

First record of two cardinal fishes (Kurtiformes: Apogonidae) and a gobioid fish (Gobiiformes: Oxudercidae) from the Odisha coast, India

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Abstract

Two cardinal fish species, *Apogonichthyoides sialis* (Jordan & Thompson 1914) and *Oestorhinchus fleurieu* Lacepède 1802, and one oxudercid goby, *Trypauchenichthys sumatrensis* Hardenberg 1931 are reported herein for the first time from the coastal waters of Odisha, India. This paper deals with the diagnostic characters and distributional information of all these three species to document their occurrence for the first time from Odisha state. Confusion in identity of these two apogonids along Odisha coast is cleared, while report of this oxudercid goby forms it's only the second record from India.

Introduction

Odisha is a maritime state from the northeastern part of India with a diversified ecosystem along its coastline that harbors rich biodiversity including fishes. Barman et al. (2007) in their work on '*Marine and estuarine fishes of Orissa*' listed only seven species belonging to the family Apogonidae and 32 species of the family Oxudercidae (included under the family name Gobiidae). Later on, two more apogonids, namely, *Taeniamia macroptera* (Cuvier 1828) and *Jaydia novaeguineae* (Valenciennes 1832) were reported from Odisha coast (Mukherjee et al. 2018; Mohanty et al. 2020). Further, two more species belonging to the currently assigned family Oxudercidae, viz., *Periophthalmus novemradiatus* (Hamilton 1822) (Mitra et al. 2010) and *Paratrypauchen microcephalus* (Bleeker 1860) (Ruidas et al. 2020), have been added to the gobioid diversity of Odisha.

The present paper reports *Apogonichthyoides sialis* (Jordan & Thompson 1914) and *Ostorhinchus fleurieu* Lacepède 1802 (Kurtiformes: Apogonidae) and *Trypauchenichthys sumatrensis* Hardenberg 1931 (Gobiiformes: Oxudercidae) for the first time from Odisha coast on the basis of samples collected from Ganjam and Balasore coast as detailed below.

Material And Methods

Fish samples were collected from Gopalpur coast (Ganjam dist.) (19°15'47.56" N, 84°54'59.26" E), estuarine region of Arjyapalli (Ganjam dist.) (19°18'38.91" N, 84°58'20.68" E) and Balaramgadi (Balasore dist.) (21°28'23"N, 87°03'16"E). A single specimen from Gopalpur was identified as *A. sialis* while three other specimens were identified as *O. fleurieu* by following relevant literature (Randall et al. 1990; Gon 2000; Fraser and Allen 2011; Mabuchi et al. 2014). Two specimens, one from Arjyapalli and another from Balaramgadi, were identified as *T. sumatrensis* following Carpenter and Niem (2001) and Murdy (2008). After collection, specimens were photographed and then preserved in 10% formalin. All the measurements of the samples were taken using digital calliper in mm units and presented as Table 1. Identified specimens were deposited in the repository of the Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha, India.

Table 1
Morphometric data of two cardinal fishes and one goby collected from Odisha coast.

	<i>A. sialis</i>	<i>O. fleurieu</i>		<i>T. sumatrensis</i>
SL in mm	94.4	53.2–89.2	SL in mm	49.1–76.7
HL in mm	40.4	21.9–35.3	HL in mm	9.4–14.1
In % SL			In % SL	
HL	42.7	39.3–41.6	HL	18.8–19.1
Body depth	39.4	34.3–39.3	Body depth	13.6–13.8
1st dorsal fin base	15.4	14.1–17.2	Pectoral fin length	5.7–6.9
2nd dorsal fin base	13.2	16.8–18.6	Pelvic fin length	5.9–6.7
Inter Dorsal fin space	7.3	5.4–6.8	Predorsal length	24.9–25.5
Anal fin base	13.1	14.6–14.8	Prepelvic length	16.9–18.5
Pectoral fin base	6.1	5.8–6.3	preanal length	38.2–42.3
Pre 1st dorsal fin length	45.3	39.1–40.8	In % HL	
Pre 2nd dorsal fin length	67.6	57.7–60.3	Snout length	19.1–21.9
1st dorsal fin length	21.6	16.9–20.8	jaw length	26.2–32.9
2nd dorsal fin length	27.6	24.2–24.3	Pelvic fin length	32.3–35.1
Anal fin length	21.3	21.1–21.6		
Pectoral fin length	26.2	23.8–26.8		
In % HL				
Eye diameter	29.9	36.5–37.1		
Snout length	20.7	19.2–19.6		
Inter Orbital width	19.8	22.1–22.3		
Upper jaw Length	45.2	47.8–48.4		

Abbreviations used: SL: Standard Length and HL: Head Length

Results

Morphometric characteristics (Table 1) of all three new records are detailed hereunder along with their geographical distribution.

Order: Kurtiformes Jordan 1923

Family: Apogonidae Gunther 1859

Subfamily: Apogoninae Gunther 1859

Genus: *Apogonichthyoides* Smith 1949

1. *Apogonichthyoides sialis* (**Jordan & Thompson 1914**) (Fig. 1)

Common name

Twinbar cardinalfish

Materials examined

EBRC/ZSI/F13909, 01 ex., 94.4 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 10.vi.2022, R.K. Behera & S. Mohapatra.

Diagnostic Characters

D VII + I, 9; A II, 8; P 15; lateral line scales 27–28; pre-dorsal scales 3; total gillrakers 19 (11 developed). Body laterally compressed, dorsally convex. Preopercular edge ventrally serrated. Third spine of 1st dorsal fin longest. Head moderate, 2.3 times in SL. Maxilla extends about the middle of orbit. Mouth wide. Body depth 2.5 in SL. Depth of Caudal peduncle 6.2 times and length of Caudal peduncle 4.2 times in SL. Pale intestine. Colour of the body brownish with grey shed. Head darker than body. Two vertical dark bars on sides, one starts from the origin of each dorsal fin and reaches up to the pectoral fin. Ventrally the bars become faint and narrower. A dense brown spot at the origin of caudal fin. Diameter of caudal spot 26.9 times in SL (3.7% SL).

Distribution

Distributed in marine habitat of Eastern Indian Ocean and Western Pacific from India, Myanmar, South China Sea to Japan (Fricke et al. 2022). In India it was earlier reported from Kochi, Kerala (Manjebraayakath et al. 2012), the Wedge Bank, Tamil Nadu (Karuppasamy 2016; Mogalekar et al. 2018) and Visakhapatnam, Andhra Pradesh (Silambarasan et al. 2022).

Remarks: The present report of *A. sialis* forms its first record from Odisha coast.

Genus: *Ostorhinchus* Lacepède 1802

2. *Ostorhinchus fleurieu* **Lacepède 1802** (Fig. 2)

Common name

Flower cardinalfish

Materials examined

EBRC/ZSI/F13898, 03 ex., 53.2–89.6 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 10.vi.2022, R.K. Behera & S. Mohapatra.

Diagnostic Characters: D VII + I, 9; A II, 8; P 14–15. Compressed body with ctenoid scale. Lateral line scales 27–28; pre-dorsal scales 5; scales on circum-peduncle 12; total gillrakers: 19–21. Body depth 2.5–2.9 in SL. Head larger, 2.4–2.5 times in SL. Serration mostly on ventral edge of preopercle. Interorbital portion dorsally convex. Eye large, about 6.6–6.8 in SL. Slightly oblique mouth. Upper jaw longer than lower jaw. Snout short. Colour of the body coppery with golden shine on the ventral half of the body. Dorsal portion of the head and the edge of maxilla bluish-black. Dorsal half of the body darker. Origin of dorsal, pelvic and anal fin pale. A strip of black mark of nearly equal width close to the origin of caudal fin & slightly fades ventrally. Blackish intestine.

Distribution

In shallow reefs and estuaries of Red Sea, South Africa, east Africa, Seychelles, Madagascar, Mauritius, Persian Gulf, through India, Sri Lanka, to Indonesia, Malaysia, Papua New Guinea, Hong Kong and Philippines, Taiwan, south to Solomon Islands (Froese and Pauly 2022; Fricke et al. 2022). The earlier reports of this species from India were from Kovalam, Kerala (Randall et al. 1990), Kalpakkam, Tamil Nadu (Biswas et al. 2012), Visakhapatnam, Andhra Pradesh (Krishna et al. 2015) and Petuaghat, West Bengal (Pradhan et al. 2023).

Remarks: The present report of *O. fleurieu* forms its first record from Odisha coast.

Order: Gobiiformes Günther 1880

Family: Oxudercidae Günther 1861

Subfamily: Amblyopinae Günther 1861

Genus: *Trypauchenichthys* Bleeker 1860

3. *Trypauchenichthys sumatrensis* **Hardenberg 1931** (Fig. 3)

Common name

Indonesian eelgoby

Materials examined

EBRC/ZSI/F13987, 01 ex., 49.1 mm SL, Arjyapalli fish landing centre, Ganjam, Odisha, 16.vi.2022, R.K. Behera; EBRC/ZSI/F14002, 01 ex., 76.7 mm SL, Balaramgadi fish landing centre, Balasore, Odisha, 02.xii.2021, S.S. Rout.

Diagnostic Characters

D 46; A 37–38; P 16; V I, 3. Strongly compressed and elongated body. Body depth 7.2–7.3 in SL. Dorsal and anal fins connected to the caudal fin. Dorsal fin origin behind pectoral fin. Pelvic fin distinctly separated. Pelvic frenum very weak to absent. Dorsal rear end of head with a pouch-shaped cavity. Frontal crest with serration and the anterior edge sharply pointed. Head small, naked, 5.2–5.4 in SL. Mouth oblique. Eye minute, hard to measure. Both lower and upper jaw of nearly equal in length. Snout small, 24.7–27.2 in SL. Colour of the body and head reddish pink. Fins comparatively pale. On preservation, colouration disappears and becomes whitish.

Distribution

In brackish waters of eastern Indian Ocean from Northeast coast of India to west coast of Malaysia, Sumatra (Indonesia) (Parenti 2021; Fricke et al. 2022). *Trypauchenichthys sumatrensis* was reported earlier only from Sandheads, Hooghly river mouth (Koumans 1941; Murdy 2008) in India.

Remarks: The present report of *T. sumatrensis* forms its first record from Odisha coast and the only second report from India.

Discussion

As discussed earlier, only nine species of apogonids were reported from Odisha coast till date (Barman et al. 2007; Mukherjee et al. 2018; Mohanty et al. 2020), which include only one species of the genus *Apogonichthyoidea*, *A. taeniatus* (Cuvier 1828), and three species in the genus *Ostorhinchus*, *O. aureus* (Lacepède 1802), *O. endekataenia* (Bleeker 1852) and *O. fasciatus* (Shaw 1790). It may be noted that *A. taeniatus* is currently known to occur from Red Sea, Persian Gulf and east coast of Africa to Madagascar in Western Indian Ocean (Fricke et al. 2022) and so, unlikely to occur along east coast of India. According to Gon (1986), the reports of *A. taeniatus* from east coast of India are possibly *A. pseudotaeniatus* (Gon 1986). Later, Gon (2000) suggested that the distributional records of *A. pseudotaeniatus* from east coast of India and western pacific are probably *A. sialis* as the distribution of *A. pseudotaeniatus* is limited to the Red Sea only. Hence, species listed in Barman et al. (2007) and Pati et al. (2018) as *A. taeniatus* could possibly be *A. sialis*. *Apogonichthyoidea sialis* have great similarities with *A. pseudotaeniatus*, as well as *A. taeniatus*, due to the presence of bars on sides, possibly that caused the misidentification of this species in the past. According to the species key of *Apogonichthyoidea* by Fraser and Allen (2011), *A. taeniatus* has a large black spot behind the head on body, in between the lateral line and pectoral fin while *A. sialis* lacks any such spot on the respective position. So, both these species can be distinguished easily considering this character. However, setting aside the misidentifications the present report forms its first evidential record from Odisha coast.

Ostorhinchus fleurieu shares great similarities with *O. aureus* but can be easily distinguished on the basis of caudal peduncular bar (ventral region diffused with wide middle vs. ventrally wider like hourglass bar) and total gillraker count (20–23 vs. 22–27) (Gon and Randall 2003). Gon (1987) once treated *O. fleurieu* as synonymous with *A. aureus*. However, Randall et al. (1990) distinguished both the species as valid and clarified their morphotaxonomic differences and distribution. They indicated that the record of *A. aureus*

by Day (1875) from Madras is referable to *O. fleurieu*. Record of *A. aureus* from Odisha coast is attributed to Mishra et al. (1999) which was majorly identified following Day (1875) and Misra (1962). As defined by Randall et al. (1990) and Gon and Randall (2003) the specimens thus identified as *O. aureus* from Indian waters are to be treated as *O. fleurieu*. The materials used by Mishra et al. (1999) could not be verified as there is no mention of its whereabouts, the present report forms first material-based evidence of *O. fleurieu* occurring along Odisha coast.

Although there are 34 species of the family Oxudercidae reported from Odisha coast (Barman et al. 2007; Mitra et al. 2010; Ruidas et al. 2020), the genus *Trypauchenichthys* was never reported from Odisha. Its distribution in India was only known from the Sandheads at mouth of Hooghly River, West Bengal based on few materials of *T. sumatraensis* collected during 1927-28 (Chatterjee et al. 2013). Record of another species, *Trypauchenichthys typus* Bleeker, from West Bengal (Mukherjee et al., 1995) was also found to be misidentification *Paratrypauchen microcephalus* (Bleeker) (Chatterjee et al. 2013). This genus comprises only four valid species, but *T. sumatrensis* can easily be separated from rest of the three species by the presence of a projection on frontal crest and variation in the number of elements in dorsal and anal fin (D 45–48 vs. 58–62; A 37–39 vs. 46–52) (Murdy 2008). The present report of this genus and species as well forms the second report from India and the first report from Odisha.

Declarations

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Author's Contributions

Suman Patra and Rajeswari Gouda: Identification and preparation of the manuscript.

Rajesh Kumar Behera, Sandeep Mohapatra, Sushree Swati Rout: Data collection.

Shesdev Patro, Subhrendu Sekhar Mishra, Anil Mohapatra: Improvisation of manuscript, Critical analysis and confirmation of data.

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Human and Animal Ethics: The specimens were collected from fish landing centres in dead condition and these fishes do not come under any protected categories in the country.

Consent for Publication: All authors consented to submit the manuscript to publish in the *Thalassas: An International Journal of Marine Sciences*.

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Figures



Figure 1

Apogonichthyoides sialis (Jordan & Thompson 1914) from Gopalpur, Odisha



Figure 2

Ostorhinchus fleurieu Lacepède 1802 from Gopalpur, Odisha



Figure 3

Trypauchenichthys sumatrensis Hardenberg, 1931 from Arjapalli fish landing centre, Ganjam, Odisha.