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Research Article

MONOGENEAN FAUNA OF DISTRICT SAHARANPUR, UTTAR PRADESH, PART-IX

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ABSTRACT

Present communication deals with two new species of the genus *Hamatopeduncularia* Yamaguti, 1953, from freshwater fish *Mystus seenghala* (Sykes). The new species is characterized on the basis of difference in shape of accessory piece, shape of transverses bars, anchors and shape of vagina etc.

Key words: Monogeneans, *Hamatopeduncularia, Hamatopeduncularia saharanpurensis, Hamatopeduncularia agrawali, Mystus seenghala.*

INTRODUCTION

During the course of study of freshwater monogenean fauna of district Saharanpur, two specimen of *Mystus seenghala* (Sykes) were infected with species of genus *Hamatopeduncularia* Yamaguti, 1953. On detailed examination, it was found that the worms at disposal of the author were new to science, hence described as such.

MATERIAL AND METHODS

Fishes, for the present investigation, were collected from river Yamuna and local fish markets of district Saharanpur. They were brought to laboratory and identified. The identification of piscine hosts was made with the help of classical works of Mclnerny and Gerard (1958), Misra (1959), Srivastava (1980), Nelson (1984) and Day (1989). Monogeneans were collected by freezing technique of Mizelle (1936 and 1938).

Worms thus collected, were washed thoroughly, and fixed in hot 70% alcohol or 10% neutral Formaline. Study of chitinoid hard parts was made in temporary Glycerin mounts. Permanent mounts were also made after staining in Aceto alum carmine, dehydrating through ascending grades of Alcohol, clearing in Xylene, and mounting in Canada balsam. Camera lucida sketches were made both from temporary and permanent preparations. Besides this, morphological studies were made using Motic Microscope and Image analyzing system. All measurements were taken with the help of stage micrometer and occulometer by method suggested by Mizelle (1936 and 1938), Gussev (1955), Malmberg (1957) and Singh (1959). The measurements were also compared with the measurement taken by Motic image analysis software 2000.

OBSERVATION

***Hamatopeduncularia saharanpurensis* n. sp.** (Plate- I, Fig. 1-8 and Plate-II, Fig. 1-3)

The body of worm is stout, elongated, measuring 0.75-0.79 mm. Maximum width was recorded in testicular region, ranging from 0.12-0.13 mm. Prohaptor and opisthaptor are fairly set off from the body proper through a shallow constriction in the anterior and haptoral peduncle in the posterior regions, respectively. Head is divisible in two lobes and lodged with five pairs of head organs and two pairs of eyespots. Each head organ is provided with a separate duct extending posteriorly. Eyespots are well developed; posterior pair of eyespot is considerably larger than anterior pair on account of presence of large number of melanistic granules. Pharynx is spherical, muscular, measuring 0.062-0.065 mm

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in diameter. Intestine is simple, bifurcate and crura end blindly.

Male reproductive system consists of a testis, seminal vesicle and male copulatory complex. Testis is oval, inter-caecal, equatorial and measures 0.095-0.097 x 0.051-0.054 mm. Seminal vesicle is balloon shaped, located in pre-equatorial region of the body, measuring 0.058-0.059 x 0.034-0.035 mm. Male copulatory complex consists of curved tubular cirrus and an accessory piece. The cirrus proper is double walled chitinoid structure, with bubble like base and pointed anterior end, measures 0.035-0.038 mm. The accessory piece of the cirrus is made up of two pieces. First piece is long rod like, having pointed tip which folds inward, measures 0.048-0.049 mm and second piece is 'U' shaped having one arm tilted at right angle, measures 0.038-0.039 mm.

Female reproductive system consists of an ovary, vagina, receptaculum seminis, and vitelline glands. Ovary is pre-equatorial, oval, measuring 0.071-0.075 x 0.032-0.034 mm. Vagina is dextral, muscular, floral whorls like, having ridges internally, anterior to ovary, lies at the level of seminal vesicle, measures 0.025-0.028 mm, communicate with well developed receptaculum seminis with a tube. The receptaculum seminis is oval, located at the level of ovary, measures 0.031-0.032 x 0.025-0.026 mm. Vitelline follicles are co-extensive with intestinal caeca.

Haptor is irregular in shape, bearing four pair of haptoral tentacles; measuring 0.13-0.14 x 0.17-0.18 mm. Armature of haptor consists of two pairs of anchors, double transverse bar and marginal hooklets. Each dorsal anchor consists of long inner roots, slightly differentiated outer roots, shaft and recurved points, measures 0.038-0.039 mm. In the shaft region, each dorsal anchor is equipped with well developed sleeve sclerite. Dorsal transverse bar is straight rod like, having groove at margins, measures 0.055-0.058 mm. Each ventral anchor is with long inner root, non remarkable outer root, strong shaft and recurved points, measuring 0.037-0.038 mm. In the shaft region each anchor is protruded and equipped with sleeve sclerite. Ventral transverse bar is strong, well developed, rod like, measures 0.041-0.043 mm. Marginal hooklets are seven pairs, and each tentacle is with a hook. Each marginal hooklet is provided with sickle shaped blade, heel and handle, measuring 0.011-0.013 mm in length. Two pairs of haptoral glands are present.

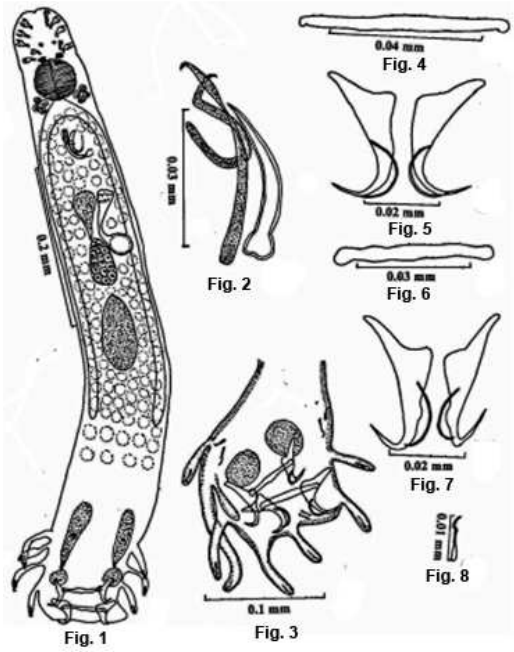
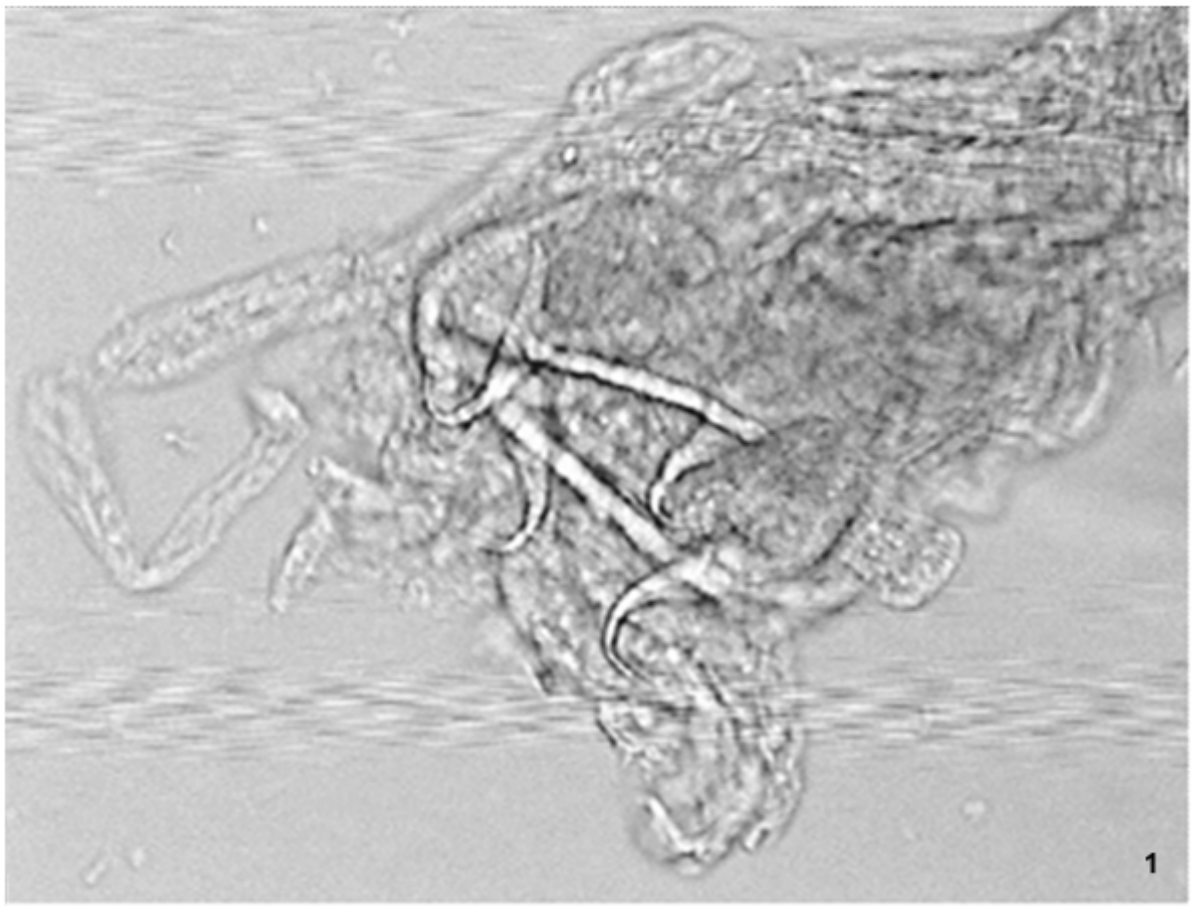
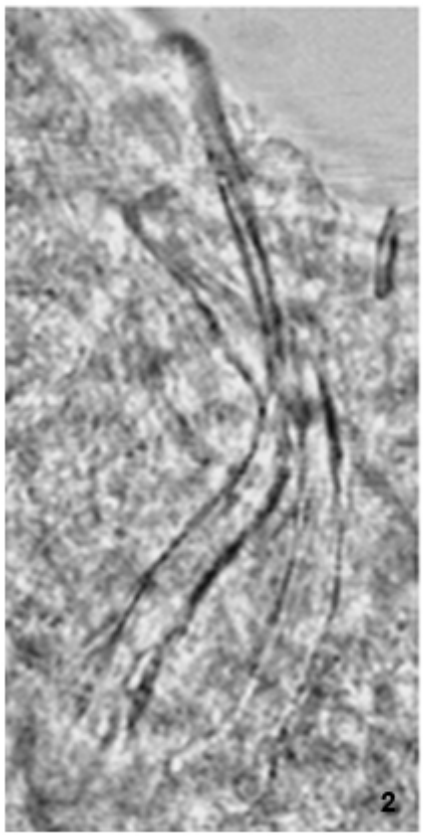


PLATE I. *Hamatopeduncularia saharanpurensis* n.sp. **Fig. 1.** Whole mount, **Fig. 2.** Male copulatory complex, **Fig. 3.** Haptor, **Fig. 4**. Dorsal transverse bar, **Fig. 5.** Dorsal anchors, **Fig. 6.** Ventral transverse bar, **Fig. 7.** Ventral anchors and **Fig. 8.** Marginal hooklet.





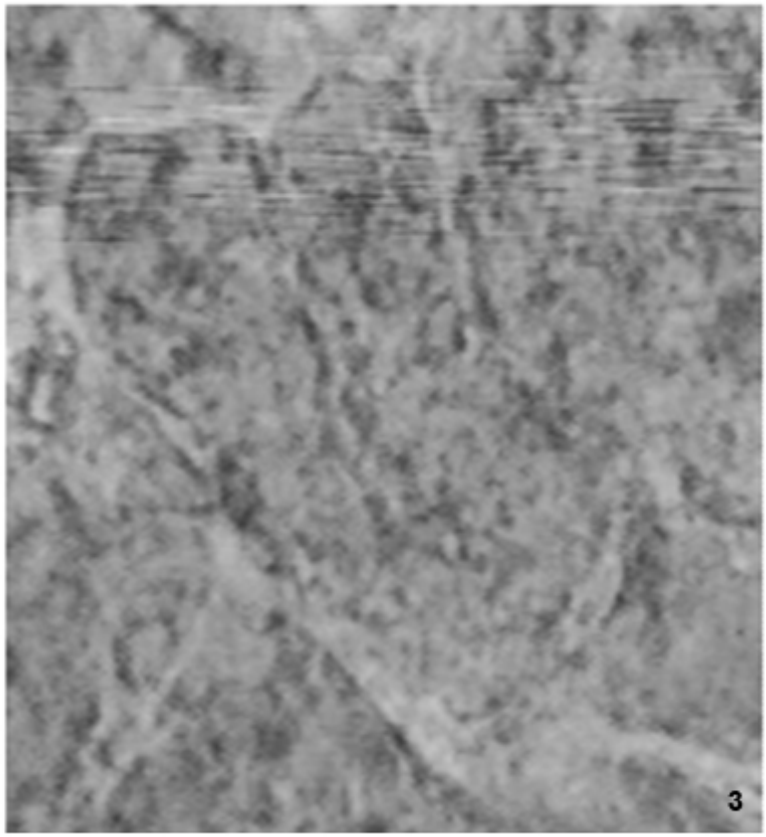


PLATE II. *Hamatopeduncularia saharanpurensis* n. sp. Microphotograph (**Fig.) 1**. Haptor, **Fig. 2.** Male copulatory complex and **Fig. 3.** Vagina.

Table 1. Showing different species of genus *Hamatopeduncularia* Yamaguti, 1953 abstracted from different part of world.

S. No.	Parasite	Hosts	Locality
1	*H. arabica* Paperna, 1977	*Arius* sp.	Porbandar (India)
2	*H. arii* Yamaguti, 1953	*Arius falcarius* *A. leiotocephalus* *A. maculatus* *A. thalassinus* *A. sinesis*	Hainan (China) Malindi (Kenya) Guandong (China)
3	*H. australis* Young, 1967	*N. australis*	Brisbane (Australia)
4	*H. bagrae* Hargis, 1955	*Bagre marinus*	Gulf of Maxico
5	*H. batrachi* Rastogi *et al.*, 2005	*Clarias batrachus*	Meerut (India)
6	*H. brisbenensis* Young, 1967	*Neoarius australis*	Brisbane (Australia)
7	*H. elegans* Bychowsky and Nagibina, 1969	*Arius falcarius* *A. macrocephalus* *A. maculatus*	Yellow sea (China), Ungwama Bay (Kenya), Straits of Malacca
8	*H. eliatica* Paperna, 1965	*Dascyllus marginatus*	Red Sea
9	*H. elongatum* Lim, 1996	*A. thalassinus*	Straits of Malacca
10	*H. heraldi* Mizelle and Price, 1964	*Zanculus canescens*	South West Pacific
11	*H. indicus* Siddiqui and Kulkarni, 1983	*A. jella*	Kakinad (India)
12	*H. isosimplex* Lim, 1996	*A. venosus* *A. maculatus* *A. sagor*	Matang (Perak) Straits of Malacca
14	*H. longicopulatrix* Lim, 1996	*A. venosus*	Matang Perak
15	*H. lucknowensis* Agrawal and Sharma, 1988	*Wallago attu*	Lucknow (India)
16	*H. major* Kearn and Whittington, 1994	*A. graffei*	Brisbane (Australia)
17	*H. malaccensis* Lim, 1996	*A. maculatus*	Matang Perak
18	*H. malayanus* Lim, 1996	*A. caelatus*	Matang Perak
19	*H. manjungi* Lim, 1996	*A. thalassinus*	Straits of Malacca
20	*H. nagibinae* Paperna, 1977	*A. macrocephalus* *A. thalassinus*	Ungwama Bay (Kenya)
21	*H. orientalis* Rastogi *et al.*, 2005	*Mystus tengara*	Meerut (India)
22	*H. papernai* Lim, 1996	*A. maculatus*	Matang Perak
23	*H. pearsoni* Kearn and Whittington, 1994	*A. graffei*	Brisbane (Australia)
24	*H. pulchra* Bychowsky and Nagibina, 1969	*A. maculatus*	Hainan and Yellow sea (China)
25	*H. ritai* Rastogi *et al.*, 2005	*Mystus tengara*	Meerut (India)
26	*H. simplex* Bychowsky and Nagibina, 1969	*A. maculatus* *A.falcarius* *A. sinensis* *Osteogeneious militaris*	Hainan and Yellow Sea, Guandong (China), Matang Perak
27	*H. sohani* Tewari and Agarwal, 1986	*Mystus seenghala*	Meerut (India)
28	*H. spiralis* Kearn and Whittington, 1994	*A. graffei*	Brisbane (Australia)
29	*H. thalissini* Bychowsky and Nagibina, 1969	*A. thalassinus* *Arius* sp.	South China Sea, (China), Porbandar (India), Straits of Malacca
30	*H. theraponi* Karyakarte and Das, 1972	*Therapon theraps*	Ratangiri (India)
31	*H. venosus* Lim, 1996	*A. venosus*	Matang Perak
32	*H. wallagonius* Singh *et al.*,1995	*Wallago attu*	Meerut (India)
33	*H. yogendrai* Pandey and Mehta, 1986	*Wallago attu*	Meerut (India)

DISCUSSION

Genus *Hamatopeduncularia* was established by Yamaguti (1953) with *H. arii* as type species. To the best of my knowledge following species are known under genus *Hamatopeduncularia* appended in the tabular form in table 1.

However, Tripathi (1959) transferred *H. bagrae* Hargis, 1955 to the genus *Hargitrema* on the basis of morphological features. This transfer were agreed by subsequent workers including Yamguti (1963); Bychowsky and Nagibina (1969); Kearn and Whittington (1994), Singh *et al.* (1995) and Lim (1996). Tripathi (1959) also proposed to synonymies the genus *Hamatopeduncularia* Yamaguti, 1953 with *Ancyrocephalus* but this synonymy was disagreed and reversed by Yamaguti (1963), with which I also agree.

Besides this, Bychowsky and Nagibina (1969) transferred *H. australis* Young, 1967 to the genus *Chauhanellus* Bychowsky and Nagibina, 1969; *H. heraldi* Mizelle and Price, 1964 to the genus *Pseudohaliotrem*a and *H. eliatica* Paperna, 1965 to the genus *Heliotrema* Tripathi, 1959, retaining species valid in all three cases. Kearn and Whittington (1994) synonymised *H. indicus* Siddiqui and Kulkarni, 1983 with *H. arii* Yamaguti, 1953. Thus, the valid species under the genus *Hamatopeduncularia* Yamaguti, 1953 are

1. *H. arabica* Paperna, 1977
2. *H. arii* Yamaguti, 1953
3. *H. bagrae* Hargis, 1955
4. *H. batrachi* Rastogi *et al.*, 2005
5. *H. brisbenensis* Young, 1967
6. *H. elegans* Bychowsky and Nagibina, 1969
7. *H. elongatum* Lim, 1996
8. *H. isosimplex* Lim, 1996
9. *H. longicopulatrix* Lim, 1996
10. *H. lucknowensis* Agrawal and Sharma, 1988
11. *H. major* Kearn and Whittington, 1994
12. *H. malaccensis* Lim, 1996
13. *H. malayanus* Lim, 1996
14. *H. manjungi* Lim, 1996
15. *H. nagibinae* Paperna, 1977
16. *H. orientalis* Rastogi *et al.*, 2005
17. *H. papernai* Lim, 1996
18. *H. pearsoni* Kearn and Whittington, 1994
19. *H. pulchra* Bychowsky and Nagibina, 1969
20. *H. ritai* Rastogi *et al.*, 2005
21. *H. simplex* Bychowsky and Nagibina, 1969
22. *H. sohani* Tewari and Agarwal, 1986
23. *H. spiralis* Kearn and Whittington, 1994
24. *H. thalissini* Bychowsky and Nagibina, 1969
25. *H. theraponi* Karyakarte and Das, 1972
26. *H. venosus* Lim, 1996
27. *H. wallagonius* Singh *et al.*,1995
28. *H. yogendrai* Pandey and Mehta, 1986

The present form differs from all the known species of the genus *Hamatopeduncularia* in having different shaped of accessory piece, shape of transverses bars, anchors and shape of vagina, therefore, it is described a new species *viz. Hamatopeduncularia saharanpurensis* n.sp., named on the region collected from.

***Hamatopeduncularia agrawali* n.sp.** (Plate III, Fig. 1-8 and Plate IV, Microphotograph 1-2)

The body of worm is stout, elongated, measuring 0.45-0.48 mm. Maximum width was recorded in seminal vesicle region, ranging from 0.057-0.058 mm. Prohaptor and opisthaptor are fairly set off from the body proper through a shallow constriction in the anterior and long haptoral peduncle in the posterior regions, respectively. Head is divisible in two lobes which are further divided into three lobes. Head is lodged with six pairs of head organs and two pairs of eyespots. Each head organ is provided with a separate duct extending posteriorly. Eyespots are well developed, posterior pair of eyespot is considerably larger than anterior pair on account of presence of large number of melanistic granules. Pharynx is oval, muscular, measuring 0.026-0.028 x 0.024-0.026 mm. Intestine is simple, bifurcate and crura end blindly.

Male reproductive system consists of a testis, vas deferens, seminal vesicle and male copulatory complex. Testis is elongate-oval, inter-caecal, equatorial and measures 0.051-0.052 x 0.021-0.022 mm. From the anterior border of testis, a fine vas deferens arises, extends anteriorly, forms loop around right intestinal limb, and dilates to form seminal vesicle. Seminal vesicle is balloon shaped, located in pre-equatorial region of the body at level of cirrus proper, measuring 0.027-0.028 x 0.015-0.016 mm. Male copulatory complex consists of tubular cirrus and an accessory piece. The cirrus proper is double walled chitinoid structure, with wide bubble like base, measures 0.025-0.026 mm. The accessory piece of the cirrus is made up of three pieces. First piece is

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'V' shaped, having pointed tip, measures 0.021-0.022 mm, second piece is stick like having broader anterior end, fits into first accessory piece, measures 0.016-0.017 mm and third piece is slightly 'Δ' in shape, measures 0.024-0.026 mm.

Female reproductive system consists of an ovary, vagina, receptaculum seminis, and vitelline glands. Ovary is pre-equatorial, pre testicular, elongated-oval, measuring 0.048-0.049 x 0.017-0.018 mm. Vagina is dextral, muscular, funnel shaped, measures 0.004-0.005 mm, communicate with well developed receptaculum seminis with a narrow tube. The receptaculum seminis is oval, located at the level of ovary, measures 0.023-0.024 x 0.014-0.015 mm. Vitelline follicles are co-extensive with intestinal caeca.

Haptor is irregular in shape, bearing of haptoral tentacles, measuring 0.12-0.13 x 0.11-0.12 mm. Armature of haptor consists of two pairs of anchors, double transverse bar and marginal hooklets. Each dorsal anchor consists of long inner roots, slightly differentiated outer roots, shaft and recurved points, measures 0.041-0.042 mm. The inner root is surrounded by a ring pad. At distal extremity, the shaft bears a clamping formation (spine like) terminating near the middle of the anchor point. Dorsal transverse bar is straight rod like, having condoyle at extremities at margins, measures 0.051-0.052 mm. Each ventral anchor is with long inner root, non remarkable outer root, strong shaft and recurved points, measuring 0.068-0.069 mm. Ventral transverse bar is strong, well developed, curved, having pendulum like posterior protrusion at middle, measures 0.054-0.055 mm. Marginal hooklets are seven pairs. Each marginal hooklet is provided with sickle shaped blade, heel and handle, measuring 0.009-0.012 mm in length. Three pairs of haptoral glands are present.

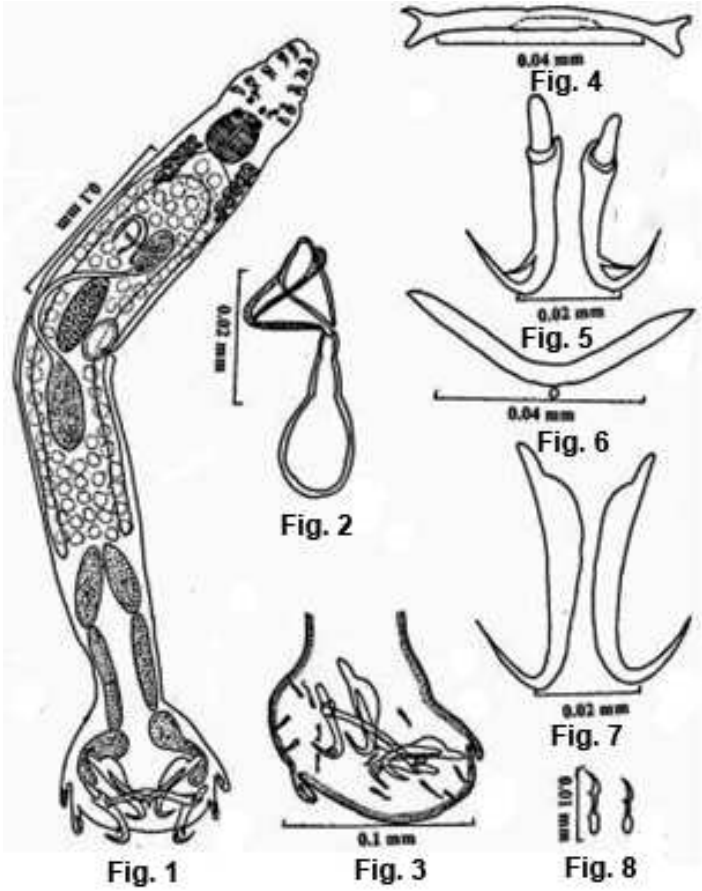

PLATE III. ***Hamatopeduncularia agrawali*** **n.sp.** Fig. 1. Whole mount. Fig. 2. Male copulatory complex. Fig. 3. Haptor. Fig. 4. Dorsal transverse bar. Fig. 5. Dorsal anchors. Fig. 6. Ventral transverse bar. Fig. 7. Ventral anchors. Fig. 8. Marginal hooklets.

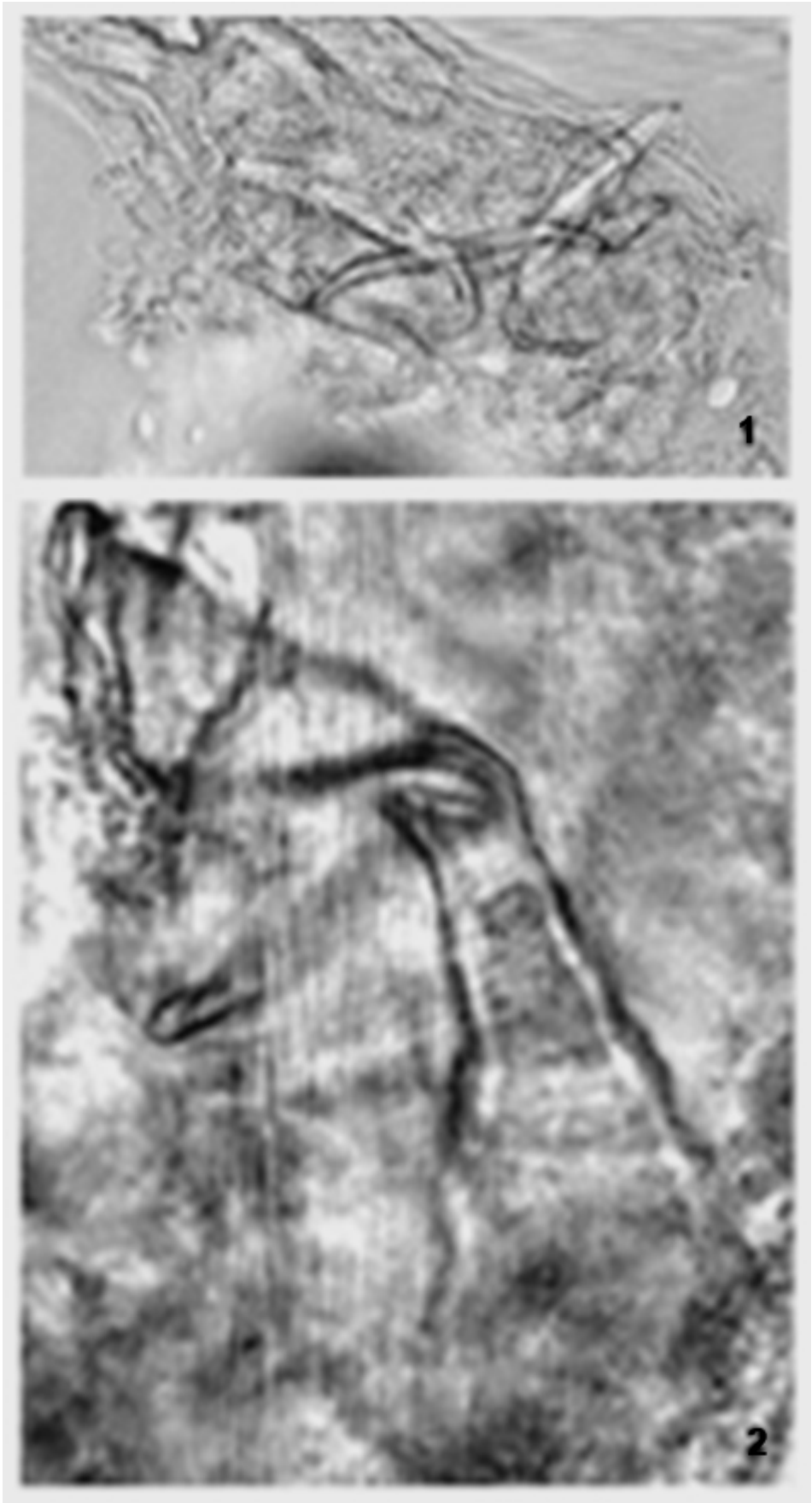

PLATE IV *Hamatopeduncularia agrawali* n.sp Fig. 1. Haptor. Microphotograph and **Fig. 2.** Male copulatory complex.

CONCLUSIONS

The present form belongs of the genus *Hamatopeduncularia* Yamaguti, 1953 and closer to *H. batrachi* Rastogi *et al.,* 2005 in following features:

1. Having ring pads at the base of anchors.
2. Having clumping formation on the inner side of shaft of anchor.
3. Having similar shape of cirrus proper.

However, present form differs from *H. batrachi* Rastogi *et al.,* 2005 in following features:

1. Different shape of accessory piece.
2. Different no. of head organs (sixteen pairs in *H. batrachi* Rastogi *et al.,* 2005 but six pairs in present form).
3. Shape of transverse bars.
4. Shape of ventral anchors.

Therefore, it is described as a new species *viz. H. agrawali* n.sp., named in honour of Prof. N. Agrawal for the valuable contribution made by her in this field.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest associated with this article.

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