

SHORT COMMUNICATION

The first record of *Drymonema* sp. from the Sea of Marmara, Turkey

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Abstract

This study presents the first record of a jellyfish of the genus *Drymonema* from the Istanbul coast of the Sea of Marmara, Turkey, in February 2020. While exceedingly rare in the second half of the 20th Century in the Mediterranean Basin, a specimen of the genus *Drymonema* (*D. dalmatinum*) has been recorded in the Gulf of İzmir and Foça (Turkey), but it has never been recorded as far into the Sea of Marmara. A role of citizen science in terms of spotting such rare species is highlighted.

Keywords: *Drymonema*, *Drymonema dalmatinum*, gelatinous zooplankton, Sea of Marmara, Scyphomedusae, citizen science

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The large scyphozoan jellyfish genus *Drymonema* was first described as *Drymonema dalmatinum* in 1880 from the Dalmatian coast of the Adriatic Sea (Haeckel 1880). Within the Mediterranean Sea, specimens of *D. dalmatinum* were then found in the Adriatic Sea (Kolosvary 1937; Stiasny 1931, 1940a, 1940b), the Strait of Gibraltar (Haeckel 1881), and the Gulf of Izmir (Antipa 1892). Interestingly, after Stiasny (1940a), *Drymonema* sp. had not been recorded in the Mediterranean Basin for more than 50 years, until Bayha and Dawson (2010) recorded *D. dalmatinum* from Foça near the Gulf of İzmir, Turkey, in 2003. However, along with their 2014 sightings, Malej *et al.* (2014) identified *D. dalmatinum* specimens from photographs, which were taken in the Adriatic Sea in 1984 and 2001.

Drymonema jellyfish represent a morphologically and evolutionarily unique semaeostome taxon. Although Haeckel (1881) recognized the distinctiveness of *Drymonema*, coining the subfamily Drymonemidae, Bayha and Dawson (2010) showed that molecular, morphological and ecological differences supported Drymonemidae as a distinct family of semaeostomeae jellyfish. *Drymonema* jellyfish are morphologically distinctive from other scyphozoan genera, especially from the similar *Cyanea*, by the fact that their rhopalia do not occur at the bell margin (unique among scyphozoans) and that tentacles arise from a broad annular band toward the center of the subumbrella in *Drymonema* (Bayha and Dawson 2010).

In addition, Genus *Drymonema* is unique among the semaeostomes in that adult jellyfish obligately eat the moon jellyfish *Aurelia* sp. (Larson 1987; Bayha and Dawson 2010; Bayha *et al.* 2012), with adults developing adaptations to soft prey as they grow (Larson 1987; Bayha and Dawson 2010). Growing very large, *Drymonema larsoni* can exert significant predation pressure on *Aurelia aurita* blooms, but likely require very large concentrations of prey to sustain their populations (Larson 1987; Bayha *et al.* 2012).

A single specimen of *Drymonema* was observed by a free diver at 6 m depth, on 22 February 2020 at Kadıköy (Figure 1), İstanbul Strait, in the northeastern part of the Sea of Marmara. Photographs and video shared by the National Jellyfish and Gelatinous Organisms Watch Programme “YaYakarsa” (www.yayakarsa.org), created and run by Turkish Marine Research Foundation (TUDAV).

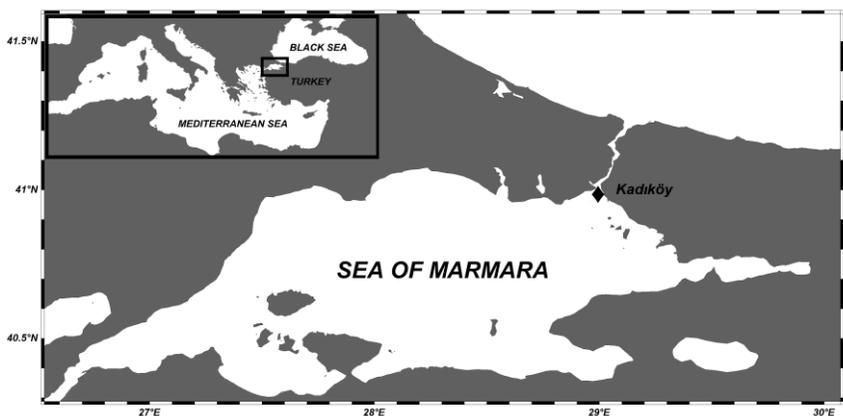


Figure 1. Location of the record of *Drymonema* sp.

Photographs and video were taken by GoPro Hero 7 near the sea floor at a depth of 6 m. Its total length was estimated as approximately 70 cm based on the video. The observed *Drymonema* individual was recorded in the middle of an area with

tens of individuals of *A. aurita* (Figure 2), which form *Drymonema*'s main food source.

Identification of the jellyfish to the genus *Drymonema* was clear, from video and still photos, based on multiple morphological characteristics, differing markedly from the genus *Phacellophora*, which also feeds on *Aurelia* and can be found in the Mediterranean. Morphological characteristics typical of *Drymonema* (Bayha and Dawson, 2010; Malej *et al.* 2014) seen in the specimen included: A) bell markings of central circle with red/brownish bifurcating radiating lines (Figure 2A); B) flame-shaped, white gonads hanging among the oral arms (Figure 2B); C) tentacles arising from bottom of the bell, from the margin toward the mouth (clear in video). On the other hand, *Phacellophora* typically has a clear bell with a yellowish center, gonads in pouches, and tentacles that occur in clusters near the bell margin (Mayer 1910).

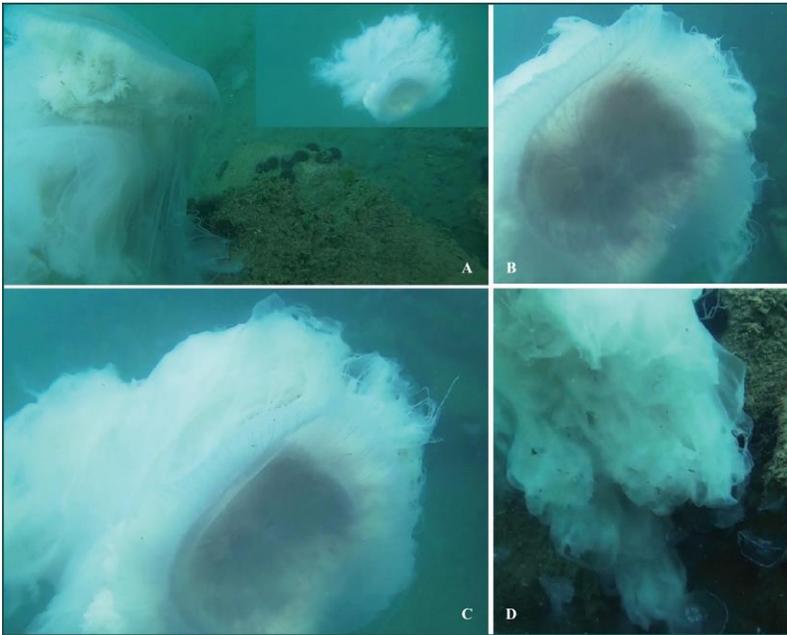


Figure 2. Live specimen of *Drymonema* sp. in the Sea of Marmara (A: Central circle, B: Gonads and oral arms, C: Tentacles and oral arms, D: Oral arms)

A range expansion of *Drymonema dalmatinum* is the simplest explanation for the appearance in the Sea of Marmara. However, there is no sufficient evidence to identify to species and long-range anthropogenic transport of another species cannot be ruled out, thus it was decided to identify only to the genus (*Drymonema* sp.). Three species of *Drymonema* were reported in previous studies, *D. dalmatinum* for the Mediterranean (Haeckel, 1880), *D. larsoni* (Bahya &

Dawson, 2010) for the Caribbean and *D. gorgo* for the Brazilian provinces (Malej *et al.* 2014).

Native and non-native gelatinous zooplankton species have been monitored for some time in the Mediterranean Sea (Brotz and Pauly 2012; D’ambra and Malej 2015), but *D. dalmatinum* can be stated as one of the rare and less studied species in the Mediterranean region. Citizen based records are becoming more critical to science, especially where species occur temporally or geographically patchy because the species is in the early stage of colonization and still rare (Langeneck *et al.* 2019). To wit, apart from historical photographs taken by citizen scientists (Malej *et al.* 2014), this species had not been sighted in the Mediterranean since before World War II until 2003 by Bayha and Dawson (2010). In their assessment of increasing *Drymonema* sightings in the Mediterranean, Malej *et al.* (2014) recognized that the reason for their increased occurrence is not clear, although, like Bayha and Dawson (2010), agreed that large populations of their obligate prey (*Aurelia*) may play a vital factor.

Although unclear, the reason for this unique appearance in the Sea of Marmara also likely relates to large populations of its prey, *A. aurita*. The coasts of Istanbul, Turkey, have been exposed to intense coastal use, with concomitant impacts on the coastal marine zone, through domestic and industrial pollution including nutrient runoff leading to eutrophication (Ediger *et al.* 2016). Along with nutrient shifts, there has been a shift in the planktonic organisms since the 1970’s, including a dramatic increase in populations of *A. aurita* (Kıdeyş and Niermann 1994). Likewise, scientific cruises carried out in the Sea of Marmara have recorded large numbers of *A. aurita* (İşinibilir 2007, 2012; Cinar *et al.* 2014; İşinibilir and Yılmaz 2016; Öztürk *et al.* 2018). In spite of all these efforts, however, *Drymonema* had never been recorded in the Sea of Marmara until now. This study also represents the importance of national/regional jellyfish monitoring programmes with the participation of citizens in order to understand the biodiversity of the gelatinous zooplankton species.

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Marmara Denizi'nde *Drymonema* sp. ilk kaydı

Öz

Bu çalışma 2020 yılı Şubat ayında, Marmara Denizi, İstanbul kıyılarında tanımlanmış olan *Drymonema* cinsi denizanasının ilk kayıdır. 20. yüzyılın ikinci yarısında Akdeniz'de son derece nadir görülen bu tür, İzmir Körfezi ve Foça'da daha önce görülmüş olmasına karşın, Marmara Denizi için ilk kayıt olma niteliğindedir.

Anahtar kelimeler: *Drymonema*, *Drymonema dalmatinum*, denizanası, Marmara Denizi, Scyphomedusae, halk bilimi

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