The morphology and Systematics of Rhabdochona (Rhabdochona) clupisomai sp. nov., a widespread parasite of freshwater fishes

Dr. Sadhana Gupta

Assistant Professor
Department of Zoology
Indira Gandhi Govt. P.G. College, Bangarmau, Unnao, India

***ABSTRACT*: Fishes form an important dietary component of humans since it is important the fish that are consumed should be healthy and free of infection ensuring public health. Parasite infested fish have no or low market value resulting in loss to fishery industry. Hence it is relevant to identify such infectious agents and suggest measures for prevention and elimination of such infections.**

Present study aimed to investigate the intestinal nematode from host *Clupisomagaruai*inhabitingbasin region of Gomati River at Lucknow to evaluate their population levels and its taxonomical status. In present study new species of *Rhabdochona*has been recorded having alated spicule, 15 pairs of caudal papillae and postequatorial vulva.

***Index Terms* – Rhabdochona, Clupisomagaruai, biodiversity, Nematoda**

INTRODUCTION

Description: Body elongated, slender attenuated towards both extremities. Mouth bounded by two lips, opens into funnel shaped prostome not supported by longitudinal thickenings anteriorly into 8 pointed teeth. Prostomeleads into mesostome or vestibule,a straight narrow tube. Oesophagus consists of short anterior muscular part and long posterior glandular part. Male tail conical, curved ventrally with narrow caudal alae. Female tail straight and elongate.Uterine branches opposed,eggs without filaments

Male: Body 12.63-15.23 long,0.16-0.18 in maximum thickness. Prostome 0.02-0.03 long.0.01-0.02 wide.Vestibule 0.13-0.14 long. Oesophagus 2.46-2.82 long, anterior muscular oesophagus 0.30-0.36 long,0.02-0.03 in width,posterior glandular oesophagus 2.16-2.46, 0.06-0.08 in width. Nerve ring 0.20-0.22 and excretory pore 0.25-0.27 from anterior end.Caudalalae narrow, extending up to tip of tail.Spicules alate unequal and dissimilar. Left long 0.75-1.00 with a bifurcated tip,right small,0.21-0.27 with conical tip. Tail 0.16-0.18 conical, curved ventrally to form 2 or 3 spiral coils, gubernaculum absent.

Female: Body 19.21-23.46 long,0.22-0.24 in maximum thickness. Prostome 0.03-0.04 long,,0.02-0.03 wide. Vestibule 0.15-0.17 long.Anterior muscular oesophagus 0.32-0.39 long,0.02-0.03 wide, posterior glandular oesophagus2.20-2.65 long,0.10-0.13 wide.Entire oesophagus 2.52-3.04 long. Nerve ring 0.19-0.23 and excretory pore 0.02-0.28 from anterior end. Vulva postequatorial,12.26-15.12 from anterior end. Vagina runs posteriorly forming a distinct U-loop. Uterine branches opposed. Eggs oval,smooth,without filaments 0.035-0.04 x0.02-0.025. Tail 0.03-0.04 long, tapering with blunt tip.

MATERIALS AND METHOD

Host fish *Clupisomagaruai*(Hamilton)of average size were collected from Gomti river basin. Nematodes were recovered from small intestine of host species under stereo-zoom dissecting microscope and the number of each host species infected and no. of each nematode sp. in fish host were recorded. For light microscopy the recovered nematode were washed in saline solution ,preserved in 70% ethyl alcohol,fixed in mixture having three part of the same fixative and one part of glycerine and cleared in lactophenol. These were mounted temporarily on glass slide in pure glycerine under coverslip. For scanning electron microscopy(SEM),specimens were postfixed in osmium tetroxide (in phosphate buffer),dehydrated through a graded acetone series,critical-point-dried and sputter-coated with gold and examined using a JEOL-JSM-T330 scanning electron microscope at an accelerating voltage of 4 kv. Drawings were made with the aid of cameralucida. All measurements are in millimetres unless otherwise indicated.

Taxonomic summary:

Host - *Clupisomagaruai*(Hamilton)

Location - Small intestine

Locality - Lucknow

Prevalence - 14 male and 10 female specimens from 8 hosts out of 105 examined

DISCUSSION AND RESULTS

Railliet(1916) erected the genus *Rhabdochona*with *Rhabdochonadenudata* (Dujardin,1845) as its type species. Gustafson (1949),Choquet(1951),Jainszeeika(1955), Campana-Rouget(1961),Raytman and Trofimenko(19640,Rasheed(1965),Holloway and Klewar(1969),Moravec(1972, 1975),Margolis et.al.(1975) etc. have studied the taxonomy and morphology of the genus *Rhabdochona* and selected the eggs as a key feature.Moravec (1972) divided the genus *Rhabdochona* into three subgenera viz. *Rhabdochona(Rhabdochona*) Railliet (1916),*Rhabdochona(Filochona*) Saidev (1953) and *Rhabdochona(Globochona*) Moravec (1972). He characterised the subgenus*Rhabdochona(Rhabdochona*) in having eggs without filaments. The subgenus *Rhabdochona (Filochona*) in having eggs with flaments and the subgenus *Rhabdochona (Globochona*) inhaving eggs with lateral globules and swellings.

Moravec (1975) revised his opinion and divided the genus *Rhabdochona* into four subgenera instead of three as he considered that the characters of the eggs are not sufficient to group the species into three subgenera. He thought that other characters such as number and arrangement of teeth in theprostome, presence of cervical alae, shape of female tail tip and shape of deirids are some of the characters which are necessary to include while dividingthe genus *Rhabdochona*into subgenera. These subgenera being *Rhabdochona (Rhabdochona*),*Rhabdochona (Globochona*), *Rhabdochona (Globochonoides)*and *Rhabdochona (Sinonema*). Subgenus *Rhabdochona (Filochona*) has been merged with *Rhabdochona (Rhabdochona*). Thus the subgenus *Rhabdochona(Rhabdochona*) include both types of filamentous and non-filamentous eggs.

Due to inadequate descriptions given by various authors the divisionof*Rhabdochona* in four subgenera is unnatural and the division of *Rhabdochona*into three subgenera as proposed by Moravec (1972) appears to be more authentic and the author follows Moravec. This division has been accepted earlier by Margolis et al(1975),Chabaud(1975),Fotedar and Dhar(1977) and Arya and Johnson(1977).

In having eggs without filament the present species has been assigned to the subgenus *Rhabdochona*(*Rhabdochona).*The following sp. has been placed under the subgenus *Rhabdochona*(*Rhabdochona),R.(R.)garuai* Agarwal,1965; *R.(R.)mazeedi* Prasad and Sahay,1965; *R.(R.)dasi*Sahay and Prasad,1965; *R.(R.)bosei* Sahay,1966; *R.(R.)baylisi* Rai,1969; *R.(R.)magna* Khan and Yaseen,1969; *R.(R.)ghaggari* Sood,1972; *R.(R.)labeonis* Kalyankar,1972; *R.(R.)yarrelli* Verma,1972; *R.(R.)parastromatei* Bilquees,1979; *R.(R.)bagarii* Gupta and Srivastava,1982; *R.(R.)chaprai* Gupta and Srivastava,1982; *R.(R.)chitala* Gupta and Srivastava,1982*; R.(R.)moraveci*Katoch and Kalia,1991; *R.(R.)guptii*Chisti and Bakshi,1992; and *R.(R.)fotedari*Katoch and Kalia,1993.*R.(R.)hypsibarbi*Moravec et al.,2013; *R.(R.)spatulum*Kakkar& Bilqees,2016

The following species has been placed under the subgenus *Rhabdochona (Filochona). R.(F.)hellichi* Sramek,1901; *R.(F.)hospeti* Thapar,1950; *R.(F.)kashmirensis* Thapar,1950; *R.(F.)barbi*Karve and Naik,1951; *R.(F.)glyptothoracis*Karve and Naik,1951; *R.(F.)singhi* Ali,1956; *R.(F.)smythi* Agarwal,1965; *R.(F.)alii* kalyankar,1972; *R.(F.)cavasius*Rehana and Bilquees,1973; *R.(F.)longleyi*Moravec and Huffman,1988; *R.(F.)lichtenfelsi*Alavarez, Garcia-Prieta and Peraz-Poncede Leon,1998.

Under the subgenus *R.(Globochona*) following species have been kept.These are *R.(G.)barusi*Majumdar and De,1971 and *R.(G.)equispiculata*Moravec and Scholz,1991;*R.(G.)rasboraeM*oravec& kamchoo,2012 ;*R.(G.)kurdistanensis*Moravec et al.,2012;*R.(G.)carpiae*Nimbalkar et al.,2013;*R.(G.) puntii* Gonzalez-Solis et al.,2014.

There are certain species in which the description of eggs has not been given so they have been separated from the above three subgenera. These are *Rhabdochonauca*Pearse,1932; *R.chanawenensis*Zaidi and Khan,1975; *R.minima*Moravec and Deniel,1976;*R. unispinate* Arya,1980 and *R. bariliusi*Soota and Sarkar,1981.

Sahay and Narayan(1971) synonymized *R.baylisi* Rai,1969 with*R.garuai*Agarwal,1965. The author does not agree with the synonymy of the above mentioned species as these two sp. appear different in having digitate and alate left spicule and vulva postequatorial. Pending the verification of characters in the type specimen these sp. can not be synonymized at present.

The present specimen resemble to *Rhabdochona (Rhabdochona)baylisi* Rai,1969 in possessing left spicule digitate, U-shaped muscular vagina,divergent uteri and non-filamentous eggs but differs from it in having alated spicules instead of non-alated,15 pairs of caudal papillae instead of 16 pairs and postequatorial vulva instead of vulva near middle of body.

All differences are sufficient to create a new species with specific name *Rhabdochona (Rhabdochona)clupisomai*sp.nov. Present species is named after the name of host.

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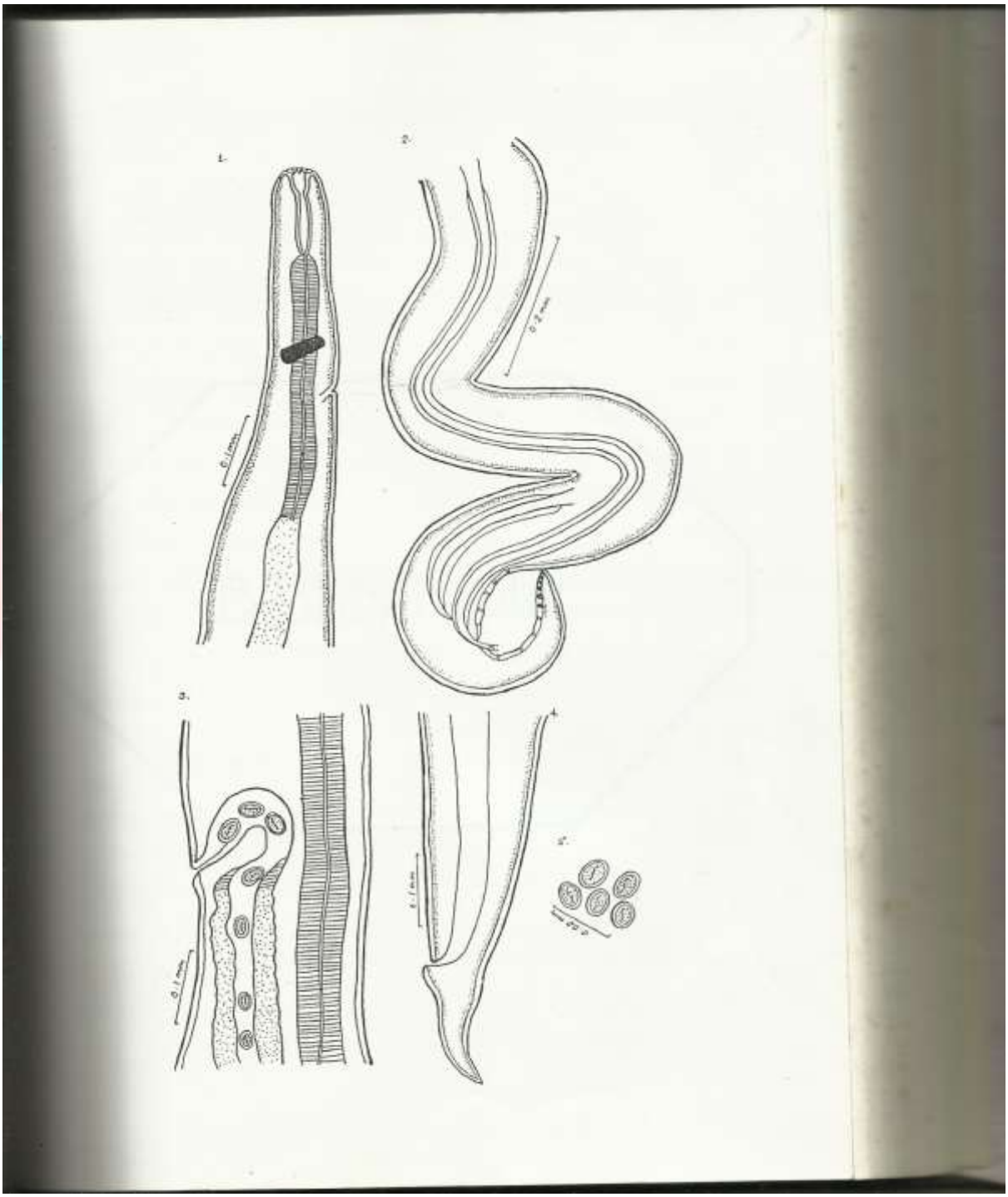
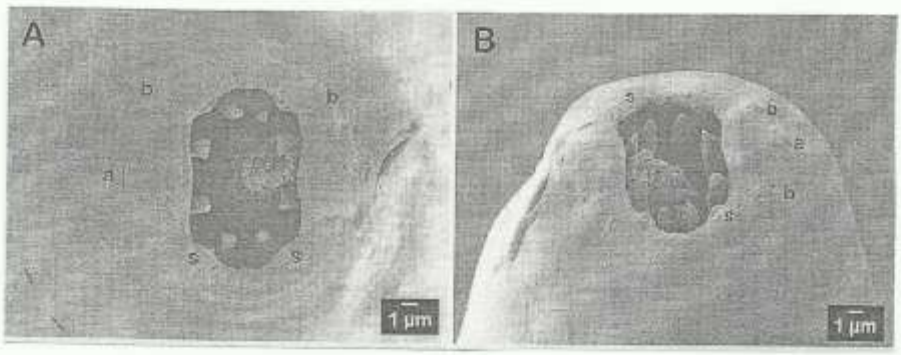
Fig. 1-4

***Rhabdochona (R.) clupisomais*p. nov.**

1. Anterior end of Body. Lateral view.
2. Posterior end of male. Lateral view.
3. Vulvar Region.Lateral view.
4. Posterior end of female. Lateral view.



Scanning electron micrographs: Cephalic end **A.** Apical view **B**.Subapical view


A
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