

Monogenean gill parasites of Indian major carps from different fish farms of Mymensingh, Bangladesh

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Abstract

All together 148 fish host samples of *Labeo rohita*, *Cirrhina mrigala*, *Catla catla* and *Labeo gonius* were collected from different fish farms of Mymensingh. The gill monogeneans were then dislodged from the gill under dissecting microscope and fixed in ammonium picrate. Five species of *Dactylogyrus* namely, *Dactylogyrus mrigali*, *D. chauhanus*, *D. yogendrai*, *D. labei* and *D. kalyanensis* were recovered from sampled fishes. All the parasites were studied and redescribed, and reported for the first time from Bangladesh. The present investigation established *Catla catla* as a new host of *D. labei*.

Key words: Monogenean fluke, Gill parasites, Indian major carps

Introduction

Monogenea is one of three orders of the class Trematoda is known to infect the external surfaces of both freshwater and marine fishes. They usually infect gills, skin, fins, mouth cavity and cause damage of host tissue by their anchors, hooks and sucker during their feeding and they particularly infect fry and fingerlings in nursery ponds (Tripathi 1957). Hoffman (1967) stated that some dactylogyrids cause great damage to gill filaments of carps and goldfish in hatcheries.

No attention has been paid by the workers to study the freshwater monogeneans in Bangladesh. There is so far only a published work on this group of parasite (Mohanta and Chandra 2000). Thus with a view to enrich our knowledge the present investigation was undertaken. During the general survey of freshwater-monogeneans of Mymensingh region authors investigated Indian major carps *Labeo rohita*, *Cirrhina mrigala*, *Catla catla* and *Labeo gonius*, and found them infested with five gill parasitic monogeneans. They are therefore, described and reported for the first time from Bangladesh.

Materials and methods

A total of 148 fishes of Indian major carps- 45 samples of *Labeo-rohita*, 38 samples of *Catla catla*, 38 samples of *Cirrhina mrigala* and 27 of *Labeo gonius* were collected from different fish farms and nurseries of Mymensingh district. Live fish were collected from

BFRI (Bangladesh Fisheries Research Institute), Fish Seed Multiplication Farm, Maskanda and private fish farms of Shambhugonj, Digarkanda and Mymensingh. Only the *Labeo gonius* were collected from fish-traders of Shambhugonj.

The collected fishes were carried live to the Fish Disease Laboratory by a water containing bucket. Fishes were then killed by a blow on the head. Both the opercula of the fish were cut by a scissors to remove the gills and dissected gills were placed in petridish containing clean water. Gills containing petridish was placed under dissecting microscope and observed the gill filaments to find out parasite. The live monogeneans were gently rubbed to dislodge from the gill filaments by the help of a bent needle and forceps. The monogeneans were removed and picked out by using a fine pipette to a small drop of water on a clean slide and covered with clean cover slip. Afterwards, a round circle was marked to confine the monogeneans by a marker pen. A small drop of ammonium picrate was introduced beneath the cover slip to fix and clean the worm. The corners of the cover slip were sealed with sialant to prevent it from moving. Preserved monogenetic trematodes were then studied under microscope and their size, shape and chitinoid structure were noted. Figures of the hard parts of flukes were drawn with the aid of a Camera lucida. Measurements were done with help of Oculomicrometer which was adjusted with stage micrometer and the microscope. Terminology used following Gussev (1976). For parasitic infestation ecological terms were used after Margolis *et al.* (1982). All measurements are shown in millimeters unless otherwise stated.

Results and discussion

Infestations

During the study period a number of monogenean flukes were recovered from gill filaments of 4 species of major carps. They were five different species under the genus *Dactylogyrus*. The list of host and their parasites are presented in Table 1.

Table 1. List of hosts and their parasites recovered

Host	Parasites
<i>Labeo rohita</i>	1. <i>Dactylogyrus labeli</i> Musselius and Gussev, 1976
<i>Catla catla</i>	1. <i>D. kalyanensis</i> Musselius and Gussev, 1976 2. <i>D. labeli</i> Musselius and Gussev, 1976
<i>Cirrhina mrigala</i>	1. <i>D. mrigali</i> Gussev, 1976 2. <i>D. chauhanus</i> Gussev and Musselius, 1976 3. <i>D. yogendrai</i> Gussev and Musselius, 1976
<i>Labeo gonius</i>	1. <i>D. labeli</i> Musselius and Gussev, 1976

A total of 36 fishes of *Labeo rohita* were infested out of 45 examined. From the infested host, 120 monogeneans were collected. The prevalence was 80%, mean intensity 3.33 and abundance 2.67. The minimum prevalence was found in *Catla catla* was 63.16%,

the mean intensity was 3.96 and the abundance was 2.50, where as the highest prevalence found in *Cirrhina mrigala* was 86.84%, mean intensity was 3.09 and abundance 2.68. The prevalence in *Labeo gonius* was found 66.67%, the mean intensity was 4.17 and the abundance was 2.78. Parasitic infestation though was the highest in *C. mrigala*, mean intensity and abundance was the highest in *L. gonius*. The infestation of monogeneans in different hosts are shown in Table 2.

Table 2. Prevalence (%), mean intensity and abundance of monogenetic trematodes recorded from sampled fishes

Host	No. of host fish		No. of parasites collected	Prevalence %	Mean intensity	Abundance
	Examined	Infested				
<i>Labeo rohita</i>	45	36	120	80.00	3.33	2.67
<i>Catla catla</i>	38	24	95	63.16	3.96	2.50
<i>Cirrhina mrigala</i>	38	33	102	86.84	3.09	2.86
<i>Labeo gonius</i>	27	18	75	66.67	4.17	2.78

Description of the monogeneans

Dactylogyrus mrigali Gussev 1976 (Fig. 1)

Forty seven specimens were collected from gill filaments of *C. mrigala*, out of which five specimens were measured. The flukes are small to moderate in length 0.37-0.51, width is 0.091-0.120. Haptor is well demarcated from body.

Anchors have well-developed roots and recurved point. Their total length is 0.037-0.039 and the inner root 0.010-0.014, outer one 0.002-0.003, point is 0.008 and main part is 0.027-0.032. Dorsal bar has considerably curved backward medial part, saddle shaped, its length and width are 0.023-0.028 and 0.006-0.009 respectively. Ventral bar is 5 ray shaped, its size is 0.033-0.037 x 0.015-0.017. Marginal hooks have handle poorly demarcated from pivot and projected heel of hooklet. Their total length is 0.017-0.024, hooks of 6th pair are the shortest and those of 4th pair are the longest.

The copulatory complex is composed of slightly curved tube and accessory piece. Tube is slender narrowing towards end with bubble like inflated initial part. Total length of copulatory complex is 0.029-0.031. Vaginal armament dextral, it has shape of curved tube, it is 0.012 - 0.016 long, its diameter is about 0.002.

Remarks: *Dactylogyrus mrigali* was first reported by Gussev, 1976 from *Cirrhina mrigala* from the water bodies near Lucknow and from a hybrid *C. mrigala* x *Labeo rohita* in Bhavanisagar water reservoir in India.

The present specimens coincide the detail morphology with *Dactylogyrus mrigali* Gussev (1976) and hence has been identified as *D. mrigali*. However, the size of the present specimens slightly differ from the previously described one. The present one slightly smaller than the Indian specimens, (which may be due to the geographical or

ecological effect on the worms in a new environment) the present specimens also coincide to *D. mrigali* Gussev (1976) in morphology of anchors, dorsal and ventral bar, and hooks. Present report indicates the availability of this worm in *Cirrhina mrigala*, also in Bangladesh.

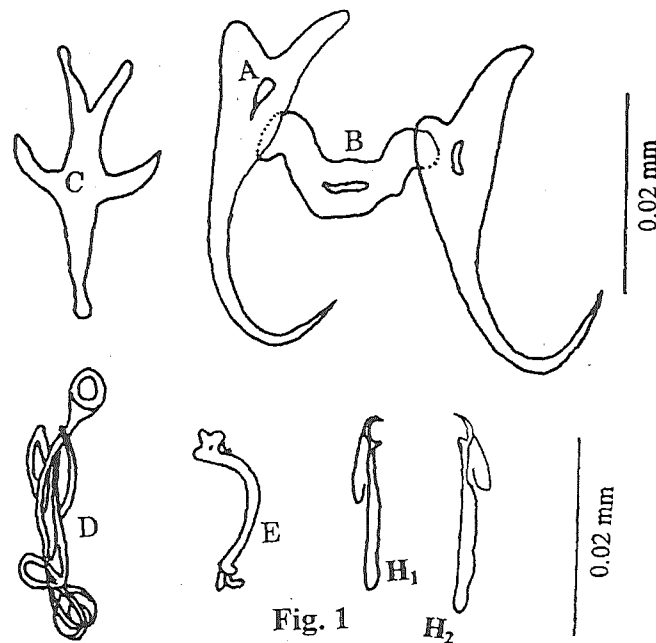


Fig. 1. Hard parts of haptor and copulatory complex of *Dactylogyrus mrigali*
 A. Dorsal anchor B. Dorsal bar C. Ventral bar D. Copulatory complex
 E. Vaginal armament H₁ and H₂ Marginal hooklets

Dactylogyrus chauhanus Gussev and Musselius 1976 (Fig. 2)

Nineteen specimens of this fluke could be collected from 38 *Cirrhina mrigala* examined. Four specimens were measured for description. The flukes are small, body length is 0.36-0.42 and body width 0.099-0.100. Eyespot is absent. Anchors with well-developed roots and greatly straightened (opened). The anchors is sabre-like (a heavy sword with a curved blade) point. Anchors bear wing and removed from the basal part to the point. Their total length is 0.044 -0.049, length of main part is 0.040-0.042, inner root is 0.009-0.012, outer root is 0.004-0.005. Only one dorsal bar almost straight, with mass widened lateral ends and a little widened middle part, its size 0.004-0.005 × 0.025-0.026. Hooks thin, with well demarcated handle and its pivot, with projecting round heel of hooklet. Their total length are 0.016-0.022.

The copulatory complex consists of a tube and accessory piece. Tube is thin, faintly narrowing towards the ends, spirally curved, has 2.5 - 3.5 spires, with bubble-like widened initial part. Accessory piece has a shape of claw-like formation disposed near the end of tube. The size of copulatory complex 0.021 - 0.030 × 0.010 - 0.012, diameter of initial part is 0.005 - 0.007. Vaginal tube is straight in the beginning and a wavy in the rest part. Its length is about 0.011 - 0.013, diameter is 0.002.

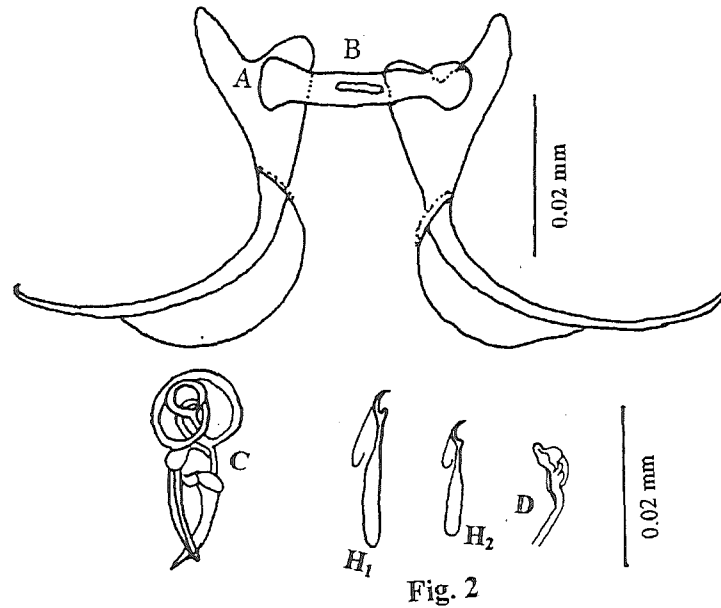


Fig. 2. Hard parts of haptor and copulatory complex of *Dactylogyus chauhanus*
 A. Dorsal anchor B. Dorsal bar C. Copulatory complex
 D. Vaginal armament H₁ and H₂ Marginal hooklets

Remarks: Gussev and Musselius (1976) first described this monogenean from the water bodies in the region of Lucknow from the host *Cirrhina mrigala*. It was named in honour of Dr. B. S. Chauhan, *Dactylogyus chauhanus*. Simultaneously it was described from Calcutta and Bhawanisagar reservoir, and also fish from Kalyani, West Bengal, India. The present specimens collected from the same host fishes in Bangladesh coincide the detail morphology with *D. chauhanus* (Gussev and Musselius 1976). Present report indicates the availability of this worm in *Cirrhina mrigala* also in Bangladesh.

Dactylogyus yogendrai Gussev and Musselius 1976 (Fig. 3)

Only 8 specimens were collected from the gill filaments of *C. mrigala* and 3 of them were measured. The flukes are relatively small 0.58-0.64 in length, 0.10-0.13 in width. Eye spot is absent.

Anchors have well-developed inner root, small outer root and small recurved point. Their total length is 0.041-0.048, inner root is 0.012-0.013, outer root is 0.001-0.002, point is 0.008-0.009 and the main part is 0.037-0.041. There is only one dorsal bar, which is almost straight, with thickened lateral butts and with wavy anterior and posterior edges; its size is 0.004-0.006 x 0.027-0.029 and wings are present in both anchors. The marginal hooks have clearly marked handle and its pivot and projected rounded heel of hooklet. The total length of marginal hook is 0.024-0.025.

The copulatory complex consists of a tube and an accessory piece. The tube is thin and spirally curved, with 3.5-4.5 spires. It is almost cylindrical, small and gradually narrowing towards the end. Tube has bubble-like widened initial part and its posterior edge has a cavity. Diameter of the initial part is 0.006. Its size is 0.025-0.029 x 0.009-0.011. Diameter of first spire is 0.010-0.012. Accessory piece has the shape of triangular frame, which disposes near end-spire of tube. The frame has a pitch fork-like appendix with claw-like ends and joins initial part of tube by means of elastic ligament. Vaginal armament has shape of tube, straight in the beginning and wavy in the rest part. Its length is 0.020-0.021 and diameter is about 0.001.

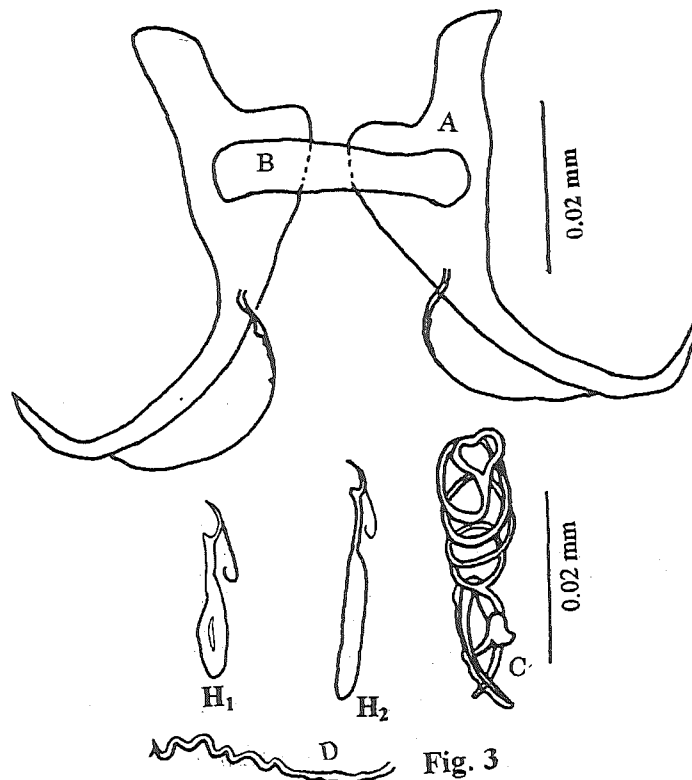


Fig. 3. Hard parts of haptor and copulatory complex of *Dactylogyrus yogendrai*.
 A. Dorsal anchor B. Dorsal bar C. Copulatory complex,
 D. Vaginal armament H₁ and H₂ Marginal hooklets

Remarks: *Dactylogyrus yogendrai* was first reported by Gussev and Musselius, (1976) from gill filaments of *Cirrhina mrigala* from the waterbodies near Lucknow. This species was also reported from Calcutta in *C. mrigala* and *Labeo rohita*. They also recorded it from Bhawanisagar reservoir and from fish farm, Kalyani, West Bengal, India. It was named in honour of Dr. Yogendra R. Tripathi, an eminent parasitologist of India. The present specimen was also collected from the gill filament of *Cirrhina mrigala* but not found in *Labeo rohita* in Mymensingh district. It coincides with the detail morphology with *D. yogendrai* Gussev and Musselius 1976. However, the size of the present worm differs slightly from the previous forms. It is slightly longer than the Indian specimens, as it has been only collected from *C. mrigala*. It has also minor variation in measurements in the chitinoid elements of haptor.

Dactylogyrus labei Musselius and Gussev 1976 (Fig. 4)

A total of 78 specimens were recovered from *L. rohita*, *L. gonius* and *C. catla*. Nine specimens were measured for description. The flukes are small. The length of body is about 0.38-0.48, maximum width is about 0.007-0.012. Eyespots are lacking.

Anchors are large, distinct, with well-developed roots and recurved point. Anchors have wings. Their lengths is 0.036-0.038, length of main part is 0.027-0.032, inner root is 0.010-0.017, outer root is 0.002-0.007. Length of point is 0.012-0.013. There are two bars - dorsal and ventral (additional) one. Dorsal bar is without posterior process, its size is 0.004-0.006 x 0.021-0.025. Ventral bars is without lateral process, its size is 0.003-0.005 x 0.022-0.023. Seven pairs and two types of hooks are present. Marginal hooks with projecting heel of hooklet and handle, slightly demarcated from its pivot. Their length are 0.012-0.017.

Copulatory complex is composed of a tube an accessory piece. The tube is S- shaped, slender, with bubble-like inflated initial part. In front of it, there is a free lying chitinoid piece. Its length along curve is 0.040 - 0.064. Vaginal tube dextral, it is cylinder-like; end plate is not thin but thick, 0.021-0.033 in length.

Remarks: *Dactylogyrus labei* was first reported by Musselius and Gussev (1976) from *Labeo rohita*, *L. calbasu* from water bodies in the region of Lucknow, also *L. rohita* from the Kalyani fish farm, West Bengal, India. The present species coincides with the detail morphology of *D. labei* Musselius and Gussev 1976 and hence has been identified as *D. labei*. However, the size of the present species differs from the previously described one. It is slightly larger than the Indian specimens collected from *L. rohita*. The specimens collected from *Catla catla* also show comparatively larger body and copulatory complex. However, specimens from *Labeo gonius* are comparatively smaller body and chitinoid structure than the other specimens collected from *Labeo rohita* and *Catla catla*. This is the first report of *D. labei* from *L. gonius* from Bangladesh and also from a new host *Catla catla*. Present investigation indicates the availability of this worm in *L. rohita*, *L. gonius* and *Catla catla* in Bangladesh.

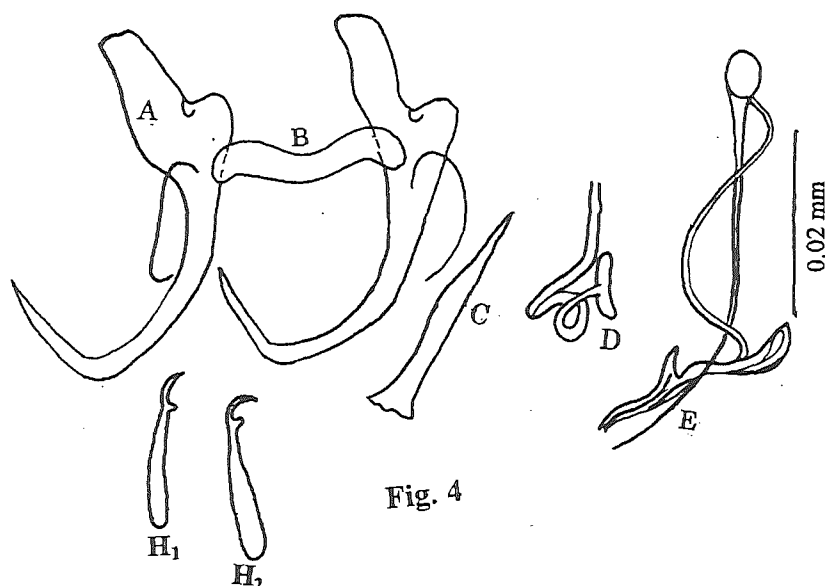


Fig. 4. Hard parts of haptor and copulatory complex of *Dactylogyrus labeli*
 A. Dorsal anchor, B. Dorsal bar C. Ventral bar D. Vaginal armament,
 E. Copulatory complex H₁ and H₂. Marginal hooklets

Dactylogyrus kalyanensis Musselius and Gussev 1976 (Fig. 5)

Only 3 specimens could be collected from the gill filaments *C. catla* and they were measured. The fluke is moderate in size. Its body length is 0.51-0.65 and the greatest body width is 0.012-0.091. Two pair of scattered eye granules are present, the anterior pair is disposed before the rounded pharynx, and the posterior pair is in the front part of the pharynx. Among the eye granules, the posterior pair is larger in size.

Anchors are prominent, large but thin with long inner curved root. They are rarely protruding outer root. Their main part has a typical widening in the place of attachment of wing, which is considerable removed from the base part to the point. The point is sharply recurved, almost straight. Total length of anchor is 0.069-0.078, length of main part is 0.046-0.050, inner root is 0.031-0.032, the outer root not more than 0.003, and the point is 0.025-0.026. The only purely connective dorsal bar is small dumb-bell shaped with round widened lateral termination. Its size is 0.005-0.007 x 0.024-0.025.

Hooks (7 pairs) are small in comparison with anchors, with well-developed widened handle and with protruding tongue-shaped heel of hooklet. Two types of hooks and the shortest hooks of 6th and 7th pair have a small pin shaped handle. Hooks are 0.013-0.018. Copulatory complex is composed of a tube and an accessory piece. Tube is very long and thin narrowing to its termination, looped, with bubble-shaped initial part. The size of the copulatory complex is 0.029-0.037 x 0.039-0.040, diameter of the initial part is 0.008 -

0.011. Accessory piece has a shape of shield connected with initial part by elastic pivot. Vaginal armament has shape of a thin tube rolled up into a clew.

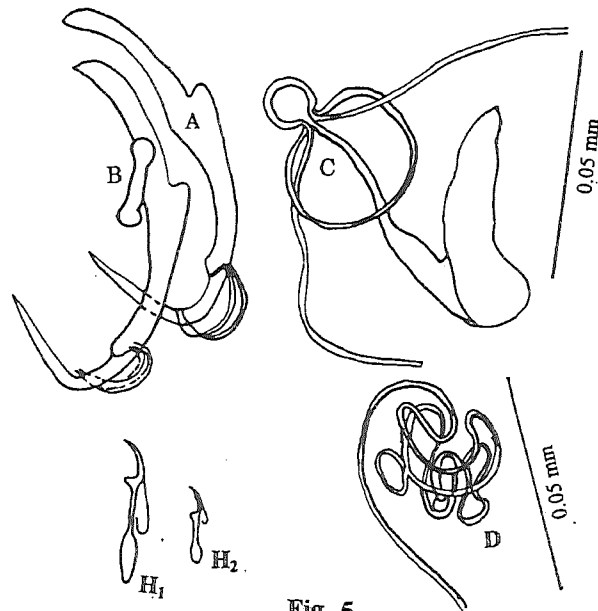


Fig. 5

Fig. 5. Hard parts of haptor and copulatory complex of *Dactylogyrus kalyanensis*
 A. Dorsal anchor B. Dorsal bar C. Copulatory complex,
 D. Vaginal armament H₁ and H₂. Marginal hooklets

Remarks: *Dactylogyrus kalyanensis* was first reported by Musselius and Gussev (1976) from *Catla catla* from Kalyani fish farm, West Bengal, India. The present species is very similar to *D. kalyanensis* Musselius and Gussev 1976. Except in certain measurements the morphology of anchor, hooks, bars, and copulatory complex are also similar. It is slightly smaller in body size but the anchor, inner root and outer root is larger than the previous specimens. This species is reported for the first time from Bangladesh.

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