Elaeophora schneideri Wehr and Dickmans, 1935 in White-tailed Deer from the Edwards Plateau of Texas

Authors: Waid, Douglas D., and Warren, Robert J.

Source: Journal of Wildlife Diseases, 20(4) : 342-345

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-20.4.342

striations on the shell, all of which are characteristic of *Capillaria hepatica* Bancroft, 1893.

On histological examination, the liver sections from all the affected rats showed multifocal granulomatous areas characterized by the presence of macrophages, lymphocytes and plasma cells and associated with fibrous connective tissue proliferation. In some granulomas foreign body giant cells formed part of the cellular exudate. In two cases sections of the liver showed in addition to the lesions described above several cross and tangential sections of adult *Capillaria* sp. and each of these was surrounded by numerous eggs of the parasite, macrophages, neutrophils and lymphocytes.

Most of the findings in the present case agree with those of Ikede and Ajayi (1976, op. cit.); however, in addition we detected adult *Capillaria* sp. in histologic sections of the livers of two rats. None of the wild rodents with capillariasis showed any visible ante-mortem clinical signs of disease even though in some the liver was involved extensively.

Voucher specimens have been deposited in the U.S. National Parasite Collection (Beltsville, Maryland 20705, USA) and assigned USNM Helm. Coll. No. 78173.

Journal of Wildlife Diseases, 20(4), 1984, pp. 342–345

Elaeophora schneideri Wehr and Dickmans, 1935 in White-tailed Deer from the Edwards Plateau of Texas

Douglas D. Waid, Robert J. Warren,[1] Department of Range and Wildlife Management, Texas Tech University, Lubbock, Texas 79409, USA; **and Danny B. Pence,** Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, Texas 79430, USA

The arterial nematode, *Elaeophora schneideri*, was first reported from white-tailed deer (*Odocoileus virginianus* (Zimmermann)) in Arizona (Hibler and Adcock, 1968, J. Parasitol. 54: 1095–1098). Since then it has been recovered from this host in Florida, Georgia, Oklahoma, and South Carolina (Prestwood and Ridgeway, 1972, J. Wildl. Dis. 8: 233–236; Hibler and Prestwood, 1981, Filarial nematodes of white-tailed deer, *In* Diseases and Parasites of White-tailed Deer, Davidson et al. (eds.), Tall Timbers Res. Sta., Tallahassee, Florida, pp. 351–362). In Texas, *E. schneideri* has been recovered from white-tailed deer (Foreyt and Foreyt, 1979, J. Wildl. Dis. 15: 55–56), Barbary sheep (*Ammotrogus lervia* Pallas) (Pence and Gray, 1981, J. Wildl. Dis. 17: 49–56), mule deer (*Odocoileus hemionus hemionus* (Rafinesque)) (Pence and Gray, 1981, op. cit.), and sika deer (*Cervus nippon* Temminck) (Robinson et al., 1978, J. Wildl. Dis. 14: 137–141).

Clinical disease due to arterial worm has been noted in Barbary sheep and sika deer (Pence and Gray, 1981, op. cit.; Robinson et al., 1978, op. cit.) and white-tailed deer have been suggested as a reservoir host for the infection in Texas (Robinson et al., 1978, op. cit.). This study was initiated to determine (1) the prevalence of *E. schneideri* in white-tailed deer from the Texas Edwards Plateau and (2) the potential for

Received for publication 20 February 1984.
[1] Present address: School of Forest Resources, University of Georgia, Athens, Georgia 30602.

white-tailed deer to serve as a reservoir of *E. schneideri* for other sympatric wild and domestic ruminants in the region.

The study area was on the YO Ranch, Kerr County, Texas. The 22,400-ha ranch is surrounded by a 2.3-m deer-proof fence. Rolling topography with shallow rocky soils of limestone origin characterize the area. Precipitation averages 63.5 cm annually, occurring primarily in May and September. Woody plant communities are mixtures of various oaks (*Quercus* spp.) and juniper (*Juniperus* sp.), with *J. ashei* as the dominant woody species. The ranch is managed for several species of exotic big game, native game, and domestic livestock. White-tailed deer densities average one per 5 ha. Doe harvest has not been practiced since the 1960's. The free-ranging deer herd is considered to be in fair to good condition, but it is in competition with free-ranging herds of exotic ungulates including sika deer, axis deer (*Axis axis* (Erxleben)), fallow deer (*Dama dama* L.), Barbary sheep, and blackbuck (*Antilope cervicapra* L.) as well as Angora and Spanish goats, sheep, and longhorn cattle.

From August 1981 to August 1982, 89 adult female white-tailed deer were collected mostly incidental to other physiological and parasitological studies (Waid, 1983, Physiological indices and food habits of deer in central Texas, M.S. Thesis, Texas Tech Univ., Lubbock, Texas, 52 pp.). Approximately 15 does were collected every 2–3 mo in six collection periods by a single rifle shot to the neck. The heads were severed at the level of the first to third vertebra from 1 to 5 hr post-mortem and frozen. The cephalic arterial system was subsequently examined for adult *E. schneideri* and associated lesions. In all hosts, 10 cm or more of the distal portion of the carotid artery remained and was examined.

Nematodes were fixed in glacial acetic acid, stored in a mixture of 70% ethanol and 5% glycerine, and identified in glycerine wet mounts. Portions of carotid arteries from infected deer were fixed in 10% buffered formalin, processed by routine methods, and stained with hematoxylin and eosin or Verhoff's iodine–iron hematoxylin counterstained with Van Gieson's stain. Two similarly fixed 1-cm^2 sections of skin from the forehead of three infected deer also were sectioned and stained for routine histologic examination. Representative specimens of *E. schneideri* were deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, USA (Accession No. 77966).

Eight of 89 (9%) deer were infected with *E. schneideri*. Nematodes were recovered from the right external maxillary artery and bilaterally from the common and external carotid arteries. A single female *E. schneideri* was recovered from the coeliac artery in one of these deer. Fifteen adult nematodes (11 females, 3 males, 1 unknown gender) were recovered ($\bar{x}$ = 1.9 nematodes per infected deer). All nematodes were reproductively mature as determined by the presence of microfilariae in females and morphology and size of males (Hibler and Adcock, 1968, op. cit.). Host age ranged from 15 to >96 mo ($\bar{x}$ = 55) for all deer as determined by tooth eruption and wear (Severinghaus, 1949, J. Wildl. Manage. 13: 195–226). Age of infected deer ranged from 42 to >96 mo ($\bar{x}$ = 61). None of the deer exhibited clinical evidence of disease.

Lesions attributable to *E. schneideri* were found in a single deer that harbored one adult nematode in the right common carotid artery at the bifurcation of the occipital and external carotid arteries. There was pronounced thickening and dilatation of the common carotid artery from approximately 20 mm posterior to the junction of the external carotid and occipital arteries and rostrally through 40 mm of the external carotid artery. The external maxillary, occipital, and caudal auricular arteries were affected similarly from their

bifurcation with the external carotid artery rostrally for a distance of 3–10 mm.

The endothelial surface of the affected arteries was rough with papilliform and villous projections. Histologically, there was extensive proliferation of intimal tissue consisting of hyperplastic endothelial cells, inflammatory cells, and a connective tissue stroma. Inflammatory infiltrates predominantly consisted of neutrophils and eosinophils with occasional plasma cells, lymphocytes, fibroblasts, and extravasated erythrocytes. Intimal reactions resulted in approximately 75% occlusion of the lumen of the occipital and caudal auricular arteries at their bifurcations with the external carotid artery and 50% occlusion of the external carotid artery. In the tunica media there were areas of focal necrosis, moderate infiltrations of neutrophils, eosinophils and lymphocytes, and moderate disruption of elastic fibers. The tunica adventitia was normal except for a mild inflammatory infiltrate of neutrophils.

Microfilariae were not observed in skin from the heads of three of the deer infected with *E. schneideri*. Unfortunately, additional skin sections were not available for examination, nor were attempts made to recover microfilariae using the Baermann technique. Failure to demonstrate microfilariae may be due to the relative insensitivity of histologic techniques and/or the paucity of microfilariae in the skin of white-tailed deer. The occurrence of microfilariae in apparently patent infections from different hosts is highly variable (Kemper, 1957, J. Am. Vet. Med. Assoc. 130: 220–224; Hibler and Adcock, 1971, Elaeophorosis, *In* Parasitic Diseases of Wild Mammals, Davis and Anderson (eds.), Iowa St. Univ. Press, Ames, Iowa, 364 pp.; Robinson et al., 1978, op. cit.; Pence and Gray, 1981, op. cit.). Since microfilariae are usually recovered from patent infections in mule deer and black-tailed deer (*Odocoileus hemionus columbianus* (Richardson)), which are considered to be the usual hosts for infection (Hibler and Prestwood, 1981, op. cit.), further sampling is required to determine the true reservoir status of the white-tailed deer from this region.

The arterial lesions described above are similar to those found in Rocky Mountain elk (*Cervus elaphus nelsoni* (Erxleben)) (Hibler and Adcock, 1971, op cit.). Although thickening of arterial walls and development of arterial plaques have been reported in experimentally infected white-tailed deer (Titche, 1976, Experimental infections of white-tailed deer with *Elaeophora schneideri*, M.S. Thesis, Colorado St. Univ., Fort Collins, Colorado, 71 pp.; Titche et al., 1979, J. Wildl. Dis. 15: 273–280), this is the first report of pathologic changes in the arteries of naturally infected white-tailed deer.

The 9% prevalence of *E. schneideri* in this study is comparable to the 2–30% prevalence for white-tailed deer herds from the southeastern United States (Prestwood and Ridgeway, 1972, op. cit.). However, the actual prevalence in our study may have been higher than the observed 9% because only the cephalic arteries were examined.

Our findings of low prevalence rates in this deer population plus the presence of arterial lesions in one animal tend to support the view of Titche et al. (1979, op. cit.) and Hibler and Prestwood (1981, op. cit.) that the host–parasite relationship of white-tailed deer and *E. schneideri* is tenuous. However, our study also suggests that white-tailed deer could serve as reservoirs of elaeophoriasis for domestic and exotic ruminants on this ranch. Robinson et al. (1978, op. cit.) found infected sika deer in this region of the Edwards Plateau where this exotic is sympatric with white-tailed deer, but mule deer are absent. Pence and Gray (1981, op. cit.) considered that mule deer in the Texas Panhandle were the reservoirs of arterial worm in the Barbary

sheep occupying sympatric ranges. Although other ruminants have not been specifically examined for *E. schneideri*, there have been no documented cases of dermal filariasis or other clinical manifestations of elaeophorosis in domestic sheep or exotics on this ranch. The hypothesis that white-tailed deer are potential reservoirs of arterial worms for other species is supported since (1) *E. schneideri* is only known from North America and cases in exotic species (and perhaps domestic sheep) were acquired after their arrival in North America, (2) there are no mule deer or other more suitable hosts in the area, (3) the role of domestic sheep as reservoirs of infection in other enzootic areas (Douglas et al., 1954, Cornell Vet. 44: 252) is tenuous, and (4) the continued presence of *E. schneideri* in deer in certain areas of the southeastern United States and the work of Titche et al. (1979, op. cit.) indicates that patent infections do occur in this species. Therefore, elaeophorosis should be considered as a factor in the management of the several exotic and domestic ruminant species when they occur sympatrically with white-tailed deer in this and other regions.

We thank Charles Shreiner IV and the Shreiner family of the YO Ranch for allowing us to collect the deer examined in this study. We are also grateful to Valerie Young who performed the necropsies. The study was supported in part by the Noxious Brush and Weed Control Program, College of Agricultural Sciences, Texas Tech University, and in part by the Institute for Museum Research, The Museum of Texas Tech University. This is manuscript No. T-9-371 of the College of Agricultural Sciences, Texas Tech University, Lubbock, Texas 79409, USA.

Journal of Wildlife Diseases, 20(4), 1984, pp. 345–346

Angiostrongylus vasorum (Baillet, 1866) in Red Foxes (*Vulpes vulpes* L.) in Italy

A. Poli, M. Arispici, A. Marconcini, F. Mancianti, and D. de Monte, Dipartimento di Patologia Animale, Profilassi ed Igiene degli Alimenti, Facoltà di Medicina Veterinaria, Università di Pisa, Pisa 56100, Italy

Adults of *Angiostrongylus vasorum* inhabit the right ventricle of the heart and pulmonary arteries of domestic dogs as well as a variety of wild carnivores (Chertkova, 1962, Tr. Vses. Inst. Gel'mintol. 9: 125–126; Rosen et al., 1970, Am. J. Vet. Res. 31: 131–143; Smith and Threlfall, 1973, Am. Midl. Nat. 90: 215–218; Tarazona, 1974, An. Inst. Nac. Invest. Agrar. Ser. Hig. Sanid. Anim. 1: 161–165). In Europe the parasite has been reported only from France, Ireland and Switzerland (Prestwood et al., 1981, J. Am. Anim. Hosp. Assoc. 17: 491–497). The purpose of this paper is to record the first report of this parasite in Italy.

From January 1981 to February 1983, 180 red foxes from different areas of Tuscany were killed for purposes of rabies control. All were examined routinely and tissue impressions from the lungs were made to search for first stage nematode larvae. Representative lung lesions and other tissues were fixed in 10% buffered formalin, embedded in paraffin, sectioned

Received for publication 18 July 1983.