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First Report of *Jainus piava* (Karling *et. al.*, 2011) from a Catfish of Oriental Region.

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Abstract

During the study of parasitic fauna of freshwater catfishes of Hindon river at Ghaziabad, authors came across one specimen of fish Wallago attu (Bloch and Schn), infected with monogenean belonging to the genus Jainus Karling et. al., 2011. Jainus piava has been originally described by Karling et. al., 2011 from Schizodon borellii (Characiformes, Anostomidae) from the upper Parana River flood plain in Brazil. Jainus piava is characterized by four pairs of head organs, Cirrus is double walled, fine sclerotized tube with a triangular base and equipped with a single sclerotized well developed, variable accessory piece. Haptor is characterized by 'Falcatoid' type dorsal anchors, 'Anchoratoid Wegeneri' type Dorsal transverse bar, 'Boreal' type Ventral anchors, "Saddle shaped" Ventral transverse bar. This is the first report of this genus from Oriental region.

Keywords: *Monogeneans, Jainus piava*

Introduction

During the course of study of freshwater monogenean fauna of catfishes of Hindon river in Ghaziabad, gill arches and gill filaments of catfish, *Wallago attu* (Bloch and Schn), were found infected with monogenean parasite *Jainus piava.* On detailed examination, it was found that worms at disposal of the authors exhibit several variations besides measurements from earlier descriptions. Moreover, it also exhibits new type locality for this species. It is therefore, briefly redescribed. The redescription is based on fresh material collected by authors.

Materials and Methods

Fishes for the present investigation were collected from Hindon bairaj, Indirapuram, Ghaziabad. They were brought to laboratory and identified. The identification of piscine hosts was made with the help of classical works of Srivastava (1980) and Day (1989). Monogeneans were collected by freezing technique of Mizelle (1936 and 1938). Worms thus collected, were washed thoroughly with distilled water, and fixed in hot 70% alcohol or 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

The worms are elongated and foliform. Prohaptor and haptor are fairly set off from body proper. These worms measure 688.0 - 697.9 µm in length. Maximum width of 149.6 - 158.2 µm is attained at the level of ovary. Prohaptor is four lobed. 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 sub spherical. It measures 49.6 - 54.1 µm in length and 46.3 - 52.9 µm in width. Pharynx leads to very short oesophagus measuring 11.4 - 15.2 x 9.1 - 13.3 µm. Oesophagus leads to intestine. Intestinal crura simple, bifurcate and confluent posteriorly slightly anterior to the haptoral peduncle. A pair of thin lateral bars is present in the intercaecal region extending from post-pharyngeal region up 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, intercaecal and elongated sac like with a broad posterior end. Testis measures 102.6 - 114.0 µm in length and 29.1 - 36.4 µm in width. A fine vas deferens arises from testis and loops around sinistral intestinal crura before opening into seminal vesicle. Vas deferens measures 361.2 - 370.9 µm in length. Seminal vesicle is pre-equatorial, intercaecal and fusiform in outline. It measures 62.1 - 68.6 µm in length and 24.7 - 36.8 µm in width. Seminal vesicle opens at the base of the male copulatory tube through a vasa efferentia. Vasa efferentia measures 64.6 - 70.2 µm in length.

The male copulatory complex consists of cirrus proper, an accessory piece and a pair of prostate glands. Cirrus is in the form of a double walled, fine sclerotized tube with a triangular base. Cirrus tube tapers abruptly posterior to base and leads to a fine convoluted tube. Length of cirrus ranges from 96.2 - 110.6 µm. Cirrus is equipped with a single sclerotized well developed, variable accessory piece. It measures 28.2 - 32.6 x 20.8 - 26.2

µm. Cirrus opens to the exterior through a separate male gonopore situated ventro-laterally on the sinistral margin posterior to cirrus. The gonopore is funnel shaped. The opening of the gonopore is surrounded by muscle fibers and measures 26.5 - 32.8 µm in length and 11.2 - 15.6 µm in width.

Female reproductive system consists of ovary, oviduct, ootype complex, receptaculum seminis, median chamber, vagina, vaginal duct and female gonopore. Ovary is pre-testicular, post-equatorial, intercaecal and oval in outline. It measures 54.2 - 60.1 µm in length and 24.3 - 31.0 µm in width. A fine oviduct measuring 124.0 - 128.5 µm arises from the anterior border of ovary and enters into the ootype complex. Ootype complex is pre-equatorial, intercaecal, oval in outline. It measures 19.1 - 23.7 x 14.2 - 20.0 µm. From ootype complex, a fine duct measuring 110.9 - 120.6 µm runs anteriorly and opens into median chamber. Median chamber is bean shaped. It measures 38.6 - 42.4 x 20.9 - 25.0 µm. A fine vestibule measuring 108.1 - 113.4 µm arises from posterior margin of median chamber and opens into funnel shaped female gonopore measuring 56.3 - 60.6 µm in length and 19.1 - 23.3 µm in width.

A lobed funnel shaped vagina measuring 20.6 - 24.1 x 13.8 - 17.4 µm is present on dextral margin at the level of receptaculum seminis. A fine vaginal duct measuring 50.2 - 58.4 µm arises from vagina and leads to receptaculum seminis. Receptaculum seminis is pre-equatorial, intercaecal and irregular in outline. It measures 36.2 - 42.4 µm in length and 23.2 - 28.7 µm in width. From postero-lateral margin of receptaculum seminis a fine duct measuring 66.9 - 71.1 µm arises and leads to ootype complex on the postero-lateral side. Vitellaria are dense, follicular and coextensive with intestinal crura up to haptoral peduncle.

Opisthaptor measures 73.8 - 78.6 µm in length and 45.0 - 52.2 µm in width. The 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. Dorsal anchors are 'Falcatoid' type measures 60.5 - 66.1 µm in length. They have bifurcated base with longer inner root and short outer root. Anchor roots are crenated with a tapering shaft and a long recurved point. Dorsal anchors are provided with sleeve sclerite associated with shaft and point on the inner side. Dorsal transverse bar measures 36.8 - 43.2 µm in length and Median width of bar 7.9 - 11.6 µm connecting the dorsal anchors is ‘Anchoratoid Wegeneri’ type. It is a slightly bend tubular structure. Lateral processes of dorsal transverse bar project upwards. The posterior lateral process of dorsal transverse bar is longer as compared to anterior half. Median part of dorsal transverse bar is more sclerotized as compared to rest of the bar. Ventral anchors are slender and 'Boreal' type measuring 25.4 - 32.1 µm in length, having deeply curved equal roots, tapering shaft and recurved point. Ventral transverse bar is ‘Saddle shaped’ measuring 22.3 - 28.9 µm in length and 2.9 - 6.3 in width with two bilateral anteriorly directed arms and two postero-medial process. Marginal hooklet could not be observed as they might have been shed during processing.

Discussion

Jainus piava has been collected and described from *Schizodon borellii* (Characiformes, Anostomidae) from the upper Parana river flood plain in Brazil by Karling

et. al., 2011. This is the first report of this parasite from a siluriform fish in oriental region. Appended table (Table 1) shows the difference in measurements of various body parts of *Jainus piava* Karling *et. al.,* 2011 and *Jainus piava* present specimens.

Table 1: Morphometric data (present in µm) of *Jainus piava* Karling *et. al.*, 2011 and *Jainus piava* present specimens.

Character	**Karling *et. al.*, 2011**	**Present specimens**
Host	*Schizodon borellii*	*Wallago attu*
Locality	Upper Parana river flood plain in Brazil	Hindon river, Ghaziabad
Total length	309	692.6
Maximum width	124.7	156.4
Head organs	3 or 4 pairs	4 pairs
Eye spots	2 pairs	2 pairs
Pharynx	Sub spherical 10.2	Sub spherical, 52.2 x 49.9
Oesophagus	-	13.2 x 11.5
Testis	Post-ovarian, fusiform 41 x 19.6	Post-ovarian, elongated and intercaecal 109.6 x 32.7
Vas deferens	-	365.1
Seminal vesicle	Large, posterior to copulatory complex	Large, fusiform, Anterior or posterior to copulatory complex 65.6 x 30.4
Cirrus	Coils of about 1.5 rings, Ring diameter- 11.9	Double walled, fine sclerotized tube with a triangular base, irregular coils 102.4
Accessory piece	Variable	Variable 30.3 x 23.5
Male gonopore	-	Funnel shaped, muscular 29.8 x 13.1
Ovary	Fusiform, elongated 78 x 15.6	Pre-testicular, post-equatorial, intercaecal and oval 56.4 x 27.7

Oviduct	-	126.0
Ootype complex	-	Sub ovate 23.3 x 20.9
Median chamber / Uterus	Delicate	Bean-shaped 40.6 x 23.5
Female gonopore	-	Funnel shaped 58.3 x 21.5
Receptaculum seminis	Irregular	Irregular 39.2 x 26.7
Egg	Spherical, 31 (diameter)	-
Vagina	Irregular	Lobed funnel shaped 21.4 x 15.6
Vaginal duct	-	54.5
Haptor		
Length	14.7	75.5
Width	23.5	50.4
Dorsal anchor		
Total length	22.5	62.1
Dorso apical length	-	39.9
Ventro apical length	-	36.2
Length of shaft	-	36.0
Length of Point	-	22.6
Dorsal transverse bar		
Length	30.7	38.4
Median width of bar	2.94	9.0
Ventral anchor		
Total length	8.64	28.1
Dorso apical length	-	21.3
Ventro apical length	-	17.0
Length of shaft	-	19.2
Length of point	-	10.8
Ventral transverse bar		
Length	33.8	25.2
Median width of bar	1.1	5.2
Marginal hooklet		

Total length	9.8	-

Conclusion

From this study it is concluded that present speciemens have some variations in measurements of various body parts. These variations might be due to the presence of these parasites in a different host or ecological niche or due to difference in the degree of maturity of worms. Original account given by Karling *et. al.,* 2011 lacks information about a pair of lateral bars present in intercaecal region extending from post pharyngeal region up to the haptoral peduncle. Seminal vesicle may be anterior or posterior to the male copulatory complex. Cirrus tube is convoluted but does not form conspicuous 1.5 coils. Funnel shaped male gonopore is described for the first time. Dorsal transverse bar is flexible may be curved or more or less straight. The posterior half of lateral processes is comparatively more developed. However, in original account, anterior and posterior half of lateral processes are equal. Median part of dorsal transverse bar is more sclerotized as compared to original description. Points of ventral anchor are larger as compared to original description.

Emended Diagnosis

Dactylogyridae, Ancyrocephalinae. Body robust, divisible into cephalic region, trunk, peduncle, haptor. Tegument variably developed, smooth or with ciliated tufts. Usually two terminal cephalic lobes poorly developed; head organs present in cephalic lobes and adjacent cephalic zones; cephalic glands present. Eyes present, usually two pairs. Mouth sub terminal, midventral; pharynx muscular, glandular, oesophagus short; intestinal caeca (2) confluent posterior to testis, lacking diverticula. Gonads intercaecal, tandem or overlapping, testis dorso-posterior to ovary. Vas deferens looping left intestinal caecum, seminal vesicle a sigmoid dilation of vas deferens; copulatory complex comprising a tubular cirrus with variably developed base and accessory piece articulated or non articulated antero-ventral to seminal vesicle. Oviduct short; uterus delicate; vagina dextral or sinistral in anterior trunk; receptaculum seminis immediately anterior to ovary. Genital pore midventral. Vitellaria well developed into two bilateral bands in trunk, confluent posterior to gonad. Peduncle short; haptor poorly developed, armed with dorsal and ventral pairs of anchors, dorsal and ventral bars, seven pairs of hooks with ancyrocephaline distribution (Mizelle, 1936). Ventral anchor with diagonally truncate point, elongate deep and superficial root; dorsal anchor shaft slightly enlarged proximally. Ventral bar with two bilateral anterior arms and one or two postero-medial process. Hooks similar, with undilated shanks, poorly developed thumb. Parasites of gills of Characiform and Siluriform fishes.

Explanation of Figures

Plate I: *Jainus piava* Karling *et. al.,* 2011. **Figure 1**. Whole mount, **Figure 2.** Cirrus and accessory piece, **Figure 3**. Female reproductive tract, **Figure 4.** Dorsal transverse bar holotype, **Figure 5.** Dorsal transverse bar paratype, **Figure 6.** Dorsal Anchors, **Figure 7.** Ventral transverse bar, **Figure 8.** Ventral anchors,

Plate II: *Jainus piava* Karling *et. al.,* 2011 **Microphotograph 1.** Whole mount, **Microphotograph 2.** Cirrus and accessory piece, **Microphotograph 3.** Female reproductive tract, **Microphotograph 4.** Dorsal anchors and transverse bar with holotype, **Microphotograph 5.** Dorsal anchors and transverse bar with paratype,

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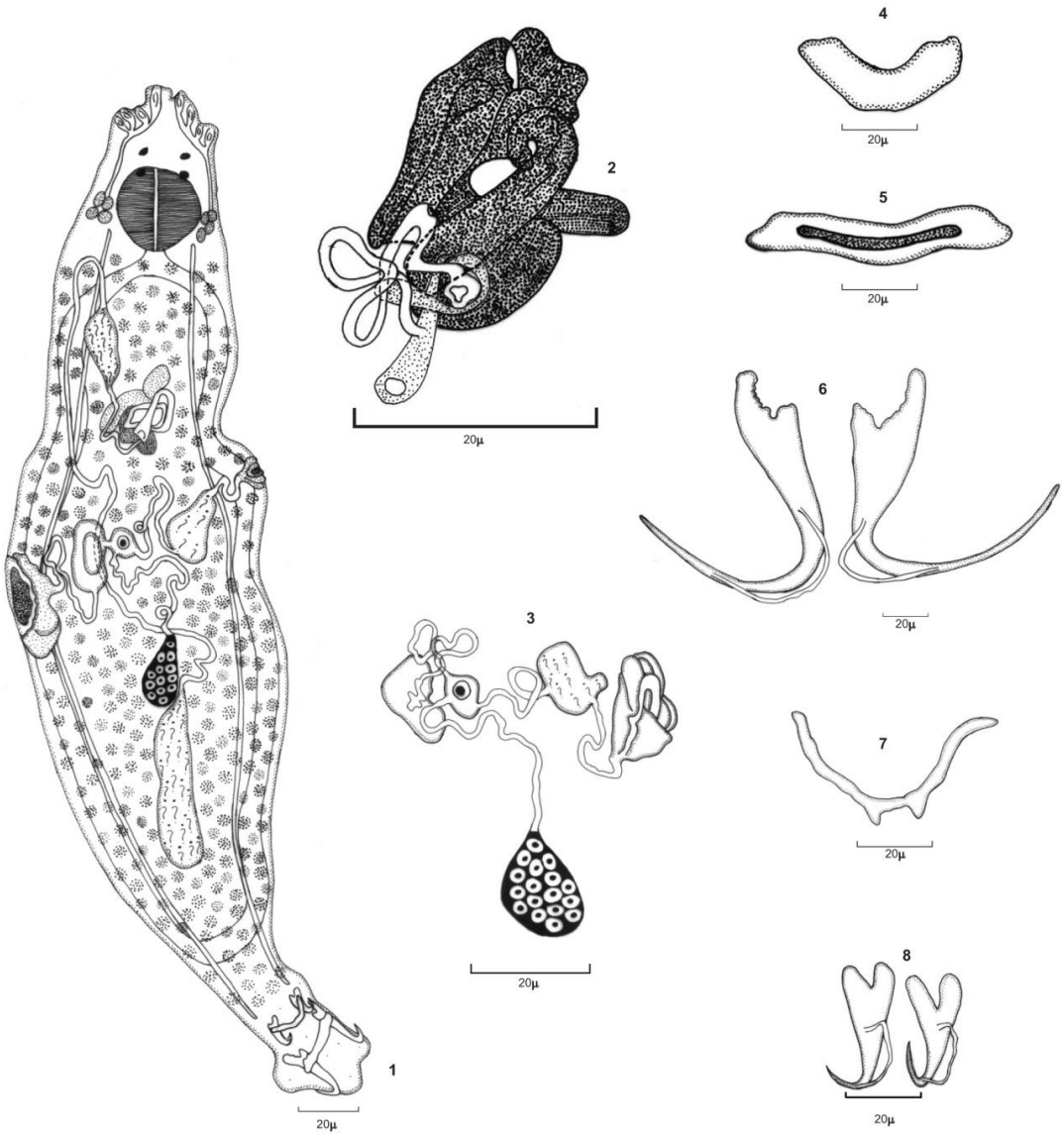

Plate-1

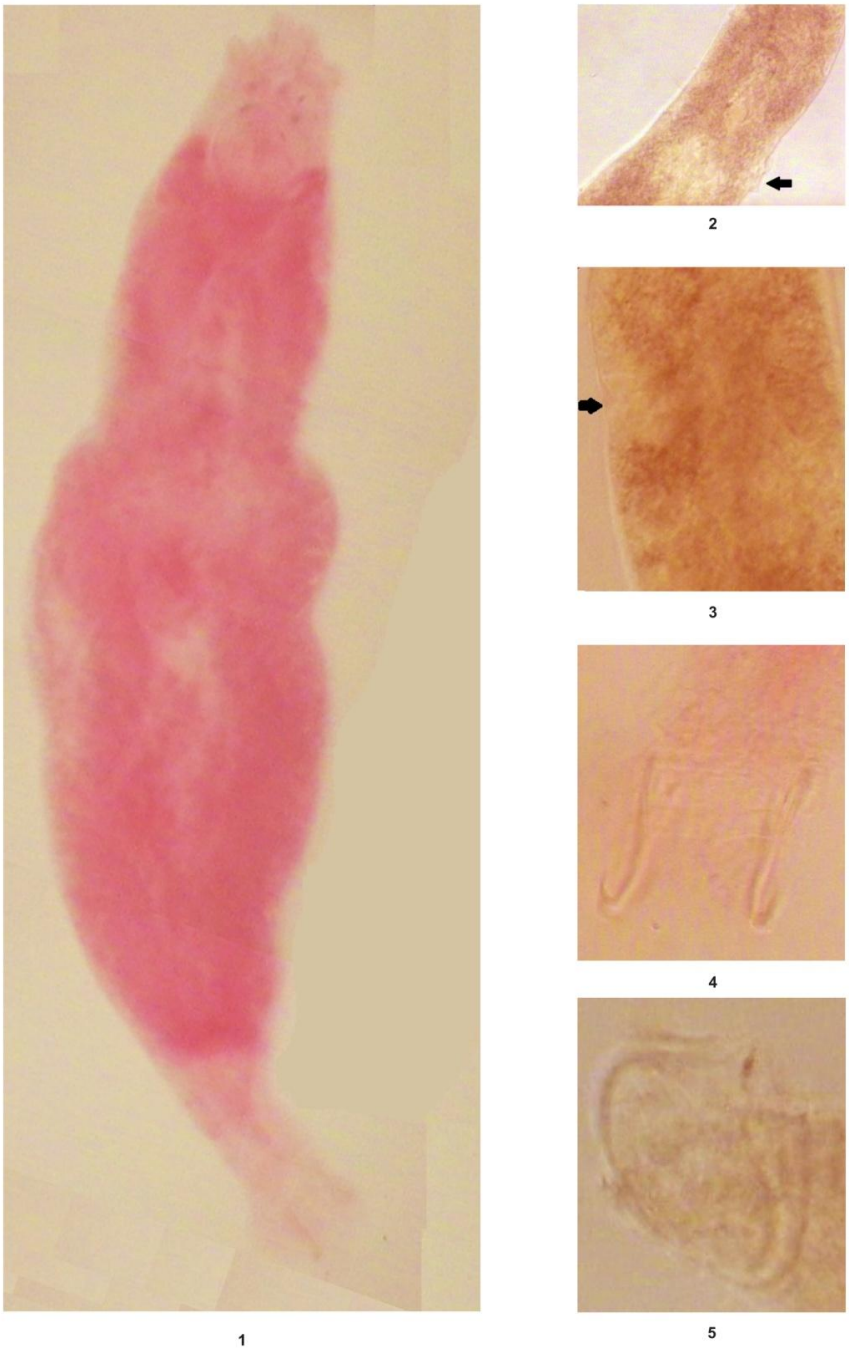

Plate-2