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Rare Occurrence of the Rough Ray *Raja radula* (Family: Rajidae) in the Northeastern Mediterranean

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Research Article

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Abstract

On December 04, 2017, a single female specimen of rough ray *Raja radula* Delaroche 1809 with a total length of 510 mm and weight of 780 g, and its egg case were caught by a commercial trawler from a 65-80 m depth range. *R. radula* is endemic to the Mediterranean and is a rare species in terms of its occurrence on the eastern Mediterranean coast of Türkiye. Therefore, the present study reports a rare occurrence of *R. radula* and its egg case off Aydıncık, Mersin Bay (northeastern Mediterranean) along with some of their morphological measurements. The species is a high priority for conservation action, and urgent plans must be made and implemented without delay to protect this species, which is approaching critical levels.

Keywords: *Rare occurrence, rough ray, Raja radula, Mersin Bay, northeastern Mediterranean.*

Introduction

In Turkish marine waters, 32 species of batoids belonging to 10 families are distributed, among which the family with the highest species diversity is Rajidae, represented by 14 species (Turan et al., 2025). Recently, blonde ray *Raja brachyura* was first recorded in Turkish marine waters by Turan et al. (2024), and it was included in the checklist of cartilaginous species of Türkiye (Turan et al., 2025).

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The rough ray *Raja radula* Delaroche 1809 belongs to the genus *Raja* of the family Rajidae. *R. radula* lives in coastal areas, commonly between 2 and 300 m depths on sandy and/or muddy bottoms in continental shelves (Froese and Pauly, 2025). It feeds on crustacean decapods, fishes, echinoderms, algae, mollusks, and polychaetas (Consalvo et al., 2010; Kadri et al., 2013a). Female individuals reach maturity at a disc width of 34 cm, while males mature at 30 cm (Capape, 1979; Yeldan, 2005; Serena et al., 2010). *R. radula*, an oviparous species, lays around 80 to 154 eggs annually (Walker, 1998). Its eggs are oblong capsules with hard, pointed horns at the corners, deposited on sandy or muddy flats (Breeder and Rosen, 1966). The egg cases measure 5.1 to 5.7 cm (Kadri et al., 2013b). Reproduction occurs year-round, with the peak active period for laying eggs being late spring and summer. Embryos take about 4 months to develop (Stehmann and Bürkel, 1984). In addition, female can live up to 12 years and grow to a total length of 80 cm, while males live up to 9 years and reach about 70 cm in length (Stehmann, 1990).

R. radula is distributed mainly in the western Mediterranean (Tortonese, 1956). Although the species has also been observed on the Atlantic coast of Morocco (Stehmann and Bürkel, 1984), these were considered probable misidentification cuckoo ray *Raja naevus* and/or African ray *Raja africana* (IUCN, 2025). *R. radula* is found in shallow waters in the western Mediterranean at various depths, such as Ibiza and Balearic Islands (Spain) (Tortonese, 1956; Morey et al., 2009), southern Sicily (Italy) (Consalvo et al., 2010), eastern Sicily (Italy) (Trialongo et al., 2018), and Gulf of Gabes (Tunisia) (Capape, 1979; Kadri et al., 2013a, b). The species has also been recorded in the eastern Mediterranean, including Israel (Golani, 2006), Greece (Papaconstantinou, 1998; Moutopoulos and Stergiou, 2002), Syria (Saad et al., 2006), and Türkiye (Fischer et al., 1987).

The distribution of *R. radula* in Turkish marine waters cover the Mediterranean (Akyüz, 1957; Geldiay, 1969), Aegean Sea (Tortonese, 1947; Geldiay, 1969; Fischer et al., 1987; Bilge et al., 2014; Eronat and Özaydın, 2014), and Marmara Sea (Yaka and Yüce, 2006; Yarmaz, 2009; Türker et al., 2019), but it is absent in the Black Sea (Serena, 2005). The species has also been reported specifically from the Saros Bay (northern Aegean Sea) by Karakulak et al. (2006), İşmen et al. (2007), Yığın and İşmen (2009, 2014), and from the eastern Mediterranean coast of Türkiye by Keskin et al. (2011) and Saygu (2011) in several studies.

The rough ray is endemic to the Mediterranean (Fricke et al., 2007; Turan et al., 2025). Despite being included in the various checklists of Turkish marine waters (Bilecenoğlu et al., 2014; Bilecenoğlu, 2024; Turan et al., 2025), *R. radula* is a rare species on the eastern Mediterranean coast of Türkiye. Thus, this study reports the rare occurrence of *R. radula* and its egg case for the first time off Aydıncık, Mersin Bay (northeastern Mediterranean).

Material and Methods

A single female specimen of *Raja radula* with its egg case was caught by a commercial trawler on December 04, 2017, off Aydıncık, Mersin Bay (coordinates: 36°07.350’ N, 33°20.750’ E and 36°06.090’ N, 33°16.250’ E) in the 65-80 m depth range (Figure 1).

The specimen and the egg case were identified, photographed, and measured. The measurements of the specimen were taken to the nearest 0.01 mm using a digital caliper, and the body

was weighed to the nearest 0.1 g. All morphological descriptions, including color, are based on Stehmann and Bürkel (1984), Serena (2005), and Compagno (2011).

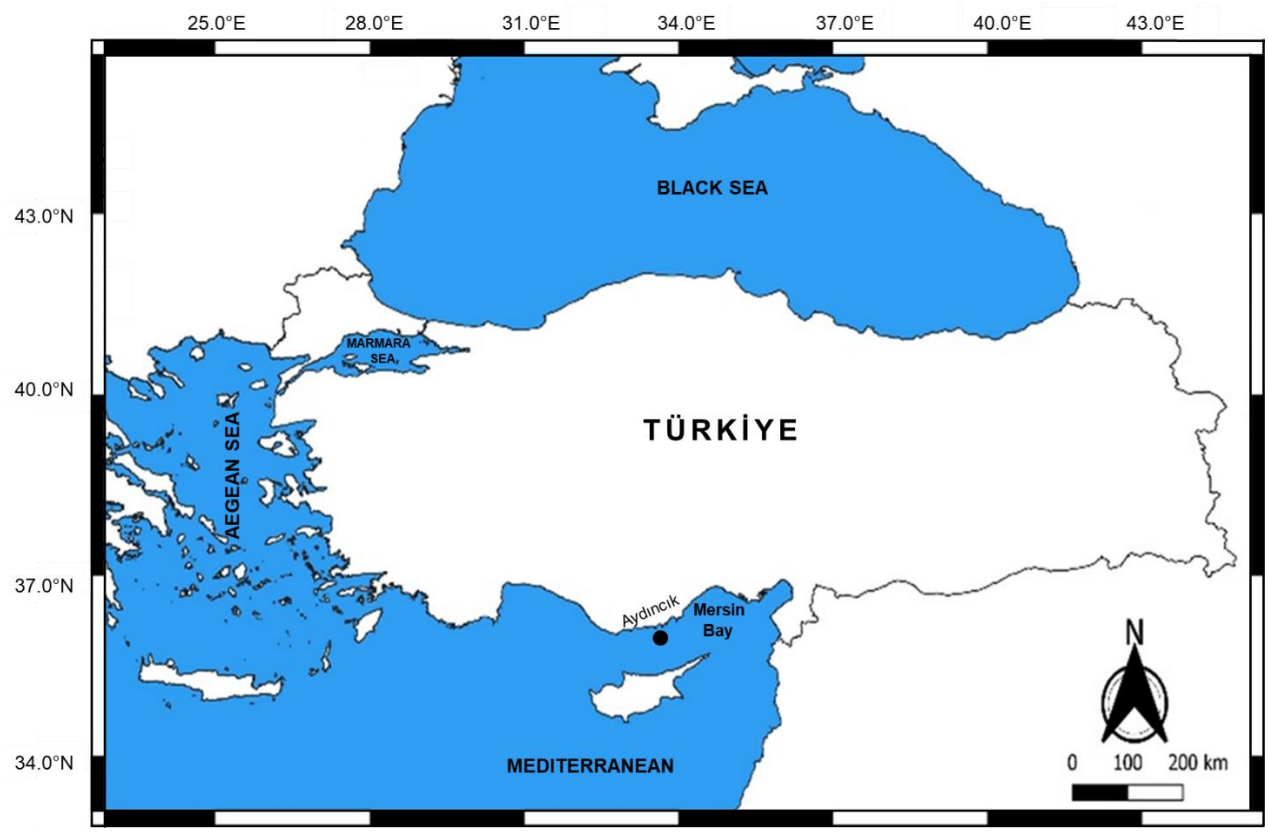

Figure 1. Sampling area (●) of *Raja radula* in Mersin Bay, northeastern Mediterranean.

Results

The main diagnostic characters and morphometric measurements of the captured *Raja radula* are given in millimeters: the specimen had a total length of 510 mm, a disc width of 350 mm, and a total weight of 780 g.

The observational evaluations of the specimen are as follows: The subcircular body features a short, curved snout, convex anterior edges, and angular wings at the extremities. The pectoral fins are wider than long and have an edge that forms a sinuous curve. The upper surface is covered with fine spinules. Small spines are on the snout and the posterior half of the tail (ventral surface), and two spines are between the dorsal fins. The upper surface is mainly light brown and grey, featuring darker spots and lines. Two eyespots with yellow rings and a thick outer dark ring dotted with light spots are positioned on each side of the spinal meridian at the widest part of the body (Figure 2).

All diagnostic characteristics of the captured *R. radula* are consistent with the morphological descriptions of Stehmann and Bürkel (1984), Serena (2005) and Compagno (2011). Some morphometric measurements of the *R. radula* specimen are given in Table 1.

Figure 2. Female specimen of *Raja radula* caught from Mersin Bay.

Table 1. Morphometric measurements of the captured *Raja radula* specimen from Mersin Bay.

Metric	Value (mm)	%TL
Total length	510	100.0
Disc length	280	54.9
Disc width	350	68.6
Snout length	30	5.8
Inter orbital width	21	4.1
Spiracle length	11	2.1
Anterior pectoral length	34	6.6
Posterior pectoral length	22	4.3
1st dorsal fin base	50	9.8
2nd dorsal fin base	45	8.8
Tail length	190	37.2
Tail base fin	35	6.8
Total weight (g)	780	-

%TL, percentage ratios of metric characters compared to the total length.

An egg case measuring 65 mm long (excluding horns) and 27 mm wide was also observed in the captured female specimen (Figure 3). Furthermore, morphological measurements and egg case were obtained for the first time from Mersin Bay.

Figure 3. Egg case of *Raja radula* from Mersin Bay.

Discussion

Raja radula, commonly found in temperate waters, is most prevalent in the western Mediterranean but is rarely found in the Eastern Mediterranean. The species is primarily caught as bycatch in commercial trawl fisheries and commonly has a demersal distribution at depths of up to 300 m (Stehmann, 1990). In this study, the rough ray was captured at a depth of about 80 m in Mersin Bay. Yığın and İşmen (2014) reported that the species was found in shallower waters (5-200 m) in Saros Bay (northern Aegean Sea). Similarly, Keskin et al. (2011) reported captures at depths of 57-78 m in the eastern Mediterranean and the northern Aegean Sea. The depth range caught is consistent with previous studies.

Previous studies have indicated that this species is rare in Israel (Golani, 2006) and northern Aegean Sea (Keskin and Karakulak, 2006). In addition, according to IUCN (2025), the decline of *R. radula* populations in the Aegean Sea and the Mediterranean is projected to be more than 50% over 27 years (1995-2023). Therefore, comprehensive and detailed studies are needed to determine the full range, abundance, interaction with fisheries and population trends of this species.

R. radula has been classified as Endangered (EN) on the IUCN Red List since 2016 (Mancusi, 2016; IUCN, 2025; Turan et al., 2025). The species is one of the few elasmobranchs endemic to the Mediterranean and rare in the eastern basin and is still not protected in Turkish marine waters. In their recent study, Turan et al. (2025) stated that *R. radula* should also be given legal protection in Turkish marine waters. Therefore, this new finding is important as it contributes to our understanding of the distributional role of the species in the region. However, confirmation of reproductive aggregations and nursery habitats in this area is required.

In conclusion, Mediterranean faces growing challenges from the destruction and overexploitation of coastal habitats, putting many fish species, especially cartilaginous ones, at risk. The Mediterranean endemic *R. radula* is caught as bycatch in coastal bottom fisheries. Its population

has been declining significantly, likely due to its high sensitivity to human activities. Therefore, this species urgently needs conservation efforts, and immediate action is needed to prevent it from reaching critical levels.

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Conflict of Interest

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

Author Contributions

All authors performed all the experiments and drafted the main manuscript text. 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 data used in the present study are available upon request from the corresponding author.

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