Occurrence of *Camallanus trispinosus* in a captive Indian star tortoise (*Geochelone elegans*)

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Abstract Camallanoids are spirurid round worms known to occur in stomach and intestine of lower vertebrate animals such as fishes and reptiles. This paper records the occurrence of *Camallanus trispinosus* in a captive Indian star tortoise of Guindy snake park, Chennai, India for the first time during necropsy and identified on the basis of morphology of male and female worms, including eggs.

Keywords *Camallanus trispinosus* · Tortoise · *Geochelone elegans* · India

Tortoises are reptiles belong to the order Chelonia. The Indian star tortoise *Geochelone elegans* is found in many zoos and is one of the most favourite of private pet collectors and hobbyists throughout the world (Vyas 2006). There are several internal and external parasites that can cause severe diseases including death in tortoises (Holt et al. 1979; Rideout et al. 1987; Satorhelyi and Sreter 1993). Genus *Camallanus* belonging to family Camallanidae consists of many species of parasitic round worms commonly occurring in fishes all over the world. Some species were reported to be occurring in chelonians such as turtles (Yamaguti 1961). The larval stages are found in wide range of crustacean intermediate hosts viz., copepods, cray fishes and cyclops (Anderson 2000). Platt (1977) and Baker (2007) reported this species of nematodes in stomach and duodenal walls of turtle

in north western Ohio (USA). However occurrence of camallanoids in tortoise was not documented from India and other countries. This is first report of *Camallanus trispinosus* in captive Indian star tortoise.

The chelonian unit of snake park, Guindy, Chennai, India maintains various species of turtles and tortoises. The Indian star tortoise *G. elegans* with radiating star pattern on its carapace is very attractive and hence maintained here for attracting tourists. A dead star tortoise was referred to Department of Wild Life Sciences, Madras Veterinary College, Chennai, India for detailed investigation. During necropsy, plenty of worms were recovered from the stomach and duodenum. These were subsequently referred to Department of Veterinary Parasitology for identification. The worms were processed and identified based on morphological characteristics (Yamaguti 1961; Baker 2007).

Stomach and duodenum of the tortoise revealed ulceration. Plenty of worms, appeared light grey colour with filiform body were recovered. The male worms were 10–15 mm long and female worms were 15–20 mm long. The mouth was slit like and buccal capsule was consisting of two lateral chitinous valves with characteristic longitudinal rib like thickenings internally (Fig. 1a). A chitinous ring at the junction of valves and oesophagus was present. The esophagus had short anterior muscular portion and long posterior glandular portion enlarged posteriorly. The posterior end of male was rolled ventrally and had small caudal alae. Seven pairs of precloacal papillae and number of post-anal papillae were present. The spicules were unequal and dissimilar without gubernaculum (Fig. 1b). The vulva of female worms situated about middle of the body and covered with flower like structures (Fig. 1c). Tail end of female was straight and sharp with alae (Fig. 1d). The eggs were thin shelled containing larvae with size of 44–66 by 22–29 µm (Fig. 1e). Based on the morphological findings, the worms were identified as *C. trispinosus*.

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Fig. 1 Plate **a** Head end of *Camallanus trispinosus* showing buccal valve with characteristic longitudinal rib like thickenings and chitinous ring, **b** Tail end of male showing dissimilar unequal spicules and lot of papillae, **c** Middle of the female worms showing vulva surrounded by flower like outgrowth, **d** Sharp female tail end, **e** The oval shape thin shelled larvated egg

Among the 150 species of *Camallanus*, 110 species were reported in fishes while remaining 40 species in amphibians and turtles (Anderson 2000). *C. trispinosus* was previously reported as common species in turtles (Platt 1977). Baker (2007) reported 87–100 percent prevalence for this worms in wild turtles in USA. These parasites were also reported from fresh water turtles (Roca et al. 2007). Though tortoises are also belonging to chelonians, they are commonly affected with nematodes belonging to ascarididae and oxyuridae all over the world (Keymer 1978). However incidence of camallanoids in tortoise was not reported elsewhere except in European pond tortoise, *Emys orbicularis* (Rataj et al. 2011). Indian star tortoises were also commonly affected with ascarid and oxyurid round worms (Nathanael et al. 2004). In the present case, the infection of *C. trispinosus* in a captive Indian star tortoise, *G. elegans* is reported for the first time.

The tortoises and turtles have been maintained very closely in different ponds in Chennai Snake Park. Thus there is possibility of co-adaptation and co-evolution among species of two ancient parasite–host groups (Roca et al. 2007). *C. trispinosus* was reported to be deeply embedded in the stomach and duodenal wall with ulceration and abscess formation in turtles (Baker 2007). The worms formed ulceration only in the duodenum of Indian star tortoise in the present report.

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