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OCCURRENCE OF *DACTYLOGYRUS* SPECIES IN *CYPRINUS CARPIO* FROM MAWANA, MEERUT UTTAR PRADESH

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ABSTRACT

During this investigation of gills of 42 fishes of a cyprinid species from local fish markets of Mawana (Meerut) and Hastinapur (Meerut), two monogenean species were found in fresh water fish *Cyprinus carpio* (Linnaeus). We found *Dactylogyrus molnari* and *Dactylogyrus vastator*. Both the species were characterized on basis of their morphological characters.

Keywords: Monogeneans, *Dactylogyrus, D. molnari, D. vastator, Cyprinus carpio*

INTRODUCTION

Diseases are the most serious limiting factors in aquaculture, because of increased density of fish in restricted water where the fish pathogens can easily transmit from one fish to another. Much of economic loss is however, preventable with proper fish health management **[1]**. The fish parasites may cause fish mortality in culture fishes where the entire fishes population of pond may be killed, resulting in loss of potential food and economic loss to the culturists. The success of the implementation of various fishery development programs depends to a certain extent on the intensification of the fish parasitological research, as the improvement of fish yield can mainly be achieved from healthy fish stock **[2]**.

Dactylogyrus spp. (belonging to Class: Monogenea, Phylum: Platyhelminthes) are ectoparasites living on the gills, present the largest group of fish parasites and major importance in the pathology of fishes **[3]**. Young fishes are subjected to the risk of infection with these parasites which might cause diseases and mortalities among fry in hatcheries, and among larger fishes [**4]**. For

example *D. vastator* caused great damage to the gill filaments of carps and goldfishes in California hatcheries **[5]**.

Fish parasites under favorable conditions, cause economic loss by affecting the health of fishes and causing high mortality especially trematodes, can cause gill infestations and inhibited oxygen exchange across gill lamella. Monogenean parasites are still wide spread in freshwater wildlife, on farm fishes and marine habitats **[6]**.

In this investigation *Cyprinus carpio* carp from local pond and local fish market were studied. Some fishes were infected with *Dactylogyrus molnari* and *Dactylogyrus vastator*. On detailed examination, it was found that worms at disposal of the writers exhibit several variations besides measurements. Moreover, it also exhibits a new host record and new type locality for these species. It is, therefore, briefly redescribed. This description is based on fresh materials collected by authors. The present investigation was carried out to identify *Dactylogyrus* species in infected fishes of Mawana region and their morphological characterization.

MATERIAL AND METHODS

Fishes, for the present investigation, were collected from ponds and local fish markets of Mawana (Meerut) and Hastinapur (Meerut). They were brought to laboratory as soon as possible and examined within 24 hours and identification of piscine hosts was made with the help of classical works of[7–10]. Monogeneans were collected by freezing technique of **[7, 8]**. Gills were removed from both sides of fishes and placed in separate tubes, half filled with water and kept in the refrigerator for 8-48 hours and shaken vigorously. This solution was poured in Petri-dishes, diluted with water and examined under a stereoscopic binuclear microscope.

Worms thus collected, were washed thoroughly and fixed in 70% alcohol. Worms were removed from the alcohol by a small pipette and placed onto slide. Permanent mounts were also made after staining in Acetoalum carmine, dehydrating through ascending grades of Alcohol, clearing in Xylene and mounting in Canada balsam. Parasites were identified according to shape of the sclerotized parts of the haptor (median hooks or anchors, connecting bars, supplementary bars and hooklets or marginal hooks) and reproductive organs (copulatory organs and vaginal armment), using light microscope equipped. The measurement of parasites was achieved by ocular micrometer. The figure were drawn by using Camera Lucida with the help of stage micrometer **[7, 8]**.

RESULTS AND DISCUSSION

A total number of 42 fishes, belonged to a species of the family Cyprinidae, were collected from local fish market of Mawana and Hastinapur (Meerut). The inspection of fishes revealed their infection with two species of the genus *Dactylogyrus*. The following is an account on description and measurement of these parasites.

***Dactylogyrus molnari* (Ergens et Dulma, 1969, [11], (Plate 1, Figure 1-7)**

Host: *Cyprinus carpio* (Linnaeus); No. of hosts examined: 22; No. of hosts found infected: 08; No. of worms collected: 14; Site of infection: Gills; Locality: Mawana (Meerut).

Worms are elliptical in shape and measures 0.24 -0.38 mm in length and 0.054-0.134 mm in width. The cephalic region is equipped with three pairs of antero-lateral head organs and cephalic end is bluntly pointed. Two pairs of eye-spots are also present, anterior to the pharynx. The pharynx is a large muscular structure spherical to oval in outline, and it measures, 0.017-0.020 x 0.015-0.018 mm in length. The intestinal crura are simple, bifurcate and confluent posteriorly, anterior to the haptor. The testes is single, fusiform, post-equtorial, inter-caecal and sinistral in position and 0.025-0.045 mm in length and 0.007-0.013 mm in width., the vas deferences measuring 0.045-0.058 mm, The seminal vesicle is bipartite, 'B' shape structure. The posterior part of seminal vesicle measures 0.0075-0.016 x 0.010-0.011 mm, while the anterior part measures 0.011-0.018 x 0.010-0.012 mm. the vasa efferentia measures 0.040-0.50 mm in length. The male copulatory structure, the cirrus is 'nanus' type, it is a double walled chitinoid conical tube like structure. The cirrus measures 0.029-0.035 mm in length. The width at the base of cirrus is 0.003-0.008 mm, while the median width of the cirrus is 0.002-0.004 mm. the cirrus is equipped 'Y' shaped chitinoid accessory piece measuring 0.030-0.049 mm in length. The proximal part of the accessory piece is swollen and fusiform in shape. The ovary is post-equatorial, inter-caecal, saccular in shape and measures 0.029-0.036 mm in length and 0.014-0.022 mm in width. From the anterior border of the ovary, arises a fine short oviduct measuring 0.008-0.019 mm, the oviduct leads into an oval ootype complex measuring 0.009-0.012 x 0.005-0.008 mm. The vaginal duct measures 0.033-0.042 mm in length. The vagina is muscular and funnel shaped; the vaginal opening is oval in outline and measures 0.003-0.008 mm in diameter. The haptor is fairly set off from the body proper. The armature of the haptor comprises of a pair of

dorsal anchors, a dorsal transverse bar and seven pairs of marginal hooklets. The anchors are boreal type, with roots bifurcated at acute angle, the inner root is longer in comparison to the outer roots. The shaft is slender and more or less straight; it gradually tapers into a fairly open point. The anchors are 'Y' shaped and further strengthened by the presence of sleeve sclerite in the region of shaft. The dorsal transverse bar is 'Anchoratoid wegeneri' type, with upwardly and downwardly directed medium prominences. The distal ends of the dorsal transverse bare are rounded. The marginal hooklets are 'definitive' type with a dilated sickle and a handle, divided into a fairly long and thin pivot of handle and the distal end is swollen and rectangular in shape – the 'heel' of the handle. Measurements of haptor - Dorso-apical length 0.022-0.036 mm, Ventro-apical length 0.016-0.026 mm, Length of point 0.008-0.014 mm, Dorso Transverse bar-Length of the bar 0.21-0.034 mm, Median width of the bar 0.003-0.006 mm, Width at ends 0.005-0.005 mm, Marginal Hooklet-Total length 0.007-0.035 mm, Length of sickle 0.003-0.007 mm, Length of pivot 0.012-0.016 mm, Length of 'heel' of handle 0.006-0.012 mm, Proximal width of sickle 0.001-0.002 mm, Length of sickle filament loop 0.017-0.020 mm.

The present specimen comes closer to the *D. molnari* **Ergens et Dulma, 1969, [11],** in having similar organization of anchors, marginal hooklets and shape of long, shaft like accessory piece. However, the specimens at the disposal of the author show minor variations from the original. The shape of anchors of the present specimen is similar to that of *D. molnari*. In both the inner root is longer than the outer root. The anchors are strengthened by 'sleeve-sclerite' in the region of the shaft, which commences at the junction of the shaft and the outer root and terminates in the middle of the shaft. Both have 'anchoratoid-wegeneri' type of dorsal transverse bars, with upwardly and downwardly directed medium prominences. The distal ends of the dorsal transverse bar are rounded. The marginal hooklets in both specimens are definitive type, with a dilated sickle and a handle. The cirrus is 'nanus' type, it is a double walled chitinoid conical tube like structure. One arm of the cirrus terminates slightly behind the other. Each arm is swollen at the base of the cirrus. The cirrus is equipped with 'Y' shaped chinoid accessory piece.

***Dactylogyrus vastator* (Nybelin, 1924) [12], (Plate 2, Figure 1-7)**

Host: *Cyprinus carpio* (Linnaeus); Number of hosts examined: 20; Number of hosts

infected: 04; Numbers of worms recorded: 17; Site if Infection: Gills; Locality: Mawana (Meerut)

The worms are elongated with narrow, bilobed anterior end and broad posterior end and measure 0.30-0.44 mm in length and 0.068-0.074 mm in maximum width. The cephalic region is bilobed and it is equipped with two pairs of eye spot. The posterior pair of eye spot is larger in comparison to the anterior pair due to the presence of larger number of melanistic granules. The male reproductive system comprises of testes, vas deferens, seminal vesicle and cirrus. The testes is single and measuring 0.034-0.038 x 0.008-0.012 mm, vas deferens 0.054-0.094 mm and seminal vesicle is oval ranges from 0.025-0.030 x 0.008-0.013 mm. The cirrus is slender, double walled tube, measuring 0.052-0.056 mm in length, it has a broad base 0.004-0.006 mm in length and the first accessory piece is Y shaped, with forked anterior end measuring 0.005-0.058 mm in length. The second accessory piece is small, stout and attached to the base of 'Y' measuring 0.020-0.024 mm in length. The vaginal duct that leads to the vagina is a narrow tube 0.001-0.0015 mm in diameter. The vagina is a saucer like structure, measuring 0.025-0.035 mm in diameter. The haptor is fairly set off from the body proper and measures 0.052-0.057 mm in length and 0.062-0.057 mm in width. The armature of the haptor consists of a pair of dorsal transverse bar and seven pairs of marginal hooklets. The length of marginal hooklet is 0.0026-0.0030 mm in length and 0.0005-0.0015 mm in width. The dorsal anchors are "boreal type', with recurved points and roots diverging nearly at right angles. Dorsal apical length 0.050-0.055 mm, Ventro-apical length 0.050-0.056 mm, Length of base of anchor 0.008-0.014 mm, Length of shaft of anchor 0.0032-0.0036 mm, Length of point 0.031-0.035 mm. The dorsal transverse bar is a more or less cylindrical bar, bent like 'V' with arms expanding outwards. Length of transverse bar 0.001-0.005 mm, Median width of bar 0.001-0.008 mm and width at ends of bar 0.04-0.008 mm. It was Nybelin, 1924, **[12]** who established the species *Dactylogyrus vastator* for the worms collected from gill filaments of *Cyprinus carpio* at Sweden. Subsequently, it was reported from the same fish from Poland by Kulwiec, 1929, **[13]**. Bychowsky, 1933, **[14]** reported this parasite from *Carassius carassius* from Russia. Yamaguti, 1941, **[15]** recorded this parasite from Japan from piscine host, *Carassius carassius*. Price and Mizelle, 1963, **[16]** reported it from *Carassius auratus* at California. Jalali and Molnar, 1990, **[17]**, reported this parasites from *Cyprinus carpio*,

Carassius auratus and *Carassius auratus* fibelio from several water bodies of Iran including Sangar, Esfahan, Same-skandeh, Khozestan and Tehran, the capital of Iran.

The present specimens show minor variations from the original description of *D. vasator* reported by earlier workers. The points of difference are Anchor points are more recurved in present specimens. The sleeve sclerite stars immediately behind the bifurcation of root (from the beginning of shaft) in present specimens, but in other descriptions, it starts from about the middle of shaft. The inner roots, in the specimens at the disposal of the writer, forms roughly right angel with the outer root and looks like a catapult, whereas, in the original descriptions, it forms an acute angle. The transverse bar is more or less butterfly shaped, having a well-developed, posteriorly directed medial prominence. The distal extremity has well developed backwardly directed prominences. The accessory piece of the cirrus is also quite different in the specimens at the disposal of the writer, the small part is 'Y' shaped and the larger part, which is attached, all the length of the cirrus, is forked distally and oppose the anterior two arms of the small accessory piece.

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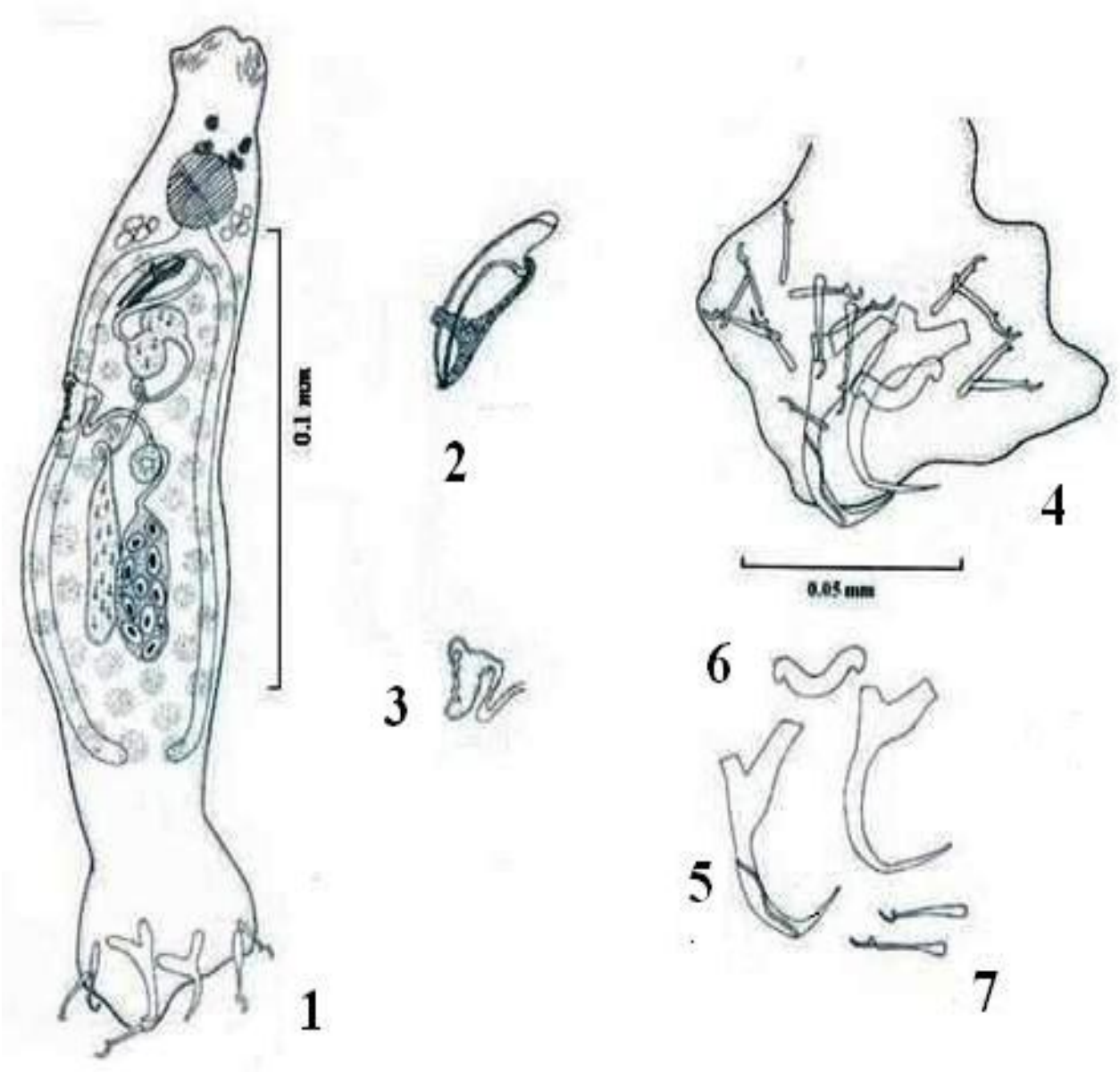

Plate 1: Figure 1: *Dactylogyrus molnari* (Ergens et Dulma, 1969, [11] whole mount; Figure 2: Cirrus; Figure 3: Vagina; Figure 4: Haptor; Figure 5: Anchors; Figure 6: Dorsal Transverse Bar; Figure 7: Marginal Hooklet

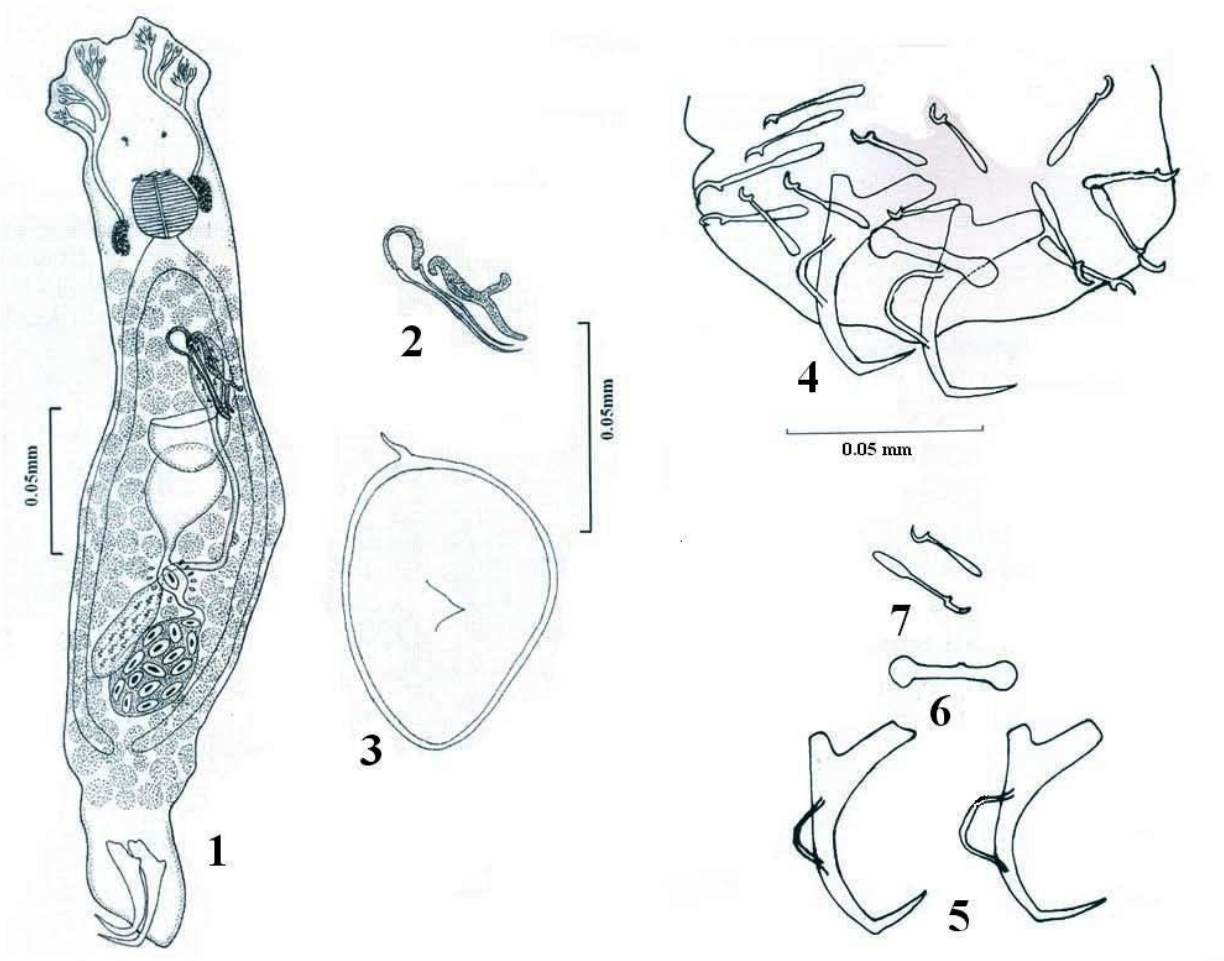

Plate 2: Figure 1: *Dactylogyrus vastator* (Nybelin, 1924) [12] whole mount; Figure 2: Cirrus; Figure 3: Egg; Figure 4: Haptor; Figure 5: Anchors; Figure 6: Dorsal Transverse bar; Figure 7: Marginal Hooklets