

# REPORT

ON

## SWINE-FEVER

IN

GREAT BRITAIN,

BY

PROFESSOR BROWN,

AGRICULTURAL DEPARTMENT,

PRIVY COUNCIL OFFICE.

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Presented to both Houses of Parliament by Command of Her Majesty.

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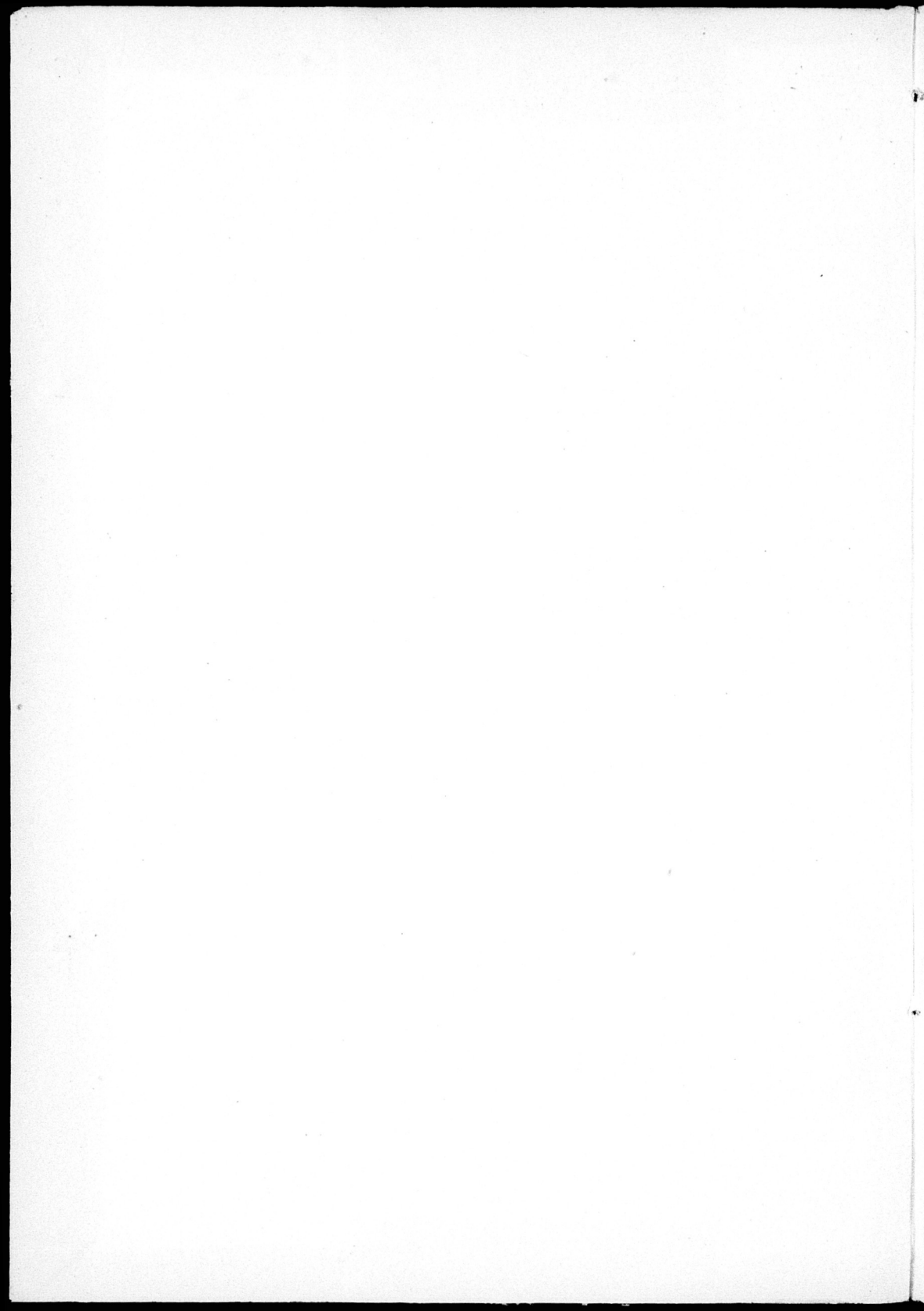
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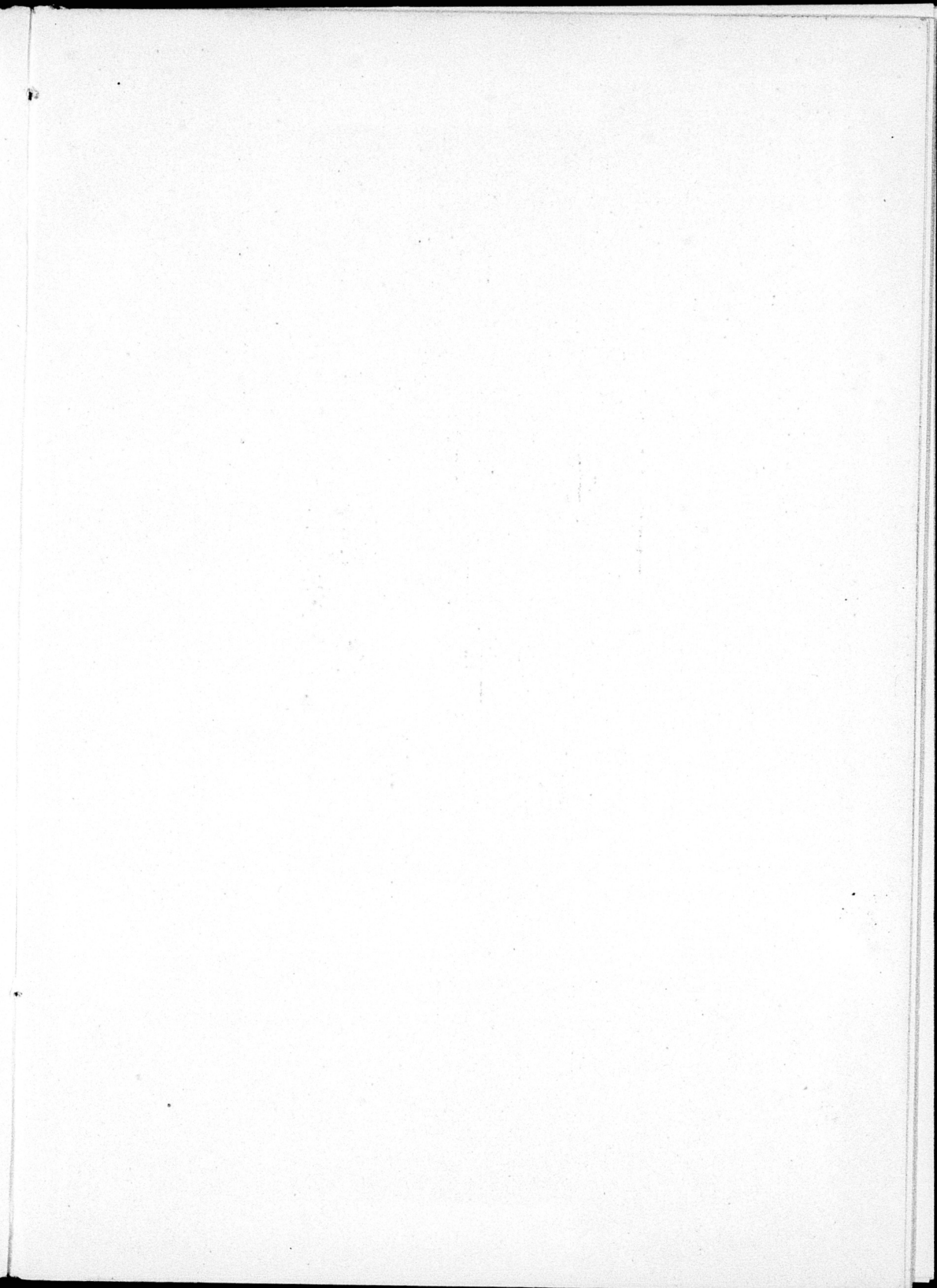
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## REPORT ON SWINE-FEVER.

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TO THE LORDS OF THE COMMITTEE OF COUNCIL  
FOR AGRICULTURE.

MY LORDS,

I HAVE the honour to submit a report, condensed from my former reports, which have been published in the annual reports of the Agricultural Department and in agricultural journals, on the subject of swine-fever which is now prevalent in Great Britain. The object of the report is to present a concise history of the nature, symptoms, and progress of the disease for the information of agriculturists, and also to call the attention of Inspectors of local authorities to the most prominent features of the affection, and to suggest the measures which are necessary for its extinction.

I have the honour to be,

Your Lordships most obedient Servant,

G. T. BROWN.

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## HISTORY OF SWINE-FEVER.

There is no evidence as to the date of the introduction of swine-fever into this kingdom, but the fact of its prior existence in the American and European continents cannot be questioned, and it is probable that it was introduced here some years before it was detected in 1862.

For a long period a fatal disease among swine in different parts of the world has been recognised and referred to by writers on diseases of animals. The descriptions which are given by the earlier authors are generally so vague, that it is not possible to identify the diseases which are referred to under the terms "murrain," "leprosy," "anthracoid erysipelas," "anthrax," or "typhus;" but, in the light of recent inquiries, it is quite clear that the terms hog cholera, the soldier, red disease, blue disease, purples, typhoid fever of swine, swine plague, and swine-fever, are all names which are intended to refer to the same disease.

America appears to have suffered to a more serious extent from this malady of swine than any other country. In a report which was issued from the Department of Agriculture at Washington in February 1878, it was stated that returns of the existence of the disease (hog cholera) had been received from 1,125 out of the 2,440 States and territories in America; and the returns showed that out of a total 18,987,342 swine in those counties, 2,599,542 suffered from "hog cholera." The money value of the losses from the disease, it was stated, was estimated at 10,091,483 dollars annually.

Dr. Klein, in his report to the Local Government Board in 1878, enters on the subject of the history of swine-fever at home and abroad, and he particularly notes that Spinola in his work on "Diseases of Swine," published at Berlin in 1842, does not describe the disease. The malady which he calls malignant erysipelas is evidently, as Dr. Klein, remarks, anthrax or splenic fever, which is quite different from swine-fever, although by some authorities the two are confounded.

In 1857, Renault and Reynal's article "Charbon" in "Nouveau Dictionnaire," &c., describes anthrax or splenic fever in the pig under the names red disease, gangrenous erysipelas, charbonous gastro-enteritis, typhus, &c., which are the titles sometimes given to swine-fever even at the present time.

In 1858, Dr. G. Sutton, of Indiana, wrote an account of swine pestilence in the North American "Chirurgical Review." In this article the ravages of the disease in the various States were referred to, and in evidence of the losses which were sustained it was stated that one distiller in Indiana had lost 1,400 hogs in one month.

Hering, in 1858, describes a disease of swine under the name of "malignant erysipelas," which appears to be anthrax, and he



quotes an account of typhus fever of swine from a paper by Falke. Some of the symptoms described appear to be similar to those which are seen in swine-fever, but the account is imperfect.

In 1865, Dr. William Budd, of Clifton, read a paper before the Royal Agricultural Society on the subject of "Typhoid Fever of the Pig," which was then prevalent in Somersetshire and also in Berkshire and Wiltshire. Dr. Budd's description of the symptoms and post-mortem appearances leaves no room for doubting that the disease was true swine-fever. The illustrations in Dr. Budd's paper are remarkably faithful to nature, and by permission of the Royal Agricultural Society and the Bath and West of England Society they are here reproduced. (See pages 24-28.)

In 1869, Carsten-Harms, of Hanover, describes a "red disease" of pigs, or "swine plague," which Dr. George Fleming considers to be identical with the pig disease which we are familiar with in this country. The writer was evidently, however, wrong in some of his conclusions; for example, in reference to the cause of the disease; which he maintains was due to the entrance of a fungus with the food. The fungus, he says, may be detected in the epidermis of the diseased skin, in the kidney, in the bladder, and in the liver. Further, he did not look upon the affection as contagious; in fact, his experiments in inoculation were attended with negative results.

In 1875, Haubner, of Berlin, describes a disease of swine (typhus) which resembled swine-fever. Haubner, agrees with Carsten-Harms that the disease is not contagious, and states that inoculation was followed by negative results.

Professor Axe, in 1875, describes the disease, and considers that it is the exact counterpart of typhoid, or enteric fever of man. In his experiments, inoculation with the products of the disease, or mixing them with the food, was always followed by its development.

Röll, of Vienna, in 1876, follows Carsten-Harms, and states that it is not yet possible to decide whether the malady is to be put in the list of infectious diseases.

#### NATURE, SYMPTOMS, AND MORBID APPEARANCES IN SWINE-FEVER.

*Definition.*—Swine-fever may be described as a specific, contagious, and infectious fever, affecting the pig; associated with local disease of the lungs, the lymphatic glands, and the mucous membrane of the digestive canal.

Dr. Detmers and Professor Law record cases of swine plague in cattle and sheep, and also in dogs, and Dr. Klein and others

have produced the disease in rabbits, mice, and rats; but these cases are interesting chiefly to the scientific pathologist, and the facts which are most important in their practical bearings are those which relate to the infection of small rodents, especially rats, which are extremely likely to act as carriers of infection. In regard to the stock of the farm, it may be stated that swine-fever is not a disease of cattle or sheep, but of the pig alone.

Recent researches have led to the conclusion that swine-fever is caused by the growth and multiplication of a minute organism, belonging to the numerous order of microscopic fungi, in the blood. Observers are not at all agreed as to the particular organism which does the mischief, because several forms have been detected, and it is not yet determined in which of the microbes which have been detected the infection exists.

Every farmer knows that some kinds of fungus plants, common mould, for instance, may grow abundantly in certain substances without doing much harm; while others—smut, rust, and the potato fungus—do serious mischief. This is exactly the case with regard to the fungi which infest animals; some forms of minute organisms live and grow in the animal body without causing any disturbance, while others induce changes which cause serious and, in some cases, fatal derangement.

The organisms which are hurtful as well as those which are harmless seem to proceed on the same principle. They are merely obeying the laws which govern their lives. Some of them want a good deal of oxygen, and are quite content to grow in the open air, but by ill chance they get into an animal's blood, where, still wanting the oxygen, they take it, regardless of consequence, from the blood cells. Others of them do not care for oxygen in its unmixed state, but require other elements for their subsistence. And in whatever position they find themselves, they set to work to re-arrange the materials which are at hand, whether animal or vegetable, by setting up fermentation, and so get what they want at the expense of their host, after the manner of parasites in general.

In the case of the microbes which are associated with special diseases, it is to be noticed that the results of their action are always uniform; the small creatures never by any chance play at cross-purposes. The microbe of tubercle works always in such a way as to produce changes in the organism which result in tuberculous deposits. The microbe of anthrax takes oxygen from the blood and sets up fermentation, causing the formation of small clots which block up some of the minute vessels, while the organisms themselves aid in the blocking up by multiplying out of all proportion to the space which the blood vessels can afford for their accommodation, and the end is anthrax (splenic fever). The microbe of swine-fever in the same way causes changes in the blood which result in congestion of lungs, alterations in the structure of the mucous membrane of the stomach and intestines,



and deposits in the glands. The whole process occurring in the tissues of a pig is no more mysterious or wonderful than that which happens in a potato when the spores of the *peronospora infestans* get into it, and cause changes in its tissues which are characteristic of the potato disease.

*Symptoms of Swine-Fever.*—It is most important that the farmer should be acquainted with the signs which indicate the existence of swine-fever at the earliest period of its development; but unfortunately the disease is very difficult of detection in the early stage in the greater number of cases, and the symptoms which are generally believed to be specially indicative of the affection, viz., redness of the skin on certain portions of the body, and diarrhœa of a peculiar kind, do not appear until the disease is fully developed, and in numerous instances are not observed at all. Dr. Klein's investigations have proved a fact, which, in its practical bearings, is the most valuable of all which have been demonstrated by experiment; the fact that swine may suffer from swine-fever in a perfectly well-defined form, readily transmitted to other swine, without showing any of the distinctive signs of the disorder, and in some cases without the appearance of any symptoms of illness. The animals feed fairly well, show no rise of temperature; they are vigorous, and for several days, and even for several weeks, betray in no way the disease. It requires very careful and prolonged observation to notice that at one time or other—at any rate at rare intervals—the swine have a short cough; not an important departure from the healthy state. Very few experts—to say nothing of the owner of the pigs—would suspect swine-fever because he happened to hear the animals cough “at rare intervals;” and there is in these mild cases, which, Dr. Klein considers, constitute the majority, absolutely nothing else which would be noticed; the skin remains quite free from any appearance of disease. It is true that the inguinal glands are distinctly enlarged; but unless the owner thinks of inspecting these small lymphatic glands (kernels) under the skin of the pig's groin, and knows what their proper size is in health, he has no chance of recognising the disease in this obscure form. In the organs of these apparently healthy pigs there are found on dissection very pronounced symptoms of disease, so pronounced, in fact, that it seems astonishing that during life the animals presented such slight signs of it. And these very slight signs, it may be remarked, were only noted by the observer in the cases of pigs which were under constant observation, after they had purposely been infected with the disease.

Swine which are affected with swine-fever in the occult form, may be moved about freely, sent to market, bought and sold over and over again, distributing the infection wherever they go, without exciting the least suspicion in the minds of those who buy or sell or keep them, that they are infected with a deadly and highly contagious disease, and in this way many outbreaks may occur without the origin of the infection being discovered.

In the more pronounced forms of swine-fever the symptoms which are shown by the sick animal will not be very definite until the affection is fairly advanced. Dulness and diminished appetite, with hot skin and occasional shivering fits, with rise of internal temperature from the normal  $103^{\circ}$  to  $105^{\circ}$  or  $106^{\circ}$  Fahr., are among the first signs of infection, and should always be taken as justifying a strong suspicion of the existence of swine-fever, especially if the disease is known to be in the locality.

It has been remarked that pigs, when suffering from swine-fever in the early stage, often seek to hide themselves beneath the litter on the floor of the sty ; but this action is so common among swine, that it would hardly be likely to attract any attention, and even when noticed it would not be looked upon as a symptom of any disease. There is, however, to the practised eye a great difference between a healthy pig, which, in its desire for warmth, or quiet, or for some other reason, buries itself under a lot of litter, and one which performs the same act in obedience to the instinctive effort of a sick animal to get out of the way of the light and its companions, and everything under the sun, and suffer in seclusion. The healthy pig when disturbed emerges from its retreat, alert and ready for action. The sick one objects to move, and, if compelled, crawls from its lair, trembling and discontented.

Sometimes there are signs of partial paralysis, and the pig moves in an unsteady manner from side to side, frequently losing the use of one or both hind-quarters, and dropping to one side, or dragging both hind-legs as it attempts to move forward. There is no loss of sensibility with the defective motion, as the animal if touched will indicate pain by a sharp cry.

Diarrhoea may occur early in the disease, after a short period of constipation, and the evacuations are generally light in colour at first, becoming darker, by and by, often from the mixture of effused blood. In severe cases the intestinal discharge consists almost entirely of blood, with masses of clot and loosened pieces of exuded lymph from the inflamed and ulcerated mucous membrane of the digestive canal.

A symptom which is considered to be characteristic of swine-fever may sometimes be detected early in the disease. Red patches or blotches appear behind the ears, inside the arms, and under the belly. Professor Axe describes a distinct eruption in the form of red spots, from one to three lines in diameter, slightly raised above the surface, so that they may be felt by drawing the finger over the skin. The eruption is not always present, and often there are not more than half-a-dozen spots extending over a large surface ; but in other cases they are very numerous. After two or three days the spots subside, and are followed by a second, third, or even a fourth crop, and after their final disappearance, the cuticle becomes ragged and scales off.

Small water-bladders (vesicles) appear on the surfaces of the red spots when the fever remains very high, and the fluid con-

tained in them either escapes or becomes dried up, forming a grey crust on the surface.

Discharge of thin fluid from the eyes and nose commonly takes place early in the course of the disease, and, as it advances, the discharge becomes thick and purulent, sticking about the eyelids and openings of the nostrils. Diarrhoea is more constant as the disease goes on. The voided matter is offensive and often streaked with blood; prostration occurs and is soon followed by complete collapse, and the animal dies in a state of unconsciousness or in violent convulsions. Death may take place at various periods from the commencement of the affection, sometimes after a few days' illness, while in other cases the animal may linger for two or three weeks.

In reference to the change of the colour of the skin in marked cases of swine-fever it may be observed that there may be, independently of the raised spots which Professor Axe describes, a diffused redness, or regular patches of redness, or a purple tinge in different parts of the surface; but these signs are not to be expected in all or even in the majority of cases of the disease; and it is well known that redness of the skin is a symptom of some common diseases of swine. It arises, for example, from exposure to wet and cold. Contact with sea water, or spray during a voyage, will also produce it; a journey in a railway truck, which has been lime-washed, is another cause; consumption of wash with which salt liquor has been mixed is followed by severe, often fatal inflammation of the mucous membrane of the digestive canal, and sympathetic irritation of the skin; and the symptom has also been noticed in acute indigestion which has resulted from eating freely of mangolds. Redness of the skin therefore, either in patches or generally, cannot be accepted as sufficient evidence of the existence of the swine-fever.

In certain instances the symptoms of swine-fever may be so well defined during life that an opinion may be given promptly and without much risk of error, but under ordinary conditions the conclusion must be the result of the careful consideration of the history of the outbreak, or of the evidence which can be obtained by dissection of the organs of a diseased animal; and, for this purpose, it is better to kill a suspected pig than to take the carcase of one which has died some time before the commencement of the inquiry, and has probably undergone post-mortem changes which will render obscure the true morbid appearances.

Experience has placed beyond all doubt the fact that swine-fever, when it once obtains a hold on a herd of swine, does not spare them. It is true that a proportion, and it may be a considerable one, of the older animals particularly, will escape with a mild attack, and in some of these mild cases there will be no characteristic symptoms to attract attention. In fact, it will appear that the animals have escaped the disease. But the critical observer will find some signs of the disease in the majority of

the swine which have been exposed to the infection. Cases which are often reported of swine-fever attacking two or three swine of a large herd and sparing the rest may safely be put down to the credit of any disease but swine-fever. And the same thing may be said of those cases which are traced to the consumption of indigestible food, or the exposure of the animal to hardship or unsanitary conditions of existence.

*Post-mortem appearances in Swine-Fever.*—Some of the changes which are effected in the organs of the body by the ravages of swine-fever can only be appreciated by the pathologist; others, and those the most distinctive perhaps, are patent to the ordinary observer; and on this point it is worth while to note the description which was given before the members of the Royal Agricultural Society in 1865, by Dr. William Budd, of Clifton, who was the first scientist in this country to investigate the disease, which was at that time looked upon as a new one.

Dr. Budd, who was an authority on the subject of typhoid fever, now known as enteric fever of man, and early adopted the view, now accepted, of its true character as a contagious disease, due to a specific virus, and not to mere septic emanations from sewers, or to other unsanitary influences, distinctly announced his conviction that the disease of swine, which he designated "Typhoid Fever in Pigs," was of the same character as, but not actually identical with, the human malady; "that disease," he remarked, "is attended and characterised by a peculiar ulceration of the intestinal follicles. So with the disease in the pig; it, too, is a typhoid fever, characterised and attended by a series of ulcerations of the intestines, which are, in some respects, the very counterpart of the ulcerations found in the human intestine, so that the two may be considered exact pathological equivalents; "but," he goes on to say,—and the qualification is too significant to be passed over,—"the differences between them, more especially as touching the order of their distribution, are, however, too serious to allow us to suppose that they are the common effect of a single specific poison. My idea is, that the two maladies are not identical, or not interchangeable. The pig fever stands towards the typhoid fever in man in just the same relation that small-pox in sheep stands to human small-pox." Professor Axe adopts the view which Dr. Budd formed twenty years ago, and carries it a little further in the same direction. Dr. Klein denies the existence of the asserted relation between the two diseases. To the stock-owner it does not matter so much how far the disease in the pig resembles any disease in man, as how to detect and deal with it in swine.

Dr. Budd's attention was particularly attracted to the changes which had occurred in the digestive organs, which he calls a series of ulcerations of peculiar character, variously distributed over the intestinal tract, from the stomach to the rectum inclusive. The illustration shows the ulcerated membrane of the stomach of a pig, but it may be remarked that these lesions are now more often found in the large intestines than in the stomach. (See Fig. 1.)



The first stage of the local affection appears to be the development (amid all the phenomena of acute inflammatory disturbance) in the substance of the mucous membrane, and in the sub-mucous tissue of an adventitious deposit (or cell-growth rather), resembling in many of its characteristics the well-known yellow matter of human typhoid. When Dr. Budd gave this description, the outgrowth from or deposits on the mucous membrane of the stomach and intestines were seen more frequently than they have been of late years; in fact, in all well marked cases they were the prominent objects in the post-mortem appearances. Soft spongy masses, sometimes in very severe cases, stained a dark red by the blood, which was extravasated into the intestines, varying in size from that of a large pea to a walnut, circular or oval in shape. Sometimes several masses were joined together; but whether large or small, separate or confluent, the deposits, from their colour in contrast with the membrane on which they were placed, were very striking objects. (*See Fig. 2.*)

A very curious appearance was sometimes seen in the intestines of swine which had partially recovered from the fever, and afterwards died from exhaustion, or were killed for the purpose of examination. The mucous membrane in these cases was spotted with the small masses of deposit which had lost the soft spongy or fungoid character, and become dense, and, so to speak, leathery-looking, not unlike yellow-leather buttons, marked with concentric rings, or, as Dr. Budd remarked, like slices of columba root. (*See Fig. 3.*)

The first simile will perhaps be more suggestive to the farmer than the latter, as slices of columba root are not familiar objects. The mucous membrane of the intestines, especially the large intestines, was often covered with ulcers, and the masses of deposit which have been referred to were generally found to be in connexion with deep excavations, the result of the ulcerative process; but in all cases the edges of the ulcers were elevated above the surface of the mucous membrane, and presented a soft fungoid character as shown in Fig. 4.

In some cases the whole of the mucous membrane of the intestine was covered with a croupous or diphtheritic deposit of a dirty white colour; and it was only after the deposit had been cleared away that patches of inflamed, and perhaps ulcerated, structure could be seen. (*See Fig. 5.*)

In some instances the diphtheritic deposit was so abundant as to fill the intestinal tube, and leave no canal for the passage of the feculent matter, and rupture of some part of the intestine was the natural result of this blocking up of the passage.

The next illustration (Fig. 6) is copied from a report on Swine Plague, by Dr. Detmers, recently published in the report of the Bureau of Animal Industry, Washington, U.S., and it may serve to indicate at the same time the characteristic appearances of the disease and the identity of the swine plague in the United States of America and the swine-fever of this country.

Besides the appearances which have been described as occurring in the stomach and intestines, especially in the large intestine there are nearly always observed patches of congestion in the lungs, with here and there condensation of the lung structure which present a fleshy character quite distinct from the healthy state. There are also changes easily distinguished by the pathologist in the liver, kidneys, spleen, lymphatic glands, and also in the cavities of the heart. In short, it may be affirmed that the morbid changes in swine-fever are so perfectly well defined that no error in opinion can occur when all the evidence which a post-mortem inspection affords is in possession of the inquirer.

#### OUTBREAKS OF SWINE-FEVER IN GREAT BRITAIN.

According to Dr. Budd's observations in 1865, the "soldier" (swine-fever) was known to the pig factors in Bristol many years before he met with the disease in 1865.

Professor Simmonds records the fact of a virulent outbreak of the pig disease in Berkshire in the beginning of 1862, and on that occasion it was found, on post-mortem examination, that the mucous membrane of the intestinal canal was covered with a dense croupous deposit which was considered to be diphtheritic in its nature.

In 1864 the pig disease was prevalent in some parts of Wiltshire and Berkshire, and many hundreds of swine were destroyed by it. Since then it has continued to appear in a virulent form at different times, but without attracting more than a passing notice.

Soon after The Contagious Diseases (Animals) Act, 1878 came into operation, swine-fever, or, as it was then called, typhoid fever of swine, was included in the definition of disease, and by an Order passed on December 17th, 1878, the slaughter of swine affected with the disease was made compulsory, and compensation was to be paid out of the local rates for all swine slaughtered by order of the local authorities. The Order also provided that no swine should be moved out of a pigsty or other place where the disease existed, or had within six days existed, without a licence, and then only for slaughter. This Order came into force on the 24th of December 1878.

As soon as the swine-fever Order came into effect, weekly returns were received from the Inspectors of local authorities, and it was soon found that the affection was more widely spread than had been suspected. By the end of the first quarter returns had been received from 31 counties in England, one in Wales, and one in Scotland. It was ascertained that the disease was most prevalent in Norfolk, Suffolk, Essex, and York (West Riding).

During the second quarter of the year returns were received from 34 counties in England, one in Wales, and one in Scotland. In the third quarter no cases were reported from Scotland, but 35 counties in England and four in Wales were infected. Scotland remained free until the middle of December, but altogether the disease was returned from 44 counties in England, six in Wales, and three in Scotland, during 1879.

Owing to the spreading of the disease among swine, a further Order of Council, entitled The Swine-Fever Order of 1879, was passed on the 14th of July, and came into force on the 21st of July. This Order contained provisions for the declaration of infected places, and for the slaughter of healthy swine which had been herded with diseased ones, and also for regulating the exposure for sale of swine in fairs and markets. Some local authorities availed themselves of the power to prohibit or regulate sales of swine, and also ordered the slaughter of suspected animals in swine-fever infected places; but an analysis of the returns shows that the power to slaughter was not carried into effect universally, even in regard to diseased animals. In the year 1879 there were 2,765 outbreaks of swine-fever reported, and 17,074 swine were attacked, all of which, or nearly all, should have been returned as slaughtered; but it appears that 3,416 of the animals died, and 124 were allowed to live, and recovered from the disease. 2,779 swine which had been in contact with diseased animals were killed.

Up to the time when swine fever was included in the definition of disease, within the meaning of the Contagious Diseases (Animals) Act of 1878, no record was published of the number of diseased swine which were landed from abroad in this country. The foreign swine affected with swine-fever, and those in contact with them, were, as a matter of course, always slaughtered at the place of landing. When the disease was dealt with by Order of Council, it was necessary to make regulations in regard to foreign swine which on inspection were found to be affected with the malady, and the inspectors at ports where foreign animals were landed were instructed to include that disease along with the other diseases in their returns to the Privy Council.

During the year 1879 there were landed in this country 1,044 swine affected with swine-fever, of which 974 were sent from the United States of America, and 70 from Canada. No cases of the disease were detected among swine sent from the continent of Europe in 1879.

From the returns which were received in the year 1880 it seemed that some progress had been made in arresting the spreading of the disease. The total outbreaks in the year in Great Britain amounted to 1,936, and there were only 9,865 swine attacked—not much more than half the number of the previous year. A considerable proportion of the diseased animals, however, escaped slaughter, as 1,940 are returned as having died from the affection; 1,811 swine, which had been herded with diseased animals, were killed.

Swine-fever existed during the year 1880 in 42 counties in England, three in Scotland, and five in Wales.

The decline in the number of outbreaks was most marked in Somerset, Norfolk, and Berks, and in these counties the local authorities had acted under powers conferred upon them by the

Privy Council, and prevented the sale of swine in fairs and markets in their districts during the prevalence of the disease.

In the East Riding and North Riding of Yorkshire, in Kent, Wiltshire, Devonshire, and Warwickshire, swine-fever increased during the year.

The only counties in England which remained free from swine-fever were Cumberland, Hereford, Lincoln (parts of Holland), Northumberland, and Westmorland.

The only counties in Scotland which were infected were Edinburgh, Haddington, and Peebles. And in Wales, Carnarvon, Denbigh, Flint, Glamorgan, and Montgomery.

Among the cases of disease in foreign animals landed in Great Britain in 1880 there were returned 416 swine affected with swine-fever. The animals were imported from Germany, The Netherlands, and the United States of America. No diseased swine were landed from any country from which we import animals which are not intended for slaughter at the place of landing.

Swine-fever extended in 1881 to six additional counties; but the number of outbreaks and of the animals attacked was less than in the previous year. The disease was reported from 44 counties in England, seven in Wales, and five in Scotland, making a total of 56 in Great Britain. There were 1,717 outbreaks in the year, and 7,994 swine were attacked, of which 6,217 were killed, 1,781 died, and the rest recovered or remained diseased at the end of the year. There were killed, during the year, 1,681 swine which had been herded with diseased ones, or were on infected premises. Among the counties in which swine-fever was most rife in 1881, were Bedford, Chester, Devon, Essex, Gloucester, Hants, Herts, Lancaster, Stafford, Somerset, and York (North, East, and West Ridings).

In Wales the county of Glamorgan suffered most severely. The counties of Carmarthen, Cardigan, Merioneth, Pembroke, and Radnor remained free from the disease during the year.

The infected counties in Scotland were Ayr, Dumfries, Edinburgh, Fife, and Lanark.

From abroad there were landed in Great Britain during the year 157 swine affected with swine-fever. The animals came from Denmark and the United States of America.

In 1882 an accession of swine-fever was observed in many parts of the country, and in the course of the year the outbreaks were more numerous than they were in 1879, the first year of the adoption of measures for arresting the course of the disease. The number of infected counties remained the same as in the previous year; but the outbreaks increased from 1,717 in 1881 to 2,983 in 1882, and the attacks from 7,994 to 14,763. Of the diseased swine, 11,903 were slaughtered, 2,799 died, and 18 recovered; and 3,682 healthy swine were killed on account of having been exposed to infection.

In England swine-fever was most prevalent in Bedford, Bucks, Chester, Devon, Essex, Gloucester, Hants, Lancaster, Stafford,



Somerset, Wilts, Worcester, and York (West Riding); in fact an increase in the prevalence of swine-fever was noticed throughout England. The number of animals attacked was more numerous than in the previous year in 34 out of the 44 counties in which it existed. In Wales the chief increase of disease occurred in one county out of the seven in which it existed. No less than 237 of the 297 outbreaks reported from Wales took place in the county of Glamorgan.

In Scotland there were only 15 outbreaks of swine-fever during the year, and these occurred in Ayr, Edinburgh, Fife, Lanark, and Renfrew.

An Order of Council was passed in July 1882, providing for the declaration of swine-fever infected areas by the Privy Council, and giving power to local authorities in England and Wales to prohibit or regulate the movement of swine into their districts from the district of any other local authority in Great Britain. The Order also empowered local authorities in Scotland to prohibit or regulate the movement into their district of swine from the district of any other local authority in Scotland; it did not appear, however, that the local authorities availed themselves of these powers except in very few cases.

From foreign countries there were landed in Great Britain 49 swine affected with swine-fever. The animals came from Denmark, The Netherlands, and Sweden. Under the provisions of the Foreign Animals Order, animals from The Netherlands can only be landed for slaughter; and in consequence of the arrival of several cargoes in which diseased swine were detected from Denmark and Sweden during the year, it was deemed expedient to apply the same restriction to swine from those countries.

A decrease of something like 600 in the number of outbreaks, and over 3,000 in the number of animals attacked with swine-fever, was recorded in 1883. But the advantage gained was rather apparent than real, so far as the progress of the disease was concerned. The number of infected counties was 53, the same as in 1879. The total outbreaks amounted to 2,400, and the attacks to 11,225; but it was still to be regretted that the provisions of the Order relating to slaughter were so imperfectly carried into effect that 2,257 died of the disease. In the counties in England, swine-fever increased particularly in Berks, Chester, Cornwall, Northampton, Oxford, Salop, Suffolk, Warwick, and York (West Riding). In Oxfordshire the outbreaks increased from 7 in 1882 to 78 in 1883, and the number of swine attacked rose from 100 to 606. In Scotland also there was an increase in the number of outbreaks; it could not therefore be considered that the state of affairs was altogether satisfactory.

During 1883 there were landed in this country from The Netherlands 12 swine affected with swine-fever.

The decrease in the number of outbreaks of swine-fever, and also of the animals attacked, continued through 1884, but the

area of the disease was rather increased than diminished; the number of infected counties in Great Britain being 54 against 53 in the previous year; 1,877 outbreaks of the disease were reported, and the number of swine attacked reached a total of 8,939. Of this number, 6,364 were killed, 2,372 died, and 153 recovered.

Notwithstanding the general decrease in the number of cases of swine-fever in 1884, the disease was more rife than it had been previously in the counties of Cornwall, Devon, Essex, Hants, Kent, Lancaster, Middlesex, Somerset, and Surrey. Some of the outbreaks which occurred threatened at one time to assume large proportions. In the district of Shaston, Dorsetshire, swine-fever appeared in a herd of 129 swine, of which 57 were attacked in the course of a few days, and the whole herd was slaughtered. A serious outbreak also took place in the Forest of Dean, where 164 swine were attacked in one week, and it was found necessary to declare a part of the forest an infected area.

The most startling event in the history of swine-fever during 1884 was its appearance in the New Forest, at a time when there were about 4,000 swine feeding there. Stringent precautions were adopted at once, and fortunately the disease did not spread. A large outbreak of swine-fever occurred in Middlesex in a herd of 261 swine, of which 143 were attacked and were slaughtered; 89 of the healthy swine were also killed, and the remainder of the animals appear to have escaped.

Another extensive outbreak of swine-fever occurred in Glasgow, in a piggery which was about an acre in size, and held 4,000 pigs. The buildings were described as old wooden cowsheds, neither drained nor provided with floors.

Further Orders of Council were passed in 1884, containing provisions relating to swine-fever. The most important change which was made referred to the provision for slaughter of diseased swine, which was objected to by some local authorities as a costly and comparatively ineffectual measure. By an Order passed in May the compulsory provision was revoked, and the slaughter of diseased swine, as well as of those herded with them, was left to the discretion of the local authority.

Another Order of Council, passed in July 1884, provided for the formation of a swine-fever infected circle round an infected place in any district to which the Order might be applied by the Privy Council at request of a local authority. The Order was applied during the year to the counties of Berks, Bucks, Chester, Hants, and Somerset; and the boroughs of Bridgwater, Canterbury, Chard, Glastonbury, Leeds, Reading, St. Helens, Taunton, Wells, and Yeovil.

From abroad only six swine affected with swine-fever were landed in Great Britain in 1884. The animals were sent from Rotterdam and landed at Deptford.

The history of swine-fever in 1885 is somewhat remarkable.

Early in the year the disease increased with extraordinary rapidity, without any apparent cause. In January and February the weekly outbreaks varied from 28 to 69, and the number of swine attacked from 149 to 480; but in the last week of March the number of outbreaks rose to 146, and the number of animals attacked to 882 in the week. In May the lowest number of outbreaks in a week was 224, and the attacks 964, and the highest number 301, with 1,457 swine attacked. In June the outbreaks varied from 298 in the week, with 1,757 attacks, to 339 outbreaks, with 1,508 attacks. By the end of June the disease had extended to 45 counties in England, 14 in Scotland, and 7 in Wales. For the previous six years the average number of outbreaks of swine-fever in the year amounted to about 2,200, and the attacks to 11,000; but during the extraordinary accession of disease in the course of the first half of 1885 the number of outbreaks amounted to over 4,000, and the number of swine attacked to more than 19,000; and for the first time since the disease was recognised in this country stock owners seemed to realise the danger; in fact, it was urged that further steps should be taken to arrest the disease, and save our small stock of two millions and a half of pigs from destruction.

In regard to the extraordinary extension of swine-fever in the latter part of March, and through April, May, and June, it may be stated that most of the outbreaks were ascertained to be due to the purchase of swine at fairs and markets, and it was therefore deemed expedient to impose restrictions on the sale of swine in all parts of England. Accordingly an Order of Council was passed on July the 3rd, to come into operation on July the 21st, prohibiting the exposure for sale of swine, except for slaughter within three days, and then only with the licence of the Local Authority of the district in which the sale was to be held. Sales of swine, fat or store, were allowed to be held on premises in which the swine to be sold had been kept for not less than 28 days, and power was reserved to the Privy Council to license the holding of a sale of swine in any circumstances. Provision was also made for the exhibition of swine at agricultural shows.

A similar Order of Council to that above described had been more than once enforced with excellent results in times of excessive prevalence of foot and-mouth disease, and there was good ground for the belief that equally good effects would follow the adoption of the measures in case of swine-fever.

A comparison of the number of outbreaks of swine-fever during the operation of the Markets and Fairs Order, with the numbers returned in corresponding periods prior to the passing of the Order, will show that considerable good was effected, although the decrease in the number of outbreaks was not so marked as might have been expected, a fact which is easily explained when it is known that pig dealers carried on their trade, as far as they possibly could, notwithstanding the provisions of the Order. During a period of six weeks before the passing of the Swine-

Fever Markets and Fairs Order, the number of outbreaks of the disease was 1,762, and the number of swine attacked was 8,521; while in the six weeks following the commencement of the Order the number of outbreaks fell to 1,370, and the attacks to 5,503.

If a period of three months be taken, the effect of the Markets and Fairs Order is still more marked, as in 12 weeks before the Order came into force the outbreaks reached a total of 3,346, and the attacks 16,124. In the period of 12 weeks under the operation of the Order the outbreaks decreased to 2,207, and the attacks to 9,469.

While swine-fever was decreasing in regard to the whole of England under the operation of the Markets and Fairs Order, the general effect was marred by the proceedings which occurred in certain districts. An Order of Council prohibiting or regulating the holding of sales of animals does not restrict the act of buying and selling; in fact, the Contagious Diseases (Animals) Act of 1878 does not give the Privy Council any powers except in regard to the holding of sales. So that owners of animals may sell, and dealers may buy, to any extent, if nothing is done which amounts to holding a sale, market, or fair, and between the act of selling and that of holding a sale there is perfectly well understood distinction, which is, nevertheless, difficult to define with legal exactness. It is somewhat unfortunate that in some parts of the country full advantage was taken of the opportunity to evade the obvious scope and object of the Order by those for whose benefit it was passed, and the natural result was that the disease continued to spread in some parts of the country, not because the provisions of the Order were in regard to those districts less appropriate than elsewhere, but simply for the reason stated above, viz., that those most concerned in securing the strict administration of the law in its obvious scope and intention, hit upon an ingenious method of infringing the spirit of the measure without doing violence to the letter.

In some districts it is probable that the spreading of swine-fever was due to causes which were peculiar to the locality, but in others it is almost a matter of certainty that it was the consequence of the regular sales and constant movement of swine, which were carried on very much as they had been before the restrictions were imposed, except that the animals were not sold openly in market-places and sale-yards.

In the following counties swine-fever increased during the third quarter of the year, notwithstanding that the Markets and Fairs Order was in operation. In Bedfordshire the outbreaks of swine-fever, which had been 27 in the second quarter of the year, the attacks in the same period having been 147, rose to 52 and 247 respectively. Durham had 135 outbreaks and 327 animals attacked in the second quarter, and 414 outbreaks with 607 swine attacked in the third. Gloucester had 47 outbreaks and 340 swine attacked in the second quarter, and 78 outbreaks and 416 swine attacked in the third quarter. Leicestershire had 43 outbreaks



and 119 swine attacked in the second quarter, and 95 outbreaks with 291 swine attacked in the third quarter.

The Markets and Fairs Swine-Fever Order was continued in operation until the end of November, and during its operation the centres of disease were so far reduced in number, that it was deemed expedient to have recourse to slaughter of diseased swine, and also of those which had been in the same pigsty or shed with diseased swine. With this view the Swine-Fever Compulsory Slaughter Order was passed, and came into operation on the 1st of December. The Order provided that local authorities should slaughter all swine that at any time in the month of December were affected with swine-fever, and all swine being or having been in contact, or in the same pigsty or shed, with swine affected with swine-fever.

Compensation was to be paid to the extent of half the value of a diseased pig, and the full value of a healthy pig, but the amount was not to exceed 40s. for a diseased and 4l. for a healthy pig. During the four weeks to the end of 1885, the effects of the system of compulsory slaughter were not altogether satisfactory. In fact, fresh outbreaks of swine-fever continued to occur in the same districts, and even in the same premises, owing to the way in which the Order was carried into effect in regard to the slaughter of swine which had been exposed to infection. For example, if a lot of swine were in a sty which was separated by a few feet from the sty in which disease existed, the animals were not slaughtered because they could not be said to be in contact, and they were clearly not in the same sty, although it might fairly be presumed that the swine so situated were exposed to the risk of infection through the atmosphere, or by the agency of persons or things by which the virus of the disease could be conveyed to a considerable distance.

Reference to the weekly returns of the outbreaks of swine-fever in Great Britain will show that the disease was not so much affected by compulsory slaughter as might have been expected.

The outbreaks in the last week in November were 74. In the following week, only five days of which came in the time of operation of the Slaughter Order, they were 74. In the second week of December, which may be called the first of the operation of the Order, the outbreaks were 71, and in the third week 78. In the fourth week, however, there was some improvement, as the outbreaks only reached the number of 70.

A month's trial of the system of slaughter was not a sufficient test of its efficacy, and the Order was therefore continued for the month of January in this year.

Taking the whole of the last year, the records of swine-fever are rather serious as compared with those of the previous six years. In the first quarter of 1885 the outbreaks in England were 713, and the swine attacked were 3,554. In Wales there were 111 outbreaks and 291 swine attacked. In Scotland the

outbreaks reached the number of 25 only, but the attacks were 410.

During the second quarter of the year the increase in the prevalence of swine-fever was enormous; the outbreaks in England were 3,032, and the attacks 14,461. In Wales the outbreaks were 86, and the attacks 275. In Scotland the outbreaks were 65, and the attacks 719.

In the greater part of the third quarter, viz., from July the 21st, the Markets and Fairs Order was in operation, and under the restrictions on the sale of swine the disease generally decreased. The total outbreaks in England were 2,602, and the attacks 11,364. In Wales the outbreaks were more than in the second quarter, viz., 112 against 86, and the attacks were 294 against 275. In Scotland the outbreaks were 57 against 65 in the previous quarter, and the attacks 234 against 719, but neither in Wales nor Scotland were the restrictions on sales of swine in force. The records of swine-fever for 1885, compared with those of 1884, are as follows:—

In 1884 the outbreaks in England amounted to 1,768, and the attacks to 8,573; while in 1885 the outbreaks were 7,370 and the attacks 35,975. In Wales the outbreaks in 1884 were 76, and the attacks 161. In 1885 the outbreaks rose to 370, and the attacks to 1,069. In Scotland, in 1884, there were only 33 outbreaks, and 205 swine were attacked; but in 1885 the outbreaks were 186, and the attacks 1,754.

From abroad, in 1885, we received one pig affected with swine-fever; the animal was landed from Rotterdam in May.

At the beginning of the year 1886 an Order of Council was in force rendering the slaughter of all swine affected with swine-fever and also those that had been in contact with them compulsory on the part of the local authorities. This Order was continued and remained in operation till the end of February, a period of nine weeks. In addition to the above Order, there was one in force during the month of February by which sales of swine could only be held under certain conditions and licences in the districts named in a schedule to the Order.

Both these Orders lapsed at the end of February, and the slaughter of the diseased pigs again became optional on the part of the local authorities.

During the first nine weeks of the year when these orders were in force, there were 754 outbreaks of swine-fever, being an average of 83.77 per week. The greatest number reported in one week being 119 in the week ending February 20th, and the smallest 59 in the week ending January 23rd. The number of swine attacked during this period was 3,395, or at the rate of 377.22 per week, the greatest number in one week being 477 in the first week of January, and the smallest 224 in the third week of the same month.

During the succeeding nine weeks from March 6th to May 1st inclusive, there were 809 fresh outbreaks reported, or 89.88 per

week on the average. The highest in one week was 123 in each of the weeks ending April 10th and May 1st, and the lowest 71 in the week ending April 17th. The number of swine attacked during this time was 4,526, or an average of 502.88 per week, the highest being 727 in the last week of this period, and the lowest 377 in the last week in March.

The disease continued to increase in May and June, and in the four weeks which ended June the 19th the outbreaks reached the average number of 206 weekly. The swine attacked each week amounted to about 1,165 per week.

#### CAUSES OF THE CONTINUANCE OF SWINE-FEVER IN THIS COUNTRY.

A review of the short history which has been given of the progress of swine-fever in this country since 1878, when it was added to the list of diseases within the meaning of the Contagious Diseases (Animals) Act, must leave on the mind of the reader an impression that very little advantage was gained by the adoption of the different measures, including compulsory slaughter, for the suppression of the disease during a period of nearly seven years. In fact, at the end of the time the malady was more rife than at the beginning, and it is not difficult to explain the unsatisfactory results of the system which was carried into effect.

When swine-fever was included in the list of diseases by Order of Council, only a few, certainly not half-a-dozen, local authorities had expressed any desire to have power to deal with the disease, the majority of stock-owners who were fully awake to the necessity for dealing stringently with pleuro-pneumonia and foot-and-mouth disease knew nothing of swine-fever; and those who were familiar with it seemed to be impressed with the idea that it was "one of those things which could not be helped," and rather objected to any more restrictions on trade and movement in regard to farm animals, on the general principle that quite enough had already been done in that direction without putting pigs under the ban.

During the greater part of the time that swine-fever was being dealt with by Orders of Council, foot-and-mouth disease was prevalent in the country, and the attention of stock-owners and legislators was exclusively devoted to the consideration of the best means of eradicating that affection and preventing its introduction from abroad. Meanwhile the less serious disease was masked by the greater, and the measures which were enforced for the purpose of arresting the spreading of the pig disease were carried into effect in a half-hearted manner.

Slaughter of diseased and infected swine was adopted in some districts with satisfactory promptitude. In others a number of animals were allowed to die before any action was taken. The disease, after being stamped out in some districts by the energetic action of the authorities, was re-introduced from other parts of the

country where the law was administered in a perfunctory manner. In short, nothing like a serious and decided effort was made to get rid of the affection, and as a natural consequence the good effects of restrictions were partial and temporary.

Imperfect cleansing and disinfection of premises may be reckoned among the causes which have contributed to the continuance of swine-fever, notwithstanding the operations of regulations which might have been expected to produce good results. Very frequently swine are kept in places which cannot be cleansed and disinfected effectually, so as to make them safe for the next lot of pigs which will be brought in as soon as the place is declared free. Old half-rotten styes with mouldy floors cannot be cleared of infection by any known process. The only course in such cases is to remove the infection-saturated timber and soil and submit them to the action of fire; but no power is vested in the authorities to do this necessary work, and the only expedient which they can employ is that of refusing to declare the infected premises free until the necessary alterations and improvements are completed. In this somewhat roundabout way they may attain the object—that of keeping out fresh swine to become victims to the disease; but this kind of pressure can only be applied under certain circumstances.

Free movement of infected and of actually, although not observably, diseased swine, and their exposure in fairs and markets, has all along been a fruitful cause of the spreading of swine-fever. Many inquiries have been made with the view of tracing the origin of different outbreaks, and the conclusion has generally been that they were due to the introduction of swine recently purchased at public sales.

Under the system, which has obtained for years, of slaughtering diseased swine, and allowing the apparently healthy to live, the extinction of the disease could not possibly be secured. And it is only in the common course of things that the malady has gradually extended all over the country, from the sale and movement of diseased and infected swine which often showed no signs of disease, and would be passed as free from swine-fever by anyone but an expert who is familiar with every phase of the malady.

The rapid extension of swine-fever in the second quarter of the year 1885 has been generally referred to the effect of the modification of the order to slaughter diseased swine; but it must be remembered that the change from compulsory to permissive slaughter was made in May 1884, and no marked extension of disease was recorded until the middle of March 1885; although many local authorities took advantage of the change, and declined to slaughter and pay compensation when the matter was left to their discretion.

It is possible that the change in the terms of the Order may have operated to some extent injuriously by depriving owners of diseased swine of the inducement to give notice of disease. It would soon be discovered that the notice given to the police was



not followed by the usual results, but that the animals were left in the owner's charge to die while his premises were declared infected, and put under severe restrictions. It is by no means improbable that under these circumstances outbreaks would be concealed, a few dead swine buried out of sight, and the infected animals sent to a distant market, whence they would be distributed in various directions, carrying the infection of swine-fever with them. There appears to be but little hope of exterminating the disease unless swine-keepers, and all who are concerned in the matter, begin to think more seriously of the importance of prompt action. In spite of all that has been said and written about the disease, there exists a very distinct impression in the minds of stock-owners generally that swine-fever is one of those evils which cannot be cured, and it is not quite decided that it is worth while to try to cure it. If the affection in all its virulence had attacked cattle instead of swine, it would have been extinguished years ago; but the fact is that the enemy is not considered to be strong enough to justify the adoption of vigorous measures.

It is necessary to supplement the above remarks by the statement that the mistakes which are frequently made in regard to the existence of swine-fever, add largely to the difficulties which are met with in the attempt to control the progress of the disease. Various affections which are due to errors in diet, or to the unsanitary surroundings in which the swine exist, are reported as swine-fever, chiefly it seems on account of the redness of the skin which is a common symptom of disease in the pig. It has been remarked that the filthy state of the ordinary sty accounts for the difficulty of eradicating the infection when it is once introduced; it should, however, be clearly understood that swine-fever cannot originate from unsanitary condition. The fact of the existence of the disease is in itself positive evidence of the presence of the specific virus derived from a previous case of the disease.

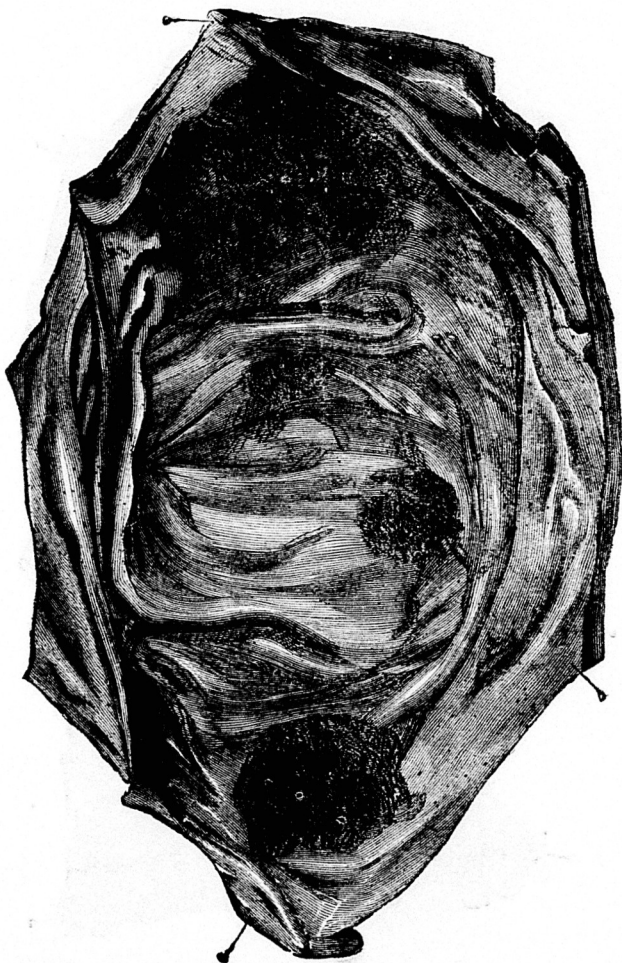
In reference to the measures which should be adopted for the extinction of swine-fever in this kingdom, it is not necessary to enter into details. On three occasions in the last twenty years, the stamping out system was successfully applied to cattle-plague. Exactly the same means would certainly succeed in ridding us of swine plague, and there is no ground for the expectation that any less severe measures of repression would be effective. It is, however, an essential condition of success, that the action taken should be uniform and general in application. But it is impossible to suggest any means of securing the necessary uniformity while the execution of the law is in the hands of some hundreds of local authorities who entertain different views as to the necessity for attempting to get rid of the disease by legislative measures, and are not agreed as to the proper means of effecting the object.

G. T. BROWN.

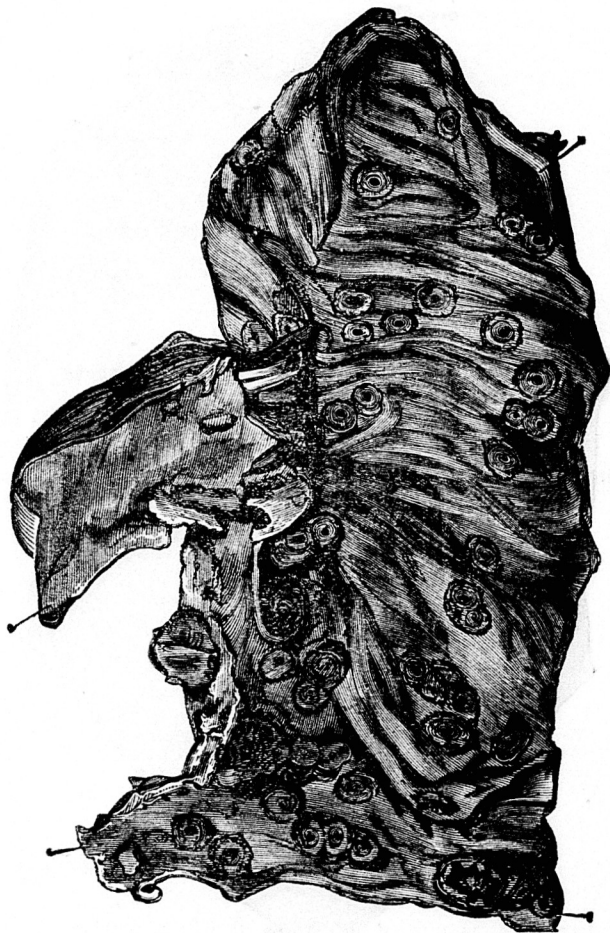
*Fig. 1.*

Interior of the Stomach of a Pig with Swine-Fever, showing the characteristic ulcerations in the early stage of the disease.

*Fig. 2.*

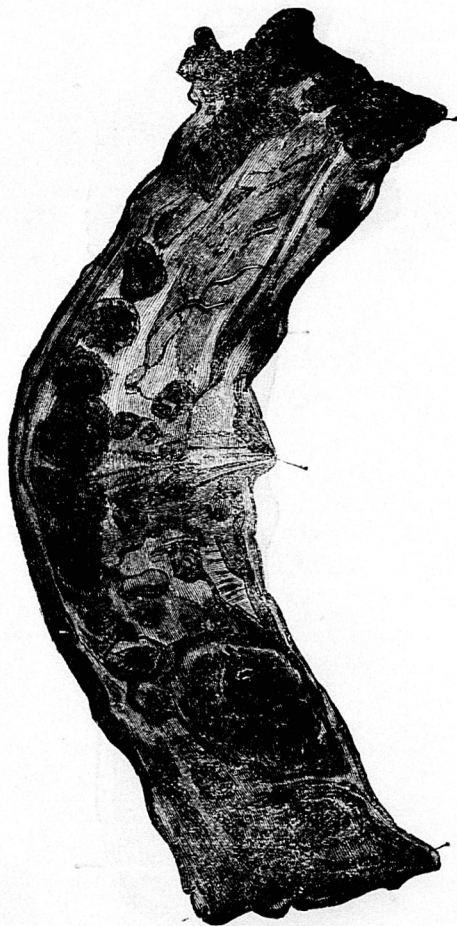


Interior of Stomach of a Pig with Swine-Fever, showing vegetative growths covering the ulcerated mucous membrane.

*Fig. 3.*

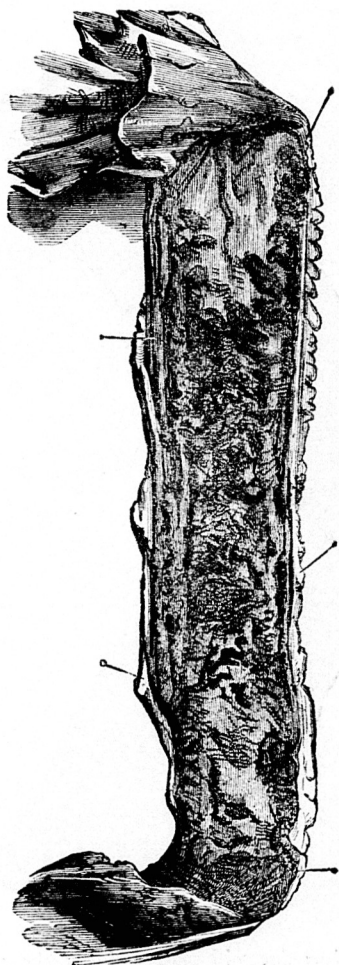
Portion of Large Intestine of a Pig with Swine-Fever, showing button-like masses covering partly healed ulcer (convalescent stage of the disease).

*Fig. 4.*



Portion of Large Intestine, with masses of exudation covering ulcers.

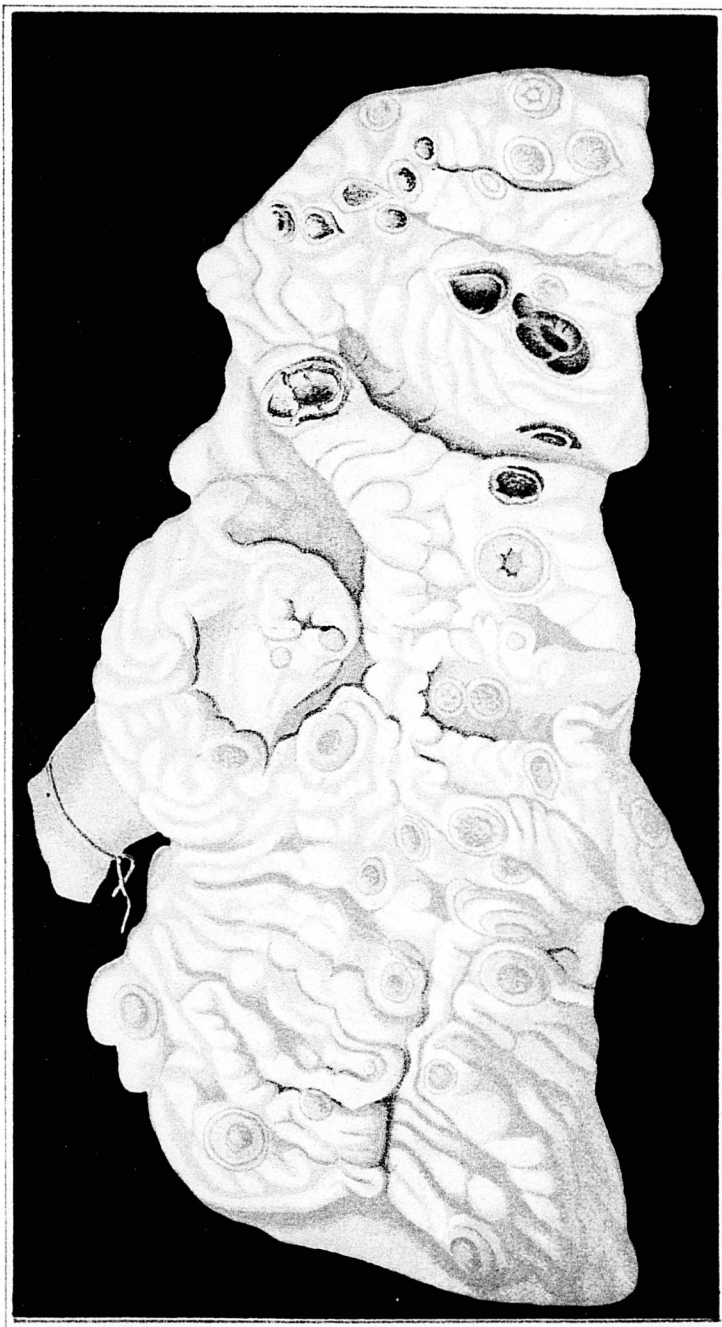


*Fig. 5.*

Portion of Intestine, with diphtheritic deposit on the mucous membrane.

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*Fig 6.*



ULCERATED CAECUM.  
(Swine Plague)

