



Description of Parasitic Branchiuran, *Argulusmonodi* Fryer, 1959 from Freshwater Fish Caught from Haleji Lake Sindh, Pakistan

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Received 13th March 2019 and Revised 12th July 2019

Abstract: A copepod parasite, *Argulusmonodi* Fryer, 1959 was recorded first time from the freshwater fish *Labeorohita* (Ham.) captured from Haleji Lake Sindh in Pakistan. *Argulusmonodi* is a rare species and was only reported from Africa and India. This is the first report on the occurrence of this species from Pakistan.

Keywords: Branchiuran parasite, Fish parasites, Fish lice, *Argulusmonodi*, Haleji Lake.

1. INTRODUCTION

Fish lice belong to Family Argulidae are the most widely distributed branchiuranecto-parasites (Poly, 2008), which infects wide variety of fishes both in marine and fresh water ecosystems (Kabata, 1985). The fish lice was known to cause great economic losses (Flick and Wiegertjes, 2005). They mostly infect the mouth, skin and gills of fishes where they cause severe damage to the epithelial tissues.

The family Argulidae (Arguloida) was first described by Leach, 1819 and now represented by 4 genera and 160 species. The genus *Argulus* Müller (1785), a cosmopolitan genus, contains 127 species (Walter and Boxshall, 2018). The first maxillae are located on either side of the mouth tube and are often the most conspicuous appendages in this family. The information and taxonomy of parasitic branchiurans neglected in the past and only few papers on the taxonomy of parasitic crustaceans were available from Pakistan. 11 species of the genus *Argulus* were reported from the region whereas only 5 species were reported from Pakistan (Jafri and Ahmed, 1991; Kazmi, 2003; Jafri and Mahar, 2009 and 2011). The *Argulusmonodi* was reported first time from Lake Bangweulu of Africa by Fryer in 1959 from the host *Hydrocyon lineatus*. This paper provides the description of *Argulusmonodi* which is collected from the freshwater fish *Cirrhinus mirigala*. This species was collected during a parasitological survey of freshwater fishes of Haleji Lake Sindh, Pakistan.

2. MATERIAL AND METHODS

The specimens of *Argulusmonodi*, were collected from the freshwater fish *Labeorohita* (Ham.), captured from Haleji Lake, Thatta which is 70 km away from

Karachi. A total of 10 host fishes were captured during 2002 to 2004. The 8 female parasites were separated from the gills of the host and sorted out under the dissecting microscope and were preserved in the 70% alcohol. The specimens were cleaned in the lactic acid for 4-5 minutes and were observed in microscope. The figures were made with the help of camera lucida and the measurements were taken with the help of an ocular micrometer. The species was identified with the help of the description given by Fryer, (1959).

3. RESULTS

Systematic account:

Order: ARGULOIDA Yamaguti, 1963

Family: ARGULIDAE Leach, 1819.

Genus: *Argulus* Müller, 1785.

Argulusmonodi Fryer, 1959.

Material Examined

8 ♀ specimens removed from gill filaments

Host: *Labeorohita*

Locality: Haleji Lake, Sindh

Description of female

Prosoma

Body is dorsoventrally flattened with the elliptical and expanded carapace. Body is approximately 1.2 times as long as wide. Gap between posterior carapace lobe is 3.8-3.9 mm long and 2.4 -2.5 mm wide. Cephalic segments are fused with the first thoracic segment and has carapace. Spinules present on the ventral side and lateral to the margins of carapace near the antennule, antennae and suction cups. There are two long respiratory areas. Among them, the outer one is larger than the inner. Eyes are compound and small (**Figs. 1A and 1B**). Median ocellus is relatively well developed

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and 2.8 - 2.9 mm long and 2.4 - 2.5 mm wide. Thorax has four segments. A wide gap occurs between the posterior region of carapace and abdomen.

Cephalic appendages:

Antennule and Antenna

Antennule is four segmented and uniramous. Basal segment contains a heavily chitinized spine at its posterior corner. Distal segment has large recurved lateral spine. Third and fourth segments are slender and having few setae. Both of them sometime referred as flagellum (**Fig. 2A**). Antenna is also uniramous and five segmented. The posterior corner of the basal segment is chitinized. The third and fourth segments have two setae on the lower margin while three setae are present at the apical end of the fifth segment (**Fig. 2B**).

Labrum, Labium, Mandible, and Maxillae

Labrum and Labium (mouth tube) both are situated in the proboscis (**Fig. 2C**). Mandible is also situated in the proboscis and lobe like shaped. The terminal end is serrated (**Fig. 2D**). First maxillae are modified into the suckers. Each sucker is almost one fourth of the width of the carapace which are the most prominent structure of the specimen (**Fig. 2E**). Center of this sucker is strengthened by rows of supporting rods along the circumference. Each supporting rod is composed of seven sclerites which are arranged on one another. The base of sclerites is crucible shaped and the rest is spherical to elliptical in shape.

Second maxillae have five segments. Basal segment bears one spine on the posterior ventral margin. Second segment has two spines and contains pear shaped chitinized area having two spines on the posterior margin. Third to fifth segments are long. They have ctenoid scales at the dorsal side. Terminal segment bears a pair of claw like spine and an accessory spine. Just posterior to this spine there is another spine known as post maxillary spine (**Figs. 2F**).

Thoracic Appendages:

There are four pairs of biramous thoracic appendages. All of them without flagellum. The basipod of each leg is two segmented (**Figs. 3A-D**).

First Thoracic Leg

The basal segment of basipod has many lateral spinules. The terminal segment contains few spinules and eight small lateral setae. The spinules of this segment occur also laterally on the dorsal side. Both rami consist of few spinules. The exopod has thirteen setae while nine setae are found on the endopod. The setae of both rami are long and laterally placed (**Fig. 3A**).

Second Thoracic Leg

The basal segment has many spinules occurred near the dorsal margin while the terminal segment contains few lateral spinules and five lateral setae. Both rami have dorsal spinules. Exopod has two spinules and four long setae. The endopod bears four spinules and nine long setae (**Fig. 3B**).

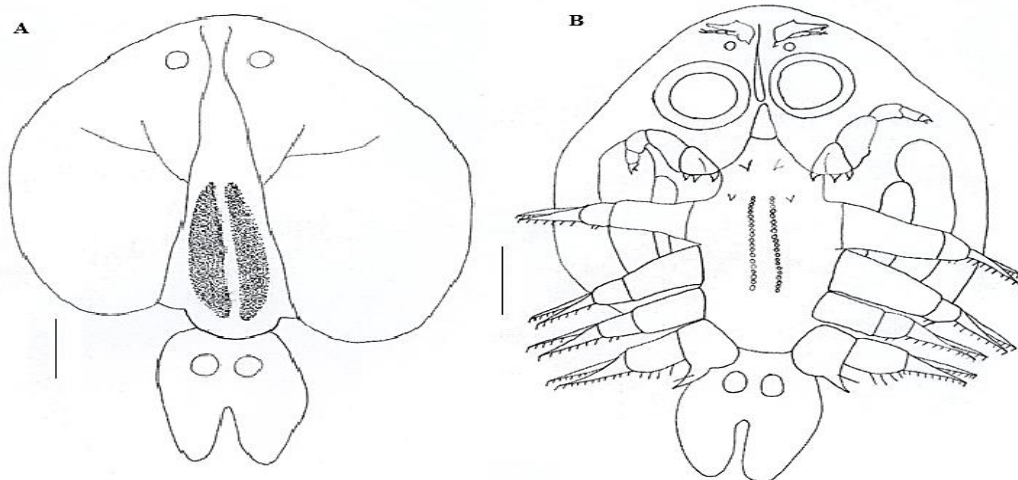


Fig. 1. *Argulus monodi* (Fryer, 1959.) adult ♀. A). whole animal dorsal view; B) whole animal ventral view.

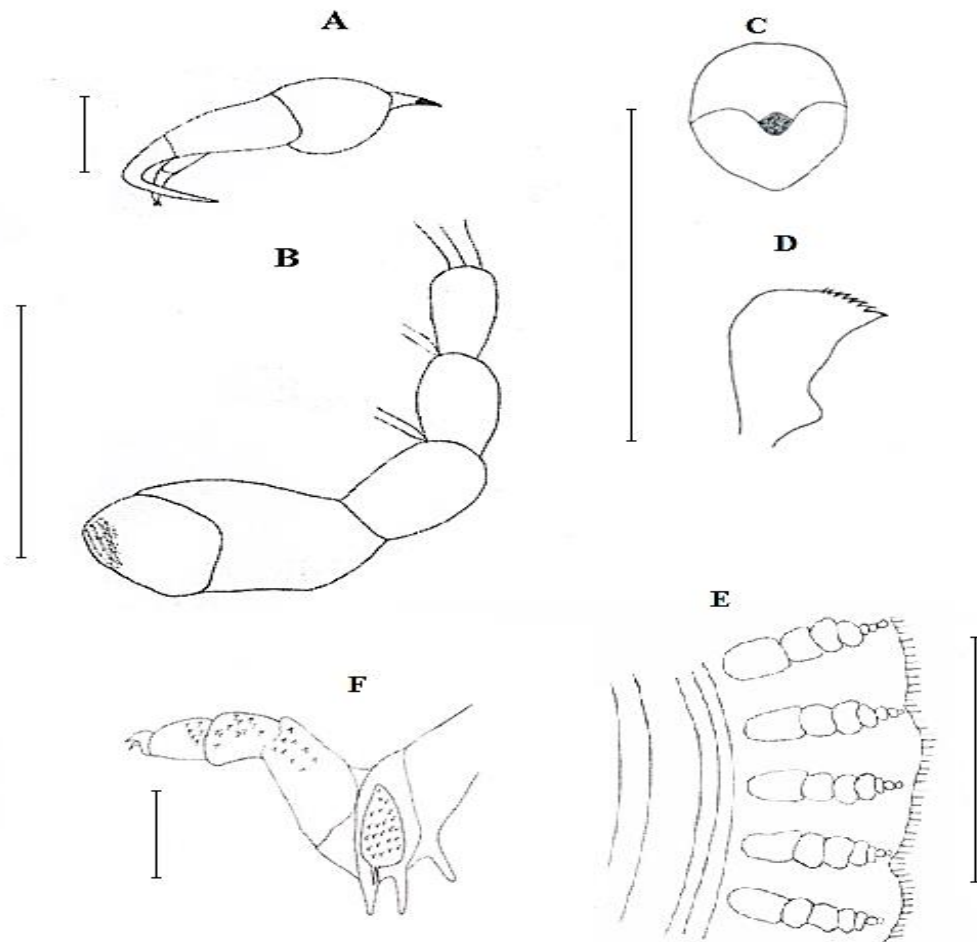


Fig. 2. *Argulusmonodi* (Fryer, 1959) A) antennules; B) antenna; C) Mouth tube; D) mandible; E) first maxilla enlarged view; F) second maxilla. Scale bar: 0.01mm

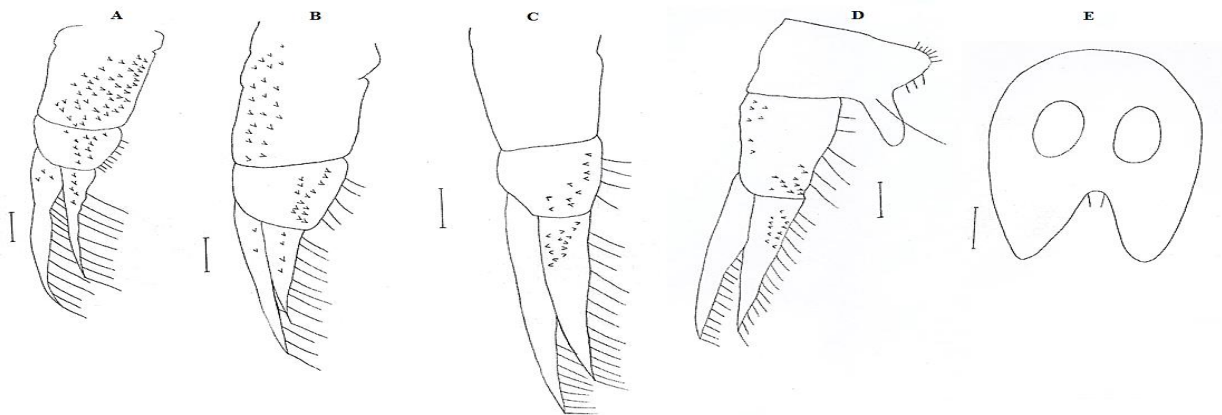


Fig. 3. *Argulusmonodi* (Fryer, 1959) adult ♀. A) first thoracic leg; B) second thoracic leg; C) third thoracic leg; D) fourth thoracic leg; E) abdomen. Scale bar: 0.01 mm.

Third Thoracic Leg

The basal segment of basipod is devoid of spinules while the terminal segment has few lateral spinules and four setae. The spinules are absent on the exopod but the endopod has few lateral spinules. In addition, exopod bears nine setae while fourteen setae are present on the endopod (**Fig. 3C**). Anteriorly projecting lobe from the proximal part of protopod is present.

Fourth Thoracic Leg

Basal segment has a long digit form process at the posterior corner and few small setae and a long seta. The terminal segment of basipod contains few spinules both on the dorsal and lateral sides. There are six long unequal setae. Exopod has twelve setae and devoid of any spinules. The endopod bears few dorsal spinules and fifteen setae (**Fig. 3D**).

Urosome

The abdomen is 1.0 –1.1 mm in length and 0.7 – 0.8 mm in width. Abdomen is about one-fourth of the whole body length and is bluntly bilobed in shape. Each lobe is kidney shaped, tapering posteriorly and broadly rounded at posterior extremities. Two very minute caudal rami are present at the posterior end of each abdominal lobe near the base of anal incision. Anal incision is narrow, depressed and almost half length of the abdomen (**Fig. 3E**). In a genital segment a pair of long, cylindrical ovaries are present at the posterior region of the metasome.

REMARKS

This is the first report on the occurrence of *A. monodi* from Pakistan. Previously this species was reported from Africa (Fryer, 1959; Paperna, 1980; Rushton-Mellor, 1994; Mwita, 2014) and from India. *A. monodi* is identified in having specific shape of the respiratory area and by the presence of seven supporting rods in each chitinous rod of the sucker. The presently described specimen of *A. monodi* is closely related to the specimen described by Fryer, 1959. The size of the present specimen is comparatively smaller than the specimen described from Africa (Northern Rhodesia).

ACKNOWLEDGEMENT

The authors were thankful to Canadian copepodologist Dr Zbigniew Kabata (late), Fisheries Research Board of Canada for his help in the identification of *Argulus monodi*.

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