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First reports of White-finned flying fish, *Cheilopogon arcticeps* (Beloniformes: Exocoetidae) from Indian Ocean

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Abstract

Cheilopogon arcticeps (Günther, 1866) is recorded for the first time from the Indian coastal waters. Two specimens of *C. arcticeps* (158–167 mm SL) were collected from the Petuaghat fishing harbour of Purba Medinipur, West Bengal, India. The present paper reports the species for the first time from Indian waters and thus, the distributional range of the species is extended from Western Pacific Ocean to the Bay of Bengal, Indian Ocean. This paper provides more detailed information on the taxonomy and morphometric of the poorly known species.

Introduction

Fishes of the family Exocoetidae are commonly known as flying fishes due to the presence of elongated pectoral fins, sometimes pelvic fins and larger lower lobe of the caudal fin in individuals, which provide a wide range of gliding and aerial escapes from predators (Breder, 1930; Lewallen, 2012). Exocoetidae is a monophyletic group under the order Beloniformes, that represents an epipelagic fish community that inhabits mainly in neritic and oceanic waters of tropical and subtropical seas throughout the world (Barman and Mishra, 2006; Lewallen *et al.*, 2018). Members of this family comprise of 80 species under seven genera (Fricke *et al.*, 2024a). From Indian waters, a total of 24 species of flying fish are enlisted in six genera (Jayakumar *et al.*, 2019).

During the local survey around the Petuaghat fishing harbour (21°47′4.05″ N; 87° 52′5.99″ E) of West Bengal (north-east coast of India), the authors collected two flying fishes and identified them as *Cheilopogon arcticeps* (Günther, 1866), which was previously reported only from the Western Pacific Ocean (Parin, 1999; Froese and Pauly, 2024; Fricke *et al.*, 2024b). The present manuscript provides material evidence of the species for the first time from the Indian Ocean along the Bay of Bengal as well as Indian waters with a westward extension of its distributional range.

Materials and methods

Two specimens of an interesting flying fish (Figure 1) were collected from the Petuaghat fishing harbour of West Bengal, India on 12 October 2019 during the local survey of the West Bengal coast. Measurements of the specimens were done by the aid of digital callipers with an accuracy of 0.1 mm. Photographs were taken with a Nikon Z30 digital camera. Digital radiography was used to capture an X-ray image of the fish's vertebrae, allowing for precise counting and analysis. Species identifications were done following Parin (1999) and Barman and Mishra (2006). The species was found to be *C. arcticeps* (Günther, 1866) and the specimens of it were deposited in the museum of the Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Odisha in 10% formaldehyde solution. Abbreviations used: D – dorsal fin; A – anal fin; P – pectoral fin; V – pelvic fin; LL – lateral line scales; SL – standard length; and GR – gill rakers.

Results

Diagnostic specific characters along with morphological characters of the specimens are expressed hereunder.

Characters

D 11–12; A 8–9; P 15; V 6; GR 17; LL 49. Body cylindrical and elongated covered with large cycloid scales. Head short, 4.28–4.49 of SL and scaleless; scales present on dorsal surface starting behind the supraoccipital process; snout short and more or less pointed, 3.82–4.05 in HL. Eye larger than snout, its diameter 2.85–3.20 in HL. Interorbital space flat, 2.80–2.86 in HL. Small, non-protrusible mouth with lower jaw slightly longer than upper jaw; numerous

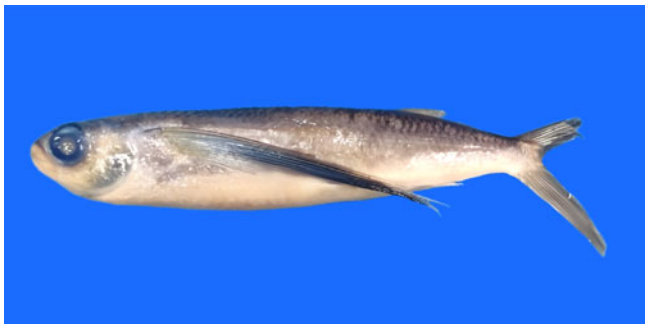

Figure 1. *Cheilopogon arcticeps* (Günther, 1866) – F-13087.

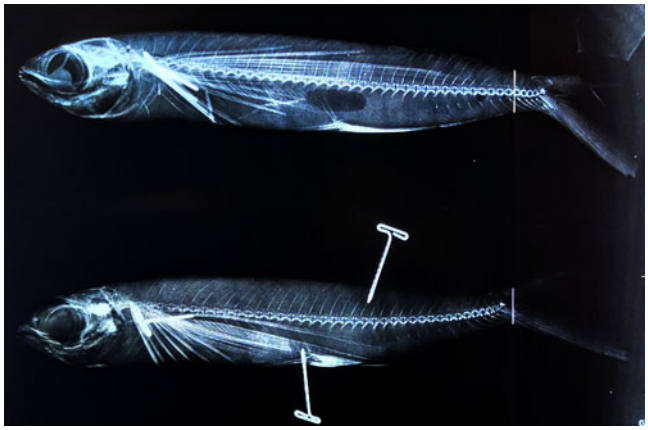

Figure 2. Vertebrae of *Cheilopogon arcticeps* (Günther, 1866).

villiform teeth present on jaws. Palatine teeth are absent. Dorsal fin is moderately low with the longest ray about 10.5 times in standard length. Predorsal length 1.45–1.46 of SL; origin of anal fin 4–5 rays behind origin of dorsal fin, preanal length 1.42–1.48 of SL; pectoral fins very long, its length 1.63–1.64 of SL, reaching till the end of anal fin base; only the first pectoral-fin rays unbranched; pelvic fins long, its length 3.4–3.6 in SL, reaching well beyond anal-fin origin, inserted nearer to anal-fin origin than to pectoral-fin insertion, but nearer to head than to lower caudal fin origin; caudal fin forked, lower lobe much longer than upper lobe; spine absent in fins. Lateral line scales 36–37, predorsal scales 27–28, prepelvic scales 17–19, transverse scale rows 7–8 present between dorsal fin origin and lateral line scales; vertebrae: 43 (Fig. 2); gill rakers on lower limb of first gill arch 17. Barbels absent. Details of morphometric measurement and meristic count are represented in Table 1.

Colour

Pectoral fins without any dark spot; fin membrane between 2 and 7 pectoral fin rays dark, other rays white. No black blotch on the dorsal fin.

Distribution

Previously, this species was recorded along the coasts of southern China, Indonesia, New Guinea, Solomon Islands, Thailand and Vietnam (Parin, 1999), the Philippines (Froese and Pauly, 2024) and Japan (Fricke *et al.*, 2024a). In this present paper, *C. arcticeps* (Günther, 1866) has been reported as the first distributional record from the Bay of Bengal along the West Bengal coast of India with a range extension from the Western Pacific Ocean to the Eastern Indian Ocean.

Table 1. Morphometric and meristic characters of *Cheilopogon arcticeps* (Günther, 1866) collected during the present study

F-13087 *Cheilopogon arcticeps* (Günther, 1866)				
	Measurements			
Characters	S1	S2	Ratio	Ratio
Standard length	158	167		
Predorsal length	107.81	114.43		
Preanal length	111.04	122.82		
Prepelvic length from head	52.88	57.08		
Postpelvic length to caudal fin origin	66.18	65.57		
Head length	36.87	37.17	**In HL**	**In HL**
Eye diameter	12.93	11.6	2.85	3.20
Interorbital length	13.17	13	2.80	2.86
Snout length	9.1	9.74	4.05	3.82
Depth at gill opening	27.33	25.97		
Depth at anus	26.06	23.43	**In SL**	**In SL**
Pectoral fin length	95.91	102.13	1.65	1.64
Pelvic fin length	43.28	48.06	3.65	3.47
Dorsal fin	11	12		
Pectoral fin	15	15		
Pelvic fin	6	6		
Anal fin	9	7		
Number of gill rakers	17	17		
Number of predorsal scales	28	27		
Number of prepelvic scales	19	17		

Discussions

The genus *Cheilopogon* Lowe, 1841 stands as the most species-rich and morphologically diverse group within flying fishes, comprising 33 confirmed species till date (Fricke *et al.*, 2024b). *Cheilopogon* differs from other genera of the family in having a dorsal fin clearly anterior to the anal fin origin, a little longer lower jaw, and juveniles with paired barbels (Parin, 1999; Barman and Mishra, 2006). *Cheilopogon arcticeps* is known to have a distribution in the Western Pacific Ocean (Parin, 1999; Froese and Pauly, 2024; Fricke *et al.*, 2024a). This species is pelagic in nearshore and neritic surface waters which never spread to open sea (Parin, 1999). Jayakumar *et al.* (2019) erroneously reported the presence of this species in the waters surrounding the Nicobar and Andaman Islands, referencing the work of Parin (1999). However, Parin's study (1999) did not explicitly confirm the occurrence of *C. arcticeps* in these waters. Further, Shakhovskoy and Parin, (2019) clearly mentioned that this species is absent in the Western Indian Ocean. Satapoomin (2011) listed *C. arcticeps* from south-western Thailand, the Andaman Sea with the distribution category as west Pacific. Possibly this was the western limit of this species, it has not yet been recorded from the Nicobar or Andaman waters. Hence, the present report extends its westward range to the northern Bay of Bengal of Indian coast.

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The original description (Parin, 1961) of *C. arcticeps* seems insufficient as the brief description mostly contains juvenile characters. Juveniles of *C. arcticeps* have two short chin barbels, pale proximally and dark distally (Shakhovskoy and Parin, 2019). However, based on Parin (1999) it is identified for having following combination of characters: 'low dorsal fin, rays more than 10 times in SL; lower jaw little longer than the upper; absence of palatine teeth; pelvic fin insertion nearer to head than to lower lobe of caudal fin; no dark spots on pectoral fin; 8 or 9 anal fin rays; predorsal scales 27 or 28; lateral transverse scales between D origin and LL 7 or 8'.

The present study reports two examples of adult *C. arcticeps*, indicating its occurrence is not restricted to Western Pacific Ocean only. The present report from the West Bengal coast of India extends its range to Bay of Bengal as well as Indian Ocean. More extensive studies are needed for understanding the regional distribution, relative abundance, systematics and biogeography of flying fishes around Indian Ocean.

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Competing interest. None.

Ethical standards. The IUCN Red List, the Convention on International Trade in Endangered Species of Wild Fauna, and the Government of India's Wildlife Protection Act do not list the fish specimens utilized in the study. The specimens were collected in dead condition from the fish landing Centre.

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