

FIRST REDSCRIPTION AND A NEW HOST RECORD OF *HYSTEROThYLACIUM SEBAE* BRUCE, 1990 FROM THE RED SEA FISH *SCARUS PSITTACUS* FROM EGYPT

By

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Abstract

Hysterothylacium sebae Bruce, 1990 (Nematodea: Raphidascadae) was collected from the small intestine of the marine fish *Scarus psittacus* caught from Northern Red Sea, of Sharm El-Naga, Makady Bay, Sothern Hurgada, Red Sea Governorate. Out of eight examined fish, three (37.5%) were found naturally infected with *H. sebae* Bruce, 1990. The parasites (one adult male & eight females) were examined morphologically and morphometrically by light microscopy. According to the previous literature, the present nematode parasite was never redescribed or reported from the marine fish *Scarus psittacus*. Therefore, *Scarus psittacus* is reported as a new host record for *Hysterothylacium sebae* Bruce, 1990 and re-described in details for the first time from Egypt.

Keywords: Red Sea fishes, Nematoda, Raphidascadae, *Hysterothylacium sebae*, *Scarus psittacus*.
New host record.

Introduction

Both adult and larvae of the genus *Hysterothylacium* Ward & Magath, 1917 which were related to Anisakidae are commonly parasitizing marine, estuarine and freshwater fishes (Li *et al*, 2008; 2013). Adult stages are restricted to the alimentary tract whilst, their larvae parasitize various tissues of numerous marine fishes (Machida *et al*, 1978; Machida, 1984) and invertebrates (Norris and Overstreet, 1976; Bruce *et al*, 1994). Balbuena *et al*. (2000) reported that infection by *Hysterothylacium* species caused clear economic repercussions due to its effect on the health of the fish hosts and even cause their death. In addition, species of this genus have been indicated as etiological agents of human intestinal anisakidosis (Yagi *et al*, 1996), due to provoking allergic reactions resultant from their somatic and excretion-secretion antigens (Valero *et al*, 2003).

Deardorff and Overstreet (1980) resurrected the genus *Hysterothylacium* to include species previously incorporated into both genera *Thynnascaris* Dollfus, 1933 and *Contraecum* Railliet & Henry, 1912. Bruce *et al*. (1994) reported 52 species in the genus *Hysterothylacium* while Li *et al*. (2007a, b)

recorded over 60 species and clarified that the genus, together with *Contraecum* Railliet & Henry, 1912, is among the largest in the superfamily Ascaridoidea. Also, they presented a modified key to 63 *Hysterothylacium* species. Up to now more than 96 valid species of a wide distribution (Bezerra *et al*, 2018), however only two sets of unidentified *Hysterothylacium* larvae have been reported in fishes from Red Sea without any record of adult worms (Petter and Sey, 1997; Al-Zubaidy *et al*, 2012). Bruce and Cannon (1989) clarified that about 20% of the *Hysterothylacium* species were adequately described and more than 80% were in urgent need to be accurately re-described. Also, Bruce *et al*. (1994) and Moravec and Nagasawa (1998) referred to presence of many poorly described *Hysterothylacium* species which made any comparison with new forms very difficult and practically impossible. Moravec *et al*. (1985) suggested solving this dilemma through new nematode collections and their exact taxonomic evaluation.

The aim of the present work was to identify and re-describe encountered nematode *Hysterothylacium sebae* Bruce, 1990 in the Red Sea fishes.

Materials and Methods

Fishes were transported alive as possible with good aeration and cooling immediately to the laboratory of Parasitology, Zoology Department, Faculty of Science, South Valley University at Qena Governorate, Egypt. Fishes were identified according to (Randall, 1982; Lieske and Myers, 1994, 1996; Lieske *et al*, 2004) and more confirmed through the fish base website (<http://www.fishbase.org>). The gastrointestinal tract was untangled with fingers (Justine *et al*, 2012). The whole digestive system and the remaining other viscera were opened longitudinally. Macroscopic and microscopic examination of different organs was carried out for detection of any visible helminth parasites. The collected parasites were cleaned by washing several times with isotonic saline solution. The relaxed nematodes were preserved in bottles containing mixture of 70% alcohol and 5% glycerin. Coiled nematodes were transferred into warm 70% alcohol heated to 60°C. The nematodes were mounted on slides with few drops of lactophenol and the parasite was covered by a cover slip. Identification of the encountered worms was done after the keys of the nematode parasites of vertebrates (Yorke *et al*, 1926; Anderson, 2000; Anderson *et al*, 2009).

Results

Incidence: Out of eight collected *Scarus psittacus* fishes (five males and three females); three; one male and two females (37.5%) were found infected with nine adults *Hysterothylacium sebae* Bruce, 1990 in their small intestine; worm burden was 2, 2, 5.

Description: Nine mature worms; one male and eight females were morphological studied (Fig. 1) and measurements, morphometric percentages and morphometric ratios were given (Tab. 1).

General: Live specimens were white while fixed ones were slightly yellowish brown. Small-sized nematodes without any transversely striated cuticle. Lateral alae inconspicuous, widest in region of first third of

esophagus length; extend posteriorly to about middle level of ventricular appendix. Maximum width was at mid-body level and tapering to both extremities. Anterior extremity has three lips provided with broad lateral flanges; each lip has narrow base. Posterior part of dorsal lip rectangular, broad, with margins of lateral flanges almost parallel; anterior part of dorsal lip much narrower, anteriorly truncate with extremely tiny outcrops, separated from posterior part of lip by two fairly shallow lateral depressions. Amphids not observed. Interlabia somewhat developed. Muscular part of the esophagus is straight, cylindrical, long, slightly increasing in width posteriorly, ending in small ventriculus which is spherical to elongated oval, wider than or slightly as wide as esophagus (Fig. 1a). Ventricular appendix narrow, about half the esophagus length (Fig. 1b). Intestine brown was as wide as esophagus with thin and short intestinal cecum slightly longer than ventriculus and extended anteriorly on esophagus ventral side to about the end level its last fifth. Anterior deirids not observed. Nerve ring extended immediately transversely posterior to esophagus first third level by very small distance. Excretory pore just posterior to level of nerve-ring. Tail was conical with pointed tip horn-like & with prominent large phasmids at the middle.

Male: Posterior end of body slightly ventrally arcuate, without caudal alae. Cloaca was represented by a small depressed region with small slit-like cloacal opening. Neither cloacal sucker nor muscular bands present anterior to cloaca. Papillae numerous, rounded, small and different sized, Phasmids large at middle of tail. Spicules were simple, alate, weakly chitinized, slender, similar in shape, equal in length, rounded anteriorly and tapering distally. No gubernaculum, tail conical, short, and wide. Tip blunt, rounded, without any caudal projection (Fig. 1 C&F).

Female: Vulva equatorial. Vaginal opening not observed. Tail was conical, much longer and much wider than tail of male,

with pointed tip horn-like and prominent phasmids at the middle. No caudal projections observed (Fig. 1, D&E).

Table 1: Measurements, morphometric percentages and morphometric ratios of *Hysterothylacium sebae*.

Measurements	Male	Female
Body Length [L]	10,227	7,667–10,085 (8,876)
Maximum body Width [W]	140	125–182 (154)
Maximum body Width %*	1.4	1.6–1.8 (1.7)
lips length	38	26–36 (31)
Esophagus length	449	353–364 (359)
Esophagus length L%*	4.4	3.6–4.6 (4.1)
Esophagus width	32	30–37 (34)
ventriculus length	143	79–107 (93)
ventriculus length%*	1.4	0.8–1.4 (1.1)
ventriculus length: esophagus length ratio	1:3.14	1:3.30–4.61 (1:3.95)
ventriculus width	56	43–70 (57)
Ventricular appendix length	145	149–195 (172)
Ventricular appendix length%*	1.4	1.5–2.5 (2.0)
Ventricular appendix width	37	23–28 (26)
Intestinal cecum length	184	94–116 (105)
Intestinal cecum length%*	1.8	0.9–1.5 (1.2)
Intestinal cecum length: ventricular appendix length ratio	1:0.79	1:1.59–1.68 (1:1.63)
Intestinal cecum width	28	22–27 (25)
Nerve ring L	20	23–24 (24)
Nerve ring breadth	72	50–59 (55)
Pre-Nerve ring distance	211	171–210 (191)
Pre-Nerve ring distance%*	2.1	2.1–2.2 (2.2)
Pre-excretory pore ring distance	287	240–257 (249)
Pre-excretory pore ring distance%*	2.8	2.5–3.1 (2.8)
Spicule length	186	Absent
Spicule length%*	1.8	–
Rectum length	Absent	49–103 (76)
Rectum length%*	–	0.6–1.0 (0.8)
Tail length	157	133–156 (145)
Tail length%*	1.5	1.3–2.0 (1.7)

All dimensions, measurements and % calculated to 1 decimal places; all ratios calculated to 2 decimal places. A&B- Anterior extremity

Discussion

Yorke *et al.* (1926) gave place newly collected specimens in the superfamily Ascaridoidea Baird, 1853. Hartwich (1957); Fagerholm (1991); Nadler and Hudspeth (2000) indicated that they belong to the subfamily Raphidascaridinae Hartwich, 1954. The overall morphological appearance of the present specimens, particularly the structure of the cephalic end, excretory pore situated posterior to nerve ring level directly, and presence of both the intestinal caeca and the ventricular appendix, reveal obviously that present specimens belong to the genus *Hysterothylacium* Ward & Magath, 1917 (Li *et al.*, 2007a). Since lateral alae were incon-

spicuous and spicules about 1.8% of body length that gave an evidence that present specimens is *H. sebae* Bruce, 1990 (Li *et al.*, 2007b) who related the genus as a member of Anisakidae.

These nematodes used fishes as intermediate and definitive hosts (Costa, 2004) (Fig. 1a). where adult nematodes of the genus *Hysterothylacium* Ward & Magath, 1917 are generally restricted to the digestive tract of fishes (Machida, 1978), whilst their larval stages parasitize various tissues of numerous fishes and invertebrates (Norris and Overstreet, 1976). Deardorff and Overstreet (1981) presented the most detailed review of the genus *Hysterothylacium*. They resurrect-

ed to include members of the genus *Thynnascaris* Dollfus, 1933 and others attributed to the genus *Contracaecum* Railliet & Henry, 1912 that mature in fishes. Bruce *et al.* (1994), recorded 52 species inside *Hysterothylacium*. Li *et al.* (2007a;b) recorded over 60 species and clarified that the genus, together with *Contracaecum* Railliet & Henry, 1912, was among the largest in the superfamily Ascaridoidea. They gave a modified key to 63 species in the genus *Hysterothylacium*. The present authors are in doubt about the validity of most of the reported species as differentiating criteria seem to be not sharp and evident (as relative length of spicules to that of the body) and it is recommended to make re-evaluation of the previously described species particularly those reported from the freshwater fishes and frogs (Raffel and Anderson, 2009).

The most recent taxonomic position of this genus showed more than 96 valid species of wide distribution (Bezerra *et al.*, 2018). Only two sets of *Hysterothylacium* larvae were reported from the Red Sea region without recording their adult worms; *Hysterothylacium* KB found in *Mene maculate*, *Mulloidichthys auriflamma*, *Otolithes argenteus*, *Pseudorhombus arsius*, *Sphyraena obtusata*, and *Upeneus sulphureus* from Arabian Gulf, Kuwait by Petter and Say (1997) and records of *Hysterothylacium* sp. by Al-Zubaidy *et al.* (2012) parasitizing *Epinephelus guttatus*, *Epinephelus tauvina*, *Sphyraena barracuda*, *Sphyraena jello*, *Lutjanus gibbus*, *Pristipomoides filamentosus*, *Abalistes stellaris* and *C. bajad* from Yemen coasts. Al-Bassel (2006) re-described the adults and larval stages of *Hysterothylacium winteri* Torres & Soto, 2004 from the marine fish *Boops boops* (Sparidae) from Alexandria fish market in Egypt. Hence, the present study presented the first re-description of *Hysterothylacium sebae* Bruce, 1990 from Egyptian Red Sea fish.

Only two parasites were previously reported from *Scarus psittacus*; a copepod *Caligus callyodoni* Prabha & Pillai, 1986 (Lin and

Ho, 2004) and acanthocephalan species *Neoechinorhynchus ningaooensis* (Pi-chelin and Cribb, 2001), hence *Scarus psittacus* herein is reported as a new host record of the nematode parasite *Hysterothylacium sebae* Bruce, 1990.

Conclusion

Hysterothylacium sebae Bruce, 1990 was re-described for the first time from the Red Sea fishes caught at Hurghada, Red Sea Governorate with addition of many internal morphological and morphometrical features. The marine fish *Scarus psittacus* represented a new host record.

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Explanation of figures

Fig 1: Camera Lucida drawings of adults *H. setae*:

A&B- Anterior extremity of parasite showed muscular oesophagus portions and intestine. C- Enlarged anterior extremity showed projected-lips like structure. D. Ventrolateral view of male posterior extremity showed spicule and cloaca. E & F. Lateral view female posterior extremity showed tail, anus, and rectum.

Abbreviations; IC, intestinal cecum; In, intestine; MO, muscular oesophagus; Ta, tail; Ve, ventriculus. Li, Lip. An, anus; Cl, cloaca; IC, intestinal cecum, rectum; Sp, spicule; Ta, tail; Ve, ventriculu.

