

A new nematode of the genus *Rhabdochona* (*Rhabdochona*) from *Botia dario* (ornamental fish) from Jiri River, Jiribam, Manipur, India

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ABSTRACT

During a taxonomic study of parasites of freshwater fishes, three new gravid female nematodes of the genus *Rhabdochona* were recovered from the intestine of a freshwater fish, *Botia dario* caught from Jiri River. Detail study revealed the specimen as a medium-sized nematode, tapering at both ends with finely striated cuticle, 14 anterior teeth in the funnel-shaped prostome, vulva post-equatorially open, vagina muscular, posteriorly directed with an ovejector, eggs oval, thin-shelled and embryonated, tail tip conoidly pointed. Thus, the present species is assigned to the genus *Rhabdochona*. Prevalence and intensity of infection is 20% (1/5) and 3(3/1) parasite per host, respectively. Comparing the relative characteristics of the two conspecies, the present species closely resembles *Rhabdochona* (*Rhabdochona*) *acuminata*. It differs in a few aspects such as the longer oesophagus, more anteriorly located excretory pore, longer vagina, thin-shelled eggs but smooth-shelled eggs in *R.(R) acuminata*, conoidly pointed tail tip but bluntly ended in *R. (R.) acuminata*. Based on these distinguishing characters the present species is described as a new species giving the name *Rhabdochona* (*Rhabdochona*) *jiribamensis* n. sp.

Figurs : 02

References : 14

Tables : 02

KEY WORDS : *Botia dario*, Jiri River, *R. jiribamensis*.

Introduction

Manipur is located in the extreme east zone of India; there is a greater chance of availability of fish fauna which occurs in varied fresh water habitats being influenced by Burmese fish fauna. Jiribam is located in the western most part of Manipur where it borders with the states of Assam. It is drained by Barak River, Jiri River and many small canals. Manipur is also one of the states having a high fish consumption rate. Fisheries and aquaculture hold an essential role in food security, nutrition and employment of a large number of people. Besides proper awareness for a hygienic way of fish consumption is highly important as fishes are subjected to many parasitic infections due to their diverse feeding habits and habitats. During the course of a taxonomic study on parasites of freshwater fishes, in monsoon, three gravid female nematode species were recovered from the intestine of a fish host species, *Botia dario*⁵ from Jiri river.

The detailed comparative morphological analysis of the present species with their congeners reveals that it is closely related to the genus *Rhabdochona*¹³.

Rhabdochona are widely distributed as intestinal parasites infecting freshwater fishes in all zoogeographical regions of the world^{8,11}. The species of the genus *Rhabdochona* posses funnel shaped prostom supported by short longitudinal ridges projecting anteriorly as sharp teeth, long and narrow mesostom. There are records of 97 valid species of *Rhabdochona*. Although, taxonomic characters of some *Rhabdochona*⁹ species still remain inadequately described, therefore more studies are highly needed.

Materials and Methods

Fishes were collected from Jiri River, Jiribam during monsoon (May-August) of 2018. Fishes were anaesthetised and examined for the presence of parasites.

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TABLE-1: Comparison of *Rhabdochona*(*Rhabdochona*) *jiribamensis* n. sp. with its closely related species; dfae (distance from anterior end); dfpe (distance from posterior end); ABD (anal body diameter).

(Measurements are given in micrometer except when indicated)

Characters	<i>Rhabdochona</i> (<i>R</i>) <i>jiribamensis</i> n. sp.	<i>Rhabdochona</i> (<i>R</i>) <i>acuminata</i> ⁶	<i>Rhabdochona</i> (<i>R</i>) <i>californiensis</i> ¹	<i>Rhabdochona</i> (<i>R</i>) <i>denudata</i> ⁴
Body length (mm)	8.96-13.87	7.45-16.55	8.72-10.67	12.02-15.50
Body width (mm)	0.13-0.18	0.09-0.19	0.18-0.2	0.16-0.19
Teeth	14	14	14	14
Vestibule including prostom	112.5-137.88	100-192	107-135	105-123
Muscular oesophagus (mm)	0.45-0.49x0.02-0.03	0.22-0.44	0.33-0.49	0.43-0.46x0.03
Glandular oesophagus (mm)	2.45-3.99x0.02-0.06	1.05-1.91	1.85-2.04	4.45-5.39x0.09-0.12
Whole length of oesophagus (mm)	2.90-4.49	1.27-2.1	2.21-2.86	4.88-5.85
Nerve ring (dfae)	127-157	127-228	185-220	189-207
Excretory pore (dfae)	160-252	172-400	310-380	341-448
Deirids (dfae) (bifurcated)	65 (simple)	41-63 (simple)	53-86 (bifurcated)	108-117
Vulva (dfae) (mm)	5.11-7.53(54-57%)	3.35-7.7(dfpe)	4.26-5.68 (48.8-53.2%)	7.97-9.30 (dfpe: 60-66%)
Vagina	367-662x57.45-61.28	219-377	260-330	Not reported
Uterus	Amphidelphic	Amphidelphic	Amphidelphic	Not reported
Eggs	12-24x6-16 (thin-shelled)	24-31x15-18 (smooth-shelled)	31-37x18-20 (thin smooth)	36-39x24 (flock like coating)
Tail (dfpe)	191-271(conoidly pointed tip)	176-249 (conical with bluntly ended tip)	320-410 (elongated with a spicate mucro)	165-171(conical with spike)
ABD	48-57	Not reported	Not reported	Not reported
Phasmids	Present	Present	Present	Not reported

The recovered parasites (three gravid females) were washed in normal saline solution (0.7%). The specimens were fixed in A.F.A. (Alcohol Formalin Acetate) and dehydrated in G.A. (Glycerine Alcohol). The prepared permanent slides were examined under a light Olympus binocular microscope (CH20i) and photomicrographs were taken by Nikon Stereozoom-microscope (SMZ1270). Diagrams were drawn with the help of Camera Lucida and measurements of holotype and paratype specimens were taken by using Ocular micrometer. Measurements are given in micrometer (μm) except when indicated.

Observation:

Rhabdochona (Rhabdochona) jiribamensis n. sp.

Fig. 1(A-G), Fig. 2 (A-G)

Female:

Body medium-sized (8.96-13.87 x 0.13-0.18) mm, tapering at both ends, cuticle finely striated, mouth tetragonally opens with two pairs of cephalic papillae, a pair of lateral amphid present near the mouth, 14 anteriorly directed teeth (8 lateral+3dorsal+3ventral) of the length 9.06-10.57 are present in the funnel-shaped prostome (19-26 x 15), vestibule straight (112.5-137.88), muscular oesophagus (457-497 x 26.25-33), glandular oesophagus (2.45-3.99 x 0.02-0.06) mm, the whole length of the oesophagus (2.90-4.49) mm. Deirids, nerve ring (26-34 x 26-38) & excretory located at 65, 127- 157, 160-252 respectively from anterior end. Excretory vesicle (95.75-141.71), Vulva (5.11-7.53) post-equatorially open at 54-57% of the body length, vagina posteriorly directed with an ovejector & has 3 portions: muscular vagina, muscular sphincter, and tromp. Uterus amphidelphic, ovary diovarial, the anterior ovary reaches near the oesophago-intestinal junction then reflexed downwards and posterior ovary

extends near the rectum and then reflexed upwards. Eggs (12-24 x 6-16) oval, thin-shelled & embryonated, tail (191-271 x 48-57) with conoidly pointed tip, phasmids present near the tail tip.

Male: Not found.

Taxonomic summary:

Type host: *Botia dario* Hamilton, 1822 (Botidae)

Local name: Sarengkhoibi.

Site of infection: Intestine

Type locality: Jiri River, Jiribam (24°79² North Latitude, 93°94² East longitude), Manipur (23°50² North to 25°41² North Latitude, 93°00² East to 94°45² East Longitude), India.

Prevalence & Intensity of infection: 20% (1/5) and 3(3/1) parasite per host, respectively.

Deposition of Specimens: Holotype and paratype specimens were deposited to the museum of Parasitology Section, Centre of Advanced Studies in Life Sciences, Manipur University, Canchipur-795003, Imphal, Manipur (India).

Etymology: The new species is named after its locality of recovery- Jiribam, Manipur.

Ethical approval: All the procedures performed in research studies using fishes were in accordance with the ethical standards of the Institutional Animal Ethics Committee of Manipur University (M.U/D.Sc./ETHICS-7/09).

Results

A detail morphological observation of the 3 (three) gravid female enables for the identification of *Rhabdochona (Rhabdochona) jiribamensis n. sp.*

TABLE-2: Comparison of *Rhabdochona (Rhabdochona) jiribamensis n. sp.* with its closest species *R.(R.) acuminata*⁶, ABD (anal body diameter).

Characters	<i>Rhabdochona (R.) acuminata</i> ⁶	<i>Rhabdochona (R.) jiribamensis n. sp.</i>
Oesophagus	Shorter in length	Longer in length
Excretory pore	More posteriorly located	More anteriorly located
Vagina	Posteriorly directed, shorter in length	Posteriorly directed, longer in length
Eggs	Smooth-shelled	Thin-shelled
Tail tip	Conical with bluntly ended	Conoidly pointed
ABD	Not reported	48-57 μm

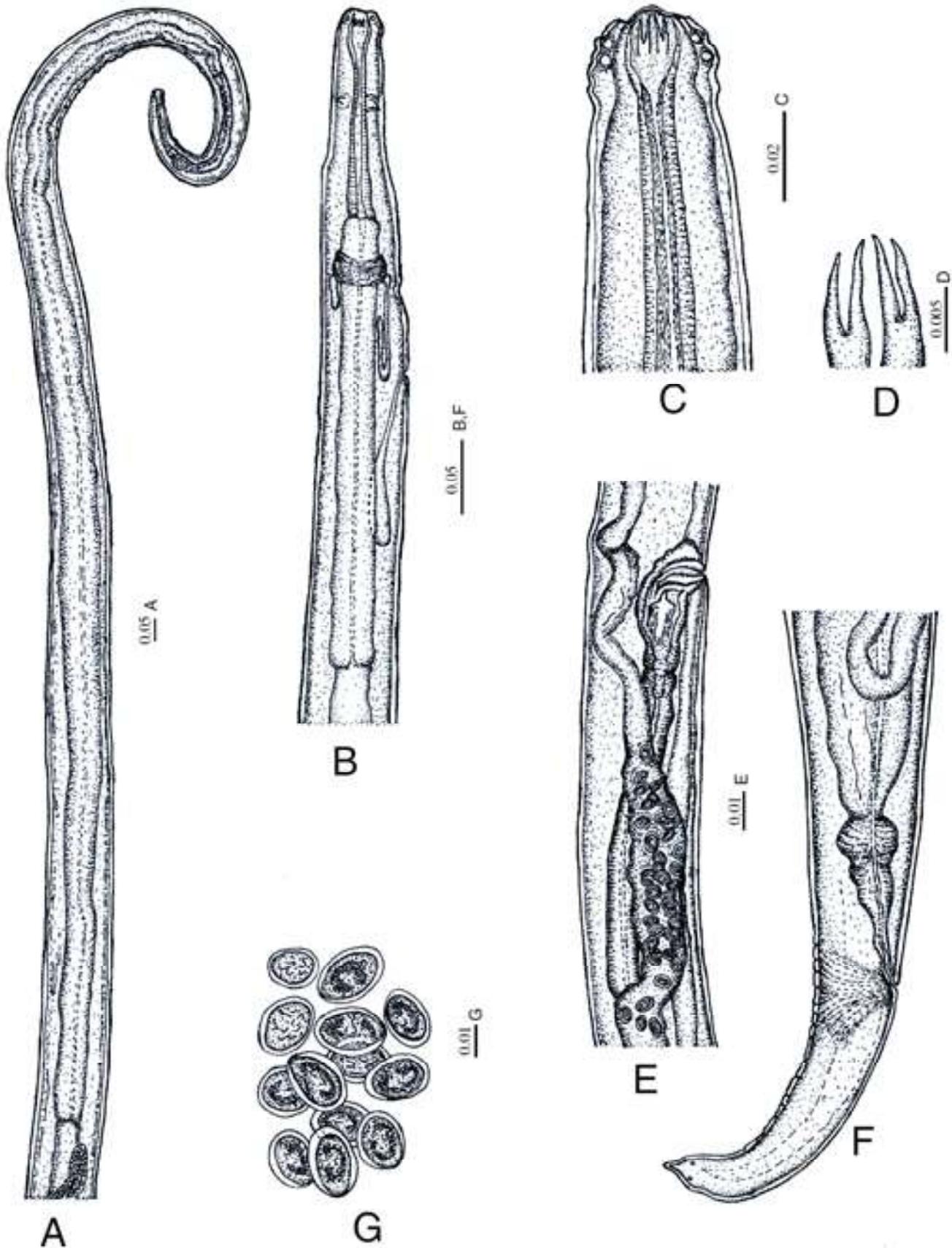


Fig. 1 (A-G) : *Rhabdochona* (*Rhabdochona*) *jiribamensis* n.sp. Female. (Scale bars in millimeters) A) Anterior end, lateral view, B) Anterior end, dorsoventral view, C) Anterior extremity, enlarge lateral view, D) Teeth, E) Vulvar region, lateral view, F) Posterior end, lateral view and G) Embryonated eggs (enlarged view)

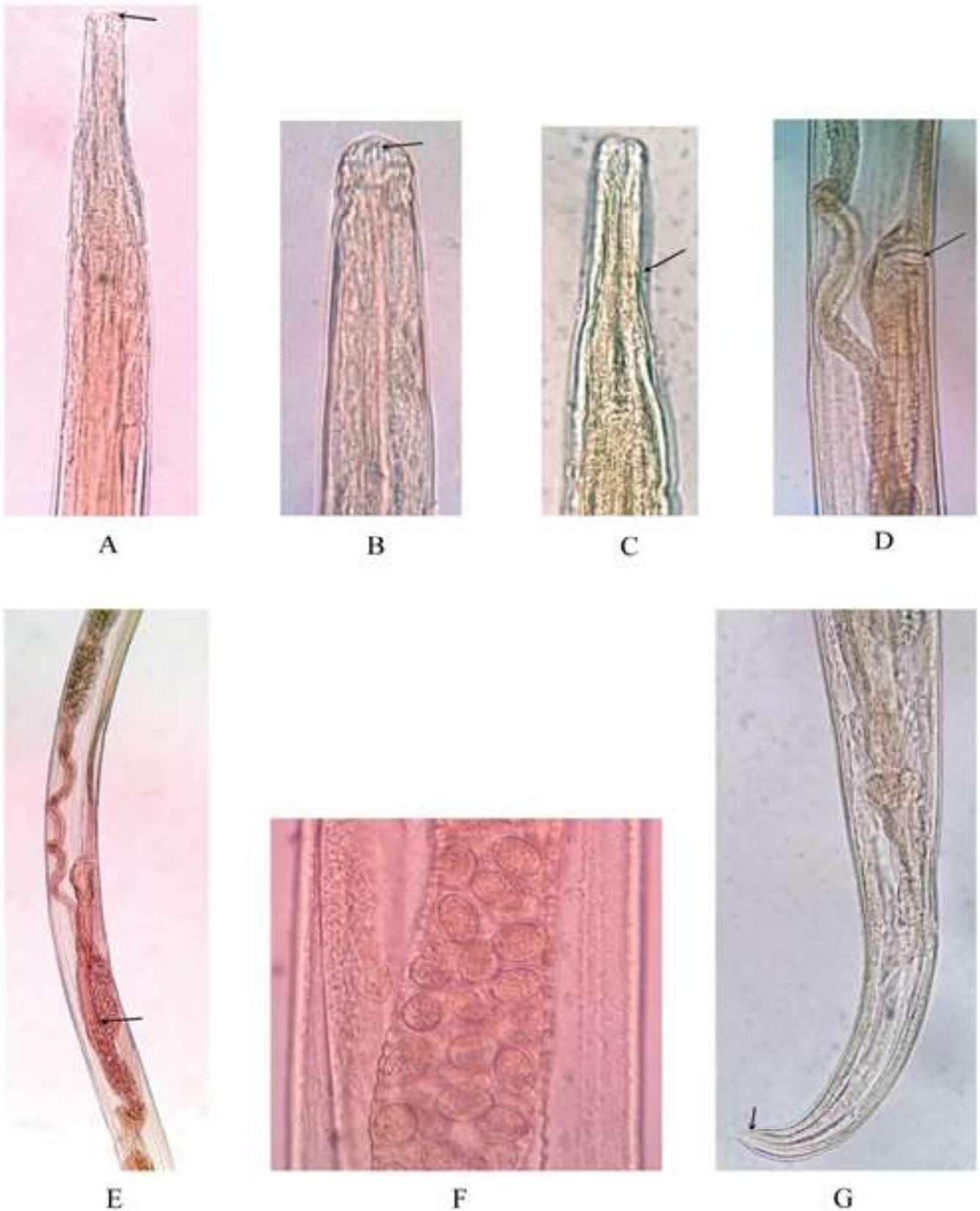


Fig. 2 (A-G) : *Rhabdochona (Rhabdochona) jiribamensis* n.sp. Female. A) Anterior region showing amphids, excretory pore, and nerve ring (dorso-ventral view), B) Anterior extremity showing teeth (enlarge lateral view), C) Anterior region showing deirids (dorso-ventral view), D) Mid-region showing vulva and vagina (lateral view), E) Mid-region showing bifurcation of uterus (lateral view), F) Mid- region showing eggs (lateral enlarged view) and G) Posterior end showing anal opening and phasmids (lateral view)

Discussion

Rhabdochonid nematodes are recurrent parasites of fishes. The prostomial structure is one of the defining characters of Rhabdochonids^{2,10}. Among the genera of Rhabdochonidae², only three genera *Beaninema*², *Fellicola*¹² and *Rhabdochona*¹³ possess an expanded anterior vestibular end that forms a funnel or barrel-shaped prostom and a posterior narrow tubular part forms mesotom. *Rhabdochona* differs from the rest genera in having short longitudinal ridges projecting anteriorly as sharp regular anterior teeth in the prostom.

Based on the morphology, eggs were classified¹⁴ the genus *Rhabdochona* into two subgenera *Rhabdochona* (eggs devoid of filaments), & *Filochona* (filamented eggs). Later, based on the type of egg Moravec⁷ divided the genus into three subgenera *Rhabdochona*, *Filochona*, & *Globochona* (eggs with special swellings). Further⁸ the only egg character is not sufficient to divide the genus into three subgenera and other characters such as number and arrangements of teeth in the prostom, presence of cervical alae, shape of the female tail tip & shape of deirids must be included.

Numbers of subgenera were raised into 4 (four) such as *Rhabdochona*¹³ (with 10-14 or 16 anterior teeth, tail tip conical in female, ending in sharp cuticular spike or rounded, eggs with a smooth surface or with very fine irregular gelatinous flocks, filaments or special polar swellings), *Globochona*⁷ (with 8 or 12 anterior teeth, the tail tip of the female widely rounded with numerous spins, mucronate points or tooth-like processes, eggs smooth or with lateral globules or swellings), *Globochonoides*⁸ (8 anterior teeth, the tail tip of the female with a crown of a minute tooth-like processes, the tail tip of male rounded and eggs smooth), & *Sinonema*⁸ (20-22 anterior teeth, the tail tip of female rounded).

But later³ were recognized only 3 (three) subgenera *Rhabdochona* (*Rhabdochona*) (eggs smooth or within ill-defined gelatinous covering), *Rhabdochona* (*Filochona*)¹⁴ (filamented eggs), and *Rhabdochona* (*Globochona*)⁷ (eggs with special hemispherical floats). From the overall studies the classification is followed in the present study which was widely accepted by many authors. The present species possess 14 anterior teeth in the prostom, a pair of simple deirid, conoidly pointed tail tip, and eggs with a smooth surface and non-filamented. Thus, it is assigned to the subgenus

Rhabdochona (*Rhabdochona*).

The present species comes closer to species *Rhabdochona* (*Rhabdochona*) *acuminata*⁶, *Rhabdochona* (*Rhabdochona*) *californiensis*¹ and *Rhabdochona* (*Rhabdochona*) *denudata*⁴ in many aspects such as in having 14 anterior teeth in the prostom, smooth eggshell without filaments, conical tail shape (Table-1).

Although *Rhabdochona* (*Rhabdochona*) *californiensis* differs from the present species in having shorter oesophagus (2.21-2.86) mm, bifurcated deirids, more posteriorly located excretory pore (310-380), more anteriorly open vulva (48.8-53.2%), shorter vagina (260-330), more elongated tail (320-410) with a spicate mucro. Moreover, *Rhabdochona* (*Rhabdochona*) *denudata*⁴ differs from the present species in having longer oesophagus (4.88-5.85) mm, bifurcated small deirids, more posteriorly located excretory pore (341-448), more posteriorly open vulva (60-66%), smooth, larvated with flock like coating eggs, shorter tail (165-171) with a cuticular spike at the tip of the tail.

Considering the relative characteristics of the 3 (three) conspecifics as shown in Table No.1, the present species is more closely related to *Rhabdochona* (*Rhabdochona*) *acuminata*⁶, in having both 14 anterior teeth, stylet like simple deirids, post-equatorially open vulva, non-filamented, oval with embryonated eggs, posteriorly directed vagina, amphidelphic uterus, diovarial ovary, the anterior ovary reaches near the oeso-phago-intestinal junction then reflexed downwards and posterior ovary extends near the rectum then reflexed upwards, and in having a conical tail. In spite of many similarities, *Rhabdochona* (*Rhabdochona*) *acuminata* differs from the present species in many aspects (Table No.2) such as shorter oesophagus (1.05-1.91 versus 2.90-4.49) mm, more posteriorly located excretory pore (172-400 versus 160-252) mm, shorter vagina (219-377 versus 367- 662) mm, smooth-shelled eggs versus thin-shelled eggs, conical tail with bluntly ended tip (176-249) versus conical tail with conoidly pointed tip (191-271). Based on these diagnostic morphometric differences from *Rhabdochona* (*Rhabdochona*) *acuminata* the present species could allow to erect as a new species and accommodated under *Rhabdochona* and assigned as a new species of *Rhabdochona* (*Rhabdochona*) giving the name as *Rhabdochona* (*Rhabdochona*) *jiribamensis* n. sp. (taking the name from Jiri river, Jiribam, the place of collection).

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