Zootaxa 3700 (2): 283–292
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3700.2.6
http://zoobank.org/urn:lsid:zoobank.org:pub:B5E4C8E1-3F8F-4975-9D64-351B57E391DE

Biodiversity of hillstream fishes in Bangladesh

ABU TWEB ABU AHMED, MD. MIZANUR RAHMAN & SUMAN MANDAL
Department of Zoology, University of Dhaka, Dhaka-1000, Bangladesh. E-mail: abu_tweb@yahoo.com

Abstract

Bangladesh is a country of 1,47,570 km^2 of mostly flat topography, but about 12 percent is hilly. The hilly areas are confined to the northeast and the southeastern parts of the country bordering India and Myanmar. Hill streams are highly variable and very important for the study and understanding of the aquatic biodiversity of Bangladesh. Hillstream ecosystems include a variety of habitats including those with sand, clay, cobble, gravel, mud, and rock substrates. In a recent field survey, 82 species of fishes have been identified from those habitats. The ichthyofauna belongs to the following families (numbers of species in parentheses) Notopteridae (1), Engraulidae (1), Cyprinidae (32), Psilorhynchidae (3), Nemacheilidae (2), Cobitidae (6), Bagridae (6), Schilbeidae (5), Amblycipitidae (1), Akysidae (1), Sisoridae (4), Erethistidae (1), Clariidae (1), Olyridae (1), Aplocheilidae (1), Ambassidae (2), Badidae (1), Mugilidae (1), Gobiidae (2), Osphronemidae (2), Channidae (3), Mastacembelidae (3), Belonidae (1) and Tetraodontidae (1). This paper provides a checklist of the hillstream fish species with their habitat preferences and associated fauna.

Key words: biodiversity, hillstream fishes, Bangladesh

Introduction

Bangladesh lies in the northeastern part of South Asia between latitudes 20^0 34' N and 26^0 38' N and between longitudes 88^0 01'E and 92^0 41' E. It has a total area of about 147,570 km^2 and is bounded on the west, north and northeast by India, in the southeast by Myanmar, and in the south by the Bay of Bengal. The geomorphology of the country is comprised of a large portion of floodplains (79.1%), terraces (8.3%), and hilly areas (12.6%).

Because of the unique situation in this tropical region, between the mighty Himalayan Mountains and the Bay of Bengal, and within the delta of the three great rivers, the Ganges, the Brahamaputra and the Meghna, warm water temperatures, plentiful rainfall, and nutritive silty clay-loam soil, the water bodies in Bangladesh are very productive. The aquatic environment as a whole is very rich in aquatic biodiversity.

The hilly areas of Bangladesh occur in the northern and eastern areas of the country in Khagrachari, Rangamati, Bandarban, Chittagong, Cox's Bazar, Mymensingh, Netrokona, Sylhet, Moulavibazar and Habiganj districts. The hills contain a number of creeks, small rivers, waterfalls, caves, lakes and a large reservoir. The hilly rivers include the Sangu River of Bandarban, the Kangsho and Somesswari rivers of Netrokona, and the Piyang and Sari rivers of Sylhet. There is a remarkable number of waterfalls in the hilly area which has created large, medium and small streams and pools. Among these, the Madopkundo waterfalls of Sylhet, the Himchori and Barachara waterfalls of Cox's Bazar, the Shailopropat Waterfall of Bandarban, and the Chittagong University campus waterfalls of Chittagong are remarkable. There is an unusual cave pool near Teknaf. The Kaptai Lake of Rangamati and the Boga Lake of Bandarban are important reservoirs. These streams, rivers and reservoirs are assumed to contain a great diversity of fish and shellfish fauna, although they have not been properly inventoried.

The inland, surface-water fish fauna of Bangladesh is an assemblage of 266 species, the diversity of which is attributed to the habitats created by the Bengal Delta wetlands and the confluence of the Brahmaputra, Ganges and Jamuna rivers that flow from the Himalayan Mountains into the Bay of Bengal. Of a total of 266 species of freshwater fish reported in Bangladesh (IUCN, 2000), more than 70 species belong to the order Cypriniformes. Rahman (2005) reported 71 cypriniform fishes in his book on inland open water bodies. He described the morphometric and meristic characteristics, habits, habitats and distributions of freshwater fishes, but does not

Accepted by L. Page: 2 Jul. 2013; published: 13 Aug. 2013

provide information on the present status of hillstream fishes of Bangladesh. Recently, Conway and Mayden (2008) recorded a new species of Psilorhynchus from the hill streams of Chittagong University, and Conway et al. (2009) described a new species of Devario from a stream in Cox's Bazar.

The present study was initiated to assess the biodiversity of fishes in relation to the diverse habitats of hill streams of Bandarban, Cox's Bazar, Chittagong, Sylhet and Netrokona districts for preparing a checklist of hillstream fishes of Bangladesh with information on their taxonomy and habitat preferences.

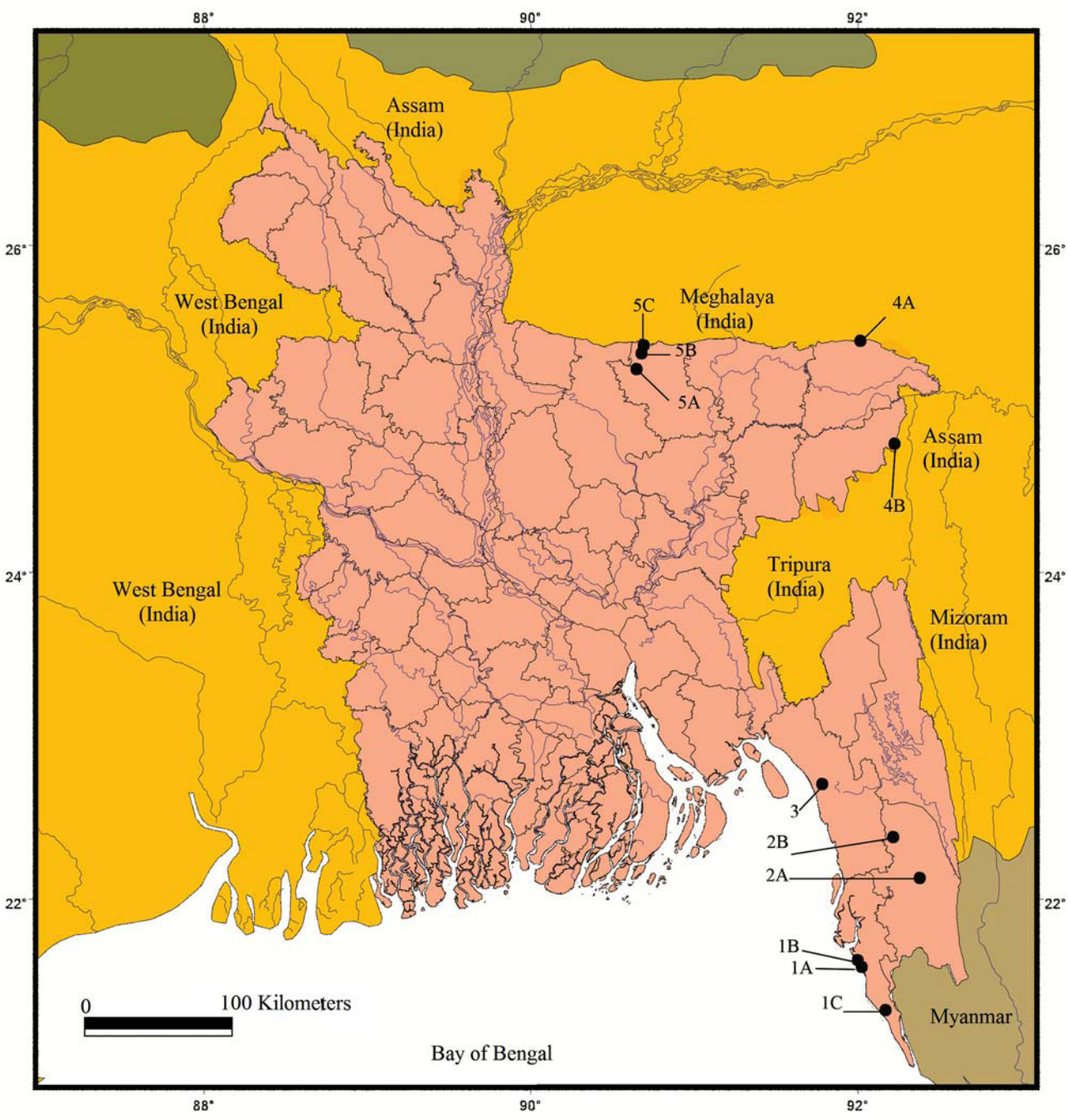

FIGURE 1. Sampling sites in hillstream areas of Bangladesh. 1) Cox's Bazar District: A, Himchori; B, Barachora; C, Kudung Cave. 2) Bandarban District: A, Sangu River; B, Shailopropat. 3) Chittagong District: Chittagong University Waterfall. 4) Sylhet District: A, Piyang River; B, Madhabkundo Waterfall. 5) Netrokona District: A, Kangsha River; B, Someshwari River; C, Gopalpur Hill Stream.

Material and methods

The present investigation was conducted in the hill streams of the northeastern and southeastern parts of Bangladesh during May 2011 to November, 2012. The 11 major sampling stations (Fig.1) included Himchori (21°21'18.36"N, 92°01'31.68"E), Borochra (21°23'45.82"N, 92°00'02.39" E) and Kudung Cave (21^{0}05.534"N, 92^0 10.168"E) of Cox's Bazar; Chittagong University Waterfall (22°28'25.8"N, 91°46'59.3E") of Chittagong; Shailopropat Waterfall (22°09'05.34"N, 92 °12'59.00"E) and Sangu River (22 °10'58.00"N, 92°13'54.00"E) of Bandarban; Piyang River (25°11'10.44"N, 92°01'00.00"E) and Madopkundo Waterfall (24°33'17.00"N, 92°13'26.40"E) of Sylhet; and Kangsha (25°00'41.40"N, 90°38'47.70"E), Somessawri River (25°06'32.99"N, 90°40'41.47"E) and Gopalpur Hill Stream (25°09'27.30"N, 90°41'33.24"E) of Netrokona District.

Live specimens were collected from 11 sampling sites (Fig. 1) using push-nets, seines, dip nets and cast-nets, and the samples were preserved in 10% formalin for taxonomic and morphometric studies. At each location, basic field data, including latitude, longitude, and elevation taken with a GPS unit, were recorded. Photographs of live and preserved specimens and habitats were taken. Specimens of associated fauna were also collected. The identifications of fishes and other fauna were completed using morphological features and morphometric analysis. Measurements were taken by slide calipers in millimeters and measuring tapes in centimeters. For the identification of genera and species of fishes, Talwar and Jhingran (1991), Menon (1999), Rahman (2005) and Siddiqui et al. (2007), Conway and Mayden (2008) and Conway et al. (2009) were followed. For verification of species identifications, the data were compared with reports of scientists and workers on the same or similar taxa and information on the internet.

Results

A total of 82 species of fishes have been identified from different ecological habitats of the hilly areas of Bangladesh. They belong to 55 genera in 24 families and 8 orders, and have been identified on the basis of meristic and morphometric characteristics. The fish diversity is dominated by the cyprinids (32 species) followed by the cobitids and bagrids with 6 species each. The taxonomic diversity of fishes is listed in Table 1 and illustrated in photos in Figs. 2-4. Sampling stations with habitats present, and fishes collected are listed in Table 2.

TABLE 1. Taxonomic diversity of hill-stream fishes of Bangladesh.

Order	Family	Species
Osteoglossiformes	Notopteridae	*Notopterus notopterus* (Pallas, 1769)
Clupeiformes	Engraulidae	*Gudusia chapra* (Hamilton, 1822)
Cypriniformes	Cyprinidae	*Amblypharyngodon mola* (Hamilton, 1822) *Barilius barna* (Hamilton, 1822) *Barilius bendelisis* (Hamilton, 1822) *Cabdio morar* (Hamilton 1822) *Chagunius chagunio* (Hamilton, 1822) *Cirrhinus cirrhosus* (Bloch, 1795) *Cirrhinus reba* (Hamilton, 1822) *Danio choprae* Hora, 1928 *Danio dangila* (Hamilton, 1822) *Danio rerio* (Hamilton, 1822) *Devario anomalus* Conway, Mayden & Tang, 2009 *Devario assamensis* (Barman, 1984) *Devario devario* (Hamilton, 1822) *Devario malabaricus* (Jerdon, 1849) *Garra gotyla* (Gray, 1830) *Garra orientalis* Nichols 1925 *Labeo angra* (Hamilton, 1822) *Labeo boggut* (Sykes, 1839)

.....continued on the next page

TABLE 1. (Continued)

Order	Family	Species
Cypriniformes	Cyprinidae	*Labeo calbasu* (Hamilton, 1822) *Osteobrama cotio* (Hamilton, 1822) *Pethia conchonius* (Hamilton 1822) *Pethia gelius* (Hamilton 1822) *Pethia ticto* (Hamilton 1822) *Puntius chola* (Hamilton, 1822) *Puntius sophore* (Hamilton, 1822) *Puntius terio* (Hamilton, 1822) *Rasbora daniconius* (Hamilton 1822) *Rasbora rasbora* (Hamilton, 1822) *Salmophasia bacaila* (Hamilton 1822) *Salmophasia phulo* (Hamilton 1822) *Securicula gora* (Hamilton, 1822), *Tor putitora* (Hamilton 1822)
	Psilorhynchidae	*Psilorhynchus balitora* (Hamilton, 1822) *Psilorhynchus rahmani* Conway & Mayden, 2008 *Psilorhynchus sucatio* (Hamilton, 1822)
	Nemacheilidae	*Acanthocobitis botia* (Hamilton, 1822) *Schistura savona* (Hamilton, 1822)
	Cobitidae	*Botia dario* (Hamilton, 1822) *Canthophrys gongota* (Hamilton, 1822) *Lepidocephalichthys berdmorei* (Blyth, 1860) *Lepidocephalichthys guntea* (Hamilton, 1822) *Lepidocephalichthys thermalis* (Valenciennes, 1846) *Pangio pangia* (Hamilton, 1822)
Siluriformes	Bagridae	*Batasio batasio* (Hamilton, 1822) *Batasio tengana* (Hamilton, 1822) *Mystus bleekeri* (Day, 1877) *Mystus cavasius* (Hamilton, 1822) *Mystus tengara* (Hamilton, 1822) *Sperata aor* (Hamilton, 1822)
	Schilbeidae	*Ailia coila* (Hamilton, 1822) *Clupisoma garua* (Hamilton, 1822) *Eutropiichthys vacha* (Hamilton 1822) *Neotropius atherinoides* (Bloch 1794) *Silonia silondia* (Hamilton, 1822)
	Amblycipitidae	*Amblyceps mangois* (Hamilton, 1822)
	Akysidae	*Akysis prashadi* Hora, 1936
	Sisoridae	*Bagarius bagarius* (Hamilton, 1822) *Gagata cenia* (Hamilton, 1822) *Gagata gagata* (Hamilton, 1822) *Glyptothorax telchitta* (Hamilton 1822)
	Erethistidae	*Erethistes pusillus* Müller &Troschel 1849
	Clariidae	*Clarias batrachus* (Linnaeus, 1758)
	Olyridae	*Olyra longicaudata* McClelland, 1842
Cyprinodontiformes	Aplocheilidae	*Aplocheilus panchax* (Hamilton, 1822)
Perciformes	Ambassidae	*Chanda nama* Hamilton, 1822 *Parambassis ranga* (Hamilton 1822)
	Badidae	*Badis badis* (Hamilton, 1822)
	Mugilidae	*Rhinomugil corsula* (Hamilton, 1822)

.....continued on the next page

TABLE 1. (Continued)

Order	Family	Species
	Gobiidae	*Awaous grammepomus* (Bleeker 1849) *Glossogobius giuris* (Hamilton, 1822)
	Osphronemidae	*Trichogaster fasciata* Bloch & Schneider 1801 *Trichogaster lalius* (Hamilton 1822)
	Channidae	*Channa orientalis* Bloch & Schneider, 1801 *Channa punctata* (Bloch 1793) *Channa striata* (Bloch 1793)
	Mastacembelidae	*Macrognathus aculeatus* (Bloch, 1786) *Macrognathus pancalus* Hamilton 1822 *Mastacembelus armatus* (Lacepède 1800)
Beloniformes	Belonidae	*Xenentodon cancila* (Hamilton, 1822)
Tetraodontiformes	Tetraodontidae	*Tetraodon cutcutia* (Hamilton, 1822)
Total: 8 orders	24 families	82 species in 55 genera

Associated fauna found in the hill streams were the following: Mollusks: *Bellamya bengalensis, Melanoides tuberculata, Tarebia lineata, Brotia costula, Paludomus conica;* Prawns: *Caridina weberi*, *Atyopsis spinipes, Macrobrachium birmanicum, M. dayanum, M. hendersoni, M. kulsiense, M. lamarrei, M. lanatum, M. lanchesteri, M. latimanus, M. lar, M. malcolmsonii, M. platyrostris, M. rosenbergii, M. rude, M. villosimanus;* Crabs: A*canthopotamon martensi*, *Perbrinckia cracens*, *Sartoriana spinigera*; Frog: *Hoplobatrachus tigrina;* Terrapin: *Kachuga tecta;* and Snake: *Python molurus.*

Discussion

The present investigation was conducted in hill streams in a diversity of habitats including headwaters, riffles, pools, lakes, and pools below waterfalls, and in pools at the entrances of caves. A total of 82 species of fishes in 55 genera, 24 families, and 8 orders have been identified. Species of barbs (Cyprinidae) accounted for the highest number of species in almost all habitats. Catfishes were collected from sandy, gravelly and silty-clay habitats. The suckerfishes (Psilorhynchidae) prefer cobble and smaller rocks in pools of streams. Loaches (Nemacheilidae, Cobitidae) are common in all types of hillstream habitats. Among the species of hillstream fishes recorded, several are common on flood plains and in other standing water bodies. The hillstream fishes are more abundant (e.g., at Sangu river station) where streams meet with larger streams because of the nutritive water and warm temperature. Species diversity is less (e.g., at Madhabkundo Waterfall at 265 ft elevation) in upper altitudes presumably because fewer species are adapted to cold water and strong current. The barbs and the loaches, however, are widely distributed in these habitats.

Kaptai Lake, the largest manmade reservoir in Bangladesh (68,800 hectares), was created by damming the Karnaphuli River near Kaptai in the Rangamati District in 1961. Kaptai Lake has an 'H' shape, and two arms of this lake join near Shuvalong. Many scientists and organizations have recorded the fishes and other fisheries-related fauna and information on Kaptai Lake. Recently, Halder et al. (1991) recorded a total of 71 fish species, including five exotic species, and two species of prawn. A study by Chakma (2007) recorded 74 freshwater species of fishes and two prawns. Recent data on fish production (2007-2008) from this lake showed an average of 8248 MT per year. Carps were dominant at the beginning, contributing about 60% of the production, but at present Corica soborna and Gudusia chapra contribute 50% of the production. Because of the loss of its natural status and conversion to a commercial aquaculture farm, the lake was not included in the present study.

TABLE 2. Sampling stations by district in Bangladesh, descriptions of habitats, and fishes collected.

Sampling station & habitat description	Fish species by family (numbers of species in parentheses)
1. Cox' s Baz ar	
(a) Himchori (16) 21°21'18.36"N, 92°01'31.68"E Elevation: 93 ft. Cobble, gravelly bottom in clear, cold water pool at base of waterfall	**Cyprinidae (7):** *Danio choprae*, *D. dangila*, *D. rerio*, *Devario anomalus*, *D. malabaricus*, *Pethia ticto, Puntius terio*; **Cobitidae (1)** *Lepidocephalichthys thermalis;* **Amblycipitidae (1)** *Amblyceps magnois;* **Akysidae (1)** *Akysis prashadi;* **Clariidae (1)** *Clarias batrachus;* **Olyridae (1)** *Olyra longicaudata;* **Badidae (1)** *Badis badis;* **Gobiidae (1)** *Glossogobius giuris*; **Channidae** (2) *Channa orientalis*, *C. punctata*
(b) Barachora (12) 21°23'45.82"N, 92°00'02.39" E Elevation: 32 ft. Sandy-clay, cobble in muddy stream	**Cyprinidae** (**8**) *Danio choprae*, *D. dangila*, *D. rerio*, *Devario anomalus*, *D. malabaricus*, *Rasbora daniconius, Pethia ticto*, *Puntius terio*; **Cobitidae (1)** *Lepidocephalichthys thermalis;* **Amblycipitidae (1)** *Amblyceps magnois;* **Akysidae (1)** *Akysis prashadi;* **Badidae (1)** *Badis badis*
(c) Kudung Cave (9) 21°05'31.8"N. 92°10'10.08"E Elevation: 70 ft. Rocky cave pool, sandy-clay, slightly turbid	**Cyprinidae (6)** *Amblypharyngodon mola*, *Devario anomalus*, *Pethia ticto*, *Puntius chola*, *P. terio, Rasbora daniconius*; **Cobitidae (1)** *Lepidocephalichthys thermalis*; **Channidae** (2) *Channa orientalis, C. punctata*
2. Bandarban	
(a) Sangu River (50) 22°10'58.00"N, 92°13'54.00"E Elevation: 56 ft. Silty, sand, pebbles, turbid, flowing water	**Notopteridae (1)** *Notopterus notopterus;* **Cyprinidae (18)** *Barilius barna*, *B. bendelisis*, *Cirrhinus cirrhosus*, *C. reba*, *Garra gotyla*, *Osteobrama cotio*, *Pethia conchonius*, *P. gelius*, *P.ticto*, *Puntius chola*, *P. sophore*, *P. terio*, *Rasbora daniconius*, *R. rasbora*, *Salmophasia bacaila*, *S. phulo*, *Securicula gora*, *Tor putitora*; **Psilorhynchidae (3)** *Psilorhynchus balitora*, *P. rahmani*, *P. sucatio;* **Nemacheilidae (2)** *Acanthocobitis botia*, *Schistura savona*; **Cobitidae (4)** *Canthophrys gongota, Lepidocephalichthys berdmorei*, *L. guntea*, *L. thermalis;* **Bagridae (5)** *Batasio tengana*, *Mystus bleekeri*, *M. cavasius*, *M. tengara*, *Sperata aor;* **Schilbeidae (3)** *Clupisoma garua*, *Eutropiichthys vacha*, *Silonia silondia;* **Akysidae (1)***Akysis prashadi;* **Sisoridae (3)** *Gagata cenia*, *G. gagata*, *Glyptothorax telchita;* **Badidae (1)** *Badis badis;* **Mugilidae (1)** *Rhinomugil corsula;* **Gobiidae (2)** *Awaous grammipomus, Glossogobius giuris;* **Channidae (2)** *Channa punctata*, *C. orientalis;* **Mastacembelidae (3)** *Macrognathus aculeatus*, *M. pancalus*, *Mastacembelus armatus;* **Belonidae** *Xenentodon cancila*
(b) Shailopropat (13) 22°09'05.34" N, 9212'59.00" E Elevation: 303 ft. Rocky, boulders in clear cold running water	**Cyprinidae (9)** *Barilius barna*, *B. bendelisis*, *Danio rerio*, *Garra orientalis, Pethia conchonius*, *P. ticto, Puntius chola*, *P. terio, Rasbora daniconius*; **Cobitidae (1)** *Lepidocephalichthys guntea;* **Bagridae (2)** *Mystus cavasius*, *M. tengara*; **Channidae (1)** *Channa orientalis*
3. Chittagong	
Chittagong University Waterfall (7) 22°28'25.8"N, 91°46'59.3"E Elevation: 79 ft. Slightly sandy clay, gravel, pebbles, boulders, clear cold running water from waterfall	**Cyprinidae (2)** *Pethia conchonius*, *P. ticto;* **Psilorhynchidae (3)** *Psilorhynchus balitora, P. rahmani*, *P. sucatio;* **Nemacheilidae (1)** *Schistura savona;* **Channidae (1)** *Channa orientalis*

.....continued on the next page

TABLE 2. (Continued)

Sampling station & habitat description	Fish species by family (numbers of species in parentheses)
4. Sylhet	

Piyang River (15) 25°11'10.44"N, 92°01'00.00"E Elevation: 51 ft. Silty sand, gravel, pebbles	**Cyprinidae (7)** *Barilius barna*, *Cirrhinus cirrhosus*, *Garra gotyla*, *Pethia conchonius, P. gelius*, *Rasbora daniconius*, *Salmophasia bacaila*; **Psilorhynchidae (1)** *Psilorhynchus balitora;* **Nemacheilidae (1)** *Schistura savona*; **Cobitidae (2)** *Lepidocephalichthys guntea*, *Canthophrys gongota*; **Bagridae (1)** *Mystus cavasius;***Ambassidae (1)** *Chanda nama;* **Channidae (1)** *Channa striata*; **Belonidae (1)** *Xenentodon cancila*
(b) Madhabkundo Waterfall (4) 24°33'17.00"N, 92°13'26.40"E Elevation: 265 ft. Rocky, boulders, cobble, sand, clear cold water pool under large fall.	**Cyprinidae (2)** *Devario assamensis*, *Pethia ticto;* **Cobitidae (1)** *Pangio pangia;* **Badidae (1)** *Badis badis*
5. Netrokona	
(a) Kangsha River (44) 25°00'41.40"N, 90°38'47.70"E Elevation: 50 ft. Sandy, silty small river.	**Notopteridae (1)** *Notopterus notopterus;* **Engraulidae (1)** *Gudusia chapra*; **Cyprinidae (12)** *Cabdio morar*, *Chagunius chagunio*, *Cirrhinus reba*, *Devario devario*, *Labeo angra, L. boggut*, *L. calbasu*, *Puntius chola*, *P. sophore*, *Rasbora daniconius*, *Salmophasia bacaila*, *Securicula gora*; **Cobitidae (2)** *Lepidocephalichthys berdmorei*, *Botia Dario;* **Bagridae (5)** *Batasio batasio*, *B. tengana*, *Mystus bleekeri*, *M. cavasius*, *M. tengara;* **Schilbeidae (5)** *Ailia coila*, *Clupisoma garua*, *Eutropiichthys vacha*, *Neotropius atherinoides*, *Silonia silondia;* **Amblycipitidae (1)** *Amblyceps magnois;* **Akysidae (1)** *Akysis prashadi*; **Sisoridae (3)** *Bagarius bagarius*, *Gagata cenia*, *Glyptothorax telchita*; **Erethistidae (1)** *Erethistes pussilus;* **Aplocheilidae (1)** *Aplocheilus panchax*; **Ambassidae (2)** *Chanda nama*, *Parambassis ranga*; **Mugilidae (1)** *Rhinomugil corsula;* **Gobiidae (1)** *Glossogobius giuris;* **Osphronemidae (2)** *Trichogaster fasciata*, *T. lalius;* **Channidae (3)** *Channa orientalis, C. punctata*, *C. striata*; **Belonidae (1)** *Xenentodon cancila;* **Tetraodontidae (1)** Tetraodon cutcutia
Someshwari River (8) 25°06'32.99"N, 90°40'41.47" E Elevation: 57 ft. Sandy, silty river at base of hills	**Cyprinidae (4)** *Cabdio morar*, *Cirrhinus reba*, *Labeo angra*, *L. boggut*; **Cobitidae (2)** *Botia dario*, *Canthophrys gongota;* **Sisoridae (2)** *Bagarius bagarius, Gagata cenia*
(c) Gopalpur Hill Stream (5) 25°09'27.30"N, 90°41'33.24"E Elevation: 77 ft. Sandy clay, muddy running water	**Cyprinidae (3)** *Pethia conchonius*, *Danio rerio*, *Devario devario*; **Amblycipitidae (1)** *Amblyceps magnois;* **Akysidae (1)** *Akysis prashadi*

Acknowledgements

This research has been funded by the Ministry of Education, Government of the People' s Republic of Bangladesh, under Grants for Advanced Research in Science. It is a part of the project, ' Studies on Fisheries Potentials of Hilly Areas of Bangladesh.' The Department of Zoology, University of Dhaka has provided technical support. The Higher Education Quality Enhancement Poroject of the University Grants Commission of Bangladesh financed my participation to the Biodiversity of Asian Fishes Conference 2013 held at the University of Brunei Darussalam.

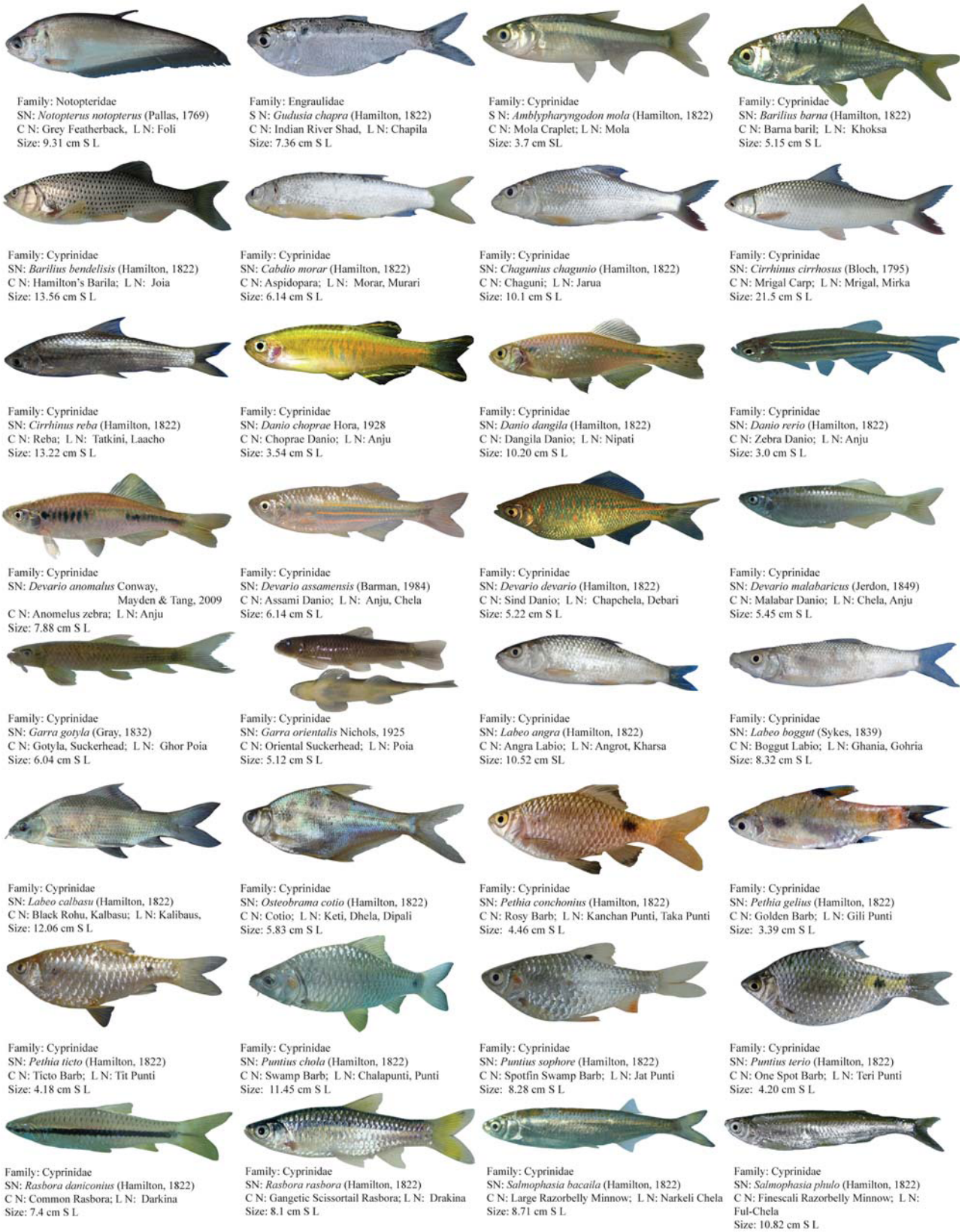

FIGURE 2. Hillstream fishes of Bangladesh, plate 1.

FIGURE 3. Hillstream fishes of Bangladesh, plate 2.

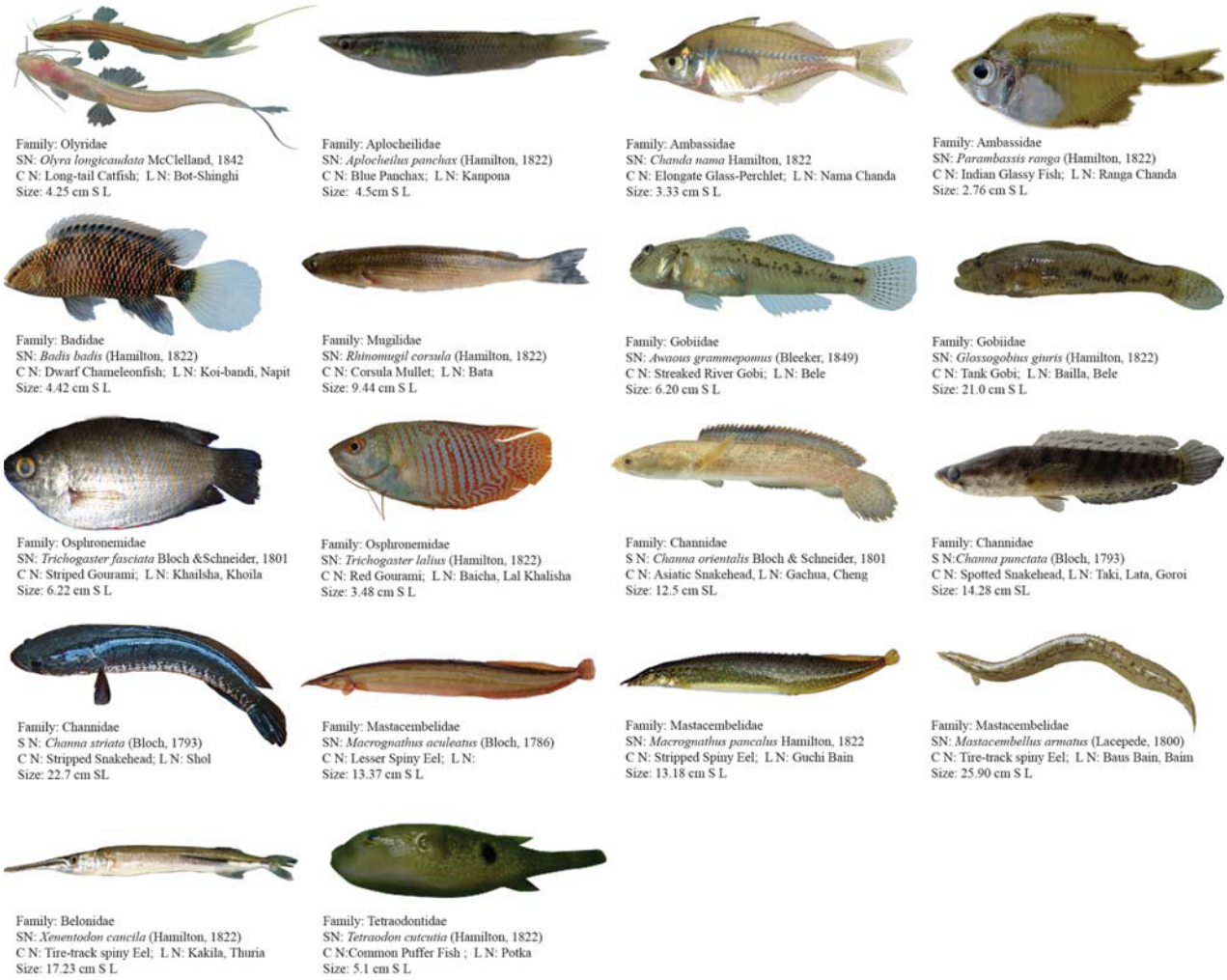

FIGURE 4. Hillstream fishes of Bangladesh, plate 3.

References

Chakma, I.L. (2007) *Fish Culture in Hill Tract Regions*, Desio Projatir Matshya Sakgrakkhon O Shamprasaran Ovijan 2007 (Bengali), Department of Fisheries, Ministry of Fisheries and Livestock, Dhaka, 68 pp.

Conway, K.W. & Mayden R.L. (2008) Description of two new species of *Psilorhynchus* (Ostariophysi: Psilorhynchidae) and redescription of *P. balitora*. *Ichthyological Exploration of Freshwaters*, 19 (3), 215-232.

Conway, K.W., Mayden R.L. & Tang, K.L. (2009) *Devario anomalus*, a new species of freshwater fish from Bangladesh (Ostariophysi: Cyprinidae). *Zootaxa,* 213, 49-58.

Halder, G.C., Mazid, M.A. Haque, K.I. Huda, S. & Ahmed, K.K. (1991) A Review of the Fishing Fauna of Kaptai Reservoir. *Bangladesh Journal of Fisheries,*14, 127-135.

IUCN Bangladesh (2000) *Red Book of Threatened Fishes of Bangladesh.* IUCN-The World Conservation Union. xii + 95 pp.

Menon, A.G.K. (1999) Checklist of the freshwater fishes of India. *Records of the Zoological Society of India, Occasional Papers,* 175, 1-366.

Rahman, A.K.A. (2005) *Freshwater Fishes of Bangladesh*. Zoological Society of Bangladesh. Dhaka-1000, Bangladesh. 394 pp.
http://dx.doi.org/10.3329/dujbs.v19i2.8956

Siddiqui, K.U., Islam, M.A., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A., Haque, E.U., Ahmed, Z.U., Begum, Z.N.T., Hassan, M.A., Khondker, M. & Rahman, M.M. (eds.) (2007) *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 23. *Freshwater Fishes*. Asiatic Society of Bangladesh, Dhaka. 300 pp.

Talwar, P.K. & Jhingran, A.G. (1991) *Inland Fishes of India and Adjacent Countries*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, India, 1, 541 pp.