

HOG CHOLERA

GRADUATING THESIS

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Hog Cholera

The disease popularly known as hog Cholera, is by no means so simple a malady as the name implies; and after many years of investigation, there is still a great deal of confusion with regard to the symptoms and causes, as well as the various names by which the disease has been known, such as Swine plague, Swine fever, red soldier, purples, and typhoid fever of swine. Scientists generally recognize two diseases, distinguished as hog cholera and Swine plague, though these may occur together in any degree of complication.

The history of the disease in the United States has been traced as nearly as possible by the Bureau of Animal Industry but the reports are not accurately scientific, since all diseases which proved destructive to swine in a certain locality were designated "hog Cholera". The first outbreak on record occurred in Ohio in 1833. It is reported from North Carolina in '37, Georgia in '38, Alabama in '40, and North Carolina in '43. From this time on, its ravages have steadily increased and become more widely scattered. There are no available data for obtaining the annual losses with any degree of accuracy. It was probably

introduced into this country from Europe, with swine imported for breeding purposes. It has found its readiest foothold in the Southern and Western States, though it has occurred in all parts of the United States and Canada.

Recent investigations have proved that the swine fever of Europe is identical with our hog cholera, though it is distinct from the Rouge of France. The disease began to be investigated by Klein in England in 1876, and by Lortmers, Salmon and Law in this country in '78. Professor Lortmers was the first to discover the specific germ which caused the disease, which he called *Vacillus suis*. Experiments have since been carried on with greater precautions by Lbr. Salmon of the Bureau of Animal Industry, Lbr. Billings of Nebraska University, and Lbr. Clemen and Welch of Johns Hopkins University and others, and which have resulted in the discovery of another *Vacillus* producing separate and characteristic lesions, which is believed to be closely allied to if not identical with the Schweine seuche *Vacillus* of Germany. These germs have been called the bacteria of hemorrhagic septicemia by a German scientist, and differ from the former in being inactive, and in growing quietly and slowly or not at all in potato culture.

According to Professor Welch, the swine plague has never been detected as an entirely separate disease, though it is highly probable that it does so occur. It is nearly always present in connection with hog cholera, and also with other debilitated conditions of swine. Its prevalence in this connection is explained by the fact that its bacillus, or at least closely related germs, are common on exposed mucous membranes of healthy swine, and find ready access when the system becomes too debilitated to resist its attacks. The characteristic pathological conditions produced by it are fibrinous pleurisy, pneumonia, and pulmonary hepatization, varying in color from white and necrotic through gray, reddish gray and red. The germs, while most abundant in the lungs, are often found in the blood, spleen, kidneys, liver, lymphatic glands and intestines, though Dr Welch is unable to their presence any definite lesions in these situations. It will readily be seen that two kinds of germs, working simultaneously in the same animal, and producing lesions of a similar nature, would very seriously complicate the study of the disease, in spite of the more characteristic lesions.

So much for the swine plague which occurs

in connection with a considerable majority of the cases of hog cholera. Now as to the hog cholera proper. This disease is caused by an active, oval belted germ, which grows readily in a culture of boiled potato. The characteristic lesions are necrotic buttons on the mucous membrane of the intestines, more frequently on the large intestine. Experiments by Welch and Clement show that it is capable of producing lesions in other parts of the body which are apparently identical with those of swine plague, and when accompanied by strangles in the bronchi, extending even to the pulmonary affections which are most characteristic of swine plague.

In making autopsies of diseased swine, the utmost precautions have been taken to determine the true cause of the disease. Microscopical investigations have been made of various organs and affected parts; cultures have been made in various ways from the same parts; and examined microscopically, rabbits, mice, guinea pigs, pigeons and healthy swine have been inoculated from these cultures, and the effects noted; and all of these results have been carefully compared. It often happens that the presence of germ will be shown by one process, which the other

methods had failed to reveal; and thus these different processes act as checks on each other. For instance, Dr Welch has found cases in which the diagnostic symptoms pointed to hog cholera even to the necrotic buttons on the intestine; but none of the examinations revealed the presence of cholera germs, and all of the inoculated animals died of swine plague. He found by inoculating healthy swine with the swine plague bacillus, that they were incapable of producing the necrotic buttons, hence he concluded that as the case in question was an old and chronic one, the cholera bacilli had done their work in the earlier stages, and then disappeared from the body.

Experiments so far have proved that the button-like necroses on the large intestine are indisputable evidence of the true hog cholera. These ulcers may be circular yellowish or blackish masses $\frac{1}{8}$ to $\frac{1}{2}$ in diameter, or they may extend over the entire surface of the mucous membrane. In this case, the intestinal wall is thickened and friable, and can be easily torn. If the surface of the ulcer is scraped away, a grayish white bottom is often exposed, which is penetrated by vast numbers of bacteria of various kinds. The depth to which the necrosis extends is not always

limited to the mucous membrane, but may go deeper and cause inflammation of the muscular and serous membranes.

There is very little difference in the distribution of the ulcers in different cases. They are most frequent about the caecum and ileo caecal valve, and the upper part of the colon. But in severe cases the lower half is also affected. Slight ulceration may also occur in the stomach and small intestine, especially if the animal has been fed with cultures or the viscera of diseased swine.

Other pathological changes produced are degeneration of the liver with softening of the parenchyma. The lymphatic glands of the diseased intestine are often enlarged pale and tough. According to Professor Welch, pneumonia, which may or may not be associated with fibrinous pleurisy, is often a lesion of uncomplicated hog cholera. The diagnostic symptoms are as uncertain as the post mortem appearances. The normal temperature ranges from 101° to 104° Fahr. In a case of hog cholera the temperature may rise from one to three degrees, but often does not. When the disease is prevalent, the rise of temperature is considered diagnostic, but its absence is no proof of immunity.

Affected swine take on a general sick appearance, and become stupid and laggard. There is generally a loss of appetite though not always. The bowels become constipated in the early stages, and remain so sometimes throughout the disease. Generally in the later stages, a foetid diarrhoea sets in, and remains till death. If slop is fed, the discharge is generally a dirty black color; if grain, it is light yellow. Pulse and respiration are usually slightly quickened, but hard to determine on account of the struggling of the animals when held. Red blue or purplish patches are often found on the skin of the nose, abdomen, and under side of the limbs. Among the first apparent symptoms is running at the eyes; at first a thin watery discharge, later becoming thick and yellowish. As the end approaches the animals look sicker, the back arches, the coat stars, the gait becomes staggering and uncertain, and emaciation is very rapid. The animal usually dies quietly. The rate of mortality is very high, being about 80 or 90 percent of all cases reported.

Besides the complications of the disease already mentioned, it seems in two forms, the acute and the chronic, supposed to be due to the condition of the attacking germ, whether virulent or attenuated. The symptoms given above are for the typical chronic form, in which the animal may live from a few days

to several months. In the acute form, the animal usually dies in a few hours. It is characterized by haemorrhages which may occur in any part of the body.

No successful treatment for hog cholera has yet been discovered though innumerable so called cures are found on the market. Pasteur and his pupils have given considerable attention to the problem of preventing the disease by the inoculation of the virus from sterilized cultures, but with little success. Since this method has proved so beneficial in cases of other infectious diseases, it is reasonable to suppose that it will ultimately be successful in this; unless as Dr. Salmon believes, the harmful effect of the cholera bacillus consists in the production of thrombosis or stoppage of the capillaries, rather than by any poisonous effects of its virus.

The germs are supposed to enter the system through the mouth, and as their passage through the stomach and small intestines is comparatively rapid, and their growth checked by the digestive secretions, they produce no marked effect until they reach the large intestine. The experiments conducted by the Bureau of Animal Industry seem to prove that beneficial results may be obtained by giving a purgative when the germs are first swallowed, or in case of an outbreak, giving it

to all the swine periodically, so as to prevent the lodgment of germs in the colon. The purgative used was calomel in combination with castor oil. Another method of treatment which may tend to lower the rate of mortality, is the feeding of substances with the daily rations which will act as antiseptics and check the multiplication of germs without causing any injury to the animal itself. The following formula is recommended by the Bureau as the most efficacious which has been tried. Wood Charcoal 1 lb. 1 lb. each of Sulphur, Sodium sulphate, and antimony sulphide, 2 lbs each of Sodium Chloride, Sodium Bicarbonate, and Sodium hyposulphite.

In any case preventive treatment is about all that can be relied upon to secure immunity from the ravages of the disease. Cholera is generally introduced into a locality by swine shipped in from some of our great stock markets, and the contagion is allowed to spread by the common practice of farmers of letting their hogs run at large where they are sure to come in contact with any germs which may be in the neighborhood. When an outbreak occurs in any locality, no pigs should be purchased from there for a year after the death of the last case, since chronic cases may hold on for several months before dying, and the infection may

remain in the soil for several months longer. It is well, when buying from a suspected district, to keep the animals quarantined for a month or so. Ordinarily the disposition of dead animals is a matter which receives little or no attention. The dead hogs are thrown into the nearest creek or into some dry ravine, and in time the contagion is carried to all the farms which lie below along the same water course. The germs may often be carried from place to place, in feed, clothing, implements, and on the feet of persons or animals who have come in contact with an affected herd. There is no evidence that currents of air are instrumental in carrying the germs, but they are very often carried by buzzards and carnivorous animals. Hogs will often carry a piece of diseased viscera for several miles.

By carefully guarding against these sources of infection, the spread of the disease may be checked to a large extent. All dead animals should be burned or buried so deep as to avoid all danger of disinterment by dogs and wolves. If the carcass is disposed of for other purposes great precautions should be taken to prevent infection of other animals through wagons, cars and yards. Many of the States have laws upon their statute books to prevent criminal

negligence in this matter, which if strictly enforced, would materially aid in stamping out the disease. As scientists are obtaining more accurate knowledge of the disease, it is to be hoped that the facts of the case may become better known to the ordinary storm raiser, and that laws may be framed and enforced which will mitigate if not destroy the ravages of this destructive plague.

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