

Research Note

***Dirofilaria immitis* Infection in a Japanese Weasel, *Mustela itatsi***

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The canine heartworm, *Dirofilaria immitis* (Leidy, 1856), is a parasitic nematode with cosmopolitan distribution. Although the main hosts are carnivores, primarily dogs and wild Canidae, a number of other species of mammals, including man, have been also reported to be infected with this nematode (Bever and Orihel, 1965; Levin, 1968; Ciferri, 1982; Soulosby, 1982; Narushima *et al.*, 1984; Yoshimura and Akao, 1985). However, spontaneous parasitism with this nematode in Mustelidae is encountered extremely rare in the literatures. In Japan, naturally-infected one mink (*Mustela vison*) and one ferret (*M. putorius furo*) had been noticed (Ohishi, 1986). To date, however, the Japanese weasel, *Mustela itatsi*, has not been reported to be infected with *D. immitis*. We reported here the first case of *D. immitis* infection in a Japanese weasel.

A male adult weasel, 295 g in body weight, was captured in Towada-shi, Aomori Prefecture, and necropsied in January, 1995. The animal was one of 45 weasels collected for the parasitological survey in eastern Aomori Prefecture during the shooting seasons from 1982 to 1996. At necropsy, a live filarial-form nematode was recovered from the right ventricle (Fig. 1). The worm was washed with physiological saline, fixed with 10% hot formalin, and then mounted in lactophenol for taxonomical identification. For histological examination, tissues

of the heart, lung, and kidneys were fixed with 10% buffered formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin. Morphological studies were performed using a light microscope and a micrometer.

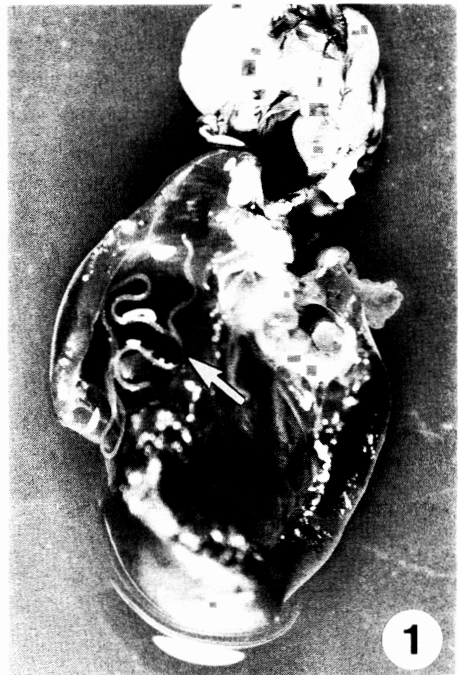


Fig. 1 Heart of a Japanese weasel, showing a female young adult of *Dirofilaria immitis* (arrow) in the right ventricle.

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Taxonomically, the worm was identified as a female young adult of *D. immitis*. The body was slender, string-like, 72.0 mm in length and 320  $\mu\text{m}$

in width and white in color, and had the cuticle provided with fine transverse striations. The anterior end of worm was bluntly rounded and had 4

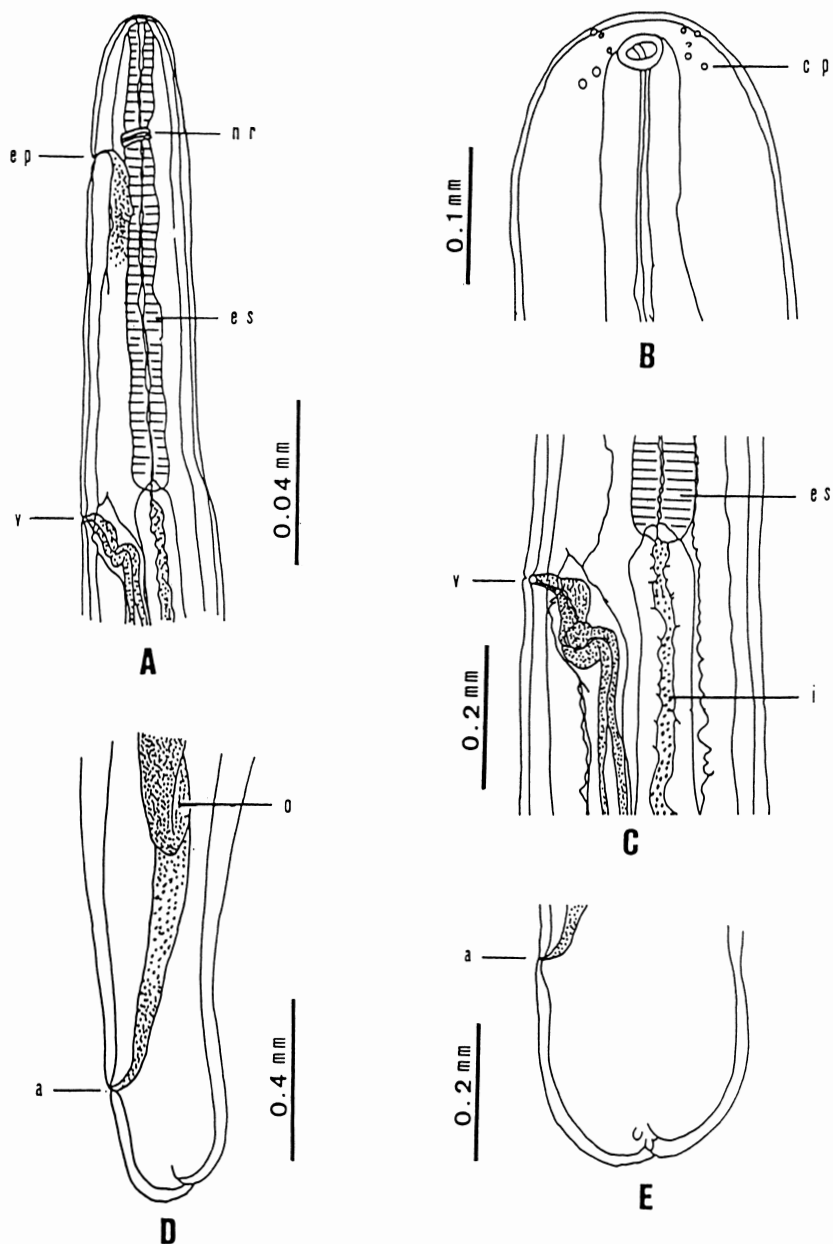


Fig. 2 Parasitic female young adult of *Dirofilaria immitis* recovered from a Japanese weasel. A and B: Anterior portion, lateral view (A), latero-apical view (B). C: Vulva, lateral view. D and E: Posterior portion, lateral view (D), tip of the tail, lateral view (E).

a: anus, cp: cephalic papillae, ep: excretory pore, es: esophagus, i: intestine, nr: nerve ring, o: ovary, v: vulva.

pairs of the small cephalic papillae and the small mouth without lips (Fig. 2). The esophagus was short, stub-like in shape with 1,100  $\mu\text{m}$  in length. The nerve ring and excretory pore were located 260  $\mu\text{m}$  and 320  $\mu\text{m}$  from the anterior end, respectively. The vulva was situated near the posterior extremity of the esophagus, and was located 1,180  $\mu\text{m}$  from the anterior end. The female genitalia were relatively developed, but no microfilaria was observed in the uterus. The tail was straight, the anus was located 142  $\mu\text{m}$  from the posterior end. The tip of the tail was bluntly rounded and has no terminal hook or papillae, although one pair of phasmid was recognizable.

By histopathological examination, a slight degree of edema with macrophages infiltration and unorganized thrombus in the right endocardium and tricuspid valves were observed. In addition, large to small-sized pulmonary arteries with thickened wall showed moderate chronic endarteritis which was characterized by hyperplasia of fibroblastic cells, lining endothelial cells, periarterial infiltration with lymphocytes, macrophages and eosinophiles.

The worm obtained from the present weasel was immature, and the features and measurements were similar to those of the developmental stage of female *D. immitis* recovered from infected dogs 85 to 120 days after inoculation (Orihel, 1961). The histological changes of endocardium and pulmonary arteries observed in the present weasel were not so pronounced, although the changes coincided essentially with those descriptions of the dirofilariasis in dogs reported by previous authors (Adcock, 1961; Tulloch *et al.*, 1970). These findings might be related to the infection with only single worm of young adult *D. immitis*. From these results, it seems that Japanese weasel is susceptible to this nematode, and the worm is the cause of pathogenic changes as in the case of ferret.

*D. immitis* infection in ferrets have been reported both in experimental infections and in natural infections in the United States (Campbell and Blair, 1978; 1979). However, the ferret is not considered a good reservoir host for *D. immitis*, because the ferret can tolerate only a few adult worms in the heart and circulating microfilariae are rarely seen in this animal (Miller and Merton, 1982; Parrot *et al.*, 1984).

In eastern Aomori Prefecture, it seems that the

incidence of *D. immitis* infection in dogs is evidently increasing, because the infection rate showed a rise from 13.3% in 1971 to 33.0% in 1994 (unpublished data). Recently, we also found a case of pulmonary dirofilariasis in a Japanese hare (*Lepus brachyurus anguistidens*) captured in Hashikami-machi near by Towada city (Oyamada *et al.*, 1995). Thus, the weasel reported here is the second case of *D. immitis* infection in wild animal species from eastern Aomori Prefecture. Much additional data are needed to determine whether the infection with *D. immitis* in wild animals and dogs are epizootic or not, and to define the weasel's role in the transmission of natural infection among the animals.

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