A New Host Record of *Camelostrongylus mentulatus* (Nematoda; Trichostrongyloidea) from Abomasum of a Giraffe at a Zoo in Japan

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ABSTRACT. *Camelostrongylus mentulatus* (Railliet et Henry, 1909) Orloff, 1933 (Nematoda; Trichostrongyloidea) was found from the abomasum of a three-year-old female cape giraffe, *Giraffa camelopardalis giraffa*, born and died in a zoo park in Yamaguchi prefecture, Japan. This is the new host record from Giraffidae and geographical distribution of *C. mentulatus*. Present case of *C. mentulatus* might be infected from other ruminants, e.g., camels, antelopes and goats, kept at a same paddock in the zoo. Risk of imported parasitic diseases by the zoo animals from outside of Japan is discussed. — **KEY WORDS:** *Camelostrongylus mentulatus*, *Giraffa camelopardalis*, zoo animal.

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On November, 1989, a 3-year-old female cape giraffe, *Giraffa camelopardalis giraffa*, was died by severe chronic malnutrition and liver fibrosis at the Akiyoshidai Safari Land, Yamaguchi prefecture, Japan. Trichostrongylid nematodes were obtained from the abomasum at autopsy. The nematodes were examined parasitologically.

Description of parasite; *Camelostrongylus mentulatus* (Railliet et Henry, 1909) Orloff, 1933 (Nematoda; Trichostrongyloidea). [Figs. 1–7]

Host; *Giraffa camelopardalis giraffa*.

Habitat in the host; Abomasum.

Geographical distribution; Yamaguchi prefecture, Japan.

Synlophe; Longitudinal cuticular ridges about 0.1 mm from the head end and showing open pattern. Number of ridges on the cross section of body 40, 43 and 45 in one male, and 36, 54 and 43 in a female at anterior region (esophago-intestinal junction level), midbody and posterior region (prebursal papillae level in male and between near the end of ovarian tube level in female), respectively. Ridges almost parallel and increasing in number posteriorly. Ventral and dorsal ridges disappear from the proximal level of spicules in males. Number of ridges gradually decreasing from the post vulval opening region in females.

Male (N=7; measurements in mm); Body length 7.9–8.9 (mean 8.31). Maximum width at the in front of the bursa, 1.09–0.156 (0.130). Esophagus 0.635–0.996 (0.860) in length. Nerve ring, excretory pore and cervical papillae 0.248–0.317 (0.277), 0.313–0.398 (3.50) and 0.277–0.325 (0.317), from the anterior extremity, respectively. Bursa copulatory almost symmetrical. Prebursal papillae present [Fig. 2]. Spicules almost equal in length, right 0.536–0.753 (0.662) and left 0.565–0.766 (0.678), respectively, and bifurcated at their distal end. Spicules run closely tight each other for their 1/2 to 2/3 length in distal side [Fig. 2]. Spicules well ornamented with numerous fine and minute branchings in the ventral side and comb-like appearance [Fig. 3]. Arrangement of ventral and lateral rays is 2–2–1 type [7]. Accessory membrane with paired “J”-shaped “7” papillae [Fig. 4]. Dorsal ray small in a small dorsal lobe [Fig. 5], with paired short branches from main trunk and

each of which divides again.

Female (N=4) [Figs. 6, 7]; Body length 9.6–12.5 (11.35). Maximum width at the vulval region, 0.085–0.109 (0.096). Esophagus 0.839–1.008 (0.911) in length. Distance from the head end to nerve ring, excretory pore and cervical papillae is 0.209–0.302 (0.250), 0.323–0.586 (0.459) and 0.248–0.323 (0.278), respectively. Distance from tail end to vulva and anus 1.29–1.47 (1.371) [Fig. 7] and 0.183–0.225 (0.202) [Fig. 7], respectively. Genitalium amphidelphic, number of eggs in uteri 10–34 (20.5). Size of eggs in uteri 0.063–0.081 (0.071) by 0.032–0.045 (0.040).

C. mentulatus is a member of trichostrongylid nematode, belonging to the subfamily Ostertagiinae, family Trichostrongylidae and superfamily Trichostrongyloidea [7–9, 12]. *C. mentulatus* is reported from many domesticated and wild ruminants in the world. The host families are spread widely ruminants, e.g., Bovidae; cattle, sheep, goat and antelopes (*Gazella thomsoni*, *Saiga saiga*, *Antelope cervicapra* and *Oryx gazella*) [13, 22], Camellidae; camels [*Camelus dromedarius* and *C. ferus* (= *C. bactrianus*)] [3, 4], *Lama glama*, *L. pacos* and *Vicugna vicugna* [11], and Cervidae; *Cervus elaphus* [14]. Cape giraffe (Giraffidae) is the first host record and also Japan is the first geographical record.

The giraffe was born at the present zoo (her parents were imported from outside of Japan) and has been kept with other ruminants at a same paddock, i.e., *Ammotragus lervia*, *Ovis musimon*, *Connochaetes taurinus*, *Orix dammah*, *Camelus dromedarius*, *C. ferus*, *Cervus elaphus* and *C. dama*. Among these ruminants, *C. mentulatus* was reported from *Camelus* spp. [1–4, 13, 16, 18, 19, 21] and *Cervus elaphus* in Spain [14]. *C. mentulatus* has not been reported in eastern Asia including the Far East, and seemed to be absent in native ruminants of Japan. The infection might be occurred from other ruminants kept in the same paddock of the zoo, because these ruminants are originally imported from abroad and/or bred in Japan. It is possible that such ruminants population might be maintaining *M. mentulatus*.

Severe pathogenicity by *C. mentulatus* infection is reported not only in domestic cattle, sheep and camel [1, 2,

Figs. 1–7. *Camelostrongylus mentulatus* (Railliet et Henry, 1909) Orloff, 1933. 1. Anterior extremity of a male. 2. Caudal end of a male, ventral view. 3. Spicules ornamented with fine and minute branchings. 4. Accessory membrane with double J-shape branches. 5. Dorsal ray. 6. Ovejectors of a female. 7. Tail end of a female. (Scale bars: 0.1 mm in Figs. 1, 6 and 7; 0.05 mm in Fig. 2; 0.02 mm in Figs. 3–5).

4–6, 15, 16, 18–21], but also in *Camelus dromedarius* [3], *Antilope cervicapra* [22], *Capra aegagrus* [13] and *Gazella thomsoni* [17] kept in zoo.

Living wild animals imported from out of Japan are not strictly inspected helminth infection, in particular, nematode parasites. Most of the trichostrongylid nematodes, although, are harmful for ungulates animals, their prevalence in zoo animals not paid attention in Japan. *C. mentulatus* is able to infect to domesticated and wild ruminants in Japan, such as cattle or sheep, and also *Cervus nippon* (Cervidae). Examination and eradication for gastro-intestinal nematodes should be carried on the newly imported zoo animals from out of Japan.

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