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Morphology of *Parapharyngodon japonicus* Houttuyn (1782) (Nematoda) Infecting *Agama stellio* from Desert Lands at South Sinai, Egypt

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Abstract: The nematodes or roundworms constitute the phylum Nematoda. They are a diverse animal phylum inhabiting a very broad range of environments. Nematode species can be difficult to distinguishand although over 25,000 have been described of which more than half are parasitic, the total number of nematode species has been estimated to be about 1 million.The present study is considered as a first description of some nematode endoparasites during a recent survey carried out on some reptiles collected from desert lands at south Sinai, Egypt. Fourteen out of 27(51.85%) of the examined *Agama stellio*were found to be infected by nematode parasites. Light microscopy revealed that this nematode is characterized by the presence of prominent annulations started just behind the cephalic extremity and continued to anus with moderate sexual dimorphism. Triangular oral opening was surrounded by oral lips. Females with conical tail terminated in short, stiff spike. No male specimens were recovered, only females. Female length was 1.81-3.20 mm (2.47 ± 0.2) without lateral alae. Width at vulva was 0.31-0.70 mm (0.47 ± 0.02). Esophagus was 0.26-0.32 mm (0.29 ± 0.02), bulb length was 0.075- 0.095 mm (0.089 ± 0.02). Eggs were in ovijector at pronucleus stage of development. Uterus extended to posterior end of the body cavity, then flexed anteriorly and joined at the midbody. Tail was terminated at a caudal spike. The recovered nematode is compared with some of the most similar species recovered from previous studies, which confirm that this nematode is similar to *Parapharyngodonjaponicas*.

Key words: Nematoda- Reptiles · *Parapharyngodon* · Light Microscope

INTRODUCTION

Egypt has 106 species of reptiles, including six endemic species, one species is threatened with extinction is the Egyptian Tortoise [1]. Parasites are probably one of the most over looked aspects of the general health of their hosts. They are small organisms that live in or on their host and in some cases are actually beneficial to the host animal. Some species of parasites can cause serious diseases and may even lead to death if left untreated for an extended period of time. For this reason it is important to understand what types of parasites are harmful to their hosts. Nematodes are found in all orders of reptiles, they are frequently inhabit the intestinal tract of these animals; larvae are seen in the respiratory tract while their adult stages are found in the intestinal cavity [2, 3]. Family Pharyngodonidae was proposed by Chatterji [4] with *Parapharyngodonmaplestoni*being the type species infecting the intestine of an oriental garden lizard, *Calotesversicolor*, collected in Burma. The main diagnostic characters include the lateral expansions of male cuticle forming lateral alae. This proposition was controversial because of the similarities between *Parapharyngodon*and *Thelandros* Wedl [5] (Nematoda: Pharyngodonidae). Many authors considered *Parapharyngodon* and *Thelandros*as synonyms [6-9]. Genus*Thelandros*was established by Wedl [5] for *T. alatus*, a nematode from the intestine of an Egyptian mastigure, *Uromastyxspinipes* (Currently *Uromastyxaegyptia*), collected in Egypt. However, others considered*Parapharyn*godon as a valid genus [10-15]. *Parapharyngodon*and *Thelandros*can be differentiated based on egg development during posture and the posterior end morphology in both sexes [16]. *Parapharyngodon* sp. males do not have a conical-shaped genital area, or an accessory piece. They have mammilliform papillae and a dorsal subterminal tail. Males of *Thelandros*sp. have a conical-shaped genital area with papillae disposed outside this cone [16, 17]. Females of *Parapharyngodon*sp. generally have a cone

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shaped tail with a thick pointed end, like a spike, eggs with a subierminal operculum that are uncleaved, or in early stages of cleavage when released. In contrast, *Thelandros*sp. females have diverse tail morphology, eggs with terminal operculum and larvae that are fully developed when they are released [14, 16, 18].

During a recent survey on the endoparasites infecting random samples of reptiles from desert lands at South Sinai, Egypt, nematode worms were isolated and identified on the basis of morphological and morphometric analyses by light microscopy.

MATERIALS AND METHODS

In the present study, 27 specimens of *Agama stellio*were examined for gastrointestinal nematode infection.Lizards were collected by hand or noose from desert areas at south Sinai, Egyptduring the year 2014. Animals were kept alive in glass cages with sand and alluvium in animal room at25-30 °C and fed with insect larvae. Identification of species was carried out according to Arnold [19] and AL-Sadoon [20]. Each lizard was killed within 8-24 h after capture with an intraperitonealinjection with an over dose of sodium pentobarbital for investigation. The hosts were dissected, gastrointestinal tracts were removed and the search for nematode parasites was performed under a stereomicroscope. They were isolated, relaxed in hot 70% ethanol and fixed in the same solutiontill examination.For light microscopy, worms were cleared and mounted in lactophenol. Prepared samples were examined, photographed by a phasecontrast Zeiss light microscope supplied with a Canon digital camera. Prevalence, meanabundance and morphometric measurements were according to the guidelines of Bush *et al*. [21] minimum and maximum values were given followed in parentheses by the arithmetic mean. Ecological terms related to parasitology usedin the present study follow Bush *et al*. [21].

RESULTS AND DISCUSSION

Parapharyngodonjaponicus Houttuyn (1782)

Description: This nematode was characterized by the presence of prominent annulations started just behind the cephalic extremity and continued to anus with moderate sexual dimorphism. Triangular oral opening was surrounded by oral lips. Females with conical tail terminated in short, stiff spike. No male specimens were recovered, only females. Female length was 1.81-3.20 mm (2.47±0.2) without lateral alae. Width at vulva was 0.31-0.70 mm (0.47±0.02). Esophagus was 0.26-0.32 mm (0.29±0.02), bulb length was 0.075- 0.095 mm (0.089±0.02). Eggs were in ovijector at pronucleus stage of development. Uterus extended to posterior end of the body cavity, then flexed anteriorly and joined at the midbody. Tail was terminated at a caudal spike.

Taxonomic Summary

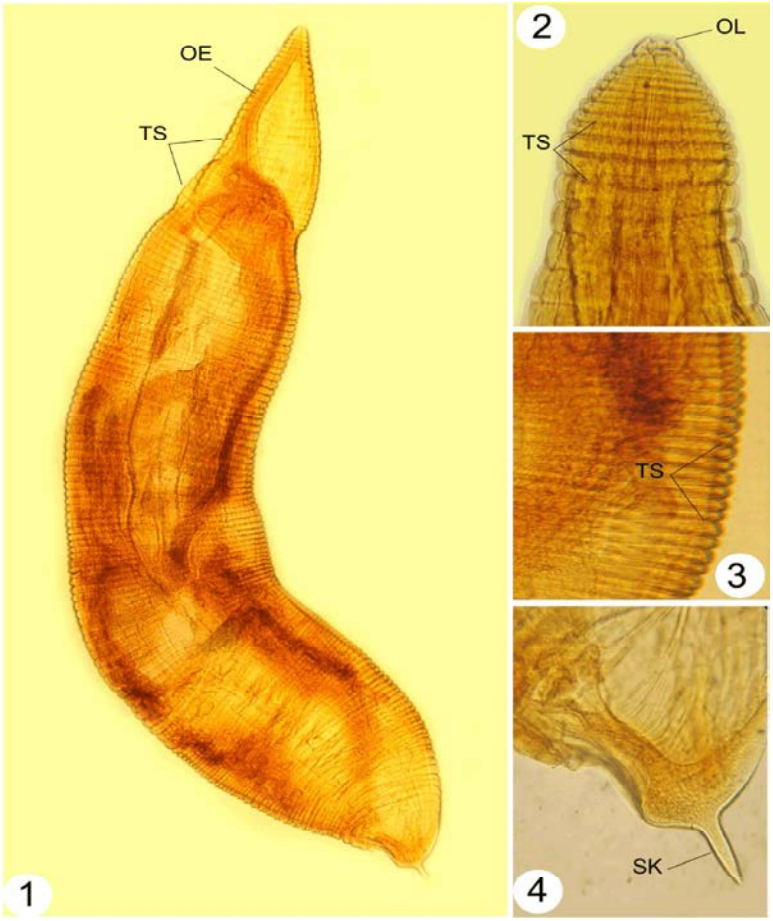
Type-Host: *Agama stellio*(Family: Agamidae).
Type Locality: South Sinai, Egypt.

Infection Site: Intestine.
Prevalence: Fourten out of 27(51.85%) of *Agama stellio*were naturally infected.

Remarks: The nematodes or roundworms constitute the phylum Nematode. They are a diverse animal's phylum inhabiting a very broad range of environments [22, 23]. Nematode species can be difficult to distinguish and although over 25,000 have been described of which more

Table 1: A comparison between the parasite recorded of genus *Parapharyngodon*and some previously described species of the same genus (Measurements in micrometer otherwise stated).

	Male				Female		
Aspect	Body length (mm)	Oeosophagus length (µm)	Tail length (µm)	Spicule (µm)	Body length (mm)	Oeosophagus length (µm)	Tail length (µm)
P. Japonicus	7.89	160	27	53	24.9	298	91
Bursey & Goldberg (1999)	(6.20-11.7)	(130-177)	(23-34)	(45-57)	(18.2-32.5)	(257-336)	(57-114)
p. duinae	1.66		79-88	40-49	3.84-4.48		192-288
Bursey &Brooks (2004)	(1.86±0.12)	-	(82±3)	(40±6)	(4.23±0.20)	-	(243±27)
P. lamothei							
Jiménez *et al.,* 2008	(2.10-2.25)	(422-428)	76	(64-66)	(3.48-5.30)	(818-1209)	283
P. maestro							
Jiménez *et al.,* 2008	(19.5-19.7)	345	63-81	62-70	(40.38-62.31)	(700-955)	218
P. Japonicus	7.75	0.6-0.82 mm	0.23-0.34		1.81-3.2	0.26-0.32	
(Present study)	(6.10-11.00)	(0.73±0.02)	mm (0.26±0.02)	-	(2.4±0.5)	mm (0.29±0.02)	125



Figs. 1-4: Photomicrographs of: *Parapharyngodonjaponicus* infecting *Agama stellio*.1: Whole mount preparation of the adult female worm with the outer covering cuticle transversely striated (TS) and a short oesophagus (OE) (X40). 2-4: High magnifications (X160) of: 2. The anterior part of the worm (cephalic region) with oral lips (OL). 3: Transverse striations of cuticle (TS).4. Posterior part of a female worm terminated at a stout spike (SK).

than half are parasitic, the total number of nematode species has been estimated to be about 1 million. Unlike cnidarians and flatworms, nematodes have tubular digestive systems with openings at both ends [22, 24]. The present study is considered as a first description of six nematode species from reptilian hosts in Egypt. Table (1) shows a comparison between the present parasite and those previously described; it was observed that the present parasite is similar to *Parapharyngodonjaponicus* recorded by Bursey and Goldberg [18]. Theanterior cloacal lip is smooth, ovary is postbulbar and the eggs are thin-walled. The female spikeis small and uterus is thick walled. Hasegawa [25] reported an unidentified species of *Parapharyngodon* from the same host speciesfrom Okinawa, Japan which differs from the present speciesin that its ovarian coils are prebulbar, the tail of the female is conical with no spike. With a new host record, the parasite recorded herein may be considered as *Parapharyngodonjaponicus*.

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