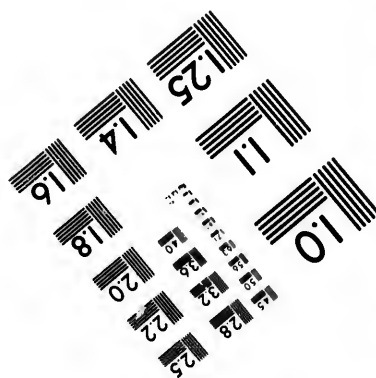
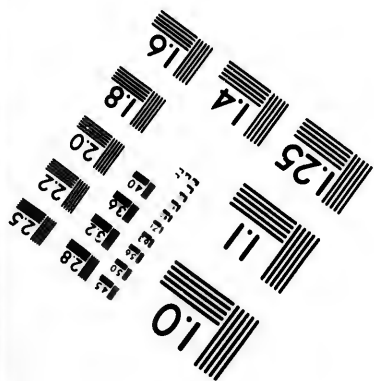
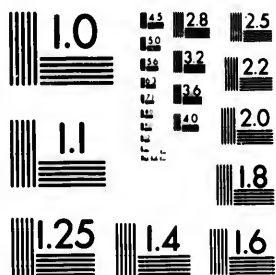


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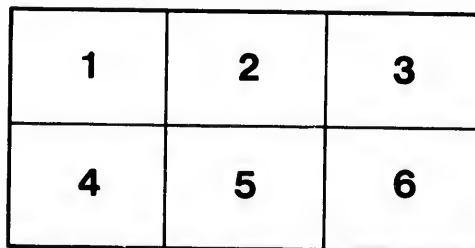
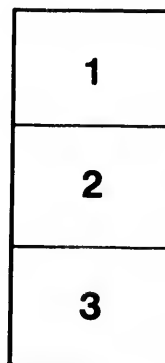
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CONTAGIOUS DISEASES

OF

CATTLE

WITH THREE ILLUSTRATIONS.

PRIZE ESSAY

BY

J. T. DUNCAN, TORONTO.

OTTAWA:

PRINTED BY MACLEAN, ROGER & CO., WELLINGTON STREET.

1880.

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P R E F A C E .

At the Provincial Exhibition, of 1879, held at Ottawa, for which a grant of \$5,000 was made by the Federal Parliament to give it a Dominion character, the Hon. J. H. Pope, Minister of Agriculture, offered a prize for the best essay on Cattle Disease, the subject being of great importance in an agricultural and commercial point of view. The essays received were submitted to the judgment of Professor Williams of Edinburgh, Scotland, who made the following report:—

“ Having read the six essays on pleuro-pneumonia and the contagious diseases of cattle.

“ I award the prize to that signed ‘*Vive et discere*,’ the envelope accompanying it containing no name.

“ The essay by Mr. Henry James, Ottawa, possesses very great merit and deserves at least to be honourably mentioned.

“ I remain, &c.,

“ W. WILLIAMS.”

Mr. J. T. Duncan, Veterinary Surgeon and Demonstrator of Anatomy, &c., Ontario Veterinary College, Toronto, is the author of the prize essay which is now published for the information of all engaged in the production of, and trade in cattle, both of which interests are yearly increasing in importance.

OTTAWA, August, 1880.

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CONTAGIOUS DISEASES OF CATTLE.

I. PLEURO-PNEUMONIA CONTAGIOSA—INTRODUCTION.

In treating of the contagious diseases of cattle, the one mentioned above demands our first attention; not only on account of the enormous injury it is capable of inflicting on the stock interests of any country to which it is brought—not only because of the prominence given to it by recent events, but because of the *facility with which it may be introduced into a country at present free from it*. This it is which gives to Canada such a vital interest in the disease. We are, and have been, free from its ravages. So long as we remain so, our trade in cattle (now one of the most lucrative and important to the country) will not be subjected to annoyance and loss by legislative interference. While the United States, by gross governmental carelessness, have allowed it to become firmly established in their borders, we are enjoying the benefits of our own precautions in the matter. Our immunity from this plague is a source of gratification, especially to the veterinary profession, and if the Government, in concert with the profession, can preserve to the Dominion a continuance of that immunity they will deserve the thanks of all.

But we know not how long this condition may remain. Along our southern frontier lies an infected country. True, the West as yet claims exemption, but this fact has not been established by proper veterinary inspection. The inter-state trade is practically unchecked, and the only reason why the West is not affected is the fact of the course of the cattle trade being from west to east. Nor are we in danger of infection from the United States only, but from Great Britain as well.

And other contagious diseases besides the one just mentioned demand our care and vigilance that they may not be brought into the country. To supply the information necessary to guard against such plagues and to spread information regarding them in an available form, these pages have been written. The more important facts will be stated as concisely and as clearly as possible, while practical matters, as distinguished from theoretical speculations, will receive most attention.

HISTORY.

Although various writers have stated that this disease has existed from time immemorial, no really good account of it was written till the eighteenth century. From the hazy and extremely general description of previous authors, it is difficult to make out of what

affection they are writing. Some, however, have supposed that Virgil wrote of pleuro-pneumonia so long ago as before the birth of Christ, quoting, in support of that opinion, a description found in the third book of the Georgics. During the 18th century it prevailed more or less extensively in Europe, and in 1769 Bourgelat, a French veterinary surgeon, first wrote a good description of it. Not, however, till 1842 was it brought to Great Britain, from which country it has never since been banished. To the United States it "was imported in 1843 and 1850 by Dutch and English cows, and has since silently spread over nearly the whole eastern sea-board."*

ORIGIN.

The question of the spontaneity or otherwise of its origin has been much discussed. Some hold that, given a certain concatenation of circumstances, and it may arise abiogenetically. Others, again, equally good authority, maintain that it does not originate spontaneously. Practically, it may be assumed that any manifestations of it seen in these latitudes are due to *contagion, mediate or immediate*.

This brings us to the question (which has been much discussed) of how the disease can be communicated. Granted that it does not arise spontaneously, is there any other means of its propagation than the actual cohabitation of infected and healthy cattle? Many excellent authorities, as Professors Simonds and Brown, hold that it can be communicated in no other way. Their experiments, as well as those recently tried by Dr. Burdon-Sanderson at the Brown Institute, go far to support this view. This is known as *immediate contagion*.

On the other hand, such able men and high authorities as Fleming, Walley, Williams, and the continental surgeons generally, strongly combat this view, holding that whatever support it may appear to have from experiments, clinical facts prove conclusively that the virus can be carried on hay, straw, manure, various objects in the stable, etc. This is what is spoken of as *mediate contagion*. The supporters of this opinion point to such facts as this: that from a stable in which pleuro-pneumonic cattle were kept, all stock were removed, the stable cleansed and kept empty for months, and perfectly healthy stock, which had no possible communication with the disease in any other way, put in; *these cattle fell victims to pleuro-pneumonia*. Such facts as these are too numerous and well authenticated to be disputed, and leave no doubt of the correctness of those who hold the possibility of *mediate contagion*, unless, indeed, we account for these outbreaks on the ground of the autogenetic origin of this disease.

DEFINITION.

It is an insidious, exudative, zymotic disease, due to a specific poison or ferment, peculiar to the ox, and having its local manifestations concentrated in the lungs and pleura. † (WALLEY.)

* Professor Law.

† Professor Yeo questions its zymotic character.

PATHOLOGY AND SYMPTOMS.*

There is much variety in the manifestations of the disease. In some instances, more especially during its first outbreak in a district, it runs a rapid course, destroying life in the course of a few days, the lungs after death presenting the appearance of a congestive inflammatory change. In other cases—and these are by far the most numerous—the onset, course, and termination of the disease occupy a period of from four to eight weeks, or even longer, the animal becoming much emaciated and finally succumbing to an exhausting diarrhoea, imperfect aëration of its blood, hydrothorax, or to the depressing influence of degenerated animal matters in the blood, and anemia.

Premonitory symptoms.—Similar to the cattle plague, the commencement of the disease is often not observable. Thus attention is only called in many instances to an animal for the first time appearing unwell, but in which an examination brings to light the fact that changes of structure have taken place to such an extent as to convince the observer that disease has been gradually increasing for a lengthened period. The thermometer is the only true guide by which we are able to discover the end of the incubative, and the beginning of the active stage. For example, the introduction of the disease into Australia from this country proves that the first manifestation of illness is not at all to be depended upon as a guide to its true commencement; for the carriers of contagion—bulls for breeding purposes—were three months on the voyage; the disease only breaking out after they were landed.

It is of great importance that thermometric observation should be made during the prevalence of pleuro-pneumonia, in order that owners of stock might be warned in time and that measures be taken to isolate or otherwise dispose of all animals in which the temperature is found to be rising. In a suspected herd, all animals showing a temperature above 102° should be carefully watched. If the heat rises above this, there can be little doubt that the disease is at work. Usually the temperature rises to 103° or as high as 106° ; but I have no case on record where the latter point has been exceeded.

The palpable or obvious symptoms are slight rigours or shiverings, the hair merely standing the wrong way; loss of appetite to some extent; secretion of milk diminished; in some cases the animal "kneekies over" at one hind fetlock, usually the right one; an occasional cough is heard, which is dry and hard in character, not the painful cough of pleurisy as one would suppose; rumination becomes irregular, and although there is some loss of appetite, the animal seems fuller than its fellows which are healthy, and eating vigorously. The bowels are rather constipated, and the urine is scanty and high coloured.

The pulse of cattle, as I have already stated, is not, more especially with regard to its number, a good guide to the practitioner in this or any other disease; however, as it advances, the pulse becomes accelerated and of a feeble character—sometimes a large soft pulse, sometimes a small wiry one. These insidious

* From Principles and Practice of Veterinary Medicine.

symptoms may continue for several days, the most careful examination of the chest denoting nothing unusual except a tenderness on pressure applied to the intercostal spaces of one or both sides, and pressure upon the back causing the animal to wince and perhaps to give a slight groan. Some cases in an infected herd will at this stage begin to give obvious signs of recovery, and in a few days be as well as ever again, the morbid material having evidently been expelled from the body without causing any important pulmonary change. In all cases, however, some amount of irritation of the lung tissue has been induced, as a cough remains for some time longer. Should recovery not take place, the signs of general disturbance gradually, sometimes rapidly, increase, the cough becomes more persistent, the mucous membranes, except that of the nose, are generally pale, the respiratory movements increased in frequency, more abdominal and shallow. When the animal stands, the elbows are turned out, the nose extended, the back arched, and the hind limbs drawn under the body and knuckling over at the fetlocks. When recumbent the animal throws the weight of the body upon the sternum, and, owing to the anatomical conformation of this bone and its articulation with the true ribs, the chest is thus expanded.

The breathing becomes painful, and is often accompanied by a moan or grunt, omitted during each expiration; the nostrils are dilated, a discharge issues from the eyes and nose, which is at first colourless, but often becomes purulent and yellowish. The extremities, as well as the horns and ears, vary much in temperature. Sometimes all are cold; often, however, one ear and one horn may be cold whilst the others are hot, and so on with the extremities. Constipation of the bowels continues in many instances for a long period, in others it is succeeded at an early stage by diarrhoea, which, if not too persistent, seems to have a salutary effect. The surface of the body becomes harsh and dry; the skin appearing to be tightly bound to the sub-cutaneous structures; there is rapid loss of flesh; and if diarrhoea assumes a colliquative character, the animal dies in from three to six weeks from the first visible manifestation of the symptoms.

The symptoms upon percussion are tenderness and some amount of dullness; the dullness increasing in proportion to the exudation and consolidation. If, at the outset of the disease, it can be determined that both lungs are inflamed, the prognosis in all cases is unfavourable; but if, on the contrary, it can be demonstrated that but one lung is affected (the right lung according to my experience being more prone to suffer, but showing a greater tendency to recovery), there are some hopes that the case may recover; for very frequently the morbid action is confined to the side primarily attacked.

Auscultation will detect a friction sound, caused in the first stage by the surfaces of dry pleura moving upon each other, and, in the more advanced stage, from being roughened by deposits of fibrin. These friction sounds are accompanied by others, which indicate that the disease is not confined to the pleural surfaces only; thus we have crepitation, both large and small, indicative of inflammation of the lung-connective tissue, with ronchus and sibilus denoting bron-

chial disease. It is seldom, indeed, but that some sound or other is detectable in all parts, except the lower portions of the chest; the consolidation of the lung, extensive though it may be, being insufficient to mask or hide the abnormal sounds emitted by the lung tissue, pleura or bronchial tubes.

When the disease is confined to one lung, the respiratory murmur in the healthy lung is louder than natural, owing to its having to admit more air than when both are in a state of health. This must not be confounded with a diseased condition, and in order not to make a mistake percussion must be applied. The healthy side will be resonant, the diseased one dull. I have seen some cases where the diseased and consolidated lung enlarged to such an extent as to push the ribs immediately covering it outwards to some extent, the animal appearing rounder and larger on that side in consequence, and some of these cases have afterwards thriven and become fit for the butcher.

Now and then it is found that some portion of the lung becomes gangrenous and is coughed up; these cases are, however, very rare. When gangrene occurs, the discharge from the nose becomes sanious and fetid, and a fetid diarrhœa soon carries off the suffering beast. Abscesses in the lung are an occasional consequence. An animal apparently recovers from the disease, but after a time begins to lose flesh and sinks from exhaustion, the *post mortem* revealing a large abscess or abscesses in the lung tissue. Another termination is the formation of groups of tumours upon the pleural surfaces, more especially that portion of them covering the anterior aspect of the diaphragm, upon the pericardium and peritoneum. These tumours are known amongst butchers and others as "grapes" and are supposed to be due to the tubercular diathesis. There is no doubt that sometimes these deposits are essentially serofulous, and are caused by that condition of the body independently of pleuro-pneumonia; in other cases it is beyond a question that they are merely the altered exudatis of pleuro-pneumonia—altered inasmuch as they have undergone the caseous, fatty or calcareous degeneration. In some instances of very extensive consolidation, the sounds detectable by auscultation and those emitted by percussion are very trivial. In such it is found that the alteration of structures is most extensive in the central portion of the lungs. One symptom is very diagnostic of this condition, namely: much coughing when the animal attempts to swallow; this is caused by the exudate pressing upon the œsophagus within the chest and retarding the act of deglutition.

THERMOMETRY.—The importance of this has already been touched upon (see p. 5.) The use of the thermometer is held to be so valuable a guide in discovering the presence of contagious diseases, that the British Privy Council insists on its use in all suspected cases, and directs that so long as the temperature of an animal is elevated, such animal must be retained in quarantine. It is of the last importance, then, that, especially in connection with this disease, the subject be understood as thoroughly as possible.

"The domestic animals present a tolerably constant temperature in health, *i. e.*, this warmth is not dependent on the atmosphere in which they are. Thus, in man it is 37.5° centigrade (99.5° Fahrenheit); in the horse, about 38.25° C. (100.85° F.), and in cattle, 38.2°

C. (100·76° F.), these numbers being the average from numerous observations.

"In disease, we find more or less alteration, and Claude Bernard has proved that a disease may be fundamentally diagnosed by the mere deviations of the temperature from the normal standard."

It has been known since the days of Hippocrates that increase of temperature was a reliable sign of disease, but it is only since the invention of the thermometer that this can be measured exactly.

"*Clinical Thermometry* is that which furnishes us with the variations of the animal temperature during disease * * * It proves of immense advantage to the practical veterinarian * * * under some circumstances pointing out the approach of disease * * * and provides valuable hints in the treatment.

"This instrument (thermometer) is necessary where exactness is required, and it answers the same purpose in investigating the temperature as the second hand does in counting the pulse."

In using the thermometer "it is placed six or eight inches in the rectum, and in complete contact with its walls; it should be left in this situation about ten minutes, after which it should be read by partially withdrawing it; replaced again for another two minutes and again read."*

In this way correctness is insured, and to save the time of the operator it is suggested that the thermometer be brought to near the normal temperature of the body before inserting it. The rectum should be cleared of excrement before the instrument is inserted. Zundel gives a very excellent table, whereby the temperature may be recorded conveniently, which all inspectors should use, as it enables a complete record of large herds to be kept with ease, the results being apparent at a glance.

To show the reliance placed upon the thermometer by the British authorities, the following *resumé* of the Report is presented:

"Notwithstanding Article 3 of the Circular of 1873, proscribing the obligatory slaughter of pneumonic animals, the Privy Council, attributing in great part the continuation of the prevailing pleuro-pneumonia to the delay of slaughtering * * * are of opinion that the disease would be efficaciously stopped by other dispositions if executed in the following manner:—

1st. Cattle affected with pleuro pneumonia must be killed in the shortest possible time.

2nd. The *internal temperature* of each animal which has been exposed to contagion must be observed, and the herd divided into two separated lots.

The lot A will include animals whose temperature will rise above 103° F. These will be destroyed in the shortest possible time, if positive symptoms of pleuro-pneumonia become manifest.

The lot B will include the balance of the herd. Those animals will be examined *with the thermometer every week and transferred to lot A if the temperature rises above 103° F.*"

As the result of a great number of experiments, a distinguished continental authority, Ed. Dele, comes to the following conclusion:†

* Aug. Zundel.

† Ed. Dele, in *Am. Veterinary Review*.

"The *invasion* of pleuro-pneumonia (not easy to recognize) is accompanied by an increase of temperature. This continues during the period of *increase*, and it is at its height at the period of *acme*. From that it declines and indicates the period of *decline* towards recovery (slow diminution) or towards death (probably more rapid)."

TREATMENT.—Seldom indeed will the enlightened practitioner attempt medicinal or curative treatment. One reason for this is the danger of keeping infected stock, for generally a case of apparent recovery is not a sound animal.

Dr. Thayer gives the following as a case of supposed recovery: "One-half or two-thirds of the lung are solidified; the first effort of nature is to throw around the diseased mass a covering of fibrinous material, entirely shutting off the healthy from the diseased tissue, which is generally accomplished in from fifteen to forty days. Separation then commences on the surface of the diseased mass, which continues until the whole is liquified; absorption is constantly going on, and in from six to twenty months the animal recovers, but with the loss of a portion of the *vital organ*. If the animal is a working bullock, its value is destroyed; if a cow in milk, after the acute stage is passed, the secretion is partly restored, and the milk consumed by the people."*

If treatment is undertaken in any case, no attempt must be made to "cut short" the course of the disease. Unfavourable symptoms may be controlled by medicine, and every attention given to hygienic measures. The sick must be carefully segregated, have plenty of fresh air "but without producing draughts; the skin should be protected by a light rug, which must be sufficiently thin to allow of cutaneous transpiration; feeding not to be thought of in the earlier stages;" later, semi-fluid matter, as milk, glycerine, and raw eggs may be given in the acute stages, cod liver oil and molasses in the convalescent. Brushing the skin is useful. "Medicinally, laxatives—hydrogogue salines in preference—should always be administered in the outset * * * Skin and diuretic medicines—as cream of tartar, acetate of ammonia, camphor and nitric ether, with carbonate of ammonia—should be given in the early stages; stimulants later. In the convalescent stages, iron compounds, arsenic, and hyposulphite of soda with nux vomica or strychnia alternated with dilute sulphuric acid."†

Bleeding is not to be recommended, nor are counter-irritants successful.

PATHOLOGICAL ANATOMY.

In order to understand more clearly the post mortem appearances seen in *pleuro pneumonia contagiosa* we may briefly indicate the normal anatomy of the bovine lung. The chief peculiarity, and one which involves the other peculiarities, is the distinctness with which the lobules are marked off and separated from each other. This division is accomplished "by thick layers of cellular (areolar) tissue, continuous with the internal face of the visceral pleura (those septa are rather the interlobular ramifications sent off from the *subserous envelope*.)

* Massachusetts Report.

† Professor Walley.

Dietrichs, who first drew attention to this peculiarity in the larger ruminants, has justly remarked that it perfectly explains the altogether special characters of lesions of pneumonia in these animals."*

The special points in the normal anatomy have been thus summed up:—

1st. The vascular and bronchial territories are distinctly defined and independent of one another.

2nd. The lobules of the lung in the ox are quite distinct, and may be separated without injuring their air-cells, (they may be drawn $\frac{1}{8}$ of an inch apart without injury to the connective tissue connecting them.)

3rd. Each lobule is enveloped in a case of connective tissue, which contains a rich plexus of lymphatics.

4th. A sheath of delicate connective tissue also surrounds the *broncho vascular* systems and forms the bed of large lymph channels.

5th. The lymph from the interlobular spaces passes along the peri-bronchial passages.

6th. As the lymph vessels follow the course of the broncho-vascular systems, those around any given system must drain the territory of the lung tissue supplied by that system.

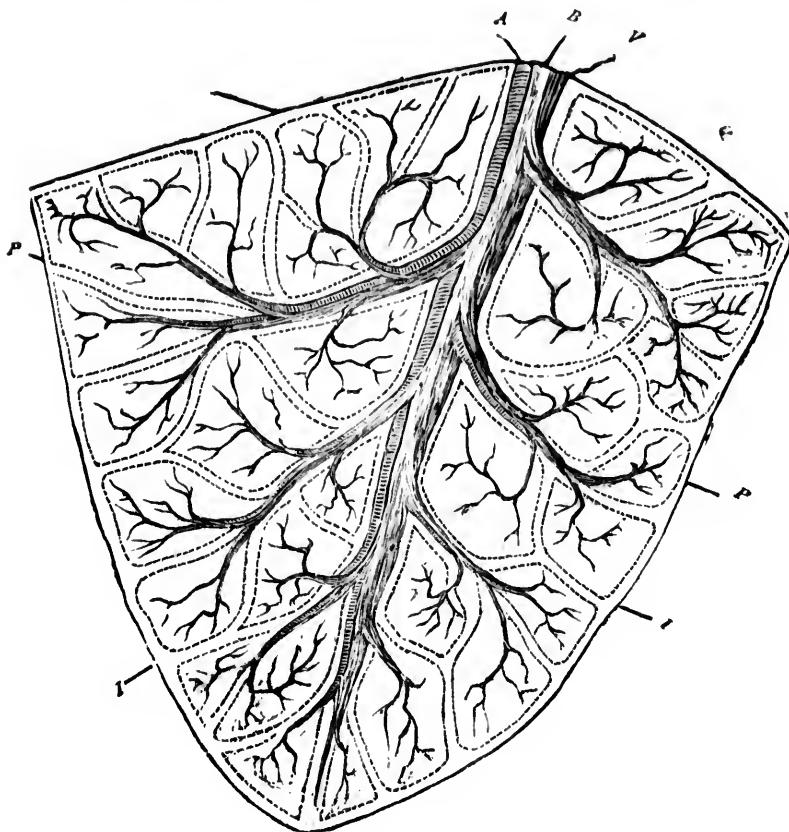
7th. The subpleural lymphatics seem to take a less important share in draining the tissue than is the case in many other animals.

These points will be more clearly understood by a reference to the accompanying diagram, obtained from Professor Yeo's admirable Report, as are the other drawings.

* Chauveau. See also Strangeway's Anatomy.

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FIG I.—Showing Broncho-Vascular system with corresponding territory.



A Artery. B. Bronchus. V. Vein. P. Pleura. I. Interlobular Space.

(The dotted lines show the course of the lymphatics.)

Here we have (in the diagram) a portion of the *lobe*, marked off into many *lobules*. The dotted lines not only show the course of the lymphatics, but, as the lymphatics ramify in the interlobular connective tissue, they indicate the manner of division into lobules. This connective tissue, as before remarked, is derived from the subserous envelope of the lungs. It can be seen to divide off the lobules completely one from the other. It will be spoken of as the *interlobular connective tissue*, and it is in this connective tissue, whether interlobular or peribronchial, that the *clear exudate* spoken of under the lung lesion, is partly found. (See page 13.)

In order that we may more clearly understand the changes, we notice, first, the *Pleural*; second, the *Lung*, and third, the *Broncho-Vascular* lesions.

Changes in the Pleura.—These show pleurisy of an acute type, differing, however, in not being diffused, as in ordinary pleurisy, but localized. Wherever the lung below is the seat of disease, the pleura above is covered with a dense fibrinous exudation. As the disease advances in the substance of the lungs, the contiguous lobes become firmly cemented by the adhesion of their pleural surfaces. The visceral and parietal surfaces are generally separated by a quantity of fluid effusion, which is thin, yellowish or greenish in colour, coagulating after removal, showing the presence of some fibrin. If the anterior lobes are affected, the pericardium generally becomes inflamed and thickened as well as the pleura. To sum up:

1st. It has the character common to the ordinary forms of acute pleurisy.

2nd. It always varies in degree of severity in different parts of the same pleura.

3rd. Its point of greatest intensity corresponds to the apparent starting point of the lung lesion.

4th. It is not an invariable or essential part of the disease, for the lung may show disease and the pleura not.

5th. It usually appears to be of more acute type and more recent development than the lung lesion.

6th. Its occurrence often gives the first indication of the existence of disease.

Changes in the Lungs—The situation of the disease of the lung is generally shown by the lesions, already mentioned, of the pleura. But if this is absent, the pleura not being affected, the portion of diseased lung tissue can still be easily recognized as a hard, heavy, airless, discoloured mass, standing out boldly from the neighbouring normally collapsed lung tissue, which is light, soft and elastic.

The extent to which the organs may be affected varies greatly; it may be a nodule the size of a man's fist, or, in a long standing case, the whole of one lung (more often the right), or the greater part of both, may seem to be involved. By inflation, the small remaining healthy portion may be brought into view. Even in an inflated lung, however, the diseased stand out above the healthy portions, being considerably increased in size (from the hyperplasia in the interlobular spaces.)

If, now, a section be made through the affected part, cutting from the surface toward the root of the lung, we find the diseased part *wedge-shaped*, the point towards the root, the broad part to the pleural surface. This is not so well seen in the advanced cases, but is exceedingly characteristic in the earlier stages. The line of demarcation in these cases always corresponds to the interlobular spaces. These sharp lines of demarcation, not only between the healthy and diseased structure, but also between the several territories affected with the various degrees of morbid change (which are so different in colour), are among the most obvious characters of the anatomical appearances.

Perhaps the most striking appearance seen on the cut surface is the net-work of pale yellow lines which is distributed over it.

The lines forming this network are, on an average, about $\frac{1}{8}$ of an inch in diameter. They cross each other so as to map out the surface into a number of polygonal areas, about one-half or three-quarters of an inch in diameter. These areas are found to correspond to the lobules, and the lines are formed by the exudate into the interlobular connective tissue. These pale lines resemble, in a cut lung, the veins in marble, hence that name has been given. This marbling is considered (by some) to be the great diagnostic character of this disease.*

Three very distinct conditions of the lung tissue are to be noted, 1st, *clear exudation*; 2nd, *opaque consolidation*; and 3rd, *black consolidation*.

The two latter forms, viz., the opaque and black consolidation, are seen in various stages in the diseased lung, generally, however, if they co-exist, being sharply divided from each other by the pale markings spoken of previously.

The portions of tissue showing the black consolidation are denser, heavier than the opaque, and show a further advanced and more intensely diseased condition. Around both the opaque and black portions, however, may be seen the first conditions spoken of, viz.: the clear exudation.

This may be spoken of as simply exudate, and infiltrates the tissues with a clear material, found, as previously stated, in the periphery of the diseased portions, forming a very complete case around them. The three conditions spoken of now may seem to shade off into each other but they are really distinct. The clear and opaque forms, also, may be seen without the black, but the latter is never found alone, being always associated with and preceded by the other lesions, which seem to be of much longer duration.

The more important of the foregoing facts, as to lung change, are:—

1st. The lung parenchyma is usually the seat of various forms of irregularly arranged exudation, which gives it a mottled look.

2nd. The interlobular spaces are always the seat of more or less exudation, which gives the sections the appearance of pale yellowish lines.

3rd. These pale lines sub-divide the mottled surface into irregular small fields—*marbling*.

4th. Three kinds of lung lesion—(a) Clear exudation, (b) Opaque, (c) Black consolidation.

5th. (a) or (b) may become dense, and form tissue of cicatricial hardness.

6th. (c) may produce gangrene, caseous degeneration or fibrinous crumbling.

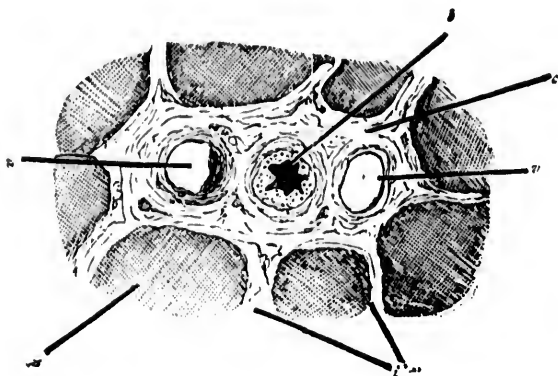
There remains now to speak only of the changes in the broncho-vascular systems. These systems will be spoken of together, as they are so intimately connected, the bronchus lying between the artery and vein, all being surrounded by a sheath of connective tissue, in which ramify the lymphatic vessels. (See Figures 1, 2 and 3.)

* It is but proper to state that, although Professor Yeo and others hold the opinion stated above, Professor Williams and others dissent entirely from it. See page 5.

On cutting across a portion of diseased lung, we find the bronchus occupied with a dense mass of granular material which completely occludes the smaller bronchi and tapers off into the larger ones. If this is removed, we find the mucous membrane rough, discoloured (dull grey or yellow), and stripped of its epithelial lining.

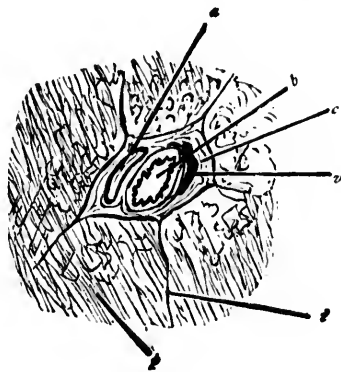
The walls of those air tubes which contain the firm plugs are always enormously thick and dense. And besides this thickening of the walls of the bronchi, their delicate connective tissue sheath (Fig. 2) is the seat of dense exudation; as a consequence, becoming a tough and rigid case. This exudation appears to be, in character, similar to that which fills the interlobular spaces.

FIG 2.—Transverse section of Broncho-Vascular system in a state of disease.



a. Artery partially occluded by a thrombus. *b.* Bronchus contracted and plugged. *v.* Vein. *c.* Broncho-Vascular sheath thickened by exudation. *i.* Interlobular tissue. *p.* Lobular parenchyma.

FIG 3.—A corresponding Broncho-Vascular system in health.



As the blood-vessels ramify with the bronchi,—surrounded by the same connective tissue sheath,—it is not surprising that we cannot have morbid changes in the bronchial without speedily finding them in the vascular system.

As a matter of fact, the walls of the blood-vessels soon become engorged, the external coat being first attacked, the others, in turn, becoming thickened and rigid. Red spots are seen here and there on the inner coat. It may be destroyed entirely for a considerable portion, and then a clot gradually forms which may completely fill the vessel. And once the stoppage is complete, the clot seems rapidly to grow into the larger branches, at last producing complete occlusion of the larger trunks.

The foregoing account of the Pathological Anatomy is much condensed from Professor Gerald Yeo's Report on the subject.

The question of where the disease commences is one which has been considerably discussed, but which is not at present of any great practical importance. Prof. Yeo holds that it always commences in the "air passages as a chronic inflammation associated with destruction of the bronchial mucous membrane," while the contrary opinion is that it may originate anywhere, either as above or in the lung tissue or the pleura.

Professor Yeo's opinion is strongly supported by the generally admitted fact that the bronchial and peri-bronchial lesions are of older standing than those of the parenchyma, while the pleuritic are the most recent of all. He says:—

"I can well understand how a beast, by sniffing the fodder of a diseased neighbour, may draw into its air passages some of the dried discharge, and thus infect the bronchial mucous membrane and get pleuro-pneumonia, while all the skill of science will not induce the disease of the lung" by inoculation with the same material.

Of more importance is the question whether pleuro-pneumonic meat is fit for human food or not. The Dublin Sanitary Association appointed a committee to examine the question, and after a full enquiry they reported decidedly against its use. On the other hand, another committee, appointed by a different society, but composed of equally distinguished medical men, and after as careful an examination say: "It follows * * * that the *fresh* and *unchanged* meat of animals slaughtered during an attack of pleuro-pneumonia may be safely consumed, and that such meat is not sensibly less in nutritive value than that of other animals unaffected by any disease, but that it is of inferior quality."

There can be little doubt that this is the case; in the early stages it is perfectly fit for human food.

Dr. Blake White has carefully examined the milk of cows suffering from pleuro-pneumonia, and he reports it as decidedly unfit for human food. He says: "I have no hesitancy in pronouncing these samples of milk not only unwholesome, but in consequence of the very low percentage of fat, innutritious, and showing in every way what a depreciating effect unwholesome and insufficient food has upon this important secretion."*

* Report of Sanitary Inspector.

PROTECTIVE MEASURES.

The question of what steps should be taken once this plague appears in a country is of the gravest importance to the community at large. Fortunately, so far, with this question the Dominion has nothing to do. But to be forewarned is to be forearmed, and considering the possibility of its introduction here, the proper course of action should now be determined on, in such an event.

Given the presence of this plague, then, two means of dealing with it present themselves, viz.: "Stamping out" and Inoculation. I say two, for no veterinarian worthy of the name would advise general treatment.

First, as regards "stamping out." The advocates of this system are uncompromising, and will admit of no modification of their method, nor have they much patience with those who wish to try other means of combatting this affection. Professor Williams says: "When the disease breaks out in a herd, the affected animals are to be isolated, or if in 'condition' slaughtered for beef—experience having proved that such beef is good and wholesome if the animal is killed early in the disease."

Dr. Thayer says: "Stamping out is the most effectual and economical method of treating pleuro-pneumonia contagiosa."

Professor Law says: "We do need a short and speedy stamping out of the disease in every locality where it has gained a footing. All measures which hinder this, whether proposals for investigation or the impossible but delusive proposition to examine all our cattle while in transit, can but work evil, and only evil, to our live stock interests."

These views have been largely acted on in many countries. Massachusetts has adopted this plan of dealing with the disease. New York State and others, are following in her steps. Great Britain has attempted "stamping out" for years. Continental Governments did the same till recently, when, owing to the progress of science, they have, to a large extent, adopted inoculation.

Disinfection.—Along with stamping out, thorough disinfection (by burning sulphur, whitewashing with lime, carbolic acid, &c.,) of all sheds and stables must be carried out.

This thorough stamping out, then, is one course open to us if pleuro-pneumonia should appear in Canada.

But in the second course which was mentioned as a means of controlling this plague, viz.: Inoculation, we have a policy of protection, which is more effective, more scientific, and which can be had at a tithe of the expense of "stamping out."

The use of inoculation as a prophylactic is not new. First attempted by Dr. Willems, in Belgium, 1851, it has since come into great favour in many parts of the world.

A Commission appointed by the French Government to test and examine the system, reported strongly in its favour.

It has produced marvellously good results in Australia, South Africa and the Continent of Europe. So great are its benefits seen to be, that some of the continental governments have made inoculation compulsory. Notably, in Holland, have the good results of this measure justified its adoption.

Out of 22,348 cases inoculated on the Continent of Europe, we find that 24½ per cent. were uniloculable, that is, gave negative results, but of the 75½ per cent. which showed results, 7.08 per cent. lost their tails, 0.24 per cent. suffered from extensive gangrene, and 2.19 per cent. died while about 1.25 per cent. contracted the disease on being exposed to contagion. This showing, compared with the results without inoculation, in which the deaths are from 50 to 50 per cent., speaks volumes in favor of this measure; which is upheld and advocated by the advanced and progressive veterinarians of the world.

It must not be supposed, however, that, excellent as is the record of inoculation, it has not its opponents. Some leading authorities object that—

1st. The deaths following inoculation are nearly, if not quite, as great as from the disease itself.

2nd. That it is but a means of spreading pleuro-pneumonia; and

3rd. That it does not afford immunity from its attacks.

In answer to these objections, it may be stated, that the first and third are fully answered by the results noted above, while the second has no foundation in fact, it being *impossible to produce pleuro-pneumonia by inoculation as has been proved by many experiments.*

But, excellent as are the results hitherto noticed, the more recent ones obtained by Mr. Rutherford, V.S., of Edinburgh, eclipse them all.

Of these experiments Mr. George Fleming says (Veterinary Journal, 1879): "Mr. Rutherford's highly successful, intelligent and scientific practice of inoculation on a larger scale than has, perhaps, ever before been attempted in this country, leaves nothing more to be desired in the way of evidence as to the absolute immunity conferred by inoculation. * * No animal inoculated by Mr. Rutherford has ever been known, no matter how much it may have subsequently been exposed to infection, to become diseased, and the dairy men have no fear whatever in introducing suspected or sick animals among those inoculated. * * The question of its efficacy and safety is now beyond discussion or dispute; thanks to Mr. Rutherford, the problem is solved and the freedom of Edinburgh from pleuro-pneumonia at the present time—a condition which has not been known to exist for more than thirty years—is mainly, if not entirely, due to his scientific skill."

Other authorities and facts might be quoted in support of inoculation, but enough has been said to prove its value, and as it is of the utmost importance that the operation be performed properly (much of the prejudice against this measure being due to ignorance and carelessness) I give Mr. Rutherford's method of operating:—

"Taking the systemic conditions, first, I find that it is not advisable to inoculate cows immediately before calving. I would not like to do it upon any cow that had less than eight or ten weeks to run; nor is it advisable to do it immediately after calving. At least fourteen days ought to be allowed to elapse, and it should only be done then if the animal has, both locally and constitutionally, recovered from parturition. It should not be done, but deferred if there is the slightest degree of inflammatory action in any part of the body; in short, the animal should be, as far as we can ascertain, well in all respects. It should not be done if we consider the ani-

mal to be affected with pleuro-pneumonia; but, at the same time, I must tell you that I have reason to think that there is a stage in the disease, the very earliest, when, if inoculation is performed, good results may reasonably be expected to follow. I do not advise it however.

"It is not advisable to inoculate in very hot weather; and it is less advisable to inoculate during the winter months, unless special arrangements can be made for maintaining a uniform warm temperature. It is not, in my opinion, advisable to inoculate with any but one kind of virus, and that should always be fresh and free from any foreign matter; nor is it advisable to adopt any modification of the true method of inoculation. I would ask you to note that mild or modified inoculation is not to be depended upon, and should not, therefore, be practised. I am of opinion that there is only one mode of inoculation, and shall now describe it.

"The virus or lymph should be obtained from an animal not too far gone in the disorder and free from other diseases. "Lymph" is the amber-colored liquid exudate found in the interlobular tissue (described previously as *clear exudation*. See page 13). It may be obtained by cutting into this clear exudate and allowing it to drain into a vessel below. Too much care cannot be exercised in selecting the lymph, as its fitness is the most important thing in connection with the operation. Select and use, therefore, only the amber-coloured liquid free from blood, serum and other extraneous matter. If not used immediately, preserve it by hermetically sealing the bottle.

"Having obtained your lymph, you saturate with it as many pieces of white worsted, eight to nine inches long each, as there are animals to operate on. The instruments used are a pair of strong clipping scissors, a pair of rowelling scissors, and the needle.

"The proper place to inoculate is the tip of the tail.

"In operating you require the assistance of two men and a lad; one man to hold the head, one to distract her attention behind with one hand, while with the other he grasps the tail firmly, while the lad holds the saucer containing the threads ready saturated for use.

"The operator, standing behind the animal, seizes the end of the tail and clips off the hair for five or six inches, only leaving a tuft at the end. Then with the rowelling scissors he makes the transverse cuts on the posterior aspect of the tail, three inches apart.

"The needle is then passed from below out at the upper cut, turned round several times sharply to enlarge the channel, threaded with a doubling of the worsted and then carefully withdrawn, leaving the thread in the tail; and after cutting off the two long ends the operation is complete.

"Within two or three days after inoculating, the part becomes slightly swollen, erythematous, but there is no discharge from the orifice. The swelling increases, and the animal is not able to lift its tail. About the ninth day the skin becomes yellowish, and beads of amber-colored lymph exude, similar to that which was introduced. Occasionally a longer time is required for the exudate to appear, but when it does inoculation is considered to be successful, and the second stage is complete.

"There are now two courses open to the operator, and much of the success of the operation depends on which he will adopt. He may allow the process to run its course, which will generally be gangrene of the end of the tail. I do not advise this process, but find the best plan to be to remove the end of the tail when inoculation is once fairly established. There are cases in which this must be done even earlier, and there are others in which it may have to be accomplished more than once, as, for instance, when the sudden setting in of coldness of the end of the tail indicates the death of the part.

"Carefully examine the end of the tail. The part to come off may not be cold, but it will be wet with exudate and probably somewhat discolored for an inch or so above it. I find that where amputation is practised early, say on the twelfth to the fourteenth day, it is not necessary to make the division more than a finger's breadth or so above the upper incision made in inoculating.

"The amputation should be followed by profuse bleeding; if not, amputate higher up till bleeding follows. Neglect of this measure is apt to be followed by gangrene.

"After amputation many will heal without further inconvenience. In the majority, however, the stump will swell (and so long as it remains warm no anxiety need be felt), suppuration set in, and a small portion of tail thrown off. This, and the formation of abscesses on any part of the tail, are not to be feared. Only wash with carbolic water twice or thrice a day and dip the end of the tail in a strong solution of carbolic acid after milking.

"The abscess following exudate deposit may be an ordinary sequel of inoculation, or it may be the result of external injury. If from an external injury, it may appear on any part of the body. So long as an abscess forms, no danger is to be apprehended; but if instead of abscess you get extension of the exudate, loss of appetite and symptomatic fever, the case becomes grave, and the animal had better be slaughtered. In like manner should she be treated when the exudate extends to the genito-urinary organs.

"Males, young stock and calves, I find from experience, can be inoculated with little or no risk. This is a very important fact; for should inoculation ever become general in the country, the necessity for doing it upon our home-bred stock when brought into dairies would be obviated by their being done at an early period of their life, when the operation, while being equally protective, is attended with little or no risk, and does not call for any after attention.

"I have nothing to say on the subject of diet while animals are under the operation. It only requires to be rather below than above the mark as to quantity for the first three weeks, and calculated to keep the stomach and bowels in order.

"In regard to medicinal measures, if it is deemed advisable to give any opening medicine, the purpose will be fully and efficiently met by the occasional admixture in the soft food of sulphur and treacle.

"This, of course, is with the view of lessening any attendant fever. I have not, however, found that there ever is much, the thermometer rarely rising above 102° F."

The above remarks do not include Mr. R's experience for 1879; this is found in the following answers to queries addressed to him by Mr. George Fleming:

1st. Have any of your inoculated animals yet become affected with pleuro-pneumonia?—Answer, *none*.

2nd. Have you tried inoculation on any animals but those of the bovine species?—Answer, *I have not*.

3rd. Will animals once successfully inoculated take the inoculation as markedly as the first?—Answer, *they will not*.

4th. What is now your average mortality?—Answer, *one per cent*.

Here, then, we have the means of successfully applying this prophylactic measure, and the results of the operation fully set forth by the most successful operator living. He says:* "So certain and absolutely protective is inoculation in its effects that I feel confident that, as its practice extends, the dread of pleuro-pneumonia will cease."

It cannot be doubted, then, that the enlightened practitioner will now, instead of depending alone upon "stamping out" to combat this plague, while carefully segregating his animals and destroying those found affected, will give to the unaffected portion of the herd the protection of inoculation, thereby reducing his losses to the smallest amount.

II.—CATTLE PLAGUE—RINDERPEST.

This affection—fearful as have been its ravages in Britain—we are not likely ever to see in this country. It is indigenous, not in Britain, but in Russia, with which country we have no trade in cattle. It is not known in the United States. In Great Britain it has been "stamped out." But, even did it exist in Britain, we are comparatively safe from its introduction from the fact that its incubative stage is very short (eight days or less), consequently its presence would be manifest on the stock reaching our shores after the sea voyage. Nevertheless, it is well to be acquainted with its characteristics. The following account has been condensed from the writings of Professor Gamgee, one of the best authorities on the subject:—

"This terrible disease is a very contagious fever, characterized by specific lesions of the intestines, similar to those of enteric fever in man. It is confined to the bovine species, only rarely affecting sheep. It spreads somewhat slowly, and is not very fatal where it originates as an enzootic, but it is propagated very rapidly, and is the most fatal of all cattle plagues when it passes into Central Europe. The disease has a short period of incubation, and is characterized by alarming symptoms, which warn people early of its outbreak. It is not so insidious as pleuro-pneumonia—not seen in a latent form, therefore, cannot penetrate a country so readily unobserved.

"*Symptoms*.—The first signs consist in dullness, prostration, and a short husky cough. The appetite is not lost, but is irregular;

* Address before the Scottish Metropolitan Veterinary Medical Association, 1879.

rumination is also slow and irregular. The animal grinds its teeth, yawns, arches its back, draws its legs together under its body, and manifests tenderness of the loins. A fever shiver ushers in the next stage. The animal becomes hide-bound, its coat stars, there is still greater tenderness of the lumbar region. The gait is stiff, joints rigid, ears and horns alternately hot and cold; pulse frequent, hard and full; breathing laboured, and secretions generally scanty. Rumination is suspended; deglutition performed with difficulty; thirst intense, and mouth hot and clammy. There is a watery discharge from eyes and nose. The eyes are blood-shot, eyelids swollen, and soon encrusted with the dried inspissated secretions from them. Saliva drops from the mouth. If blood is drawn, it coagulates with difficulty. The dry excrement and high coloured urine are scanty and discharged with some difficulty. The abdomen is tense and tender. In cows the secretion of milk is stopped. In some cases general emphysematous swellings form at this period, and there are exacerbations of all the symptoms towards night-time. This stage lasts about three days.

"The symptoms increase in severity. Diarrhoea supervenes, great weakness appears. The pulse is 90 to 100, weak and indistinct at the jaw. The discharge from the nose and salivation increase. The cough is softer, and on the buccal and schniederian membranes, as well as in the clefts of the feet, a vesicular eruption is seen. Ulcers result wherever the vesicles burst.

"An unfavorable termination may be looked for when the body becomes cold, breathing quick, exhalations fetid, feces (fluid or bloody) discharged involuntarily, abortion in cows, and symptoms of insensibility or consciousness lost. The animal dies from the third to the tenth day of the development of the disease.

"In favourable cases there is an early diminution in the severity of the symptoms; the diarrhoea is not severe, and there is a pustular eruption over the body, or a desquamation of cuticle. The convalescence is long, and may last several weeks.

"*Post mortem appearances.*—In the first, or catarrhal stage, the lesions are not characteristic of the disease, but, taken in connection with the history of the outbreak, may assist materially in diagnosis. The mucous membrane of the fourth stomach, especially near the pylorus, as well as the lining of the small intestine, is swollen, and shows red spots or streaks. The surface of the membrane is covered with a viscid, tenacious, reddish or bloody secretion, which is more or less mixed with the intestinal contents, and in the sub-mucous tissue there is a turbid semi-fluid exudation. In the large intestine only redness is noticeable, especially of the cœcum.

"In the second stage the lesions are more characteristic. There are numerous patches of yellow exudation most abundant near Peyer's patches, but also seen in the fourth stomach, near the pylorus. Peyer's glands themselves have a perforated appearance, and in the vicinity of these reddish yellow deposits around the glands there is a sort of catarrh or secretion from the mucous membrane.

"In the third stage the exudations or deposits spoken of get loose from their periphery towards the centre. They become soft, adhere in the centre, their edges floating, till at last they get quite

free, and are discharged with the excrements. The portions of membrane from which these sloughs have separated are red and ulcerated, but the ulcers are not usually deep.

"The other organs of the body do not indicate any specific change. There is more or less redness and tumefaction of all the mucousmembranes. The heart is soft and flabby, the lungs normal or slightly congested, the liver dark in colour, its ducts and bladder full of bile. The mesenteric glands are apt to be swollen, and contain a yellowish red exudation, and may attain twice their natural size.

"*Treatment and prevention.*—The curative treatment of this disease has failed as a rule. Preparations of chlorine, iron, or neutral salts, have been used, and only with success in mild cases, and especially in Russian cattle.

"The prevention of the disease when it is known to originate spontaneously, or to exist constantly, is sometimes attempted by inoculating the cattle, a practice recommended first during the last century when the disease appeared in Britain."

When, however, the disease enters a country like our own, it is proper and prudent to kill out the diseased and infected animals, and prevent contagion by all known means.

III.—ECZEMA CONTAGIOSA (WILLIAMS); ECZEMA EPIZOOTICA (WALLEY)—FOOT AND MOUTH DISEASE.

Of the diseases hitherto spoken of, this is the only one which has been seen in Canada. "Last year (1875) we had an outbreak of foot and mouth disease in Ontario. It came through the medium of some sheep imported from England in the month of August. They were shipped from England (Liverpool), I believe, apparently healthy, duly inspected and furnished with a clean bill of health (one of the fallacies of inspection). When at sea several days some of them were noticed to be lame and sore, and the attendant thought they were cases of "Foot rot," or, perhaps, simple bruises. These sheep were brought to the Province and located on two farms, sixty miles apart. The cattle on these and neighbouring farms soon became affected with *eczema epizootica*, and there was considerable excitement in the districts so infected. On the part of the Ontario Government, I was requested to investigate the circumstances connected with the appearance of the disease, and also to adopt measures to prevent its spread. In all about 200 head of cattle were affected, and I had no difficulty whatever in tracing the origin of the disease to the sheep already referred to. * * Of course I recommended isolation and no intercourse with the farms where diseased animals were, and in a few weeks its progress was arrested. The cold weather came on, and I assure you our Canadian winter proves the best of disinfectants." *

Definition.—A highly contagious and infectious febrile disease, associated with a vesicular eruption in the mouth, between the pedal digits and around the coronets.

* * In milch cows it sometimes happens that a vesicular eruption occurs on the mammary gland, and within the lactiferous

*Prof. Smith in *Veterinary Journal*.

ducts. When such occurs, the milk contaminated by the vesicular discharge is rendered unfit for use, either as food for the human being or for the lower animals.*

Symptoms.—"Unlike rinderpest or pleuro-pneumonia, which are almost confined to the ruminantia, contagious eczema affects cattle, sheep, pigs, dogs, poultry, and even human beings;" cattle, however, suffering most.

After a period of incubation varying from twenty-four hours to three or four days, the invasion and progress of the disease are characterized by the elevation of temperature of from two to four degrees; by the formation of vesicles, varying in size from that of a sixpence to that of half a crown, on the tongue, inside the lips, roof of mouth, and sometimes on the udder, whilst smaller blisters make their appearance between the digits and around the coronets and heels, the animal at the same time presenting signs of uneasiness in the mouth and feet. * * In a short time the epithelial and cutaneous structures enclosing the vesicles are separated from the vascular structures and are thrown off in more or less rounded patches, leaving raw surfaces, which are, however, speedily recovered by epithelium. In some cases there is entire separation of the hoofs from the feet. It was at one time believed that an animal which had once suffered from eczema contagiosa was guarded against another attack. This is not the case, however; but one attack generally gives immunity during that season. Even this latter rule, however, is not an invariable one, as some animals will take it several times the same season.

Treatment.—Mild cases require but little medical treatment. If the mouth be sore, give plenty of cold water, in which may be dissolved a little nitrate of potash as a febrifuge. Soft, easily masticated food must be given in every case. Watch the feet carefully; if suppuration occurs remove all detached horn and dress with mild astringents. "What I usually prescribe is an ounce of the concentrated solution of pure carbolic acid, one part to sixteen hot water, to twelve of white lotion; pledgets of tow dipped in this are to be bandaged on. This simple expedient, so generally neglected, will often prevent a lameness of many weeks or even months' duration." If great weakness is manifest, stimulants, as brandy, whiskey and spirits of nitrous ether must be administered. In all instances bleeding, purging and other depleting measures are to be avoided. The bowels, perhaps constipated at first, become loose as the disease advances; their condition is not to be interfered with, as frequently the morbid material is thus expelled. If the structures of the feet slough extensively, they must be treated by solutions of chloride of zinc or carbolic acid, say one of acid to eight of oil.

Sheep lose flesh very rapidly while suffering from foot and mouth disease. They suffer more in the feet than cattle, and consequently require more careful vigilance. It is a good plan to cause the affected flock to walk through a shallow trough containing the above named weak astringent and antiseptic solution once or twice a day. And, finally, it is my opinion that both cattle and sheep ought to be washed before they are allowed to be driven on a public

* Williams.

road or exposed in a market if they have recently recovered from this disease. It may be difficult to do this with large herds of young cattle, and its compulsion would be considered a hardship, but of two evils it is incomparably the lesser.*

IV.—VARIOLA VACCINA.

In speaking of contagious diseases of cattle, I have adopted Williams' classification of those diseases.† By this classification only *variola vaccina*, or cow pox, remains to be considered.

Definition.—A contagious, febrile and eruptive disease, resulting from the presence of a specific poison, which is reproduced and multiplied in the animal body during the course of the malady.—

* * * WILLIAMS.

Cow-pox and the small-pox of man are undoubtedly identical, as has been proved by inoculating cows with the lymph of human small-pox, as well as by other experiments, such as enveloping cows in blankets in which small-pox patients lay. *Variola vaccina* has been produced by these experiments.

There are many forms of eruption in the udder of the cow which may be confounded with those of *variola*, but those of *variola* have certain special characteristics. The local symptoms of true *variola* are heat and tenderness of the teats for three or four days, followed by irregular pimply hardness of the skin, more particularly about the base of the teats.

The pimples may sometimes be felt in five days after communication; they assume a red hue when about the size of a pea, are very painful and hard, gradually increasing in size, and in three or four days attain that of a horse-bean. They rise in the centre, become more or less pointed, containing at first a clear, and ultimately a turbid fluid. If the vesicles are broken, troublesome ones supervene, the discharge from which will communicate the disease to the milker, if he is not protected by previous inoculation. The pustules become depressed in the centre, and dry scabs form on the surface. Some of these slough, leaving a raw surface.

The crusts, if left undisturbed, become thicker, and spontaneously separate in about three weeks, leaving a small depression or pit.

In hot climates, *variola vaccina* is sometimes fatal, but in temperate climates, there is but slight diminution of milk, with almost no loss of appetite.

When the disease breaks out in a dairy it is apt to spread to the whole herd, unless affected animals are separated from each other, and different attendants employed.

The milk should be drawn off with a syphon, and if the mammary gland be much inflamed, it should be thoroughly fomented, and dressed with a cooling lotion; a saline purgative (or laxative rather) be given, together with nitrate of potash dissolved in the water.

* Abridged from Principles and Practice of Veterinary Medicine.

† Principles and Practice of Veterinary Medicine.

As a general general rule no medicinal measures are required, however.*

I have thus passed briefly in review the contagious diseases of cattle. Press of professional duties has prevented me giving the time to the subject that I could have wished to devote to it; but I hope that in these pages will be found the *practical* questions in connection with the diseases, discussed with sufficient fullness and clearness to repay their perusal by all interested in the conservation of our present immunity from them.

* Professor Williams.

