

THE RELATION OF ANIMAL DISEASES TO PUBLIC HEALTH

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"Man is his own worst enemy" in the spread of communicable diseases, but the lower animals are a close second. It is only necessary to cite bubonic plague, a disease of rats, which carried off 25 percent of the world's population not so long ago and which is today costing the United States Government large sums of money in preventive measures. Another instance is sleeping sickness, a disease primarily of animals and transmitted by the tse-tse fly, which makes certain parts of Africa actually uninhabitable for either white man or native. Some prominence has been given this question lately through the offer of the Germans to give to the world a cure for sleeping sickness in return for certain territory.

But to get nearer home, take our own domestic cow. Tuberculosis is by far the most serious problem, ranging in extent from 2 to 3 per cent of the cattle in the southern part of Illinois to 50 per cent or more of the animals in the intensive dairying districts of the northern part of the state. The hogs that follow the cows, and the chickens that follow the hogs may also become infected with bovine tuberculosis and be incidental sources of danger. The chief source of danger is through milk to children. In surveys made some years ago in several large cities about 10 per cent of milk samples were found infected with tubercle bacilli, and this figure probably holds good today in the average small city of Illinois. Efficient and compulsory pasteurization has eliminated danger in the large cities. While 25 per cent of tubercular children formerly were infected with the bovine type of the disease, recently bone and gland tuberculosis (evidence of the bovine infection) have been rare occurrences in cities like Chicago. Dr. Lorenz on his last visit to this country cried, "Where is your bone tuberculosis?"

Two other diseases, anthrax and foot and mouth disease, may be spread not only by cattle, but also by the other domestic animals which are subject to infection. There occurred during the calendar year 1922 in the United States 89 cases of human anthrax, of which Illinois had four. The disease is well under control, although present in various parts of the country. Foot and mouth disease is rather rare in man, due principally to the immediate destruction of infected animals. Milk is a possible source of danger, but proper pasteurization will prevent infection.

Contagious abortion among cattle is very prevalent, but its relation to human welfare is not yet settled. Huddleson has shown the presence of abortion bacilli in milk from infected cattle, and Park and others have shown as high as 25 per cent of individuals giving agglutination reactions to this organism. In several states the problem is considered of public health importance and tests for the disease in cattle are performed by the laboratory of the State Board of Health. The writer at one time observed a herd of cattle badly infected with contagious abortion where the wives of three successive herdsman gave premature births to children. Pasteurization of milk is a proper safeguard to the public.

Trichiniasis, primarily a disease of hogs, has played a considerable part in the world's history. The old Jewish law against eating pork was in all probability the result of havoc wrought by this disease. Great epidemics in Europe have been caused by the parasite, *trichinella spiralis*, and some forty years ago it caused international complications between this country and Germany, with the result that American pork was barred from German markets. The danger from eating raw pork is today common knowledge, yet from 0.5 per cent to 2 per cent of the population of civilized countries show trichina embryos at post mortem examinations.

Glanders, very common in horses, is rather rare in man. The two classes of persons likely to be infected are hostlers and laboratory workers. Recently a case in Illinois was drawn to the attention of the writer through laboratory examinations. The disease was not suspected

previous to this time. Often the symptoms are very obscure, and it is possible many more cases may occur than are recognized.

Rabies is spread usually by our good friend, the dog, though all other animals are susceptible and if infected are sources of danger. The disease for centuries was the dread of all peoples, in some communities the unfortunate person bitten by an infuriated animal being put to death immediately. Not till fifty years ago did Pasteur discover a preventative which has greatly reduced the mortality. In 1922, 50 deaths were reported in the United States. At the present time there amounts to what is almost an epidemic of rabies among dogs in the southern part of Illinois.

Of all useless animals on earth, the rat is the most detestable. As a marauder he is bad enough, as a murderer he excels. Reference has already been made to bubonic plague, which has swept the world in three great pandemics. The first authentic epidemic originated in 542 A. D. in Pelusium, Egypt. It spread by trade routes over the then known world, till at its height the mortality was 5,000 persons a day and rose to 10,000 persons some days. According to Procopius, a witness of the epidemic, "It spared neither island nor cave nor mountain top where man dwelt—. Many houses were left empty and it came to pass that many for want of relatives and servants were left unburied for several days. At that time it was hard to find any one at business in Byzantium. Most people who met in the streets were bearing a corpse. All business had ceased, all craftsmen had deserted their crafts." The second epidemic, known in history as the Black Death, originated in Mesopotamia about the middle of the eleventh century. Again the disease spread by trade routes over the entire known world, carrying off 25,000,000 people, or one-fourth the population of Europe. The third epidemic had its origin in China in 1871, coming to the ports of Europe and America. Due to advancement of the sanitary sciences and their strict application in war upon rats and fleas, the world epidemic never reached beyond isolated cases at seaports in Europe and America. The disease is of especial importance to Illi-

nois because of the water ways from the two coasts, and will be of increasing importance as these waterways are improved for ocean-going vessels.

Of lesser importance are infectious jaundice and rat bite fever. Rats in many cities in the United States have been shown to harbor the *Spirocheta icterohemorrhagiae*, causing infectious jaundice in man. In Illinois several epidemics have been reported. Rat bite fever is less prevalent in this country than in other parts of the world, though some cases have occurred here. The causative agent is *Spirocheta morsus muris* harbored by rats. Very recently the United States Public Health Service has been making an extended investigation of tularemia, a disease of rats transmitted by the rat flea to man. Man seems very susceptible to the disease. The bacteriologists in Washington who were working with the causative agent, *Bact. tularense*, one after another became infected till everyone connected with the problem had had the disease. The Lister Institute in London then requested a culture of this virulent organism, which was sent, together with a warning that great care must be used in handling it. In spite of this warning, word was received two months later that the bacteriologist working on tularemia had contracted the disease. Added interest was lent to the subject when many rabbits for sale in Washington markets were found infected with tularemia.

Goats are subject to a disease known as malta fever, which may be transmitted to man through goat milk. In Texas considerable trouble has been caused in this manner. Guinea pigs usually are harmless little creatures, but recently an epidemic of "guinea pig plague" was reported in man. The infection was spread to bakeries by rats.

The domestic fowl is especially subject to a disease known as "white diarrhea". The writer some years ago found the disease especially fatal to young rabbits, young kittens and young guinea pigs. The eggs from infected hens contain large numbers of the organisms,—*Bact. pullorum*,—which are not destroyed by usual methods of cooking eggs. The relationship of the disease to man is problematical, but there is little doubt that a severe

gastro-intestinal upset if nothing worse might be caused by a young child eating infected eggs. This disease is very prevalent in poultry in Illinois.

Another problem that keeps recurring is the relation of paralyzed animals to poliomyelitis. In Illinois a few years ago the writer had the opportunity to study several outbreaks of paralysis among animals which epidemiologically were closely related to poliomyelitis among children. Laboratory studies however were negative. The animals included in these studies were colts, hogs, and chickens.

Brief mention should be made of intestinal parasites. *Tenia saginata*, the beef tapeworm, *Tenia solium*, the pork tapeworm, and *Dibothriocephalus latus*, the fish tapeworm, all infect man. *Belascaris mystax* is a common parasite of the dog and cat and hence found in children.

Some of the arthropods are subject to diseases quite fatal to man. Among these are ticks, transmitting relapsing fever and rocky-mountain spotted fever, lice which spread typhus fever, mosquitoes whose bite causes malaria, yellow fever, dengue and filaria, and the flies especially in regard to sleeping sickness.

This paper must not be closed without including an animal disease which is not fatal to man, but which has actually been the means of saving a countless number of human lives. This is cowpox, infection with which will prevent the fatal smallpox in human beings.