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Short Communication

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

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Two cardinal fish species, *Apogonichthyoides sialis* (Jordan & Thompson, 1914) and *Ostorhinchus 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. The confusion in the identity of reported apogonids along the Odisha coast is cleared, while the report of oxudercid goby forms only the second record from India.

[**Keywords**: Amblyopinae, Apogonichthyoides, Cardinal fish, Ganjam, Goby, Trypauchenichthys]

Introduction

Odisha is a maritime state of India with rich biodiversity, including fishes. In Odisha, only seven species belonging to the family Apogonidae and 32 species of the family Oxudercidae (included under the family name Gobiidae) were listed[1]. Later on, two more apogonids, namely, *Taeniamia macroptera* (Cuvier) and *Jaydia novaeguineae* (Valenciennes), were reported from the Odisha coast[2-3]. Two more species belonging to the currently assigned family Oxudercidae, *viz*., *Periophthalmus novemradiatus* (Hamilton)[4] and *Paratrypauchen microcephalus* (Bleeker)[5], have been added to the gobioid diversity of Odisha.

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

Material and Methods

Fish samples were collected from the Gopalpur coast (Ganjam district) (19°15'47.56" N, 84°54'59.26" E), estuarine region of Arjyapalli (Ganjam district) (19°18'38.91" N, 84°58'20.68" E), and Balaramgadi (Balasore district) (21°28'23" N, 87°03'16" E). A single specimen collected from Gopalpur was identified as *A. sialis*, while three other specimens were identified as *O. fleurieu* following relevant literature[6-9]. Two specimens, one from Arjyapalli and another from Balaramgadi, were identified as *T. sumatrensis* following Carpenter & Niem[10] and Murdy[11]. After collection, specimens were photographed and then preserved in 10 % formalin. All the measurements of the samples were taken using a digital calliper in mm and are presented in Table 1. Identified specimens were submitted to the repository of the Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha, India.

Abbreviations used

SL: Standard Length, and HL: Head Length.

Results

Order: Gobiiformes Günther 1880
Family: Apogonidae Gunther 1859
Subfamily: Apogoninae Gunther 1859
Genus: *Apogonichthyoides* Smith 1949

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

Materials examined: EBRC/ZSI/F13909, 01 specimen, 94.4 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 10.vi.2022.

Diagnostic characters: D VII+I, 9; A II, 8; P 15; lateral line scales 27 – 28; pre-dorsal scales 3; total gillrakers 19. Body laterally compressed, dorsally convex. Preopercular edge ventrally serrated. Third spine of 1st dorsal fin longest. Head moderate, maxilla extends about the middle of orbit. Mouth wide. Pale intestine. Colour of the body brownish with grey shed. Head darker than body. Two vertical dark bars

Table 1 — Morphometric data of two Apogonidae and one Oxudercidae collected from Odisha coast

	A. sialis	*O. fleurieu*		*T. sumatrensis*
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		

Fig. 1 — *Apogonichthyoides sialis* (Jordan & Thompson 1914) from Gopalpur, Odisha

on sides, 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, Myanmar, South China Sea to Japan[12]. In India, it was earlier reported from Kochi, Kerala[13], the Wedge Bank, Tamil Nadu[14-15] and Visakhapatnam, Andhra Pradesh[16].

Genus: *Ostorhinchus* Lacepède 1802

2. *Ostorhinchus fleurieu* Lacepède, 1802 (Fig. 2) (Flower cardinalfish)

Materials examined: EBRC/ZSI/F13898, 03 specimens, 53.2 – 89.6 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 10.vi.2022.

Diagnostic characters: D VII+I, 9; A II, 8; P 14 – 15. Compressed body with ctenoid scales. Lateral line scales 27 – 28; pre-dorsal scales 5; scales on circum-peduncle 12; total gillrakers: 19 – 21. Head large. Serration mostly on ventral edge of preopercle. Interorbital portion dorsally convex. Eyes large. Slightly oblique mouth. Upper jaw longer than lower jaw. Snout short. Colour of the body coppery with golden shine on ventral half of body. Dorsal portion of head and edge of maxilla bluish-black. Dorsal half of 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, that is wider at middle and 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[17]. The earlier reports of this species from India were from Kovalam, Kerala[6], Kalpakkam, Tamil Nadu[18], Visakhapatnam, Andhra Pradesh[19], and Petuaghat, West Bengal[20].

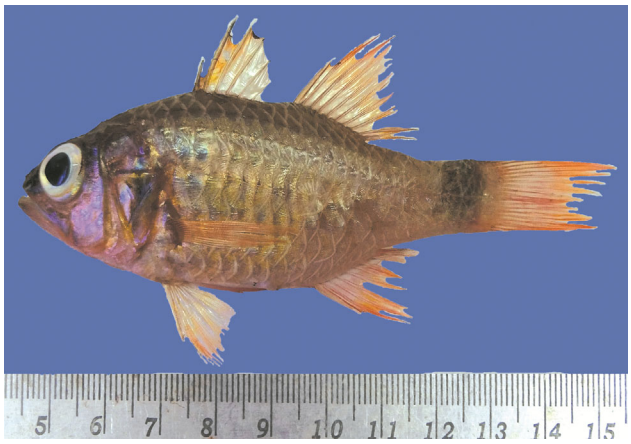

Fig. 2 — *Ostorhinchus fleurieu* Lacepède 1802 from Gopalpur, Odisha

Fig. 3 — *Trypauchenichthys sumatrensis* Hardenberg, 1931 from Arjyapalli fish landing centre, Ganjam, Odisha

Order: Gobiiformes Günther 1880
Family: Oxudercidae Günther 1861
Subfamily: Amblyopinae Günther 1861
Genus: *Trypauchenichthys* Bleeker 1860

3. *Trypauchenichthys sumatrensis* Hardenberg, 1931 (Fig. 3) (Indonesian eelgoby)

Materials examined: EBRC/ZSI/F13987, 01 specimen, 49.1 mm SL, Arjyapalli fish landing centre, Ganjam, Odisha, 16.vi.2022; EBRC/ZSI/F14002, 01 specimen, 76.7 mm SL, Balaramgadi fish landing centre, Balasore, Odisha, 02.xii.2021.

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. Mouth oblique. Eye minute, hard to measure. Both lower and upper jaws nearly equal in length. Snout small. 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)[21]. *Trypauchenichthys sumatrensis* was reported earlier only from Sandheads, Hooghly river mouth in India[11-22].

Discussion

As stated earlier, only nine species of apogonids are reported from the Odisha coast till date[1-3], which include only one species of the genus *Apogonichthyoides*, *A. taeniatus* (Cuvier, 1828), and three species in the genus *Ostorhinchus*, *viz*. *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 the Red Sea, Persian Gulf and east coast of Africa to Madagascar in the Western Indian Ocean[12] and is therefore unlikely to occur along the east coast of India. According to Gon[23], the reports of *A. taeniatus* from the east coast of India are possibly *A. pseudotaeniatus*[23]. Later, Gon[7] suggested that the distributional records of *A. pseudotaeniatus* from the east coast of India and the western pacific are probably *A. sialis* as the distribution of *A. pseudotaeniatus* is limited to the Red Sea only. Hence, the species listed in Barman *et al*.[1] and Pati *et al*.[24] as *A. taeniatus* could possibly be *A. sialis*. *Apogonichthyoides sialis* has great similarities with *A. pseudotaeniatus*, and *A. taeniatus*, due to the presence of bars on sides, possibly causing the misidentification of this species in the past. According to the species key of *Apogonichthyoides* by Fraser & Allen[8], *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 in 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 the 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 and the middle part wider vs. ventrally wider like hourglass bar in *O. aureus*) and total gillraker count (20 – 23 vs. 22 – 27)[25]. Gon[26] once treated *O. fleurieu* as synonymous with *A. aureus*. However, Randall *et al*.[6] distinguished both species as valid and clarified their morphotaxonomic differences and distribution. They indicated that the record of *A. aureus* by Day[27]

from Madras is referable to *O. fleurieu.* The record of *A. aureus* from the Odisha coast is attributed to Mishra *et al*.[28], which was majorly identified following Day[27] and Misra[29]. As defined by Randall *et al*.[6] and Gon & Randall[25], the specimens thus identified as *O. aureus* from Indian waters are to be treated as *O. fleurieu*. The materials used by Mishra *et al*.[28] could not be verified as there is no mention of their whereabouts. The present report forms the first material-based evidence of *O. fleurieu* occurring along the Odisha coast.

Although 34 species of the family Oxudercidae were reported from the Odisha coast[1,4-5], the genus *Trypauchenichthys* was never reported from Odisha. This genus comprises only four valid species, but *T. sumatrensis* can easily be separated from the rest of the three species by the presence of a projection on the 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)[11]. The present report of species of this genus forms the second report from India and the first from Odisha.

Conclusion

In this paper, three taxonomically interesting species are reported for the first time from the Odisha coast with comprehensive morphological descriptions to eliminate prior confusion regarding their identification. Further exploration of finfish diversity in Odisha could lead to the discovery of previously unknown species.

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Conflict of Interest

Authors don't have any conflict of interest in this research and authorship.

Ethical Statement

This study follows all ethical research practices.

Author Contributions

SuP & RG: Identification and preparation of the manuscript; RKB, SM & SSR: Specimen collection; ShP, SSM & Anil M: Improvisation of manuscript, critical analysis and confirmation of data.

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