



DIVERSITY AND DISTRIBUTION OF CARDINAL FISHES IN INDIAN COASTAL WATERS WITH AN OCCURRENCE REPORT OF SPOT FIN CARDINAL FISH *APOGON QUEKETTI* FROM CENTRAL SOUTH WEST COAST OF INDIA

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ABSTRACT

The family Apogonidae is a specious family with 346 species, in which most of them marine and some thrive in brackish water. These are commonly referred to as cardinal fishes, which seldom reaches a maximum size of 20 cm. Sixty four species of this family, have been reported from Indian waters. *Apogon queketti* is a valid species and two taxa have been synonymised with this viz., *Apogonichthys queketti* (Gilchrist, 1903) and *Jaydia queketti* (Gilchrist, 1903). The genus *Apogon* which contains 108 valid species (Fraser & Allen, 2010) are mostly marine, living on sandy and muddy bottom of the continental shelf. Nearly 15 species of Apogonidae have been reported from the Minicoy Atoll ecosystem and 41 species from the Gulf of Mannar ecosystem. The spot fin cardinal fish *Apogon queketti* has a widespread distribution throughout the Red Sea, Mozambique, South Africa and Persian Gulf. This paper brings forth the first documented report of this species along central west coast of India.

Key words:

Cardinal Fish, West coast of India, Kongan Coast, Karnataka

INTRODUCTION

The family Apogonidae is a specious family with 346 species, in which most of them marine and some thrive in brackish water. These are commonly referred to as cardinal fishes, which seldom reaches a maximum size of 20cm (Allen, 1993). Sixty five species of this family have been reported from Indian waters. *Apogon queketti* (Plate-I) is a valid species and two taxa have been synonymised with this viz., *Apogonichthys queketti* (Gilchrist, 1903) and *Jaydia queketti* (Gilchrist, 1903). The genus *Apogon* which contains 108 valid species (Fraser & Allen, 2010) are mostly marine, living on sandy and muddy bottom of the continental shelf. Nearly 15 species of Apogonidae have been reported from the Minicoy Atoll ecosystem (Prabakaran *et al.*, 2013). However *Apogon queketti* has not so far been reported there.

MATERIALS AND METHODS

The Apogonidae diversity was assessed from various publication available on this group in the national and international repository and they have been compiled in the present study (Dutt and Rao, 1980; Ranjith *et al.* 2016; Govindarao *et al.* 2016 a,b; Muddulakrishna *et al.* 2015; Smith, 1961; Suresh & Thomas, 2006; Hashim, *et al.* 2012; Nagakrishnaveni *et al.* 2014; Joshi *et al.* 2016; and Venkataraman *et al.* 2012). A single specimen of *Apogon queketti* was collected

from the commercial trawl operated off the coast of Murudeshwar at 60m depth (Plate-II). Body colour of the fresh specimen was pinkish grey dorsally, shading to silvery on sides and ventral, spot on first dorsal fin and distal edge of anal fin intense black; edge of second dorsal and caudal fin blackish. The specimen was fixed in formalin and deposited in the Marine Biodiversity Museum of Mandapam Regional Centre of CMFRI (Accession code: MMMC- 13021). Meristic characters of the specimen were measured with a digital caliper (to the nearest 0.01mm) as per Gon and Randall (2003).

RESULTS AND DISCUSSION

Among the 38 genera of the family Apogonidae, sixty four species from seventeen genera have been reported from Indian waters (Fig.1 & Table.1). For, *Apogon queketti* all measurements, morphological descriptions as well as the colour were comparable with the earlier descriptions by Gon and Randall (2003), Eryilmaz and Dalyan (2006), Gokoglu *et al.* (2011) and Filiz *et al.* (2012). Table.2 shows the comparison of morphometric measurements of *Apogon queketti* collected from different parts of Red sea and Mediterranean with the present specimen. In several measurements, however the values obtained for the Murudeshwar specimen

deviated from the range of measurement given by the different authors; for example the body depth in SL, head length in SL, and orbit diameter in HL. This kind of difference must have arisen due to the single measurement taken now and as experienced by Filizet *et al.* (2012). The Netrani Island, a rocky island with coral reef assemblages, is ten nautical mile off Murudeshwar, boasts a variety of coral reef fishes within the reef assemblages. Cardinal fishes are generally noted for their resilience and spreading to newer territories. The Suez canal which opens the Red Sea into the Mediterranean paved way for lessepsian migration and *Apogon queketti* has invaded in these new territories (Eryilmaz and Dalyan, 2006) viz., Aegean Sea, Iskenderun Bay, Antalya Bay, and Ekincik Bay from its known range of the western Indian Ocean, the Persian Gulf and the Red Sea. The present record is the first reported occurrence of this species along this coast, and the invasive nature of this species may allow widespread distribution along the coral reef coast of Gulf of Mannar, south east of India. Gon and Randall (2003) reported the occurrence of *Apogon queketti* off Chennai coast in Tamil Nadu but has not been reported so far from the Gulf of Mannar. Cardinal fishes are caught by trawlers, which normally operate at 60-80 m depth but since it does not have a commercial value it mostly discarded by the crew. Dineshbabu *et al.* (2012) has estimated that the cardinal fishes contribute 0.3 percentage by weight in the trawl discard in a size range of 40 to 105mm. The new records of cardinal fishes from Indian coast is increasing in recent times as more attention is paid to these groups (Suresh and Thomas, 2007; Koya *et al.* 2011, Hasim *et al.* 2012). Such studies will help to understand this ecologically important, yet one of the least known among tropical reef fishes.

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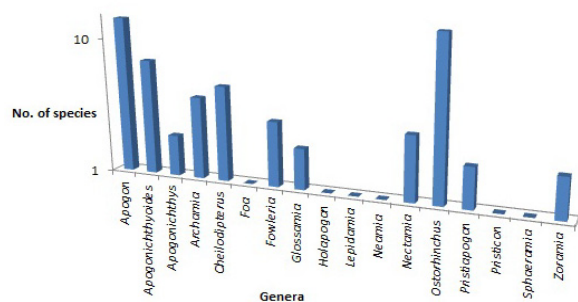


Fig.1. Spices diversity of cardinal fishes along Indian Coast



Fig.2 Apogon queketti

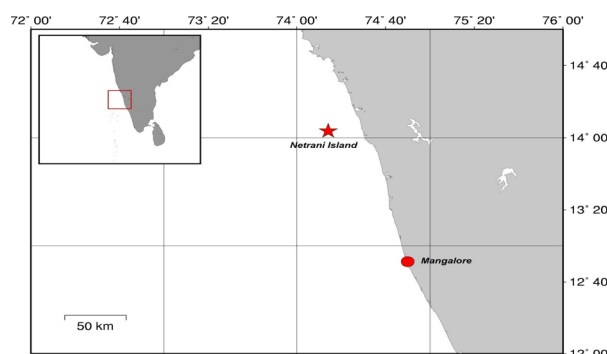


Fig.3 Map Showing the area of collection of *Apogon queketti*

Table.1 Diversity of Apogonidae fishes from Indian seas

- 1 *Apogon andhrae* Dutt & Rao, 1980
- 2 *Apogon coccineus* Rüppell, 1838
- 3 *Apogon ellioti* Day, 1875
- 4 *Apogon hyalosoma* Bleeker, 1852
- 5 *Apogon lineatus* Temminck & Schlegel, 1842
- 6 *Apogon multitaeniatus* Cuvier, 1828
- 7 *Apogon nitidus* (Smith, 1961)
- 8 *Apogon poecilopterus* Cuvier, 1828
- 9 *Apogon queketti* Gilchrist, 1903
- 10 *Apogon quinquestriatus* Regan, 1908
- 11 *Apogon sangiensis* Bleeker, 1857
- 12 *Apogon septemstriatus* Günther, 1880
- 13 *Apogon smithi* (Kotthaus, 1970)
- 14 *Apogon truncatus* Bleeker, 1855
- 15 *Apogon ichthyoides* *serdmanni* Fraser & Allen, 2011
- 16 *Apogon ichthyoides* *heptastygma* (Cuvier, 1828)
- 17 *Apogon ichthyoides* *nigripinnis* (Cuvier, 1828)
- 18 *Apogon ichthyoides* *pseudotaeniatus* (Gon, 1986)
- 19 *Apogon ichthyoides* *sialis* (Jordan & Thompson, 1914)
- 20 *Apogon ichthyoides* *taeniatus* (Cuvier, 1828)
- 21 *Apogon ichthyoides* *umbratilis* Fraser & Allen, 2010
- 22 *Apogon ichthysocellatus* (Weber, 1913)
- 23 *Apogon ichthysperdix* Bleeker, 1854
- 24 *Archamia fucata* (Cantor, 1849)
- 25 *Archamia lineolata* (Cuvier, 1828)
- 26 *Archamia macroptera* (Cuvier, 1828)
- 27 *Archamia zosterophora* (Bleeker, 1856)
- 28 *Cheilodipterus arabicus* (Gmelin, 1789)
- 29 *Cheilodipterus artus* Smith, 1961
- 30 *Cheilodipterus lachneri* Klauswitz, 1959
- 31 *Cheilodipterus macrodon* (Lacepède, 1802)

- 32 *Cheilodipterus quinquelineatus* Cuvier, 1828
- 33 *Foa brachygramma* (Jenkins, 1903)
- 34 *Fowleria aurita* (Valenciennes, 1831)
- 35 *Fowleria marmorata* (Alleyne&MacLeay, 1877)
- 36 *Fowleria punctulata* (Rüppell, 1838)
- 37 *Glossamia sandei* (Weber, 1907)
- 38 *Glossamia trifasciata* (Weber, 1913)
- 39 *Holapogon maximus* (Boulenger, 1888)
- 40 *Lepidamia kalosoma* (Bleeker, 1852)
- 41 *Neamia octospina* Smith & Radcliffe, 1912
- 42 *Nectamia bandanensis* (Bleeker, 1854)
- 43 *Nectamia fusca* (Quoy&Gaimard, 1825)
- 44 *Nectamia savayensis* (Günther, 1872)
- 45 *Ostorhinchus apogonoides* (Bleeker, 1856)
- 46 *Ostorhinchus aureus* (Lacepède, 1802)
- 47 *Ostorhinchus chrysoaenia* (Bleeker, 1851)
- 48 *Ostorhinchus compressus*(Smith & Radcliffe, 1911)
- 49 *Ostorhinchus cookii* (MacLeay, 1881)
- 50 *Ostorhinchus cyanosoma* (Bleeker, 1853)
- 51 *Ostorhinchus dispar* (Fraser & Randall, 1976)
- 52 *Ostorhinchus endekataenia* (Bleeker, 1852)
- 53 *Ostorhinchus fasciatus* (White, 1790)
- 54 *Ostorhinchus fleurieu*Lacepède, 1802
- 55 *Ostorhinchus hoevenii*(Bleeker, 1854)
- 56 *Ostorhinchus lateralis* (Valenciennes, 1832)
- 57 *Ostorhinchus moluccensis* (Valenciennes, 1832)
- 58 *Ostorhinchus nigrofasciatus* (Lachner, 1953)
- 59 *Ostorhinchus novemfasciatus* (Cuvier, 1828)
- 60 *Pristiapogon fraenatus* (Valenciennes, 1832)
- 61 *Pristiapogon kallopterus* (Bleeker, 1856)
- 62 *Pristicontri maculatus* (Cuvier, 1828)
- 63 *Sphaeramia orbicularis* (Cuvier, 1828)
- 64 *Zoramia fragilis* (Smith, 1961)
- 65 *Zoramia leptacantha* (Bleeker, 1856)

Table.2 Measurements of *Apogonqueketti* compared with specimens caught off KwaZulu- Natal- South Africa(A: Gon&Randall,2003), Iskenderun Bay-Turkey(B: Eryilmaz&Dalyan 2006), Antalya Bay-Turkey (C: Gokogluet *al.*, 2011) and Ekincik Bay-Turkey(D: Filizet *al.*, 2012)

Parameters	A	B	C	D	Present study
Total length (mm)		102-111	74-104	105	95
Standard length		85-91	60-88	83	80
Body depth	2.6-2.9(inSL)	2.7(in SL)		2.8(inSL)	3.1(inSL)
Body width				14	10.43
Head length	2.2-2.5(inSL)	2.4-2.8(in SL)	22-31	2.9(inSL)	3.9(inSL)
Snout length	5-7(in HL)	3.7-4.5(in HL)		4.6(inHL)	3.0(inHL)
Orbit diameter	3.3-4(inHL)	3.3-3.6(inHL)	8.0-9.0	3.5(inHL)	2.2(inHL)
Interorbital length	4.1-4.9(inHL)	3.3-3.6(inHL)		3.1(inHL)	2.8(inHL)
Upper-jaw length					15.23
Caudal-peduncle depth	1.3-1.8(inCPL)				1.12(inCPL)
Caudal-peduncle length	4.2-5.1(inSL)				6.2(inSL)
Predorsal length					29.38
Preanal length					48.07
Prepelvic length					26.26
Pectoral fin base length					4.22
Pelvic fin base					5.08
First dorsal spine length					3.14
Second dorsal spine length					7.74
Third dorsal spine length					12.54
Fourth dorsal spine length					12.1
Ninth dorsal spine length					5.11
First dorsal ray length					8.86
Second dorsal ray length					13.5
Third dorsal ray length					15.02
Last dorsal ray length					12.62
Anal-fin length					15.88
Anal-fin base length					11.58
First anal spine length					4.01
Second anal spine length					7.49
First anal ray length					11.21
Third anal ray length					14.49
Fourth anal ray length					16.14
Last anal ray length					8.26
Caudal fin length					14.11
Pectoral-fin length				18	15.56
Pelvic spine length					7.65
Pelvic-fin length				16	17.71
First pelvic ray length					8.35
Fifth pelvic ray length					11.15

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