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Short Communication

First distributional record of four cardinal fishes (Gobiiformes: Apogonidae) from Odisha coast, India

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Four cardinalfish species of the family Apogonidae are found to occur for the first time from the Odisha coast, Bay of Bengal. The species *Archamia bleekeri* (Günther, 1859), *Jaydia smithi* Kotthaus, 1970, *Jaydia striata* (Smith & Radcliffe, 1912), and *Lepidamia kalosoma* (Bleeker, 1852) were collected from different fish landing centres of the Odisha coast. This paper documents reported species as new distributional records for the coastal waters of Odisha.

[**Keywords**: *Archamia*, Distribution, First report, *Jaydia*, *Lepidamia*]

Introduction

Apogonidae (Cardinalfishes) are small nocturnal fishes found in coral or rocky reefs of the Pacific, Indian, and Atlantic Oceans, and occasionally in seagrass and estuaries[1]. They belong to the order Gobiiformes and are classified into four subfamilies: Apogoninae (34 genera), Pseudamiinae (3 genera), Amioidinae (2 genera), and Paxtoninae (1 genus), comprising altogether 385 species[2]. The subfamily Apogoninae includes the genera *Archamia*, *Jaydia*, and *Lepidamia*[1]. The genus *Jaydia* has 21 valid species, *Lepidamia* has 4, and *Archamia* is monospecific with *A. bleekeri* as the only valid species[2].

The Odisha coast harbours 605 fish species from 138 families and 27 orders, with seven species from the Apogonidae family[3]. Recently, two more Apogonids, *Taeniamia macroptera*[4] and *Jaydia novaeguineae*[5], were reported from Odisha, bringing the total to nine species. In this study four cardinal fish species were identified along the Odisha coast *viz*. *Archamia bleekeri*, *Jaydia smithi*, *Jaydia striata*, and *Lepidamia kalosoma*. The current reports mark the first record of these species in Odisha, based on the morpho-taxonomic identification of 62 specimens from three locations, and provide a distribution map of these species (Fig. 1).

Materials and Methods

Random collection of fresh samples of cardinalfishes were collected from the Gopalpur fish landing centre (19°15'36.48" N; 84°54'47.02" E) and Arjyapalli fish landing centre (19°18'38.91" N; 84°58'20.68" E) near Gopalpur Port. Later on, few old preserved samples from Paradeep (20°17'25.90" N; 86°42'26.73" E) were also traced out from among the collections of the Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha. Available literature[1,6-8] was followed to identify the specimens. Samples were collected by the authors from the native fishermen caught using the seine net. Measurements were taken in mm units using a digital calliper with 0.1 mm accuracy. Identified species were registered and deposited in the repository of Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha, India.

Abbreviations used

TL – Total Length, SL – Standard Length, BD – Body Depth; HL – Head Length.

Results

Order: Gobiiformes
Family: Apogonidae Günther, 1859
Subfamily: Apogoninae Günther, 1859

Genus: *Archamia* Gill, 1863

1. *Archamia bleekeri* (Gunther, 1859) (Gon's cardinalfish)

Materials examined

EBRC/ZSI/F13621, 13 specimens, 47.5–59.4 mm SL (Table 1), Arjyapalli fish landing centre, Ganjam, Odisha, 28.viii.2021, R. K. Behera; EBRC/ZSI/F13602, 30 specimens, 54.3–61.6 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 02.ii.2022, R. K. Behera.

Diagnosis

D1 VI; D2 I 9; A II 15–17; P 14–15. Body compressed laterally. Head moderate with little concavity above the orbital region. Eyes large, eye diameter more than snout length. Maxilla reaching below middle of eye. Preopercular edge serrated, but

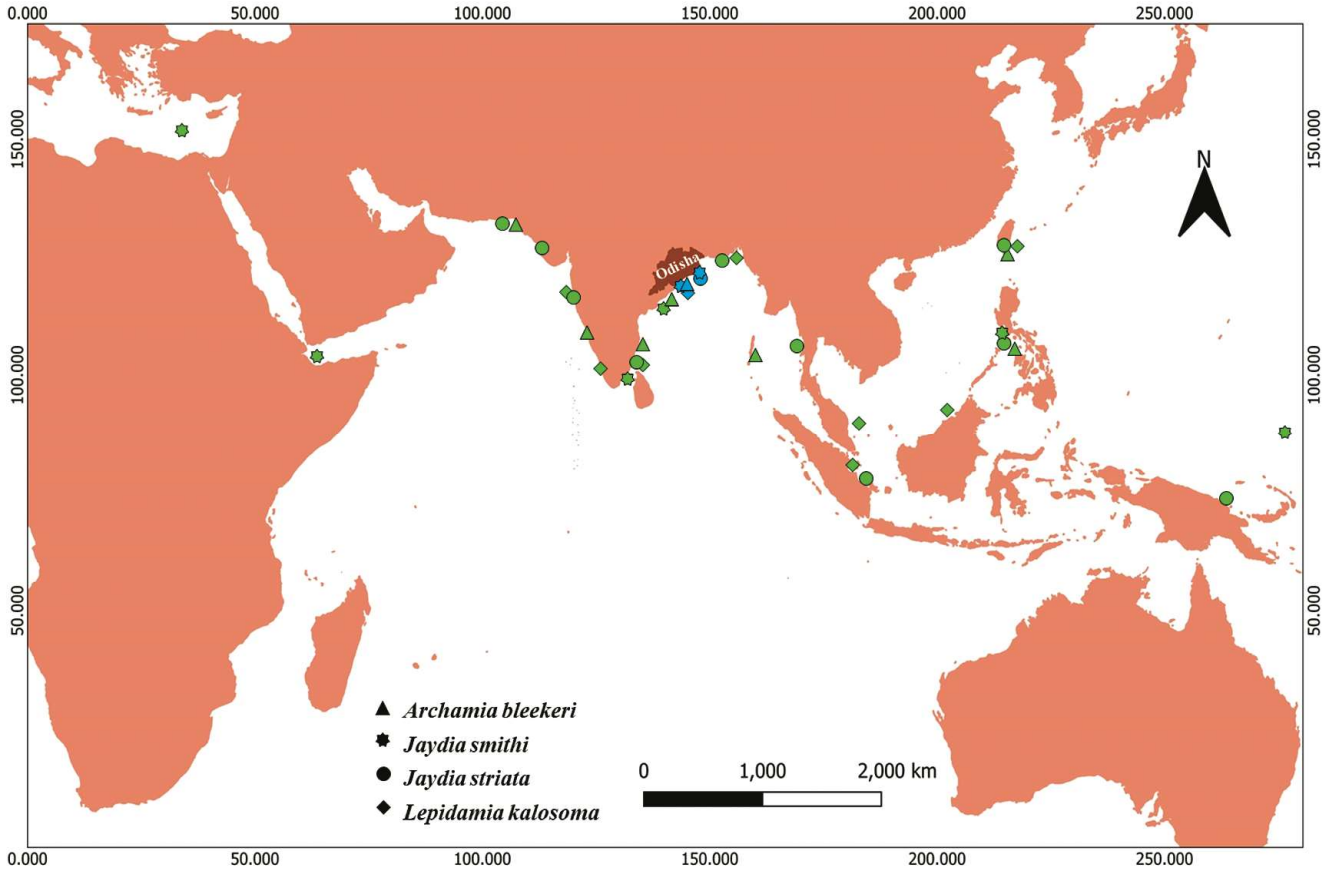

Fig. 1 — Distribution map of four cardinal fishes including current (from Odisha coast) and previous records

the ridge lacks serration. Upper limb of first gill arch with 5 – 6 gill rakers (four developed) and lower limb with 16 – 18 gill rakers, including only 0 – 1 rudimentary raker. Last ray of anal fin divided at its base. Lateral line scales 24 – 27; transverse scales above lateral line 2 – 4, and scales below lateral line 5 – 7; predorsal scales 5 – 6. Fresh specimens with glassy, almost translucent body without any stripes or bands (Fig. 2a). Tip of snout blackish yellow; lip, lower jaw and base of pectoral fin yellowish (Fig. 2b). A condensed black spot at the base of caudal fin (Fig. 2c). A fine orange line at the base of anal fin. On preservation, body became whitish and lost its transparency.

Distribution

This species inhabits reef areas with various substrata[9]. It is found in the Indo-West Pacific region from Pakistan to the Philippines, north to Taiwan[2,10]. This species was reported from Madras, India as *Apogon notata*[11], which is relegated to the synonymy of *A. bleekeri*[3]. *Archamia bleekeri* was also reported from the Andaman Nicobar Island[12], Zuari estuary, Goa[13], Visakhapatnam, Andhra Pradesh[14] and Chennai coast, Tamil Nadu[15] of India.

Genus: *Jaydia* Smith, 1961

2. *Jaydia smithi* Kotthaus, 1970 (Smith's cardinalfish)

Materials examined

EBRC/ZSI/F13595, 3 specimens, 66.1–81.7 mm SL (Table 1), Paradeep fish landing centre, Jagatsinghpur, Odisha, 12.x.2021, S. R. Mohanty & R. K. Behera; EBRC/ZSI/F13613, 7 specimens, 66.2 – 78.7 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 02.ii.2022, R. K. Behera; EBRC/ZSI/F13678, 3 specimens, 71.3 – 75.2 mm SL, Arjyapalli fish landing centre, Ganjam, Odisha, 22.ii.2022, R. K. Behera & S. Roy.

Diagnosis

D1 VII; D2 I 9; A II 8; P 15–17. Head comparatively large with dorsal profile convex. A small hump is present at the tip of the snout. Maxilla reaching beyond middle of orbit. Serrations found on both edges and ridges of preopercle. Upper limb of first gill arch with 3 – 4 gill rakers (1 developed) and

Table 1 — Morphometric data of four cardinal fishes collected from Odisha coast

	Archamia bleekeri	***Jaydia smithi***	***Jaydia striata***	***Lepidamia kalosoma***
TL	60.5 – 76.9 mm	83.2 – 98.53 mm	73.8 mm	120.4 mm
SL	47.5 – 61.6 mm	66.1 – 81.7 mm	58.1 mm	92.4 mm
Range in % SL				
HL	34.84 – 39.89	38.43 – 40.99	40.103	37.21 – 39.42
BD	32.84 – 37.52	29.58 – 32.40	35.283	35.31 – 38.20
Body width	11.24 – 13.79	12.60 – 14.99	14.629	15.12 – 16.64
Eye diameter	9.4 – 10.44	8.81 – 10.12	9.638	10.13 – 11.08
Snout length	5.97 – 7.02	6.22 – 6.89	6.196	7.90 – 9.07
Inter Orbital width	8.82 – 10.44	9.50 – 10.03	8.777	8.68 – 9.30
Lower jaw Length	15.09 – 16,94	14.32 – 17.54	18.588	14.74 – 15.86
Upper jaw Length	13.54 – 14.91	14.07 – 16.34	17.039	16.14 – 16.66
Caudal Peduncle depth	12.28 – 14.21	11.91 – 14.09	14.457	13.97 – 16.12
1st dorsal fin base	9.31 – 10.68	16.16 – 18.14	19.621	15.14 – 16.49
2nd dorsal fin base	14.90 – 17.22	14.24 – 15.40	16.179	14.35 – 16
Inter Dorsal fin space	5.70 – 7.14	5.50 – 7.40	4.13	2.64 – 3.20
Anal fin Base	28.97 – 30.97	12.14 – 14.32	13.597	13.47 – 14.39
Pectoral fin base	5.19 – 6.02	4.94 – 5.87	5.679	6.81 – 7.30
Pre 1st dorsal fin length	35.50 – 38.58	35.61 – 38.83	35.111	41.01 – 42.56
Pre 2nd dorsal fin length	49.15 – 55.61	54.46 – 62.66	57.487	58.63 – 63.09
1st dorsal fin length	11.95 – 15.97	12.85 – 14.84	15.662	14.14 – 17.75
2nd dorsal fin length	19.72 – 24.24	19.94 – 22.39	20.826	20.40 – 22.94
Aanl fin length	16.83 – 18.93	18.84 – 20.21	19.793	18.55 – 20.52
Pectoral fin length	23.70 – 27.93	19.27 – 20.44	24.268	23.70 – 24.68
Range in % HL				
BD	87.66 – 98.64	73.17 – 80.44	87.982	92.34 – 99.71
Body width	28.19 – 38.43	32.80 – 37.22	36.48	39.54 – 44.74
Eye diameter	24.66 – 27.98	22.92 – 24.72	24.034	27.11 – 27.55
Snout length	17.14 – 18.91	15.45 – 16.87	15.45	20.62 – 23.72
Inter Orbital width	23.39 – 27.92	23.50 – 26.11	21.888	22.70 – 24.29
Lower jaw Length	39.91 – 45.51	37.26 – 42.85	46.351	39.62 – 40.30
Upper jaw Length	36.32 – 42.07	36.62 – 39.92	42.489	43.11 – 43.50

lower limb with 11 – 13 gill rakers (9 – 10 developed). Lateral line scales 24 – 27; scales above lateral line 3 – 5, and scales below lateral line 5 – 7. Fresh samples blackish grey in colouration laterally with shiny slivery touch. Four to six faint blackish vertical bars present laterally. On preservation, the shiny colour disappears, and the bars become darker. Head and snout with small dark spots. First dorsal fin with a black margin followed by a white bar below; second dorsal fin with a black bar at the mid portion with white colouration on both sides. Fin rays pigmented (Fig. 3a). Along the preopercular edge, a dark slim line is visible clearly (Fig. 3b). Peritoneum with black spots of different sizes, while the intestine remains pale or with very minute spots (Fig. 3c).

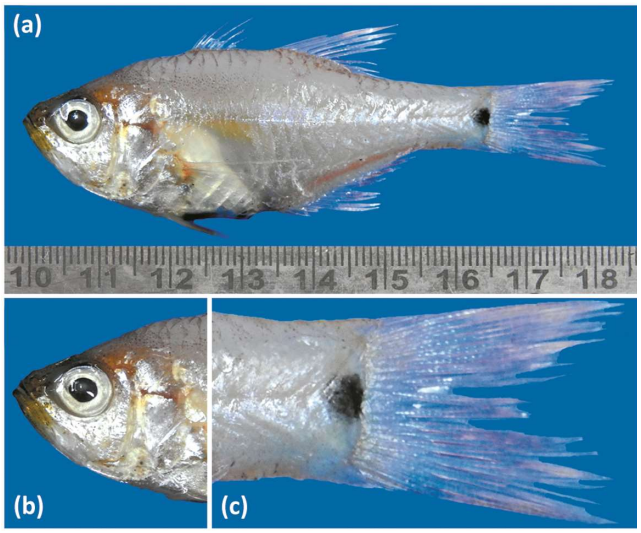

Fig. 2 — a) *Archamia bleekeri* from Gopalpur, Odisha; b) Snout and lower jaw colouration; and c) Black basicaudal spot

Distribution

Jaydia smithi is reported from the Red Sea; in the Indo-West Pacific from the Gulf of Oman, east to the Philippines and the Marshall Islands, and also recorded from the Mediterranean Sea[2]. It was formerly described as *Apogon andhrae*[16] from Andhra Pradesh, India, which was later treated as a junior

synonym of *Jaydia smithi*[7]. The species is also reported from Tamil Nadu, India[17].

3. *Jaydia striata* (Smith & Radcliffe, 1912) (Largefin cardinalfish)

Materials examined

EBRC/ZSI/F13600, 1 specimen, 58.1 mm SL (Table 1), Paradeep fish landing centre, Jagatsinghpur, Odisha, 12.x.2021, S. R. Mohanty & R. K. Behera.

Diagnosis

D1 VII; D2 I 9; A II 8; P 15. Maxilla reaching up to the near end of eye. Weak serrations found both on preopercular ridge and edge. Upper limb of first gill arch bear 4 gill rakers (3 developed), and lower limb is with 12 gill rakers (10 developed). Lateral line scales 25; scales above lateral line 4, and scales below lateral line 6; pre-dorsal scales 5. Body dull and sandy in colour when preserved. Base of fins whitish; faint dark bands on median fins present. Melanophores scattered on head. Ten vertical bars running between preoperculum and the base of caudal fin (Fig. 4).

Distribution

Jaydia striata is distributed in Indo-West Pacific from the Persian Gulf and Pakistan, east to west coast of Myanmar, Indonesia, Taiwan, Philippines and Papua New Guinea[2,18]. From India, it is reported from Gujarat and Maharashtra (Bombay)[7], West Bengal[19], and Chennai coast[15].

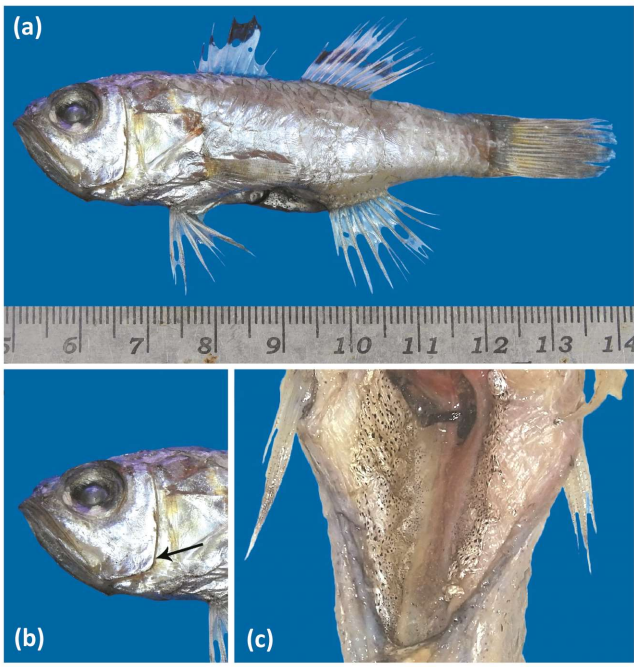

Fig. 3 — a) *Jaydia smithi* from Gopalpur, Odisha; b) Dark preopercular edge; and c) Peritoneum with various shaped dark spots

Remarks

Specimen of *J. striata* (TL: 73.8 mm) reported in current study has numerous black pigments on the distal edge of anal fin. These pigments may occur in larger specimens having a total length greater than 60 mm[(ref. 19)].

Genus: *Lepidamia* Gill, 1863

4. *Lepidamia kalosoma* (Bleeker, 1852) (Pinstripe cardinalfish)

Materials examined

EBRC/ZSI/F13680, 1 specimen, 92.4 mm SL (Table 1), Arjyapalli fish landing centre, Ganjam, Odisha, 22.ii.2022, S. Roy; EBRC/ZSI/F13687, 4 specimens, 79.4 – 102.5 mm SL, Gopalpur fish landing centre, Ganjam, Odisha, 08.iii.2022, R. K. Behera & S. Acharya.

Diagnosis

D1 VIII; D2 I 9; A II 8; P 15. Serration found in the preopercular edge. Upper limb of first gill arch bear 5 gill rakers (2 – 3 developed), and the lower limb with 14 – 15 gill rakers (7 – 8 developed). Lateral line scales 39 – 42; scales above lateral line 5 – 6, and scales below lateral line 8 – 9; pre-dorsal scales 6 – 7. Caudal fin bifurcated with rounded margin. Body of fresh specimens reddish, with brown to black narrow horizontal stripes. Head and body ventrally pinkish. First dorsal fin blackish anteriorly. Pectoral fin, anal fin, pelvic fin and caudal fin faint red with pale edges and very thin dark tip. Diffused dark spot at base of caudal fin (Fig. 5). On preservation, body becomes orangish and fins pale.

Distribution

Lepidamia kalosoma is distributed in the eastern Indian Ocean and the western Pacific region: from Bangladesh, western Indonesia, Malaysia, Brunei to Taiwan[2]. It is also reported for India from Maharashtra (Bombay) and Kerala[6], and from Tamil Nadu[20] earlier.

Fig. 4 — Preserved specimen of *Jaydia striata* collected from Paradeep fish landing centre

Fig. 5 — Preserved specimen of *Lepidamia kalosoma* collected from Arjyapalli fish landing centre

Discussion

Only seven species of cardinal fishes namely, *Ostorhinchus aureus* (Lacepède 1802), *Ostorhinchus endekataenia* (Bleeker 1852), *Ostorhinchus fasciatus* (Shaw 1790) [as *Apogon quadrifasciatus* Cuvier], *Apogonichthyoides taeniatus* (Cuvier 1828), *Jaydia ellioti* (Day 1875), *Jaydia poeciloptera* (Cuvier 1828) and *Fowleria aurita* (Valenciennes 1831) have been listed earlier from the Odisha coast. Later, *Taeniamia macroptera* (Cuvier, 1828) and *Jaydia novaeguineae* (Valenciennes, 1832) were reported by Mukherjee *et al*.[4] and Mohanty *et al*.[5]. The present paper adds four more species to the list.

Archamia bleekeri (Günther, 1859), *Jaydia smithi* Kotthaus, 1970, *Jaydia striata* (Smith & Radcliffe 1912), and *Lepidamia kalosoma* (Bleeker, 1852) are reported here for the first time from Odisha, east coast of India. This increases the number of reported cardinalfishes from nine to thirteen, from the coastal waters of Odisha state. This confirms the distribution of these four species along the northern east coast of India. Formerly, *A. bleekeri*, *J. smithi* and *L. kalosoma* were recorded for the south-east Indian states. Whereas, *J. striata* was previously reported only from West Bengal[18] and now from Odisha state, indicating a possibility that it has a wide distribution throughout the east coast of India.

Conclusion

Constant monitoring could uncover additional Apogonidae species along the west and east coasts of India. Further research is essential to explore the potential commercial value of these newly identified cardinalfishes.

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Conflict of Interest

Author's don't have any conflict of interest on this research and authorship.

Ethical Statement

This study follows all ethical research practices.

Author Contributions

SuP, SR & RG: Identification and preparation of the manuscript; RKB, SRM & SA: Data collection; ShP, SSM & AM: Improvisation of manuscript, critical analysis and confirmation of data.

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