

## ***Rhabdochona (Globochona) spinicauda* New Species (Nematoda: Rhabdochnidae) From the Putitor Mahaseer, *Tor putitora*, in Pakistan**

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**Abstract.-** A new nematode species *Rhabdochona (Globochona) spinicauda* n. sp. based on fifth stage larvae (L5 or young adults) is described here from the intestine of a freshwater fish, the putitor mahaseer *Tor putitora* (Ham.). The main diagnostic trait is the possession of a prominent spine at the tail tip of female specimens. The new nematode parasite is also characterized by possessing square-shaped eggs with cuticular floats on four sides of its surface, 0.012-0.018 by 0.005-0.02 mm in size; a thick, muscular, backwardly directed vagina; 10 teeth in the prostome; two very unequal and dissimilar spicules with spicular ratio 1:2.48-2.55 and 11 pairs of caudal papillae (6 preanal, 5 postanal) at the caudal end of male specimens.

**Key words:** *Rhabdochona (Globochona) spinicauda* n. sp, nematode parasite, *Tor putitora*.

### INTRODUCTION

*Rhabdochona* Railliet, 1916 is a speciose genus of roundworms (nematodes) of the family Rhabdochnidae Skrjabin, 1946, comprising over 160 nominal species. Much taxonomic work has been conducted worldwide on species from this genus (Saidove, 1953; Campana-Rouget, 1961; Chabaud, 1975; Sood, 1988; Moravec, 1972, 1975, 1994, 2008; Rehana and Bilqees, 1973; Zaidi and Khan, 1975). Members of *Rhabdochona* are widely distributed in freshwater fishes usually inhabiting the digestive tract. To date, 20 species of *Rhabdochona* have been reported from freshwater fishes of Pakistan. Of these, 11 were described in Balochistan (Asmatullah-Kakar *et al.*, 2010).

In the present paper a new species of *Rhabdochona* based on fifth stage larval form is described from the putitor mahaseer, *Tor putitora* from Bolan, thus raising the number of total species from this genus to 21 in Pakistan. The new species belongs to the subgenus *Globochona* Moravec, 1972, which is characterized by possessing cuticular floats or globules on eggs. The finding reported here represents the first record of a species of the subgenus *Globochona* Moravec, 1972 from this locality and fish host species.

### MATERIALS AND METHODS

Thirty six individuals of putitor mahaseer, *Tor putitora* (Ham.) were captured in a stream at Bolan valley (29° 24' 10" N and 67° 4' 44" E), Balochistan at the time of maximum fish activities during 2006. The fish sample was examined for nematode parasites. A total of 28 roundworms were collected from the intestine of 9 hosts. These specimens were preserved and stored in 70% ethanol and processed for a detailed study. The worms were firstly cleared with glycerol, then with lactophenol, being mounted on slides with glycerol using the method described by Asmatullah-Kakar *et al.* (2010). Enface preparation followed the method of Campana-Rouget (1961). Drawings were made with the aid of a camera lucida. Measurements are given (length x width) in microns, with range followed by mean in parentheses. The specimens studied are deposited in the helminthological collection in Museum of Zoology Department, University of Balochistan, Quetta, Pakistan.

### RESULTS

*Rhabdochona (Globochona) spinicauda*, new species  
(Figs. 1-2)

#### *Description*

Description based on fully grown fifth stage (4 females and 5 males) larvae. Small, delicate

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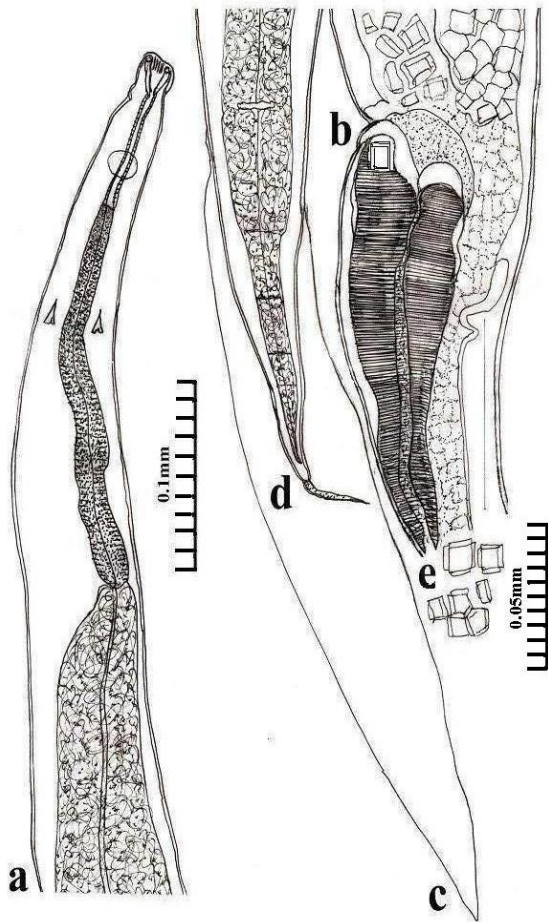


Fig. 1. *Rhabdochona (globochona) spinicauda* n.sp., holotype female. a, anterior body region showing cephalic region, buccal capsule, muscular and glandular esophagus, part of intestine, nerve ring, and deirids; b, region of genital opening showing marginal vulva with single egg and vagina; c, postequatorial region showing tail, slit-like anal opening and associated region; d, note long spine at the end of tail; e, eggs provided with floats.

nematodes, greatest width at the preequatorial region. Body of male enclosed in cuticular envelope but in female cuticular extension found only at the caudal region. Female has a long spine at the tail end distinct from the posterior end of body, while caudal end of male is bluntly pointed. Anterior end flat in both the sexes with two prominent cephalic papillae. Prostomal teeth, 10 (3 ventral, 3 dorsal and 2 on each lateral side), pointed anteriorly. Buccal capsule almost funnel-shaped. Muscular esophagus

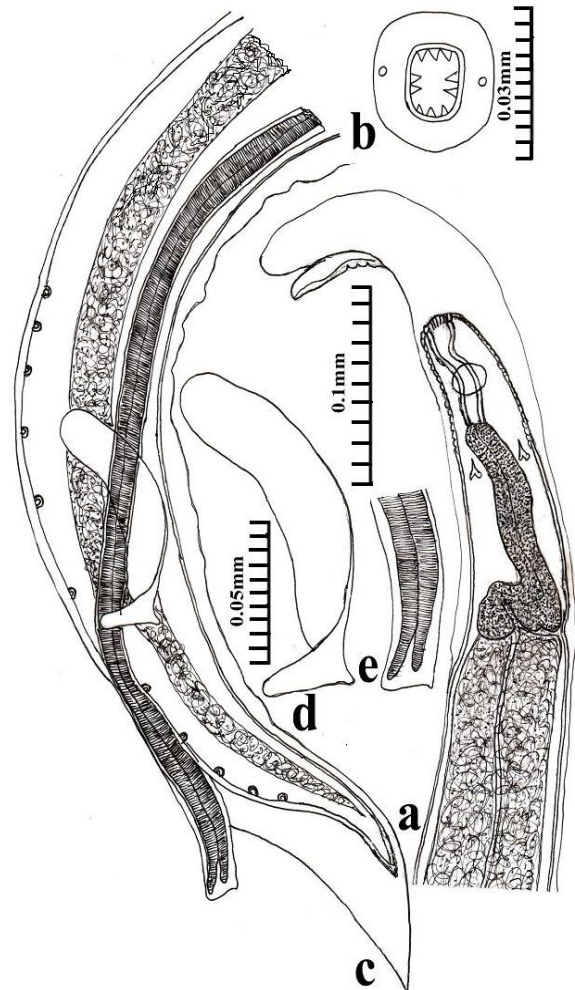


Fig. 2. *Rhabdochona (globochona) spinicauda* n.sp., allotype male. a, anterior body region showing anterior cuticular extension, buccal capsule, nerve ring, deirids, muscular and glandular esophagus and part of intestine; b, enface view showing prostomal teeth; c, posterior region showing large and small spicules, caudal papillae, tail and posterior extension of cuticle; d, small spicule enlarged; e, posterior tip of large spicule enlarged.

much smaller than glandular esophagus. Glandular esophagus comparatively larger and straight in female, transversely bent at the base in male. Nerve ring surrounds the muscular part of esophagus located in the middle of it in male but in female located in the second half of the muscular esophagus. Deirids medium-sized, bifurcate, lateral, situated at the level near to anterior end of glandular esophagus of male while slightly anterior to middle

length of glandular esophagus of female. Excretory pore postequatorial in both sexes.

Vulva marginal, preequatorial, vagina strongly muscular, directed backward, broad anteriorly, narrow posteriorly becoming tubular at the end; as a whole, it appears elephant snout in shape. Eggs prominently square-shaped with lateral swellings or floats, a single egg also prominent at the tip of vulvar aperture.

Spicules, two, unequal and dissimilar in size and form. Large spicule more than three times longer than the small spicule, bent dorsally except at the tip, where is slightly bent ventrally anterior part of spicule flat, with almost uniform thickness through its length and striated portion divided into two at the tip and covered by a cuticular membrane; slightly alate posteriorly. Small spicule curved ventrally and distinctly divided into two portions, a long portion rounded at both ends, and almost a triangular piece at the base. Eleven pairs of caudal papillae, including 6 pairs preanal and 5 pairs postanal. Tail small and pointed.

#### Measurements

##### Female (n=4)

Body length 3870-4220 (4050), greatest width 160-180 (171), prostome 5-6 (5.6) x 6-7 (6.5), mesostome 9-10 (9.5) x 8-9 (8.6), muscular esophagus 71-72 (71.6) x 7-8 (7.4), glandular esophagus 210-220 (216) x 0.022-0.023 (22.7) in size. Distance of nerve ring 49-53 (51), deirids 138-141 (140) and excretory pore 2680-2750 (2710) from the anterior end of body. Vulva 64-83 (77) x 17-24 (22), anterior vulvar lip 57-69 (63) x 9-12 (10), posterior vulvar lip 24-32 (29) x 10-13 (12), Distance of vulva 2150-2170 (2160) from the posterior end of body. Vagina 130-220 (170) x 51-64 (60). Mature eggs 12-18 (15.8) x 5-20 (12) in size. Caudal spine 42-45 (43) x 3-5 (4), Tail 230-250 (240) long.

##### Male (n=5)

Body length 3410-3450 (3430), greatest width 100-200 (160), prostome 6-7 (6.4) x 5-6 (5.4), mesostome 0.011-0.012 (0.0113) x 0.009-0.01 (0.0093), muscular esophagus 0.04-0.042 (0.041) x 11-12 (11.3), glandular esophagus 141-143 (142) x 17-18 (17.3) in size. Distance of nerve ring 20-30

(23), deirids 60-70 (63) and excretory pore 1980-2000 (1990) from the anterior end of body. Large spicule 348-435 (396) x 10-20 (15), small spicule 140-170 (154) x 23-24 (233). Spicules length ratio 1: 2.48-2.55 (2.51). Tail 120-140 (130)  $\mu$ m long.

#### Taxonomic summary

Type host: *Tor putitora* (Cyprinidae)

Site of infection: Intestine

Type locality: Bolan valley, Balochistan

Number of specimens: 28 individuals, 18 female and 10 male from 9 fishes, maximum 7 female and 5 male from a single fish

Prevalence and intensity: 25% (9 fishes infected per 36 fishes examined), 1-6 (mean 3) nematodes per infected fish

Holotype female: ZBU-N44

Allotype male: ZBU-N45

#### Etymology

The species name refers to long spine on tail tip of the female specimens

## DISCUSSION

The presence of distinct long spine at the tail tip of females differentiate *Rhabdochona* (*Globochona*) *spinicauda* n. sp. from species of the genus hitherto described from freshwater fishes of Pakistan *R. cavasius* Rehana and Bilqees, 1973; *R. megasacculata* Ghazi and Atta-u-Rahim, 1999; *R. charsaddiensis*, *R. shizothoracis* Mohammad Nasim Siddiqi and Abdur Rais Khattak, 1984; *R. sarana* (Karve and Naik, 1951) Mohammad Akram and Nasira Khatoon, N., 2001; *R. hillichii* (Sramek, 1901) Mohammad Akram and Nasira Khatoon., 2001; *R. rahimi* Rafia Rehana Ghazi., Noor-u- Nisa and Bilqees Fatima Mujib., 2003; *R. kharani* Asmatullah-Kakar, Bilqees Fatima Mujib and Juma. Khan Kakar., 2006; *R. uvaginus* Asmatullah-Kakar and Bilqees, 2007b; *R. milesi* Asmatullah-Kakar, Bilqees Fatima Mujib and Mohammad Nawaz, 2008b; *R. magnavesicula* Asmatullah-Kakar and Bilqees Fatima Mujib., 2008c; *R. mujibi* Asmatullah-Kakar and Bilqees, 2009 and *R. gubernaculus*. Asmatullah-Kakar, Bilqees Fatima Mujib, Kashif Kamaran and Gul-e-Shadab Mukhtar, 2010. The new species can also be differentiated

from *R. charsaddiensis*, *R. shizothoracis* and *R. gubernaculus* by the absence of filamented eggs, and from *R. cavasius*, *R. megasacculata* (description based on a single female), *R. kharani*, *R. uvaginus*, *R. milesi*, *R. mujibi* and *R. magnavesicula* by possessing eggs with floats. In contrast, *R. spinicauda* resembles very closely *R. rahimi*, which also possesses floated eggs, and *R. gubernaculus*, which bear bifurcated deirids. However, it differs from these species by the shape of vagina, and the position of vulva and the excretory pore.

The new species is most similar to *R. megasacculata*, *R. hillichii*, *R. nushkiai* Asmatullah-Kakar and Bilqees, 2007 (description based on single male), *R. magnavesicula*, *R. gubernaculus* and *R. milesi* in having 10 prostomal teeth and to those with 10-12 teeth include *R. charsaddiensis* and *R. rahimi* differing substantially from them by the length of spicules, number and arrangements of caudal papillae.

*Rhabdochona spinicauda* n. sp. possess 11 pairs of caudal papillae, 6 preanal, 5 postanal, and the length of spicules (LS) is 0.348-0.435 and 0.14-0.17, whereas *R. hellichii* has 19-20 pairs caudal papillae, 13-14, preanal, 6 postanal, LS:0.48 and 0.15; *R. nushkiai* Asmatullah-Kakar and Bilqees, 2007 (based on a male only) has 20 pairs of caudal papillae, 11 preanal, 9 postanal, LS:0.329 and 0.081; *R. magnavesicula* has 9 pairs of caudal papillae, 4 preanal, 5 postanal, LS:0.284-0.345 and 0.1-0.13; *R. gubernaculus* has 15 pairs of caudal papillae, 8 preanal, 1 adanal and 6 postanal, LS:0.198-0.324 and 0.062-0.083; *R. milesi* has 19 pairs of caudal papillae, 12 preanal, 7 postanal, LS:0.314-0.355 and 0.09-0.1. In *R. charsaddiensis* and *R. rahimi* caudal papillae consisted of 15-17 pairs including 10-11 preanal 5-6 postanal respectively, LS being 0.54-0.58 and 0.09-0.103, and 0.29-0.3, 0.062-0.063, respectively. Males of *R. megasacculata* are not described.

The following species of *Rhabdochona* reported from other regions also have 10 teeth, namely, *R. paxmani* and *R. salmonis* Maggneti Armand., Fawzia Abdel-Rehman and Cid Del Prado Vera., 1992; *R. lichtenfelsi* Sanchez-Alvarez, Garcia-Prieto. and Perez-Ponce De Leon., 1998; *R. mazedii* Prasad and Sahay, 1965 (Sood, 1988 mentioned 10 prostomal teeth) *R. onchorynchi*

(Fujita, 1921) Fujita, 1927; *R. mexicana* Caspeta-Madujano, Moravec and Guillermo Salgado-Maldonado., 2000; *R. ahuehuelensis* Mejía-Madrid and Pérez-Ponce de León, 2003. *R. kisutchi* Margolis, Moravec and McDonald., 1975; *R. singhi* Ali, 1957; *R. catostomi* Kyton, Kritsky and Tobias., 1979 and *R. penangensis* Furtado, 1965. However, these species differ largely from *R. spinicauda* in lacking a prominent spine on the tail tip of females. In addition, these species exhibit obvious differences in other differential diagnostic features including the shape and length of spicules, the number of caudal papillae in males and the structure of egg (except in *R. kisutchi*, *R. onchorynchi*, *R. mexicana* and *R. singhi*) and vagina. *Rhabdochona kisutchi*, *R. onchorynchi*, *R. mexicana* and *R. singhi* closely resemble *Rhabdochona spinicauda* n. sp. in having eggs with cuticular floats.

Based on the above discussion, we submit that the present material represents a new species for which the name *Rhabdochona (Globochona) spinicauda* is proposed.

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