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REDESCRIPTION OF *DACTYLOGYRUS KALYANENSIS*, MUSSELIUS AND GUSSEV (1973) FROM GILLS OF *WALLAGO ATTU* AT GHAZIABAD.

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ABSTRACT

Present communication deals with a known species of genus *Dactylogyrus* Diesing, 1850 from freshwater fish *Wallago attu* (Bloch and Schn). Generic diagnosis of genus *Dactylogyrus* is as follows: Cephalic lobes two pairs. Eye spots two pairs, may disintegrate into eyespot granules or entirely absent in adult. Anchors directed by their points to dorsal side, supported by 1-3 connective bars. Vas deferens usually loops around left intestinal limb. Seminal vesicle formed by mere dilation of vas deferens. Two prostatic reservoirs present. Copulatory organ mostly tubular, with accessory piece. Vagina single, exceptionally double, may or may not have sclerotised supporting structures, opens near right (rarely near the left) side of the body. Parasites of freshwater teleosts. *D. kalyanensis* has been collected and described in India from gills of *Catla catla* (a Cyprinid fish) by Musselius and Gussev (1973) and Kumar (2013) from Kalyani fishfarms in West Bengal and Sharanpur in Uttar Pradesh respectively. *D. kalyanensis* has been collected from a new host *Wallago attu* (Bloch and Schn) (a Silurid fish) for the first time at a new locality in India.. The initial account given by Musselius and Gussev (1973) lacks the details of soft anatomy and male gonopore. However, the more recent account given by Kumar (2013) shows some discrepancies with regards to the description of structure of parasite. Therefore, *D. kalyanensis* Musselius and Gussev (1973) is redescribed from the gills of *Wallago attu* at Ghaziabad based on fresh material collected by authors. *D. kalyanensis* is characterized by the shape of its accessory piece and cirrus, together with its vaginal armament and egg

Key Words: Monogeneans, *Dactylogyrus kalyanensis.*

INTODUCTION

During the course of study of freshwater monogenean fauna of catfishes of Hindon river in Ghaziabad, the authors came across one specimen of *Wallago attu* (Bloch and Schn), infected with *Dactylogyrus kalyanensis* Musselius and Gussev, 1973. On detailed examination, it was found that the 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 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 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 10% neutral Formaldehyde. Study of 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. 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

Moderate sized worms are elliptical in shape and measure 440.7 (436.4 - 443.2) µm in length and 91.5 (88.4 - 94.6) µm in width. Prohaptor and opisthaptor are fairly set off from body proper. Posterior end of the body is broad while, cephalic end tapers gradually into a bilobed prohaptor. Cephalic region is equipped with five pairs of antero-lateral head organs. Two pairs of eyespots are present. Posterior pair of eyespots is larger on account of having greater number of melanistic granules. Pharynx is large muscular, spherical to oval structure measuring 38.9 (35.8 - 41.2) µm in length and 41.1 (38.9 - 44.2) µm in width. Oesophagus is very short, cylindrical tube measuring 9.l (7.1 - 11.4) µm in length and 5.9 (3.6 - 7.8) µm in width. Intestinal crura simple, bifurcate and confluent posteriorly, slightly anterior to haptoral peduncle. Male reproductive organ comprises of testis, vas deferens, seminal vesicle and cirrus. Saccular testis is single, fusiform, equatorial, pre-ovarian, midventral and intercaecal. Testis measures 43.3 (41.1 - 45.6) µm in length and 24.6 (22.3 - 26.9) µm in width. From the anterior border of testis a fine vas deferens arises. Vas deferens measures 106.2 (103.6 - 108.9) µm in length. It runs anteriorly and opens into seminal vesicle. Seminal vesicle is fusiform. It measures 16.5 (13.8 - 18.7) µm in length and 20.4 (17.6 - 22.4) µm in width. Seminal vesicle opens at the base of cirrus through fairly long vasa efferentia measuring 48.8 (46.4 - 50.5) µm. Male copulatory complex consists of cirrus proper and an accessory piece. Cirrus is a double walled tube. Base of cirrus is funnel shaped with an almost oval opening measuring 7.5 (5.3 - 9.7 x 6.8 (4.7 - 9.0) µm. Inner margin of base is fringed. Funnel shaped base tapers abruptly into a long narrow double walled tube. Cirrus tube is convoluted. It makes a **U** - shaped loop behind the base, moves anteriorly makes a prominent bubble shaped circular loop above the base of cirrus. It runs anteriorly and becomes convoluted. Cirrus measures 306.1 (303.5 - 309.0) µm in length. Diameter of the base of cirrus is 6.3 (4.3 - 8.6) µm. Cirrus is equipped with two accessory pieces. The first accessory piece is shield like measuring 41.2 (39.7 - 43.5) µm. It is made up of 4 - 6 pieces of irregular shape joined together by suture like joints. Anterior or distal end of cirrus is attached to an oblique sickle shaped accessory piece measuring 17.7 (15.4 - 19.9) µm. Cirrus tube glides in the cavity formed between the first and second accessory piece. Male gonopore measuring 18.9 (16.3 - 21.2) X 13.4 (11.1 - 15.5) µm is present on the lateral margin at the level of cirrus. It is dextral in position.

Female reproductive system comprises of ovary, oviduct, ootype complex, receptaculum seminis, median chamber and vagina. Ovary is saccular, post testicular, post-equatorial and intercaecal. It measures 51.4 (49.3 - 53.9) µm in length and 35.3 (33.4 - 37.5) µm in width. From the anterior border of ootype complex a short fine duct measuring 25.8 (22.6 - 27.8) µm leads to median chamber. Median chamber is roughly fusiform measuring 26.7 (23.7 - 29.3) x 11.8 (8.8 - 13.6) µm. Developing eggs can be seen in the lumen of median chamber. A fine vaginal duct arises from lateral margin of median chamber and opens into sinistral funnel shaped vagina. Vaginal opening 14.2 (12.2 – 16.7) µm in length and 10.0 (8.1 – 12.3) in width. From the lateral margin of ootype complex a short fine duct measuring 23.4 (21.1 – 25.4) µm in length arises and leads to dextral fusiform receptaculum seminis. From anterior border of receptaculum seminis a fine duct measuring 20.1 (18.1 – 23.4) leads to funnel shaped dextrally placed female gonopore lying below the male gonopore. Vitellaria sparse and coextensive with the intestinal crura. Egg is oval in outline measuring 40.2 (38.8 - 41.1) x 36.6 (34.4 - 38.1) µm bearing a terminal hook like spur. Haptor is fairly set off from body proper and measures 70.8 (67.4 - 72.6) µm in length and 31.7 (28.9 - 33.7) µm in width. Armature of haptor comprises of a pair of dorsal anchor, a dorsal transverse bar and seven pairs marginal hooklets. Anchors are ‘Anchoratoid Wegeneri' type with recurved point, very long inner root, but almost without outer root. Shaft is slender

and more or less straight, it tapers gradually into a fairly recurved point. Anchors are further strengthened by the presence of sleeve sclerite in the region of shaft. Dorsal transverse bar is 'Anchoratoid Wegeneri' type, with downwardly directed median prominence. Distal ends of the dorsal transverse bar are rounded and projected downwards. Marginal hooklets are 'Definitive' type with a dilated hooklet and a handle. Handle is divided into a fairly long and thin pivot of handle and the distal end is swollen.

DISCUSSION

Dactylogyrus kalyanensis has been collected and described from the gills of *Catla catla* by Musselius and Gussev (1973) and Kumar (2013). The appendable table (Table-1) shows the difference in various measurements (in µm) of *Dactylogyrus kalyanensis*.

Table - 1
A comparative account of *Dactylogyrus kalyanensis* Musselius and Gussev (1973), *D. kalyanesis* Kumar (2013) and *D. kalyanensis* present specimen

Character	***D. kalyanensis* Musselius and Gussev (1973)**	***D. kalyanensis* Vivek Kumar (2013)**	***D. kalyanensis* Present specimen**
Host	*Catla catla* (Ham)	*Catla catla* (Ham)	*Wallago attu* (Bloch and Schn)
Locality	Kalyani, West Bengal	Saharanpur (U.P.)	Hindon Bairaj, Ghaziabad (U.P.)
Total length	900	341 - 345	440.7
Total width	120	65 - 68	91.5
Head organs	-	4 pairs	5 pairs
Eye spots	2 pairs	2 pairs	2 pairs
Pharynx	-	28 - 29 x 21-22	38.9 x 41.1
Oesophagus	-	-	9.1 x 5.9
Position shape and size of testis	-	Intercaecal, post – equatorial, post – ovarian, 54 - 55 x 21-23	Equatorial, preovarian, sac like, intercaecal, 43.3 x 24.6
Vas deferens	-	48 – 49 x 17 –18	106.2
Shape and size of seminal vesicle	-	Fusiform, 48 - 49 x 17 - 18	Fusiform, 16.5 x 20.4
Cirrus	-	Curved tubular with a swollen bubble like base	Double walled tube, funnel shaped base
Length of cirrus	420 - 430	92 - 96	306.1
Diameter of base	-	12 - 16	6.3
Shape and Size of accessory piece	Shield shaped, 6.0-10	Sickle shaped, 38- 39	I - shield shaped, 41.2x17.5 II - sickle shaped, 17.7
Position, shape and size of ovary	-	Equatorial, pre – testicular, elongated - oval, 48 - 49 x 18 - 19	Post - testicular, post – equatorial, intercaecal, saccular, 51.4 x 35.3
Oviduct	8 - 18	-	46.3
Shape and size of ootype complex	-	-	Dextral, preovarian, oval, 22.0
Egg	-	22 - 23	40.2 x 36.6
Position and shape of Vagina	-	Anterior to ovary, muscular, sinistral, funnel shaped, 0.011 - 0.012	Anterior to ovary, muscular, sinistral, funnel shaped, 20.4 x 10.2
Vaginal opening	-	-	14.2 x 10.0
Vaginal duct	42	-	62.8
Median chamber	-	0.012 - 0.013	45.2 x 37.4
Haptor	-	61 - 62 x 45 - 46	70.8 x 31.7
Dorsal anchor			
Total length	63 - 73	58 - 59	80.1
Length of shaft			4.7
Length of point	26 - 29	15 - 16	11.4
Dorsal transverse bar			
Total length	4 - 5	15 - 16	80.1
Median width	23 - 25	-	5.9
Marginal hooklet			
Length	13 - 18	8 - 11	17.3
Length of hook	-	-	4.5
Length of handle	-	-	10.9
Length of loop	-	-	2.1

Worms at the disposal of authors exhibit minor variations in the measurements of various body parts. This variation might be due to the presence of these parasites in a different host or ecological niche or due to the difference in the degree of maturity of worms. The initial account given by Musselius and Gussev (1973)* lacks the details of soft anatomy and male gonopore. However, the more recent account given by Kumar (2013) shows some discrepancies with regards to the description of structure and the photomicrographs provided by him with his research articles which are as follows: Kumar (2013) has described four pairs of head organs in the cephalic region whereas worms at the disposal of authors exhibit presence of five pairs of head organs. In the specimens available with the authors intestinal crura are confluent posteriorly a bit anterior to haptoral peduncle. Not at the level of haptoral peduncle as described by Kumar (2013). Male gonopore is dextral in position and is funnel shaped and it is at the level of base of cirrus. According to Kumar (2013), Testis is post equatorial, post ovarian. However, worms at the disposal of authors exhibit presence of equatorial, pre ovarian saccular testis. Authors agree with Musselius and Gussev (1973) and Kumar (2013) that the cirrus or Male copulatory complex has bubble shaped initial part. However the accessory piece of cirrus has a shape of shield connected with initial part by elastic pivot. Here the authors disagree with Musselius and Gussev (1973) and Kumar (2013). According to Musselius and Gussev (1973) there is a single shield shaped accessory piece. While, according to Kumar (2013) the accessory piece is sickle shaped. However, authors are of the opinion that cirrus is provided with two accessory pieces. The first piece is shield shaped (as described by Musselius and Gussev, 1973) made up of 4 – 6 pieces joined together by suture like joints. The second accessory piece is sickle shaped (as described by Kumar, 2013 running obliquely from the distal part of first accessory piece. In our opinion, the sickle shaped pivot of accessory piece described by Musselius and Gussev (1973) is actually the second accessory piece. Kumar (2013) probably misunderstood the sickle shaped accessory piece to be the complete accessory piece. The shield shaped accessory piece is visible markedly in the photograph provided by Kumar (2013) with his research article. Further, authors are of the opinion that the first accessory piece consists of 4 – 6 pieces joined together by suture like joints which might have been overlooked by previous workers due to paucity of resources. Authors agree with Musselius and Gussev (1973) regarding shape of vaginal opening. However, the authors are of the opinion that clew referred to by previous workers are actually the convolutions of vaginal duct over the median chamber. Ootype complex is described for the first time. Ootype complex is dextral, preovarian, oval structure. Developing egg is seen in the median chamber. A well developed spur is present at the broad side of egg. This spur has been over looked by Kumar (2013). However it is very well visible in the photograph given by him with his research article.

Plate I
Dactylogyrus kalyanensis Musselius and Gussev, 1973

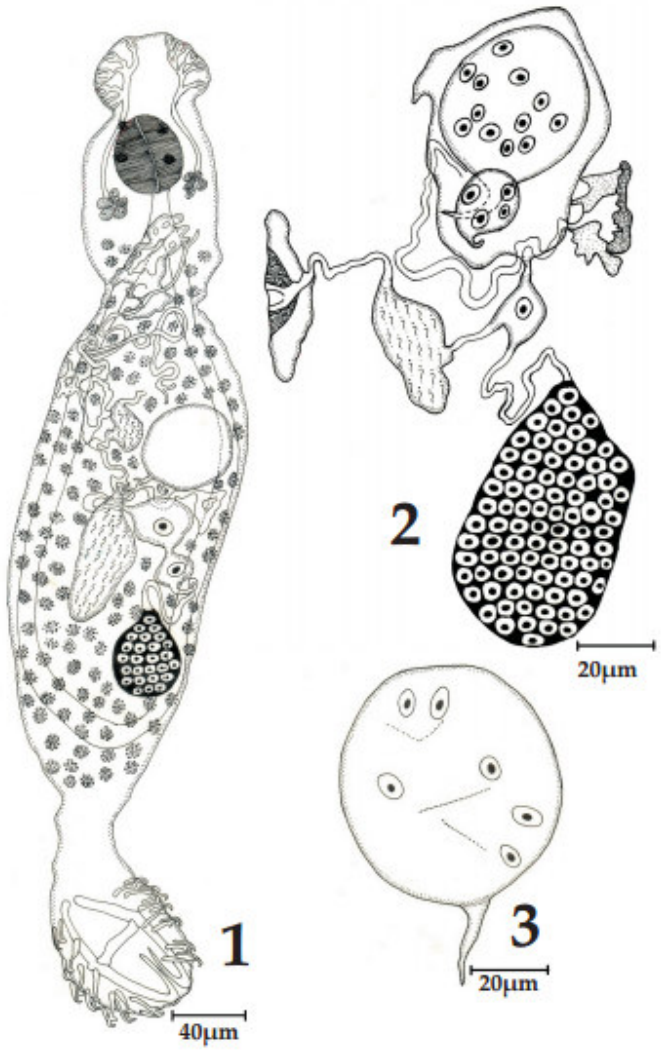


Figure 1. ***Whole mount,***
Figure 2. ***Female reproductive system,***
Figure 3. ***Egg,***

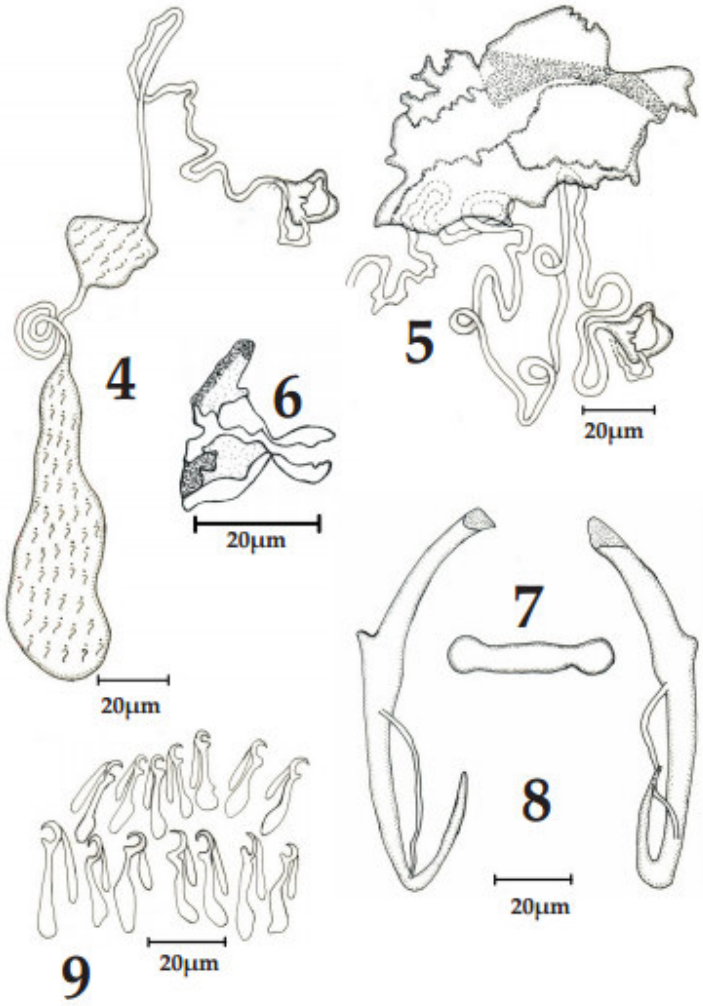
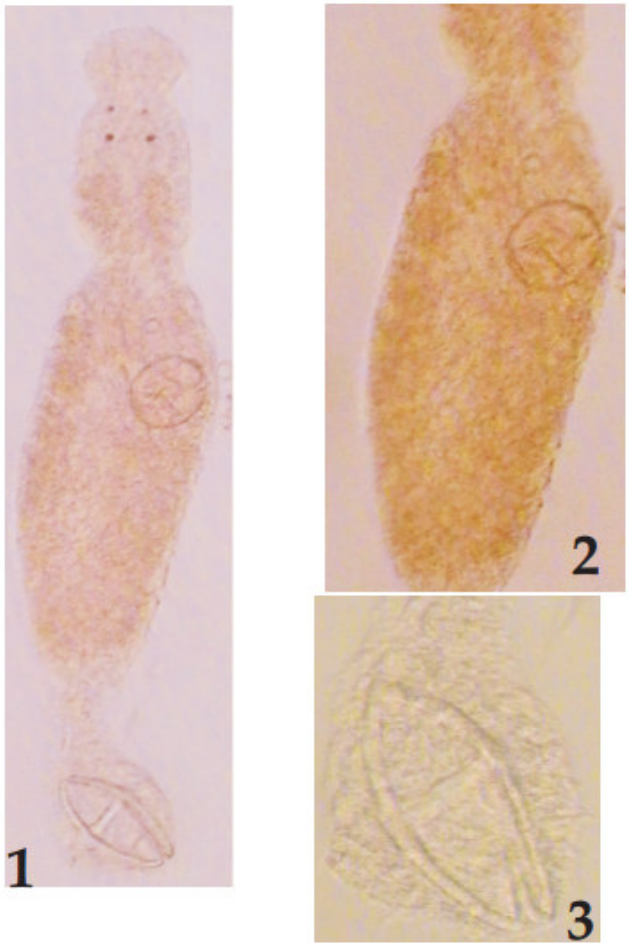


Figure 4. ***Male reproductive system,***
Figure 5. ***Cirrus and accessory piece,***
Figure 6. ***Male gonopore,***
Figure 7. ***Dorsal transverse bar,***
Figure 8. ***Dorsal Anchors,***
Figure 9. ***Marginal hooklets,***

Plate II
Dactylogyrus kalyanensis Musselius and Gussev, 1973



Microphotograph 1. ***Whole mount,***
Microphotograph 2. ***Male copulatory complex, Female reproductive system and Egg,***
Microphotograph 3. ***Haptor***

CONCLUSION

D. kalyanensis is a parasite of freshwater fishes belonging to order Cypriniformes. But *Catla catla* is a Cyprinid fish, while *Wallago attu* is a Silurid fish. So far, this is the first report of this parasite from a silurid fish. Authors are of the opinion that as, the breeding season of monogenean parasites coincides with that of their host; the onchomiracidium larva might get transferred to a silurid fish in the riverine system itself. As *Wallago attu* builds nest in shallow water and *Catla catla* breeds in shallow ditches of stagnant water. Thus, ecologically breeding conditions are almost same for both the fishes. Hence, this parasite can be easily transmitted from *Catla catla* to *Wallago attu* during breeding and developmental stages.

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