

ANNALES

*Analì za istrske in mediteranske študije
Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies
Series Historia Naturalis, 32, 2022, 2*



UDK 5

ISSN 1408-533X
e-ISSN 2591-1783



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Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies

Series Historia Naturalis, 32, 2022, 2

KOPER 2022

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Založništvo PADRE d.o.o.

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Zgodovinsko društvo za južno Primorsko - Koper / Società storica del Litorale - Capodistria[®]

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Redakcija te številke je bila zaključena 23. 12. 2022.

**Sofinancirajo/Supporto finanziario/
Financially supported by:**

Javna agencija za raziskovalno dejavnost Republike Slovenije (ARRS) in Mestna občina Koper

Annales - Series Historia Naturalis izhaja dvakrat letno.

Naklada/Tiratura/Circulation: 300 izvodov/copie/copies

Revija Annales, Series Historia Naturalis je vključena v naslednje podatkovne baze / La rivista Annales, series Historia Naturalis è inserita nei seguenti data base / Articles appearing in this journal are abstracted and indexed in: BIOSIS-Zoological Record (UK); Aquatic Sciences and Fisheries Abstracts (ASFA); Elsevier B.V.: SCOPUS (NL); Directory of Open Access Journals (DOAJ).

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received: 2022-06-20

DOI 10.19233/ASHN.2022.41

THE MAUVE STINGER, *PELAGIA NOCTILUCA*, HAS EXPANDED ITS RANGE TO THE SEA OF MARMARA

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ABSTRACT

A single individual of *Pelagia noctiluca* (Forsskål, 1775) with an approximate bell diameter of 10 cm was observed and photographed from Paşalimanı Island on 12 December 2021, located at the south of Sea of Marmara. The species was hitherto known only from the Aegean and Levantine coasts of Turkey and the present record significantly expands its distribution range. There are currently no signs of an established *P. noctiluca* population, but monitoring studies are certainly required to detect any possible further records from the region.

Key words: *Pelagia noctiluca*, Sea of Marmara, Scyphozoa, range expansion

LA MEDUSA LUMINOSA, *PELAGIA NOCTILUCA*, HA ESTESO IL SUO AREALE AL MAR DI MARMARA

SINTESI

Un singolo individuo di *Pelagia noctiluca* (Forsskål, 1775) con un diametro dell'ombrellino di circa 10 cm è stato osservato e fotografato il 12 dicembre 2021 dall'isola di Paşalimanı, situata a sud del Mar di Marmara. La specie era finora nota solo per le coste egee e levantine della Turchia e il presente ritrovamento ne amplia significativamente l'areale di distribuzione. Al momento non ci sono segni di una popolazione consolidata di *P. noctiluca*, ma sono certamente necessari studi di monitoraggio per individuare eventuali ulteriori segnalazioni nella regione.

Parole chiave: *Pelagia noctiluca*, Mar di Marmara, Scyphozoa, espansione dell'areale

INTRODUCTION

In their comprehensive checklist, Çınar *et al.* (2014) has listed five scyphozoan species from the Sea of Marmara, namely, *Aurelia aurita* (Linnaeus, 1758), *Chrysaora hysoscella* (Linnaeus, 1767), *Rhizostoma pulmo* (Macri, 1778), *Periphylla periphylla* (Péron & Lesueur, 1810) and *Paraphyllina ransonni* Russell, 1956. The local inventory has prominently increased since then by newly recorded species, as an indication of the complex changes in hydrography and bioecology of the region. Occurrences of four additional species were documented lately (*Discomedusa lobata* Claus, 1877 – İşinibilir *et al.* 2015; *Cotylorhiza tuberculata* (Macri, 1778) – İşinibilir *et al.*, 2021; *Mawia benovici* (Piraino, Aglieri, Scorrano & Boero, 2014) and *Drymonema dalmatinum* Haeckel, 1880 – İşinibilir *et al.*, 2022), corresponding to 80% increase in Scyphozoa diversity of Sea of Marmara just within the past eight years.

The mauve stinger, *Pelagia noctiluca* (Forsskål, 1775), is a small-sized warm-temperate holoplanktonic jellyfish occurring in tropical and subtropical regions of the world as far as the North Sea (Mariottini *et al.*, 2008), which is also widely distributed across the Mediterranean Sea (Boero, 2013). Periodical blooms of this species in the western Mediterranean have been reported, causing adverse effects on human health, fisheries, and pelagic ecosystems (Axiak & Civili, 1991). In Turkey, the distribution of the species is restricted to the Aegean and Levantine coasts (Çınar *et al.* 2014), in which the northern limit of the species is the entrance of Çanakkale Strait (Alpaslan, 2001). Despite its noteworthy abundance in the Mediterranean Sea, published information on the species from Turkey is quite limited and only a single outbreak from the northeastern Levant has recently been documented (Çınar & Dağlı, in press).

In this paper, we are recording the first occurrence of *P. noctiluca* from the Marmara Archipelago (Sea of Marmara) ecosystem, representing a significant expansion from its documented distribution range. Due to its characteristic coloration and distinct morphology, we assume its range expansion to the region as a recent event.

MATERIAL AND METHODS

A scientific survey on board the research vessel K. Piri Reis was organized at Marmara Archipelago (south of the Sea of Marmara) during December 2021 within the scope of the MarIAS project (Addressing Invasive Alien Species Threats at Key Marine Biodiversity Areas Project) to assess the composition and distribution of certain alien species through

scuba dives and bottom trawlings. Since the region has recently undergone a catastrophic mucilage event between late 2020 and summer 2021, we also tracked a wide range of organisms other than those targeted within the project. On 12 December 2021, a single individual of *Pelagia noctiluca* was sighted and photographed (Fig. 1) at the southern tip of Paşalimanı Island (Fig. 2., 40°26'42.67"N – 27°39'21.87"E), at a depth of 10 m where the seawater temperature was 13°C. Although the collection of the specimen was not possible at that time, several underwater photographs enabled us to carry out a positive identification. Photographs were taken with a digital compact Olympus TG-6 camera.

RESULTS AND DISCUSSION

The single individual observed had a bell diameter of about 10 cm, characterized by a hemispherical umbrella, four oral arms (longer than the bell diameter) around the mouth, eight relatively thick tentacles (> 25 cm) arising between successive lappets, mauve-colored exumbrella, oral arms and tentacles, rounded warts scattered on the exumbrellar dome, and reddish (female) to purple (male) gonads, conforming to the diagnostic features of *P. noctiluca* (Piraino *et al.*, 2014). The closely related confamilial species *Mawia benovici* is clearly distinguished from *P. noctiluca* by having horse-shoe shaped milky white outwardly convex gonads, white transparent color of tentacles, manubrium and oral arms, and rounded to arrow-pointed exumbrellar cnidocyst warts (Piraino *et al.*, 2014). Considering the bell diameter >8.5 cm (Malej & Malej, 2004) and the purple-colored gonad (Fig. 1), we may assume the present finding of *P. noctiluca* from the Sea of Marmara denotes a mature male individual. Since the study locality (Marmara Archipelago) is regularly being surveyed on a seasonal basis since September 2020 where more than 100 scuba dives were performed, the occurrence of *P. noctiluca* in the region is probably a recent event, currently with no signs of an established population.

The Sea of Marmara is the focus of attention in Turkey, especially due to the drastic ecosystem changes and environmental catastrophes it has experienced during the past few decades. Not only the seawater temperatures showed a significant increase from 15.1 °C during the 1970–1979 period to 16.8 °C during the 2011–2021 period (TSMS, 2021), but also extreme blooms of algae are being observed since 2007, likely to be triggered by the combined effects of human-induced pressures such as domestic and industrial wastes, insufficient treatment levels and overfishing, along with the climate change (Balkış-Özdelice *et al.*, 2021). Such cumulative effects have been indicated

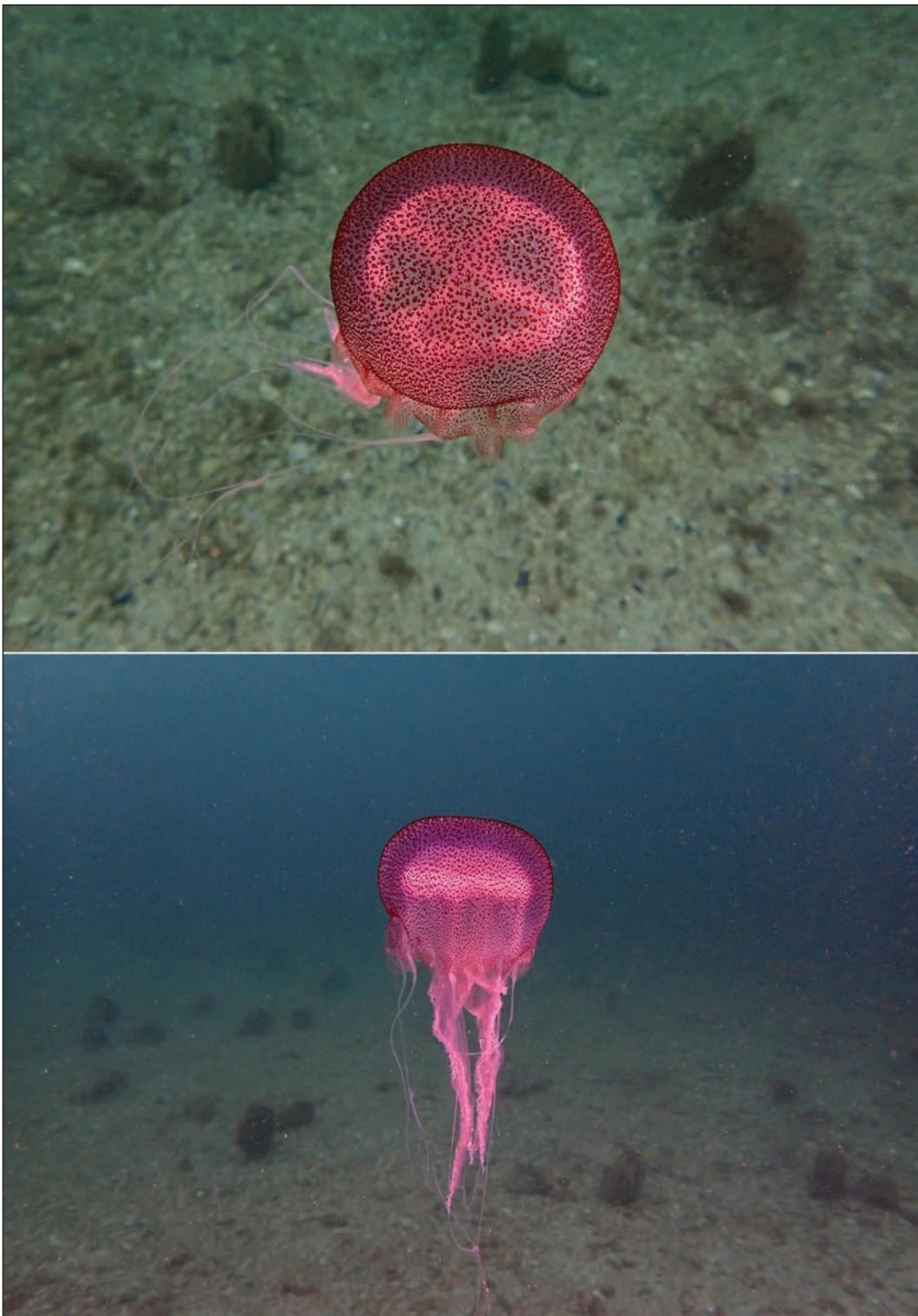


Fig. 1: Underwater photographs of the single *Pelagia noctiluca* individual observed in Sea of Marmara (top: upper view, bottom: lateral view). Gonad color (purple) indicates a male individual (Photo: M. Bilecenoglu).

Sl. 1: Podvodni fotografiji primerka mesečinke (*Pelagia noctiluca*), opaženega v Marmarskem morju (zgoraj: pogled z vrha; spodaj: pogled s strani). Barva gonad (vijolična) kaže, da gre za samca (Foto: M. Bilecenoglu).

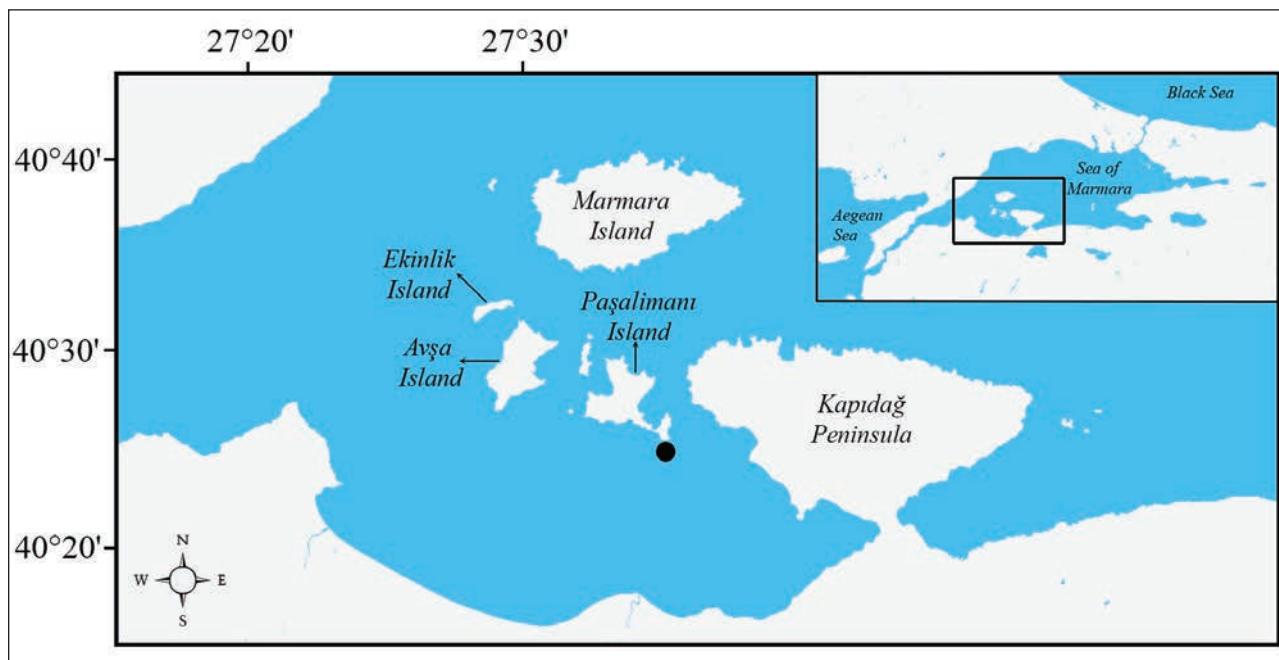


Fig. 2: Map of the observation locality of *Pelagia noctiluca* (indicated by a full dot) in the Sea of Marmara.
Sl. 2: Zemljevid z lokaliteto, kjer je bil opažen primerek mesečinke (*Pelagia noctiluca*) (črn krogec) v Marmarskem morju.

to be involved in the mechanisms which can promote the increase of jellyfish occurrence (Mills, 2001; Boero, 2013). In addition to the above-mentioned stressors, *P. noctiluca* has been identified as prey of some apex Mediterranean predators, including tuna (*Thunnus thynnus*) and swordfish (*Xiphias gladius*) (Cardona et al., 2012), which have disappeared from the Sea of Marmara simply due to overfishing (Ulman et al., 2020), and massive removal of top-predator fishes could open up food resources for jellyfish (Mills, 2001). It is worth mentioning that our *P. noctiluca* observation from the Sea of Marmara is followed by the recent mucilage event (November 2020 to mid-2021) that has intensely impacted the region to an unimaginable extent, corresponding to the most vulnerable ecosystem state where mass mortalities and/or severe declines of several taxa such as the endangered *Pinna nobilis* (Çınar et al., 2021a; also see the dead individuals in the background of Fig. 1) and the vulnerable *Paramuricea clavata* (Topçu & Öztürk, 2021) were observed.

The Aegean Sea is connected to the Sea of Marmara through the Çanakkale Strait, which is a very important biological corridor characterized by a

two-layered current system, facilitating not only the penetration of thermophilic native species, such as *P. noctiluca*, but also many alien species originating from the Red Sea that have formed viable populations (Çınar et al., 2021b). To assess and understand the changes that these species will trigger in the fragile ecosystems of the Sea of Marmara, long-term monitoring studies are required.

ACKNOWLEDGEMENTS

We are grateful to the crew of research vessel K.Piri Reis for their constant support throughout the study. Special thanks to our scuba diving buddies Dr. M.Baki Yokeş and Dr. Harun Güçlüsoy. The study is financed by the project titled “Addressing Invasive Alien Species Threats at Key Marine Biodiversity Areas GEF VI Project” implemented by the Republic of Türkiye, Ministry of Agriculture and Forestry, the General Directorate of Nature Conservation and National Parks in cooperation with the United Nations Development Programme (UNDP) funded by the Global Environment Facility (GEF).

MESEČINKA (*PELAGIA NOCTILUCA*) JE RAZŠIRILA SVOJ AREAL DO MARMARSKEGA MORJA

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POVZETEK

Primerek mesečinke, *Pelagia noctiluca* (Forsskål, 1775) s premerom klobuka približno 10 cm so 12 decembra 2021 opazovali in fotografirali blizu otoka Paşalimanı v južnem Marmarskem morju. Do zdaj so to vrsto poznali le z egejske in levantske obale Turčije. Pričajoči zapis o pojavljanju potrjuje, da se je njen areal znatno razširil. Za zdaj ni znakov, da bi mesečinka vzpostavila svojo populacijo, je pa smiseln redni monitoring, ki bi obelodanil možne nove zapise o pojavljanju te vrste v regiji.

Ključne vrste: *Pelagia noctiluca*, Marmarsko morje, Scyphozoa, širjenje areala

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