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Redescription of *Rhabdochona baylisi* Rai, 1969 from a cat fish, *Eutropiichthys vacha* from Jiri River, Jiribam, Manipur, India

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Abstract

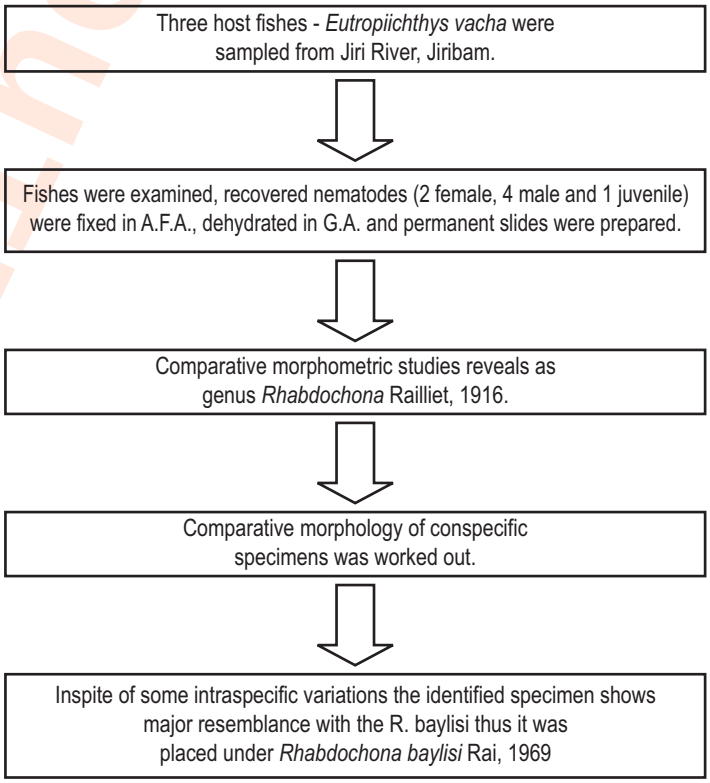
Aim: To investigate and record a taxonomic account on parasite fauna of freshwater fishes from Jiri River, Jiribam, Manipur (India).

Methodology: During the taxonomic study carried out in January-April 2019, the fishes were collected, anaesthetised, and examined for the presence of parasites. Recovered parasites (two gravid female and four adult male and one juvenile nematode species) from the intestine of *Eutropiichthys vacha* were washed, fixed, and dehydrated in Glycerine Alcohol. The permanent slide specimens were examined under a light binocular microscope.

Results: Based on the study, the recovered nematode was identified as *Rhabdochona baylisi* Rai, 1969 of the genus *Rhabdochona* Railliet, 1916.

The identified species possessed 8 prostomal teeth, U-loop shape vagina, smooth eggs, and tail with a rounded tip in both sexes. Thus, it can be assigned to the subgenus *Globochona* Moravec, 1972a. Moreover, it resembles with their conspecies *R. mazeedi*, *R. garuai*, *R. bosei* and *R. baylisi*, in general morphology. Comparing the relative characteristics with their conspecies, the present species has closely resembled *Rhabdochona baylisi* Rai, 1969 but differs in a few aspects such as the spicule length ratio (1:3.3 vs. 1:5.5), shorter with blunt tip left spicule in present species whereas more longer with bifurcated distal tip in *R. baylisi*, the number and arrangement of caudal papillae (13+0+5 vs.12+0+4), The present species posses 8 prostomal teeth whereas teeth are not reported in *R. baylisi.* Inspite of some intraspecific variations the identified specimen shows major resemblance with the *R. baylisi*, thus it was assigned to *Rhabdochona baylisi* Rai, 1969 as a new redescription record from Jiri River, Jiribam, Manipur (India).

Keywords: *Eutropiichthys vacha*, Jiri River, Manipur, Nematode, *Rhabdochona*



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Introduction

North East India is considered as one of the hot spots of freshwater fish biodiversity in the world (Kottelat and Whitten, 1996). Since Manipur is located in the extreme east zone of India, there is a greater chance in the available of fish fauna being influenced by Burmese fish fauna. According to recent reports a total of 139 ornamental fishes are found in Manipur. Out of the total 139 ornamental fishes found in the state of Manipur, 61 were recorded from Jiribam alone (Khomdram *et al.,* 2014).

Besides, a total of 117 fish species belonging to 65 genera and 25 families has been recorded from Chindwind headwaters in Manipur (Vishwanath *et al.,* 1998). Therefore, Manipur has a rich fish fauna which occurs in varied fresh water habitat. Jiribam is located in the westernmost part of Manipur where it borders with the state of Assam. It is drained by Barak River, Jiri River and many small canals. Jiri River meets the Barak River at Jirimukh conflux and hence, becomes the main reason of harboring a large number and variety of fish fauna (Khomdram *et al.,* 2014). Besides, fish also harbour many parasite fauna. The parasite fauna of freshwater fishes of Jiri River, Jiribam, Manipur, India is not yet fully explored. The present study was, therefore, carried out to record and establish a systematic account of the nematode fauna of fresh water fishes of Jiribam.

The nematode genus *Rhabdochona* Railliet, 1916 (Rhabdohonidae) comprises a large number of species parasitizing freshwater fishes in all zoogeographical regions (Moravec, 2010). The species of the genus *Rhabdochona* possessed funnel shaped prostom supported by short longitudinal ridges projecting anteriorly as sharp teeth, long and narrow mesostom. The prostomal structure is a defining character of the genus *Rhabdochona* (Caspeta-Mandujano *et al*., 2001; Moravec *et al*., 2001).

There are records of 97 valid species of the genus *Rhabdochona* (Moravec and Kamchoo, 2012). Although, taxonomic characters of some *Rhabdochona* species still remain inadequately described. Therefore new redescriptions are highly needed. Some morphological features that were not observed in *R. baylisi* Rai, 1969 which was reported from *Eutropiichthys vacha* (Hamilton, 1822) and *Clupisoma garua* (Hamilton, 1822) are redescribed in the present study.

Materials and Methods

Fishes were collected from Jiri River, Jiribam, during January-April 2019. Three fishes, *Eutropiichthys vacha* (Hamilton, 1822) were anaesthetised and examined for the presence of parasites. The recovered parasites were washed in normal saline solution (0.7%). The specimens were fixed in Alcohol Formalin Acetate and dehydrated (Seinhorst's, 1959 rapid glycerine method) in Glycerine Alcohol. The prepared permanent slides were examined under a light binocular microscope, and photomicrographs were taken by Stereozoom-microscope. Diagrams were drawn with the help of Camera Lucida and measurement of holotype and paratype specimens were taken by using ocular micrometer.

Description:

***Rhabdochona (Globochona) baylisi* :** Body medium sized, slender with finely striated cuticle. Prostom funnel shaped with 8 forwardly directed anterior teeth (Fig. 1B, 1C). Mouth hexagonal surrounded with 2 pairs of cephalic papillae. Simple and small deirids (Fig.1B), vestibule narrow, muscular, extending posteriorly upto the anterior end of oesophagus. Oesophagus long, tail conical.

Female: Body 33.13-37.82 X 0.36-0.39 mm, Prostom 0.04 x 0.02 mm, vestibule with prostom measuring 0.18-0.19 x 0.14 mm. Muscular oesophagus 0.59-0.68 x 0.04-0.05 mm, glandular oesophagus 4.71-5.96 x 0.13-0.16 mm. Total length of oesophagus 5.3-6.65 mm. Length of both oesophagus in 1:9 ratio. Nerve ring and excretory pore at 0.27-0.28 mm, 0.42-0.44 mm respectively from the anterior end. Vulva at 18.76-21.72 mm i.e., 57.45% of the body length. Vagina 0.84-0.89 X 0.11-0.13 mm, post-equatorial, directed first anteriorly and then posteriorly from vulva displaying as inverted U-shape (Fig. 1E, 2E). Embryonated, non filamented, thin and smooth eggs 0.02-0.03 x 0.01-0.02 mm (Fig. 1G, 2F). Tail 0.24-0.28 X 0.07 mm, conical with a rounded tip.

Male: Body 17.86-20.57 X 0.16-0.21 mm, Prostom 0.03-0.04 x 0.02 mm, vestibule with prostom 0.16-0.17 mm, nerve ring, excretory pore, deirids at 0.23-0.26 mm, 0.37 mm and 0.09 mm, respectively from the anterior end. Muscular oesophagus 0.54-0.64 X 0.03 mm, Glandular oesophagus 2.48-4.17 x 0.07 mm, in 1:8 ratio, total length of oesophagus 3.13-4.7 mm, representing 22.89% of the body. Papillae 12+1+4+1 in pairs, representing 12 pairs of sub-ventral preanal with 1 lateral pair, and 4 pairs of sub-ventral post-anal with 1 lateral pair (Fig.1F). Spicules unequal, non alate, short spicule 0.27-0.36 mm, long one 0.90-0.97 mm, length of spicules in 1:3.3 ratio. Tail conical 0.3 X 0.07 mm, ending with rounded tip.

4th stage larva: Body 8.85 mm, 6 teeth, funnel shaped prostom 0.02 X 0.01 mm, vestibule with prostom 0.11 x 0.007 mm, nerve ring, excretory pore at 0.17 mm and 0.25 mm, respectively from the anterior end. Muscular oesophagus 0.36 x 0.02 mm, Glandular oesophagus 1.93 x 0.06 mm, total length of oesophagus 2.29 mm, representing 25.87% of the body length. Tail 0.06 mm, conical with a rounded tip.

Taxonomic summary:

Type host: *Eutropiichthys vacha* (Hamilton, 1822)
Local name: Laria (Manipuri)
Site of infection: Intestine

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Type locality: Jiri River, Jiribam (24°79' North Latitude, 93°94' East longitude), Manipur (23°50' North to 25°41' North Latitude, 93°00' East to 94°45' East Longitude), India.

Prevalence of infection: prevalence and intensity of infection 33.33% (1/3) and 7(7/1) parasite per host, respectively.

Deposition of specimen: Holotype and Paratype specimens were deposited to the museum of Department of Zoology, Manipur University.

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 and Discussion

Taxonomic studies taken during January-April 2019, two female, four male and one juvenile nematode species of the genus *Rhabdochona* Railliet, 1916 were recovered from the intestine of fresh water fish, *Eutropiichthys vacha* (Hamilton, 1822) from Jiri River, Jiribam, Manipur (India).

Rhabdochonids are frequent parasites of freshwater fishes all over the world. According to Moravec and Kamchoo (2012), 97 species of the genus *Rhabdochona* are valid. Saidov (1953) subdivided the genus *Rhabdochona* into two subgenera, *Rhabdochona* and *Filochona* based on the egg filament. Moravec (1975) considered that classification based only on egg is not sufficient to divide the genus *Rhabdochona* into subgenera and emphasized on other characters such as number and arrangements of teeth in the prostom, presence of cervical alae, shape of female tail tip and shape of deirids. Later Moravec subdivided the genus into 4 subgenera, *Rhabdochona* Railliet, 1916; *Globochona* Moravec, 1972a; *Globochonoides* Moravec, 1975; *Sinonema* Moravec, 1975. But later Chabaud (1975) recognised only 3 subgenera, *Rhabdochona* Railliet, 1916, *Globohona* Moravec, 1972a and Filochona Saidov, 1953. Chabaud's classification is followed in this study which was widely accepted by many authors.

The subgenus *Globochona* Moravec, 1972a are the groups of genus *Rhabdochona* having 8 or 12 anterior teeth, tail tip of the female widely rounded with numerous spins (dim striations), mucronate points or tooth like processes, eggs smooth or with lateral globules or swellings. Only a few species of *Rhabdochona (Globochona)* are known from fresh water fishes in tropical and subtropical Asia and Africa (Moravec, 1975; Boomker and Petter, 1993; Wang *et al.,* 1994). Most South Asian *Rhabdochona* species produce eggs that have neither filament nor provide with any surface ornamentation. In India, six species of *Globochona* have been reported in freshwater fishes (Moravec, 1975, 2010; Boomker and Petter, 1993; Wang *et al.,* 1994; Moravec and Yooyen, 2011; Moravec and Kamchoo, 2012; Moravec and Jirku, 2014). Morever, *R. (G) puntii* (David, 2014) is reported from freshwater Indian fishes. So far 7 valid species of this subgenus is reported from freshwater fishes in India.

The present species is reported from *Eutropiichthys vacha*. Besides several other *Globochona* species (*R. baylisi, R. bosei, R. mazeedi* and *R. chanawanensis*) have been reported from the same host (*E. vacha)*. Moravec (2010) redescribed *R (G) mazeedi* Prasad and Sahay, 1965 from *Garua bachcha* (Hamilton, 1822) in Ganges River, West Bengal, India. Moravec (1975) and Soota (1983) considered *R. bosei,* Sahay,1966 as a synonym of *R. garuai*. Moreover, Sahay and Narayan (1971) considered *R. baylisi* as a synonym of *R. garuai*. Later, Moravec suppressed both *R. baylisi* and *R. bosei* under *R. (G) garuai*. Gupta and Masoodi (1982) agreed with Moravec and redescribed *R. (G) garuai* Agrawal, 1965 from *Wallago attu*. The present species posses 8 prostomal teeth (Fig. 1B, 1C, 2A, 2B), egg smooth (Fig.1G, 2F), tail with rounded tip in both sexes (Fig. 1F, 1H, 2D, 2G). Thus, it can be assigned to the subgenus *Globochona (*Moravec, 1972a). Furthermore, the present species also showed similar feature with *R. mazeedi*, *R. garuai*, *R. bosei* and *R. baylisi* like general morphology, presence of 8 teeth, post-equatorially located with U-loop shape vagina (Fig.1E, 2E).

Although the morphology of present species is markedly differed from *R. mazeedi* (redescribed by Moravec, 2010) in shape of deirids (simple, small and pointed vs. small bifurcated), length and shape of spicule (longer left spicule with blunt distal tip vs. unusually short left spicule with bifurcated tip), spicule length ratio (1:3.3 vs. 1:1.6), number and arrangement of caudal papillae (12+1+0+ 4+1=18 pairs, representing 12 sub-ventral pairs with 1 lateral preanal pair, 4 subventral pairs with 1 lateral postanal pair vs. 10-11+2+0+4+2, representing 10-11pairs sub-ventral preanal papillae, 2 lateral preanal papillae, 4 pairs of sub-ventral and 2 lateral postanal papillae). The present species also differed from *R. garuai* in shape of left spicule tip (non alate vs. alate), absence of caudal alae in both sexes vs. narrow caudal alae extending upto the tip of tail in male. It also differed from *R. bosei* in shape of distal tip of left spicule (non alate vs. bifurcated), shape of tail (tail with rounded tip in both sexes vs. sharply pointed in both sexes), and arrangement of caudal papillae (13+0+5 vs. 11+0+4). The eggs were thick shelled in *R. mazeedi, R. garuai*, *R. bosei*, and *R. baylisi* whereas thin shelled in the present species.

The present species was found closer to *R. baylisi* Rai, 1969. Despite similarities of the present species with *R. baylisi*, certain differences were also noted like spicules length ratio (1:3.3 vs. 1:5.5), left spicule shorter with a blunt tip in the present species whereas the left spicule was more longer with bifurcated distal tip in *R. baylisi*, the number and arrangement of the caudal papillae (13+0+5 vs.12+0+4), a pair of lateral papillae in both preanal and post anal was observed in present species but lateral papillae were not reported in *R. baylisi*, number of prostomal teeth was not reported in *R. baylisi.* Moreover, in the present study, a

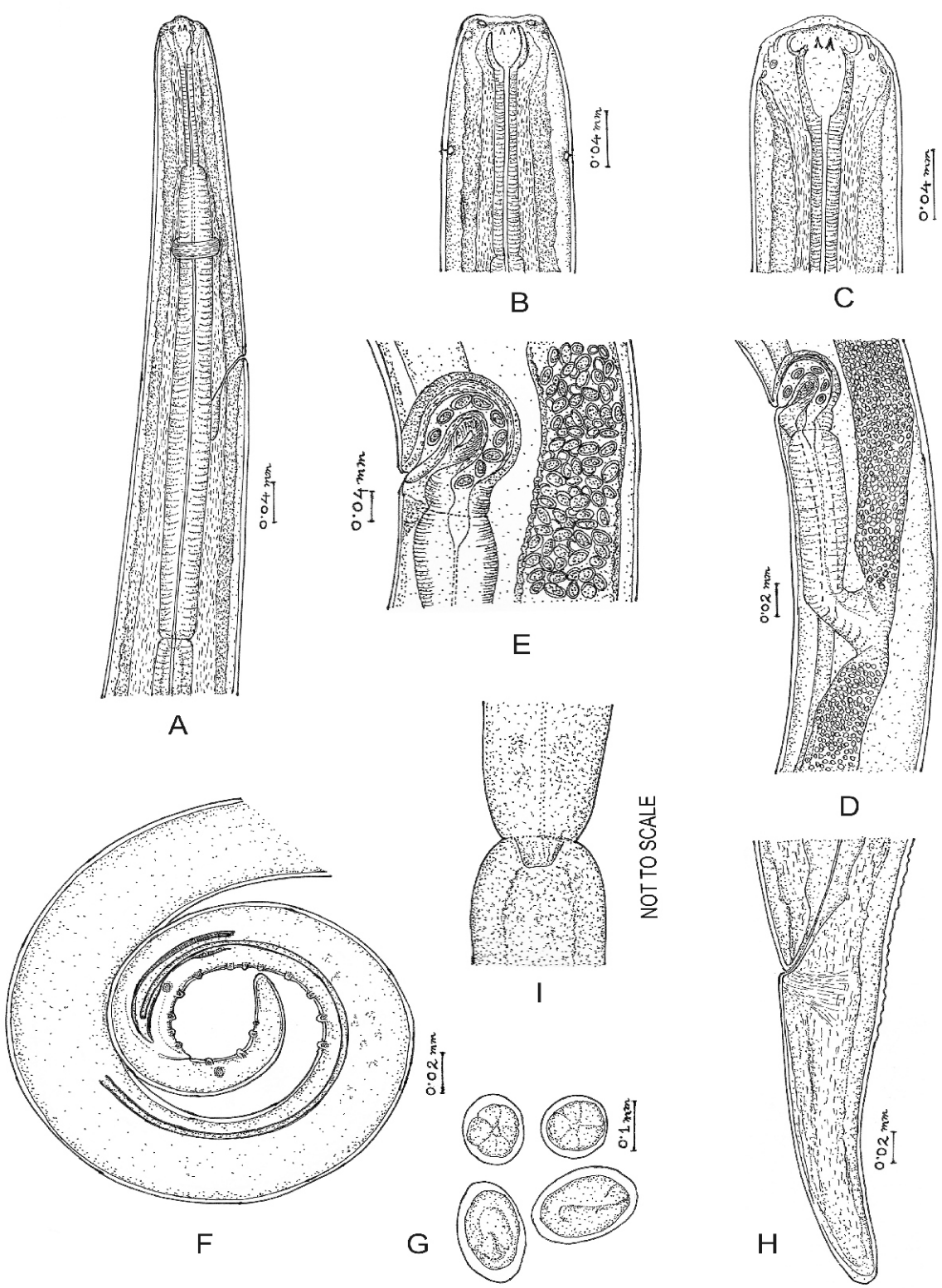

Fig. 1 (A-H): *Rhabdochona baylisi*. (A) Female anterior end, lateral view (B) Male anterior end, dorsoventral view © anterior extremity, enlarge lateral view (D) Vulvar region, lateral view (E) Vagina, enlarge view (F) Male posterior end (G) Embryonated eggs, enlarge view (H) Oesophago-intestinal junction.

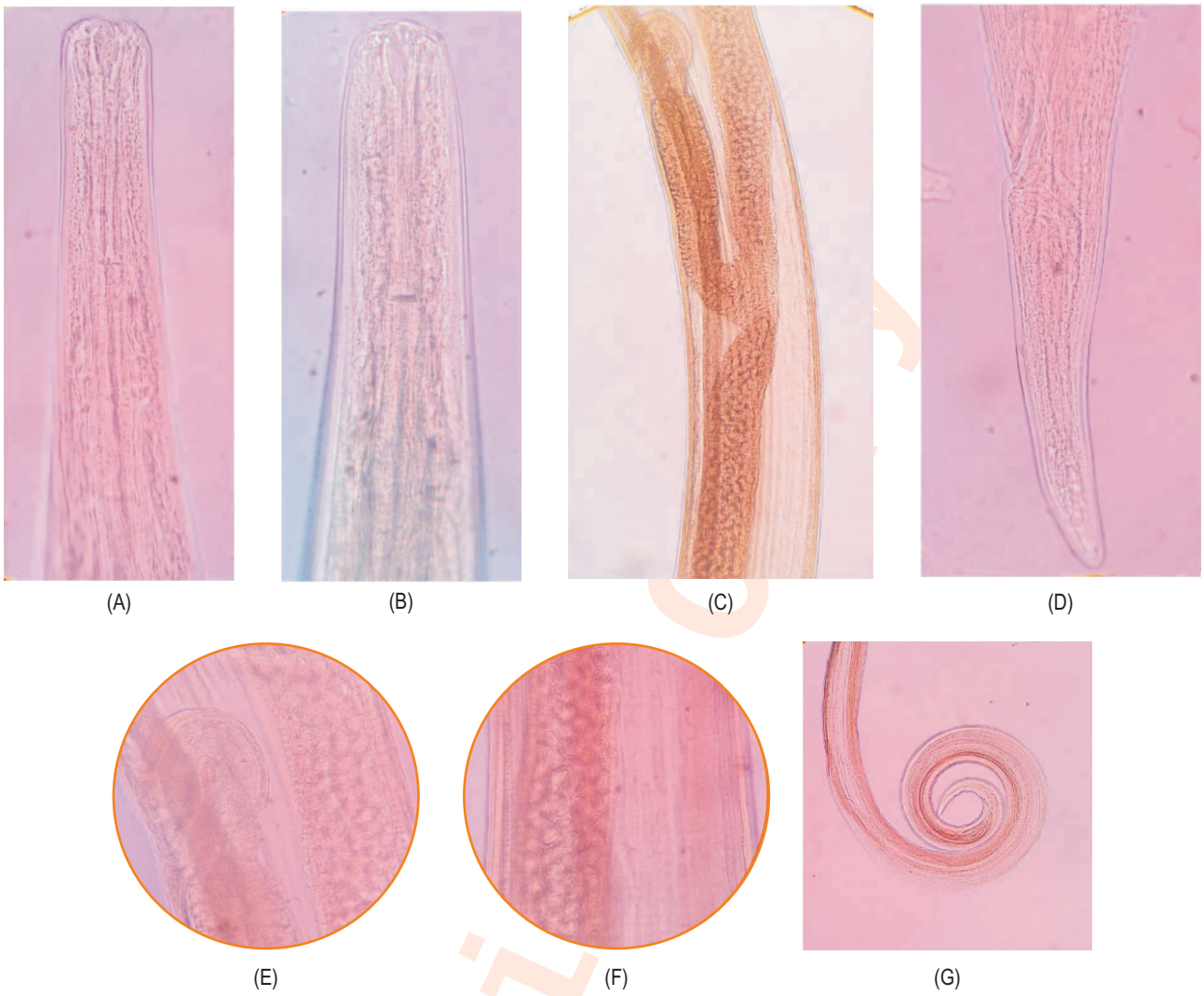

Fig. 2 : (A-G) Rhabdochona baylisi. (A) Female anterior end, lateral view (B) Male anterior end, dorsoventral view (C) Vulvar region (D) Tail (E) Vagina, enlarge view (F) Eggs (G) Male posterior end.

description of 4th stage larva was reported. Inspite of some morphometric variations the present species shows major resemblance with *R. baylisi* Rai, 1969 in many aspects. The description of the present species has no diagnostic morphological or morphometric differences from *R. baylisi* Rai, 1969 which could allow to erect as a new species. So the present species is assigned to *R. baylisi* Rai, 1969 as a new redescription record from Jiri River, Jiribam, Manipur, India.

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