

On a New Species of Spirurid Nematode *Rhabdochona* (*Rhabdochona*) *annai* (Spirurida: Thelazioidea) from Freshwater Mahseer, *Tor putitora* (Ham.)

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Abstract: A new species of *Rhabdochona* (Thelazioidea: Rhabdochonidae) is described here as an intestinal parasite of Mahseer, *Tor putitora* (Ham.) from a river basin at Bolan of Balochistan province, Pakistan. *Rhabdochona* (*Rhabdochona*) *annai* n. sp. is characterized by a combination of diagnostic features that includes the presence of prostomal teeth, simple (not bifurcated) deirids, and different length ratio between spicules. The combination of these features easily differentiated the new species from all its congeners, including those species possessing 8 teeth in the prostome. The new species appears to be specific to freshwater cyprinids, as the previously twelve species of *Rhabdochona* Railliet, 1916 that were described from this group of fish, only from Balochistan.

Key words: Spirurid nematode, freshwater Mahseer, *Rhabdochona*, *Tor putitora*.

INTRODUCTION

Among spirurid nematodes, the species of genus *Rhabdochona* Railliet, 1916 are known to parasitize edible freshwater fishes (Aguilar *et al.*, 2010), and less frequently marine fish (Bilqees, 1979; Lakshmi, 2001), reptiles (Moravec, 1983), birds (Kumar and Gupta, 1979) and crustaceans (Poinar and Kannangara, 1972). During a survey conducted for parasitic nematodes, specimens of *Rhabdochona* were observed attached to the intestine (the most common site of attachment in the gastrointestinal tract) of the fish hosts. However, specimens of this nematode genus may also be found infesting the esophagus, pyloric caeca and stomach of fishes. Specimens belonging to a new species of *Rhabdochona* collected from the fish *Tor putitora* (Hamilton, 1822) during the present survey are described herein.

MATERIALS AND METHODS

In two localities along the river Bolan (Bibi Nani and Gokurt), thirty three carps (Cypriniformes) were collected with sweep net and hook in

September 2007. Nematode parasites were recovered from the intestine and preserved in 70% ethanol, adding few drops of glycerin gel. Worms were cleared in lactophenol for examination and provisionally mounted in glycerin gel. Enface view preparation and identification of nematodes followed Guitang *et al.* (1994) and Chabaud (1975), respectively. Drawings were made with the aid of a drawing tube. Measurements (length x width) are given in millimeters. Holotype, allotype and paratype specimens were deposited in the collection of helminth parasites in the museum of Zoology Department, University of Balochistan, Quetta, Pakistan.

RESULTS

Rhabdochona (*Rhabdochona*) *annai*, n. sp. (Figs. 1-3)

Type host: *Tor putitora* (Cyprinidae)
Site of infection: Intestine
Type locality: River Bolan, Balochistan, Pakistan
No. of specimens: Twenty two nematodes (9 males and 13 females) from 12 out of 33 fishes examined. Maximum 3 males and 4 females from a single host.

Type material

Holotype male (voucher No. ZBU-N42) and allotype female (voucher No. ZBU-N43) were

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deposited in the museum of Department of Zoology, University of Balochistan, Quetta, Pakistan.

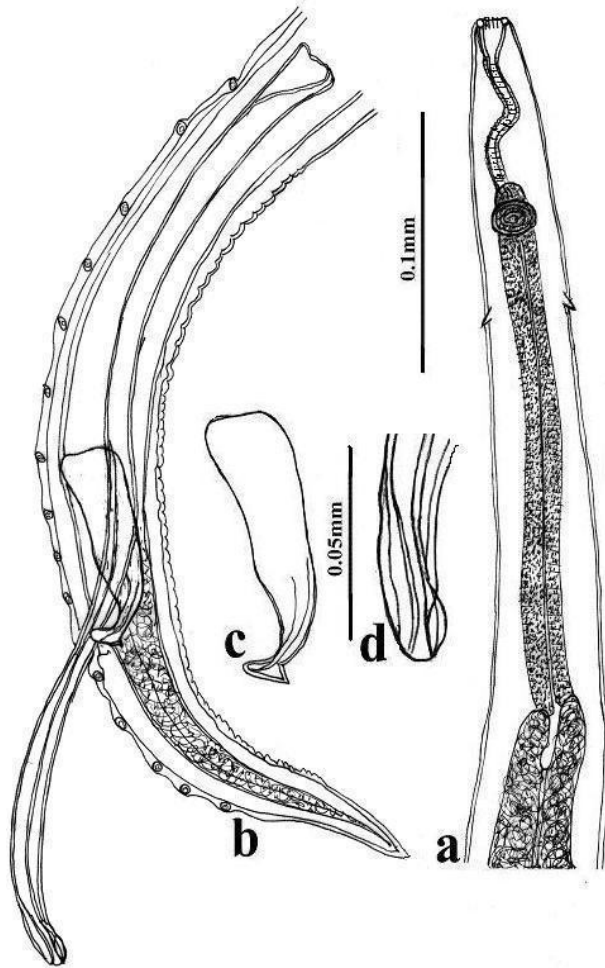


Fig. 1. *Rhabdochona* (*Rhabdochona*) *annai* n.sp., holotype male. a, anterior body region showing buccal capsule, muscular and glandular esophagus, nerve ring, deirids and anterior portion of intestine; b, posterior region showing large and small spicules, caudal papillae and tail; c, small spicule enlarged; d, tip of large spicule enlarged. Scale is the same for a, b, c and d.

Description

Small, delicate worms, body smooth, tapers gradually towards both ends. Females longer and broader than males. Mouth of females opens into a cup-shaped buccal capsule, almost triangular in males. Eight conical teeth present, 2

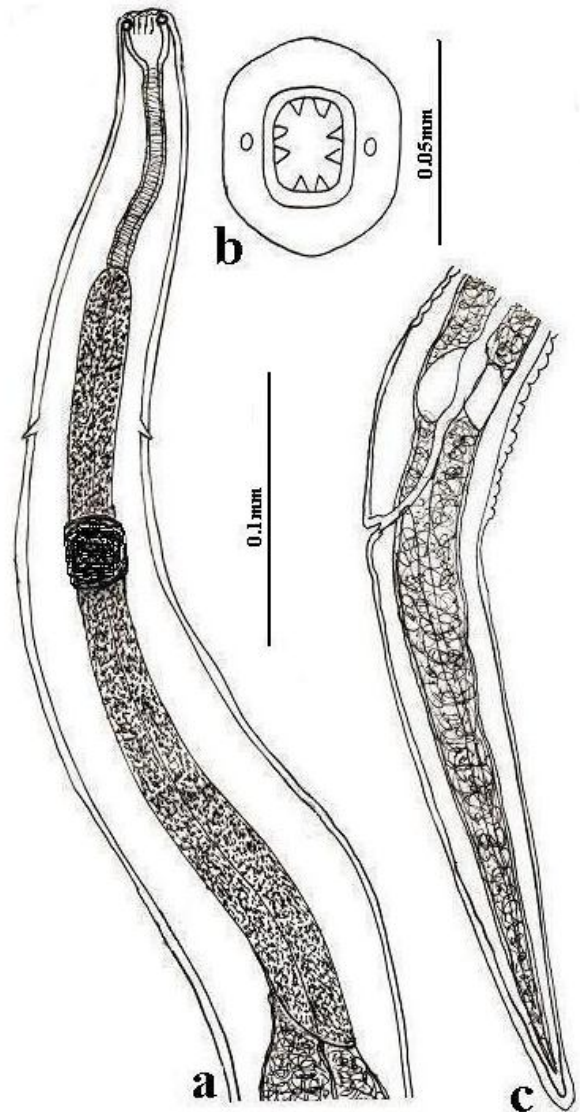


Fig. 2. *Rhabdochona* (*Rhabdochona*) *annai* n.sp., allotype female. a, anterior body region showing buccal capsule, muscular and glandular esophagus, nerve ring, deirids and anterior portion of intestine; b, enface view showing prostomal teeth; c, posterior region showing tail, and associated structures. Scale is the same for a and c.

ventral and 2 on each lateral side. Cephalic papillae prominent, one on each side of the prostome. Muscular esophagus of males notched markedly in midregion, those of females slightly curved ventrally, less than half of the length of glandular esophagus. Glandular esophagus longer in females

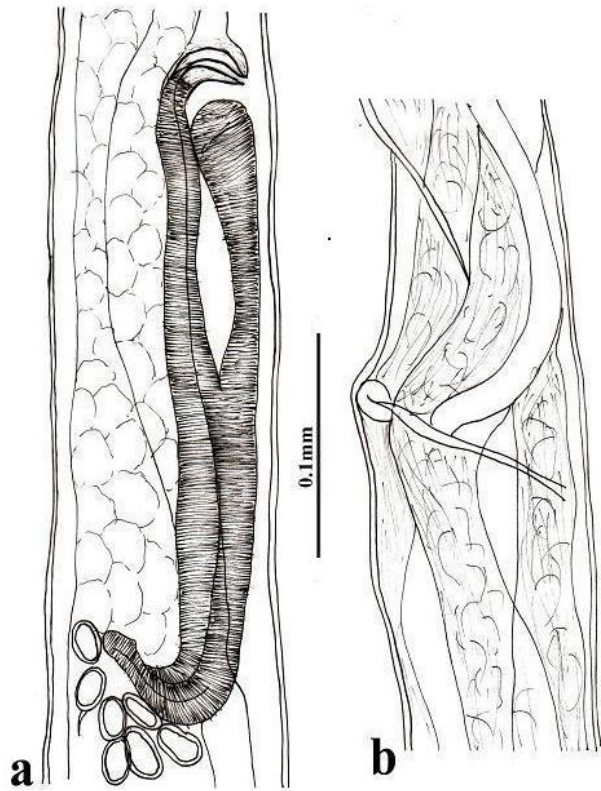


Fig. 3. *Rhabdochona* (*Rhabdochona*) *annai* n.sp., allotype female. a, region of genital opening showing submarginal vulva, vagina and eggs; b, region of excretory pore. Scale is the same for a and b.

than in males. Intestine without any diverticula. Nerve ring situated a little behind the anterior end of glandular esophagus in males, while in females is located in the second half of glandular esophagus. Deirids conspicuously medium sized and simple, located opposite to the first half level of glandular esophagus, excretory pore postequatorial. Position of deirids and excretory pore of females similar to that of males. Spicules unequal, non-alate. Large (left) spicule bent dorsally at the anterior and posterior regions with middle curvature at the ventral side, anterior end broader with triangular chitinous piece, posteriorly protruding from the body ending in a bilobed tip. Small (right) spicule bent ventrally, spatulate in shape with a very broad and flattened anterior end, becoming narrow posteriorly joining a triangular piece at the base, rounded on the left side and pointed on the right side. Of the 15 pairs caudal papillae, 10 pairs

preanal and 5 postanal. Vulva beak-shaped, postequatorial. Vagina large, strongly muscular, turns posteriorly from the vulva, originating two directly opposed branches, posterior end bent upward ventrally. Excretory vesicle more prominent than in males. Eggs oblong-oval, double walled; a single egg had a small projection at one side but the rest were smooth. Tail slightly curved dorsally, pointed in males, straight and bluntly pointed in female specimens.

Male

(Based on 3 specimens; measurements of holotype in parentheses). Body 3.68-4.55 (3.91) mm in length, maximum width 0.09-0.12 (0.11), prostome 0.0038-0.005 (0.004) x 0.005-0.007 (0.0063), mesostome 0.008-0.11 (0.1) x 0.007-0.01 (0.009), muscular esophagus 0.042-0.067 (0.058) x 0.003-0.005 (0.004), glandular esophagus 0.14-0.25 (0.19) x 0.008-0.016 (0.012) in size. Distance of nerve ring, deirids and excretory pore from the anterior extremity 0.058-0.065 (0.059), 0.09-0.113 (0.09) and 2.34-3.42 (2.89), respectively. Large spicule 0.38-0.53 (0.47) x 0.008-0.014 (0.012), small spicule 0.07-0.12 (0.09) x 0.02-0.034 (0.026), length ratio of spicules 1: 4.41-5.42 (1:4.68). Tail 0.09-0.2 (0.17).

Female

(Based on 4 specimens; measurements of allotype in parentheses). Body 4.43-6.56 (5.52) mm in length, maximum width 0.13-0.15 (0.136), prostome 0.006-0.009 (0.007) x 0.0041-0.0071 (0.0058), mesostome 0.007-0.01 (0.009) x 0.008-0.011 (0.009) muscular esophagus 0.05-0.08 (0.074) x 0.0052-0.0085 (0.008), glandular esophagus 0.12-0.28 (0.2) x 0.011-0.025 (0.021) in size. Distance of nerve ring, deirids and excretory pore from the anterior extremity 0.099-0.175 (0.169), 0.097-0.014 (0.011) and 3.32-4.12 (3.88), respectively. Vulva 0.022-0.035 (0.03) x 0.01-0.014 (0.013). Anterior vulvar lip 0.017-0.023 (0.021) x 0.003-0.005 (0.004), posterior vulvar lip 0.018-0.024 (0.022) x 0.004-0.006 (0.0048). Distance of vulva from the posterior extremity 2.27-2.87 (2.63). Vagina 0.19-0.27 (0.23) x 0.02-0.031 (0.025). Mature eggs 0.009-0.21 (0.017) x 0.005-0.012 (0.009) in size. Tail 0.1-0.25 (0.23).

Etymology

The species is named in honor of Dr. Anna Kohn (Institute of Oswaldo, Rio de Janeiro Brazil), an expert in the field of helminth parasites.

DISCUSSION

The present specimen belongs to the genus *Rhabdochona* and subgenus *Rhabdochona* Railliet, 1916 because of the presence of prostomal teeth, deirids, cephalic and caudal papillae, spicules and smooth eggs. These characters had been considered as key diagnostic traits in the identification of *Rhabdochona* species (Campana-Roujet, 1961; Chabaud, 1975; Moravec, 1994; Caspeta-Mandujano *et al.*, 2005; Pinto *et al.*, 2010). The different species of this genus (including those possessing 6 or 10 teeth) reported from Balochistan province are listed in Table I. The new specimen *Rhabdochona annai* n. sp. exhibit similarities with members of the genus reported from Balochistan (Pakistan): *R. kharani* Asmatullah-Kakar *et al.*, 2006, *R. watsoniai* Asmatullah-Kakar and Bilqees, 2007a (based on males only), *R. uvaginus* Asmatullah-Kakar and Bilqees, 2007b, *R. bolani* Asmatullah-Kakar *et al.*, 2008a (based on males only), and *R. mujibi* Asmatullah-Kakar and Bilqees, 2009 in having 8 teeth, non-bifurcated (simple) deirids and eggs devoid of filaments or floats. It differs from the above named species in the morphology of its spicules. In *R. annai* n. sp., the large spicule bears a chitinous triangular piece at the anterior end and a bilobed posterior tip; the small spicule is spatulate, ending in a triangular piece at the base. Furthermore, the new and the above mentioned species differ in their spicular ratio, number and distribution of caudal papillae. It also exhibits similarities with *R. sarana* (Karve and Naik, 1951) Akram and Khatoon, 2001 (based on females only), reported from other region of Pakistan in the possession of 8 teeth, smooth eggs and simple (non-bifurcated) deirids.

Rhabdochona annai n. sp. has 15 pairs (10 preanal and 5 postanal) of caudal papillae, ratio between spicules length is 1: 4.41-5.42; *R. kharani* has 16-18 pairs of caudal papillae, 10-11 preanal, 1 adanal and 6-7 postanal, ratio between spicules length is 1:3.6-3.8; *R. uvaginus* has 13 pairs of

caudal papillae, 8 preanal and 5 postanal, length ratio of spicules is 1: 2.30; *R. watsoniai* has 17 pairs of caudal papillae, 12 preanal, 5 postanal, ratio between spicules length is 1: 4.13. *R. bolani* has 17 pairs of caudal papillae, 12 preanal and 5 postanal pairs; ratio between spicules length is 1: 5.49-5.91. In *R. mujibi* caudal papillae are 15 pairs (similar to the new species but differs in the arrangements of papillae) including 9 preanal and 6 postanal, ratio between spicules length is (1:4.40-4.48). The male specimens of *R. sarana* are unknown.

Table I.- List of species of *Rhabdochona* reported from Balochistan province (Pakistan) and their hosts.

<i>Rhabdochona</i> sp.	No. of teeth	Host sp.
<i>Rhabdochona (Rhabdochona) bifidum</i>	6	<i>Tor putitora</i> Hamilton, 1822
<i>Rhabdochona (R.) cephalodiverticula</i>	6	<i>Tor putitora</i> Hamilton, 1822
<i>Rhabdochona (R.) hingoli</i>	6	<i>Cyprinion milesi</i> Day, 1880
<i>Rhabdochona (R.) kharani</i>	8	<i>Labeo gedrosicus</i> Zugmayer, 1912
<i>Rhabdochona (R.) uvaginus</i>	8	<i>Tor putitora</i> Hamilton, 1822
<i>Rhabdochona (R.) bolani</i>	8	<i>Tor putitora</i> Hamilton, 1822
<i>Rhabdochona (R.) mujibi</i>	8	<i>Tor putitora</i> Hamilton, 1822
<i>Rhabdochona (R.) watsoniai</i>	8	<i>Cyprinion watsoni</i> Day, 1872
<i>Rhabdochona (Filochona) gubernaculus</i>	10	<i>Cyprinion watsoni</i> Day, 1872
<i>Rhabdochona (Rhabdochona) nushkiai</i>	10	<i>Cyprinion milesi</i> Day, 1880
<i>Rhabdochona (R.) milesi</i>	10	<i>Cyprinion milesi</i> Day, 1880
<i>Rhabdochona (R.) magnavesicula</i>	10	<i>Schizocyprinus brucei</i> Regan, 1914

Rhabdochona annai n. sp. is similar to species of the genus reported from India (*R. barusi* Majumdar and De, 1971; *R. sarana* Karve and Naik, 1951 (based on females only); *R. garuai* Agrawal, 1965; *R. moraveci* Duggal and Kaur, 1987; *R. fotedari* Katoch and Kalia, 1993) in possessing 8 teeth and simple (smooth) eggs. The new nematode species is also similar to *R. brevichona* (reported from China) Guitang *et al.* (1994) in the shape of eggs and number of teeth (8). *R. annai* n. sp. can be distinguished from *R. barusi* in lacking floats on

eggs. Similar number of teeth (8) is present in species reported from Africa (*R. congolensis* Campana-Rouget; 1961, *R. paski* Baylis, 1928; *R. versterae* Boomker and Petter, 1993); North America (*R. beatriceinsleyae* Holloway and Klewer, 1969; *R. ovifilamenta* Weller, 1938 and *R. coronacauda* Belouss, 1965); Europe (*R. chabaudi* Mawson, 1956) and Far-East SSR (*R. sulaki* Saidov, 1953; *R. chodukini* Osmanov, 1957). These differ from *Rhabdochona annai* n. sp. in having filaments on the surface of eggs.

The above mentioned comparisons of characters reveal that the present nematode specimens correspond to an undescribed species of *Rhabdochona* for which the name *R. (R.) annai* is proposed.

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