

## ORIGINAL ARTICLE

# A New Species of *Thaparocleidus* from Gills of *Wallago Attu* at Ghaziabad

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### ABSTRACT

A new species of genus *Thaparocleidus* Jain, 1952 is described from the gills of *Wallago attu* (Family: Siluridae) from Hindon River, Ghaziabad. This species is characterized by coiled cirrus tube making 8 ½ coils and equipped with rosette like accessory piece comprising of six leaflets of irregular shape and unequal size. Egg bears a conical spur at its posterior end. Vaginal opening is triangular and vaginal duct is convoluted. Haptor is characterized by 'Falcatooid' type dorsal anchors, possessing a pair of additional conical patches or capitulum. Dorsal transverse bar is 'Anchoratoid Wegeneri' type. It possesses backwardly directed lateral ends and a short conical postero-medial process. Ventral anchors are 'Boreal' type. Ventral transverse bar is a paired bar with slender equal halves. Seven pairs of 'Definitive' type marginal hooklets are also present.

**Key Words:** Monogeneans, *Thaparocleidus ghaziabadensis*.

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## INTRODUCTION

Jain, 1952 [7] established genus *Thaparocleidus* for the worms collected from freshwater siluriform fishes. Since then, several different species of this genus have been reported from different parts of the globe like India, Yunnan, Malaysia and Czech Republic. Gussev, 1976 [6] described new genus *Silurodiscooides* as synonym of *Thaparocleidus*. During the course of study of freshwater monogenean fauna of catfishes of Hindon river at Ghaziabad, the authors came across one specimen of *Wallago attu* (Bloch and Schn), infected with monogeneans belonging to genus *Thaparocleidus* Jain, 1952 [7]. On subsequent study, the present form appears new to us and described herein as such.

## MATERIALS AND METHODS

Fishes for present investigation were collected from Hindon bairaj, Indirapuram, Ghaziabad. They were brought to laboratory and identified. Identification of piscine hosts was made with the help of classical works of Day [4]. Monogeneans were collected by freezing technique of Mizelle [14, 15]. Worms thus collected, were washed thoroughly with distilled water, and fixed in 10% neutral Formaldehyde. 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 Motic image analysis software 2000.

## RESULTS

Worms are elongated and foliform. Prohaptor and haptor are fairly set off from body proper. These worms measure 722.1 - 734.0 µm in length. Maximum width of 95.3 - 102.6 µm is attained at the level of ovary. Four pairs of head organs are present in the cephalic region. Head organs lead to cephalic glands through separate ducts. Cephalic glands are present on either postero-lateral sides of pharynx. Two pairs of eyespots are also present. Posterior pair of eyespots is larger, on account of having greater number of

melanistic granules. Pharynx is large, muscular and subspherical. It measures 55.3 - 59.0  $\mu\text{m}$  in length and 50.1 - 54.4  $\mu\text{m}$  in width. Pharynx leads to very short oesophagus measuring 9.9 - 13.2 x 7.8 - 11.1  $\mu\text{m}$ . Oesophagus leads to intestine. Intestinal crura simple, bifurcate and confluent posteriorly slightly anterior to haptoral peduncle.

Male reproductive system comprises of testis, vas deferens, seminal vesicle, vasa efferentia, male copulatory complex and male gonopore. Testis is single, post-equatorial, post-ovarian, intercaecal and sub ovate in outline. Testis measures 58.3 - 63.5  $\mu\text{m}$  in length and 50.0 - 55.6  $\mu\text{m}$  in width. A fine convoluted vas deferens arises from testis and opens into seminal vesicle. Vas deferens measures 298.0 - 322.4  $\mu\text{m}$  in length. Seminal vesicle is pre - equatorial, inter-caecal and bilobed. It measures 91.8 - 95.6  $\mu\text{m}$  in length and 21.4 - 27.2  $\mu\text{m}$  in width. Seminal vesicle opens at the base of the male copulatory tube through a vasa efferentia measuring 44.2 - 48.6  $\mu\text{m}$ .

Male copulatory complex consists of cirrus proper and an accessory piece. Cirrus is in the form of a double walled, fine sclerotized tube. Cirrus tube is coiled and makes 7 1/2 coils. Length of cirrus ranges from 812.5 - 830.9  $\mu\text{m}$ . Cirrus is equipped with a single sclerotized well developed accessory piece. Accessory piece of cirrus is rosette like consisting of six leaflets of unequal size and irregular shape. It measures 24.4 - 29.3  $\mu\text{m}$ . Cirrus opens to the exterior through a separate male gonopore situated ventro-laterally on the dextral margin posterior to cirrus. Male gonopore is funnel shaped. Opening of male gonopore measures 22.7 - 30.0  $\mu\text{m}$  in length and 9.3 - 13.2  $\mu\text{m}$  in width. A pair of prostrate glands is present near the base of cirrus.

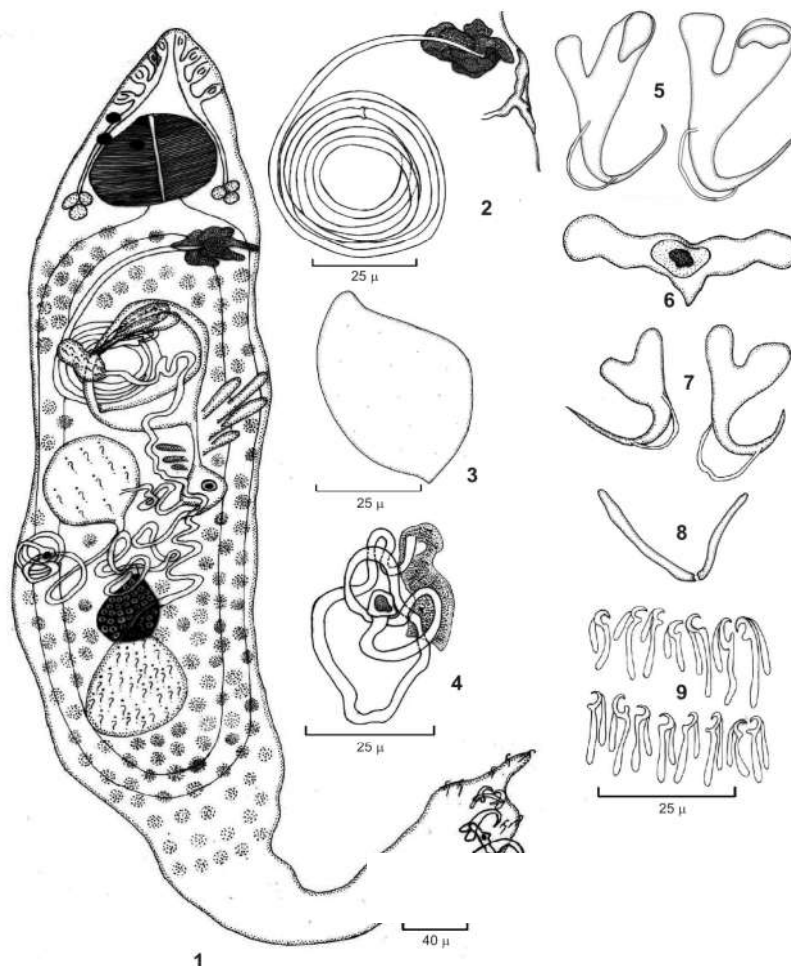


PLATE I: *Thaparocleidus ghaziabadensis*, Figure 1. Whole mount, Figure 2. Cirrus, accessory piece and male gonopore Figure 3. Egg, Figure 4. Vagina and accessory piece Figure 5. Dorsal Anchors with capitulum, Figure 6. Dorsal transverse bar, Figure 7. Ventral Anchors, Figure 8. Ventral transverse bar, Figure 9. Marginal hooklets.

Female reproductive system consists of ovary, oviduct, ootype complex, receptaculum seminis, median chamber, vagina, accessory piece, vaginal duct and reproductive glands. Ovary is pre - testicular, post - equatorial, inter-caecal and subovate. It measures 46.6 - 51.8  $\mu\text{m}$  in length and 34.1 - 42.7  $\mu\text{m}$  in width. A fine oviduct measuring 154.8 - 169.9  $\mu\text{m}$  arises from the anterior border of ovary and leads to ootype complex. Ootype complex is pre - equatorial, intercaecal, oval in outline. It measures 32.3 - 37.1 x 28.2 - 33.6  $\mu\text{m}$ . From ootype complex a fine duct measuring 42.6 - 49.0  $\mu\text{m}$  runs anteriorly and opens into median chamber. Median chamber is oval in outline. Measuring 78.8 - 83.6 x 54.2 - 67.1  $\mu\text{m}$  developing egg can be seen in the lumen of median chamber.

Vagina is sinistral. Vaginal tube is convoluted with a triangular opening measuring 16.0 - 21.3 x 14.5 - 19.9  $\mu\text{m}$ . Vagina is equipped with an accessory piece. Accessory piece of vagina has a narrow proximal and broad distal part giving it spade like appearance. A fine vaginal duct measuring 136.0 - 156.5  $\mu\text{m}$  arises from vaginal opening and leads to receptaculum seminis. Receptaculum seminis is pre - equatorial, intercaecal and spherical in outline. It measures 38.6 - 43.9  $\mu\text{m}$  in length and 34.2 - 38.1  $\mu\text{m}$  in width. From postero - lateral margin of receptaculum seminis a fine duct measuring 61.3 - 70.5  $\mu\text{m}$  arises and enters ootype complex on the posterior - lateral side. Egg is sub ovate and bears a small conical spur at its posterior end, thin shelled. Egg measures 66.2 - 71.4 x 40.5 - 46.6  $\mu\text{m}$ . Vitellaria, dense follicular and coextensive with intestinal crura upto haptoral peduncle.

Opisthaptor measures 98.4 - 105.3  $\mu\text{m}$  in length and 44.3 - 50.2  $\mu\text{m}$  in width. Opisthaptor is fairly set off from body proper by a peduncle. The armature of haptor consists of two pairs of dissimilar and unequal anchors (dorsal and ventral), a dorsal and a ventral transverse bar and a pair of patches. Dorsal anchors are 'Falcatoid' type, 56.2 - 63.3  $\mu\text{m}$  in length. Dorso apical length is 36.4 - 42.0  $\mu\text{m}$  and Ventro apical length is 30.2 - 38.6  $\mu\text{m}$ . They have bifurcated base with longer inner root and short outer root. Anchor roots are crenated, tapering shaft and a long recurved point. Dorsal anchors are provided with sleeve sclerite associated with shaft measuring 32.6 - 41.2  $\mu\text{m}$  and point measuring 18.3 - 23.5  $\mu\text{m}$  on the inner side. A small conical patch measuring 6.4 - 10.1  $\mu\text{m}$  in length and 2.8 - 6.2  $\mu\text{m}$  in width is present on dorsal anchor near its outer root. Dorsal transverse bar measuring 46.4 - 53.1  $\mu\text{m}$  in length and 11.3 - 16.0  $\mu\text{m}$  in median width connecting the dorsal anchors is 'Anchoratoid Wegeneri' type. It is a slightly bend tubular structure with backwardly projecting lateral ends. It also possesses a short conical postereo-medial process. Ventral anchors measure 40.8 - 45.3  $\mu\text{m}$  in length. Dorso apical length of Ventral anchors is 21.2 - 28.4  $\mu\text{m}$  and Ventro-apical length is 18.3 - 24.4  $\mu\text{m}$ . Ventral anchors are slender and 'Boreal' type, having deeply curved equal roots, tapering shaft measuring 29.1 - 32.3  $\mu\text{m}$  and recurved point measuring 16.5 - 21.9  $\mu\text{m}$ . Ventral transverse bar measuring 29.9 - 35.6  $\mu\text{m}$  in length and 2.1 - 4.0  $\mu\text{m}$  in median width is a paired bar with slender equal halves. Marginal hooklets are 'Definitive' type measuring 20.9 - 25.5  $\mu\text{m}$  with a dilated hooklet measuring 3.2 - 6.4  $\mu\text{m}$  and a handle measuring 15.3 - 19.1  $\mu\text{m}$ . Handle is divided into a fairly long and thin pivot of handle and the distal end is swollen.

## DISCUSSION

Jain [7] established the genus *Thaparocleidus* for the worms collected from gill filaments of *Wallago attu* (Bl. and Schn.) at Lucknow. Generic diagnosis for the worms:

Tetraonchinae: Gut bifurcate but confluent posteriorly. Several pairs of head organs and two pairs of eyespots. Anchors in two pairs, dissimilar in shape and size. Three haptoral bars dissimilar in shape and size. Five pairs of hooks. Testis anterior to ovary, receptaculum seminis and vesicular seminalis present. Vagina sinistral, highly chitinised and coiled. Cirrus coiled with several complete loops, accessory piece horse-shoe shaped with a handle; both non-articulate at the base. Vitellaria from pharynx to the posterior end. Single egg. Parasite of freshwater fishes.

Gussev (1976<sup>[6]</sup>) synonymized the genus *Thaparocleidus* Jain [7] with *Silurodiscooides* for the worms collected from gill filament of *Silurus glanis*. The generic diagnosis according to Gussev [6] is:

Dactylogyridae, Ancylo-discoidinae, two pairs of glandular head lobes, two pairs of eyespots. Haptor slightly separated from the body, its armament consists of seven pairs of hooks, more often hooks are of larval type, two pairs of anchors of which ventral have re-curved point and are smaller than dorsal ones, of non-paired dorsal bar and non-paired or paired ventral bar, pair of patches (additional supporting bars) of dorsal anchors. Ventral anchors are somehow removed backwards from the dorsal ones and are disposed in two moderate posterior lobes of haptor. The rest as in the diagnosis of the subfamily. Parasites of catfishes.

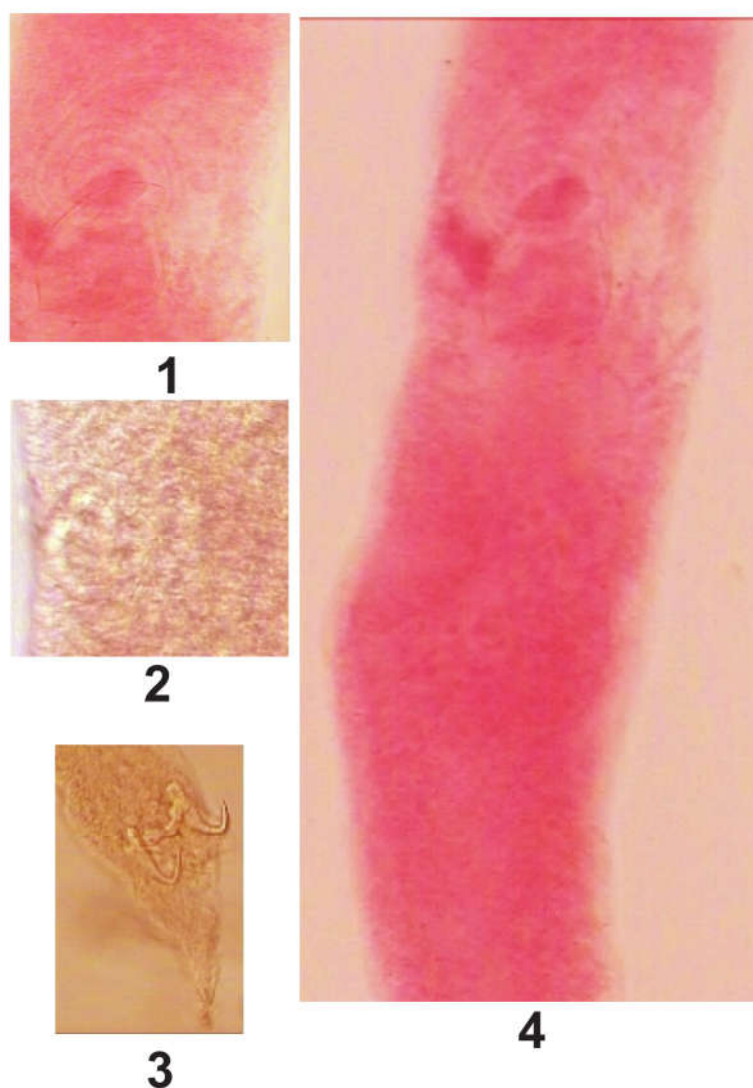


PLATE II: *Thaparocleidus ghaziabadensis*, Microphotograph 1. Cirrus and egg, Microphotograph 2. Vagina, Microphotograph 3. Haptor, Microphotograph 4. Reproductive system.

Gussev [6] included 48 species to this genus from Europe, Far East, India and Indochina. Lim [12] pointed out that *Thaparocleidus* is a senior synonym of *Silurodiscoides*. She listed 80 species of *Thaparocleidus*, emphasized the need to ascertain the status of some species from Indian fishes, and suggested that a detailed redescription of *T. wallagonius*, the type-species was required.

Lim *et. al.*, [13] listed dactylogyridean monogeneans of siluriform fishes of the Old World and have tentatively considered 77 species of *Thaparocleidus* valid and further questioned the validity of certain Indian species. Moreover, they also amended the generic diagnosis of genus *Thaparocleidus*:

Body elongate, with four eyespots. Caeca unite posterior to testis. Haptor may or may not be well demarcated from body, sometimes bilobed. Patches on dorsal anchors. Dorsal anchors usually larger than ventral anchors, with roots of variable length; ventral anchors usually smaller, with roots of variable length. Dorsal bar straight to V-shaped; ventral bar usually V-shaped or divided into two parts. Marginal hooks of variable shapes and sizes. Seminal vesicle single, blind, sac-like. Copulatory organ consists of usually coiled copulatory tube and accessory piece. Vaginal opening normally sinistral. On freshwater siluriform fishes, Palaearctic, India, Southeast Asia.

Pandey *et. al.*, [8] redescribed some Indian species of genus *Thaparocleidus* along with *T. seenghali* [9] [12]. To the best of knowledge of the authors following species have been reported from India, appended in tabular form in table (Table 1).

Table 1: Showing different species of genus *Thaparocleidus* Jain, 1961<sup>[9]</sup> reported from India.

S. No	Species	Author	Host
1.	<i>T. chauhani</i>	[2], [12]	<i>Wallago attu</i>
2.	<i>T. dayali</i>	[16], [12]	<i>W. attu</i>
3.	<i>T. devaraji</i>	[6] [12]	<i>Ompok malabaricus</i>
4.	<i>T. gomtius</i>	[7] [12]	<i>W. attu</i>
5.	<i>T. guptai</i>	[19]	<i>W. attu</i>
6.	<i>T. gussevi</i>	[20] [12]	<i>W. attu</i>
7.	<i>T. indicus</i>	[10] [12]	<i>W. attu</i>
8.	<i>T. isostylus</i>	[10]	<i>W. attu</i>
9.	<i>T. jaini</i>	[1]	<i>W. attu</i>
10.	<i>T. kheri</i>	[17]	<i>Labeo rohita</i>
11.	<i>T. longicirrus</i>	[12]	<i>W. attu</i>
12.	<i>T. lucknowensis</i>	[3] [12]	<i>Mystus vittatus</i>
13.	<i>T. malabaricus</i>	[6] [12]	<i>O. malabaricus</i>
14.	<i>T. multispiralis</i>	[8]) Lim, 1996[12]	<i>Silondia silondia</i>
15.	<i>T. octotylus</i>	[10], [12]	<i>O. pabda</i>
16.	<i>T. pangasi</i>	[21][12]	<i>Pangasius pangasius</i>
17.	<i>T. pusillus</i>	[6] [12]	<i>M. vittatus</i>
18.	<i>T. purvulus</i>	[6] [12]	<i>M. vittatus</i>
19.	<i>T. postorchidis</i>	[10] [12]	<i>Sperata aor</i>
20.	<i>T. raipurensis</i>	[5] [9]	<i>Clupisoma garua</i>
21.	<i>T. ramalingami</i>	[19] [9]	<i>W. attu</i>
22.	<i>T. ritius</i>	[9] [12]	<i>Rita rita</i>
23.	<i>T. saharanpurensis</i>	[17]	<i>W. attu</i>
24.	<i>T. seenghali</i>	[9] [12]	<i>S. seenghala</i>
25.	<i>T. sharmae</i>	[12]	<i>W. attu</i>
26.	<i>T. sohani</i>	[19]	<i>W. attu</i>
27.	<i>T. sudhakari</i>	[6] [12]	<i>W. attu</i>
28.	<i>T. surendrai</i>	[17]	<i>W. attu</i>
29.	<i>T. tengra</i>	[21] [12]	<i>M. tengra, M. gulio</i>
30.	<i>T. wallagonius</i>	Jain, 1952[7]	<i>W. attu</i>
31.	<i>T. vachi</i>	[21], [12]	<i>Eutropiichthys vacha</i>
32.	<i>T. vachius</i>	[9], [12]	<i>E. vacha</i>
33.	<i>T. vaginalis</i>	[6] [12]	<i>C. garua</i>
34.	<i>T. yogendrai</i>	[1]	<i>W. attu</i>
35.	<i>T. agrawali</i>	[11]	<i>W. attu</i>
36.	<i>T. yamunaii.</i>	[11]	<i>W. attu</i>
37.	<i>T. ghaziabadensis</i> n. sp.	Present specimen	<i>W. attu</i>

The present specimen comes closer to *Thaparocleidus wallagonius* [7] in shape of cirrus and accessory piece and vagina. It comes closer to *T. seenghali* [9] [12] in shape of vagina and ventral transverse bar. It comes closer to *T. malabaricus* [6] [12] in shape of cirrus and vagina. It comes closer to *T. multispiralis* [8] Lim [12] in shape of cirrus and accessory piece of cirrus.

Cirrus in present species is different from all the above specimens in having 7<sup>1/2</sup> coils. The number of coils in above species is 1<sup>1/2</sup>, 3<sup>1/2</sup>, 3<sup>1/2</sup>, 19<sup>1/2</sup> coils respectively. Accessory piece of cirrus is rosette like with six leaflets of unequal, irregular size and shape. Accessory piece of vagina has a narrow proximal and broad distal part giving it spade like appearance. Egg is sub ovate with a small conical spur at its posterior end.

Present species is different from all the above species in the structure of dorsal anchor which is Anchoratoid in above species with rudimentary outer roots, whereas, it is "Falcatoid" type with equal roots in the present specimen. Ventral anchor in present specimens is "Boreal" type whereas it is juvenile type in above specimens. Dorsal transverse bar in present specimens is "Anchoratoid wegeneri" type with backwardly projecting lateral ends. It also possesses a short conical postero medial process.

On the basis of above variations the present specimens is described as new species *Thaparocleidus ghaziabadensis*.

**Type Host:** *Wallago attu*

**Type Locality:** Hindon River (Ghaziabad)

**Microhabitat:** Gills

**ETYMOLOGY**

Present species is named after the place of collection of host.

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