Dirofilaria immitis in Red Foxes (Vulpes vulpes) in an Endemic Area Near Sydney, Australia

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americana) (Thorne, 1982, Diseases of Wildlife in Wyoming, 2nd ed., Wyo. Game and Fish Dept., Cheyenne, Wyoming, 353 pp.). These abscesses were found most commonly between large muscles of the legs. The condition is not readily transmissible from one individual to another.

This is the first report of *C. pyogenes* from *B. bison*. The hepatomegaly and adhesions observed in the present case are believed to be a result of the infection. It appears as if the current case was an isolated incident with few serious implications for the health and welfare of the Delta Junction bison herd.

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The prevalence of heartworms (*Dirofilaria immitis*) in foxes has been reported in several countries (Jones and Aulerick, 1981, Bibliography of Foxes, Journal Article No. 9871, Michigan Agricultural Experiment Station, East Lansing, Michigan, USA, pp. 45–73). While there are no reports of heartworms in foxes in Australia, this parasite is endemic in dogs in many urban and semi-rural areas, particularly the east coast where prevalences may be as high as 85% (Kelly, 1978, Refresher Course on Canine Heartworm Disease, Post-Graduate Committee in Veterinary Science, University of Sydney, Sydney, Australia, Proc. No. 40, pp. 5–34). Prevalences of heartworms in foxes vary between 0% and 50% elsewhere (Hubert et al., 1980, J. Wildl. Dis. 16: 229–232), although the importance of this animal as a reservoir host of this parasite has been questioned by some authors (Kazacos and Edberg, 1979, J. Am. Vet. Med. Assoc. 175: 909–910; Otto, 1969, J. Am. Vet. Med. Assoc. 154: 370–373), based on the size of worms recovered and the absence of developing embryos within the worms. A previous suggestion that foxes may have an innate physiological resistance to *D. immitis*, based on lack of infection in 48 gray foxes (*Urocyon cinereoargenteus*) and two red foxes in a hyperenzootic area for canine heartworm (Walton, 1963, J. Parasitol. 49: 526) is yet to be substantiated.

In the present study, six of 68 (8.8%) foxes shot in the Sydney area in May and June 1982 and 1983 had *D. immitis* in their right ventricles. The proximal end of the pulmonary artery was also examined in each case but the lungs were not examined. Three hearts contained worms of both sexes (4 females and 2 males, 5 females and 1 male, and 3 females and 1 male, respectively) (South Australian Museum, Adelaide, South Australia, accession numbers V3114 and V3115). The three other infected hearts contained worms of only one sex (2 female worms, 1 female worm, and 2 male worms, respectively), most of which were in the mature size

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range for *D. immitis*. Two of the infections involving worms of both sexes were patent. Blood from one of these foxes contained large numbers of circulating microfilariae and although blood from the other fox was not examined, developing microfilariae were observed in the uterus of the female worms recovered from this animal.

By comparison, 51 of 405 (12.6%) dogs of all breeds and ages from the same locality routinely examined at the Rural Veterinary Centre of the University of Sydney for microfilariae of *D. immitis* in the 2 yr preceding July 1983, were positive.

The results indicated that heartworm infection was reasonably prevalent in red foxes living in the western fringes of Sydney, and that patent infections do occur in this species. Fecund *D. immitis* females and circulating microfilariae have been demonstrated in red foxes elsewhere (Monson et al., 1973, N.Y. Fish Game J. 20: 48–53; Stone, 1974, N.Y. Fish Game J. 21: 87) and this survey reaffirms the potential of these canids to serve as reservoir hosts of this parasite.

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Parasites of Chiroptera in Zambia

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During mist-netting operations for birds in Zambia a small number of bats was caught and examined for haematozoa and ectoparasites. Thin blood smears were prepared from peripheral blood, air-dried, fixed in 100% methanol for 3 min and stained with Giemsa's solution at a strength of 1:10 at pH 7.2 for 1 hr. Microscopical examination was carried out under 10× and 100× (oil immersion) objectives.

Of the 22 bats examined, most were caught at Balmoral (15°33′S, 28°12′E) and Copper Chalice some 8 km north. Six (37.5%) of 16 *Epomophorus gambianus parvus* Ansell (Pteropodidae) were infected with a haematozoan parasite identified as *Hepatocystis epomophori* (Rodhain) (Garnham, 1966, Malaria Parasites and other Haemosporidia, Blackwell Scientific Publications, Oxford, England, 1,114 pp.). One *Rousettus aegyptiacus leachi* (A. Smith), Pteropodidae; one ?*Nycteris woodi* Andersen, Nycteridae; one *Tadarida pumila* (Cretz.), Molossidae (from Kafue National Park); one *Pipistrellus nanus* (Peters) and two *Scotophilus viridis* (Peters), Vespertilionidae, were negative. The infected bats were caught at the Copper Chalice site between 30 March 1980 and 27 April 1980 at the end of the rainy season, indicating a vector activity associated with the rains. This confirms earlier observations reported by Garnham (1966, op. cit.). No ectoparasites were found on any *E. gambianus parvus*. A single nycteribiid, *Eucampsipoda africana* Theodor, was recovered from *Rousettus aegyptiacus leachi*, and one mite, *Spinturnix walkerae* Zumpt & Till, from *Pipistrellus nanus*.

Keymer (1971, J. Zool. (Lond.) 163: 421–441) recorded several haematozoan parasites from bats in Zambia including a parasite tentatively identified as *H. epo-*

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