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FOX DISTEMPER BEING INVESTIGATED

Frequent requests from fox breeders for assistance in controlling infectious diseases in their animals have prompted the Bureau of Biological Survey of the United States Department of Agriculture to investigate conditions on a number of fox farms. Between the years 1921 and 1926 Dr. Karl B. Hanson and Dr. H. L. Van Volkenberg, of the Division of Fur Resources of the Biological Survey, visited as many infected premises as possible, studying conditions for periods ranging from a day to a week at each. Special note was made regarding the history of the various outbreaks, the rate of mortality, and the class of animals affected, their symptoms and the organs involved.

The source of the disease was directly traceable in the greater proportion of the outbreaks to animals brought from other farms or from fox shows. Whenever a bacteriological laboratory was near at hand, advantage would be taken of the opportunity to send fresh carcasses there for examination. Lack of facilities or funds prevented other studies of the bacteriology or the microscopic injuries caused in these infections.

It was soon found that a very thorough and comprehensive investigation would have to be made of so-called distemper, or of the various diseases known by that name. It was deemed important that the bacteriology and microscopic pathology of the animals affected first be given particular attention with a view to determining the causes of the trouble and working out more accurate methods of diagnosis.

Dr. R. G. Green, of the Medical School of the University of Minnesota, who with a group of associates had investigated outbreaks on large farms near Minneapolis, visited F. G. Ashbrook, of the Bureau of Biological Survey, in December, 1926, and discussed the work done at the University of Minnesota. Fresh material in abundance had been available for his use, and each outbreak was kept under close observation throughout its entire course.

A program of cooperative research on diseases of carnivorous animals was entered into between the Biological Survey and the University of Minnesota on October 1, 1927. The work has been carried out under the combined direction of Dr. J. E. Shillinger, of the Bureau of Biological Survey, and Dr. R. G. Green,

of the University of Minnesota. The cooperative undertaking had the benefit of almost three years' earlier work by Doctor Green and his associates. Dr. Earle T. Dewey and Dr. Newell R. Ziegler, who have been associated with Doctor Green since the time he began his fox-disease investigation, have continued as part of the staff of nine workers under the cooperative program.

When the University group started its investigations its activities were directed to the study of a bacterial infection that was present on a number of fox ranches in Minnesota. This disease, known as fox paratyphoid, disappeared in Minnesota and was followed by another, discovered by Doctor Green, and here tentatively called epizootic fox encephalitis, to which investigations are now being directed. An epizootic, it will be understood, is in animals the same as an epidemic in man.

Fox Paratyphoid

On a number of fox ranches in the Northwest an infection known as fox paratyphoid occurred during the fall of 1924 and the winter and spring of 1925. It appeared to be a disease of young foxes rather than adults. On affected ranches the young would die in large numbers, while only an occasional breeding animal would succumb. The mortality in its typical course ran as high as 60 per cent of all the younger animals on a ranch. Bacterial vaccine tended to control the disease on these ranches, and the fox paratyphoid has not been encountered by the University of Minnesota group since the summer of 1925. The very fact that it has disappeared from view is strong evidence that the disease studied was a primary infection, and if so, that it can be expected to reappear in epizootic form sometime in the future.

Epizootic Fox Encephalitis

Following their work on the paratyphoid infection, the University group began investigations of a second disease of foxes that previously was not described or was known under the name "distemper," and now is tentatively being called epizootic fox encephalitis. The solution of the various problems, especially the development of a preventive vaccine, will undoubtedly require the major efforts of the group for several years to come.

This disease was first encountered in the fall of 1925. It was recognized first in groups of animals that had been immunized with the paratyphoid vaccine. The evidence that foxes so vaccinated were resistant to an infection by the same organism indicated that a new disease was being dealt with in vaccinated animals. Accordingly transmission experiments were carried on with foxes that had been

so vaccinated.

Epizootic fox encephalitis has been present on numerous ranches throughout the United States during the past three years. Outbreaks developed following fox shows at Portland, Me., and Buffalo, N. Y., in 1925, and have been present on many ranches under observation continuously since that time. It appears to be a disease of adult foxes as well as pups, and in outbreaks studied deaths in adults have been as numerous as among the young. Even on a carefully supervised ranch the majority of animals are found dead even though only a few hours before they were apparently well. Sick foxes when found may show convulsions, extreme weakness, paralysis, or sleepiness. All the various symptoms appearing in ranch animals have been reproduced in animals artificially infected from a single sick fox, showing that all these manifestations are part of the same disease.

The animals dying from experimental infection appear the same in all ways as do the animals dying on a ranch. On a ranch the mortality from this disease does not often exceed 15 per cent, but a number of epizootics have been observed where it was as high as 40 per cent. Positive diagnosis of this disease has been difficult, and one of the problems confronting the investigators is to find a technique making the diagnosis less difficult.

Considerable experimental work has been necessary to an understanding of epizootic fox encephalitis. Close to 400 animals have been used in transmission experiments, and approximately 1,400 sick animals have been carefully studied. Thus far it appears that two diseases of foxes have been encountered, and the group of investigators is not sure but that a third may be discovered as the work goes on. The development of a vaccine for epizootic fox encephalitis is the immediate aim, and it is hoped that the research undertaken by the University of Minnesota and the Bureau of Biological Survey will have the cooperation and support of fox ranchers.

The cooperative investigations are supported by funds from Federal appropriations and supplied by the University of Minnesota and its cooperators, including direct gifts from fox ranchers to the University. Such gifts have aided materially in the expansion of the work, and as fox ranchers realize its extent and appreciate the importance of solving the problems similar financial support will without doubt be forthcoming.

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