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RESEARCH ARTICLE

**APOCRYPTES CAUDALIS, A NEW SPECIES OF MUDSKIPPER FROM PASCHIM MEDINIPURE,
WEST BENGAL, INDIA**

Bidisha Paul and *Angsuman Chanda

PG Department of Zoology, Raja N.L. Khan Women's College, Midnapur, Paschim Medinipur - 721102,
West Bengal, India

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ABSTRACT

A new freshwater Indigenous fish species, *Apocryptes caudalis* sp. nov., has been described from Pingla, Paschim Medinipur, West Bengal, India. The species has been described after detailed morphological examination and careful comparisons with its congener. Present species is easily distinguished from its congener, *Apocryptes bato* (Hamilton, 1822) by the presence of long caudal fin, short standard length, number of fin rays in second dorsal fin, presence of more vertical bars, greater head length.

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INTRODUCTION

Freshwater fishes are a poorly studied group since information regarding distribution, population dynamics and threats is incomplete, and most of the information available is from a few well-studied locations only (Zooreach organization 2010; Sabuj Kumar Chaudhuri 2010). Paschim Medinipur endowed with freshwater resources. The major riverine resources of Paschim Medinipur are Kangsabati, Keleghai, Subarnarekha, Silabati and Rupnarayan. From a survey throughout the Paschim medinipur, I found the species namely *Apocryptes caudalis* sp. nov. from the branch of river Kangsabati. Oxudercine gobies (Teleostei, Gobiidae, Oxudercinae), also known as 'mudskippers', include abundant and typical resident species of mangrove and mudflat ecosystems throughout the Indo-Pacific region and along the Atlantic African coasts (Murdy 1989). Mudskippers have amphibious type respiration with the help of specific type of physiological and morphological adaptive characters (Graham, 1997). Currently Mudskipper have 34 species of 7 different genera found in the world (Murdy, 1989, 1999; YJ Lee *et al.*, 1995; U Darumas *et al.*, 2002; HK Larson *et al.*, 2004; Z Jaafar *et al.*, 2008, 2009). Out of 34 species of mudskippers 9 species are found in Indian coastal area (RP Barman *et al.*, 2000; ML Shukla *et al.* 2013).

The genus *Apocryptes* is represented only one species in the Indian sub- region namely *Apocryptes bato* (Synonymes – *Gobius bato* Hamilton, 1822; *Apocryptes batoides* Day, 1876). Hamilton, 1822 found this fish from estuaries of Ganges, then Day, 1876 found this species from Moulmein, Burma. But the type specimen of Hamilton's species and also the type specimen of Day's species was not available (Hora 1934). In a survey of all blocks of Paschim Mednipur the *Apocryptes caudalis* sp. nov. was found in a branch of river Kangsabati namely chandikhal. At first this specimen is likely to be *Apocryptes bato* (Hamilton, 1822).

But a keen observation shows that it differs from *A. bato* by its long caudal fin, short standard length, number of fin rays in second dorsal fin, presence of more vertical bars, greater head length. Measurements of different morphological characters are given in the Table 2. Much of the terminology used in the description is after K. C. Jayaram, 2010. Standard length is the straight distance from the anterior tip of the head to the end of vertebral column and total length is the distance from the anterior tip of the head to the most posterior tip of the caudal fin. According to www.fishbase.org. (ver. 08/2015) *Apocryptes bato* is under Not Evaluated Category. The species has been found in the estuarine region of east coast of India to the Atlantic coast of Africa and also in the freshwater region of Paschim Medinipur. *Apocryptes caudalis* sp. nov.

***Corresponding author: Angsuman Chanda,**
PG Department of Zoology, Raja N.L. Khan Women's College,
Midnapur, Paschim Medinipur - 721102, West Bengal, India.

MATERIALS AND METHODS

During a fish biodiversity survey in all 29 blocks of Paschim Medipur from April 2013 to August 2015, the authors observed a mudskipper which at a first glance likely same as *Apocryptes bato*. But long tail of these species are different from the known one (Fig. 1). 27 specimens were collected and brought to the laboratory of Raja Narendra Lal Khan Women's College for taxonomic identification. Measurement of data were recorded to 1 mm. Morphometric data of *Apocryptes bato* was cited in Table 1 and make comparison with the newly described species. Measurements were made with digital calipers. Subunit of the different measurements were abbreviated as follows: Total length (TL), Standard length (SL), Head length (HL), Head width (HW), Body depth (BD), Caudal fin length (CFL), Base of caudal fin length (BCFL), Anal fin length (AFL), Base of anal fin length (BAFL), Dorsal fin length (DFL), Base of dorsal fin length (BDFL), Snout length (SnL), Eye diameter (ED). All the examined specimens are preserved in Raja Narendra Lal Khan Women's College (RNLK), Paschim Medinipur, West Bengal, India.

Material Examined: Gobardahnpur, Pingla, Paschim Medinipur, West Bengal, India; holotype: TL 115.0 mm; paratypes: TL 106.4 – 136.0 mm; all were collected from same locality. The types are deposited in the reference collection of Raja. N. L. Khan Women's College museum regn. no. RNLK – ZOO57A1 (holotype) and RNLK- ZOO57A2 – RNLK- ZOO57A27 (paratypes).

Holotype : RNLK – ZOO57A1, 82.1 mm SL male, collected from the freshwater river of Pingla (22°16'19"N 87°35'08"E), Paschim Medinipur, West Bengal, India; B. Paul, 28-05-2013.

Paratypes : RNLK – ZOO57A2, 82.3 mm SL; RNLK – ZOO57A3, 82.9 mm SL; RNLK – ZOO57A4, 84.0 mm SL; RNLK - ZOO57A5, 81.5 mm SL; RNLK- ZOO57A6 , 83.3 mm SL; RNLK- ZOO57A7, 73.4 mm SL; RNLK – ZOO57A8, 75.4 mm SL; RNLK- ZOO57A9, 87.0 mm SL; RNLK-ZOO 57A10, 76.1 mm SL; RNLK- ZOO57A11, 89.0 mm SL; RNLK- ZOO57A12, 77.2 mm SL; RNLK- ZOO57A13, 79.1 mm SL collected from the same locality as holotype; B. Paul, 10-03-2014.

Diagnosis : Major differences between *A. bato* (Hamilton, 1822) and *A. caudalis* sp.nov. are given in the Table. 1.

Table 1. Comparison of diagnostic characters between *A. bato* (Hamilton, 1822) and *A. caudalis* sp.nov

| Features | <i>A. caudalis</i> | <i>A. bato</i> |
|-------------------------|--------------------|----------------|
| Standard length (mm.) | Max. 89.3 | Max. 141.0 |
| Head length (%SL) | 22.47-25.28 | 21.9-23.9 |
| Caudal fin length (%SL) | 36.43-52.8 | 22.6-32.9 |
| Second dorsal fin rays | 22-25 | 21-23 |
| Anal fin rays | 24-26 | 20-24 |
| Verticle bars | 7-9 | 6-7 |

Adult *A. caudalis* differs in having the smallest size with 89.3 mm SL (Vs. 141.00 mm SL in *A. bato*), in having a greater head length (vs. head length 22.47-25.28 % of *A. bato*). Moreover, *A. caudalis* differs in having body colour greyish

with 7-9 distinct vertical bands on body, but the ventral surface lighter creamy white (vs. yellow brown / brown above and ventral side white; *A. caudalis* bears 6-7 verticle black stripes on each side). *A. caudalis* also differs from its congeneric species by having long caudal fin which is completely separated from anal fin with 36.43 – 52.8 % SL. Moreover *A. caudalis* can be easily distinguished from its congener by having a long caudal fin (vs. Short caudal fin length in *A. bato*).

Measurements (mm): Holotype (male), RNLK- ZOO57A1: TL 115.0; SL 82.1; HL 20.1; HW 12.3; ED 3.0; SNL 5.3; BD 14.3; AFL 35.0; 1st DFL 13.0; 2nd DFL 37.5; BPFL 7.0; CFL 32.9 and PvFL 11.8. Paratype: TL 116.5; SL 82.3; HL 19.3; HW 9.6; ED 3.3; SNL 4.4; BD 12.0; AFL 34.8; 1st DFL 8.5; 2nd DFL 39.0; BPFL 6.7; CFL 38.2 and PvFL 11.0.

Colour: In live condition dorsal portion is light greenish and ventral portion is white and in preserved condition dorsal portion is greyish and ventral portion is creamy white. 7-9 transverse band present in the body. Scales cycloid, scale present on the longitudinal series is 110-126.

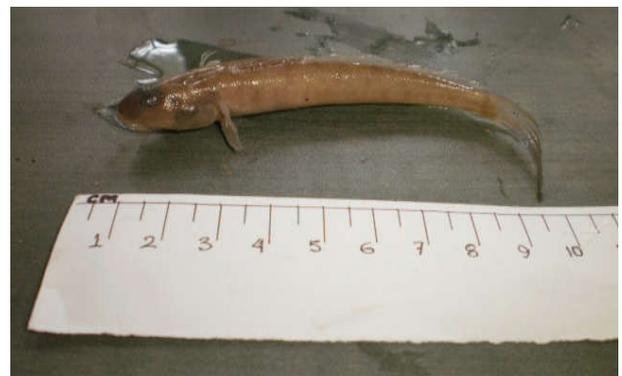


Fig. *Apocryptes caudalis* sp. nov

Description: In *Apocryptes caudalis* sp. nov. Standard length (8.9 c.m) is small than the *Apocryptes bato* (14.1 c.m). Body is elongate, slippery in live condition, subcylindrical upto the base of pelvic fin. Head sub cylindrical, length ranges from 22.47-25.28 %SL. Head with minute scale. Shoulder girdle smooth. Mouth horizontal, cleft extending middle of the eye. Snout length ranges between 19.44 – 26.5% HL. Lips thick, upper jaw bend downward, lower jaw slightly longer. Eyes small, placed in the middle portion of the head and not visible from the ventral side ranges between 14.90- 17.13%HL. Barbells absent, Isthmus broad, a pair of canine teeth present in the lower jaw. Tongue rounded, gill openings are less wide. Standard length range between 73.4 cm to 89.0 cm. Dorsal fin spine 5/6; thin and flexible. Base of 1st dorsal fin length was 10.32 – 15.83 % SL. Spines connected each other by membrane. First spine shorter than other, fifth spine is longest. Fin rays of second dorsal fin 22-25. Tip of last ray of second dorsal fin exceed the base of the anal fin. Fins are connected by membrane from base to the tip. Base of 2nd dorsal fin length was 43.46 – 47.39 % SL. Rays are simple. Membranes are spotted. Pectoral fin rays 17-20, range between 13.37 – 17.5 %SL, middle rays are long and outer rays are short. Anal fin is ribbon like ranges between 42.28 – 50.66% SL and extend upto the caudal fin.

Table 2. Summary of the diagnostic character of *A. caudalis* sp. nov. comparison with *A. bato* (Hamilton, 1822)

| Features | <i>A. caudalis</i> sp. nov. | | <i>A. bato</i> (Hamilton, 1822) | |
|---|-----------------------------|-------|---------------------------------|------|
| | Range m.m. (%SL) | Mean | Range m.m. (%SL) | Mean |
| Standard length | 73.4 – 89.0 | 81.02 | 141.0 | |
| Head length | 22.47-25.28 | 23.38 | 21.9-23.9 | 22.7 |
| Head width | 11.37 – 14.98 | 12.74 | 12.1- 17.3 | 15.1 |
| Body depth | 14.25 – 17.42 | 15.47 | x | x |
| Base of 1 st Dorsal fin length | 10.32 – 15.83 | 12.07 | 7.1-8.9 | 7.9 |
| Base of 2 nd Dorsal fin length | 43.46 – 47.39 | 45.65 | 41.4-46.9 | 44.1 |
| Pectoral fin length | 13.37 – 17.5 | 15.39 | 14.2-17.9 | 16.2 |
| Base of pectoral fin length | 6.20 – 8.55 | 7.54 | x | x |
| Pelvic fin length | 12.51 – 14.62 | 13.57 | 12.7-15.3 | 13.8 |
| Base of Anal fin length | 42.28 – 50.66 | 45.41 | 39.8-45.4 | 41.9 |
| Caudal fin length | 36.43-52.8 | 44.18 | 22.6-32.9 | 28.2 |
| Caudal fin rays | 20-23 | 22 | 22 | 22 |
| | Range c.m. (%HL) | | | |
| Snout length | 19.44 – 26.5 | 22.79 | x | x |
| Eye diameter | 14.90- 17.13 | 15.86 | x | x |
| Head width | 47.60 – 61.67 | 54.56 | x | x |

Caudal fin is lanceolate shaped, ranges between 36.43-52.8%SL. There is a gap between anal fin and caudal fin. Pelvic fin united, forming a cup like structure, ranges between 12.51 - 14.62 % SL with 11-13 branched rays. 7-9 vertical bars present in the dorsal side. First bar locate beneath the base of pectoral fin, second at the tip of the first dorsal fin, third at the end of first dorsal fin, fourth between the 4th and 5th rays of second dorsal fin, fifth at the 9th rays, sixth between the 12th and 13th rays, seventh between the 16th and 17th rays, eight at the 22nd ray, ninth placed at the last rays.

Distribution: Known only from the type locality.

Etymology: The specific name 'caudalis' related to the long caudal fin of the new species.

DISCUSSION

The species is similar to *Apocryptes bato* (Hamilton, 1822). The standard length and caudal fin length justify a distinct species status. The head length is quite different. Hamilton, 1822; Murdy, 1989; Gunther, 1988 described *A. bato* by having 223.96 141.0 mm SL, head length 21.9 – 23.9 % SL, total elements in 2nd dorsal fin was 21 -23, 6-7 verticle narrow brown bars, caudal fin length 22.6 – 32.9 % SL. Thus new species *A. caudalis* differs from it's congener in having shortest standard length, greater head length, long caudal fin, 2nd dorsal fin rays 22-25, vertical bars 7-9, eyes are oval, 1st dorsal fin was seperatyed from 2nd dorsal fin, pectoral fin contain 17-20 rays.

SL of *A. bato* and *A. caudalis* (Fig. 1) also indicate that newly described species is different from its widely distributed geographical congener. Moreover, *A. caudalis* is also readily distinguishable from its congeners by the fin formula of D1 5 - 6, D2 22-25, P 17 - 20, V 11- 13, A 24 – 26, C 20-23. In case of *A. bato*, it is D1 5, D2 21-23, P 20- 25, A 20-24, C 22 (Murdy, 1989 ; Hamilton, 1822 & Talwar, Jhingran 1991).

In summary, the biodiversity of aquatic ecosystems of Paschim Mednipur, West Bengal have been very poorly investigated and several areas remain untouched, indicating that very less attention has been focused on the freshwater small indigenous fishes and their role in aquaculture, nutritional value, biological significance, breeding status, and conservation.

Therefore, a unified and comprehensive effort is needed to identify the species with the fully illustrated taxonomic key and identification guide for the classification of freshwater fishes.

Key to the species of *Apocryptes*

- Caudal fin length 22.6-32.9 %SL
A. bato (Hamilton, 1822).
- Caudal fin length 34.83-49.35 %SL
A. caudalis sp. Nov.

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