



Short Communication

First record of the Garman's lanternfish *Diaphus garmani* (Family: *Myctophidae*) from Indian waters

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Abstract

The myctophid *Diaphus garmani* is recorded for the first time from Indian waters. Three specimens (54-59 mm standard length) were collected from deep sea shrimp trawlers off Quilon, southwest coast of India, between 80°-110° N and 74°-76° E, at depths from 250 to 450 m.

Keywords: *Diaphus garmani*, first record, southwest coast of India, Myctophidae

Introduction

Lanternfish of the family Myctophidae are found in all the oceans, with 32 genera and 240 species (Nelson, 2006). An important characteristic of myctophids is the presence of luminescent organs called photophores along the ventral body surface and head. For species identification, different patterns of photophores have been used along with meristic data. These fishes have species-specific diel vertical migration patterns (Watanabe *et al.*, 1999). Like many other mesopelagic fishes, myctophids are an important constituent of the diet of commercially important oceanic fishes and marine mammals (Jackson *et al.*, 1998).

Investigations on the myctophid fauna of the western and northern Arabian Sea were carried out by R/V Dr. *Fridtjof Nansen* during 1975-1981 and 1983-84 (Gunnar *et al.*, 1999). Studies on distribution and abundance of Myctophidae in the EEZ of India were carried out by FORV *Sagar Sampada* during 1985-1986 (Mini and James, 1990). About 55 species of myctophids are known from the Arabian Sea including its southern part of the Indian Ocean (Nafpaktitis, 1978). Karuppasamy *et al.*, (2006) reported 27 species of myctophids from the Indian EEZ. Somvanshi *et al.* (2009) reported 5 species of myctophids from the southwest coast of India.

Diaphus is the most speciose of the myctophid genera, with 70-75 known species (Nafpaktitis *et al.*, 1995). The members of this genus can be assigned

to two distinct groups on the basis of the presence or absence of a suborbital (So) luminous organ and an inner series of broad-based, forward-hooked teeth on the posterior part of the premaxilla (Nafpaktitis, 1978). *Diaphus garmani* is a small diaphid fish, which attains a maximum length of about 60 mm.

Material and Methods

Three specimens of *D. garmani* (Fig. 1) were collected in April 2009 from a commercial deep-sea shrimp trawler which operated from 250 to 450 m depth in the outer shelf of southwest coast of India between 8° N - 11° N and 74° E - 76° E. Identification was based on the luminous organs on the head, number of fin rays, gill rakers and morphometric characters (Nafpaktitis, 1978). Photophore nomenclature follows Hulley (1984). The specimens of *D. garmani* were deposited in the National Biodiversity Referral Museum, CMFRI, India under the accession Number GB.27.1.5.25.



Fig. 1. *Diaphus garmani*, 54 mm SL

Results and Discussion

Description: Peculiar characters of this fish which makes it different from other species are the position and size of Dorsal (Dn), Ventronasal (Vn) and Suprapectoral (PLO). Dn is small directed anterolaterally. Descriptive characters of the fish are: origin of dorsal fin over base of ventral fin; origin of anal fin behind end of base of dorsal fin; base of adipose fin directly over end of base of anal fin; PLO distinctly nearer to lateral line than to base of pectoral fin; Supraventral (VLO) midway between

lateral line and base of ventral fin; SAO (Supraanal organ) on a straight line, SAO₂ slightly behind line through centers of supra anal (SAO₁) and SAO₃; SAO₃ at lateral line; anterior anal (AOa₁) abruptly elevated, directly above AOa₂; last AOa also elevated; posterolateral (Pol) in contact with lateral line; posterior anal (AOp₁) over end of base of anal fin; first three precaudal (Prc) evenly spaced, forming a gently arc; Prc₃-Prc₄ interspace enlarged with Prc₄ about 1.5 times its diameter below midlateral line; a vertically elongated, rough rectangular luminous scale at PLO.

Table 1. Morphometric measurements and meristics of *Diaphus garmani*

Measurements	Off Japan, 32 specimens (25.5-53.0 mm SL)*	Sulu Sea, 6 specimens (52.0-59.5 mm SL)*	South China Sea, 1 specimen (40.0 mm SL)*	Atlantic, 45 specimens (27.5-48.0 mm SL)*	Present study, 3 specimens (53.4-58.9 mm SL)
Head length	26.5-30.7	26.2-28	27.9	27.6-30.4	27.8-31.3
Head depth	21.6-25.0	22.3-23.4	23.7	21.4-24.2	22.5-24.5
Eye diameter	6.9-8.7	6.9-7.6	7.5	6.9-8.8	7.0-7.4
Upper jaw length	19.4-22.6	19.3-20.3	21.9	20.0-22.3	20.3-24.6
Body depth	20.8-24.1	22.4-23.4	22.9	22.2-24.7	22.4-23.4
Caudal depth	9.2-12.9	10.4-11.6	10.7	10.3-12.2	10.6-11.4
Predorsal length	40.8-44.0	40.7-41.9	42.9	41.1-44.7	40.4-41.4
Preventral length	40.4-44.7	39.1-44.1	42.4	39.8-44.9	39.7-43.7
Prepectoral length	27.4-30.5	26.2-29.2	28.4	27.6-30.3	28.3-30.1
Preanal length	59.3-63.3	59.9-64.6	59.6	59.1-63.1	60.1-61.7
Preadipose length	76.2-80.2	77.2-80.5	79.8	77.8-81.8	79.2-80.7
Upper jawlength/E.D	2.4-3.1	2.6-2.9	2.6	2.4-3.2	2.5-2.8
H.D/ED	3.3-4.1	3.5-4.0	3.3	3.3-4.3	3.2-3.8
Dorsal fin base length	17.7-21.2	17.3-20.4	20.4	18.8-22.4	19.2-20-8
Anal fin base length	17.5-21.3	10.0-20.6	20.2	19.7-22.6	18.8-20.1
Dorsal fin ray	14 (13-15)	15 (14-16)	15	15 (14-16)	15
Anal fin ray	15 (14-17)	15 (14-16)	15	16 (15-17)	15
Pectoral fin ray	12 (11-12)	11-12	11	12 (11-12)	12
Gill rakers on first arch	7 (6 or 8, rarely 5) + 1+13-14 (rarely 12) = 20-23 (rarely 18)	7+1+14 (13)=22(21)	7+1+13=21	7 (6 - 8)+ 5 (4-6very rarely 7) =12(11-13, very rarely 14)	7+1+14=22
AO photophores	6-8+5-6 (rarely 4)=11-13 (rarely 14)	6-7+5-6= 11, 12	6+6=12		7+4
Lateral line scales	37-38	37-38		38-39	38

*Source, Kawaguchi and Shimizu (1978)

Morphometric and meristic characteristics:

Number of fin rays (all soft): dorsal - 15, pectoral -12, pelvic - 9, anal - 15 and caudal - 20. Gill rakers on first arch - 22 (8+14). Photophores were counted as follows: PVO – 2 (Subpectoral organ), PO – 4 (Pectoral organs), VO – 3 (Ventral organs), SAO - 3, AOa - 7, AOp - 4 and Prc - 4. Lateral line organs - 38. Morphometric measurements of the specimens are presented in Table 1. Other morphometric and meristic data of these specimens are similar to those collected from the Southeast Asian seas recorded by Kawaguchi and Shimizu (1978).

Other records of occurrence of the species include Eastern Atlantic: Canary Islands, off Senegal; Western Atlantic: west of 30°W between 36°N and 10°S; Indo-West Pacific: off East Africa, Comoro Islands and west coast of Madagascar; off Japan south of 40° N, southeast Asian seas, Australia and New Zealand; Eastern Pacific: near Hawaii, and off Acapulco, Mexico and South China Sea; Western Indian Ocean: between 16° S and 26° S and off Sri Lanka (Fig. 2) (Nafpaktitis, 1978; Dalpadado and Gjosaeter, 1993, Froese and Pauly, 2007). The specimens reported here widen the known distribution of this species to the southwest coast of India.

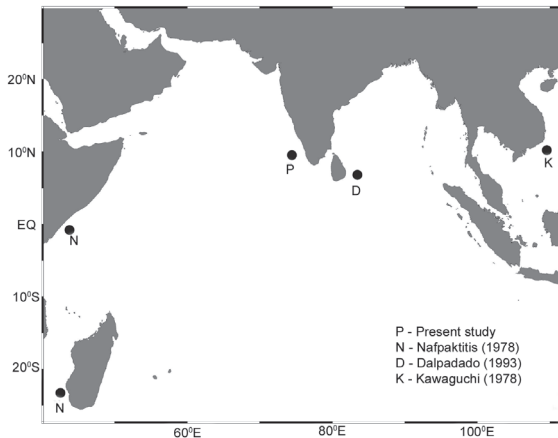


Fig. 2. Map showing distribution records of *Diaphus garmani*

Diaphus garmani is the tenth species of the genus *Diaphus* to be recorded from the Indian waters after *D. problematicus*, *D. effulgens*, *D. fragilis*, *D.*

perspicillatus, *D. aliciae*, *D. lucidus*, *D. phillipsi*, *D. signatus*, *D. watasei* (Karuppasamy *et al.*, 2006), *D. thiollieri* (FAO, Smith and Heemstra.1986)

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