



New Geographical Record of *Chaunax penicillatus* McCulloch, 1915 (Chaunacoidei: Chaunacidae) from the Eastern Indian Ocean

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Abstract

This paper discusses the first occurrence of *Chaunax penicillatus* McCulloch, 1915 from Andaman waters of India, Eastern Indian Ocean. It is the only member in the *Chaunax pictus* group occurring outside the Atlantic Ocean, and is characterized by the deep black, concave illicial trough, very short illicium and numerous stout cirri on esca. Three specimens were collected from Andaman coast of India at a depth ranging from 321 m to 337 m by the fishery surveys of onboard *Sagar Sampada* employing bottom trawls. Along with the diagnostic characters, previous distributional records are also provided.

Keywords *Chaunax penicillatus* · Coffin fishes · New record · Andaman waters · Eastern Indian Ocean

Introduction

The Chaunacidae, (coffinfishes or sea toads) are one of the 18 families in the order Lophiiformes (Pietsch 2009), is a group of benthic anglerfishes that inhabit the continental slope, at depths ranging from 200 m to 2500 m. Generally, they are moderately sized (up to 400 mm total length) with various colour patterns, with or without spots on dorsal body. The body is rounded and slightly compressed with loose, flaccid skin with small, spine-like scales. Head large and globose, with a network of open lateral-line canals and a single lateral-line canal extending posteriorly along the trunk and tail. The angling apparatus (modified first dorsal fin spine) consists of a short illicium, with a terminal esca comprised of a dense cluster of short cirri, which is retractable into a naked cavity just behind it.

Currently there are 25 species distributed within three groups, *C. fimbriatus* group, *C. pictus* and *C. abei* group (Caruso 1989; Ho and Shao 2010; Ho and McGrouther 2015; Ho and Ma 2016). The present species, *C. penicillatus* belongs to *C. pictus* group, diagnosed by a black, strongly

concave illicial cavity; short esca having black anterior and silvery to pale posterior regions; with or without black ring on illicial stem and different color patterns on the dorsal surface of fresh specimens or retention of circular markings on the body after preservation. Three valid species are recognized in the *C. pictus* group; *C. pictus* Lowe, 1846; *C. stigmaeus* Fowler, 1946 and *C. penicillatus*.

The recent exploratory surveys of Fishery Oceanographic Research Vessel *Sagar Sampada* (FORV-SS) owned by Centre for Marine Living Resources and Ecology (CMLRE), under Ministry of Earth Sciences (MoES), India along the Indian waters contributed many new species and records of deep-sea fishes (Ho et al. 2016; Rajeeshkumar et al. 2016; Rajeeshkumar 2018). The present specimen is the first representative from Indian EEZ, comprising Arabian Sea, Bay of Bengal and Andaman waters having a total area of 2.02 million sq. km. which contributes one more record to the existing marine fauna from this area. The check list of Lophiiformes from Indian EEZ is revalidated to 36 species under 17 genera and 8 families. Of these; 5 species belong to Lophiidae family; 4 species to Chaunacidae; 17 species to Ogcocephalidae; 4 species to Diceratiidae; 2 species each from Ceratiidae and Oneirodidae and 1 species each from Melanocetidae and Himantolophidae (Rajeeshkumar 2018).

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Materials and Methods

All the specimens were preserved in 5% buffered formaldehyde solution and deposited in the CMLRE reference

collection (IO-Indian Ocean; SS-*Sagar samapada* (Ship); FIS- Fish collection). Measurements and counts were taken from preserved specimens following Caruso (1989) and Ho et al. (2013). Neuromasts counts were taken from both sides. Gill Rakers (GR) counts follow Ho et al. (2013). The terminology used in describing the angling apparatus follows Bradbury (1967). Comparative data are taken from Ho et al. (2013).

Material Examined IO/SS/FIS 00528, 112.9 mm SL, ♀, 6.1° N, 93.1° E, Andaman Sea, 321 m, gear used- High Speed Demersal Trawl -Crustacean Version (HSDT-CV), September 2010. IO/SS/FIS 00529, 165 mm SL, ♀, 6.8° N, 93.1° E, Andaman Sea, 337 m. HSDT-CV, December 2011. IO/SS/FIS 00530, 118 mm SL, ♀, 6.8° N, 93.1° E, Andaman Sea, 337 m. HSDT-CV, December 2011.

Systematic Accounts

Order LOPHIIFORMES.

Family CHAUNACIDAE.

Genus *CHAUNAX* Lowe, 1846.

Chaunax penicillatus McCulloch, 1915.

Diagnosis A species belonging to *C. pictus*-species group with a black and very deep illicial trough, short illicium and esca. Numerous cirri on esca with deep black anterior and silvery posterior regions. Dorsal-fin rays III, 12; anal-fin rays 7; pectoral-fin rays 13. GRi = 12–13, GRii = 9; GRiii = 9–10, GRiv = 7 and lateral-line neuromasts: BD = mainly 2, GH = 10–11 mainly 11, BI = 34–35.

Description Head globular, relatively narrow, skull slightly elevated posteriorly; trunk cylindrical in shape, tapering posteriorly; skin flaccid; broad interorbital space; caudal peduncle relatively long and slender, slightly compressed,

tapering posteriorly; short tail. Eyes rounded, lateral, covered by thin dermal membrane which is firmly attached to the adjoining skin. Very short illicium and esca (Fig. 1a, b); esca with numerous stout cirri. Second dorsal-fin spine adjacent to illicium, embedded under the skin; third dorsal-fin spine situated at about mid-point of pre-dorsal distance also embedded under the skin. Anterior nostril surrounded by fleshy membrane, posterior nostril a simple round hole; large and wide mouth, opening nearly vertical; lower jaw slightly extends in front of upper jaw; maxilla tapering above, broad below; lower jaw symphysis having a blunt spine. Broad transparent membrane on first gill arch; first ceratobranchial broadly connected to opercular wall; gill filaments on second to fourth gill arches, two rows of gill filaments on second and third gill arches, single row of gill filaments on fourth gill arch, those on inner row of third and fourth gill arch subequal to those of other arches; inner surface of fourth gill arch completely connected to body. Morphometric and meristic data are given in Table 1. All measurements of presented specimen listed herein fall well within the range described by Ho et al. (2013) except illicial trough length, mean 5.5 (3.6–5.3); may be due to prolonged preservation.

Color Color of the Indian specimen in fresh, unknown. Preserved specimens uniform creamy white without any retention of markings (may be due to the prolonged preservation) except illicial trough, which is deep black.

Distribution Holotype (AMS E.5488; paratype: AMS I.13605 (1); were collected from 60 km SW of Cape Everard, Victoria, Australia, depth 293–366 m. Andaman Coast of India at depths of 321–337 m. (Present study). *Chaunax penicillatus* is widest distributed species of the genus in the Indo-Pacific region, including Kenya, South Africa, Madagascar, Japan, Taiwan, South China Sea, Australia and New Zealand (Fig. 2). Bathymetric range 300–1000 m (Ho 2015).

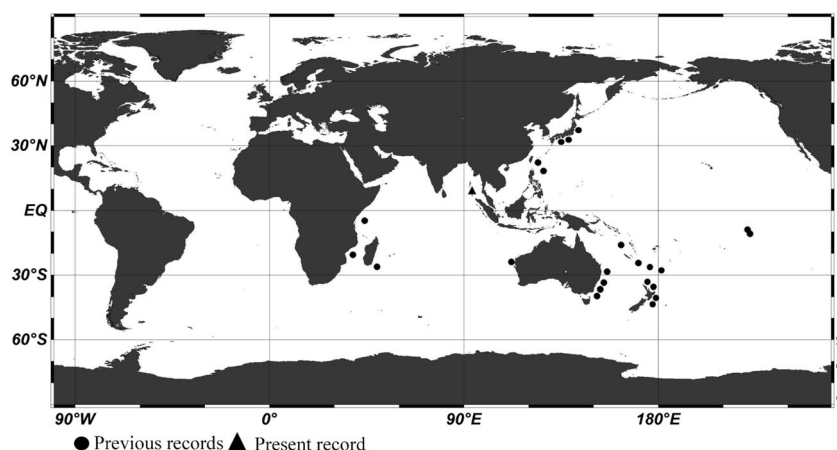


Fig. 1 a *Chaunax penicillatus*, IO/SS/FIS 00528, dorsal view showing lateral-lines; b, enlarged view of head with illicium

Table 1 Morphometric and meristic data for *Chaunax penicillatus* compared with previous study

<i>Chaunax penicillatus</i>								
Measurements	Present study						Ho et al. 2013	
	IO/SS/ FIS 00529	IO/SS/ FIS 00530	IO/SS/ FIS 00528	Mean	Range	SD	Mean (Range)	SD
Standard length (SL)	165	118	113		113–165			
In % of SL								
Head length	44.2	36.7	43.5	41.5	36.7–44.2	3.4	41.0 (37.8–45.2)	2.2
Head width	18.9	19.3	20.1	19.5	18.9–20.1	0.5	18.2(17.0–20.4)	1.0
Pre-dorsal length	50.6	49.0	54.1	51.2	49.0–54.1	2.1	49.4(45.6–53.4)	2.4
Pre-gill opening length	58.5	60.9	59.4	59.6	58.5–60.9	1.0	63.1 (58.3–67.7)	3.0
Pre-opercular length	28.5	27.9	30.0	28.8	27.9–30.0	0.9	28.3 (27.4–29.5)	0.7
Upper-jaw length	20.8	19.6	20.9	20.4	19.6–20.9	0.6	20.7 (19.3–22.1)	0.9
Illicial length	2.1	2.2	2.4	2.2	2.1–2.4	0.1	1.9 (1.5–2.2)	0.3
Illicial trough length	5.5	5.7	5.4	5.5	5.4–5.7	0.1	4.1 (3.6–5.3)	0.6
Eye diameter	6.9	8.5	7.9	7.8	6.9–8.5	0.6	7.8 (6.8–8.7)	0.7
Post-dorsal fin length	15.6	16.6	18.7	16.9	15.6–18.7	1.3	16.9 (15.0–18.7)	1.4
Post-anus length	30.3	28.5	31.2	30.0	28.5–31.2	1.2	29.1 (26.5–31.8)	1.9
Post-anal length	15.2	14.7	15.1	15.0	14.7–15.2	0.2	14.3 (13.0–15.3)	0.7
Caudal-peduncle depth	8.3	7.8	8.4	8.2	7.8–8.4	0.2	8.8 (7.4–9.5)	0.6
Caudal fin length	30.3	29.7	32.8	30.9	29.7–32.8	1.3	30.2 (27.5–32.2)	1.7
Meristics								
Dorsal-fin rays	12	12	12		12		11–12	
Pectoral-fin rays	13	13	13		13		11–13	
Anal-fin rays	7	7	7		7		6–7	
Gill rakers								
GR i	12	13	13		13		13–14	
GR ii	9	9	9		9		8–10	
GR iii	10	10	9		10		8–11	
GR iv	7	7	7		7		7–8	
Neuromasts counts								
AB	10:11	11:11	11:11		10:11		10:12	
AC	8:8	7:8	8:8		7:8		8:8	
BD	2:2	2:2	2:2		2:3		2:3	
CD	7:7	6:7	7:7		6:7		6:7	
DG	3:3	3:3	3:3		3:5		3:4	
EF	6:6	6:6	6:6		4:4		3:5	
FG	3:3	3:3	3:3		3:3		3:4	
GH	11:11	10:11	11:11		11:13		10:13	
BB'	4:4	5:5	4:4		5:5		4:5	
BI	35:35	34:35	34:35		36:37		35:40	

Fig. 2 Distributional records of *Chaunax penicillatus*; A single symbol may represent more than one capture



Discussion

Alcock (1899) recorded first Chaunacid species, *Chaunax pictus* (Lowe, 1846), from Bay of Bengal at depth a ranging from 265 to 457 m. However, later studies showed that *C. pictus* is restricted to the Atlantic Ocean, and records from outside the Atlantic Ocean were misidentifications (Caruso 1989; Ho et al. 2013). Lloyd (1909) described *Chaunax apus* from the Bay of Bengal which was the oldest valid species of family Chaunacidae from the Indian Ocean. Recently *C. multilepis* was described by Ho et al. (2016) from Andaman waters of the Indian EEZ. Studies of Ho and Last (2013); Ho and Ma (2016); Ho et al. (2016) reveals that approximately 10 species of the genus *Chaunax* found in Indian Ocean: *C. pictus*; *C. flammeus*; *C. nebulosus*, *C. africanus*, *C. hollemani*; *C. multilepis*; *C. apus*; *C. russatus*; *C. atimovatae* and *C. penicillatus*. Of the other two members of the pictus group, *C. stigmaeus* can be easily distinguished from *C. penicillatus* having a black ring on illicial stem and distinct blotches on the dorsal surface of the body; *C. pictus* differ from present species by a relatively long tail, narrow head and black spots on the dorsal surface of the body. Currently four species of genus *Chaunax*: *C. apus*, *C. multilepis* and *C. penicillatus* (present study) and one undescribed sp. were represented in the Indian EEZ (unpublished). It is also noted that unlike other the other two species, so far *C. penicillatus* and undescribed species has been found only in Andaman waters and Arabian Sea respectively.

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Compliance with Ethical Standards

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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