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Bidisha Paul

PG Dept. of Zoology, Raja N. L.
Khan Women's College,
Midnapur, Paschim Medinipur,
West Bengal, India

Angsuman Chanda

PG Dept. of Zoology, Raja N. L.
Khan Women's College,
Midnapur, Paschim Medinipur,
West Bengal, India

A study on small indigenous freshwater fish under family Cobitidae Swainson, 1838 from Paschim Medinipur, West Bengal, India

Bidisha Paul and Angsuman Chanda

Abstract

Present work is a study on the systematics of small, indigenous fish under family Cobitidae from freshwater aquatic systems of Paschim Medinipur district of West Bengal. Taxonomy of the species found in the study area as well as their zoogeographical distribution and diversity is the prime interest of the work. Results reveal that the existence of two genera and three species namely *Botia almorhae*, *Lepidocephalichthys guntea*, and *Lepidocephalichthys thermalis* under the family Cobitidae has been recorded from the study area.

Keywords: Small, Indigenous, Fish, Cobitidae, Diversity, Medinipur

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. 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^[1]. They inhabit in rivers and tributaries, floodplains, ponds, tanks, lakes, beels, streams, lowland areas, wetlands and paddy fields. These fish can live in a harsh environmental condition and are able to reproduce and grow rapidly in favourable condition. These species are not only a source of valuable protein to the rural poor but also a important source of micro-nutrients such as calcium, zinc, iron & essential fatty acids^[2, 3]. Research has proved that the bioavailability of calcium from these small indigenous freshwater fish species is at par with that derived from milk^[2]. These species also can provide a source of supplementary income to rural households. Due to local demand for small indigenous fish species of freshwater origin and its gradual decrease in population size, the FAO^[4] has indicated the possibility of integrating such indigenous species into freshwater aquaculture systems with major carps. Small scale aquaculture along with Indian major carps of *Amblypharyngodon mola*, *Puntius sophore*, *Osteobrama cotio*, *Cirrihinus reba*, *Labeo bata*, *Gudusia chapra* have been reported^[5, 2, 6]. In the Indian region out of 2500 species, 930 are freshwater inhabitants and 1570 are marine^[7]. Zoological Survey of India has recorded a total of 2641 Pisces in 2012 from Indian region. A lot of works has been done in Northern region followed by southern region of India. Goswami *et al.*,^[8] reported 422 fish species from north-east India, belonging to 133 genera and 38 families. Rema and Indra^[9] have reported 667 species under 149 Genera of 35 families in southern region of India. As per record of Fishbase^[10], Indian freshwater represents 950 species of fish.

In West Bengal 171 freshwater fish species was reported by Sen^[11]. After few years there were a wide change in number of fish species has been reported. Barman. R.P.^[12] recorded 239 freshwater species belonging to 147 genera, 49 families and 15 orders from West Bengal. Basu *et al.*^[13] reported 70 indigenous ornamental fish species belonging to 45 genera, 30 families and 9 orders from West Bengal. Paul and Chanda^[14] reported 48 species belonging to 32 genera under 18 families of 7 orders from Paschim Medinipur District. Above works are mostly based on indigenous ornamental freshwater fishes of the study area. But works on small indigenous freshwater fishes, other than ornamentals are scanty. 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 freshwater ecosystem of the study area, and have established a baseline for future studies.

Correspondence

Angsuman Chanda

PG Dept. of Zoology, Raja N. L.
Khan Women's College,
Midnapur, Paschim Medinipur,
West Bengal, India

Present paper is restricted only on the family Cobitidae and recorded three species namely *Botia almorhae* (Gray, 1831), *Lepidocephalichthys guntea* (Hamilton, 1822), and *L. thermalis* (Valenciennes, 1846), from the study area.

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 (23° 00'-21° 47'N & 86° 40'-87° 52'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. Identification of the specimens has been done on the basis of literature like Talwar-Jhingran [15]; Jayaram, K.C., [17] & www.fishbase.org. [10]

Results and Discussion

Fishes under study 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 Cobitidae Swainson, 1838.

The family Cobitidae was created by Swainson^[16]. Family Cobitidae has about 29 genera. In India family Cobitida represents by 8 genera. In Paschim Medinipur District 2 genera has been reported during the present study.

Diagnosis of the Family: Worm like body with compressed head and mouth. Near eye a spine present. Mouth is subterminal or inferior. Lips are thick, fleshy and papillated. Barbells are three pairs. Airbladder enclosed in an osseous capsule. They are mainly bottom dwellers.

Key to genera

1. Two pairs of rostral barbells placed very close to each other. Caudal fin well forked..... *Botia*
2. One pair of rostral barbell. Caudal fin rounded or slightly emarginated..... *Lepidocephalichthys*

Genus *Botia* Gray, 1831

J.E.Gray^[17] created the genus based on the *Botia almorhae* as type species for the genus. 9 species of Genus *Botia* has been found in the world and 8 species found in Indian freshwater. A brief history of the genus with special reference to Indian contribution has been given below.

1922 *Botia* Hora, *Rec. Indian Mus.*, 24:313-321; Banarescu and Nalbant, 1968, *Mitt. Hamburg Zool. Mus. Inst.*, 65:341; Taki, 1972, *Jap. J. Ichthyol.*, 19(2): 63-81.

1839 *Hymenophysa* McClelland, *Asiatic Researches* v. 19 (pt 2): 217-471, Pls. 37-61.

Type species: *Botia almorhae* Gray, 1831, *Zool. Misc.*, 7-9.

Type locality: Almorah, Uttar Pradesh.

Diagnosis of the Genus: Body elongated, head long and pointed. Eyes with circular and prominent margin. Mouth inferior, lips thick, barb three or four pairs. Dorsal fin inserted over and anterior of pelvic fin with 10-13 rays. Anal fin short with 7-9 rays. Caudal fin forked. Head without any scales. Lateral line present.

Remark: Only one species *Botia almorhae* has been recorded from the study area.

***Botia almorhae* (Gray, 1831)**

Botia almorhae was originally described as *Botia almorhae* (Gray, 1831) from Almorah, Uttar Pradesh. A brief history of the species with special reference to Indian contributions has been given below.

1878 *Botia almorhae* Day, *Fishes of India*:607, pl.154, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, 1:217;; Menon, 1992, The fauna of India and the adjacent countries. *Pisces*. IV. Teleostei - Cobitoidea. Part 2. Cobitidae. viii + 1-113, Pls. 1-10.

Type species: *Botia almorhae* Gray, 1831, *Zool. Misc.*, 8.

Type locality: Almorah, Uttar Pradesh.

Materials Examined: 2 female (4cm – 4.2 cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 28.10.2013, B. Paul; 1 male (3.9 cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, B. Paul ;

Diagnosis of the species (Fig. 1.): Body elongate, head length about 4.2-4.5 Times in SL. Dorsal side is more convex than ventral side. Mouth small, barbells four pairs. Dorsal fin inserted nearer to caudal fin base. Body with Y shaped black mark on yellow background. Fin formula- D 11-12; P 14; V i 7, A ii 5-6.



Fig. 1: *Botia almorhae*

Distribution: India: It has been found in India (Bihar, Rajasthan, Uttaranchal, Uttar Pradesh).

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

Elsewhere: Nepal, Myanmar.

Remarks: *Botia almorhae* is being first time reported from Paschim Medinipur District of West Bengal. Basue *et al.*^[13] (2012) reported only *Botia derio* from Derjeeling and Jalpaiguri District of West Bengal.

Genus *Lepidocephalichthys* Bleeker, 1863

Bleeker^[18] created the genus based on the *Cobitis hasselti* as type species for the genus. 18 species of Genus *Lepidocephalichthys* has been found in the world and 9 species has been reported from India. A brief history of the genus with special reference to Indian contribution has been given below.

1858 *Lepidocephalus* Bleeker, *Nat. Tijdschr. Ned. Inde.* 16:303.

1863 *Lepidocephalichthys* Bleeker, *Verst. K. Akad. Wet. Amsterdam*, 18:38, 42.

1865 *Platacanthus* Day, *Proceedings of the Zoological Society of London*, (pt 1): 286-318.

Type species: *Cobitis hasselti* Cuvier & Valenciennes, 1846, *Histoire naturelle des poissons*, 18: i-xix + 2 pp. + 1-505 + 2 pp., Pls. 520-553.

Type locality: Riviere Tjelankahan, Java; based on a drawing sent by Kuhl and van Hasselt; no type material.

Diagnosis of the Genus: Body elongate with a laterally compressed caudal peduncle. Mouth inferior, barbells three pairs. Dorsal fin is short with eight to nine rays. Anal fin short with seven to eight rays. Caudal fin slightly emarginated, truncate and forked. Lateral line is absent.

Remark: Two species, *Lepidocephalichthys guntea*, and *Lepidocephalichthys thermalis* has been recorded from the study area during the study.

Key to species

1. Body color yellow, ten black spots along side..... *L. thermalis*
2. A dark lateral band or dark grey spot on body..... *L. guntea*

Lepidocephalichthys guntea (Hamilton, 1822)

Lepidocephalichthys guntea was originally described as *Cobitis guntea* (Hamilton, 1822) from Bengal. A brief history

of the species with special reference to Indian contributions has been given below.

1822 *Cobitis balgara* Hamilton, *Fishes of Ganges*: 356, 394; Tilak and Husain, 1981, *Occ. Paper Rec. Zool. Surv. India*, (32):7.

1878 *Lepidocephalichthys guntea* Day, *Fishes of India*: 609, pl.155, fig.4; Day, 1889, *Fauna Br. India*, Fishes, 1:220, fig. 80.

1945 *Lepidocephalus octocirrhus* Smith, *Bull. U. S. Nat. Mus.*, (188): 294

1968 *Lepidocephalus guntea birmanicus* Banareescu and Nalbant, *Mitt. Hamburg Zool. Mus. Inst.*, 65: 345, pl. 2, fig. 21.

1979 *Lepidocephalus dibruensis* Sen, *Bulletin of the Zoological Survey of India*, 2 (1): 35-38.

1981 *Lepidocephalus (Lepidocephalichthys) guntea* Tilak and Husain, *Occ. Paper Rec. Zool. Surv. India*, (32):7, fig 1-4.

Type species: *Cobitis guntea*, Hamilton-Buchanan, 1822, *Fishes of Ganges*: 353, 394.

Type locality: Bengal.

Materials Examined: 7 female (6.1cm – 9.6 cm), 5 male (7.1cm- 9.6cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 07.03.2014, B. Paul; 9 female (4.3cm – 7.7 cm), 3 male (6.3cm- 7.8cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, B. Paul; 6 female (2.8cm-6.4cm), 9 male (2.6cm-7.1cm), Keshiary (Bhasra), Paschim Medinipur, West Bengal, 26.10.2013, B. Paul; 4 female (4.2cm- 6.9cm), 11 male (4.4cm-8.2cm), Jhargram (Lodhasuli, Sardhia), Paschim Medinipur, West Bengal, 09.09.2013, B. Paul; 6 female (3.3cm-7.2 cm), 8 male (3.4cm- 7.6cm), Sabong (Kundalpal, Mohar, Harirhat, Kundara), Paschim Medinipur, 21.05.2013, B. Paul; 9 female (3.5cm-7.9 cm), 10 male (4.0cm- 8.1cm), Pingla (Khamarkusumda, Churchara, Mundamari, Gobordhanpur), Paschim Medinipur, West Bengal, 28.05.2013, B. Paul; 8 female (2.6cm-6.9 cm), 5 male (2.2cm- 5.4cm), Debra (Kethar, Panchgeria), Paschim Medinipur, West Bengal, 23.05.2013, B. Paul; 7 female (2.2cm-8.1 cm), 10 male (2.7cm- 7.8cm), Narayangarh (Murakata), Paschim Medinipur, West Bengal, 20.05.2013, B. Paul; 11 specimen (4.8cm-7.2 cm), 5 male (4.9cm- 7.2cm), Binpur I (Lalgarh), Paschim Medinipur, West Bengal, 14.09.2013, B. Paul; etc.

Diagnosis of the species (Fig. 2): Body is elongate and slightly compressed. Dorsal and ventral portion are nearly parall. Caudal fin rounded with some bands. A dark band extends from snout to caudal base. Patches of scales is present below and behind the eyes. Lateral line is absent. A black ocellus present on the upper half of the body. Dorsal and caudal fin with spots. Pectoral fin with an osseous spine in males. Fin formula- D 8-10; P 7-9; V 7-8; A 7.

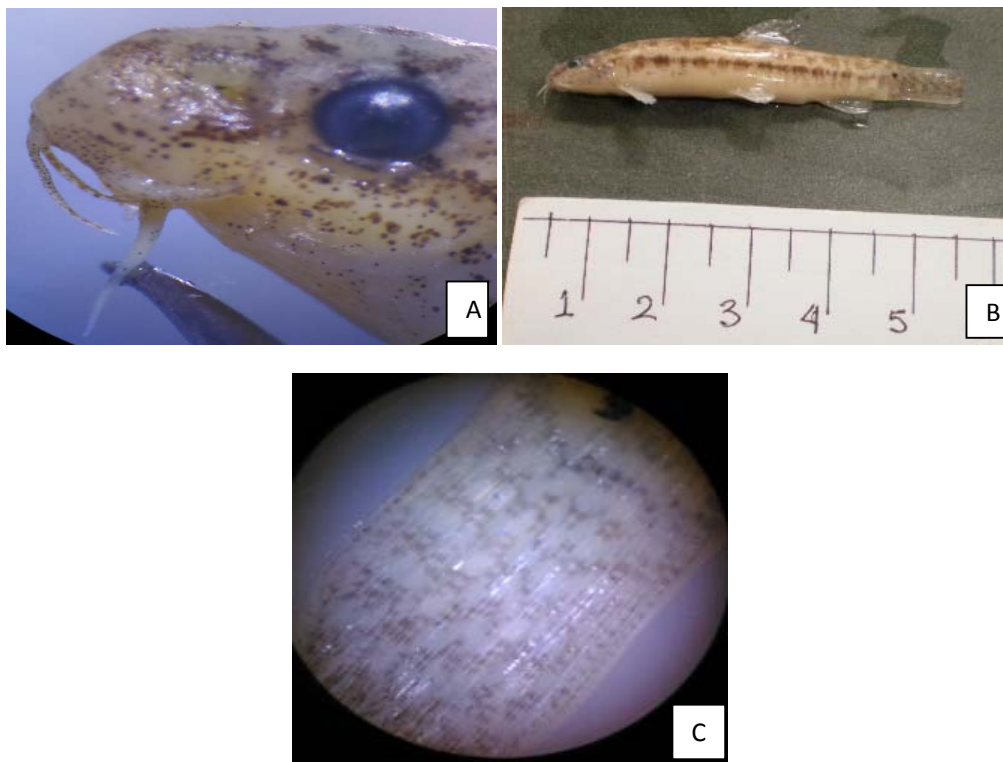


Fig 2: *Lepidocephalichthys guntea*; A, Whole specimen; B, Anterior part of mouth showing barbules; C, Caudal fin pigmentation.

Distribution: India: It has been found in India (Arunachal Pradesh, Assam, Bihar, Darjiling, Himachal Pradesh, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Sikkim, Tripura, Uttaranchal, Uttar Pradesh and West Bengal.).

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

Elsewhere: Myanmar; Nepal, Bangladesh, Nepal, Myanmar, Thailand and Sri Lanka.

Discussion: Characteristic feature of the present material reveal largely in agreement with Day^[19], Tilak and Husain^[20], Talwar and Jhingran^[15], Jayaram^[7] and Havird and Page^[21].

***Lepidocephalichthys thermalis* (Valenciennes, 1846)**

Lepidocephalichthys thermalis was originally described as *Cobitis thermalis* (Valenciennes, 1846) from Malabar. A brief history of the species with special reference to Indian contributions has been

1846 *Cobitis thermalis* Valenciennes, in Cuvier & Valenciennes,

1968 *Lepidocephalus thermalis* Banarescu and Nalbant, *Mitt.*

Hamburg Zool. Mus. Inst., 65: 346, pl. 11, fig. 22.

1868 *Platacanthus maculates* Day [F.], *Proceedings of the Zoological Society of London*, (pt 3): 935-942.

1878 *Lepidocephalichthys thermalis* Day, *Fishes of India*: 610, pl.155, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 1:221. Havird & Page, 2010; Kottelat, 2012.

Type species: *Cobitis thermalis* Valenciennes, 1846, *Hist. Nat. Poiss.*, 18: 78.

Type locality: Malabar.

Materials Examined: 2 female (5.9cm- 7.3cm), 4 male (6.7cm – 9.3 cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 07.03.2014, B. Paul; 7 female (5.3cm – 8.7 cm), 1 male (7.2cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, B. Paul.

Diagnosis of the species: Body elongate and slightly compressed posteriorly. Mouth inferior, barbels three pairs. Dorsal fin inserted slightly anterior to pelvic fin. Caudal fin almost truncate. Scales are very small. 8-10 dark blotches present on the body. A small black spot on the upper half of the caudal fin. Fin formula- D 8-9; P 7-8; V 7; A 7-8.

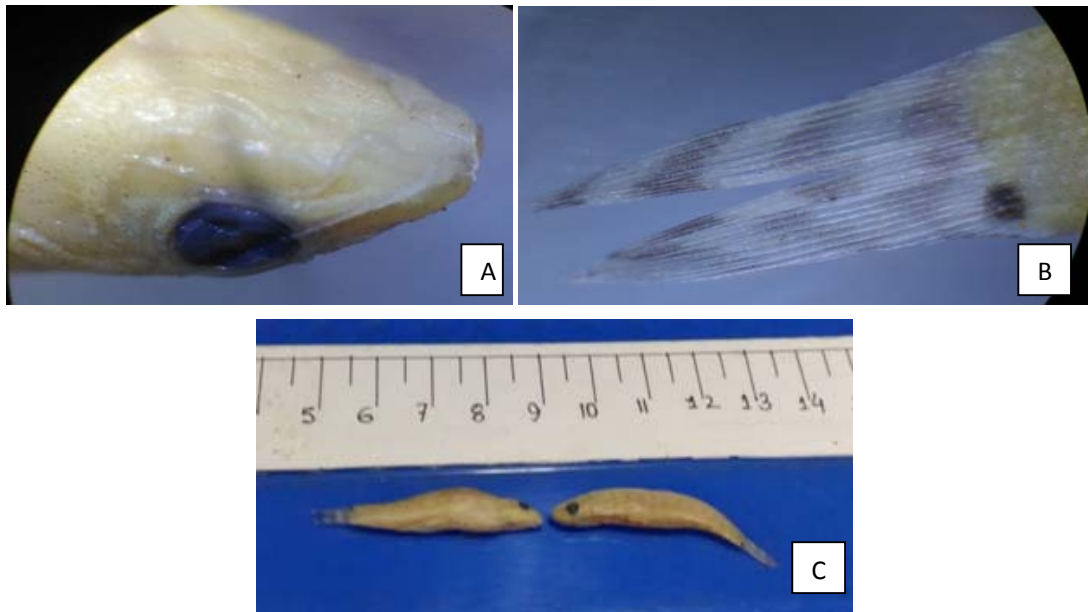


Fig 3: *Lepidocephalichthys thermalis*; A, Hole specimen, B, Ventral view of head showing burbles, C, Caudal fin showing pigmentation pattern.

Distribution: India: It has been found in India (Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal).

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

Elsewhere: Sri Lanka.

Remarks: "Red List Category & Criteria: Least Concern ver 3.1 Year Assessed: 2010 Conservation Actions: Currently there is no specific action plan directed towards *Ambassis dussumieri*. Research on the population status, ecology and threats to the species is essential."

Discussion

The two species *L. guntia* and *L. thermalis* are not very closely related. They are easily differentiated by body shape and proportions, colour pattern, and form of sexual dimorphism that is unique to *L. guntia*. Further, a mature adult *L. guntia* is significantly longer than *L. thermalis*. It is not easily confused with *L. thermalis* owing to its distinctive colour pattern and robust, tubular body. *L. guntia* is more common than *L. thermalis* in the study area. Similar observation has been reported by Basu *et al.* [13]. Basu *et al.* found former species in almost all districts of West Bengal but later one is reported only from Darjeeling, Cochin and Jalpaiguri district of West Bengal i.e., North Bengal. Therefore, *L. thermalis*, from South Bengal is being first time reported. During the present study *L. thermalis* is recorded only from Gopiballavpur revenue block of Paschim Medinipur. *L. guntia* is very widely distributed throughout Paschim Medinipur District.

Conclusion

District Paschim Medinipur is a geographically arid zone of West Bengal, located in south-western part of the state (23° 00'-21° 47'N & 86° 40'-87° 52'E). Most of the small indigenous fish species remain confined within the pond and rivers during summer season. Main rivers of Paschim Medinipur are

Kansaboti, Subarnarekha and Silaboti, largely depend on the annual rain fall and during summer season water become stagnant into some restricted zones of the river. Therefore, most of the freshwater indigenous fishes are high risk of over harvesting by the local people. Due to over exploitation, indigenous species of fish, either become reduced in number or became extinct very rapidly from its natural habitat. Therefore, a thorough investigation and conservation measures have to be enacted for proper protection and conservation of these highly risked groups of animals. Captive breeding of these species of small indigenous fishes are being suggested as a suitable process for future protection and conservation as well as food security for local people.

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