A report on indigenous freshwater fish under Order Synbranchiformes, from Paschim Medinipur and Jhargram District of West Bengal, India.

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Abstract
Present study reveals the existence of three species of small, indigenous fish under two genera of family Mastacembelidae of order Synbranchiformes from freshwater aquatic systems of Paschim Medinipur and Jhargram district of West Bengal. It is the first time study on the group from the study area. Taxonomy of the species as well as their geographical distribution and diversity is the prime interest of the work. A comprehensive zoogeography of the species in different revenue blocks of the districts has been recorded in details. Hence, the work is a documentation of macro faunal diversity at regional level for freshwater ecosystem of the study area.

Key Words: Regional, Diversity, Small, Fish, Synbranchiformes.

1. Introduction
Small indigenous freshwater fish are often an important ingredient in the diet of village people who live in the proximity of freshwater bodies. Word ‘Indigenous’ means the originating in and characteristic of a particular region or country & native area. They inhabit in rivers and tributaries, flood plains, ponds, tanks, lakes, beels, streams, lowland areas, wetlands and paddy fields. These fish can live in a harsh environmental condition and able to reproduce and grow rapidly in favourable condition. These species are not only a source of vital protein to the rural poor but also a valuable source of micro-nutrients such as calcium, zinc, iron & fatty acids (Roos et al., 2007; Halwart 2008). Research has proved that the bioavailability of calcium from these small indigenous freshwater fish species is at par with that derived from milk (Ross et al., 2007). These species also can provide a source of supplementary income to rural households. Given the local demand for small indigenous fish species of freshwater origin, the FAO (1999) has also indicated the possibility of integrating such indigenous species into freshwater culture systems. Small scale aquaculture along with Indian major carps of Amblypharyngodon mola, Puntius sophore, Osteobrama cotio, Cirrhinus reba, Labeo bata, Gudusia chapra have been reported (Ayyappan and Jena J.K.2003, Roos et al 2003, Jena et al., 2008). In the Indian region out of 2500 species, 930 are freshwater inhabitants & 1570 are marine (K.C.Jayaram 2010). ZSI has recorded 2641 Pisces in 2012. A lot of works has been done in Northern region followed by southern region of India. Recent paper of Goswami et al., (2012) enlisted 422 fish species from north east India, belonging to 133 genera and 38 families. Rema and Indra (2009) have reported 667 species under 149 Genera of 35 families in southern region. 950 species of freshwater fishes have been found in India [Fishbase (ver.10/2015)]. If we look for the report from West Bengal, we see that a very few works has been done on freshwater fishes from the region.

In West Bengal 171 freshwater fish species was reported by Sen, 1992. After few years there were a wide change in number of fish species has been
reported. Barman. R.P. 2007 recorded 239 freshwater species belonging to 147 genera, 49 families and 15 orders from West Bengal. 70 indigenous ornamental fish species belonging to 45 genera, 30 families and 9 orders were reported by Basu et al. (2012). All of these works are mostly based on indigenous ornamental freshwater fishes. But works on small indigenous freshwater fishes, other than ornamentals are scanty. So, the record of freshwater fish fauna of Paschim Medinipur and Jhargram are nil. Therefore, present work is the first attempt towards the recording of small indigenous freshwater fish fauna of the study area. The results presented here provide an insight to the regional macro-faunal diversity of the study area, and have established a baseline for future studies. Present paper is restricted only on the order Synbranchiformes and recorded three species namely Macrognathus aral (Bloch & Schneider, 1801), Macrognathus pancalus Hamilton, 1822 and Mastacembelus armatus (Lacepède, 1800) under family Mastacembelidae from the site under studied.

2. Materials and Methods:
Present study is mainly based on the specimen collected from different river, pond, beells applying different commercial fishing method throughout all the blocks of undivided Paschim Medinipur (22°25'N 87°19'E) during May 2013 to November 2015. Collection of fish fauna was done at early morning and specimens were immediately preserved in 4-6% formaldehyde and were brought to laboratory in preserved condition. Then fish specimen were washed and finally preserved in 4-6% formaldehyde. Body parts of all the specimen have been dissected and studied for identification under stereoscopic binocular microscope. In some cases additional important diagnostic characters are included. Identification of specimens has done on the basis of literature like Talwer and Jhingran (1991), K. C. Jayaram (2010) and Fishbas (2013). The detailed synonymies have been furnished to the genera and species and also their diagnosis, distribution, taxonomic remarks have been furnished. In addition an attempt has been made to include a comprehensive coverage of the references in reference section. For all citations of taxon author's name and year of publication has been given.

3. Results:
Systematic Accounts
Fishes under study are belongs to the class Actinopterygii. A brief account of its systematic position is given bellow:

Kingdom : Animalia (Linnaeus, 1758)
Phylum : Chordata (Haeckel, 1874)
Class : Actinopterygii (Klein, 1885)
Order : Synbranchiformes.

Order Synbranchiformes
Literature reveals that the Order Synbranchiformes represents 3 families and all these three are also recorded from Indian water. Study area represents only family Mastacembelidae.

Family Mastacembelidae
World literature reveals that the Family Mastacembelidae represents three valid genera and Indian water represents two out of the three, named Mastacembelus and Macrognathus. The study area also represents both the genera.

Diagnosis of the Family: Body eel- like, elongate and compressed. Snout pointed, rostral appendages are fleshy, posterior nostrils are present near eyes. 9-42 isolated spines present on dorsal fin with 52-131 soft rays. Two or three spines in anal fin and number of soft rays are 30-130. Scales are small. Caudal fin often connected to posterior end of dorsal & anal fin.

Key to the genera:
Dorsal fin spines are 33 or more, rostrum relatively small, no rostral tooth plate present

Mastacembelus
Dorsal fin spines are 32 or less, rostrum relatively large, rostral tooth plate present

....... Macrognathus
Genus *Macrognathus* Lacepède, 1800

Lacepède (1800) created the genus based on the *Ophidium aculeatum* Bloch, 1786 as type species for the genus from Indonesia. Twenty four species of Genus *Macrognathus* has been found in the world and 10 species were found in India freshwater. Study area represents only two species. A brief history of the genus with special reference to Indian contribution has been given below.


1801 *Rhynchobdella* Bloch and Schneider, *Sumtibus Auctoris Impressum et Bibliopolithi Sanderiano Commissum*. i-lx + 1-584, Pls. 1-110.


**Type locality:** Kali Brantas basin, channelled stream through drained area at Campurdarat south to Tulungagung, Java Timur, Java, Indonesia.

**Diagnosis of the Genus:** Body elongated and compressed. Rostrum is relatively larger & fleshy. In some species rostrum with concave ventral surface lined with tooth plates. Pre-orbital and preopercular spines are absent. In anterior nostrils rim with six fingers like projections are present. Dorsal fin with 13-32 spines, Anal fin with 47-93 rays and Pectoral fin with 17-27 rays are the characteristic features.

**Remark:** Two species *Macrognathus aral* and *Macrognathus pancalus* has been recorded from the study area.

**Key to the species:**

1. Dorsal fin with 16-23 spines and 44-45 soft rays ....... *Macrognathus aral*

Dorsal fin with 24-26 spines and 30-42 soft rays ....... *Macrognathus pancalus*
Fig. 1: *Macrognathus aral* (Bloch & Schneider, 1801)

**Distribution:** India: It has been found in India (West Bengal, Assam, Tamil Nadu and Odisha).

**Paschim Medinipur:** During the present study the species has been found in Keshiary block of Paschim Medinipur.

**Elsewhere:** Nepal; Pakistan, Sri Lanka, Bangladesh and Myanmar.

*Macrognathus pancalus* Hamilton, 1822

*Macrognathus pancalus* was originally described as *Macrognathus pancalus* (Hamilton, 1822) from Gangetic Province. A brief history of the species with special reference to Indian contributions has been given below.


**Type species:** *Macrognathus pancalus* Hamilton Buchanan, 1822, *Fish. Ganges*: 30, 364.

**Type locality:** The tanks of the Gangetic Provinces.

**Materials Examined:** 4 female (6.1cm – 9.6 cm), 2 male (7.4cm- 9.2cm), Gopiballavpur I (Gopiballavpur) , Jhargram, West Bengal, 07.03.2014, A. Chanda; 2 female (9.3cm – 10.7 cm), 3 male (8.1cm- 10.4cm), Gopiballavpur II (Tapsia, Andharia) , Jhargram, West Bengal, 29.10.2013, A. Chanda; 3 female (7.8cm-9.4cm), 5 male (7.4cm-10.4cm), Keshiary (Bhasra), Paschim Medinipur, West Bengal, 26.10.2013, A. Chanda; 2 female (8.4cm-9.2cm), 3 male (7.6cm- 8.9cm), Jhargram (Lodhasuli, Sardhia), Jhargram, West Bengal, 09.09.2013, A. Chanda; 3 female (11.3cm– 12.2 cm), 4 male (9.7cm- 11.7cm), Sabong (Mohar), Paschim Medinipur, 21.05.2013, A. Chanda; 1 female (11.9 cm), 2 male (10.5cm- 11.0cm), Pingla (Gobordhanpur), Paschim Medinipur, West Benal, 28.05.2013, A. Chanda; 9 female (9.6cm-13.9 cm), 4 male (8.7cm- 12.6cm), Debra (Patna, Panchgeria), Paschim Medinipur, West Bengal, 23.05.2013, A. Chanda; 5 female (10.2cm-16.1 cm), 3 male (10.4cm-15.6cm), Narayangarh (Murakata), Paschim Medinipur, West Bengal, 20.05.2013, A. Chanda; 4 female (9.8cm-12.2 cm), 1 male (11.7cm), Binpur I (Lalgarh), Jhargram, West Bengal, 14.09.2013, A. Chanda.

**Diagnosis of the species (Fig. 2):** Body eel like and compressed. Rostrum rounded in cross section and absent of tooth plates. 2-5 spines present on the preopercle, preorbital spines strong and it pierces skin. Mouth is small. Dorsal fin inserted opposite of the anal fin. Caudal fin is separated from dorsal and anal fin. Fin formula- D XXIV-XXVI 30-42; P 17-19; A III 31-46 C 12.

Fig.2 *Macrognathus pancalus* (Hamilton,1822)

**Distribution:** India: It has been found in India (Manipur, Uttaranchal and West Bengal).

**Paschim Medinipur:** During the present study the species has been found in all blocks of Paschim Medinipur and Jhargram Districts.

**Elsewhere:** Nepal; Pakistan; Bangladesh.
Genus *Mastacembelus* Scopoli, 1777

Scopoli (1777) created the genus based on the *Ophidium mastacembelus* as type species for the genus. 64 species of Genus *Mastacembelus* has been found in the world literature and 1 species has been found in India as well as in the study area. A brief history of the genus with special reference to Indian contribution has been given below.


**Type species:** *Ophidium mastacembelus* Banks [J.]

**Type locality:** Quwayq River, Halab, Syria.

**Diagnosis of the Genus:** Body eel like and compressed. Preopercular spine is usually present. Preorbital spine may occasionally present. In rostrum tooth plates are absent. In the anterior nostril, rim with two finger like projection and two flaps are present. Dorsal fin possess 32-40 spines. Dorsal fin rays are 67-90 in number.

**Remark:** Only one species *Mastacembelus armatus* has been recorded from the study area.

*Mastacembelus armatus* (Lacepède, 1800)

*Mastacembelus armatus* was originally described as *Macrognathus armatus* (Lacepède, 1800). Dey (1876) placed the species under genus *Mastacembelus*. A brief history of the species with special reference to Indian contributions has been given below.


**Type locality:** Not mentioned.

**Distribution:** India: It has been found in India (Arunachal Pradesh, Jharkand, Uttarakhand and West Bengal).

**Paschim Medinipur:** During the present study the species has been found in Chandrakona II, Binpur I,
Keshiary, Gopiballavpur I, Gopiballavpur II blocks of Paschim Medinipur. 

Elsewhere: Myanmar; Nepal; Pakistan; Sri Lanka; Thailand; Viet Nam; Bangladesh; Cambodia; China.

Conclusion:
These three indigenous fishes under study are regarded as food fish as well as ornamental fish and its market demand is high for its flavour and body imprinted decoration respectively. They are least concern category as per IUCN (2010 ver. 3.1). It is difficult to estimate the population density of such fishes as these are not commercially marketed. Local survey reveals that the population is rapidly depleted. Research on the group is urgently needed to rescue these valuable natural resources. Captive breeding is being suggested as an effective measure for sustainability of these species.

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