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TRYPANOSOMES FROM ELK AND HORSE FLIES IN NEW MEXICO[1]

ROBERT B. DAVIES[2] and GARY G. CLARK[3]

Abstract: A *Trypanosoma* sp. was isolated from five of seven yearling elk *(Cervus canadensis)* at Red Rock Wildlife Area and 29 of 31 horse flies *(Hybomitra laticornis)* collected in the Gila National Forest, New Mexico. To our knowledge, this represents the first isolation of trypanosomes from elk.

INTRODUCTION

Trypanosomes have previously been observed in histological sections of horse flies and cultured from mule deer *(Odocoileus hemionus)* in New Mexico and Colorado,[1] and white-tailed deer *(O. virginianus)* in the southeastern United States.[4] As a continuation of these initial findings, a limited survey of elk *(Cervus canadensis)* and horse flies (Diptera: Tabanidae) was conducted (in southwestern New Mexico) during the summer and early fall of 1972.

MATERIALS AND METHODS

Samples of blood (5 ml) were taken in June and September, 1972, from seven of ten captive yearling elk at Red Rock Wildlife Area. These animals, captured during the winter of 1971-72 in Jackson Hole, Wyoming, were transported to the Red Rock facility for experimental infection with *Elaeophora schneideri.* Each blood sample was inoculated and maintained as previously described.[1]

Horse flies (Hybomitra laticornis), collected from various parts of the Gila National Forest, were dissected, the midgut removed and placed in a culture tube containing 5 ml Neopeptone Blood Agar overlaid with 2 ml of Veal Infusion Broth.[3] Antibiotics added to the veal infusion medium were included in amounts identical to those in the broth. Culture tubes were incubated at 22 C.

After an initial 7-day incubation period, cultures were examined daily for 2 weeks or until trypanosomes were observed. A wet mount was prepared by withdrawing a small amount of liquid from the top portion of precipitated blood and placing it on a glass slide. A cover glass was added and the preparation examined at 100X. If the sample was positive, trypanosomes were usually quite numerous.

RESULTS

Five of seven elk (71%) sampled at Red Rock Wildlife Area on 27 and 28 June yielded trypanosomes. Blood samples obtained from the nine elk available on 18 September were all negative on culture.

Thirty-one horse flies were cultured for trypanosomes and 29 (97%) were positive. Both uninfected flies were captured at Aztec Park in the Gila National Forest on 16 June. One of these flies had no blood in the gut. Two other flies captured at the same time were infected

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with trypanosomes even though no blood was observed in the gut. These two flies also harbored larvae of *Elaeophora schneideri,* as did 14 (45%) of the flies cultured. This filarial infection was indicative of a blood meal derived from mule deer.

A random sample of 10 trypanosomes each from mammalian blood cultures and horse fly cultures were measured and found to be almost identical in size. Those from blood samples ranged from 9.7 to 18.3 (13.6) μ by 1.2 to 2.4 (1.9) μ. Those cultured from the horse flies were 9.5 to 17.9 (10.7) μ by 1.3 to 2.2 (1.7) μ. These values are within the range reported from mule deer.[1]

DISCUSSION

A search of the literature revealed no prior report of trypanosomes from North American elk. The prevalence of infection from this limited number of elk is very close to that found in mule deer (69%)[1] and white-tailed deer (76%).[4] It is not known if the elk were infected with trypanosomes in Wyoming or acquired their infection after arrival in New Mexico. It is assumed that they were infected in Wyoming due to the absence of horse flies in the Red Rock area. Additional elk and other wild ruminants are currently being examined to determine the distribution and prevalence of trypanosomes.

There are two feasible explanations for the negative results obtained from the elk at Red Rock during September. First, the animals lost their infection by developing immunity to the parasite. It is conceivable that the animals effectively responded immunologically to the parasite, as such a phenomenon has been observed in other mammals[5] and may occur in elk. Another possibility is that the medium was defective and incompatible with propagation of typanosomes. The cause lies, very likely, with defective medium since these tubes were from the lot prepared in June, 1972. The shelf-life of this medium is not known, but in the 3 months after the medium was prepared, it was subjected to temperature extremes of 0 to 42 C during field work. This temperature range, plus the time lapse, may have caused deterioration of the medium to a point that the trypanosomes could not survive.

Since the trypanosomes recovered from elk, mule deer and horse flies were morphologically similar, it is possible that a single species is represented, with horse flies serving as the vector. However, since no attempt has yet been made to go from horse fly to culture to mammal, this has not been conclusively elucidated. This final step is important when evaluating the source of the tabanid infection. Wallace[6] summarized the transmission of trypanosomes, including *T. congolense, T. evansi, T. simiae, T. theileri,* and *T. vivax* by Tabanidae. He also discussed the two genera, *Blastocrithidia* and *Crithidia,* that have been described from this insect family and noted that some members of the former genus were intermediate forms of *T. theileri.* The organisms that we observed were structurally similar to the culture forms of *T. cruzi* that have been described by Clark[2] who compared the morphology of four genera of Trypanosomatidae.

The significance of these findings is unknown at present and further studies are needed to ascertain the trypanosome species present and pathogenicity, if any, resulting from their occurrence in big game animals. In addition, the route or routes of infection need clarification. If vectors are required, other hematophagous arthropods should be examined.

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