Pakistan J. Zool., vol. 42(1), pp. 75-80, 2010.

Rhabdochona (*Filochona*) *gubernaculus* New Species (Nematoda: Rhabdochonidae) from Riverine Fish *Cyprinion watsoni* (Day, 1872) in Balochistan, Pakistan

Asmatullah-Kakar*, Fatima Mujib Bilqees* Kashif Kamran and Gul-e-Shadab Mukhtar
Department of Zoology, University of Balochistan, Quetta, Pakistan (AK, KK, GESM) and
Department of Zoology, Jinnah University for Women, Karachi 74600, Pakistan (FMB)

Abstract.- Parasitological studies of nematode parasites of freshwater fishes have been conducted in River Bolan, Balochistan. A new species of nematode genus *Rhabdochona* Railliet, 1916 is described from the stomach of a local cyprinid fish *Cyprinion watsoni*. The new species *R.* (*F.*) *gubernaculus* n. sp. belongs to the subgenus *Filochona* Saidov, 1953 which differs distinctly from other species of the genus in possessing a gubernaculum. The new species is also characterized by the presence of ten teeth in the prostome, eight pairs of preanal, one adanal and six postanal caudal papillae in the males and by unifilamented eggs in the adult females. In both male and female specimens, the excretory pore is postequatorial.

Key words: Nematode, *Rhabdochona* (*Filochona*) *gubernaculus* n. sp., *Cyprinion watsoni*, Bolan, Balochistan.

INTRODUCTION

The genus *Rhabdochona* Railliet, 1916 is a diverse group of freshwater fish nematodes, with more than 150 known species distributed worldwide. *R. praecox* (Pionar and Kannangara, 1972) has been reported from a freshwater crab, *Paratephusa rugosa* (Alcock, 1909), from Sri Lanka (Ceylon) and *R. puylaerti* (Moravec, 1983) from a snake, *Causus rhombiatus* (Lichtenstein, 1823), from Uganda. Only *R. parastromatei* (Bilqees, 1979), *R. marina* (Lakshmi and Sudha, 1999) and *R. Indiana* (Lakshmi, 2001) are recorded from marine fishes. The present paper provides the description of a new species, *R.* (*F.*) *gubernaculus*, belonging to the subgenus *Filochona* Saidov, 1953, from the fish species *Cyprinon watsoni*, from river Bolan, Balochistan.

MATERIALS AND METHODS

Thirty seven nematodes including 19 males and 18 females were collected from the stomach of 8 out of 12 *Cyprinion watsoni* (Day) of river Bolan, Balochistan in September, 2005. Dissection and examination for parasitic nematodes were performed under dissecting light microscope. Nematodes were fixed and preserved in 70% ethanol and cleared with glycerin for examination. For enface view, the specimens were placed on a glass slide using an arrow pin and the prostome was cut by a sharp blade and flattened with a drop of glycerin under a cover slip and examined under light microscope. Drawings were made with the aid of a Zeiss microscope drawing tube. All measurements are given in millimeters (length x width). The specimens have been deposited in the helminthological collection of Fish Parasitology, Department of Zoology, University of Balochistan, Quetta.

***Rhabdochona* (*Filochona*) *gubernaculus*,** new species
(Figs. 1-2)

Description

Description is based on 9 male and 8 female nematods. Small to medium-sized worms, body smooth, tapering anteriorly and posteriorly. Anterior extremity flat, posterior bluntly pointed in male and rounded in female. Buccal capsule funnel-shaped, wider in female. Ten prostomal teeth, 3 of which are dorsal, 3 ventral and 2 on each lateral side. Teeth broad, rounded anteriorly. Deirids bifurcated, located in the second half of muscular esophagus in male while slightly posterior to the middle of

* Corresponding author: asmardanzai@yahoo.com
0030-9923/2010/0001-0001 $ 8.00/0

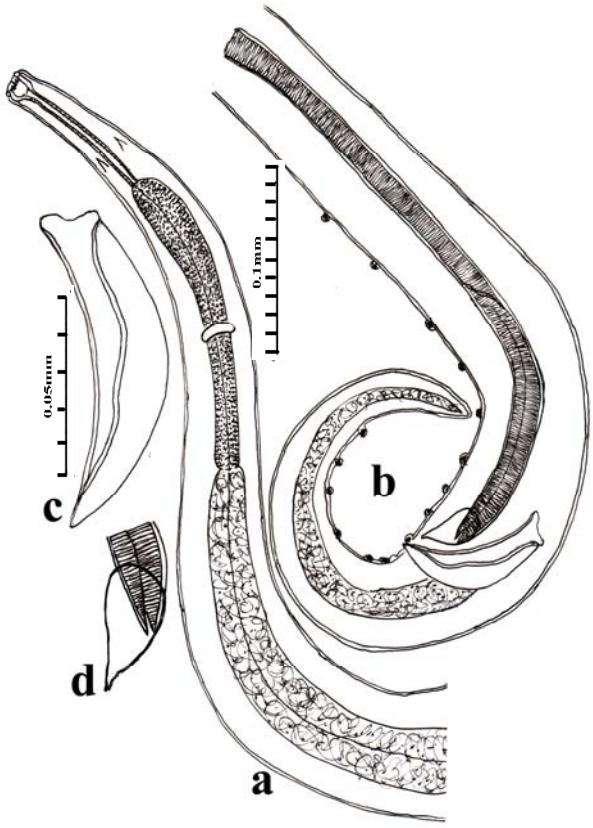

Fig. 1. *Rhabdochona (Filochona) gubernaculus*, new species. Holotype male: a, Anterior region showing buccal capsule, muscular and glandular esophagus and anterior portion of intestine, nerve ring and deirids also seen; b, Posterior region showing large and small spicules, caudal papillae and tail; c, Small spicule enlarged; d, Enlarged posterior tip of large spicule with gubernaculums. Scale bar of Fig. 1.

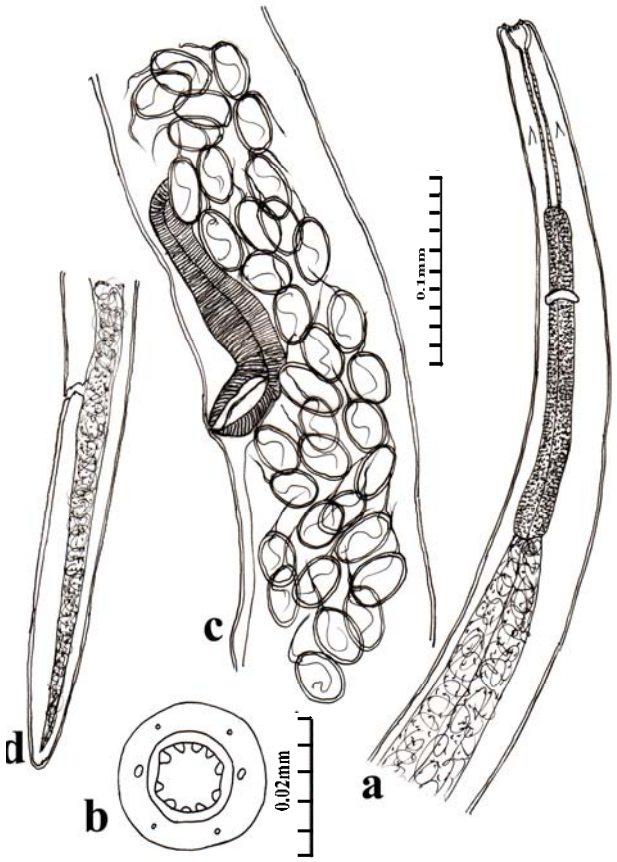

Fig. 2. *Rhabdochona (Filochona) gubernaculus*, new species. allotype female: a, Anterior region showing buccal capsule, muscular and glandular esophagus and anterior portion of intestine, nerve ring and deirids also seen; b, Enface view showing prostomal teeth; c, Region of genital opening showing marginal vulva, vagina and filamented eggs; d, Posterior region showing tail, and associated structure.

muscular esophagus in female. Nerve ring encircling the glandular esophagus, situated below the middle of glandular esophagus in male, but in the anterior half of glandular esophagus in female. Glandular esophagus of both the sexes much longer and wider than the muscular portion of esophagus. Anterior part of glandular esophagus much wider than the rest of the portion, slightly narrow in male. Excretory pore postequatorial.

Two spicules, unequal and dissimilar. Spicules length ratio 1:3.51-3.90. Large spicule striated throughout its length, broad and flat at the anterior tip, almost of uniform thickness becoming pointed and bifurcated at the posterior tip with sharp pointed ends. Small spicule convex dorsally and slightly concave on the ventral side, divided intwo parts longitudinally with notched anterior end, posterior end is pointed. A small leaf-like chitinous piece present: the gubernaculum. Gubernaculum is a rare feature in the genus *Rhabdochona*. Fifteen pairs of caudal papillae, including 8 preanal, 1 adanal and 6 postanal.

Females larger than males. Vulva submarginal, oval in shape consisting of two elongate, overlapping lips, postequatorial in position. Vagina strongly muscular directed upward

joining the uterus. Eggs numerous, unifilamented oval, relatively large, double walled. Excretory pore postequatorial.

Male (n=9)

Body length 2.7- 3.5 (3.08), greatest width 0.09-0.14 (0.11), prostome 0.002-0.004 (0.003) x 0.005-0.007(0.059), mesostome 0.0064-0.0084 (0.0073) x 0.009-0.14 (0.086), muscular esophagus 0.063-0.072 (0.066) x 0.0042-0.0065 (0.0052), glandular esophagus 0.094-0.162 (0.126) x 0.01-0.02 (0.013) in size. Distance of nerve ring, deirids and excretory pore 0.131-0.175 (0.146), 0.055-0.062 (0.059) and 1.14-2.22 (1.57) respectively from the anterior end of body. Large spicule 0.218-0.324 (0.262) x 0.012-0.018 (0.0154) 0.062-0.083 (0.063), small spicule 0.069-0.097 (0.082) x 0.015-0.023 (0.017). Spicules length ratio 1: 3.51-3.90 (3.68). Gubernaculum 0.012-0.03 (0.02) x 0.01-0.018 (0.015). Tail 0.07-0.09 (0.08) mm long.

Female (n=8)

Body length 3.14-4.22 (3.74), greatest width 0.093-0.138 (0.109), prostome 0.0023-0.0035 (0.0029) x 0.0069-0.0075 (0.0072) mesostome 0.007-0.01 (0.008) x 0.009-0.012 (0.01), muscular esophagus 0.069-0.082 (0.076) x 0.0051-0.0065 (0.0058), glandular esophagus 0.098-0.164 (0.132) 0.009 x 0.018 (0.0134). Distance of nerve ring, deirids and excretory pore from the anterior end of body 0.098-0.14 (0.113), 0.047-0.053 (0.049) and 1.35-2.[illegible] (1.95) respectively. Vulva 0.03-0.05 (0.04) x 0.017-0.023 (0.019), anterior vulvar lip 0.028-0.037 (0.033) x 0.0031-0.0043 (0.0036), posterior vulvar lip 0.02-0.032 (0.028) x 0.005-0.007 (0.006). Distance of vulva from the posterior end of body 1.21-2.13 (1.60). Vagina 0.121-0.151(0.141) x 0.027-0.033 (0.029). Mature eggs 0.012-0.037 (0.025) x 0.0097-0.02 (0.015).. Tail 0.1-0.2 (0.13) mm long.

Taxonomoic summary

Type host:	*Cyprinion watsoni* (Cyprinidae)
Site of infection:	Stomach
Type locality:	River Bolan, Balochistan
Number of specimens:	37 nematodes, 19 males and 18 females from 8 fishes, maximum 9 males and 7 females from a single fish, 12 hosts were examined.
Holotype male:	ZBU-N50
Allotype female:	ZBU-N51

Etymology

The species name *R.* (*F.*) *gubernaculus* refers to the presence of a gubernaculum in males.

DISCUSSION

The present new species *R.* (*F.*) *gubernaculus* n. sp. differs distinctly from all known species of the genus *Rhabdochona* Railliet, 1916 in having a gubernaculum, a rare character in the genus. In *R. filamenta* Weller, 1938, a gubernaculum was described, but it was actually the short spicule, and the area designated as the short spicule was a curvature of the wall of the grooved ventral posterior part of the true short spicule (Weller, 1938). Chouqette (1951) also mentioned that "what appear to be a gubernaculum is an optical effect caused by a bend in the spicule". But the present species appears to have a true gubernaculum, clearly visible as a chitinous small leaf-like structure, in addition to a large and a small spicule.

The new species is included in the group of species having 10 teeth in the prostome. Those possessing 10 teeth reported from Pakistan includes *R. megasacculata* Ghazi and Atta-u-Rahim, 1999 (description based on the female only); *R. hellichi* Sramek, 1901; Akram and Khatoon, 2001; *R. nushkiai* Asmatullah-Kakar and Bilqees, 2007 (description based on the single male only); *R. milesi* Asmatullah-Kakar *et al*., 2008a and *R. magnavesicula* Asmatullah-Kakar and Bilqees, 2008. The new species differs from the above mentioned species in the morphology and size of spicules, number and arrangement of caudal papillae, and. in the possession of bifurcated deirids, instead of simple ones. In *R. megasacculata* deirids are not described.

Rhabdochona gubernaculus n. sp. possesses 15 pairs of caudal papillae, including 8 preanal, 1 andanal and 6 postanal; spicules length ratio is 1:3.51-3.90. In *R. hellichi*, caudal papillae are arranged in 19-20 pairs: 13-14 preanal and 6 postanal; spicules length ratio is 1:2.8-3.2; in *R. magnavesicula* caudal papillae are 9 pairs: 4 preanal and 5 postanal; spicules length ratio is 1:2.85-2.84.

R. nushkiai has 20 pairs of caudal papillae, including 11 preanal and 9 postanal; spicules length ratio is 1: 4.06. Male of *R. megasacculata* is not known.

The female of *R. gubernaculus* n. sp. has a strongly muscular vagina directed upward, whereas in the rest of species included within the 10 prostomal teeth group, is directed backward. Eggs of *R. gubernaculus* n. sp. has one filament, whereas in the rest of species of this group, eggs are smooth, excepting those of *R. hellichi*, with two X filaments. The present new species differs from *R. megasacculata*, *R. hellichi* and *R. magnavesicula* in having a preequatorial vulval opening but is similar to *R. magnavesicula* in having a postequatorial excretory pore. In *R. megasacculata* and *R. hellichi*, the genital opening is postequatorial as in *R. magnavesicula*. Female of *R. nushkiai* is not known.

R. charsaddiensis Siddiqi and Khattak, 1984 and *R. rahimi* Ghazi *et al*., 2003, reported from Pakistan, have 10-12 teeth. *R. sarana* Inglerve and Naik, 1951, Akram and Khatoon, 2001, *R. kharani* Asmatullah *et al*., 2006, *R. watsoniai* Asmatullah-Kakar and Bilqees, 2007a, *R. uvaginus* Asmatullah-Kakar and Bilqees, 2007b, and *R. bolani* Asmatullah-Kakar, Fatima Mujib Bilqees and Saeed Ahmad, 2008a) have 8 teeth. Species possessing only 3 teeth include *R. magna* Khan and Yaseen, 1969 (description based on the female only) and *R. cavasius* Rehana and Bilqees, 1973a. There are 4 teeth in the prostome of *R. chanawanensis* Zaidi and Khan, 1975 (description based on male only). The number of teeth in *R. schizothoracis* Siddiqi and Khattak, 1984 is not described. The above mentioned species are remarkably different from the new species in lacking a gubernaculum and in the number and metrical arrangements of caudal papillae, relative size of spicules and the morphology of eggs. These species are devoid of deirids, except *R. charsaddiensis*, *R. watsoniai* and *R. bolani*, which have simple deirids rather than bifurcated, as in *R. gubernaculus* n. sp..

The following Pakistani species (which description is based on male specimens only) have 6 prostomal teeth: *R. bifidum* Asmatullah-Kakar and Bilqees, 2007c, *R. hingoli* Asmatullah-Kakar and Bilqees, 2007c and *R. cephalodiverticola* Asmatullah-Kakar, Fatima Mujib Bilqees and Saeed Ahmad, 2008a. These species differ in important diagnostic features from the species under consideration in relevant length of spicules, number and arrangement of caudal papillae and shape of deirids.

In *R. charsaddiensis* and *R. rahimi* caudal papillae are 15-17 pairs, 10-11 preanal and 5-7 postanal, spicules lenght ratio is 1:5.63-6 and 1:4.76-4.83 in *R. charsaddiensis* and *R. rahimi* respectively. *R. kharani* has 17-18 pairs of caudal papillae, 10-11 preanal, 1 adanal, 6-7 postanal, spicules lenght ratio is 1:3.6-3.8. *R. uvaginus* has 13 pairs of caudal papillae, 8 preanal, 5 postanal, spicules lenght ratio is !:2.30 (description of male based on single specimen only) The species *R. watsoniai* (description based on single male only) and *R. bolani* posses 17 pairs of caudal papillae, these are 12 preanal and 5 postanal, spicules lenght ratio is 1:4.13 and 1:5.49-5.91 respectively. In *R. cavasius* caudal papillae are 14 pairs, 8 preanal, 6 postanal, spicules lenght ratio is 1:2.85 (description of male based on single specimen only). *R. chanawanensis* has 20 pairs of caudal papillae, 11 preanal, 9 postanal, spicules lenght ratio is 1:1.95-2.21. In *R. schizothoracis* caudal papillae are 15 pairs (similar to new species) including 9 preanal and 6 postanal, spicular ratio is beginning 1:2.73-3.01. Males of *R. sarana* and *R. magna* are not known.

The above named species have smooth eggs excluding *R. charsaddiensis* and *R. schizothoracis* which posses eggs with polar filaments as in the species under consideration. In *R. rahimi* eggs are provided with lateral cuticular floats. In these species the excretory pore is preequatorial and vulva is postequatorial differ from the present new species.

The species bearing 10 prostomal teeth described from other localities (North and South America, Japan, India and Malaysia) include *R. paxmani* and *R. salmonis* Maggneti *et al*., 1992, *R. lichtenfelsi* Sánchez-Alvarez, Garcia-Prieto and Perez-Ponce De Leon *et al*., 1998, *R. mazeedi* Prasad and Sahay, 1965 (Sood [1988] mentioned 10 prostomal teeth), *R. onchorynchi* (Fujita, 1921) Fujita, 1927a, *R. mexicana* Caspeta-Mandujano, Moravec and Salgado-Maldonado, 2000, *R. ahuehuellensis* Mejía-Madrid and Pérez-Ponce de

León, 2003, *R. kisuchi* Margolis, Moravec and Mcdonald, 1975, *R. singhi* Ali, 1957, *R. catostomi* Kyton, Kritsky and Tobias, 1979, and *R. penangensis* Furtado, 1965. These species differ distinctly from the *R. gubernaculus* n.sp. in lacking a gubernaculum, spicules length, number and arrangements of caudal papillae and shape of eggs and vagina.

In conclusion, we consider the presence of a prominent leaf-like gubernaculum, as well as other differential characters above discussed, enough to justify the osal of a new species.

ACKNOWLEDGMENTS

The authors are grateful to University of Balochistan UOB and Higher Education Commission HEC that facilitated the study. We also express our gratitude to our colleagues who assisted in collecting the data.

REFERENCES

AKRAM, M. AND KHATOON, N., 2001. *Schizothorax plagiostomus*, a new host of nematode infection of *Rhabdochona* species from Gilgit, Pakistan. *Pakistan J. Zool*., **33**: 77-79.

ALI, S.M., 1957. es on the nematode parasites of fishes and bir Hyderabad State. *Indian J. Helminth*., **8** (1956): 1-83.

ALCOCK, A., 1909. Di is of new species and varities of freshwater crabs. Nos.1-3. *Rec. Indian Mus.*, **3**: 243-252.

ASMATULLAH-KAKAR, BILQEES, F. M. AND KAKAR, J. K., 2006. *Rhabdochona kharani* sp. n. (Nematoda: Rhabdochonidae) from the fish *Labeo gedrosicus* Zugmayer, 1912 from Garruk, District Kharan, Balochistan. *Acta Parasit. Turc*., **30**: 63-68.

ASMATULLAH-KAKAR AND BILQEES, F. M., 2007a. Two new species of the genus *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from the fishes *Cyprinion milesi* Day, 1880 and *C. watsoni* Day, 1872 of Nushki, Balochistan. *Pakistan J. Nematol*., **25**: 147-155.

ASMATULLAH-KAKAR AND BILQEES, F. M., 2007b. *Rhabdochona uvaginus* new species (Nematoda: Rhabdochonidae) from the fish *Tor putitora* of River Bolan, Balochistan. *Pakistan J. Zool*., **39**: 51-55.

ASMATULLAH-KAKAR AND BILQEES, F. M., 2007c. Two new species of *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from the fishes of Hingol River and Bolan River of Balochistan. *Proc. Parasitol*., **44**: 29-39.

ASMATULLAH-KAKAR AND BILQEES, F.M., 2008. *Rhabdochona magnavesicula* new species (Nematoda: Rhabdochonidae) from the fish *Schizocyprus brucei* Regan, 1914 of River Loni, Musakhel, Balochistan, Pakistan. *Proc. Parasitol*., **46**: 49-65.

ASMATULLAH-KAKAR, BILQEES, F. M. AND SAEED A., 2008a. Two new species of the genus *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from the fish *Tor putitora* (Cyprinidae) of Bolan, Balochistan, Pakistan *Pak. J. Nematol*., **26**: 21-28.

ASMATULLAH-KAKAR, BILQEES, F. M. AND NAWAZ, M., 2008b. A new species of *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from a freshwater fish in Khaisar valley, Balochistan, Pakistan. *Proc. Parasitol*., **45**: 53-66.

BILQEES, F.M., 1979. *Rhabdochona parastromatei* sp. nov. (Nematoda: Rhabdochonidae) from the fish *Parastromateus niger* (Bleeker) of the Karachi coast. *Zool. Scr*., **8**: 107-110.

CASPETA-MANDUJANO, J. M., MORAVEC, F. AND SALGADO-MALDONADO, G., 2000. *Rhabdochona mexicana* sp. n. (Nematoda: Rhabdochonidae) from the intestine of characid fishes in Mexico. *Folia Parasitol*., **47**: 211 – 215.

CHOQUETT, L.P.E., 1951. On the nematode genus *Rhabdochona* Railliet, 1916 (Nematoda: Spiruroidea). *Can. J. Zool.*, **29**: 1-16.

FUJITA, T., 1927. On the new species of nematodes from Lake Bewa. *Jap. J. Zool*., **1**: 169.

FURTADO, J. I., 1965. *Rhabdochona penangensis* sp. nov. (Nematoda: Rhabdochonidae) from a Malayan cyprinid fish. *Zool. Anz*., **174**: 231-236.

GHAZI, R. R. AND ATTA-U-RAHIM., 1999. Proposal of a new species *Rhabdochona megasacculata* (Nematoda: Rhabdochonidae) from a freshwater fish *Brilius vagra* (Ham.1889) caught from the Chatter steam, Islamabad. *Proc. Parasitol*., **28**: 61-65.

GHAZI, R. R., NOOR-U-NISSA. AND BILQEES, F. M., 2003. First report of the genus *Rhabdochona (Globochona) rahimi* sp. n. from a freshwater fish, *Brilius vagra* in Pakistan. *Acta Parasitol. Turc*., **27**: 217-221.

KARVE, J. AND NAIK, G. G., 1951. Some parasitic nematodes of fishes. II. *J. Univ. Bombay*., **19**: 1-37.

KHAN, D. AND YASEEN, T., 1969. Helminth parasites of fishes of East Pakistan 1. Nematodes. *Bull. Dept. Zool. Punjab Univ*., **4**: 1-33.

KYTON, R. J., KRITSKY, D. C. AND TOBIAS, R. C., 1979. *Rhabdochona catostomi* (Nematoda: Rhabdochonidae) from the intestine of *Catostomus* spp. *Proc. helminth. Soc. Wash*., **46**: 224-227.

LAKSHMI, B. B., 2001. *Rhabdochona indiana* n. sp. (Nematoda: Rhabdochonidae) from the intestine of *Pempheris vanicolensis*. *Bol. Chil. Parasitol*., **57**: 3-4.

LAKSHMI, B. B. AND SUDHA, M., 1999. On a new species *Rhabdochona marina* (Nematoda: Rhabdochonidae) from the intestine of *Pempheris vanicol* (Cuvier) of

Visakhapatnam. Uttar Pradesh. *Uttar Pradesh J. Zool*., **19**: 165-170.

LICHTENSTEIN, G., 1823. Viperidae: *Causus rhombeatus*, *Sepedon rhombeatus* (Lichtenstein). *Verz. Doubl. Mus. Berlin*., **1**: 106.

MAGGENTI, A. R., ABDDEL-RAHMAN, F. AND VERA, I., 1992. New species of *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from rainbow trout in California streams. *J. Nematol*., **24**: 379-390.

MARGOLIS, L., MORAVEC, F. AND MCDONALD, T. E., 1975. *Rhabdochona kisutchi* sp. nov. (Nematoda: Spiruroidea) from Coho salmon, *Oncorhynchus kisutch* (Walbaum), of Western Canada. *Can. J. Zool*., **53**: 960-966.

MEJIA-MADRID, H. AND PEREZ-PONCE DE LEON, G., 2003. *Rhabdochona ahuehuellensis* 1916 (Nematoda: Rhabdochonidae) from the Balsas goodieid, *Ilyodon whitei* (Osteichthyes: Gooddeidae) in Mexico. *J. Parasitol*., **89**: 356-361.

MORAVEC, F., 1983. *Rhabdochona puylaerti* sp. n. (Nematoda: Rhabdochonidae) recorded from the African viper *Causus rhombeatus* (Lichtenstein). *Folia Parasitol*., **30**: 313-317.

PRASAD, D. AND SAHAY, U., 1965. On *Rhabdochona mazeedi* sp. nov. (Thelaziidae, Rhabdochoninae, *Rhabdochona* Ralliet, 1916) from the intestine of *Eutropiichty vacha. Indian J. Helminthol*., **17**: 43-48.

POINAR, G.O. JR. AND KANNANGARA, D.W., 1972. *Rhabdochona praecox* sp.n. and *Proleptus* sp. (Spiruroidea: Nematoda) from fresh water crabs in Ceylon. *Ann. Hum. Comp*., **47**:121-129.

REHANA, R. AND BILQEES, F.M., 1973a. *Rhabdochona cavasius* sp. n. (Nematoda: Rhabdochonidae) from a freshwater fish *Mystus vitattus* (Ham.) of Kalri lake Sind, Pakistan. *J. scient. industt. Res*., **16**: 110-111.

SAIDOV, Y.U.S., 1953. Revision of the family Rhabdochonidae Skrjabin, 1946 and the subfamily Cyclozoninae Sobolev, 1949), Sb. "*Rabory po gelmintologii*" *k 75-letiyu Akad. K. I. Skrajabina, Moscow*., pp. 622-635 (in Russian).

SANCHEZ-ALVAREZ, A., GARCIA-PRIETO, L. AND PEREZ-PONCE DE LEON, G., 1998. A new species of *Rhabdochona* Railliet, 1916 (Nematoda: Rhabdochonidae) from endemic goodeids (*Cyprinodontiformes*) from two Mexican lakes. *J. Parasitol*., **84**: 840-845.

SIDDIQI, M. N. AND KHATTAK, A. R., 1984. Three new species of the family Rhabdochonidae Skrjabin, 1946 from fishes of N.W.F. P., Pakistan. *Pakistan J. Zool*., **16**: 181-188.

WELLER, T. H., 1938. Desricption of *Rhabdochona ovifilamenta* n. sp. (Nematoda: Thelaziidae) with a note on the life history. *J. Parasitol*., **24**: 403-407.

ZAIDI, D. A. AND KHAN, D., 1975. Nematode parasites from fishes of Pakistan. *Pakistan J. Zool*., **7**: 51-73.

(Received 29 May 2009, revised 18 August 2009)