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TROPHIC INTERACTIONS BETWEEN THE GIANT DEVIL RAY *MOBULA MOBULAR* AND SHARKS IN SICILIAN WATERS (MEDITERRANEAN SEA)

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We report two cases of trophic interactions between the giant devil ray and sharks in Sicilian waters, Mediterranean Sea. These include a shortfin mako filmed while feeding on a giant devil ray in the Messina Strait in May 2018, and a female giant devil ray stranded in Milazzo in January 2025 showing bite marks likely inflicted by a blue shark.

Keywords: devil fish, giant devil ray, *Mobula mobular*, shortfin mako shark, *Isurus oxyrinchus*, diet, predation, scavenging

The giant devil ray, or devil fish, *Mobula mobular* (Bonnaterre, 1788) belongs to the order Myliobatiformes and the family Mobulidae. Its lozenge-shaped disc is much broader than long, with wide and pointed pectoral fins. The tail is filamentous, with a small dorsal fin and a spine near its base. Prominent fleshy cephalic lobes extend forward on each side of the head [Last, Stevens, 2009]. The mouth is broad and subterminal, with 150–160 rows of minute teeth in each jaw. There are five pairs of gill slits located ventrally. Dorsal surface is brown to bluish-black with a blackish collar across the head; ventral surface is white [Ebert, Dando, 2021]. The giant devil ray is known to inhabit the eastern Atlantic and the Mediterranean Sea, but it may have a circumglobal distribution in temperate and tropical waters [FishBase, 2024]. It is pelagic, coastal, and oceanic, occurring at a depth range from 0 to 700 m [Canese et al., 2011; Weigmann, 2016]. The embryonic development of this species is aplacental viviparous, with a gestation period of up to 25 months and litter size of 1–2 young [Ebert, Dando, 2021]. Its disc width at birth is 90–160 cm, and the disc can attain a maximum size of 320 cm [Ebert, Dando, 2021]. It feeds on planktonic crustaceans and small schooling fishes, filtering water over its gill filter-plates [McEachran, Capapé, 1984].

In the present article, we report two cases of trophic interactions between giant devil rays and sharks in Sicilian waters, Italy, central Mediterranean Sea.

MATERIAL AND METHODS

In May 2018, a video documenting a juvenile shortfin mako shark *Isurus oxyrinchus* Rafinesque, 1809, swimming with a giant devil ray in its mouth, was filmed in the Messina Strait, Italy. The 1 min and 13 s video was filmed by Giuseppe Morabito from the feluca "Felicia II," a traditional fishing boat used to catch swordfish. The shark can be seen holding the head of the giant

devil ray in its mouth while swimming calmly at the water surface. The giant devil ray is apparently dead: it is turned upside down, and has the apex of its right pectoral fin removed by an apparent bite of the shark (Fig. 1).

Fig. 1. Juvenile shortfin mako shark *Isurus oxyrinchus* with a giant devil ray *Mobula mobular* in its mouth, observed in the Messina Strait, Italy, in May 2018. Photo from a video by Giuseppe Morabito

Рис. 1. Ювенильная особь акулы-мако *Isurus oxyrinchus* со средиземноморским рогачом *Mobula mobular* в пасти, зарегистрированная в Мессинском проливе (Италия) в мае 2018 г. Фотография из видео Джузеппе Морабито

On 3 January, 2025, a stranded female giant devil ray was found recently deceased on a beach in Milazzo, approximately 30 km west of the Messina Strait, Italy (N38.23095°, E15.24882°). The estimated width of the disc was 2.6 m. The ray was tied with a rope, probably by some fishermen. The right pectoral fin of the ray bore at least two shark bites. The injury had an overall length of about 30 cm (Figs 2–4). Pictures of the giant devil ray and a tissue sample were taken by the second author.

Fig. 2. Female giant devil ray *Mobula mobular* found dead on a beach in Milazzo, Italy, on 3 January, 2025. Photo by Giancarlo Torre

Рис. 2. Погибшая самка средиземноморского рогача *Mobula mobular*, обнаруженная на пляже в Милаццо (Италия) 3 января 2025 г. Фотография Джанкарло Торре

Fig. 3. Ventral view of the giant devil ray *Mobula mobular* found dead on a beach in Milazzo, Italy, on 3 January, 2025. The right pectoral fin of the ray bears at least two shark bites. Photo by Giancarlo Torre

Рис. 3. Погибший средиземноморский рогач *Mobula mobular*, обнаруженный на пляже в Милаццо (Италия) 3 января 2025 г. (вид снизу). На правом грудном плавнике заметны как минимум два укуса акулы. Фотография Джанкарло Торре

Fig. 4. Close-up of the shark bites on the giant devil ray *Mobula mobular* found dead on a beach in Milazzo, Italy, on 3 January, 2025. Photo by Giancarlo Torre

Рис. 4. Крупный план укусов акулы на средиземноморском рогаче *Mobula mobular*, найденном мёртвым на пляже в Милаццо (Италия) 3 января 2025 г. Фотография Джанкарло Торре

RESULTS AND DISCUSSION

Concerning the case of the shortfin mako observed carrying a giant devil ray in its mouth in the Messina Strait, it is unclear if it was a case of predation or scavenging. The shark may have caught and killed the ray, or it may have simply found the ray after it had been caught by fishermen and discarded at sea. It is also possible that the shark found the ray when it was hooked, still alive or already dead.

Concerning the case of the giant devil ray stranded in Milazzo, it seems reasonable to conclude that the ray was first caught on a longline hook or in a net. At that stage, a shark found the ray, still alive or more likely already dead, and bit off part of the ray's pectoral fin. Then, the fishermen found the ray and brought it on board the fishing vessel by tying a rope around its damaged pectoral fin. The fishermen may have brought the ray to the beach, or they may have thrown it back into the sea, at which point the waves would have washed it ashore.

Examination of the shark bites on the giant devil ray reveals that on the ventral surface, the cut is clean and sharp, while on the dorsal surface, it is more irregular, with some clean cuts but also tears and punctures. Therefore, teeth of the upper jaw of the shark must have been different from those of the lower jaw. The very clean cuts on the ventral surface suggest the upper teeth of a blue shark *Prionace glauca* (Linnaeus, 1758), and the more irregular ones on the dorsal surface could be compatible with the lower teeth of the same species. However, the identification of the shark species responsible cannot be confirmed.

Conclusions. To the best of our knowledge, the two cases reported in this article are the first ones reported in the scientific literature of trophic interactions between the giant devil ray and sharks. Moreover, while it is known that the shortfin mako can feed on rays [De Maddalena et al., 2005], the case recorded in the Messina Strait in May 2018 is the first observation of *Isurus oxyrinchus* feeding on a species of the family Mobulidae.

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ТРОФИЧЕСКИЕ ВЗАИМОДЕЙСТВИЯ МЕЖДУ СРЕДИЗЕМНОМОРСКИМ РОГАЧОМ *MOBULA MOBULAR* И АКУЛАМИ В ВОДАХ СИЦИЛИИ (СРЕДИЗЕМНОЕ МОРЕ)

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Сообщается о двух случаях трофических взаимодействий между средиземноморским рогачом и акулами в Средиземном море. Приведена фотография акулы-мако во время поедания ею средиземноморского рогача в Мессинском проливе в мае 2018 г. На теле самки средиземноморского рогача, выброшенной на берег в Милаццо в январе 2025 г., видны следы укусов, вероятно нанесённые синей акулой.

Ключевые слова: средиземноморская мобула, средиземноморский рогач, *Mobula mobular*, акула-мако, *Isurus oxyrinchus*, рацион, хищничество, питание падалью