

Marine Record

Cite this article: Siapatis A, Markakis K, Tsagarakis K (2023). First record of the Atlantic soft pout *Melanostigma atlanticum* (Teleostei, Zoarcidae) in the eastern Mediterranean Sea. *Journal of the Marine Biological Association of the United Kingdom* **103**, e82, 1–3. <https://doi.org/10.1017/S0025315423000681>

Received: 1 March 2023

Revised: 4 September 2023

Accepted: 12 September 2023

Keywords:

Cretan sea; deep sea; fish diversity; mesopelagic zone

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First record of the Atlantic soft pout *Melanostigma atlanticum* (Teleostei, Zoarcidae) in the eastern Mediterranean Sea

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Abstract

This paper reports the first record of the Atlantic soft pout *Melanostigma atlanticum* Koefoed, 1952, from the eastern Mediterranean Sea. The specimen was caught in a pelagic trawl during a research trip carried out north of the island of Crete (Greece) in December 2019. The fish measured 66.1 mm in total length and weighed 0.810 g. The presence of *M. atlanticum* in the eastern Mediterranean Sea indicates that the geographical distribution of the species is not restricted only to the western part of it but spreads throughout the basin. *Melanostigma atlanticum* is typically found in the deep sea, where limited surveys and research have resulted in major data gaps. The lack of recording of the species until recently in the eastern Mediterranean Sea is attributed to the species' small size and slender body shape that allow it to escape traditional fishing gears, as well as the low trawling activity in depths greater than 400 m and the lack of surveys targeting the mesopelagic fish communities.

Introduction

Atlantic soft pout *Melanostigma atlanticum* Koefoed, 1952 of the family Zoarcidae (eelpouts) is a mesopelagic species that inhabits waters between 400 and 1800 m deep on the continental slope (Andriashev, 1986). Of the 14 species included in the genus *Melanostigma* (Orlovskaya and Balushkin, 2020) only *M. atlanticum* is distributed in the North Atlantic region, specifically from the western north Atlantic (Newfoundland to Cape Hatteras) to the coast of Scotland and the north-western Africa in the east, including the Mediterranean Sea (Orlovskaya and Balushkin, 2020). Three more species of the genus *Melanostigma* (*M. gelatinosum*, *M. meteori*, and *M. thalassium* sp.) are distributed in the South Atlantic (Orlovskaya and Balushkin, 2019), while all other species are distributed in the Pacific and the Southern Oceans (Orlovskaya and Balushkin, 2020). The first record of *M. atlanticum* in western Mediterranean waters was found by Tortonese (1970) in the Gulf of Genoa at a depth of 450 m. Four new specimens were found in July 1973 off Blanes (Catalan Sea) at a depth of 570 m (Matallanas, 1975). Several records of *M. atlanticum* were reported later in the western Mediterranean, commonly below 500–600 m depth (Andriashev, 1986; Quignard and Tomasini, 2000; Massuti *et al.*, 2004). In addition, *M. atlanticum* was only recently discovered in the southern Adriatic Sea, along with other rare species (Ungaro *et al.*, 2002).

The biology of *M. atlanticum* is poorly known. McAllister and Rees (1964) and Andriashev (1986) describe it as a planktivorous mesopelagic species which lives along the continental slope. It reaches a length of 15 cm, usually 7–11 cm. During the reproductive period, *M. atlanticum* is known to burrow in soft sediment in groups for egg laying (Silverberg *et al.*, 1987; Silverberg and Bossé, 1994). In the Mediterranean, a patchy distribution has been reported for the species, probably related to aggregation during reproduction and to its preference for specific sediments (Dallarés *et al.*, 2021). Low larval dispersion could be a determining factor posing difficulties for colonizing neighbouring habitats.

In this paper, the presence of *M. atlanticum* is reported for the first time in the eastern Mediterranean basin (Sea of Crete). It is the easternmost confirmed record of the species which extends its distribution range in the Mediterranean Sea eastwards by more than 1000 km.

Materials and methods

During a research trip carried out on 11/12/2019 onboard the R/V PHILIA one specimen of *M. atlanticum* was collected at a station north of the island of Crete in the south Aegean Sea (Sea of Crete; N 35° 31.810, E 24° 49.510; Figure 1). A pelagic trawl with vertical opening of 7 m, horizontal opening of 12 m and a cod-end mesh size of 8 mm (bar; i.e. 16 mm stretched), was used. The trawl sample was collected during daylight, with a 78 min tow duration. The fishing depth was 683 to 710 m (avg. 698.4 m) while the bottom depth varied from 735 to 769 m (avg. 757.5 m); therefore, the pelagic trawl was constantly towed at an approximate distance of 50 m above the seabed. Sampling was carried out within the framework of the MesoBED project in order to explore the distribution, biological aspects, and the ecological role of mesopelagic fish in Greek seas.



Figure 1. Map of the study area; the station is marked with an X.

Results and discussion

The specimen measured 66.1 mm total length (TL), 53.2 mm standard length (SL), 20 mm preanal length (PL) and its total weight was 0.810 g. It had an eel-like elongated and gelatinous body, with a rounded section, which compressed laterally towards the tail. The body was a translucent, gray-colour with violet hues, which darkened to almost black on the back, on the tip of the tail, snout, and chin. The body lateral line and scales were absent and the eyes were large and round (Figure 2). The internal organs and myomeres were visible and the number of myomeres counted was 95, within the range reported for the species (i.e. 93–99; Orlovskaya and Balushkin, 2019). Five suborbital pores and there another five mandibular ones were present under the eyes and in the lower jaw respectively, in agreement with the species' original description (Koefoed, 1952). The head was ovoid and wide, 13% of total length. The pectoral fins (7 rays) were developed, while the pelvic fins were absent. The dorsal and anal fins met at the back of the body and were joined by the tail fin (Figure 2).

Melanostigma atlanticum is the only zoarcid present in the Mediterranean (Dallarés *et al.*, 2021). The specimen matched the description of *M. atlanticum* provided by Orlovskaya and Balushkin (2019) and differed from *M. thalassium*, the only *Melanostigma* species found in the east (but south) Atlantic and which has a non-transparent body (Orlovskaya and Balushkin, 2019). The specimen is stored in formalin at the labs of the Institute of Marine Biological Resources and Inland Waters (IMBRIW, Athens, Greece).

Although several studies on fish communities have been performed in the eastern Mediterranean, this species had never

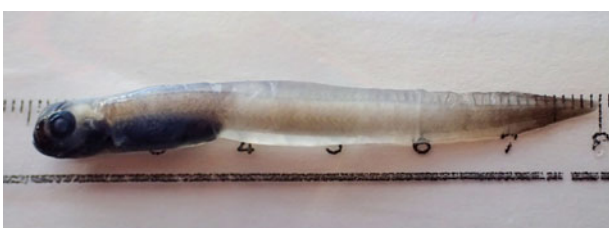


Figure 2. The specimen of *Melanostigma atlanticum* from the Sea of Crete (Total length: 66.1 mm).

been caught or reported from this region due to its deepwater habitat (Golani *et al.*, 2006; Papaconstantinou, 2014). The presence of *M. atlanticum* in the eastern part of the Mediterranean Sea proves that the geographical distribution of the species is not restricted to the western part but spreads throughout the basin. We hypothesize that this species is native to deepwater habitats in the eastern Mediterranean, though it may be rare in these waters. The lack of earlier recording of the species in the eastern Mediterranean Sea is likely attributed to its very small size and slender body shape, which helps it easily escape capture by most commercial fishing gears, as well as the limited trawling activity at depths greater than 400 m (Maina *et al.*, 2018). A large number of studies on the fish fauna of the Mediterranean Sea have concentrated in coastal areas and shallower waters, and focused mainly on commercial species, and more extensive research surveys in those deeper areas occupied by meso- and bathypelagic fish fauna will be required to better understand the biodiversity and ecology of the Mediterranean deep-sea fish community (Tsagarakis *et al.*, 2021).

Authors' contributions. A. Siapatis performed sampling, identified the species, performed measurements and wrote the first draft of this manuscript. K. Markakis performed sampling, identified the species and reviewed the manuscript. K. Tsagarakis acquired funding, performed sampling and measurements and reviewed the manuscript.

Financial support. Sampling was performed in the framework of project MesoBED 'Mesopelagic fish: Biology, ecological role and distribution of a disregarded trophic link', funded by the General Secretariat for Research and Innovation (GSRI) and the Hellenic Foundation for Research and Innovation (HFRI), Greece (Project No. 449).

Competing interest. None.

Ethical standards. Not applicable.

Data availability. The authors confirm that the data supporting the findings of this study are available within the article.

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