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Prevalence of *Toxoplasma* Antibodies in Wild Mammals Collected on Three Iowa Farms

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ABSTRACT

The data herein reported reveal the prevalence of toxoplasma antibodies in a small number of mammals collected on three Iowa farms during October, 1964. Serologic evidence of past or persistent infection was noted in the feral house cat, gray and red fox and the opossum. Specimens found positive ranged in titer from 1:64 to 1:1024. Numbers in each category are insufficient to estimate general prevalence of infection in wild mammals in Iowa.

INTRODUCTION

Toxoplasmosis is caused by a protozoan, *Toxoplasma gondii*, and is widely distributed geographically and zoologically throughout the world. Inapparent infections appear to be the rule; disease the exception. Although toxoplasmosis is considered a zoonosis, definitive proof of animal-to-man transmission is lacking. The present lack of complete knowledge about the modes of transmission, except by congenital means, precludes control programs in man or lower animals. Knowledge of the prevalence of infection in specific geographic areas in man, domestic and wild mammals and birds is a necessary prerequisite to understanding man-animal interrelationships.

In Iowa, serologic evidence of infection has been reported in swine, sheep, dogs and cats, but none in cattle or horses.³ Toxoplasma organisms have been isolated from naturally infected hens used for meat and egg production in Iowa.⁴ This paper reports the prevalence of toxoplasma antibodies in wild mammals collected on three Iowa farms.

MATERIALS AND METHODS

Source of Specimen: Following a human

leptospirosis outbreak in Linn County, Iowa in 1964, epizootiologic studies on wild mammals were conducted on three farms. Traps were set and of 75 animals captured, blood specimens were available on 47 (the majority of animals not tested were mice that were found dead when removed from the traps). The 47 mammals represented 8 species: feral house cat (*Felis domestica*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes fulva*), muskrat (*Ondatra zibethicus*), opossum (*Didelphis marsupialis*), cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), and fox squirrel (*Sciurus niger*).

Serologic Procedures: Serum specimens were stored at -40°C until tested. They were serially tested without dilution four-fold to endpoint (1:4, 1:16, etc.). All specimens were inactivated at 56°C for 30 minutes in a water bath. The USPHS Communicable Disease Center modification of the Sabin-Feldman dye-test was used and a titer of 1:16 or higher was considered significant evidence of past experience with the infection.

RESULTS

The serological findings (1:16 dilution or higher) of the mammals tested are as follows: Muskrats, 0 of 11; cotton-tailed rabbits, 0 of 8; raccoon, 0 of 5; fox squirrels, 0 of 4; feral house cat, 1 of 1 (1:1024 titer); gray fox, 2 of 2 (both positive at a 1:64 titer); red fox, 1 of 4

(1:256 titer); and opossum, 1 of 12 (1:256 titer).

DISCUSSION

In the United States, several serological or parasitological surveys have been conducted on the wild mammal species and McCown⁵, used the complement-fixation test and found 20 of 107 wild rabbits (19%) with antibody titers ranging from 1:8 to 1:64 but none of the following species were found positive: fox, opossum, raccoon or squirrel. Animals were trapped in the Patuxent Refuge in Laurel, Maryland.

From the same Patuxent area, Jacobs, Stanley and Herman² tested rabbits, raccoons and squirrels for toxoplasma antibodies by using the methylene blue dye-test. At a 1:16 dilution or higher, 21 of 95 cottontail rabbits (22%) 18 of 77 raccoons (23%), and 2 of 24 squirrels (8%) were found positive. Although test methods differed in the two Patuxent studies, similar serologic results were noted in rabbits (19% & 22% positive).

In the Memphis, Tennessee region, Eyles, *et al.*¹, found one of 9 cottontail rabbits positive at a 1:16 dilution but did not find parasitologic evidence of infection; one muskrat was tested and found negative parasitologically. No infections, serologic or parasitologic, were demonstrated in 19 fox squirrels collect-

ed in rural Arkansas.

A comprehensive serologic and parasitologic study of 264 wild animals representing 12 species was conducted at Fort Stewart, Georgia⁶. Dye-test titers, 1:16 dilution or higher, were reported in the following species of mammals: 22 of 67 raccoons (33%); 7 of 76 opossums (9%); 33 of 47 gray fox (70%); 3 of 16 cottontail rabbits (19%); and 2 of 2 red fox. By a mouse inoculation technique, toxoplasma organisms were isolated from one gray squirrel and one raccoon found serologically negative which emphasizes the importance of parasitologic studies to more clearly estimate the true prevalence of infection in a given area.

The data herein reported from Iowa reveal the prevalence of toxoplasma antibodies in a small number of mammals collected on three farms during October, 1964. Serologic evidence of past infection was noted in the feral house cat, gray and red fox and the opossum. Specimens found positive ranged in titer from 1:64 to 1:1024. Numbers in each category are insufficient to estimate the general prevalence of infection in wild mammals in Iowa. Additional studies, both serologic and parasitologic, are needed to define the epizootiology of wild animal toxoplasmosis in Iowa.

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