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On A New Monogenean-ectoparasites *Wallagotrema gondai* n.sp. From Edible Fresh-water Shark *Wallago attu* of District Gonda, Uttar Pradesh, India

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ABSTRACT

The edible fresh-water shark*Wallago attu* (Bloch. And Schn.) was collected from local fish market of district Gonda (U.P.) and examined 22 specimens, of which 07 specimens was found infected with 55 specimens of said species. The site of infection being the gill filaments of the host. The present form differs from *Wallagotrema longicirrus; Wallagotrema chauhani; Wallagotrema orientalis*and*Wallagotrema indicus*in number of head organs, shape of cirrus, absence of accessory piece and prostatic reservoir and absence of beak like protuberance at the base of dorsal anchors. On subsequent study, the present form appear to be a new species of the genus *Wallagotrema* **(Tripathi, 1959 and Yamaguti, 1961)** and described as a new species and named *Wallagotrema gondai* n. sp. named after the place from where it is collected.

KEYWORDS: *Fresh-water, Monogenean ectoparasites, Wallagotrema gondai, Wallago attu*

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INTRODUCTION:

Monogenean is a class of parasitic flatworms that are mainly ectoparasites of fishes but occasionally they are found as endoparasites **(Gussev and Fernando, 1973)**. Commonly they occur as ectoparasites on the gills and skin of fishes and lower aquatic invertebrates. Monogenean are browsers that move about freely on the fish`s body surface feeding on mucus and epithelial cells of the skin and gills; however, a few adult monogenean will remain permanently attached to a single site on the host. Monogenean undergo asexual mode of reproduction and multiply rapidly to form dense population on the gills of the host. The population structure of this monogenean, however, depends on a wide range of environmental factors; the relative importance of these factors varies from species to species and also within the same species depending on the host taxonomy and the nature of habitat **(Chubb, 1977)**.

Monogenean constitutes a group, which play an important role as pathogens of severe diseases **(Hoffman, 1979 and Srivastava, 1980)**. This is because they affect those organs and tissues which are vital to the normal functioning such as gills and skin, the organs of respiration **(Mishra, 2007, 2014a)**. In majority of cases, monogenean cause dual type of injury to their hosts. Through their hooks and other organs of attachment, they break the continuity at the site of attachment and result is to localize hemorrhage **(Mishra, 2008, 2014b and 2021a)**. Monogenean infestations cause irritation and excessive mucus production and create an opening for bacterial invasion **(Mishra, 2020a)**. A few monogeneans on a healthy mature fish are not usually significant; however, moderate numbers can cause significant mortalities **(Pandey and Mehta, 1986; Mishra, 2021b)**. When fish are exposed to environmental or behavioural stressors, the potential damage from monogenean is greater. Prevention of monogenean infestations by appropriate quarantine is preferable to treatment of the parasites after they have become established in a system **(Pandey, 1973 and Mishra,2020b)**.Monogeneans are the most ubiquitous and abundant group of helmith parasites in the aquatic environment **(Bychowsky, 1957; and Mishra, 2014c)**. Monogeneans feed upon the blood and cells of ruptured tissues **(Bychowsky, 1957**and **Mishra, 2015)**.

The genus *Wallagotrema*has been recorded and described in detail from the gills of teleost fishes of super family Siluroidae. Several workers like**Gussev (1974);Agarwal and Pandey (1981); Venkatnarsaiah and Kulkarni (1981);Singh and Sharma (1992);** and **Singh et. al. (2000)**has reported different species of this genus from different teleost as different name. During the study of fresh-water monogenean of district Gonda, we came across seven infected specimens of *Wallago attu*, infected with monogenean belonging to the genus *Wallagotrema*

(Tripathi, 1959). On subsequent study, the present form appears new to us and described here in as such.

MATERIAL AND METHODS:

The fishes for the present investigation were collected from fresh-water bodies and local fish market of district Balrampur, Uttar Pradesh, India. The monogenean were collected by **Mizelle`s** freezing techniques. They were kept in refrigerator for 8 to 48 hours. The low temperature not only relaxes the worm but also help in automatic removal of mucus in which there flukes were entangled. Subsequently, the gills were removed, placed in separate tubes, half filled with water and shake vigorously. This solution now poured in clean petri-dish diluted with water and examined under binocular microscope. The worms thus collected were washed and fixed in hot 70% ethyl alcohol or 10% neutral formalin. Study of chitinoid hard parts were made in either temporary (glycerin) or permanent preparations. Permanent preparations were made after dehydrating through ascending grades of alcohol, clearing in xylene and mounting in Canada balsam. Camera Lucida sketches were made from permanent preparations within a week since the stain fades away in ten days.

GENERIC DIAGNOSIS:

Body elongate, with three pairs of head organs and two pairs of eye spot. Opisthohaptor broader than body proper, with two pairs of unequal anchors and 12 - 14 marginal hooklets. Dorsal anchors with paired accessory bars crossing each other and forming a triangle with unpaired transverse bar; ventral anchors with paired connecting bars meeting in median line. Caeca confluent posteriorly. Testis elliptical, post-equatorial, separated from ovary. Vas deferens passing along right side of ovary, enlarged to form fusiform seminal vesicle. Two prostatic reservoirs present. Cirrus long, tubular, bent back on itself, without accessory piece. Ovary ovoid, a little anterior to testis. Vagina tubular, opening laterally. Vitellaria co-extensive with intestine.

DESCRIPTION:

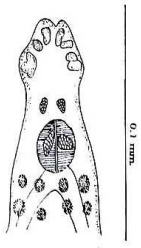
The body of worm is elongated, narrower anteriorly and broad posteriorly. The length of the body ranges from 0.83 - 0.91 mm while the width of the body ranges from 0.14 - 0.17 mm. The head is fairly set off from the body proper. In some forms it is bilobed whereas in others circular in outline and in some others it is triangular in shape. The head is equipped with 3 - 5 pairs of head organs and two pairs of eye spots. These head organs are darkly stained structure found distributed in the anterior most portion of the head. The eye spots are present at the level of pharynx. In most of the forms posterior pair of eye spotis larger as compared to the anterior due to the presence of greater number of milanistic granules. Moreover, in some cases the size of anterior and posterior pair of eye spots appears to be same.

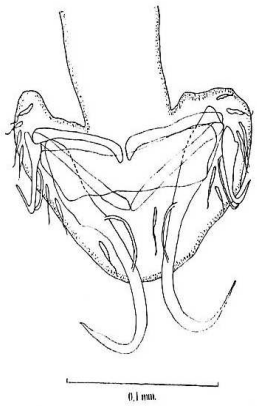
The pharynx is muscular, round to oval in shape, measuring 0.039 - 0.048 mm in diameter. The intestine is simple, bifurcated and crura are united posteriorly. The testis is elongate, oval, post equatorial, post ovarian; inter caecal in position and measures 0.012 - 0.014 * 0.03 - 0.05 mm in size. A fine vas deferens arises from the anterior border of the testis, extend anteriorly beneath the ovary and dilate to form elliptical seminal vesicle at the level of receptaculum seminalis in the pre-equatorial region of the body measuring 0.030 - 0.043 * 0.013 - 0.017 mm. The male copulatory complex is in the form of double wall chitinoid tube measuring 0.12 - 0.24 mm in length. In most of the forms it is nanus type without any accessory piece. Prostatic glands are absent.

The ovary is rounded in shape, equatorial in position, pre-testicular; inter caecal and measuring 0.035 - 0.045 mm in length. The vagina is dextral in location, at the level of the base of male copulatory complex funnel shaped, non-muscular and non chitinous in organization. Posteriorly, the vagina leads in to an oval receptaculum seminalis through a small oviduct, measuring 0.021 - 0.030 * 0.031 - 0.050 mm in size. The vitelline follicles are distributed throughout the body from behind the pharynx up to the posterior most extension of intestine.

The haptor is fairly set off from the body proper in almost every case. In a few cases the haptor is almost triple times broader than rest of the body. The size of haptor ranges from 0.06 - 0.10 mm in length and 0.10 - 0.15 mm in width. The armature of haptor comprises of a pair of dorsal anchor, a pair of ventral anchors, dorsal and ventral transverse bars, accessory piece of dorsal anchor and marginal hooklets.

The dorsal anchors are juvenile type with slightly recurved points and broad base. It is further strengthened with a small membranous wing present at the shaft of anchors. The details of measurements of the dorsal anchors are -





Total length:	0.07 - 0.12 mm.
Length of anchor shaft:	0.009 - 0.019 mm.
Length of anchor shaft:	0.079 - 0.11 mm.
Length of point:	0.041 - 0.051 mm.

The ventral anchors are much smaller as compared to the dorsal anchors. Roughly they are 1/3rd in dimension as compared to the dorsal anchors. They are varicorhinus type with slightly broad and bifid base, stout shaft and recurved points. They are further strengthened with the help of wing extending throughout the shaft along its inner margin. The details of measurements are -

Total length: 0.019 - 0.034 mm.
Length of anchor root: 0.009 - 0.011 mm.
Length of anchor shaft: 0.021 - 0.031 mm.
Length of point: 0.013 - 0.015 mm.

The dorsal transverse bars are vastator type, straight having slightly upwardly directed endings. The details of measurements are -
Total length: 0.06 - 0.12 mm.
Total width: 0.010 - 0.016 mm.

At the base of dorsal anchors a set of elongated accessory pieces are present. Their distal endings are inwardly directed which cross each other in the middle of the body. In a few cases these do not cross but it's freely above the dorsal transverse bars. The details of its measurements are -
Total length: 0.049 - 0.059 mm.
Total width: 0.004 - 0.008 mm.

The ventral transverse bars are paired, which unite in the middle region of the body like accessory piece of the dorsal anchors. These are European type. Details of its measurements are -
Total length: 0.039 - 0.068 mm.
Total width: 0.005 - 0.008 mm.

The marginal hooklets are seven pairs in numbers. They are dactylogyrus type. The details of its measurements are -
Total length: 0.021 - 0.031 mm.
Length of sickle: 0.003 - 0.008 mm.
Length of handle: 0.006 - 0.016 mm.

Prevalence: Fifty five specimens from seven hosts out of twenty two examined.

DISCUSSION:

The genus *Wallagotrema* was erected by **Tripathi, 1959** from the worms collected from freshwater cat fish *Wallago attu* (Bloch. and Schn.) with *Wallagotrema longicirrus* as type species. **Yamaguti, 1961** agree with the systematics proposed by Tripathi and included it as such in his classical work, "Systema Helminthum".

As for as the author is aware so far three more species have been added to the genus -
*Wallagotrema chauhani*Agarwal and Pandey, 1981.
*Wallagotrema indicus*Singh and Sharma, 1992
*Wallagotrema orientalis*Singh *et. al*., 2000

The present form differs from all known species of the genus *Wallagotrema* in number of head organs, shape of cirrus, absence of accessory piece and prostatic reservoir and absence of beak like protuberance at the base of dorsal anchors. Thus it is described as a new species viz. ***Wallagotrema gondai***n. sp. named after the place from where it is collected.

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