

## Nematode parasites of the slender loris, *Loris tardigradus*

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**Abstract.** Occurrence of *Physaloptera* Rud. 1819 (Syn. *Chlamydonema* sp.) and *Subulura* Molin 1860 (Syn. *Allodapa* sp.) in the slender Loris, *Loris tardigradus*, was not known thus far and this paper reports the occurrence of these two parasites. There was a 35.7% occurrence of *Physaloptera masoodi* in the stomach and a 100% occurrence of *Subulura indica* in the large intestine and the vermiform appendix of 14 animals studied. While *Physaloptera masoodi* developed in the stomach, the *Subulura indica* did in the appendix. Data on the size and the dimensions of these parasites are tabulated and nematode parasites in the loris and their pathogenicity to the host are discussed.

**Keywords.** *Physaloptera masoodi*; *Subulura indica*; nematode parasites.

### 1. Introduction

Importance of non-human primate research is much appreciated in recent years both in relation to studies on parasitization with reference to zoonotics as also in the conservation of host species. Parasites of macaques, baboons and chimpanzees have been studied at length (Stiles and Hassall 1929; Myers and Kuntz 1965 and 1972), but there is hardly any information on prosimian parasites. Since the distribution of slender loris is restricted to Africa and South India where it is also on the decline (Seshadri 1969), studies on its biology and diseases are important in its conservation. Khera (1954) reported 9 species of *Subulura* from primates and described a new species *S. indica* from a loris, (Stenops) *Lydekkerianus* (Caabr) based on observations of worms from a single animal. No detailed study of the incidence or the parasitization in different parts of digestive tract in the loris has been made. Moreover, since several animals housed in our laboratory died apparently of parasitic infestation and more than one species of nematode parasite were encountered, contrary to Khera's report, the present investigation was undertaken.

### 2. Materials and methods

Viscera of 14 animals were individually fixed in Bouin's fluid and examined for the occurrence of parasites. Different parts of the digestive tract were slit and the contents together with mucous coat scrapings were flushed out with normal saline into

separate bowls. The visible worms were separated and the sediment of washing was observed under the stereomicroscope for the presence of cysts and immature worms as described by Myers (1970).

Six worms from stomachs of 5 animals and 2457 from large intestines of 14 animals were found. Small intestine and other visceral organs were free from worms. The worms were identified and the occurrence of males, females and immature were tabulated (table 1).

### 3. Observations

#### 3.1. *Nematodes from stomach*

5 out of 14 animals had 6 worms in stomach region constituting 35.7% occurrence. The worms were identified as nematodes belonging to the genus *Physaloptern* Rud. 1819 (Syn. *Chlamydonema* Hegt. 1910) based on Yorke and Maplestone (1962) and Yamaguti (1961). These were large worms of a light yellow colour visible to the naked eye. They were free in the lumen and had a straight anterior end and a hooked posterior one (figures 1-4). The anterior end held 2 large, simple and trifoliate lips with distinct demarcations. The oesophageal bulb was distinct and the cuticle was thick and smooth without distinct annulations. At the oesophageal level, it was provided with a pair of minute cervical papillae about 518  $\mu$  behind the anterior end. The nerve ring was distinct and placed at a distance of 330-345 (338)  $\mu$  from the anterior end and about 180  $\mu$  to the front of cervical papillae. Measurements of other regions have been tabulated (table 2).

**Table 1.** Incidence of nematode parasites in the slender loris. *L. tardigradus*.

	No. of animals investigated	No. of animals infested	Male	Female	Immature
<i>P. masoodi</i> in stomach	14	5	1	4	1
<i>S. indica</i> in large intestine	14	14	755	1305	397

**Table 2.** Morphometric data of *P. masoodi* from *L. tardigradus* (Number in parenthesis denotes the number of worms obtained).

	Female (2)	Male (4)	Mean $\pm$ SD
1. Body length (mm)	18	16	$\pm 4$
2. Body width (mm)	6	5	$\pm 2$
3. Oral papilla ( $\mu$ )	12	10	
4. Mouth collar length ( $\mu$ )	203	183	$\pm 16$
5. Mouth collar thickness ( $\mu$ )	43	40	$\pm 4$
6. Buccal tubule depth ( $\mu$ )	476	437	$\pm 23$
7. Oesophagus length ( $\mu$ )	4121	3963	$\pm 324$
8. Length of oesophagus: Anterior muscular region ( $\mu$ )	3315	2930	$\pm 292$
9. Length of oesophagus: Posterior glandular region ( $\mu$ )	1236	1033	$\pm 186$
10. Cervical papilla ( $\mu$ )	526	518	$\pm 7$

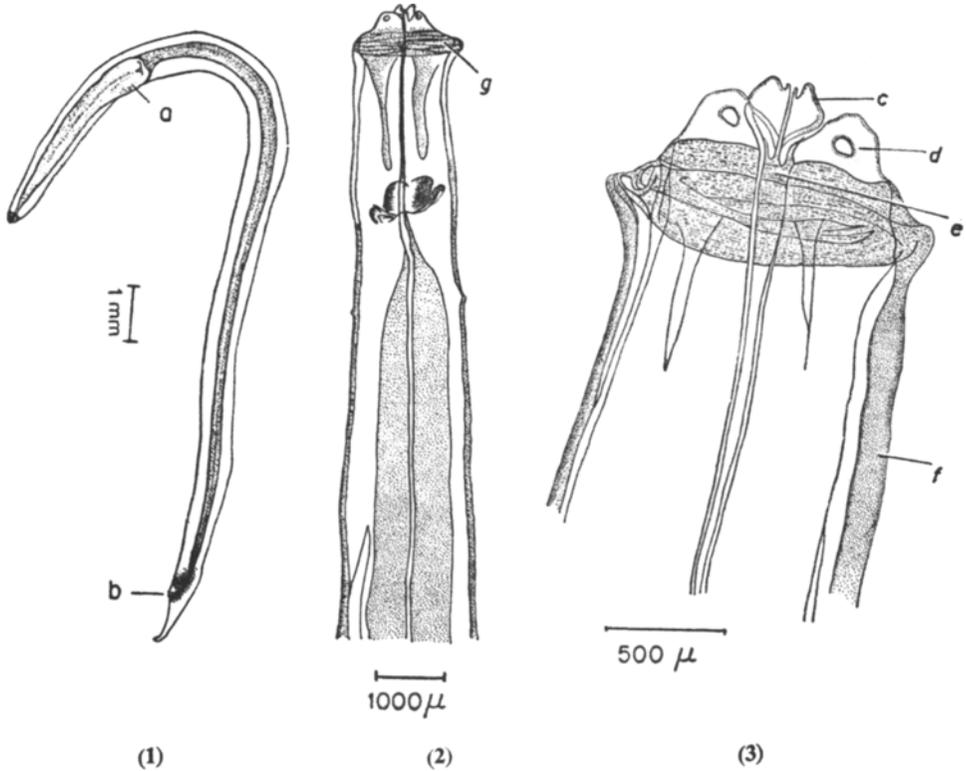


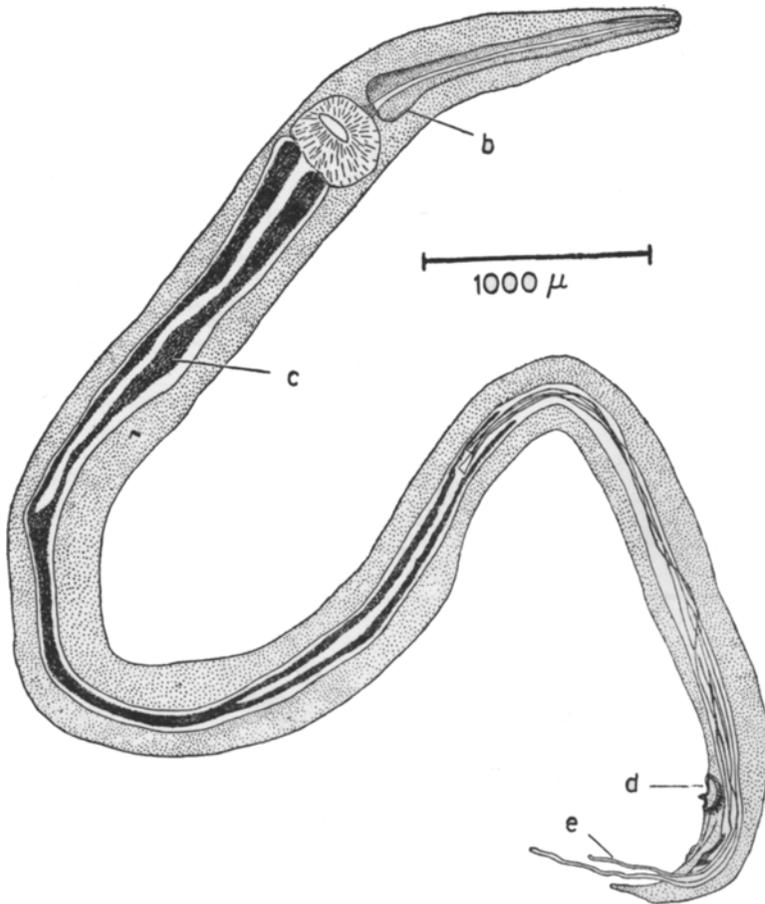
Figure 1-3. 1. Camera lucida drawing of *P. masoodi* from *L. tardigradus*. (a) Oesophageal bulb. (b) Precloacal sucker. 2. *P. masoodi* head end under low power (g) nerve ring. 3. *P. masoodi* head end enlarged. (c) trifoliate lip. (d) lateral compartment. (e) middle compartment. (q) cuticle.



Figure 4. *P. masoodi* tail end enlarged. (q) precloacal sucker.

### 3.2. Nematodes from large intestine

There was a 100% occurrence of worms in large intestine and vermiform appendix which belonged to genus *Subulura* Molin 1860 (Syn. *Allodapa*, Diesing 1861) as identified (figures 5-6) by the key of Yorke and Maplestone (1962) and Yamaguti (1961). Maximum number of worms in one animal was 354 and minimum 3. 7 out of 14 vermiform appendixes were literally studded with worms, more so at the apex and held very little and semisolid faecal matter. The number of worms in these 7 appendixes as against those in large intestines (appearing in parentheses) was 300 (54); 212 (6); 300 (13); 150 (7); 99 (10); 119 (2); and 77 (29). Both in appendix and large intestine, the worms were located in the lumen and immature ones amidst the faecal mass. The ratio of male to female to immature worms procured from both large intestine and appendix of the animals studied was 30.8; 53.1; 16.1. The males possessed twisted tail ends which in a few cases assumed the semilunar curve. 10 to 15% of males obtained had extruded spicules. Each structural measurement for



**Figure 5.** Camera lucida drawing of *S. indica* from *L. tardigradus*. (b) Oesophagus. (c) uterus. (d) precloacal sucker. (e) spicule.

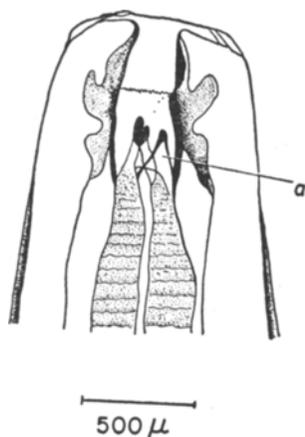


Figure 6. *S. indica* head and enlarged. (a) tooth.

Table 3. Morphometric data of male, female and immature worms of *S. indica* from *L. tardigradus* (values are on the average in micra of 202 worms).

	Immature worm	Male worm	Female worm
1. Body length	4312	8016	10928
2. Body width	222	362	387
3. Vestibular length	52	79	87
4. Vestibular diameter	23	30	31
5. Vestibular thickness	—	6.6	6.6
6. Tooth size	20	32	34
7. Oesophageal length	957	1523	1704
8. Oesophageal bulb length	185	278	305
9. Oesophageal bulb diameter	164	277	296
10. Width of prebulbular swelling	97	163	166
11. Length of intestine	3043	6237	7897
12. Width of intestine	128	191	222
13. Position of rectum from anterior end	4034	7767	9930
14. Rectum length	124	188	243
15. Tail length	233	406	664
16. Precloacal sucker diameter	—	106	—
17. Precloacal sucker length	—	37	—
18. Position of Vulva from anterior end	3075	—	5067
19. Vagina length	100	—	145
20. Length of Uterus (Extension within body)	—	—	7846
21. Position of uterus from anterior end	—	—	1895
22. Position of uterus from posterior end	—	—	1065
23. Egg size	—	—	62 × 56
24. Length of Spicule (Right)	2175	3227	—
25. Length of Spicule (Left)	—	3155	—

male, female and immature worm is given on the average in table 3, although there were individually considerable variations in the dimension.

#### 4. Discussion

Nematode worms *Physaloptera masoodi* and *Subulura indica* obviously infect the slender loris in large numbers. The vermiform appendix contained a major number of *S. indica* in different stages of development as well as adults, while the large intestine

exclusively housed adult worms, suggesting appendix as the site suitable for the development. As the immature worms and the adults were entangled in faeces and in the lumen, it was apparent that these worms were lumen dwellers as *P. masoodi* which lived and developed within the confines of stomach.

In reviewing the taxonomy of *Subulura*, Khera (1954) stated that the worm that he procured from the loris had a chitinized vestibule and therefore designated it as a new species *Subulura indica* without any explanation as to the nature and the extent of chitinization. The characteristics of the worms collected by us however conformed with the ones described for *Allodapa* Diesing (1861). The presence of *Physaloptera* Rud. 1819 in the slender loris has not been reported by Khera. *P. masoodi* is known to infest *Felis chaus* (Mirza 1934).

As 90% lorises that died in the captivity had a heavy infestation of *Subulura indica* and as the autopsy did not reveal any detectable cause of death, it is presumed that such infestation was fatal to them.

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