



Additional Record of *Cheilodipterus novemstriatus* (Rüppell, 1838) from the Aegean Sea (Gökova Bay, Türkiye)

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Research Article

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Abstract

On 23 July 2025, the schools of *Cheilodipterus novemstriatus* associated with three black longspine urchins (*Diadema setosum*) over a hard substrate in the shoreline of Akbük, Gökova Bay were observed during snorkeling. The depth of the substrate was recorded as 1 m. This ichthyological note presents the second record of *C. novemstriatus* from the southeastern Aegean Sea. Since 2010, the species has been documented in eight different locations, and ongoing westward and northward spread.

Keywords: *Cheilodipterus novemstriatus*, additional record, snorkelling, southeastern Aegean Sea, Gökova Bay.

Introduction

The cardinalfishes (family Apogonidae) have 27 genus, and genus *Cheliodipterus* contains 16 species (Myers et al., 2025). The Indian Ocean two-spot cardinalfish, *Cheilodipterus novemstriatus* (Rüppell, 1838) is a tropical marine demersal fish, inhabiting depths ranging from 1 to 50 meters (Froese and Pauly, 2025). *C. novemstriatus* was easily distinguished from other apogonids in the Mediterranean by four distinct black stripes on the body, and fifth stripe runs along anal fin base, a large yellow spot

on both sides of the caudal fin, a prominent black mark in the middle, and a black spot on the dorsal part of the caudal peduncle (Çiçek et al., 2020; Golani et al., 2021; Froese and Pauly, 2025).

These fishes are nocturnal in nature and are often observed in shallow protected waters during the day. They are known to take refuge among rocks and corals and have been observed sheltering among the spines of sea urchins of the genus *Diadema*, usually in groups of up to 30 individuals (Golani et al., 2021; Froese and Pauly, 2025). During nocturnal hours, they depart from their rocky habitat to feed in open areas, and zooplankton consists of their diet (Golani et al., 2021; Froese and Pauly, 2025).

Its range of distribution in the Western Indian Ocean extends from the Persian Gulf to the Gulf of Oman and northward to the Red Sea (Froese and Pauly, 2025). In the Mediterranean as a Lessepsian migratory species, the first documented record of *C. novemstriatus* was reported off the coast of Israel on 2 June 2010 (Goren et al., 2010), followed by observations off Lebanese coast in 2012 (Bariche and Azzurro, 2012). Records of the species in Turkish waters are as follows: off Mersin coast in 2014 (Irmak and Engin, 2015), from Iskenderun Bay in the same year (Turan et al., 2015), and recently from southeastern Aegean Sea (off the coast of Bodrum) (Langeneck et al., 2023). *C. novemstriatus* was also reported from Cypriot waters (Crocetta et al., 2015).

As the cited records suggest, the species was well established in the eastern Mediterranean over a five-year period. Thus, the present ichthyological note reports the second documented record of *C. novemstriatus* in the southeastern Aegean Sea (Gökova Bay).

Material and Methods

On 23 July 2025, the schools of *C. novemstriatus* were observed during snorkeling over a hard substrate at a depth of 1 m in the shoreline of Akbük, Gökova Bay, southeastern Aegean Sea (37.0196957 N, 28.1127185 E) (Figure 1). The species was also seen to be associated with three black longspine urchins *Diadema setosum*. A GoPro Hero 9 Black action camera was used to record the images of observed specimens of *C. novemstriatus* and the associated habitat.

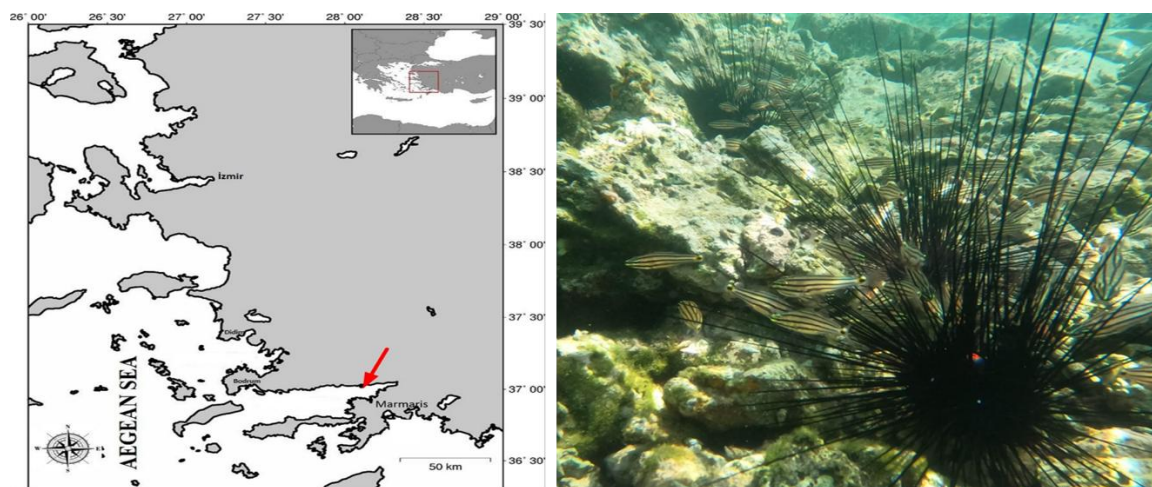


Figure 1. The observation area of *Cheilodipterus novemstriatus* (red arrow) and the aggregations of their schools around *Diadema setosum* off the Akbük coast, Gökova Bay.

Result and Discussion

Chelodipterus novemstriatus specimens were observed to be associated with three black longspine sea urchins (*Diadema setosum*). The population density of the fish was approximately 50 individuals per black longspine sea urchin, located in close proximity to each other. Their length was estimated to be 70–80 mm TL. The schools of *Chromis chromis* and a specimen of *Tripterygion melanurus* were also observed in the locality. Especially *T. melanurus* was in contact with *D. setosum*. As posited by Bilecenoğlu et al. (2019), the symbiotic relationship between fish and sea urchins is well-known. The three-dimensional structure of the sea urchin's spines, providing a tightly ordered and difficult to access network, has been shown to provide excellent shelter, especially for juvenile fish (Bilecenoğlu et al., 2019). Furthermore, a symbiotic relationship between sea urchins, particularly the non-indigenous *D. setosum*, has been stated to offer several benefits for *C. novemstriatus*, including facilitation of settlement, enhancement of biomass, and promotion of range expansion (Çiçek et al., 2020). Moreover, Bilecenoğlu et al. (2019) observed the occurrence of some fish species in association with *D. setosum*, including *C. novemstriatus*, *C. chromis*, *T. melanurus*, and *Thalassoma pavo*. Three of the observed cases are in alignment with the findings of this study. Bilecenoğlu (2019) demonstrated that the *D. setosum* population, characterized by its elongated and venomous spines, functions as a refuge for the associated fish species in the northern Levant Sea, offering protection against predators. Table 1 summarizes the recorded distributions of the species in the Eastern Mediterranean over a 5-year period.

Table 1. Records of *Cheilodipterus novemstriatus* throughout the Mediterranean.

Sampling locations	Depth (m)	Method of detection	Date	N	Size range (TL, mm)	References
Tel Aviv, Israel	30	Hand net	02.06.2010	2	55-66	Goren et al. (2010)
Lebanese coasts	35	SCUBA	30.07.2012	1	70	Bariche and Azzuro (2012)
Lebanese coasts	37	SCUBA	15.08.2012	1	50	Bariche and Azzuro (2012)
Lebanese coasts	33	SCUBA	08.09.2012	20	30	Bariche and Azzuro (2012)
Rosh HaNikra, Israel	26	SCUBA	20.10.2012	-	50-60	Rothman et al. (2013)
Taşucu, Mersin, NE Mediterranean	17	SCUBA	30.11.2014	200	-	Irmak and Engin (2015)
Iskenderun Bay, NE Mediterranean	15	Purse-seine	01.12.2014	2	41-47	Turan et al. (2015)
Taşucu, Mersin, NE Mediterranean	12	Trawl	01.12. 2014	-	-	Irmak and Engin (2015)
Iskenderun Bay, NE Mediterranean	13	SCUBA	07.12.2014	-	-	Turan et al. (2015)
Protaras, Cyprus, NE Mediterranean	18	SCUBA	03.10.2015	2	-	Crocetta et al. (2015)
Kaş, NE Mediterranean	2-20	SCUBA	07-08.2018	107	-	Bilecenoğlu et al. (2019)
Iskenderun Bay, NE Mediterranean	6	SCUBA	29.11.2019	30	-	Çiçek et al. (2020)
Bodrum, SE Aegean Sea	-	SCUBA	08.06 2023	-	-	Langeneck et al. (2023)
Akbük, Gökova Bay, SE Aegean	1	Snorkelling	23.07.2025	150	70-80	This study

In conclusion, *C. novemstriatus* has been documented in eight different locations since 2010, with the species continuing to advance west and northwards. The northwestern expansion of *C. novemstriatus* in the Mediterranean is likely to be attributable to the propagation of *D. setosum*, which has been shown by the distributional co-occurrence of both species, e.g. in northeastern Mediterranean (Bilecenoğlu et al., 2019; Çiçek et al., 2020). Thus, a collaboration with the recreational snorkellers and scuba divers as ‘citizen scientists’, and encouraging them to provide underwater images of *C. novemstriatus* and *D. setosum*, will be beneficial for the close monitoring of

their range extension throughout the Turkish waters, which previously demonstrated for the range extension records of several thermophilic or tropical bony fishes in the mentioned region (Karakulak et al., 2024a,b).

Conflict of Interest

The authors declare that for this article they have no actual, potential or perceived conflict of interest.

Author Contributions

H.T. observed and photographed the species. All authors prepared the main manuscript text. The authors reviewed and approved the final version of the manuscript.

Ethical Approval Statements

No ethics committee permissions are required for this study.

Data Availability

The visual data used in the present study are available upon request from the corresponding author.

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