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Record of two Threatened Fish Species under Genus *Barilius* Hamilton, 1822 from Paschim Medinipur District of West Bengal

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Abstract
Present study reveals that the genus *Barilius* represents two closely related species, *B. barna* (Hamilton, 1822) and *B. vagra* (Hamilton, 1822) in the freshwater system of Paschim Medinipur District of West Bengal, India. Apparently these two species seems to be the same species because of their similar pattern of vertical stripes on the upper half of lateral side and laterally compressed body as well as more or less similar body colour. But closer examination can distinguish these two species by convex ventral margin and absence of barbells in *B. barna*. Both the species is being first time reported from South Bengal, Paschim Medinipur District.

Keywords: *B. barna*, *B. vagra*, Distinguish, Reported

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 faunal or floral components of a particular region or country & native nature. Small indigenous freshwater fish species (SIF) are defined as fishes which grow to the size of 25-30 cm in mature or adult stage of their life cycle (Felts et al, 1996). They inhabit in rivers and tributaries, floodplains, ponds, tanks, lakes, bells, 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*, *Cirrihinus 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. 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). Majority of these works are 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 is nil. Therefore, present work is the first attempt towards the recording of small indigenous freshwater fish fauna of Paschim Medinipur. The results presented here provide an insight to the macro-faunal diversity of the study area, and have established a baseline for future studies. Present paper is restricted only on the genus *Barilius* Hamilton, 1822 and recorded two closely related Red listed species namely *Barilius barna* (Hamilton, 1822) and *Barilius vagra* (Hamilton, 1822), from the study area. *Barilius barna* (Hamilton, 1822) has been reported earlier by Karmakar et al. (2008) from estuarine part of Subarnarekha River.

Materials and Methods

Present study is mainly based on the specimen collected from different river, pond, bills applying different commercial fishing method throughout all the blocks of 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. 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. Both the species has been photographed for proper identification. Identification has been made on the basis of Talwar, and Jhingran, (1991) and Jayaram (2010).

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 :Cypriniformes Bleeker, 1859.

Family Cyprinidae Howes G.J., 1991

Family Cyprinidae has about 370 genera. They are found in Freshwaters of North & Central America, Africa, Europe, Southern Mexico and Asia. Indian freshwater represents 60 genera under family Cyprinidae (Jayaram, 2010). In Paschim Medinipur District 13 genera is being reported during the present study.

Diagnosis of the Family: Body generally compressed. Mouth terminal or inferior. Head without scales.Usually thin lips, papillae absent; mouth sometimes suckerlike (*Garra* and *Labeo*). Present or absent of barbels. Premaxilla usually borders the upper jaw, making the maxilla entirely or almost entirely excluded from the gape. Usually upper jaw is protrusible. In some cases dorsal fin with spiny rays. Adipose dorsal fin is absent.

Remarks: Phylogenetic analyses at a higher level within Cypriniformes using nuclear genes are few and done only by Mayden et. al. 2007, divide Family Cyprinidae into nine Subfamily (Acheilognathinae, Cultrinae, Cyprininae, Gobioninae, Leuciscinae, Rasborinae, Squaliobarbinae, Tincinae, Xenocyprinae). The Cyprinidae family was classified into 10 subfamilies on the basis of osteological characters and two tribes, Leuciscini and Barbini (Chen X.L., Yue P.Q., Lin R.D., 1984). Later on Cyprinid was classified into Labeoninae, Barbinae and Cyprininae and in many tribes and subtribes by Rainboth, (1991) and Howes, (1991). The taxonomic confusion and uncertainties within the Cyprinidae are evident by considering just the taxonomic treatment of Vietnamese cyprinids. Mai (1978) recognised 9 subfamilies (Cyprininae, Barbinae, Acheilognathinae, Gobioninae, Gobiobotinae, Xenocyprinae, Cultrinae, Leuciscinae and Hypophthalmichthyinae). In contrast, Truong and Tran (1993) and Mai et al. (1992) placed Vietnamese cyprinids just into four groups (Cyprininae, Abraminae, Rasborinae, Garrinae). Nguyen and Ngo (2001) divided Cyprinidae in Vietnam into 11 subfamilies (Labeoninae, Cyprininae, Barbinae, Acheilognathinae, Gobioninae, Gobiobotinae, Xenocyprinae, Cultrinae, Leuciscinae, Danioninae and Hypophthalmichthyinae). Such contradictory opinions on cyprinid classification hinder evolutionary, biogeographic and even comparative studies of the group and are clearly undesirable for such a widespread and important group of fishes. Here, during the present work the more accepted classification of Nguyen and Ngo (2001) has been followed. The organisms of interest are under subfamily Danioninae.

Subfamily Danioninae

Tyson Roberts (1986) noted that the Danionin group was thought to include *Parabarilius*, *Danio*, *Brachydanio* and *Danionella*. In this scheme, danionins were distinguished from other cyprinids by the uniquely shared character of the danionin notch, a large and peculiarly shaped indentation in the medial margin of the mandible; this feature is not noted in rasborins, esomins, bariliins, or chelins. However Nelson (2006), listed Danioninae as a synonym of Rasborinae. According to fish catalogue (2016), 61 genera and 330 species under subfamily Danioninae are found in the world.

Diagnosis of the subfamily:

Diagnosis of Danionins were distinguished from other cyprinids by the uniquely shared character of the "danionin notch", a large and peculiarly shaped indentation in the medial margin of the mandibles and "danionin mandibular knob", a bony process on the side of the mandible behind the danionin notch. Caudal fin rays are ≤ 9 in all species of Danionin group.

There are 61 genera under subfamily Danioninae, out of which study area represent eight genera and the present species are under genus *Barilius*.

Genus *Barilius* Hamilton, 1822

F.Hamilton (1822) created the genus based on the *Cyprinus barila* as type species for the genus. Thirty four species of Genus *Barilius* has been found in the world and 21 species has been found in India. A brief history of the genus with special reference to Indian contribution has been given

below.
1822 *Barilius* F.Hamilton, *Fishes of Ganges*: 266, 384; Menon, 1999, Rec. *Zool. Surv. India Occ.* Paper. No. 175:12.
1864 *Pelotrophus* Günther (A.), *Proc. Zoo. Soc. London*, (pt 2): 303-314.
1868 *Schacra* Günther (A.), *Catalogue of the fishes in the British Museum*, v. 7: i-xx + 1-512.

Type Species: *Cyprinus barila* F.Hamilton, 1822, *Fishes of Ganges*: 266, 384.
Type Locality: Rivers of northern Bengal.

Diagnosis of the Genus: Body laterally compressed. Operculums are deep and narrow. Ventral portion is more convex than the dorsal. Mouth is terminal. Barbels are one or two pairs or totally absent. Dorsal fin inserted behind the origin of pelvic fin with 7-10 branched rays. Anal fin with 9-17 rays. Pectoral fin with an auxillary scale. Lateral line complete, incomplete or absent. Body colour is silvery with dark stripe.

Remark: Only two species, *Barilius barna* and *Barilius vagra* has been recorded from the study area. Karmakar et al. (2008) recorded *Barilius barna* from estuarine part of Subarnarekha river and *Barilius vagra* is being recorded from Darjeeling by Paul et al. (2009). Both the species are first record from the present study area. These two species can be separated by the following key.

Key to species:
1. Body with 7-11 vertical lateral dark bar; barbells absent ..... *B. barna*
   Body with 13-18 vertical lateral bluish bar; two pair of barbells present ..... *B. vagra*

***Barilius barna* (Hamilton, 1822)**
Barilius barna was originally described as *Cyprinus (barilius) barna* F.Hamilton (1822) from Yamuna and Brahmaputra river. A brief history of the species with special reference to Indian contributions has been given below.
1822 *Cyprinus (barilius) barna* F.Hamilton, *Fishes of Ganges*: 268, 384.
1878 *Barilius barna* Day, *Fishes of India*: 592, pl.148, fig. 1& 2; Day, 1889, *Fauna Br. India*, Fishes, **1**:350.
1985 *Barilius jayarami* Barman, *Jour. Bombay Nat. Hist. Soc*., **82** (1): 170-174.

Type Species: *Cyprinus (barilius) barna* F.Hamilton 1822, *Fishes of Ganges*: 268, 384.

Type Locality: Yamuna river and Brahmaputra river.

Materials Examined: 5 female (3cm – 5.3 cm), 4 male (3.2cm- 5.1cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 28.10.2013, A. Chanda; 2 female (4.1cm – 5.6 cm), 3 male (3.5cm- 5.4cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, A. Chanda; 6 female (2.6cm – 6.1 cm), 5 male (3.6cm- 5.7cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 07.03.2014, and A. Chanda. All the specimens has been registered under a single registration number, RNLK/ZOO/FISH/42 and preserved in Departmental Museum.

Diagnosis of the species (Fig. 1): Body compressed, ventral portion is more convex than the dorsal. Mouth moderate and barbells are absent. Body with 7-11 lateral dark bars. Present specimens bear 9 lateral bars. 36-38 scales on lateral line. Fin formula D. 9; P. 14-15; V. 9; A. 12-14.

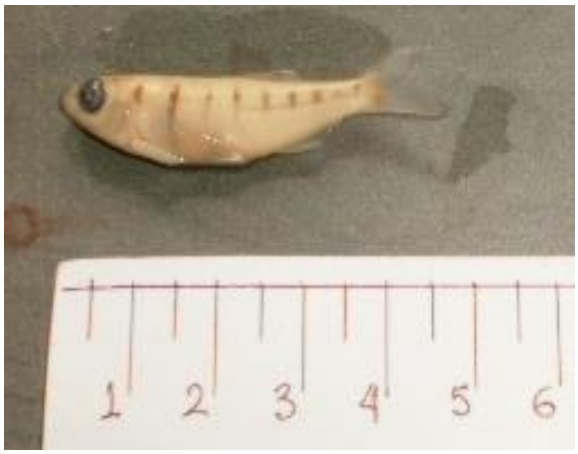

Fig. 1: *Barilius barna*

Distribution: India: It is distributed mainly in north-east India.

Paschim Medinipur: During the present study the species has been found in Gopiballavpur I and Gopiballavpur II blocks of Paschim Medinipur.

Elsewhere: Bangladesh; Bhutan; Myanmar; Nepal.

Remarks: The species is being first time reported from southern part of West Bengal.

***Barilius vagra* (Hamilton, 1822)**
Barilius vagra was originally described as *Cyprinus (Barilius) vagra* Hamilton (1822) from Ganges River at Patna. A brief history of the species with special reference to Indian contributions has been given below.
1822 *Cyprinus (Barilius) vagra* Hamilton, *Fishes of Ganges*: 269, 385.
1878 *Barilius vagra* Day, *Fishes of India*: 589, pl. 148, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1**:345.
1978 *Barilius vagra pakistanicus* Mirza and Sadiq, *Biologia*, 24(1): 1.

Type species: *Cyprinus (Barilius) vagra* Hamilton 1822, *Fishes of Ganges*: 269, 385.

Type locality: Ganges River at Patna.

Materials Examined: 7 female (3.5cm – 5.5 cm), 5 male (3.1cm- 5.1cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 28.10.2013, A. Chanda; 3 female (3.5 – 5.1 cm), 4 male (3.8cm- 4.9cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, A. Chanda. All the specimens has been registered under a single registration number, RNLK/ZOO/FISH/43 and preserved in Departmental Museum.

Diagnosis of the species (Fig. 2): Body shallow, mouth moderate, jaws long. Barbells are two pairs, rostral barbells shorter than eye diameter and maxillary pair very short. 38-44 scales on lateral line. Pectoral fine is slightly shorter than head. Caudal fins are deeply forked and the lobes are equal. Body colour is silvery with 13- 18 bluish lateral bar. Present specimens bear 15 lateral bars. Fin formula D. 9-10; P. 14-16; V. 9; A. 12-15.

Fig. 2: *Barilius vagra*

Distribution: India: It is distributed in India (Uttaranchal, Uttar Pradesh).

Paschim Medinipur: During the present study the species has been found in Gopiballavpur I and Gopiballavpur II blocks of Paschim Medinipur.

Elsewhere: Afghanistan, Pakistan, Nepal, Bangladesh and Sri Lanka.

Remarks: This species has been reported from Karala River, a tributary of Tista River in North Bengal by Patra and Dutta (2010). Therefore present record is the evidence of continuous distribution of the species in eastern India.

Conclusion: More studies on fish diversity and regular monitoring of the ecosystem are required for formulating proper management practices and strategies for biodiversity conservation. In the absence of chronological records of fish diversity, it has not been possible to assess the time scale changes, which might have taken place over last few decades. Some of the species might have escaped notice of investigators during their study and therefore, continuous effort for updating the fish biodiversity status in the freshwater system is being suggested for complete data base of fish fauna of a study area.

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