



The confirmed occurrence of two specimens of *Remora remora* (Linnaeus, 1758) from Mersin Bay (NE Mediterranean, Turkey)

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Cite this article as:

Ergüden, D., Ayas, D. (2021). The confirmed occurrence of two specimens of *Remora remora* (Linnaeus, 1758) from Mersin Bay (Ne Mediterranean, Turkey). *Aquatic Research*, 4(3), 293-298. <https://doi.org/10.3153/AR21023>

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ABSTRACT

Remoras attach to sharks, big fish, and sea turtles and continue their lives with these creatures. Kapızlı and Tekeli beaches are located near Göksu Delta and Anamur nesting areas of *Caretta caretta*. In this study, two *Remora* individuals were caught with a fishing rod in July, when the ovulation was most intense. The smaller remora individual (33 cm) was caught from the coast of Tekeli with the chicken breast at a depth of 2.5 m, and the larger one (66 cm) with bread at a depth of 1.5 m from Kapızlı beach on 24.07.2020. The two *Remora* individuals caught were probably attached to the sea turtles. However, probably due to sea turtles going to the beach to lay eggs, *Remoras* started to free-swimming, and they were caught with the fishing line since they could not be fed. The present study reported that the first occurrence of *Remora* specimens is probably attached to turtles for Turkey's northeastern Mediterranean coast. Besides, this study is provided some morphometric and meristic data on this species and discussed a probable host of these specimens.

Keywords: Echeneidae, Shark sucker, Record, Mediterranean Sea, Turkey

Submitted: 23.08.2020

Revision requested: 14.12.2020

Last revision received: 15.12.2020

Accepted: 15.12.2020

Published online: 16.05.2021

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Introduction

The family Echeneidae is represented in the Mediterranean Sea by two genera *Echeneis* (Sucking disc with 18 to 28 laminae), *Remora* (Pelvic fins broadly attached to the abdomen; disc laminae 16 to 20), and four species of live sharksucker *Echeneis naucrates* Linnaeus, 1758, Whalesucker *Remora australis* (Bennett, 1840), Marlin sucker *Remora osteochir* (Cuvier, 1829), and Shark sucker *Remora remora* (Linnaeus, 1758) (Bilecenoglu et al., 2014; Stamouli et al., 2018; Tuncer et al., 2012).

The sucking disc easily distinguishes *R. remora* on the top of the head, which represents a modification of the spinous dorsal fin. It is a globally distributed, epipelagic species found to a maximum depth of 200 m (Fricke et al., 2011) in tropical to warm temperate waters in the western and eastern Pacific, western and eastern Atlantic, including the Mediterranean (Fishbase, 2020). This species is frequently associated with sharks, large fishes, turtles, and occasionally free-swimming (Eschmeyer et al., 1983; Mundy, 2005). It feeds mainly on scraps resulting from the feeding activities of their host and sometimes feed on parasitic copepods (Muus & Nielsen, 1999).

Remora species may attach to a diverse array of host types. *Remoras* probably are benefited from this association in several ways, including transport, feeding opportunities, and protection from some predators (Alling, 1985; Fertl & Landry, 2002; O'Toole, 2002).

This study aimed to document the first confirmed record of two specimens of *R. remora* for the northeastern Mediterranean coast of Turkey. Besides, provide some morphometric and meristic data on the species and discuss a probable host of this specimen.

Material and Methods

One specimen of the *R. remora* was caught with a fishing rod at a depth of 1.5 m in the Kapızlı ($36^{\circ}24'11.0''N$ - $34^{\circ}04'44.4''E$) (Figure 1), and other specimen was caught by a fishing rod at a depth of 2.5 m on Tekeli coast (Coordinate: $36^{\circ}07'55.0''N$ - $33^{\circ}07'39.2''E$) Mersin Bay on 24 July 2020 (Figure 2). Sampling points of the species in Turkey's Eastern Mediterranean Sea coast is presented in the map (Figure 3). These specimens were immediately transported to the laboratory for a more detailed examination. Morphometric measurements of the samples were made to the nearest 0.1 mm using a digital caliper and weighed to the nearest gram (g). All measurements, counts, and morphological characters agree with those of Muus & Nielsen (1999). These specimens

were preserved in 4% formaldehyde and deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (catalog number: MEUFC-20-11-131).

Results and Discussion

The specimens of *R. remora*, 33.0 cm and 66.0 cm in total length and 356 and 1665 g in weight, presented the following meristic characters: dorsal fin rays 21-23, anal-fin rays 21-22, pectoral fin rays 25-26, and suction disc laminae (modified first dorsal fin), 19-22 (Table 1).

Body elongate and robust. Head depressed. Head with a sucking disc which does not extend posteriorly as far as the end of depressed pectoral fin short and round. Caudal fin emarginate and caudal peduncle thick. Scales minute and indistinct. Disc extending more or less to the distal end of the pectoral fin. Lower jaw extending beyond the upper jaw. Teeth on jaws, palatines, vomer, and tongue. Dorsal and anal fins are originating well behind the middle of standard length, low, longest ray about 6th (Paulin & Habib, 1982).

The morphometric data gave the following ratios, as a percent (%) of Standard Length (SL) or Head Length (HL): body depth 7.3-7.4, head length 70.0-69.7, predorsal length 32.9-33.0, preanal length 74.5-74.9, caudal peduncle length 3.3-3.4, all in SL; eye diameter 8.8-9.6, preorbital distance 42.6-43.7, postorbital distance 39.7-40.8, all in HL. The morphometric measurements and meristic counts of *R. remora* were indicated in Table 1 and compared to previous reports from New Zealand (Paulin & Habib, 1982) from Irish waters (Quickley et al., 1994). Morphological data of *R. remora* are consistent with measurements and counts reported by other authors describing this species (Muus & Nielsen 1999; Paulin & Habib, 1982; Quickley et al., 1994), with minor differences.

The color of fresh specimens was the body brown, and the sucker disk contained light brown and dark brown stripes. The edge lower sides of the body were colored light grey-blue strips.

Remoras select a wide variety of large fishes, reptiles, cetaceans, and some species as hosts or attach themselves to floating objects. This species shows considerable host specificity (Strasburg, 1964; Lachner, 1966). According to Nelson (1976), the *Remora* specimens have pressed the disc against its intended host and adheres by the partial vacuum created by operating the disc ridges like slats in a Venetian blind.

Table 1. Morphometric (mm) and meristic characteristic of the *R. remora* specimens from the Northeastern Mediterranean (Mersin Bay, Turkey) compared with and compared with previous record (Paulin & Habib, 1982 and Quickley et al., 1994)

Measurements	Values (cm)		
	This Study (n=2)	Paulin & Habib (1982) (n= 36)	Quickley et al. (1994) (n=1)
Total length	33.0-66.0	-	36.5
Standart length	26.7-53.5	6.0-26.5	29.5
Head length	6.8-13.5	2.6-3.0	7.5
Body depth	1.9-3.9	1.3-1.6	-
Disc length	4.8-9.6	3.2-3.9	9.5
Disc width	2.5-4.9	1.4-2.0	4.3
Eye diameter	0.6-1.3	0.3-0.5	-
Preorbital distance	2.9-5.9	-	-
Postorbital distance	2.7-5.5	-	-
Dorsal fin length	4.0-8.0	2.6-3.2	-
Predorsal length	8.8-17.7	6.2-7.0	-
Preanal length	20.0-40.0	-	-
Caudal peduncle length	0.9-1.8	0.5-0.7	-
Dorsal fin rays	21-23	20-24	21
Anal fin rays	21-22	-	21
Pectoral fin rays	25-26	-	25
Disc laminae	19-22	16-18	17



Figure 1. A specimen of *Remora remora* 66 cm TL, in Kapizlı, Mersin Bay



Figure 2. A specimen of *Remora remora* 33 cm TL, in Tekeli, Mersin Bay

Remora remora lives more active as parasite pickers (Smith, 1997) and can reach up to 86.4 cm (Claro, 1994) and commonly occur 40 cm in total length, TL (Sanches, 1991). Froese & Pauly (2020) suggested that its maximum published weight was 1100 g (IGFA, 2001) for this species.

According to O'Toole (2002), *Remoras* (Echeneidae) are known to attach to several types of marine vertebrates, including fishes (large teleost fish and sharks), turtles, and mammals. However, they sometimes can be free swimming. Lachner (1966) is reported that several genera and species of sharks and large teleost's as hosts for this species, and he stated that in his study, the hosts to which *Remora* specimens collected by the purse-seiner were attached to could not be recorded because when the *Remoras* are taken out of the water, they detach themselves from the host. Besides, a few researchers (Kaspiris & Ondrias, 1984; O'Toole, 2002) reported samples of *R. remora* found with attached on a turtle in the southeast Aegean Sea.

Kapızlı and Tekeli coasts are located near Anamur and Göksu Delta, the significant nesting areas of Mersin, which allows *Caretta caretta* turtles to go out on the beaches and lay their eggs (Türkozan & Kaska, 2010). In this study, two *Remora* individuals caught were probably be attached to the sea turtles. It is assumed that *R. remora* samples caught by fishing rod probably free swimming when caught. Similarly, Phillips (1964) are reported the recording of *R. remora* individuals is associated with the marlins, *Caretta caretta* turtle, and the blue shark in New Zealand waters.

Fretey (1978, 1979) had observed specimens of *R. remora* in the French Guiana coast accompanying a female leatherback turtle onto the beach during the nesting season. Result of this study, he had informed that although some of the *Remoras* died from dehydration, others actually survived and again returned to the sea still attached to their hosts. Similarly, Quickley et al. (1994) reported six *R. remora* specimens had been recorded in association with leatherback turtles *Dermochelys coriacea* in Irish waters 1980's. Also, Quickley et al. (1994) declared that about the occurrence of both species with together along the south Irish coast and even in northern European waters by several researchers (Angel, 1922; Bouxin et al., 1933; Brongersma, 1967, 1972; Wheeler, 1969, 1978; Whitehead et al., 1986) in previous years.

Conclusion

In the present study, two *Remora* individuals captured are probably associated with the *Caretta caretta* turtles. However, we think that because the turtles go to the beach for nesting, the *Remoras* may tend to free swimming, and due to they cannot be fed, they probably are caught by fishing rods.

Compliance with Ethical Standard

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

Ethics committee approval: Approved by institutional, regional and national animal ethical statements.

Funding disclosure: -

Acknowledgments: The authors would like to thank the fishers for providing the specimens of *Remora remora*.

Disclosure: -

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