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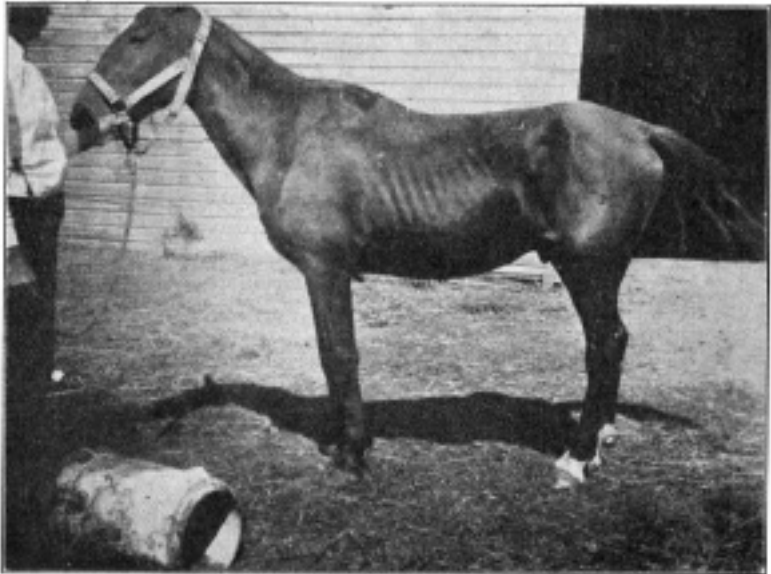
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BY A. T. PETERS



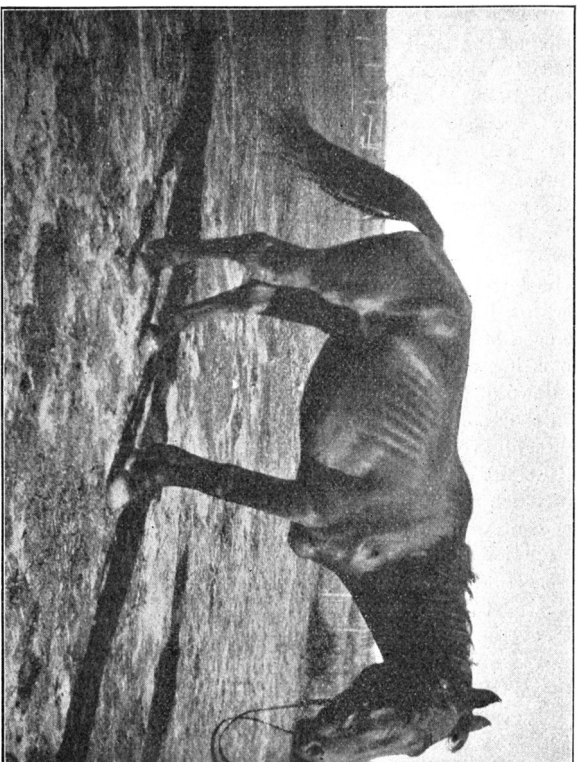
An Acute Case, First Stage

MALARIAL FEVER IN HORSES

BY A. T. PETERS

This disease is also called "swamp fever" by farmers, and "pernicious anaemia" by veterinarians. In Nebraska many of the farmers call the disease "typhoid fever," for it resembles this fever very much. The manner in which the disease is contracted by horses is not definitely understood. In the last few years, the veterinarians in the Philippines have discovered a disease, prevalent in India under the name of "surra," the description of which corresponds very much to that of malarial fever of horses in this country, with the exception that bacteriologists have not been able to find the surra parasite in the blood of affected animals in this country. As the parasite of surra is very easily detected in the blood of affected animals, and as we have not been able to discover it, the conclusion seems reasonable that the diseases are not identical. It is difficult to ascertain how the disease first made its appearance in Nebraska. We find it on the marshy pastures during very wet seasons. It is the general opinion of those who have studied the disease that it is caused by feeding on certain low, marshy pastures and on hay that comes from such pastures. Whatever its origin, the disease has spread on these pastures during the last few years. Horses die from this disease on the Missouri river bottom and in the Elkhorn valley and farther up in the western part of the state. In these districts the loss is very great, especially in wet seasons, such as we have had in the last few years. To the stockman the loss is very heavy, for when it once makes its appearance on a ranch, it is very apt to recur, and carry off every horse. Many ranchmen in these districts lost all of their horses and were seriously crippled in finishing up their season's work, many farmers losing from two to eight head of horses. This is the most serious disease among horses that this state has been called upon to investigate.

SYMPTOMS.—The disease usually starts in with a fever of the recurrent type. Following this is the symptom of weakness. The horses become tired easily. They apparently have no life and perform their usual work with great difficulty. The mucous membranes of the mouth and eyes become very pale. After the animals have shown these symptoms for a few days, one will notice a staggering gait. They become weak over the loins, so that farmers suspect some kidney trouble. They drag their legs. During these first symptoms the horses do not apparently lose their appetite, eating ravenously, but growing thinner and weaker all the time. The temperature becomes more elevated, running as high as 103° to 106°. The variation in temperature is one of the characteristic symptoms. It may remain high for several days and then drop down, only to rise again. In this condition of changing temperature the horses become too weak to work. They lose flesh very rapidly and are usually laid off from work. It may occur that the animal will improve for a week or ten days, only to have another attack more severe than the first one. Horses may have two or three attacks and death finally follows, either from heart failure or from exhaustion. The ranch-



A Second Attack, Second Stage

men have observed that when they feed their horses all they want while they are sick with this disease, death is certain, but that if they feed them sparingly they may recover, but usually have another attack. In the early stages of the disease the pulse is always very rapid, while in the latter stages it is very weak. Horses may linger with this disease for several months. The writer has observed some to live three months. As a rule, horses live from two to three weeks. It is only occasionally that animals recover. Besides the above symptoms, there is a swelling of the legs. This is a symptom that is not always observed, and then, only in the latter stages of the disease. This swelling may also be noticed under the abdomen. The swelling indicates a very poor circulation, and is a very bad symptom. There are also found petechiae (little blood spots) on the mucous membranes. These are especially found on the surface membrane of the eye. As the disease advances, the color of these spots become darker, resembling that in mortification, and gives the observer a very good index of the progress of the case. Whenever these spots are found on the mucous membrane of the eye, the case almost always proves fatal. Another marked symptom is the increase of the urine. Large quantities of urine are secreted. This is also a serious symptom.

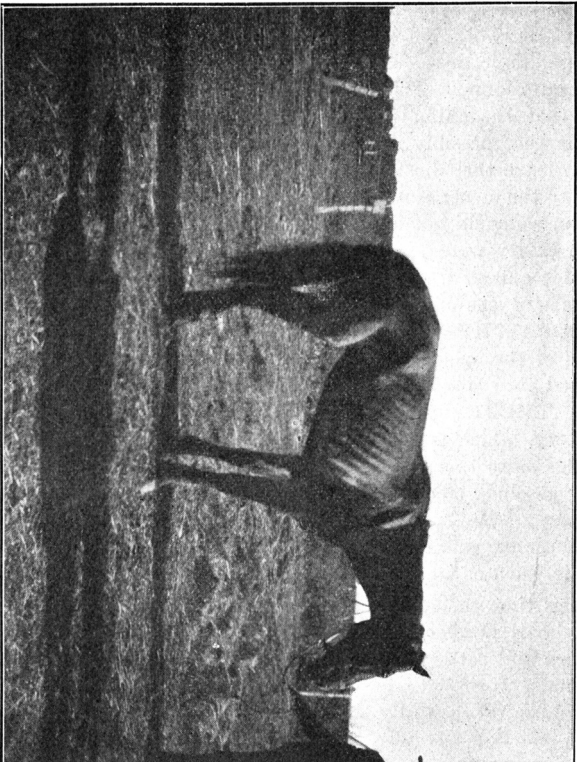
DIAGNOSIS.—This disease is not very difficult to diagnose, at least not in the latter stages of the disease. In the early stages it may be mistaken for influenza or pneumonia, but when one has seen a case in the advanced stages, then it is not so difficult. However, it is well for one who is inexperienced to defer judgment until the animal has been examined two or three times on that many days. If one takes into consideration the good appetite with continual loss of flesh, the pale mucous membranes, and the peculiar pulse, he can diagnose without much trouble.

PROGNOSIS.—The prognosis of this disease is very unfavorable. Some ranchmen and veterinarians claim that the death rate runs from 50 to 75 per cent, while others claim even a higher percentage. The writer is of the opinion that a very small per cent of the animals recover. We have observed that where farmers have carefully nursed their animals they appeared to recover, only to have another attack which seemed to be more severe, death finally resulting. The writer has never seen a thoroly cured animal since he has observed this disease.

FIELD WORK.—The disease was first observed by this station in 1902 in this state. Since that time a great many horses have been lost.

The field work consisted in visiting several ranches on which a number of horses had died, so as to study the conditions. It was our aim to make post mortem examinations and to treat animals that were affected. In the majority of cases that came under our observation the animals were in the advanced stages of the disease.

Last July the writer, together with the State Veterinarian, Dr. C. A. McKim, visited a number of ranches, and also held post mortem examinations on diseased animals. We found that the animals were all greatly emaciated and the mucous membranes very pale; and in all cases we found



A Chronic Case, Third Stage

the characteristic blood spots on the mucous membrane of the eye. These blood spots were more pronounced in some cases than in others, due to the severity of the attack. Some blood counts were made from the diseased animals. The red corpuscles ran as low as 1,800,000 to 2,200,000, while the normal for a healthy animal is about 7,500,000 red corpuscles, which explains why the affected animals emaciate and become pale so very rapidly. The post mortem examination also showed a large number of worms known as the tetracanthum. This worm was found more abundant in horses that showed slight symptoms or were in the early stages of the disease, and was not found so abundant in the chronic cases. It was always found in the colon and the intestines. In none of the specimens that were examined were we able to find this worm in the circulation. It is of importance to note that, as stated, in advanced, long-standing chronic cases, when a post mortem is held, few if any of these parasites are found. This may possibly be explained by the severe emaciation that the animal has undergone, the blood being in such poor condition that possibly it had no nutritive value, thus causing the parasites to leave their hosts. In one post mortem examination where, according to the owner's statement, the horse had been affected twenty-one days, we could not find any of these worms. The organs in the abdominal cavity were practically normal except the kidneys, which were very much enlarged, and showed plainly chronic lesions of nephritis (inflammation of the kidneys).

LABORATORY EXPERIMENTS.—Cultures were made from the contents of the spleen, blood, kidneys, and urine. These cultures were inoculated into smaller animals, but without any results.

TREATMENT.—The treatment of this disease has not been very satisfactory, which is largely due to the fact that we have no definite knowledge as to the true cause of the disease. The treatment consisted in using gasoline, creolin and creosote to cleanse out the stomach of the intestinal parasites. In addition to this, fever remedies were used, such as quinine, nux vomica, digitalis, and the like, followed up with a general tonic, such as Fowler's solution, but with no universal success.

At this time the Station is giving attention to the method by which these animals become infected. Possibly it may be in the same way that sheep and cattle become infected with the small parasite known as the stomach worm. Embryos of worms have been found on blades of grass and are taken up by stock when grazing. As soon as the definite cause of infection has been learned, then possibly a cure may be forthcoming.

CONCLUSIONS.—Since we have no definite knowledge of how the animal becomes infected, and from the fact that all medicinal treatment so far employed has given no uniform success, attention should be given to the prevention, and especially to the mode of infection, as stated before. In Circular No. 93, of the Bureau of Animal Industry, just published, is an interesting history of the twisted wireworms that inhabit sheep and other ruminants. This circular shows how the embryos of

this worm are found on blades of grass, and how moisture increases the development of this worm embryo. It also gives information as to the effects of cold and dryness on this embryo; gives the mode of infection, tells how the eggs are scattered over the pastures and fences by cattle and sheep. Now if that is possible with an embryo of the character of the twisted wireworm, it may also be true of the embryo of this worm that is found in the horse, and careful investigation should be made to ascertain if such infection is not possible. If it is, methods of prevention should be suggested, such as the disinfecting of the pastures, either by burning or by other methods, such as drainage, and the use of chemicals. This line of work, together with the bacteriological investigation will be pursued. The bacteriological and pathological records in the laboratory have not been given here, but will be published the coming year, in the Twentieth Annual Report of this Station.