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An updated inventory of cardinalfishes (Kurtiformes: Apogonidae) in Indian waters with emphasis on distribution patterns and conservation status

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Original Article

Abstract

Long-term, standardised biodiversity monitoring is essential for elucidating temporal diversity patterns and evaluating the success of ongoing conservation strategies. As a part of the continuous biodiversity assessment of marine resources, an updated checklist of fish species of the family Apogonidae listed in India is provided. This checklist identifies 88 species in 26 genera in India namely *Apogon* (2 species), *Apogonichthys* (1 species), *Apogonichthyoides* (9 species), *Archamia* (1 species), *Chelidopterus* (7 species), *Fibramia* (2), *Foa* (1); *Fowleria* (3), *Glossamia* (2), *Gymnapogon* (1), *Holapogon* (1), *Jaydia* (7), *Lepidamia* (2), *Neamia* (1), *Nectamia* (3), *Ostorhinchus* (27), *Pristiapogon* (2), *Pristicon* (2), *Pseudamia* (1), *Rhabdamia* (1), *Siphamia* (1), *Sphaeramia* (1), *Taeniamia* (5), *Verulux* (1), *Yarica* (1) and *Zoramia* (2). The majority of species are currently categorised as 'Least Concern' or remain 'Not Evaluated' under the IUCN Red List. The present checklist provides information that is crucial for formulating effective management strategies to ensure the protection and conservation of apogonids, which constitute an important marine resource.

Keywords: *Apogonidae, diversity, checklist, cardinalfish, conservation*

Introduction

The Apogonidae family, which includes cardinalfishes, is a predominant element in nocturnal planktivore assemblages in Indo-Pacific reefs (Allen, 1993) and is ranked third among all reef fish families in terms of species diversity and abundance (Bellwood, 1996). Small in size (usually less than 10 cm), apogonids are predominantly nocturnal predators of fish, plankton, and benthic invertebrates (Chave, 1978; Vivien, 1975); an important trophic route on coral reefs that has not received much attention (Parrish, 1989). These fish spend the day resting in branching coral or caves, frequently congregating in dense, multi-species groups (Greenfield and Johnson, 1990). Cardinal fishes are distributed worldwide; the family is represented by 381 valid species globally, of which 367 species are reported from the Western Indian Ocean (Fricke *et al.,* 2024), with 17 new species records added in the period 2015-2024. Compilations and checklists from India waters have been scattered over the years with the first by Day (1878) with 22 species and by Saravanan *et al.* (2018) with 65 species; other reports being localised checklists (Jones and Kumaran, 1980; Suresh and Thomas, 2006, 2007; Rao, 2009; Rajan *et al.,* 2013; Prabhakaran *et al.,* 2013 and Kumar *et al.,* 2019). The present study and checklist not only ascertain the presence of the species in the region but also help field workers in the proper reporting of the occurrence of these species. By this checklist, we anticipate that the diversity of the apogonids will be improved with the addition of new species and new distributional species.

Material and methods

The present study focused on the preparation of a checklist of apogonids recorded, reported, or published from Indian waters. The species checklist was prepared based on the updates and evaluations following a thorough examination of both published and unpublished literature, as well as collections from various fish landing centres across both coasts of India. Published reports of several cardinal fish species from the Indian waters were taken as a baseline record. Taxonomical categories were placed in

accordance with the online version of Catalog of Fishes (Fricke *et al.,* 2025; http://researcharchive.calacademy.org/research/Ichthyology/); older records of fishes were checked with current nomenclature and the current accepted valid names was accepted as per the online version of Catalog of Fishes (Fricke *et al.,* 2025; http://researcharchive.calacademy.org/ research/Ichthyology/), and additional new distributional records included in the checklist. Field collections were attempted from different landing centres and harbours from trawlers; collections were also done using drag nets and scoop nets at other locations with the help of local fishermen. Specimen identification was carried out using diagnostic characters and taxonomic keys provided in Weber and Beaufort (1929), Gon (1986; 1996), Allen (1975; 1999), Allen and Erdmann (2012) and Psomadakis *et al.* (2015). Morphometric measurements were recorded to the nearest 0.01 mm using digital callipers. Terminology, meristic counts, and morphometric procedures followed Hubbs and Lagler (1958). The compiled species list was validated against Froese and Pauly (2024) and Fricke *et al.* (2025). Conservation status was assigned according to the IUCN Red List of Threatened Species. A distribution map was prepared to illustrate species occurrences (Fig. 1). All proportional measurements were standardised to standard length (SL), and morphometric variables were expressed as ratios to eliminate size-dependent variation. Nomenclature and taxonomic details were adopted from the Eschmeyer Catalogue of Fishes (2025).

To make a comparative statement on the apogonid fishes recorded globally with that from the Western Indian Ocean, the World Register of Marine Species (WORMS, 2025), Fishbase (Froese and Pauly, 2024), Catalog of Fishes online (Fricke *et al.,* 2025), lists of apogonids recorded from neighbouring countries were also compiled to compare species distribution and diversity across the region. (MOE, 2012; Moazzam and Osmany, 2023). The data on the fish records from Indian waters gathered from published literature and from field collections were tabularized and compared with the earlier published data to make comparisons (Table 1). For the analysis of diversity across regions, data were grouped state-wise and coastwise. The western coast of India included the states of Gujarat (GJ), Maharashtra (MH), Goa (GA), Karnataka (KR), Kerala (KER), and the Lakshadweep group of islands (LAK). In contrast, Tamil Nadu (TN), Andhra Pradesh (AP), Odisha (OD), West Bengal (WB), and Andaman and Nicobar Islands (AN) encompass the east coast of India and have collections from the Bay of Bengal.

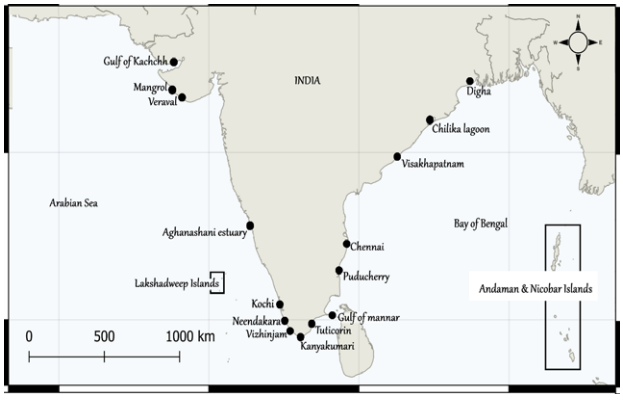

Fig. 1. Map showing locations from which cardinal fishes are reported in India

Results and discussion

Global and regional compilations

Variations exist in the world and regional compilations of apogonids; 25 genera in two families of Apogonidae and Kurtidae were recognised by the Integrated Taxonomic Information System (2025) with 310 species. According to WORMS (2025), the Order Kurtiformes comprises 381 valid species in 63 genera, reported from the world's oceans. Fricke *et al.* (2024) report 71 genera with 40 valid with 525 species in the world oceans; of this, one genus was added to the count during 2016-2024 period, and 381 species are considered valid. Froese and Pauly (2024) however reports 367 species worldwide. Of this, 133 species were from the Western Indian Ocean. Compilations of apogonids from Pakistan, Sri Lanka, and China show the presence of 42 species in 16 genera from Pakistan, 120 species in 33 genera from China, and 17 species in 6 genera from Sri Lanka. Thirty five species in 18 genera were reported from Indian waters by various authors. In the present study, 88 species in 25 genera have been reported. (Table 1).

Table 1. Diversity list of apogonids reported from various compilations

Source	Family Apogonidae			
	Genus	New genus added from 2016-2025	Available species	Valid species
WORMS (2025)	63			361
Fricke *et al.,* 2024	71 (40 valid)	1	525	381
Froese and Pauly, 2024				
World				367
WIO			28	133
India	18			35
Pakistan	16			42
Sri Lanka	6			17
China	33			120
Red Sea	12			54
Present study (2025)	27			87

Systematics

Order: Kurtiformes
Family: *Apogon* Gunther, 1859

The total list of species reported from Indian waters by various workers has been compiled. 87 species belonging to 26 genera are presently documented here from Indian waters. (Table 2). This includes fish collected during surveys along the maritime states during the period 2004 -2020, along with compilations of collections in the museum and literature. Genera reported from Indian waters are *Apogon* (2 species), *Apogonichthys* (1 species), *Apogonichthyoides* (9 species), *Archamia* (1 species), *Chelidopterus* (7 species), *Fibramia* (2), *Foa* (1), *Fowleria* (3), *Glossamia* (2), *Gymnapogon* (1), *Holapogon* (1), *Jaydia* (7), *Lepidamia* (2), *Neamia* (1), *Nectamia* (3), *Ostorhinchus* (27), *Pristiapogon* (2), *Pristicon* (2), *Pseudamia* (1), *Rhabdamia* (1), *Siphamia* (1), *Sphaeramia* (1), *Taeniamia* (5), *Verulux* (1), *Yarica* (1) and *Zoramia* (2). Of these, seven collections were additional to the already existing collection reports from Indian waters and are described herewith.

Genus *Apogonichthyoides* Smith, 1949

Apogonichthyoides nigripinnis (Cuvier, 1828)–Bullseye cardinal

D VII+1, 9; A II, 8; P 15; V I, 5; LL 27; Gr (3-4) + (13-14). Small fish with prominent dark ocellus on mid-body and 3-4 dark vertical bands on body (Fig. 2). Body deep, compressed, its depth 2.4 in SL; eyes big, diameter 3.8 in HL; mouth, oblique, maxillary ends on a vertical below rear edge of eye; pre-operculum serrated; head length 2.6 in SL; pelvic fin long, reaches anal fin origin, caudal fin truncate. The fish is reported from tropical areas and is found on rocky and rubble bottoms of coastal and deep offshore waters and weedy bottoms (Paxton *et al.,* 1989; Myers, 1991). Maximum recorded length is 10 cm TL (Gon, 1986). The fish is reported to be a mouth brooder (Golani *et al.,* 2002); nocturnal, feeding mostly on planktonic larvae and zooplankton. The fish is landed only

Table 2. Consolidated list of Cardinal Fish reported across India with their locations

Species	Conservation Status	Locations	Source
Genus *Apogon*			
Apogon ceramensis Bleeker, 1852	Least Concern	Andaman and Nicobar Islands	Rao (2009); Rajan *et al.* (2013)
Apogon coccineus Ruppell, 1838	Least Concern	Lakshadweep; Andaman and Nicobar Islands)	Jones and Kumaran (1980); Rao (2009); Prabhakaran *et al.* (2013); Rajan *et al.* (2013); Saravanan *et al.* (2018)
Genus *Apogonichthys*			
Apogonichthys ocellatus (Weber, 1913)	Least Concern	Kerala	Bijukumar and Deepthi (2009)
Genus *Apogonichthyoides*			
Apogonichthyoides erdmanni Fraser and Allen, 2011	Not Evaluated	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Apogonichthyoides heptastygma (Cuvier, 1828)	Not Evaluated	India	Murty (1969); Saravanan *et al.* (2018)
Apogonichthyoides melas (Bleeker, 1848)	Least Concern	Andaman and Nicobar Islands	Rajan *et al.* (2013)
Apogonichthyoides nigripinnis (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Neendakara (Kerala)	Present study; Rajan *et al.* (2013); Nair and Kuriakose (2014); Rajan and Sreeraj (2014); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Apogonichthyoides pseudotaeniatus (Gon, 1986)	Not Evaluated	Gulf of Mannar (Tamil Nadu); Mangrol, Veraval, Gulf of Kachchh (Gujarat); Vizhinjam (Kerala)	Suresh and Thomas (2007); Sluka (2013); Nair and Kuriakose (2014); Parmar *et al.* (2015); Joshi *et al.* (2016); Saravanan *et al.* (2018); Kumar *et al.* (2019)
Apogonichthyoides sialis (Jordan and Thompson, 1914)	Not Evaluated	Cochin; Odisha	Manjebrayakath *et al.* (2012); Saravanan *et al.* (2018); Patra *et al.* (2023)
Apogonichthyoides taeniatus (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands; Vizhinjam (Kerala)	Suresh and Thomas (2006); Rao (2009); Rajan *et al.* (2013); Saravanan *et al.* (2018)
Apogonichthyoides umbratilis Fraser and Allen, 2010	Not Evaluated	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Apogonichthys ocellatus (Weber, 1913)	Not Evaluated	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Rao (2009); Rajan *et al.* (2013); Prabhakaran *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Apogonichthys perdix Bleeker, 1854	Not Evaluated	Andaman and Nicobar Islands	Krishnan and Mishra (1992); Rao (2009); Rajan *et al.* (2013); Saravanan *et al.* (2018)
Genus *Archamia*			
Archamia bleekeri (Günther, 1859)	Least Concern	Andaman and Nicobar Islands	Rajan and Mishra (2018)

Species	Conservation Status	Locations	Source
Genus *Cheilodipterus*			
Cheilodipterus arabicus (Gmelin, 1789)	Not Evaluated	Andaman and Nicobar Islands; South-Kerala	Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Cheilodipterus artus Smith, 1961	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Cheilodipterus intermedius Gon, 1993	Least Concern	Andaman and Nicobar Islands	Rajan and Mishra (2018)
Cheilodipterus isostigma (Schultz, 1940)	Not Evaluated	Andaman and Nicobar Islands	Rajan and Mishra (2018)
Cheilodipterus lachneri Klausewitz, 1959	Not Evaluated	Lakshadweep	Jones and Kumaran (1980); Murty *et al.* (1989); Saravanan *et al.* (2018)
Cheilodipterus macrodon (Lacepede, 1802)	Not Evaluated	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Rao (2009); Rajan *et al.* (2013); Ranjith *et al.* (2015); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Cheilodipterus quinquelineatus Cuvier, 1828	Least Concern	Andaman and Nicobar Islands; Lakshadweep	Murty (1969); Murty *et al.* (1989); Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Fibramia*			
Fibramia lateralis (Valenciennes, 1832)	Not Evaluated	Andaman and Nicobar Islands; Digha (West Bengal)	Goswami (1992); Rao (2009); Rajan *et al.* (2013); Yennawar *et al.* (2015); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Fibramia thermalis (Cuvier, 1829)	Not Evaluated	Andaman and Nicobar Islands; Lakshadweep; South-India	Jones and Kumaran (1980); Kumaran *et al.* (1989); Rao (2009); Sluka (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Foa*			
Foa brachygramma (Jenkins, 1903)	Least Concern	Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Genus *Fowleria*			
Fowleria aurita (Valenciennes, 1831)	Least Concern	Andaman and Nicobar Islands; Lakshadweep)	Jones and Kumaran (1980); Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Fowleria marmorata (Alleyne and MacLeay, 1877)	Not Evaluated	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Fowleria variegata (Valenciennes, 1832)	Least Concern	Andaman and Nicobar Islands	Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Glossamia*			
Glossamia sandei (Weber, 1907)	Least Concern	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Glossamia trifasciata (Weber, 1913)	Least Concern	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Genus *Gymnapogon*			
Gymnapogon africanus Smith, 1954	Not Evaluated	Lakshadweep	Jones and Kumaran (1980)
Genus *Holapogon*			
Holapogon maximus (Boulenger, 1888)	Not Evaluated	Mudasalodai landing centre (Tamil Nadu); Neendakara; Kochi (Kerala)	Present study; Nair and Kuriakose (2014); Saravanan *et al.* (2014); Ranjith *et al.* (2016a); Saravanan *et al.* (2018)
Genus *Jaydia*			
Jaydia ellioti (Day, 1875)	Not Evaluated	Andaman and Nicobar Islands; Chennai and Gulf of Mannar (Tamil Nadu)	Present study; Rao (2009); Rajan *et al.* (2013); Nair and Kuriakose (2014); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Jaydia lineata (Temminck and Schlegel, 1843)	Least Concern	Gulf of Mannar (Tamil Nadu); Mangrol (Gujarat)	Joshi *et al.* (2016); Saravanan *et al.* (2018); Kumar *et al.* (2019)
Jaydia poeciloptera (Cuvier, 1828)	Not Evaluated	Andaman and Nicobar Islands); Vizhinjam (Kerala)	Suresh and Thomas (2006); Rao (2009); Rajan *et al.* (2013); Saravanan *et al.* (2018)
Jaydia queketti (Gilchrist, 1903)	Not Evaluated	Digha (West Bengal); Tuticorin (Tamil Nadu); Neendakara (Kerala); Veraval (Gujarat)	Present study; Nair and Kuriakose (2014); Ranjith *et al.* (2016b); Saravanan *et al.* (2018); Kumar *et al.* (2019); Pradhan *et al.* (2022)
Jaydia smithi Kotthaus, 1970	Not Evaluated	Gulf of Mannar (Tamil Nadu); Visakhapatnam (Andhra Pradesh)	Dutt and Radhakrishna Rao (1980); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Jaydia striata (Smith and Radcliffe, 1912)	Not Evaluated	Digha (West Bengal)	Ray *et al.* (2018)
Jaydia truncata (Bleeker, 1855)	Not Evaluated	Gulf of Mannar (Tamil Nadu); Andaman and Nicobar Islands	Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Lepidamia*			
Lepidamia kalosoma (Bleeker, 1852)	Not Evaluated	Gulf of Mannar (Tamil Nadu)	Venkataraman *et al.* (2002); Saravanan *et al.* (2018)

Species	Conservation Status	Locations	Source
Lepidamia multitaeniata (Cuvier, 1828)	Not Evaluated	Andaman and Nicobar Islands; Neeendakara (Kerala); South-Kerala	Rao (2009); Sirajudheen (2012); Baiju *et al.* (2019); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Neamia*			
Neamia octospina Smith and Radcliffe, 1912	Not Evaluated	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Genus *Nectamia*			
Nectamia bandanensis (Bleeker, 1854)	Least Concern	Gulf of Mannar (Tamil Nadu); Minicoy; Lakshadweep	Venkataraman *et al.* (2002); Prabhakaran *et al.* (2013); Saravanan *et al.* (2018)
Nectamia fusca (Quoy and Gaimard, 1825)	Least Concern	Andaman and Nicobar Islands; Lakshadweep	Jones and Kumaran (1980); Rao (2009); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Nectamia savayensis (Gunther, 1872)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Murthy *et al.* (1989); Rao (2009); Rajan *et al.* (2013); Prabhakaran *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Ostorhinchus*			
Ostorhinchus angustatus (Smith and Radcliffe, 1911)	Least Concern	Andaman and Nicobar Islands	Rajan *et al.* (2013); Rajan and Mishra (2018)
Ostorhinchus apogonides (Bleeker, 1856)	Not Evaluated	Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Kumaran *et al.* (1989); Manjebrayakath *et al.* (2012); Prabhakaran *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus aureus (Lacepède, 1802)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Neendakara (Kerala); South-India	Rao (2009); Sirajudheen (2012); Rajan *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus chrysotaenia (Bleeker, 1851)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus compressus (Smith and Radcliffe, 1911)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Rajan *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus cookii (Macleay, 1881)	Least Concern	Andaman and Nicobar Islands; South-Kerala; Vizhinjam (Kerala)	Rao *et al.* (2000); Rao (2009); Rajaram and Nedumaran (2009); Sirajudheen (2012); Baiju *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus cyanosoma (Bleeker, 1853)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Talwar (1990); Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Ostorhinchus dispar (Fraser and Randall, 1976)	Least Concern	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus endekataenia (Bleeker, 1852)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Murty *et al.* (1989); Rao (2009); Prabhakaran *et al.* (2013); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Ostorhinchus fasciatus (White, 1790)	Least Concern	Andaman and Nicobar Islands; Digha (West Bengal); Gulf of Kachchh and Mangrol (Gujarat); Neendakara (Kerala); South Kerala	Sirajudheen (2012); Rajan *et al.* (2013); Nair and Kuriakose (2014); Parmar *et al.* (2015); Baiju *et al.* (2016); Saravanan *et al.* (2018); Baiju *et al.* (2019)
Ostorhinchus fleurieu Lacepede, 1802	Least Concern	Andaman and Nicobar Islands); Chennai; Gulf of Mannar; Kalpakkam and Tuticorin (Tamil Nadu); Visakhapatnam (Andhra Pradesh); Odisha; Petuaghat (West Bengal)	Present study; Rao (2009); Biswas *et al.* (2012); Rajan *et al.* (2013); Krishna *et al.* (2015); Joshi *et al.* (2016); Saravanan *et al.* (2018); Pradhan *et al.* (2022); Patra *et al.* (2023)
Ostorhinchus hoevenii (Bleeker, 1854)	Least Concern	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus holotaenia (Regan, 1905)	Least Concern	India	Saravanan *et al.* (2018)
Ostorhinchus kiensis (Jordan and Snyder, 1901)	Least Concern	Neendakara (Kerala)	Suresh and Thomas (2006)
Ostorhinchus luteus (Randall and Kulbicki, 1998)	Not Evaluated	Lakshadweep	Nair and Kuriakose (2014)
Ostorhinchus moluccensis (Valenciennes, 1832)	Least Concern	Andaman and Nicobar Islands; Lakshadweep; South-Kerala	Jones and Kumaran (1980); Rajan *et al.* (2013); Murty *et al.* (1989); Baiju *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Ostorhinchus nanus (Allen Kuiter and Randall, 1994)	Least Concern	Andaman and Nicobar Islands	Rajan and Mishra (2018)
Ostorhinchus neotes (Allen Kuiter and Randall, 1994)	Least Concern	Andaman and Nicobar Islands	Rajan and Mishra (2018)
Ostorhinchus nigrofasciatus (Lachner, 1953)	Least Concern	Gulf of Mannar (Tamil Nadu)	Joshi *et al.* (2016); Rajan and Mish*r*a (2018); Saravanan *et al.* (2018)
Ostorhinchus novemfasciatus (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep	Kumaran *et al.* (1989); Murty *et al.* (1989); Rao (2009); Prabhakaran *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Ostorhinchus oxina (Fraser, 1999)	Not Evaluated	Sakthikulangara (Kerala); Chennai and Tuticorin (Tamil Nadu)	Fraser (1999); Sirajudheen (2012); Rajeshkannan *et al.* (2017)
Ostorhinchus pleuron (Fraser, 2005)	Not Evaluated	Mandapam (Tamil Nadu)	Fraser (2005)

Species	Conservation Status	Locations	Source
Ostorhinchus properuptus (Whitley, 1964)	Least Concern	Andaman and Nicobar Islands	Rajan *et al.* (2013); Rajan and Mishra (2018)
Ostorhinchus quadrifasciatus (Cuvier, 1828)	Not Evaluated	Andaman and Nicobar Islands; Gulf of Mannar and Pondicherry (Tamil Nadu); Lakshadweep; Neendakara (Kerala)	Gon and Randall (2003); Rao (2009); Sirajudheen (2012); Prabhakaran *et al.* (2013); Joshi *et al.* (2016)
Ostorhinchus quinquestriatus (Regan, 1908)	Not Evaluated	Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1959); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Ostorhinchus septemstriatus (Günther, 1880)	Not Evaluated	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu)	Murty (1969); Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018); Bijukumar *et al.* (2019)
Ostorhinchus wassinki (Bleeker, 1860)	Not Evaluated	Andaman and Nicobar Islands	Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018)
Genus *Pristiapogon*			
Pristiapogon fraenatus (Valenciennes, 1832)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep; Tuticorin (Tamil Nadu)	Present study; Jones and Kumaran (1959); Murty *et al.* (1989); Vijay Anand *et al.* (2005); Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Pristiapogon kallopterus (Bleeker, 1856)	Least Concern	Andaman and Nicobar Islands; Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1959); Murty *et al.* (1989); Rao (2009); Prabhakaran *et al.* (2013); Rajan *et al.* (2013); Joshi *et al.* (2016); Saravanan *et al.* (2018)
Genus *Pristicon*			
Pristicon rhodopterus (Bleeker, 1852)	Least Concern	Tuticorin (Tamil Nadu)	Kumar *et al.* (2011)
Pristicon trimaculatus (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands; Vizhinjam (Kerala)	Suresh and Thomas (2007); Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Pseudamia*			
Pseudamia gelatinosa Smith, 1956	Least Concern	Lakshadweep	Jones and Kumaran (1980)
Genus *Rhabdamia*			
Rhabdamia gracilis (Bleeker, 1856)	Not Evaluated	Andaman and Nicobar Islands; Lakshadweep; South-India	Jones and Kumaran (1980); Kumaran *et al.* (1989); Rao (2009); Rajan *et al.* (2013); Sluka (2013); Rajan and Mishra (2018)
Genus *Siphamia*			
Siphamia tubifer Weber, 1909	Least Concern	Andaman and Nicobar Islands	Rajan *et al.* (2013); Rajan and Mishra (2018)
Genus *Sphaeramia*			
Sphaeramia orbicularis (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands	Present study; Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Genus *Taeniamia*			
Taeniamia buruensis (Bleeker, 1856)	Least Concern	Lakshadweep	Jones and Kumaran (1959)
Taeniamia fucata (Cantor, 1849)	Least Concern	Andaman and Nicobar Islands; Kalpakkam (Tamil Nadu); Lakshadweep; South-Kerala; Vizhinjam (Kerala)	Jones and Kumaran (1959, 1980); Kumaran *et al.* (1989); Rao (2009); Biswas *et al.* (2012); Rajan and Mishra (2018); Sirajudheen (2012); Rajan *et al.* (2013); Baiju *et al.* (2016); Saravanan *et al.* (2018)
Taeniamia lineolata (Cuvier, 1828)	Not Evaluated	Andaman and Nicobar Islands, Lakshadweep	Jones and Kumaran (1959); Rao (2009); Saravanan *et al.* (2018)
Taeniamia macroptera (Cuvier, 1828)	Least Concern	Andaman and Nicobar Islands); Chennai and Gulf of Mannar (Tamil Nadu); Odisha	Basheeruddin and Nayar (1961); Rao (2009); Rajan *et al.* (2013); Joshi *et al.* (2016); Mukherjee *et al.* (2018); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Taeniamia zosterophora (Bleeker, 1856)	Least Concern	Vizhinjam (Kerala)	Suresh and Thomas (2007)
Genus *Verulux*			
Verulux cypselurus (Weber, 1909)	Least Concern	Lakshadweep	Jones and Kumaran (1980); Kumaran *et al.* (1989); Rajan and Mishra (2018)
Genus *Yarica*			
Yarica hyalosoma (Bleeker, 1852)	Least Concern	Andaman and Nicobar Islands; Kerala (South-India)	Talwar (1990); Rajaram and Nedumaran (2009); Rao (2009); Rajan *et al.* (2013); Sluka (2013); Shyla and Jameela Beevi (2014); Saravanan *et al.* (2018); Sreeraj *et al.* (2023); Rajan and Mishra (2018)
Genus *Zoramia*			
Zoramia fragilis (Smith, 1961)	Least Concern	Andaman and Nicobar Islands	Talwar (1990); Rao (2009); Rajan *et al.* (2013); Rajan and Mishra (2018); Saravanan *et al.* (2018)
Zoramia leptacantha (Bleeker, 1856)	Least Concern	Andaman and Nicobar Islands (Gulf of Mannar (Tamil Nadu); Lakshadweep	Jones and Kumaran (1980); Kumaran *et al.* (1989); Murty *et al.* (1989); Prabhakaran *et al.* (2013); Rajan *et al.* (2013); Joshi *et al.* (2016); Rajan and Mishra (2018); Saravanan *et al.* (2018)

as stray numbers and categorised as Least Concern (Allen and Myers, 2022). Body brownish to grey with 3-4 dark vertical bands; 2 below both the dorsal fin origin and one at the caudal base; a prominent dark ocellus with white margin above the pectoral fin. Fins darker. The fish bears a close resemblance to *A. pharaonis.*

The species has been reported earlier from the Red Sea, East Africa (Gon, 1986), Thailand, Vietnam, Hong Kong, Indonesia (Gloerfelt-Tarp and Kailola, 1984), Australia, Taiwan, and the Mediterranean Sea (Por, 1978). Chennai (Day, 1888), Gulf of Mannar (Ramesh *et al.*, 2008), Visakhapatnam (Andhra Pradesh) (Sujatha, 1995), and Trivandrum coast (Kerala) (Kurian, 1953) in India. The present specimens were collected from Neendakara (Kerala) and the Gulf of Mannar (Tamil Nadu) (Fig. 2).

Fig. 2. *Apogonichthyoides nigripinnis* (Cuvier, 1828)

Genus Holapogon Fraser, 1973

Holapogon maximus (Boulenger, 1888) – Titan cardinal fish

Description: D VII + I, 9; A II, 8; P 14; V I, 5; LL 28. The species is readily identified by its size, large eyes, and two dorsal fins. Body deep, slightly compressed, depth 2.6 times in SL; head length 2-3 times in SL; dorsal profile slightly concave above eye, snout short, its length 6 in HL; eyes big, its diameter 3.1 in HL; mouth terminal to slightly superior, maxilla ending on a vertical below the middle of eye. Pre-operculum serrated. Dorsal soft rays longer than its spines; pelvic fin long, reaching anus; caudal peduncle depth 2.3 in HL; caudal fin emarginate. The fish is reported from sandy bottoms of continental shelf areas and coastal waters of depth 50-150 m. This species appears in small numbers and has not been evaluated by the IUCN for its conservation status. The maximum recorded length of the species is 25 cm TL (Randall, 1995). Body pinkish grey to brown with the centre of the scales black forming rows of body stripes; a black vertical streak from nape to dorsal opercular region; fins yellow green and sometimes hyaline. The fish had been reported earlier from the Gulf of Oman (Randall, 1995) and the West coast of India (Koya *et al.,* 2011). The present specimens were collected from Neendakara, Kochi (Kerala), on the southwest coast of India (Fig. 3).

Fig. 3. *Holapogon maximus* (Boulenger, 1888)

Genus Jaydia Smith, 1961

Jaydia ellioti (Day, 1875)–Flag in cardinal fish

Elongated cardinal fish with a large head; colour silvery white with a prominent black band on soft dorsal and anal rays. Outer tip of dorsal spines and caudal blackish. Body slightly elongated, tapering posteriorly, depth 3 in SL; head large, length greater than body depth, 2.3 in SL; snout blunt; eye diameter 4.3 in HL; mouth large, oblique, terminal. Pre-operculum is slightly serrated at the lower edge. Soft dorsal and anal rays are slightly long. Caudal peduncle long, length 2.7 in HL; caudal fin rounded. These fish are nocturnal feeders, with luminous organs on the thorax and abdomen, which help them in aphotic conditions (Paxton *et al.,* 1989). They are generally found in deep waters, reef-associated sandy and soft bottoms, and continental shelf areas (Paxton *et al.,* 1989). Maximum reported size is 16 cm TL (Willing and Pender, 1989). The species is landed very rarely and is not evaluated for its conservation status. (IUCN, 2024 online). Head and body silvery white, fins tan or pale. Outer tip of dorsal spines and caudal with blackish; soft dorsal and anal rays with a black band at the centre. Reported from East Africa, Maldives, Thailand (Monkolprasit *et al.,* 1997), Vietnam, Hong Kong, Indonesia, Papua New Guinea, Philippines, Australia (Myers, 1991), New Caledonia, Marshall Islands (Strasburg, 1953), Taiwan and Japan (Masuda *et al.*, 1984), Gulf of Mannar (Venkataraman *et al.,* 2002), Visakhapatnam (Andhra Pradesh) (Sujatha, 1995), Kerala (Bijukumar and Deepthi, 2009) and Andaman Islands (Rao, 2009) in India

(Murty, 1969). Present specimens were collected from Chennai, Tamil Nadu, on the southeast coast of India (Fig. 4).

Fig. 4. *Jaydia ellioti* (Day, 1875)

Table 3. State-wise distribution of apogonid genera in India

Genus	AND	KER	TN	LAK	GUJ	WB	AP
Apogon	×		×	×			
Apogonichthys		×					
Apogonichthyoides	×	×	×		×		
Archamia	×						
Cheilodipterus	×	×	×				
Fibramia	×					×	
Foa	×		×				
Fowleria	×		×	×			
Glossamia			×				
Gymnapogon				×			
Holapogon		×	×				
Jaydia	×	×	×		×	×	
Lepidamia	×		×				
Neamia	×		×				
Nectamia	×		×	×			
Ostorhinchus	×	×	×	×	×		×
Pristiapogon	×		×				
Pristicon	×	×					
Pseudamia				×			
Rhabdamia	×	×		×			
Siphamia	×						
Sphaeramia	×						
Taeniamia	×	×	×	×			
Verulux				×			
Yarica	×	×					
Zoramia	×		×				

*AND – Andamans; KER – Kerala; TN – Tamil Nadu; LAK- Lakshadweep; GUJ – Gujarat; WB – West Bengal; AP – Andhra Pradesh.

Table 4. Conservation status of Apogonids as per the IUCN Red List

Genus	Least Concern	Not Evaluated
Apogon	2	
Apogonichthys	1	
Apogonichthyoides	4	7
Cheilodipterus	4	3
Fibramia		2
Foa	1	
Fowleria	2	1
Glossamia	2	
Gymnapogon		1
Holapogon		1
Jaydia	1	6
Lepidamia		2
Neamia		1
Nectamia	3	
Ostorhinchus	19	8
Pristiapogon	2	
Pristicon	2	
Pseudamia	1	
Rhabdamia		1
Siphamia	1	
Sphaeramia	1	
Taeniamia	4	1
Verulux	1	
Yarica	1	
Zoramia	2	

Jaydia queketti (Gilchrist, 1903)–*Spotfin cardinal*

D VII +I, 8; A II +8; P 15; V I, 5; LL 27; Gr 5+10. The small-sized fish is readily identified by the prominent black spot on the first dorsal fin and black edged median fin rays. Body slightly elongated, depth 2.9 in SL; head large, length 2.5 in SL; snout small; eyes large and placed high on dorsal profile with diameter 4.6 times in HL; mouth large, terminal to slightly superior, maxilla overlapping on a vertical at the rear edge of eye. Two separate dorsal fins, the spinous shorter. Caudal peduncle long, rounded. Body pinkish grey above, silvery below with edges of the scales darker; a prominent black spot on the rear edge of the first dorsal fin, edges of the second dorsal fin, anal fin, and caudal fin black; head darker. The fish resembles *Apogon pharaonis and A. imbertis* in external appearance. The fish is generally found on reef-

associated sandy bottoms and coastal waters. The fish is landed only in small numbers and has not been evaluated by IUCN for its conservation status. The maximum recorded length of this species is 8 cm TL (Gon, 1986). The fish has been recorded previously from the Red Sea, Mediterranean Sea (Eryilmaz and Dalyan, 2006), Syrian waters (Ibrahim *et al.,* 2019), Oman and South Africa (Gon, 1986); Tuticorin (Tamil Nadu) (Ranjith *et al.,* 2016); Veraval (Gujarat) (Kumar *et al.,* 2019). The present collection was from Neendakara on the West coast of India (Fig. 5).

Fig. 5. *Jaydia queketti* (Gilchrist, 1903)

Genus Ostorhinchus Lacepède 1802

Ostorhinchus fasciatus (White, 1790) – Broad banded cardinalfish

Description: Meristic counts: D VII + I, 9; A II, 8; P 14; V I, 5; LL 28; Gr 5 + 14. Small cardinal fish with a broad black mid-lateral stripe, extending to the tip of the caudal fin; two narrow stripes above. Body slightly elongated, moderately compressed, depth 2.7 in SL; head length 2.8 in SL; eyes prominent, diameter 2.9 in HL, greater than snout length; snout short, length 1.7 in eye diameter; mouth moderately large; teeth in jaws small, villiform; two separate dorsal fins; first with seven spines and second with 1 spine and 9 rays; pre-operculum slightly serrated; scales ctenoid; caudal fin slightly forked. Body brownish silvery with two dark horizontal stripes; the upper stripe, narrower, runs from above the post-temporal bone backward to below the posterior end of the second dorsal fin, where it becomes less visible, and continues to the upper origin of the caudal fin; the lower stripe runs from the snout along mid-body to the end of the caudal fin. A black dark spot on the anus; pelvic and anal fins pinkish; pectoral, dorsal, and caudal fins white to transparent; when preserved, body loses its colour except the stripes. In fully erected second dorsal and anal fins, a reddish stripe with tiny black spots is visible above the bright stripe. Above this, the fin is pinkish-orange with tiny black spots. Pelvic fins are bright, with reddish colour on the membrane between the third and fifth rays (Fig. 6).

Fig. 6. *Ostorhinchus fasciatus* (White 1790)

The fish is reef-associated and often seen on soft and sandy bottoms and coral reefs at depths of 2-128 m (Lieske and Myers, 1994). Juveniles are seen to occur near sea anemones (Lieske and Myers, 1994; Myers, 1999). Since the fish is landed rarely and in discards, it does not command much value and is assessed as Least Concern (Allen *et al.,* 2022). It is reported to feed on small benthic invertebrates like crabs, shrimps, zooplankton (Randall, 2005; Goren *et al.,* 2009), and planktonic larvae (Yamashita *et al.,* 1987). The maximum recorded length is 13 cm TL (Paxton *et al.,* 1989).

Ostorhinchus fleurieu Lacepede, 1802 - Flower cardinalfish

D VII+I, 9; A II, 8; P 13; V I, 5; LI 28-29; Gr 20-30. A small cardinal fish with prominent eyes and a short snout. Body coppery red in colour. Body moderately deep, depth 2.2 in SL; dorsal profile slightly concave in front of eye; head length 2.8 in SL; snout short; eyes relatively big, diameter 2.7 in HL; mouth oblique, terminal, maxillary ends on a vertical below the middle of the eye. Two separate dorsal fins, the first spinous, the second with 1 spine and 9 rays. Caudal peduncle broad. Caudal fin emarginate. The fish is reported from shallow coastal waters and reef habitats; it occurs mostly in small schools (Kuiter and Tonozuka, 2001). The fish is landed in small numbers and has been assessed as Least Concern (Fricke and Gon, 2010) by IUCN. The maximum recorded length of the fish is 12.5 cm SL (Allen, 1998). Head, fins, and body pinkish to reddish pink with a broad caudal peduncle band. A thin blue stripe runs from the tip of the mouth to the operculum, across the eye. A broad, blackish diffused band extends from the snout to the orbit and behind the eye.

The fish is reported from Oman, Yemen, East Africa, South Africa, Seychelles, Maldives, Sri Lanka, Andaman and Nicobar Islands, Myanmar, Vietnam, Hong Kong, Indonesia (Allen, 1998), Papua New Guinea, Philippines, Australia, Taiwan, Japan, Ryukyu Islands (Randall *et al.,* 1990). Andaman Islands (Rao, 2009) and the East coast of India (Day, 1875). The present specimens studied were collected from Chennai, the Gulf of Mannar (Tamil Nadu) (Fig. 7).

Fig. 7. *Ostorhinchus fleurieu* (Lacepede, 1802)

Genus Pristiapogon Klunzinger, 1870

Pristiapogon fraenatus (Valenciennes, 1832)– Bridled cardinalfish

D VII+I, 8; A II, 7; P 13; V I, 5; Ll 26; Gr 5+13. Body small, oblong, slightly deep, compressed posteriorly, depth 3.2 in SL; head length 2.5 in SL; eyes big, diameter 3.1 in HL; snout short; mouth small, slightly inferior; pre-operculum serrated; 2 well separated dorsal fins; pectoral and pelvic fins moderately long; caudal peduncle length 1.9 in HL. The caudal fin is truncated to slightly emarginate. Body pale or brown with a prominent black median band from the tip of the mouth to the caudal peduncle, across the eye; a black caudal spot at the tip of the band at the caudal peduncle; more than half of the spot above the lateral line. Head light greyish; 1st and 2nd dorsal spines with black spots; both top and lowermost ray of the caudal fin black; soft dorsal rays and anal with black bands before the base. This marine fish is generally found on coral and rocky reefs, coastal waters, lagoons, and reef flats of depth 25 m (Myers, 1991). Maximum recorded length is 10 cm TL (Gon, 1986). The fish is classified as Least Concern (Allen *et al.,* 2022 b).

The fish was earlier reported from the Red Sea, Oman (Randall, 1995), Yemen, East Africa, South Africa (Gon, 1986), Madagascar, Mauritius, Reunion, Seychelles, Maldives, Sri Lanka, Bangladesh, Myanmar, Thailand, Vietnam, Hong Kong, Indonesia (Allen and Adrim, 2003), Papua New Guinea, Philippines, Australia, New Caledonia, Vanuatu, Solomon, Hawaiian, Line, Marshall and Tuamoto Islands, Taiwan, Japan (Masuda *et al.,* 1984), and Ryukyu Islands (Fraser and Lachner, 1985), Cuddalore coast (Lakshmi and Sundaramanickam, 2011), Lakshadweep Islands (VijayAnand and Pillai, 2007; Jones and Kumaran, 1980) and Andaman Islands (Rao, 2009) in India. The present reports are from Tuticorin, Tamil Nadu, on the southeast coast of India (Fig. 8).

Genus Sphaeramia Fowler & Bean, 1930

Sphaeramia orbicularis (Cuvier, 1828) Orbiculate cardinalfish/ Polka-dot cardinalfish

D VI+I, 9; A II, 8; P 10; V I, 5; LL 26 to 27; Gr 6+20. Deep bodied cardinalfish with a pointed snout and short first dorsal spine. Body deep, slightly triangular, compressed; body depth 1.8 in SL; head length 2.7 in SL; dorsal profile of the head steeply sloped; eyes moderately big, diameter 2.8 in HL; mouth superior, large, oblique; pre-operculum rounded, serrated. Two separate dorsal fins, pelvic fin slightly elongated, fin connected with body by a membrane, length 2.5 in SL. Secondary rays on the uppermost and lowermost edge of the caudal fin; caudal peduncle prominent, deep, caudal fin emarginate. Body covered with ctenoid scales. Vertical bar on the body is nearly half the eye diameter. Greenish grey above, grey to white below; a dark vertical bar from the origin of the first dorsal spine to just in front of the anus; head with some scattered dots; pelvic fins dark. The fish is used in the aquarium trade; captured with hand nets or surround nets. (Gon, 1986) and is assessed as Least concern (Allen *et al.,* 2022c).

Reported from Mozambique (Gon, 1986), Andaman and Nicobar Islands (Rao, 2009), Vietnam, Hong Kong, Indonesia, Papua New Guinea (Allen, 1993), Philippines, Australia (Allen, 1975),

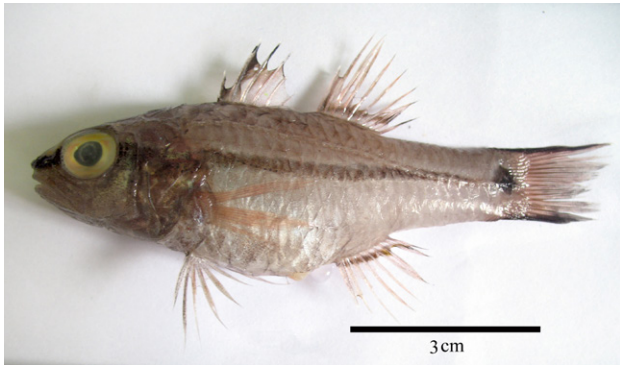

Fig. 8. *Pristiapogon fraenatus* (Valenciennes, 1832)

Fig. 9. *Sphaeramia orbicularis* (Cuvier, 1828)

New Caledonia, Vanuatu, Fiji, Taiwan, Japan (Masuda *et al.,* 1984), Ryukyu and Tongo Islands (Randall *et al.,* 2003). Present specimens were collected from the Andaman Islands (Fig. 9).

Discussion

The WORMS (2025) classifies the cardinal fishes in the family Apogonidae in the order Kurtiformes and reports the presence of 63 genera, while Fricke *et al.* (2025) has recorded the fishes in the order Gobiiformes with suborder Apogonoide and the presence of two families under this, *viz.* Kurtidae Bleeker 1859 and Apogonidae Günther 1859; 71 genera have been recorded in the Family Apogonidae, with 40 treated valid genera with 381 valid species. Froese and Pauly (2024), however, give a lesser count of 367 species, with 36 per cent from the Western Indian Ocean alone and 35 species in 18 genera from Indian waters. The differences in the classification of the group by different taxonomic researchers have confused researchers. Compilations of this group from different global locations point to a higher diversity in the Chinese waters and the Red Sea, with lesser diversity reported from Pakistani waters and Sri Lankan waters. The present compilation from Indian waters fills the gap in diversity with 87 species in 27 genera, which accounts for 22% of the valid species reported worldwide and an increase, over 57% compared to the earlier records from Indian waters. (Fig. 10 and Table 1). Taking a coastwise breakup, the east coast has higher diversity, with the Andaman Islands and Tamil Nadu coast together accounting for 67% of the occurrences. (Table 3). The biodiversity-rich waters of the Gulf of Mannar and Palk Bay abound in coral reefs, which are the major habitat of this group of fish. In addition, the coral islands of Andaman and Nicobar also support a rich diversity of apogonids. On the west coast, the Lakshadweep islands had the highest diversity, followed by the south-west tip of Kerala in the rocky and coralline areas around Vizhinjam. This study validates the presence of this group in the different marine ecosystems of the Indian coast.

Taking a genus-wise breakup, maximum diversity has been reported in the genus *Ostorhinchus* (25 species), which is cryptobentic in behaviour, followed by *Apogonichthyoides* (8 species) and *Jaydia* (7 species). Of the twenty-seven genera reported from Indian waters, all except five are present in the Andaman Islands; 15 genera were recorded from the Gulf of Mannar and Palk Bay region (Tamil Nadu), which is over 62% of the recorded genera. On the west coast, Kerala and Lakshadweep recorded nine genera each, which was 38% of the total records. Genus *Ostorhinchus* was recorded all along the coastline except West Bengal, which may be due to the lack of concerted efforts in West Bengal. Looking at the species-wise diversity, *Ostorhinchus fasciatus*, *O. fleurieu,* and *O. quadrifasciatus* have been reported from all over the coastline. In a global context, the species *O. fasciatus* has a wide distribution throughout the Red Sea, Mozambique, Fiji, New Caledonia, the Persian Gulf, and east to the Western Pacific (Fraser, 2005), while *O. fleurieu* occurs in the Indo-West Pacific region (Randall *et al.,* 1990; Gon and Randall, 2003). This taxonomic richness can be attributed to a combination of ecological adaptability, evolutionary radiation, and habitat heterogeneity along the Indian coastline. The genus *Ostorhinchus* is one primed for diversification. Modern molecular systematics shows that the traditional "*Apogon*" complex contains multiple, well-differentiated lineages (Mabuchi *et al.,* 2014); *Ostorhinchus* comprises several species rich clades within the Indo-West Pacific; thus, many Indian "*Apogon*" *sensu lato* have resolved into *Ostorhinchus,* inflating species counts in this one genus locally.

Of the 88 species reported currently from Indian waters, only 52 have been assessed in the global IUCN Red List as 'Least Concern', and 34 species are in the 'Not Evaluated' category. Given the fact that many of the apogonids face intense anthropogenic pressures, including overfishing, habitat degradation, climate change, invasive species, and pollution. Conservation banding identifies which species are most at

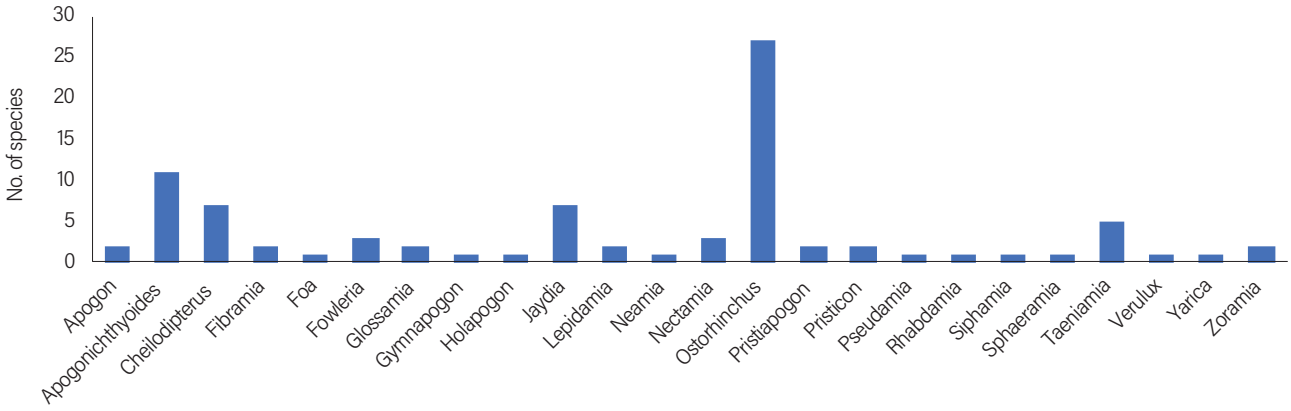

Fig. 10. Species diversity of the family Apogonidae in India

risk and prioritises them for action. IUCN assessments provide an internationally recognised baseline for governments, NGOs, and local agencies to design management plans, marine protected areas, and sustainable fisheries policies. Banding allows scientists to detect population declines early, before species reach critical endangerment. This proactive approach is more effective and cost-efficient than crisis-driven conservation. A consolidated list from Indian waters with its conservation status is very important because of its ornamental and conservation aspects. In the checklists prepared by Rajan and Mishra (2018) and Saravanan *et al.* (2018) distribution pattern and conservation status of fishes are lacking. For any conservation to take place, an authoritative report of species is the need of the hour. Cardinal fishes are also popular in the aquarium trade since they can tolerate shipping stress, handling, and suboptimal water conditions. The most popular species in trade are reported to be *O. fleurieu* and *O. taeniophorus*; however, there are no official reports on the occurrence of *O. taeniophorus* in Indian waters. This could be due to misidentifications in trade with closely allied species or a lack of concerted effort in identification.

Fishes of the family Apogonidae play a part in the transit of energy from lower to higher trophic levels, and they are part of the "cryptobenthic reef fishes (CRFs)", a guild of small, short-lived species that occur in high abundance on coral reefs. They are highly productive and act as an important trophic link between lower trophic levels (zooplankton, benthic invertebrates) and higher predators (larger reef fishes, cephalopods, seabirds). Their high turnover and constant biomass supply make them critical in sustaining reef predator populations (Depczynski and Bellwood, 2003; Brandl *et al.*, 2018). Cardinalfishes are mouthbrooders, with males carrying eggs until hatching; this reproductive mode enhances larval survival but limits dispersal, contributing to localised population structures and, over evolutionary timescales, to high species diversity (Allen and Erdmann, 2012), and hence their importance lies in their number and the speed of their turnover. Cardinalfish feed almost exclusively on invertebrates (Randall, 1967) and are themselves eaten in the coral reef by large piscivorous fish such as Serranidae, Aulostomidae and Scorpaenidae (Vivien, 1975). Hence, more studies on this group warrant importance to add to the biodiversity of the Indian waters, as well as in the trophodynamics of the marine group.

Conclusion

Checklists of fish biodiversity are critical tools for understanding, conserving, and managing India's rich aquatic ecosystems. By providing comprehensive inventories of fish species, they facilitate the documentation of biodiversity and serve as benchmarks for assessing the health of aquatic habitats. In a country like India, with vast and diverse water bodies spanning rivers, estuaries, and marine ecosystems, such checklists are invaluable in identifying species richness, endemicity, and areas of ecological importance. Groupwise and area-wise checklists are essential to maintain the database of the resource in view of the rapid climate change and natural calamities, which cause varied changes in the waterbodies and their flora and fauna. The decline of local or regional biodiversity often leads to a decrease in the availability of goods and services, many of which hold significant economic value. This includes diminished resilience to environmental changes, declining ecosystem health, reduced fisheries productivity, and lost recreational opportunities. By assessing these potential losses, managers can be better equipped to allocate resources effectively towards achieving vital and achievable goals related to biodiversity and ecosystem services.

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Author contributions

Conceptualisation: RJN, DKS; Methodology: RJN, DKS; Data collection: RJN, DKS; Data analysis: RJN, DKS; Writing original draft: RJN; Writing, review and editing: RJN, VKM; Supervision: RJN

Data availability

The data are available and can be requested from the corresponding author.

Conflict of interest

The authors declare that they have no conflict of financial or non-financial interests that could have influenced the outcome or interpretation of the results.

Ethical statement

No ethical approval is required as the study does not include activities that require ethical approval or involve protected organisms/ human subjects/ collection of sensitive samples/ protected environments. No animals were harmed during research. Collections were made from fish collections brought to shore by the different fishing vessels.

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