical operation. Out of nineteen cows that I have operated on, one alone has been at all unwell after the third day, and this cow died, but I believe, from all I can learn, not from the consequences of the operation, but from pleuro-pneumonia. I regard the operation as quite as safe, if not safer, than castration of horses, and certainly far less painful.

I have next to refer to the advantages of spaying dairy cows.

These I summed up in a paper published in the Highland Society's Transactions in 1857. Since then I have tested the operation as occasion presented itself, and am fully convinced of its importance for dairy cows kept in large towns, and under certain circumstances for cows even in the country, such as very lean and abundantly milking cows, those that are affected

with œstromania, and others that are subject to protrusions of the vagina.

By the present system of dairy management in towns, immense loss is certainly sustained. In a dairy, say of thirty cows, to keep up thirty good milkers, from fifty to sixty must be purchased annually, and this because a cow is dry on the average eight months after calving; and what with sickness and death, if a dairyman has regularly to supply the quantity of milk yielded by thirty cows when in full milk, he must purchase about double the number of animals every year. These animals are highly fed and confined; they are apt to sicken, become dry, and must then be sold to the butcher in very spare condition. Not unfrequently they are fed and fattened, but this requires care and time, which a town dairyman does not frequently allow his cows, and he therefore sells them at a somewhat reduced price. To secure a more advantageous sale, and that a beast may fatten more readily, she is served by the bull, and made to bear and to nourish a calf in her interior, which is a loss in beef to the extent of the weight of the contents of the uterus at the time the cow is slaughtered. A certain number of dairy cows become affected by œstromania—they are termed bullers, and cannot be stinted. In Edinburgh the disease is known by the names of "dumb œstening" or "dumb bulling." The excited condition they are in is one ill-suited to favour

the development of muscle and the deposit of fat, so that it is best to dispose of them soon. A buller is sometimes a wild, dangerous, and difficult animal to manage, and never pays for keep. Charlier, has, in his essays on this subject, made some very fair and remarkable calculations to prove what losses are sustained every year in France. Out of 800,000 cows annually slaughtered, at least 80,000, that is to say, 10 per cent are bullers. From these animals being lean, yielding anything but good beef, notwithstanding considerable expense incurred in attempting to fatten them, Charlier estimates a loss of about £648,000. By pregnant cows, likewise, the loss is great. Three hundred thousand out of the 800,000 are slaughtered in this condition in France, and Charlier estimates the loss of £48,000 simply by the calf and its envelopes. It is disgusting to reflect that from the imperfect inspection of our slaughter-houses, calves that are found in cows are sold for human consumption. It is termed "slink veal."

The spaying of cows is unquestionably the safest method to avert such losses. A spayed cow yields milk about twice as long, hence twice as much, as that given by a cow under ordinary circumstances. She fattens readily, laying on flesh from the time she is spayed, and very rapidly after she has ceased to give milk. The condition of a spayed cow contrasts most

favourably with that of other cows in a town byre, and her flesh is of course tender and rich. There is no loss as by pregnant cows, and spaying is the only and safe preventative and sure means of cure for œstromania.

That spayed cows yield twice as much milk as the same number of cows, each producing a calf every year, Charlier maintains, as proved by the facts he has observed and recorded. But let us follow him more especially in what he says of cows destined ultimately for the butcher, and of which as much milk is obtained as possible in the dairy. We shall, for convenience, look on the French "litre" as equivalent to an English quart. For the sake of example, says Charlier, let us take three cows of equal size and age, fed in the same way, and giving 15 quarts of milk daily.

The first cow is supposed to be covered six months after the birth of a calf, and to be slaughtered at the expiration of a year from the latter term. The second is not served by the bull, but slaughtered when fat, fifteen months after having given birth. The third is castrated at the time she gives most milk, and continues to give milk for eighteen months, when she is fat, especially if, within the last few months, the milk has considerably diminished in quantity—not calculating for the chances, in the first instance, of the cow being stinted or not at once, or for accidents during

gestation; and in the second instance, whether she becomes a buller, hence liable to great irregularity, so far as regards the secretion of milk. But taking the three animals in their natural condition, and supposing all conditions favourable, it results :—

1st, That the cow fattened whilst pregnant gives—

For	3	months	15	quarts	per	diem,	.	.	1350	quarts.
,,	3	,,	12	,,	,,	.	.	.	1080	,,
,,	1	,,	9	,,	,,	.	.	.	270	,,
,,	1	,,	6	,,	,,	.	.	.	180	,,
,,	1	,,	3	,,	,,	.	.	.	90	,,
					Total	quarts	.	.	2970	

During the three succeeding months the milk ceases to flow, and the fattening process is completed.

2d, The cow that is not covered will give milk for fifteen months, and is then fit for the butcher. She will yield :—

For	3	months	15	quarts	per	diem,	.	.	1350	quarts.
,,	3	,,	12	,,	,,	.	.	.	1080	,,
,,	3	,,	9	,,	,,	.	.	.	810	,,
,,	3	,,	6	,,	,,	.	.	.	540	,,
,,	3	,,	3	,,	,,	.	.	.	270	,,
					Total	quarts	.	.	4050	

That is to say, she will yield that which is equivalent to 270 quarts monthly, or 3240 quarts per annum.

3d, The castrated cow is fat by the eighteenth month. She gives :—

For 12 months		15	quarts per diem,	.	5400	quarts.
,,	3	,, 10	,,	,, .	900	,,
,,	3	,, 5	,,	,, .	450	,,
			Total quarts	.	6750	

Or, in other words, 375 quarts monthly, and 4500 per annum—viz., 1260 quarts more than the cow which has not been covered, and 1530 more than the one fattened whilst bearing a calf.

This calculation has been made by Charlier, in accordance with the most correct estimates of produce by milch cows, and after careful experiments conducted at Rheims. Attempts have been made, and with considerable success, to show that the milk of a spayed cow is richer than that of any other animal. Analyses by Grandval and Maumené show that in the milk they tested of cows, under ordinary circumstances, there existed from 66 to 80 parts of cheese and butter in 1000 of milk; and in the produce of the castrated cows, the proportions of the above were as 101 or 117 or 150 in 1000.

My friend Professor Ercolani, of Turin, published a case, which may be looked upon as an unfavourable one, from the difficulties met with in spaying the animal; but otherwise proving that, even where there has been some difficulty in the performance of the operation, the good results are obtained. The cow was operated on, on the 18th of September 1855;

she yielded scarcely three pints of milk. On the 28th of October—that is to say, forty days after the operation—the quantity of milk the cow gave in twenty-four hours was about four pints and a half. Professor Chiappero analysed it; but as the milk of this cow had not been tested before the animal was spayed, in order to institute a comparison an analysis was made of the milk furnished by the rest of the cows in the dairy. Their relative composition was :—

	Milk of spayed cow.	Milk of other cows (not spayed) of the same dairy.
Cremometric degrees	161,400	121,200
Water	851·50	863·10
Butter	54·40	42·70
Sugar of milk and soluble salts	45·00	52·50
Casein and insoluble salts	49·10	41·70
	1000.00	1000·00

Another analysis of the milk of a cow spayed in the Royal Veterinary College of Turin, gave the following results :—

	Before spaying.	After spaying.
Cremometric degrees	121·4	14·00
Water	864·40	855·50
Butter	42·20	50·10
Sugar of milk and soluble salts	52·10	37·80
Casein and insoluble salts	41·30	56·60
	1000·00	1000·00

Bearing upon this point are some facts published in the July number of the Milan Veterinary Journal. From experiments conducted in the "Department de la Seine Inférieure," it has been found by M. Marchand that the milk of cows, under ordinary circumstances, in his district contains, for every kilogramme—

Butter		36·44
Casein	31·61	
Albumen	5·06	39·73
Salts	3·06	
Sugar of milk		52·85
Fixed matters		129·02
Water		870·98
		1000·00

The milk of a cow that was spayed by M. Hue, and which had been delivered of a calf a twelvemonth, contained, for every kilogramme of milk—

Butter	61·06
Casein, albumen, and salts	56·88
Sugar of milk	49·86
Fixed Matters	167·80
Water	832·20
	1000·00

The largest proportion of butter ever found in Marchand's district was 45·92, so that the spayed cow yielded richer milk than could otherwise have been obtained.

From what has been said, then, it appears that by spaying, cows may be obtained for dairy purposes, yielding much and good milk for a considerable length of time. That, moreover, they fatten well, is a fact, and is in accordance with all experience as to the fattening qualities of castrated animals. So far as the health of dairy cows is concerned, if we can get cows not to dry so quickly, and that may be kept on for a much longer time than heretofore, then, as habit exerts a peculiar influence in checking disease, so will the mortality be less. The town slaughter-houses will certainly receive less town cows in a diseased condition, because less cows will be annually taken into the dairies; and, moreover, there are certain diseases and accidents which are absolutely prevented by the practice of spaying.

The accidents that are avoided by keeping spayed cows in preference to others in a dairy, are mentioned by Charlier as the following:—

1st, Accidents attending the regular and natural condition of œstrum; diminution of milk, and sometimes complete suspension of the secretion; loss of flesh.

2d, Accidents attending an irregular and prolonged œstrum, accompanied by fever or disturbance of the digestive organs and of nutrition, with swelling of the mammæ, etc. In fortunate cases the milk is

diminished in quantity, curdles on being boiled, and spoils any milk with which it is mixed, besides affecting the health of young children if given to them.

3d, Accidents attendant on excessive sexual excitement, associated with fever, complete loss of appetite, suspension of the functions of rumination and of the secretion of milk; sometimes indigestion and tympanitis, inflammation of the mammæ, and other complications, occasionally ending in death, or laying the foundation for other diseases, such as nymphomania, etc. Cows in this condition become excessively vicious and unmanageable, and never thrive.

With reference to pregnant cows in dairies, there is danger of—

1st, Loss of appetite, and then diminution of milk and loss of flesh.

2d, Derangement and congestion of the organs of generation, and of the urinary organs, with certain cows, from the return of sexual excitement.

Spaying cows by Charlier's method is recommended as being a safe and certain preventative against all the untoward results above mentioned. The mortality is not one per cent if performed on sound healthy cows which are neither on heat or pregnant. The deaths from the spaying of cows are not so numerous as from the castration of male animals. Cows may be insured at a small premium against loss from the effects of the

operation, as Charlier has done since he began to operate upon them. "Nothing can prevent," says Charlier, "that, in the course of time, proprietors, and all having to do with dairies, will cause all cows to be spayed that are kept to supply milk, and afterwards to realise as much as they can for slaughter; but *routine*, *indifference*, and prejudice, are with difficulty overcome."

It is not to be imagined that a bad cow, or a badly kept one, can be made to yield much milk, and to thrive simply by removing her ovaries. If the opera- is of use, it is to secure good cows for a long time in a dairy; and any experiments instituted to prove the utility of the operation in any town, should be conducted from the first with sufficient faith in what has already been done, and with sufficient prudence to operate on good animals, and exercising proper attention for the well-being of all operated upon.

CHAPTER VI.

Milk.

It is not my object under this head to refer to the production of milk in relation to the breeds of milch cows or their management. I have rather to refer to milk as modified by disease, and point to the many circumstances which deteriorate its value, and may render it in some instances absolutely injurious, either to suckling animals or to human beings. A great deal of information is scattered over veterinary periodicals and other works regarding the prejudicial changes which the milk suffers when secreted by a diseased animal; and the attention of medical practitioners, of officers of health, and of the owners of dairy stock, should be forcibly turned to this subject, in order to favour the adoption of the strictest hygienic rules in the management of cows.

The physical and chemical properties of milk do not vary very materially, as observed in the secretion of different cows. It is white, with a blueish or yellowish tint, only slightly transparent, odourless, and with an

agreeable sweetish taste. It varies somewhat in density, the average being, according to Lehmann, from 1.028 to 1.044. The reaction of milk is alkaline in the cow, and other herbivora, though sometimes, on being fed with green cut food, the animals yield a secretion as acid as that of carnivorous quadrupeds. Contact with acids, and particularly the acids of the stomach, coagulates the casein of the milk. Heat produces a pellicle of casein and fat on the surface of the milk, but does not coagulate the latter. The fatty matters constituting the cream form a superficial layer of variable thickness when milk is allowed to rest in a jar for any length of time. The richness of the milk is determined by the appearance of the cream, and its depth on a given quantity of milk. Glass vessels are constructed, such as the one drawn in the annexed woodcut, which, being graduated at the upper part, indicate the amount of cream. The degrees usually receive the name *cremometric*, and the instrument is called a lactometer or cremometer.

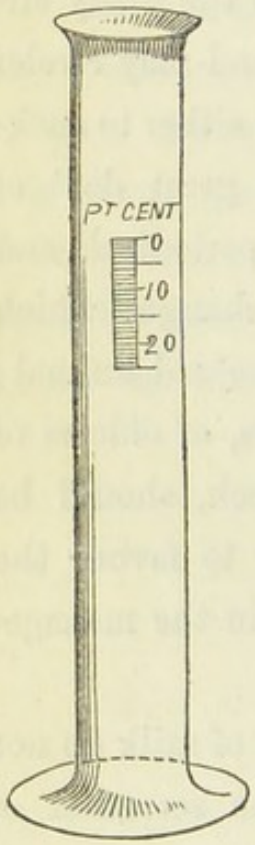


Fig. 43.

The chemical composition of milk does not vary much from the subjoined result obtained by my brother in analyzing good town cow's milk. In 1000 parts there is—

Butter	26·80
Casein	54·00
Sugar of milk Traces of soluble salts	35·00
Insoluble phosphates .	4
Water	880·20

The amount of water may be as low as 815 ; that of casein as high as 90 ; of butter, 35 ; and of milk sugar, 50, in a thousand parts. One ingredient or other is found most abundant or deficient in any particular sample of milk—the richest yielding the smallest quantity of water, and the largest of butter or casein. The inorganic constituents of milk are of the greatest value in connection with the nourishment of young animals and the consolidation of their bones. Haidlen says that 1000 parts of milk contain from 5 to 7 parts of ash or mineral matter, and this consists of about one-half of phosphate of lime (bone-earth), and the rest of soda and alkaline salts.

Inorganic Constituents of 1000 *lbs. of Cow's Milk* (Haidlen) :—

	1st Sample.	2d Sample.
Phosphate of lime . . .	2·31 lbs.	3·44 lbs.
,, magnesia . .	0·42 ,,	0·62 ,,
,, iron . . .	0·07 ,,	0·07 ,,
Chloride of potassium . .	1·44 ,,	1·83 ,,
,, sodium . .	0·24 ,,	0·34 ,,
Free soda	0·42 ,,	0·45 ,,
	4·90 lbs.	6·77 lbs.

The udder undergoes a variety of functional changes in preparation for a prolonged and active milk secretion. These have been referred to in a happy manner by Kölliker.

"The milk—the secretion of the lacteal glands—consists of a fluid portion or plasma, holding in suspension innumerable, round, dark, shining corpuscles, (fig. 44) varying in size, from a maximum of 0·001‴ to 0·002‴ and upwards, to others which are too small to be measured. These are the milk-globules, which, in all probability, possess a delicate envelope of caseine around the particles of fat, of which they consist; it is to these corpuscles that the milk owes its white colour. With regard to the formation of the milk, it is to be remarked, that at other periods than those of lactation and pregnancy, the glands contain nothing but a small quantity of yellowish viscid mucus, with a certain number of epithelial cells, and are lined to their extremities with a pavement-epithelium, which becomes cylindrical externally. On conception, this structure becomes altered. The cells of the gland-vesicles begin to enlarge and to develop fat in their interior (at first but little, afterwards more and more), so that they completely fill the terminal vesicles. To this is super-

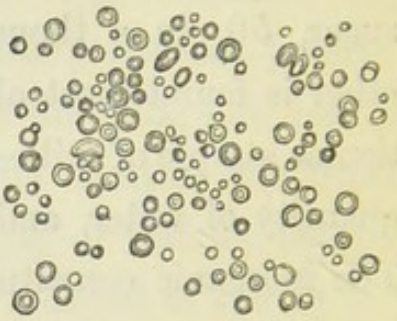


Fig. 44.

added, before the end of pregnancy, a new formation of cells containing fat, in the gland-vesicles, so that the older cells become forced into the lacteal ducts, and gradually fill them. Thus it happens that, although no proper secretion yet takes place, that some drops of a fluid can, as a rule, be pressed out of the gland in the latter half of pregnancy. This fluid is not, indeed, real milk, as its yellowish colour will show; but still it contains a certain number of fat-globules, quite similar to the subsequent milk-globules; and these are derived from the fatty cells, more or less disintegrated, and with them entire cells of the same kind are also seen, with or without an envelope; and these are the so-called *colostrum* bodies. When lactation commences after parturition, the formation of cells in the gland-vesicles attains an unusual energy, so that the fluids collected in the lacteal canals and acini are discharged in the first three to four days as *colostrum*, or immature milk, which then gives way to the secretion of the true lacteal fluid."

The subjoined engraving, from Mr. Bowman's "Medical Chemistry," affords a good illustration of colostrum corpuscles, which vary in size from $\frac{1}{2000}$th to $\frac{1}{800}$th of an inch in diameter. Donné was the first to describe the colostrum corpuscles, and Joly and Filhol called them mulberry-form corpuscles. The colostrum of the cow is usually alkaline. Fraas found

it slightly acid, and with a tendency rapidly to undergo fermentation. According to Moleschott, during winter, when cows are exclusively enclosed and fed in stables, the colostrum is strongly acid. The milk immediately after parturition contains more albuminoid principles and less cream.

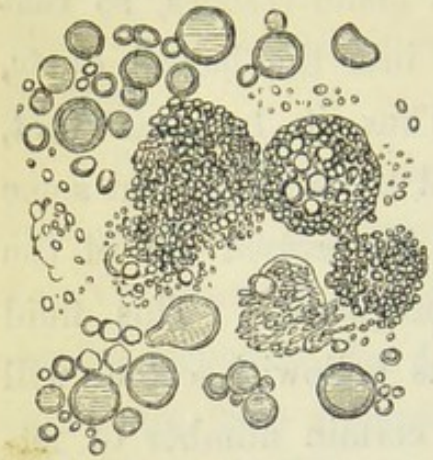


Fig. 45.

With regard to the influences of seasons, or different periods of the day, on the condition of milk, Boedecker's researches* have shewn that the amount of fat in milk drawn from a cow at different times in the day varies considerably. The variation depends, in a great measure, on the manner of feeding. Thus the amount of fatty matter in the milk is far less in the morning than in the afternoon and evening. A similar result is obtained with casein. The sugar of milk is most abundant early in the morning, and least after midday. The quantity of salts remains very constant.

It is a well-known fact amongst persons connected with the dairy, that the last portions of the meal†

* Ueber die Milch, insbesondere in Medicinish—polizeilicher Beziehung, von Bernhard Nauheimer, Giessen, 1860.

† Meal signifies the quantity of milk which a cow yields at one milking.

or milking, contain the largest amount of cream. Quevenne says that the proportion of the latter ingredient, in different portions of milk, obtained at one milking, are as 1 to 2⅔ths. During the winter season especially, if animals are exposed to cold, the quantity of milk diminishes, and it is deficient in water.

The remarkable peculiarities of the colour and odour of milk, occasionally assumed, are generally due to feeding on certain plants. Thus, feeding on carrots, on caltapalustris, safron, and rhubarb, tinges the milk yellow. Schauenstein and Spaeth found, several hours after giving a cow half a drachm of rhubarb, the characteristic violet colour of chrysophanic acid. This acid, formerly called rhubarberine is yellow, but it yields a fine violet with alkalies, and thus colours any alkaline fluid, such as milk. Madder and other red pigments give to milk a red colour. Spinola says that the colour is chiefly observed in the butter. Myosotis palustris, Polygonum aviculare and fagopyrum, Mercurialis annua and perennis, Esparsette, Anchusa officinalis, Equisetum, and other plants, give to milk a blue colour. With the shells of green peas, and species of mentha, the milk becomes green. Fuchs has shewn, that in some cases, milk may be perfectly clear when first drawn, and shortly after become yellow or blue. Under these circumstances vegetable parasites induce the discoloration; Vibrio Xantho-

genus produces the yellow colour, and Vibrio Cyanogenus the blue. The first form in the shape of delicate threads, composed of minute pearl-like objects, which are in themselves colourless, but when accumulating in the milk, reflect the peculiar colour mentioned. Braconnot has stated that the blue colour may be also due to a species of byssus, covered with a short down of a deep ultramarine blue colour, and called *byssus cœrula*. Delafond has shewn that when a little drop of blue milk is thrown into clear milk, the latter speedily becomes blue, and this is owing to the very rapid development of the parasitic fungi. Lehmann says it is extremely rare to observe any vibriones, and he has only once met with Byssus cœrula colouring the milk.

Milk has been occasionally seen of a green colour, as noticed by Berthollet. Fuchs believes this to be due to the combination of blue and yellow vibriones in the same milk, but his observations require to be confirmed. Whenever milk is discoloured by fungi-form productions, it is from dirt in the dairy. Bad ventilation in a confined dairy, and dirty pans, are the most common causes of these changes in milk.

Certain bitter principles may communicate a bitter taste to milk, such as Arthemisia, Absynthium, Gentian, Chestnuts, Mercurialis perennis and annua, Sonchus Alpinus, and others. The bitter taste is not always induced, and may depend on constitutional

predisposition in some animals. Oilcake and linseed oil give to milk a rancid taste. Cabbage gives to milk an unpleasant taste, as well as the yellow turnip and vine leaves. Many substances are apt to give to the mammary secretion both a specific odour and taste.

There is no doubt that both the latter may be avoided by proper feeding and cleanliness, and particularly with reference to feeding, I am induced to refer to the management of cows, as stated in a pamphlet recently issued, recording the experience of an intelligent and practical lady, Mrs. Agnes Scott. On the manner in which her cows were fed, she says—

"Experience soon taught me that most milk and butter were produced when the feeding was most carefully attended to. In order to ensure this, I superintended this department myself, and shall give the management as systematically followed.

"In *winter*, at *six* o'clock morning, two cows got a *windling** of straw between them; afterwards they were well cleaned, the stalls being also well littered, and the doors of the cow-houses shut until *eight* o'clock, when all hands were called to the milking. At *ten* o'clock, an ordinary-sized barrowful of turnip was given between three cows; and when turnip was not to be had, a quart of pease or bean meal was given instead, mixed with a pint of cold water. There is no

* An armful of hay or straw tightly wound up.

feeding, however, equal to turnip, especially the yellow Aberdeen. A richer taste and colour are imparted to the butter produced by this root than from any other kind of feeding in the early part of winter—while a larger quantity, both of milk and butter, is produced thereby. In spring, when the feeding properties of this root are very much deteriorated, a small quantity of pease or bean meal will be found needful to keep up the full return of milk. The pease or bean meal is preferable to oilcake or locust-beans, as both of the latter give the milk and butter a harsh flavour.

"About *one* o'clock the cows should be let out to watering; and when the weather is mild and otherwise favourable, fresh air will be found to be of very great advantage to the general health of the dairy stock. When the cows are at large, the cow-houses should be thoroughly cleaned in every nook and corner, the doors being left open to admit fresh air. Even after calving, cows should, in the course of three or four days, be let out for an hour or so, to breathe the fresh air, weather being seasonable. While kept in the house, let them have a drink of meal-and-water *twice* a-day; a handful of oatmeal and three pints of lukewarm water will be sufficient. In the first draught, let a handful of salt be given.

"When the cow-houses are well aired, a *windling* of straw should be given between two cows as they return

from watering. Upon supposition that the cow-houses are well ventilated from the roof, the doors should be shut. About *four* or *five* o'clock, turnip is again given in quantity as before; or, failing turnip, the above-named substitute. The *time of feeding* should be regulated according to the season; *milking-time* also should be so fixed that it may be *regularly* kept—and kept so as to be suitable not only for the parties engaging in it, but so as not *unduly* to disturb either the rest or feeding of the cows.

"At *eight* o'clock a *windling* of good meadow-hay between two cows should be given for supper, the quantity being always regulated according to what each cow can consume. It is a great mistake to keep fodder in quantities lying unused; rather let the appetite be tested, and, by keeping it always sharp, not only will each meal be eaten up with a relish, but a much more healthful state will be maintained. In *addition* to this hay, cows that have recently calved should get half-a-pailful of boiled turnip mixed with a quart of pease or bean meal, rather more than lukewarm. For four or five days after calving, cows should have no raw turnip."

On the diseases of cows which affect the milk.—It should be laid down as a rule that the milk of a cow suffering from an acute disease, coupled with considerable irritative fever, and often associated with the

development of a specific animal virus, should not be mixed with the milk of healthy cows and sold.

Epizootic Aphtha.—I have on several occasions written on the subject of using without restriction milk obtained from cows affected with the vesicular murrain and epizootic aphtha, see page 86. Sagar recorded, in 1765, that during the prevalence of epizootic aphtha in Moravia in 1764, both man and animals took the disease by partaking of the milk of diseased cows. A similar observation was made in 1811 in the neighbourhood of Lyons. Jacob witnessed severe symptoms resulting from the use of such milk in the vicinity of Basle, in 1839, and Hertwig performed some most interesting experiments in Berlin. He drank a quart of the diseased milk daily. On the second day he suffered from slight fever, headache, dry and hot mouth, and pruritus about the hands and fingers. These symptoms lasted in a mild form for about five days, at the expiration of which time the mucous membrane of the mouth and the tongue began to swell, and vesicles formed about the lips, cheeks, and tongue. Vesicles formed also on the hands and fingers, and they dried up, and became covered with a scab in about ten days. The medical men who experimented on themselves in company with Hering suffered in the same manner. In children, this milk induces vomiting, diarrhœa, and even death. I have elsewhere stated that it has

proved deadly to calves, and to litters of pigs fed on the milk of cows affected with epizootic aphtha. It would appear that the milk is most dangerous when warm and recently drawn. It is less so when cold, though whenever a cow is ill, and indeed even during periods of excitement, such as oestrum, the milk has a tendency to turn sour, and may induce gastric and intestinal irritation in young children.

Cow-pox.—We have in a former part of this little work stated that Jenner discovered the preservative influence of the cow-pox virus, against small-pox in the human subject, from the effects produced in the dairymen and milk-maids, who were employed in milking cows affected with the disease. The effects are constitutional as well as local, and likely to follow drinking the hot milk, as much as from the contact of the milk with the hands of the milkers.

Pleuro-pneumonia Epizootica.—The extent to which this disease prevails now-a-days amongst dairy cows, renders it a very interesting question to know if the milk is affected by the disease. That its quantity is diminished is too well known, and indeed, such diminution is often the first symptom noticed by the dairyman. It frequently acquires a yellow colour, is imperfectly elaborated, has an alcaline reaction, is thick and curdled, and may be compared to colostrum. When the cream is removed, the milk is thin and

blue. According to Fraas, it contains in one hundred parts :—

Water	75·02
Butter	10·73
Casein and insoluble salts . . .	10·13
Sugar of milk and soluble salts . .	0·09

In every case of well-developed pleuro-pneumonia, the milk should not be mixed with that of healthy cows, and though the stout stomach of man may not be affected by it, it should not be given to infants.

Tubercular Disease.—This affection is often associated with oestromania. The milk becomes thin, bluish, sour, and contains little butter or casein. Labillardière found in such milk seven times as much phosphate and carbonate of lime, as in healthy milk. This is bad milk for children and weakly persons.

Anthrax Fevers.—As in all general disorders, the mammary secretion is affected in anthrax fever. Generally, however, the anthrax poison is not to be met with in the milk, and it is only very rarely that accidents have happened with it. Virchow refers to its dangerous properties, but these are not always observed.

Contagious Typhoid—Rinderpest.—This plague, characterised by a spread due to an eminently contagious poison, does not seem to affect the secretion of milk as a general rule. The secretion has given rise

to diarrhœa in some instances, but commonly no ill effects follow its consumption.

Mammitis.—Diseases of the udder modify the condition of milk in a remarkable manner, and render it unfit for use, and unfit to be used with the milk of healthy animals. Pus and blood are sometimes mixed with it, and we need scarcely say, should preclude its use.

I have only to add, that the secretion of milk is materially altered in almost every disease producing any impression on the animal's system, and even fear, fright, undue excitement, oestromania, etc., may cause such changes as to render the produce totally unfit for use.

Medicines taken into the system, are apt to affect the milk, and may prove fatal to the consumer of the latter. Euphorbium, and the ranunculaceæ, black hellebore, and many other substances, are thus injurious. Probably the "trembles," or milk disease witnessed in America, is due to poisonous principles eaten by the animal, and passing into the milk, which is rendered poisonous. Iodine and its preparations may be detected in milk obtained from a cow that has received the same medicinally. This applies to arsenic, which Hertwig says may pass into the milk in such quantities, as absolutely to poison human beings. Salts of iron, bismuth, and zinc, are detected in milk, though astrin-

gent preparations of iron usually suspend the secretion. In the same way, chloride of sodium, the acid carbonate of potash, sulphate of potash, oxalates, and even lead, may be traced in milk. Antimony and mercury enter the milk secretion, and it has been found in the human subject, that the child is acted on by opium, morphia, and quinine, which the mother has received in medicinal doses.

PART II.

CHAPTER I.

BRITTANY AND ITS PEOPLE.

The ancient province of Brittany, to the N.W. of France, embraced that strip of land now divided into the departments of Côtes-du-Nord, Ille-et-Vilaine, Loire-Inférieure, Morbihan, and Finistère. Jutting out from the mainland it separates the English Channel from the Atlantic Ocean, and that portion of this bare peninsula, so renowned for its diminutive but precious breed of cattle, was then peopled by the Veneti, a hardy race living on the sea-board formed by almost inaccessible promontories and tongues of shore. The Gulf of Morbihan or Little Sea stretches inland to Vannes, the capital of Basse-Bretagne, and in the days of Cæsar considerable commerce was carried on across the English Channel with Vannes, then the most powerful, the wealthiest, and most peopled of the towns of Armorica.

The Morbihan has no extensive plateaux or plains, but is slightly hilly to the north, and has considerable undulating ground. Running and stagnant waters abound in it, the country being in some parts marshy, in others rocky. Bellamy says :—"Travelling for the first time in the department of the Morbihan, and only passing by the high roads, a painful impression is produced by the bare lands and rugged rocks. Notwithstanding the appearance of occasional windmills, a stranger must ask himself on what do the people of the country subsist. After this first *coup-d'œil*, if attention be paid to the few habitations situated near the high roads, we observe that rules of architecture and of hygiene are completely unknown : four walls of stone or earth pierced with small holes, through which light can barely penetrate, and covered with black straw, some lumps of earth, and branches of trees. If the tourist enters any of these dwellings he will find but one room ; on one side a little fire in a recess which bears but the name of a chimney, a bed, a table, a bench, sometimes a cupboard blackened with smoke ; and the inmates at this end of the room consist of a woman, an old man, and four or five children ; at the other end of the room is a bed of leaves and heather, on which lie a cow, a goat, and a pig. Having seen all this, the poverty of the soil and its inhabitants may be imagined. We can understand that the old Breton

A DAIRY IN BRITTANY.

proverb, "Lande tu fus, lande tu es, lande tu seras," is unfortunately but too true.

"Nevertheless," continues Bellamy, "if you inquire from any individual of the Morbihan, he will tell you that the country produces more grain than the people can consume; he will tell you that there are some fine farms, fields well cultivated, and good prairies: but it is in the interior of the land, at a distance from the high roads, that the real riches of the country are to be seen."

On the subject of human food in Brittany, Mr. Jephson, author of a delightful work, entitled, "Narrative of a Walking Tour in Brittany," says,—

"I was anxious to become acquainted with the manners of the peasantry, and therefore took my seat on a bench at the common table, where two men were drinking their cider with the host. One was a tall, light-haired, blue-eyed man in a blouse, and looked like a Norman horse-dealer. The other had the aquiline nose, dark piercing eyes, and oval face of the Breton. The hostess, a stalwart dame in blue petticoat, black stockings, coloured apron pinned across her bosom, and snow-white cap, was at the fire preparing the noonday meal. From an earthenware pot she poured upon a griddle, under which blazed a fire of dry gorse, some batter, which she smoothed out with a wooden spoon until it was of about the thickness of a

pancake. After turning it with a flat shovel till it was sufficiently browned on both sides, she placed it on a dish, which was soon heaped with a smoking pile of cakes. The Norman told me that they were called *galettes*, and that they were made of the flour of *sarrasin*, or buckwheat, or, as it is commonly called by the peasantry, *blé noir*. The hostess had placed basins of milk on the table for all the guests, who now proceeded to break their galettes into them. I had the curiosity to taste the mixture, and found it excellent. The galette itself is rather insipid ; but when mixed with the rich milk of this country, it assumes a nutty flavour, and must be very nourishing. It is still better when spread, smoking hot, with butter, and then much resembles a crumpet.

"With us buckwheat is used almost exclusively for feeding pheasants, and I was therefore puzzled to make out what was done with the immense fields of it which I had seen in the course of my morning's walk. I now understood that it formed the principal food of the peasantry."

Having given Bellamy's description of the hut of a Breton, I may, as a pleasing contrast, give one from the pen of an Englishman, though the farm described is one of the better sort, alluded to by the former author.

"My guide, a handsome, dark-eyed, mild-looking

Breton youth of eighteen, first led me across the fields to the abbey of Sainte Croix, or Holy Cross, now turned into a farmhouse. The walk is very pretty. After going about a mile along the high-road to Pontrieux, you take a short cut across the fields till you come to the river Trieux at a bridge. On the other side of this stands the abbey, with its ruined church and its picturesque corn-mills, the splash and clatter of which serve to give animation to the scene. The church, like most of the purely monastic buildings which I have seen in this country, is heavy. It now serves as a barn, and general receptacle for cider-presses, old carts, and other lumber. Some of the choir windows remain, and are of flamboyant or florid Gothic. Rising from the front of the conventual buildings is a fine massive round tower, with a turret springing from it about halfway up its height. A farm-servant, who spoke only Brezonec, replied to my guide's request to see the interior, by a cheerful "Ja, ja!" and we were left to wander alone into every part of the house.

"The kitchen, or hall, was, as usual, furnished round the side with *lits-clos* of polished chestnut, the curtains gathered up into graceful folds. Against the walls stood cupboards and wardrobes of the same handsome wood, their fantastic locks and hinges of steel and brass, polished to the utmost. From the massive

beams of the ceiling hung a goodly row of hams and flitches of bacon, not very thick, it must be owned, but reaching down nearly to the floor, the produce of a race of pigs which prevails throughout Brittany. They are long-legged, humpbacked, greyhound-snouted, lop-eared, about as tall as a donkey, and as broad across the shoulders and loins as a cat. On a shelf, hung from the ceiling, was ranged a row of neatly polished shoes, some of them with buckles, kept for the holiday use of the bourgeois and his family. The dressers were resplendent with immense brass skillets, not less than a yard across, as bright as a new sovereign. A massive table seemed to groan under the weight of huge rings of bread and large basins of milk, while about the house bustled three stalwart, broad-hipped, bare-legged Bretonnes, under the direction of the portly bourgeoise, in her snowy cap. It was a pleasing scene of rustic splendour and abundance."

The system on which the land is let tends to retain the Morbihan in its unimproved state. The farmer can be removed at any moment by the proprietor defraying the expense he has been at in improvement. Usually the farms are let for nine years. Evidently the defects of this system are great, and should be corrected, in order to develope the resources of the country.

Whether the people of the Morbihan are as enter-

prising and acute as the ancient Bretons, we can scarcely say. It has been said of them that they have forgotten nothing, and have learnt nothing. The following sentence of reproach has been frequently addressed to them in France,—"Ils n'ont rien oublié, ils n'ont rien appris." In the days of Cæsar they were not mere savages, "they were a people of high courage, disciplined, and obedient to authority, and yet impatient of subjection; not unacquainted with some important arts of life; exchanging commodities for money of copper and iron; mining and smelting their native tin; possessing an agriculture not wholly unscientific, for they understood the process of marking, and raised cattle in great numbers; a naval people, with boats, and probably vessels of burden, sailing far away into a tempestuous sea; a warlike people, with swords and shields and chariots, that could not be fabricated without some mechanical knowledge; a religious people, building temples of gigantic proportions, and raising memorials of the dead in earthworks that rival the wonders of modern engineering. Their priests were their lawgivers, and the great ministers of whatever moral or natural civilization they possessed; and we see that the most perfect element of the learning of the priests was considered to exist in Britain. Were these teachers and lawgivers surrounded by few votaries and subjects? The population is very great, and the build-

ings very numerous," says Cæsar. "All merely savage nations never replenish a land, because they never subdue it to their use."

My brother, Mr. Arthur Gamgee, who has repeatedly visited Brittany, says—

"The inhabitants of different parts of Brittany are so unlike one another in language and customs, that the description of those of one department does not apply to those of another. The most characteristic of the Brittany departments are the Morbihan and the Finisterre. The traveller who at Rennes hears the French language universally spoken, and who notices nothing peculiar in the appearance of the people beyond the "coiffe" of the women, will be astonished to find that a few hours' journey to Vannes conveys him into a country very dissimilar to that which he leaves, and inhabited by people, evidently less civilized, who almost totally ignore the French language. Instead of the well-cultivated fields of the Ille-et-Vilaine, he notices barren lands which extend on all sides as far as the eye can see, and a miserable hut takes the place of the more comfortable farm-house of the Ille-et-Vilaine. The costume is also peculiar: the men wear a wide brimmed felt hat and short jackets, and generally have very long hair.

"The Bretons are very ignorant. Very few can read, still fewer can write; till a few years back very little

was done for their improvement; they were entirely in the hands of the Roman Catholic priests, who, following their usual policy, checked education as much as possible. Since the accession of Napoleon III. great changes have taken place; there is a qualified schoolmaster in every village, and parents are obliged, under pain of being fined, to send their children to school. The instruction is carried on in French, as it is the wish of the Emperor to make the French language take the place of the Breton, and thus to abolish the barriers which separate Brittany from the rest of France.

"The Bretons are a brave, energetic people, and are not as flippant as the French in general, though, as a rule, less intelligent. They are at once known to be the bravest and stupidest of the soldiers of the French army; and it has been observed that when they leave the ranks and return to the country, they very soon lose the soldier-like appearance they have contracted. The Bretons, like true Celts, are extremely fond of intoxicating liquors, and though their scanty means do not allow them as a rule to drink anything but cider, they indulge in it immoderately. I have already said that the Bretons are ignorant, and it is not to be wondered at therefore, that they are very bigoted. Brittany has always been considered the stronghold of papacy in France, and the priests have known well how to use their power.

"I was extremely interested by a visit I made to the shrine of St. Anne d'Auray, the patron saint of Brittany, on the occasion of her feast. The roads leading to the shrine were crowded with pilgrims dressed in the most picturesque costumes, and I noticed among them many Norman and Bordeaux ones. I was astonished to find that in most cases the pilgrimage was made more as a pleasure excursion than with a religious object. The bands of men and women walking arm in arm, and singing national songs in rather an excited state, under the influence of copious libations, convinced me of this. I must here mention that the notion prevails, and is taught by the priests, that in order that the petitions which the pilgrims make to St. Anne should be favourably listened to by her, they must sleep one night in a field adjoining the shrine; as the pilgrimage occurs in summer, no one objects to this, and the consequence is that the field is the scene of much merry-making and great immorality.

"The Bretons, as I have said, have some great defects: they are ignorant, bigoted, and love the cup too much, and perhaps their morality has been too much praised; yet they are a very honest, hard-working, and brave set of men.

"Much is being done to ameliorate the condition of the people in Brittany. Railways are being constructed, which will unite the most distant towns of this most

interesting part of France with Rennes, and by this means with Paris."

Of late years much has been done to improve the agriculture of Brittany, though the efforts of such men as Bodin have been more especially directed to improvements in Haute-Bretagne, especially brought about by the labours of able instructors in the School of Agriculture at Rennes.

In the Morbihan some of the rudest instruments are still in use, and the greater part of the department appears to be ploughed with great facility. The oxen of the country are used in pairs, and in some parts one of their small horses is sufficient to work the plough. Little attention is paid to the system of ploughing, and the manure employed is but scanty, consisting to a certain extent of marine plants towards the sea shore, and inland, from the fact that their cattle are chiefly kept out of doors, and when housed have no litter capable of forming into manure with any facility. It is obvious that the land is very imperfectly dressed; maize, buckwheat, mil, barley, seigle, and oats, are the plants they chiefly cultivate.

It is the natural, permanent, and bare pasture that constitutes the scanty provender on which the Brittany cattle have to subsist. Rugged, exposed, and bare, the country affords the smallest opportunities for the development of the breeds of animals, and it is

undoubtedly due to this cause, that, with the greatest aptitude for affording a large return for keep, the Brittany breed has remained small in size though its inborn excellence could not be destroyed.

Poor as the Morbihan is, it numbers 63,237 oxen, 5439 bulls, 161,911 cows, and 83,949 heifers, viz., a total of 314,536 head of cattle. There are annually slaughtered in the department 67,778, and 19,071 are annually exported.

There are 42,399 horses in the department, 254,948 sheep, and 59,495 pigs. Of the latter, some are carefully tended, and realize a return, but the others are extremely poor, being left to wander for food wherever they can pick it up.

CHAPTER II.

BRITTANY CATTLE—THEIR ORIGIN, FORM, AND OTHER PECULIARITIES.

In some remote parts of Brittany, and particularly in the Morbihan, the uniformity in breed amongst the cattle is evidently very great. Stretching over the five departments, however, many varieties of the ox tribe are to be met with—from a coarse, bastard kind, attaining considerable size in the south, to the pure breed remarkable for beauty and high milking qualities. It is the latter breed which Bellamy believes to be very ancient, and to have spread far and wide in every direction, not excluding northwards as far as Scotland, where, indeed, he believes it to have originated the Ayrshire breed.

It has been supposed that the breed of the Morbihan came from India, because there are cattle near Bordeaux which are believed to have been imported from Asia, and which resemble the former in every respect. The larger variety of the Brittany breed has

been declared descendant from the Dutch, but, says Bellamy, the original of the many varieties is, in truth, in Brittany, and it is false to imagine that the cattle of Bordeaux and elsewhere, so similar to those of the north-west of France, should have been derived from distant parts of the world.

Evidently many of the Dutch cattle resemble some of the poorer kinds of the Brittany breed, and I remember when, last year, Professor Bellamy visited Scotland to purchase stock for the French Government, he would scarcely believe that some oxen that were being fattened by a farmer near Dalkeith, and known to be imported from Holland, had not been brought over from France.

From time immemorial, says Bellamy, have dealers visited Brittany to purchase its cattle for exportation; and he evidently attributes to them the spread, in various parts, of a breed which he considers typical, and owing its forms, colour, size, and other qualities, to the influence of climate, nourishment, and habits.

There are not many persons who may be considered judges of this particular breed, inasmuch as the dealers often purchase animals of no value, and possessing none of the characteristic qualities of the best cattle of Brittany, and, indeed, only approaching them in colour and size.

If any judge of stock will travel the counties of

Ayr, Lanark, Dumfries, and a few more, to study the Ayrshire stock, he will find the greatest varieties—one individual having a byre full of worthless animals, and another containing a majority of pure bred ones, possessing all the well-known qualities of Ayrshire dairy stock.

Similarity in many points may be found with the greatest diversity in others; and accordingly, there is no breed more precious, if the pure is obtained, than the Brittany, though a herd may contain some miserable specimens. It may be said that this remark applies to any breed; nevertheless it is especially applicable to those breeds of cattle which are apt to be confounded one with another. Thus we can state on the best authority, that cows may be bought in Brittany that may be taken for Alderney's and Guernsey's, still far inferior to these as dairy stock, and many such have been imported to England as genuine Guernsey animals. And with regard to Brittany cattle, though the pure breed yields a larger proportion of rich milkers than any other breed in France, still hundreds may be bought in the fairs in Brittany, utterly worthless for the purpose which the pure breed so admirably fulfils.

So much, therefore, depends on a proper choice, and so difficult is it to choose when unaccustomed to these small animals, that we purpose furnishing a full

description of the distinctive characters of the pure Brittany breed.

Any person knowing the pure Ayrshire breed may at once understand the peculiarities of the Brittany cow, when he is told that she is absolutely an Ayrshire in miniature, only black and white as a rule, and yielding, in proportion to size, more and richer milk.

Aiton's description of the Ayrshire cattle of last century corroborates in part Bellamy's notices of a strong resemblance between it and the Brittany breed, though certainly some of the bad qualities have never been seen in the pure Brittany cow, notwithstanding the many circumstances which have interfered with its growth and improvement. Mr. Aiton says the shapes most approved of are :—

"*Head* small, but rather long and narrow at the muzzle ; the *eye* small, but smart and lively ; the *horns* small, clear, crooked, and their roots at considerable distance from each other ; *neck* long and slender, tapering towards the head, with no loose skin below ; *shoulders* thin ; *fore-quarters* light ; *hind-quarters* large ; *back* straight, broad behind, the joints rather loose and open ; *carcass* deep, and *pelvis* capacious, and wide over the *hips*, with round fleshy *buttocks*.*

* Mr. Rankine very properly remarks, that, "compared with other improved breeds, the thighs, or what are called the twist of the Ayrshire cow, are *thin*. She is, characteristically, not a *fleshy* animal."

Tail long and small; *legs* small and short, with firm *joints*; *udder* capacious, broad and square, stretching forward, and neither fleshy, low hung, nor loose; the *milk veins* large and prominent; *teats* short, all pointing outwards, and at considerable distance from each other; *skin* thin and loose; *hair* soft and woolly. The *head, bones, horns,* and all parts of *least value,* small; and the general *figure* compact and well proportioned."

Description of the Brittany Cow.—We can portray a good cow of the breed as follows:—

Standing from 32 to 42 inches high at the period of maturity, viz., at four years of age, there is a remarkable symmetry of form; a short fine head, with sharp outline; small muzzle, well-defined nostrils, quick well-made eye, small ear, and slender horn, indicate the pure blood. The horns are well set, curving outwards and upwards, with the points turned to each other. In proportion as the horn is slender is it prized by all judges of a Brittany cow. The colour of the horn is usually white at the root, and black towards the point; sometimes it is all black, or all of a yellowish colour; at others, but far more rarely, is of a pure white throughout its whole length.

The head is beautifully hung on a slender neck, which is well-defined from the sharp outline of the jaws; the crest is free, and the dewlap very small.

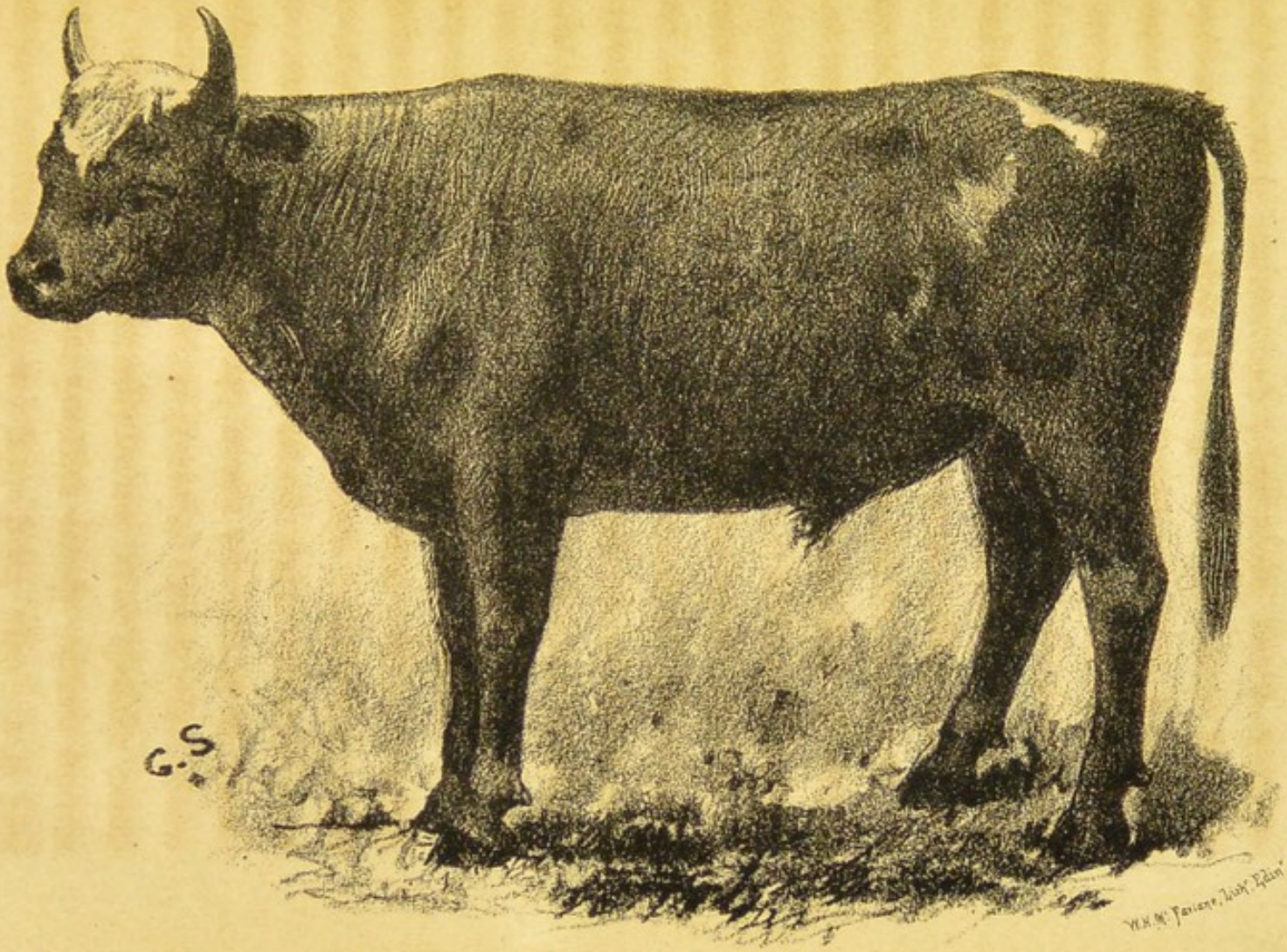
The body of the little animals is distinguished by

a straight back, with well-formed withers; long and broad loins; prominent hips, indicating a large pelvic capacity, hence capabilities for bearing young. The rump is short, and the long tail is well attached, though the defect of the Ayrshire breed is sometimes seen from an elevation at the root of the tail, and a depression just at its apparent attachment. When the tail is thick at the base, and elevated or outwardly attached, there are usually other defects of external form.

The chest of the Brittany cow is wide and deep, with ribs well arched, and affording good room for internal organs.

The limbs are very beautiful, with large fore-arms, though slightly muscular, short legs; joints small, but well defined; and the limbs, usually straight, are always tapering and slender. The hoofs are small, dry, and black.

The skin is, in a good cow, invariably very fine and supple, the coat short and shiny, the colour is usually black and white; some, but very few, are all black, or with a white mark across the withers or croup, or along the back; the lower part of the belly is usually white; the muzzle is black, or black and white, rarely quite white; the roof of the mouth and tongue is always white. Some Brittany cows are red and white, and if a really good specimen of this colour can be met with, it is highly esteemed in France, and will



Brittany Bull.

realize a very heavy price, but usually, the red and white Brittany cows are not so good as the black ones.

The udder is generally well shaped, compact, though large for so small an animal, with teats pointing inwards. The mammary vein, commonly called the vessel, is large and flexuous. According to Guénon's system, referred to more particularly at the commencement of this little work, every fine Brittany cow shews the typical points of a good milker, and usually belongs to the first class—that of the *flandrines*.

A Brittany cow is capable of great endurance. She is active and strong; though always gentle and quiet. Hardy by nature, she thrives under any circumstances; and when well cared for, and stall-fed, fattens rapidly. She has indeed the greatest aptitude for laying on flesh so soon as the secretion of milk is suspended. This should not be lost sight of by those who purchase these animals chiefly for the milk they yield. It will be found that, in proportion as they are allowed exercise, when well fed, will they continue to give much milk.

There are many animals in a herd of Brittany cows, the growth of which has been obviously too much stinted by starvation, and others that indicate coarseness of breed, by thick and ill-shaped loins, dull eye, broad muzzle, heavy fore-quarters, small pelvis, badly hung tail, hocks turned inwards, and very small udder.

By attention to feeding, and by careful selection of good hills and good runs to feed upon, considerable good has been done, even in the Morbihan, where the opportunities for such care and attention are not numerous. Bellamy describes the specimens of the improved breed as follows :—They are larger, standing from 40 to 50 inches high ; the body is longer, and the dorsal line more horizontal than in the old breed. The belly is straight, and only drops at the age of four, five, or six years. At this period the animal becomes less lively, its movements are slow, and its temperament is changed. The colour and other qualities are the same, so that it may be regarded as the Brittany breed enlarged, and possessing the same aptitudes. The ancient breed has a quick, mild look, indicating intelligence and blood, but the new breed is decidedly inferior to it in this respect. The ancient breed is that which satisfies most when in a nobleman's park, from its beauty and properties. The new breed is more particularly destined to yield abundant produce, and remunerating its owner.

The Brittany Bull.—There are bulls of the ancient and of the improved breed. The little bull of the *landes* is always black and white, with short shining coat, and a tuft of long curly hair on its forehead. Those that are not all black are especially sought for. It is from 30 to 40 inches high at the age of from two to three years. He becomes larger and

stronger than his dam, but developes slowly. The head is short, and broad above. It is impossible to mistake the head for that of a cow, and the colour of its muzzle is often black. The tongue and roof of the mouth is white, and when this is not the case, there are usually other signs of a defective animal. The horns are short, slender, and slightly turned forwards; they are sometimes white, at others of a bright black, but more frequently rough, and dull in colour. The neck is short, and does not become thick until the age of two or three years. The dewlap should be small; if large, it is a sign of impurity of breed. The chest is large, the withers wide, the back round, and the ribs deep and well curved.

Generally the Brittany bull has a round barrel, the loins being broad and short, and on the same line as the back and rump. The latter is often short, sometimes horizontal and well formed. The tail is fine, and provided with an abundant tuft.

Usually tame and quiet, the Brittany bull has a quick decided look, and is very gentle and vigorous. The majority of the Brittany bulls belong to Guénon's class of *courbelignes*, and have a yellow colour of the escutcheon, indicating the aptitude of the breed for the production of milk and butter.

There are few bulls to be found in Brittany, and all promising calves are usually cut, as a good ox is

very highly prized. Rarely are the bulls sold in fairs.

The bull of the improved breed, according to Professor Bellamy's descriptions, is distinguished from the ancient by characters similar to those given for the cow. They usually have not the same roundness of form. At the age of three years they average from 40 to 50 inches in height. The head is rather elongated, and sometimes may be mistaken for that of a young ox. The forelock is long and curled; the head is sometimes not well set on the neck, especially when the breed of Quimper has been crossed with that of Léon. Amongst other occasional defects are small withers, flattened ribs, long loins, and narrow croup. In the hands of good breeders, however, the most perfect animals are to be met with.

The Breton ox, which we have next to consider, is much larger than the cow, and, indeed, the difference is so great that there are many persons who would doubt that they were of the same breed. The same characteristic points are observed in the ox as in the cow and bull. There are some red and white oxen, but, like the cows, these are usually not pure. There are exceptions, and the farmers admire a black and white and a red and white one in a pair.

The oxen are of two sizes.

They are provided with long slender horns sharp-pointed, and, consequently, most dangerous, if used as

weapons of offence, but usually these animals are quite docile, and are not given to attack. The contrast between the horns of the ox and those of the bull are very remarkable. The shape and polish of the horns is so much esteemed in Brittany that they are frequently cleaned, and even artificially twisted into proper form.

The bulls are usually castrated when very young, so that the head remains small, and with a sharp outline ; the neck short, deep, but not thick ; the chest is broad, the ribs round and long, the withers, back, loins, and croup, are nearly in the same line and wide. The tail is often attached too high, though it is always long and fine.

The Breton ox has but a small dewlap, and a thin and supple skin. The shape of the abdomen varies according to the keep allowed the animal. Usually the limbs are straight and well formed.

The walk of these oxen is as rapid as that of the horse, and they can trot fast and for some time together.

All that has been said, therefore, tends to prove that amongst the Brittany cattle may be found perfect animals *in miniature*. This cannot be said precisely of the ox, and evidently some specimens of the "race améliorée" attain considerable size, even when not castrated. Of the bulls and cows imported into England, we have seen some abortive specimens of the smaller kind, with coarse skins, thick horns, crooked

limbs, and none of the qualities for milking so constant in the pure breed. On the other hand, some very beautiful specimens have been imported recently, and have been admired by all good judges of dairy cattle. Their perfect symmetry, thorough-bred looking heads, horns, and limbs, with good hind-quarters, and well-shaped udders could not fail to attract notice.

The manifest similarity between our improved Ayrshire stock and its parent—according to Bellamy—the Brittany breed has naturally led to the improvement of the latter in France by crosses with the former. For this purpose many excellent Ayrshire bulls have, within the last two years especially, been purchased by the French Government to be distributed in the improving districts of the Morbihan and other parts of Brittany; and a most valuable cross has been formed, which in recent agricultural shows in France has held such a prominent position as the "Ayr-Bretonne" breed. Probably this cross will better serve the purposes of our country than the diminutive animals which have been brought over in such quantities of late, and which have, perhaps, fallen somewhat short of the expectations encouraged by exaggerated statements.

There cannot be a doubt, however, that a good Brittany cow yields much and very rich milk. The produce of two or three of these cows contrasted with any of our home breeds does, in comparison with the cost of keep,

as a general rule, tell in favour of the breed of the Morbihan. The disposition of the latter to fatten indicates that, to ensure the full benefit of its milk-forming qualities, we should allow it good, regular, but moderate diet, with that amount of exercise and freedom in the open air which it enjoys in its native country. I have recently had an opportunity of seeing two of the little cows of this breed which calved last August. They reared two beautiful calves, and are now, seven months after calving, giving, individually, six quarts of milk, and are in calf. The latter circumstance necessarily tends to diminish the quantity of milk secretion, nevertheless in relation to the size of the animals, and their consumption of food, the amount is so large that, in addition to the animals being of excellent quality, much judicious management must be required to ensure at all times such a result. If overfed and pampered these animals soon grow fat and cease milking. Though they must not be starved, their food and exercise require to be so proportioned as to insure health without plethora.

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