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Research Note

The Gullet Nematode, *Gongylonema pulchrum* from Sika Deer, *Cervus nippon* in Hyogo Prefecture, Japan

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Key words: *Gongylonema pulchrum*, sika deer, *Cervus nippon*, Japan

The gullet nematode, *Gongylonema pulchrum* Molin, 1857, has been found from various hosts, including wild and domestic mammals (Baylis, 1925; Cappucci *et al.*, 1982; Davidson *et al.*, 1987; Lichtenfels, 1971; Prestwood *et al.*, 1970; Skrjabin *et al.*, 1967). Recently in Japan, this worm has been obtained from cattle in Hokkaido and Tohoku regions (Kudo *et al.*, 1992; Suzuki *et al.*, 1992b), but in Japanese wild mammals, this species has been reported only from Japanese macaque, *Macaca fuscata* in Kyushu (Uni *et al.*, 1992). However, Kitamura (1992) has found a few *Gongylonema* sp. from sika deer in Hokkaido, *Cervus nippon yesoensis*. In this paper, we report on the *G. pulchrum* recovered from sika deer in Honshu, *Cervus nippon centralis* Kishida, 1936 shot in Hyogo Prefecture in the Western region of Honshu, Japan.

The sika deer in this study were shot in Wadayama, Asago and Santo in the central area of Hyogo Prefecture from February 29 to March 15 in 1992. Ten cervical and 23 thoracic esophagi of 25 deer were examined macroscopically. More than 100 nematodes were recovered from 2 cervical and 6 thoracic esophagi. These worms were fixed in 10% formalin, cleared in lactophenol solution and observed using camera lucida. Some regions of the tissues parasitized by this worm were fixed in 10% formalin and examined histopathologically using H-E stain.

The worms and their traces were found in the mucosa of the cervical and thoracic esophagi, showing characteristic serpentine features.

The anterior end of the worm is covered with cuticular bosses or tubercles, arranged for the most part in rather irregular longitudinal rows. There are a pair of lateral cervical papillae and two relatively broad lateral cervical alae. The caudal end of the male spirally twisted is with somewhat asymmetrical lateral alae, and with 4–6 and 4–5 pairs of preanal and postanal papillae, respectively. The left spicule is very long and slender, whereas the right spicule is short and broad. The tail of the female is bluntly conical. The vulva is slightly prominent at the level anterior to anus, with a long vagina which runs anteriorly to near the middle of the body. The eggs are oval in shape and embryonated in the uteri.

The measurements of the adult worms are as follows, in mm; mean±SD (min.–max.).

Male (20 specimens): Total length 31.66±5.97 (20.00–41.86) and maximum width 0.177±0.020 (0.142–0.208). Nerve ring, excretory pore and cervical lateral papillae 0.265±0.019 (0.233–0.288), 0.433±0.037 (0.381–0.526) and 0.121±0.012 (0.083–0.142) from anterior end, respectively. Pharynx

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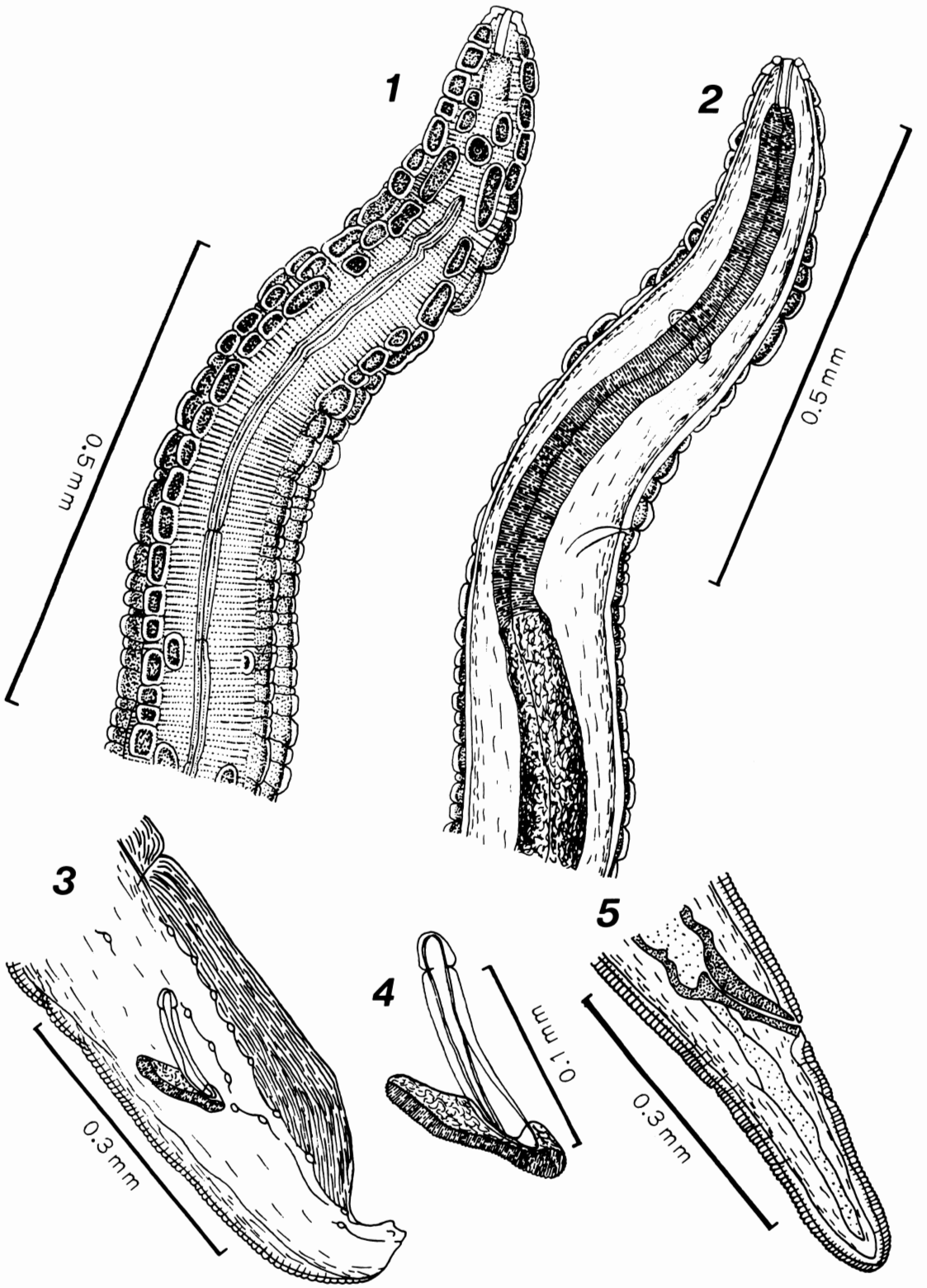
Figs. 1–5 *Gongylonema pulchrum* obtained from sika deer in Hyogo Prefecture, Japan.
Figs. 1 and 2 Anterior end of female, lateral view.
Fig. 3 Posterior end of male, lateroventral view.
Fig. 4 Right spicule and gubernaculum.
Fig. 5 Posterior end of female, lateral view.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0.044±0.004 (0.036–0.052) long. Esophagus 5.07±0.45 (4.27–5.83) long; muscular and grandular portions, 0.498±0.053 (0.403–0.619) and 4.57±0.42 (3.82–5.23) long, respectively. Right and left spicules 0.115±0.013 (0.102–0.144), and 10.83±1.80 (6.48–13.27) long, and gubernaculum 0.092±0.007 (0.083–0.114) long.

Female (20 specimens): Total length 55.45±11.35 (32.92–79.50) and maximum width 0.229±0.026 (0.195–0.282). Nerve ring, excretory pore and cervical lateral papillae 0.295±0.027 (0.244–0.362), 0.508±0.057 (0.424–0.606) and 0.133±0.017 (0.106–0.166) from anterior end, respectively. Pharynx 0.047±0.005 (0.038–0.056) long. Esophagus 6.28±0.41 (5.33–7.03) long; muscular and glandular portions 0.609±0.062 (0.475–0.713) and 5.67±0.37 (4.85–6.32) long. Vulva and anus 2.86±0.53 (1.84–3.91) and 0.254±0.039 (0.211–0.383), from posterior end. Eggs 0.060±0.002 (0.059–0.065) by 0.035±0.001 (0.034–0.038).

Microscopically, the worms were always found intraepithelially, in the lacunae formed by the worm invasion. Slight infiltration of eosinophils was sometimes observed in the lamina propria, but not in the epithelium.

This species has been found in some cervids including fallow deer *Cervus dama*, red deer *C. elaphus*, samber deer *C. unicolor*, white-tailed deer *Odocoileus virginianus* and *Odocoileus* sp. (Baylis, 1925; Davidson *et al.*, 1987; Lichtenfels, 1971; Prestwood *et al.*, 1970; Skrjabin *et al.*, 1967). Kitamura (1992) has obtained *Gongylonema* sp. from sika deer in Hokkaido, Japan, but its identification was only on the generic level. Therefore, this paper is the first case report on the infection of *G. pulchrum* in sika deer. The present data of measurements are in general smaller than those of this nematode obtained from cattle in Japan (Kudo *et al.*, 1992; Suzuki *et al.*, 1992b). But the size of this nematode has been known to vary considerably according to the host species in which it was found (Baylis, 1925) and a quantitative analysis of these relative measurements has been proposed to be useful to identify the species of this genus (Lichtenfels, 1971).

The prevalence and intensity of the present worms are shown in Table 1. No fawn harboured this nematode; this is also the case with cattle in Japan

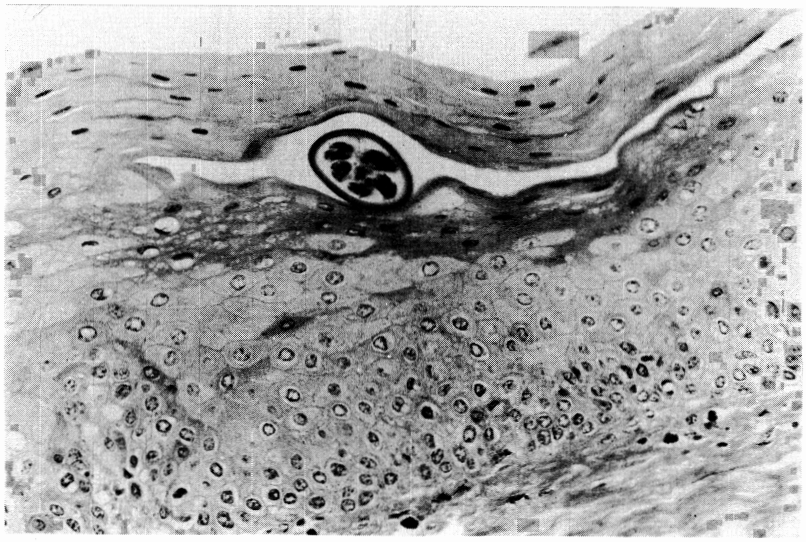

Fig. 6 Cross section of *G. pulchrum* in the midzone of the epithelium of esophagus of sika deer. (×300)

Table 1 Prevalence and intensity of *Gongylonema pulchrum* in sika deer from three localities in Hyogo Prefecture, Japan

Locality	Sex of hosts	Age of hosts	Prevalence		Intensity	
			CE*	TE†	CE	TE
Wadayama	male	0	not exam.	0/1 (0.0)‡	not exam.	–
	female	≧1	0/1 (0.0)	1/3 (33.3)	–	1–11
Asago	male	0	0/2 (0.0)	0/3 (0.0)	–	–
	female	0	0/2 (0.0)	0/4 (0.0)	–	–
	female	≧1	2/4 (50.0)	0/5 (0.0)	1, 2	–
Santo	female	0	not exam.	0/2 (0.0)	not exam.	–
	female	≧1	0/1 (0.0)	5/5 (100.0)	–	6–68

*CE: cervical esophagus; †TE: thoracic esophagus.
‡Number of positive hosts / number of deer examined (%).

(Kudo *et al.*, 1992; Suzuki *et al.*, 1992b) and white-tailed deer in USA (Prestwood *et al.*, 1970), though adult male deer were not examined in the present study.

The prevalence and intensity of *G. pulchrum* was higher in Santo than in Wadayama and Asago (see Table 1). In Santo, there are some dairy farms which may be a potential source of infection of *G. pulchrum* to the deer, while the present hunting locations in Santo are not always near these farms (Dr. T. Koizumi, per. com.). The present findings may suggest the potential importance of wild sika deer and domestic cattle as mutual reservoir of *G. pulchrum*.

The local population of sika deer in this study has shown high reproductive performance, i.e. puberty occurred in most yearlings and the pregnancy rate of yearlings and older females was calculated to be over 90% (Suzuki *et al.*, 1992a). This tendency was common to the deer in the 3 localities (T. Koizumi, per. comm.), in spite of such intensive differences of the *G. pulchrum* infection. Therefore, we consider that this worm has apparently little influence on the reproduction of the present sika deer.

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