

ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterranee
Annals for Istrian and Mediterranean Studies
Series Historia Naturalis, 34, 2024, 2





ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterraneei
Annals for Istrian and Mediterranean Studies

Series Historia Naturalis, 34, 2024, 2

ISSN 1408-533X
e-ISSN 2591-1783

UDK 5

Letnik 34, leto 2024, številka 2

**UREDNIŠKI ODBOR/
COMITATO DI REDAZIONE/
BOARD OF EDITORS:**

Alessandro Acquavita (IT), Nicola Bettoso (IT), Christian Capapé (FR), Darko Darovec, Dušan Devetak, Jakov Dulčić (HR), Serena Fonda Umani (IT), Andrej Gogala, Daniel Golani (IL), Danijel Ivajnskič, Mitja Kaligarič, Marcelo Kovačič (HR), Andrej Kranjc, Lovrenc Lipej, Vesna Mačič (ME), Alenka Malej, Patricija Mozetič, Martina Orlando-Bonaca, Michael Stachowitsch (AT), Tom Turk, Al Vrezec

**Glavni urednik/Redattore capo/
Editor in chief:**

Darko Darovec

**Odgovorni urednik naravoslovja/
Redattore responsabile per le scienze
naturali/Natural Science Editor:**

Lovrenc Lipej

Urednica/Redattrice/Editor:

Martina Orlando-Bonaca

Prevajalci/Traduttori/Translators:

Martina Orlando-Bonaca (sl./it.)

**Oblikovalec/Progetto grafico/
Graphic design:**

Dušan Podgornik, Lovrenc Lipej

Tisk/Stampa/Print:

Založništvo PADRE d.o.o.

Izdajatelj/Editori/Published by:

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

Inštitut IRRIS za raziskave, razvoj in strategije družbe, kulture in okolja / Institute IRRIS for Research, Development and Strategies of Society, Culture and Environment / Istituto IRRIS di ricerca, sviluppo e strategie della società, cultura e ambiente®

**Sedež uredništva/Sede della redazione/
Address of Editorial Board:**Nacionalni inštitut za biologijo, Morska biološka postaja Piran / Istituto nazionale di biologia, Stazione di biologia marina di Pirano / National Institute of Biology, Marine Biology Station Piran
SI-6330 Piran / Pirano, Fornače/Fornace 41, tel.: +386 5 671 2900, fax +386 5 671 2901;
e-mail: annales@mbss.org, internet: www.zdjp.si

Redakcija te številke je bila zaključena 16. 12. 2024.

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

Javna agencija za znanstveno-raziskovalno in inovacijsko dejavnost Republike Slovenije (ARIS)

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).

To delo je objavljeno pod licenco / Quest'opera è distribuita con Licenza / This work is licensed under a Creative Commons BY-NC 4.0.



Navodila avtorjem in vse znanstvene revije in članki so brezplačno dostopni na spletni strani <https://zdjp.si/en/p/annalesshn/>
The submission guidelines and all scientific journals and articles are available free of charge on the website <https://zdjp.si/en/p/annalesshn/>
Le norme redazionali e tutti le riviste scientifiche e gli articoli sono disponibili gratuitamente sul sito <https://zdjp.si/en/p/annalesshn/>



VSEBINA / *INDICE GENERALE* / *CONTENTS*BIOTSKA GLOBALIZACIJA
GLOBALIZZAZIONE BIOTICA
*BIOTIC GLOBALIZATION***Malek ALI, Aola FANDI & Christian CAPAPÉ**

The First Mediterranean Record of Red-Toothed Triggerfish *Odonus niger* (Balistidae) from the Syrian Coast (Eastern Mediterranean Sea) 173
Prvi zapis o pojavljanju rdečezobe balestre Odonus niger (Balistidae) iz sirske obale (vzhodno Sredozemsko morje)

Zafer TOSUNOĞLU & Okan AKYOL

Occurrence of *Pterois miles* (Scorpaenidae) in the Mediterranean Sea 179
Pojavljanje navadne plamenke Pterois miles (Scorpaenidae) v Sredozemskem morju

Izdihar Ali AMMAR New Non-Native and Rare

Marine Invertebrates in Syrian Waters 187
Novi primeri o pojavljanju tujerodnih in redkih morskih nevretenčarjev v sirske vodah

Luca CASTRIOTA, Manuela FALAUTANO & Laura SINAPI

A New Locality Record for the Range Expanding Fish *Seriola fasciata* in the Mediterranean 199
Nova lokaliteta pojavljanja vrste Seriola fasciata, ki širi areal v Sredozemskem morju

F. Saadet KARAKULAK, Mehmet GÖKOĞLU, Uğur UZER & Hakan KABASAKAL

First Record of the *Abudefduf* cf. *saxatilis/vaigiensis/troschellii* Species Complex (Pisces: Pomacentridae) in the Black Sea 205
Prvi zapis o pojavljanju primerka vrste iz kompleksa Abudefduf cf. saxatilis/vaigiensis/troschellii (Pisces: Pomacentridae) iz Črnega morja

SREDOZEMSKA HRUSTANČNICE

*SQUALI E RAZZE MEDITERRANEE**MEDITERRANEAN SHARKS AND RAYS***Farid HEMIDA, Christian REYNAUD & Christian CAPAPÉ**

Occurrence of the Rare Blonde Ray, *Raja brachyura* (Rajidae), Off the Algerian Coast (Southwestern Mediterranean Sea) 213
Pojavljanje redke okraste raže, Raja brachyura (Rajidae), ob alžirski obali (jugozahodno Sredozemsko morje)

Hakan KABASAKAL, Uğur UZER & F. Saadet KARAKULAK

Occurrence of Longnosed Skate, *Dipturus oxyrinchus*, in the Sea of Marmara 221
Pojavljanje koničaste raže, Dipturus oxyrinchus, v Marmarskem morju

Cem ÇEVİK, Gökhan GÖKÇE & Deniz ERGUDEN

Capture of a Juvenile Sharpnose Sevengill Shark, *Heptranchias perlo* (Bonnaterre, 1788), from the Turkish Coast (Eastern Mediterranean Sea) with Updated Records from Mediterranean Waters 229
Ulov mladostnega primerka morskega psa sedmeroškrgarja, Heptranchias perlo (Bonnaterre, 1788), iz turških voda (vzhodno Sredozemsko morje) z posodobljenim seznamom zapisov o pojavljanju v Sredozemskem morju

Eloïse DEYSSON, Sarah FOXONET, Etienne RÉGNIER, Chloé MOSNIER, Florane TONDU, Janis BROUTIN-RENAUD Bruno COGNIE, Alessandro DE MADDALENA, Hakan KABASAKAL & Nicolas ZIANI

Additional Historical Records of Great White Sharks, *Carcharodon carcharias*, Caught in the Gulf of Lion, Northwestern Mediterranean Sea, Between the 1920s and 1950s 239
Dodatni zgodovinski zapisi o belih morskih volkih, Carcharodon carcharias, ujetih v zalivu Lyon (severozahodno Sredozemsko morje) v dvajsetih in petdesetih letih

Malek ALI, Aola FANDI, Dima GHANEM & Christian CAPAPÉ

Capture of a Juvenile Basking Shark, *Cetorhinus maximus* (Cetorhinidae), Off the Syrian Coast, With Comments on the Occurrence of the Species in the Levant Basin (Eastern Mediterranean Sea) 251
Ulov mladostnega primerka morskega psa orjaka, Cetorhinus maximus (Cetorhinidae), ob sirski obali s komentarji o pojavljanju vrste v levantskem bazenu (vzhodno Sredozemsko morje)

Hakan KABASAKAL, Uğur UZER & F. Saadet KARAKULAK

Impact of Fishing Capacity and Environmental Parameters on Landings of *Hexanchus griseus* in the Sea of Marmara 257
Vpliv ribolovne zmogljivosti in okoljskih parametrov na ulov vrste Hexanchus griseus v Marmarskem morju

MORSKA FAVNA
 FAUNA FAUNA
 MARINE FAUNA

Tea KNAPIČ, Irena FRKOVIČ, Borut MAVRIČ & Lovrenc LIPEJ

An Insight into the Heterobranch Fauna of Fiesa (Slovenia, Northern Adriatic Sea) 275
Vpogled v favno polžev zaškrGARJEV Fiese (Slovenija, severni Jadran)

Francesco TIRALONGO, Alessandro NOTA, Emanuele MANCINI & Luigi MUSCO

Wounds Inflicted on Humans by the White Seabream (*Diplodus sargus*): First Scientific Report of Aggressive Behavior 291
Rane, ki jih ljudem zadajajo šargi (Diplodus sargus): prvo znanstveno poročilo o agresivnem vedenju

ORNITOFAVNA
 ORNITOFAUNA
 ORNITHOFAUNA

ANDREA DE ANGELIS & MARIO PELLEGRINI

Nuovo Sito di Nidificazione di Aquila Reale *Aquila chrysaetos* nel Subappennino Abruzzese 301
Novo gnezdišče planinskega orla v subapeninskih Abrucih

FLORA
 FLORA
 FLORA

Amelio PEZZETTA & MARCO PAOLUCCI

La flora di Taranta Peligna (Abruzzo, Italia) 317
Flora Taranta Peligna (Abruci, Italija)

Kazalo k slikam na ovitku 357
Index to images on the cover 357

received: 2024-10-06

DOI 10.19233/ASHN.2024.33

WOUNDS INFLICTED ON HUMANS BY THE WHITE SEABREAM (*DIPLODUS SARGUS*): FIRST SCIENTIFIC REPORT OF AGGRESSIVE BEHAVIOR

Francesco TIRALONGO

Department of Biological, Geological and Environmental Sciences, University of Catania, Catania, Italy
francesco.tiralongo@unict.it
Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy
CNR-IRBIM - National Research Council, Institute of Biological Resources and Marine Biotechnologies, Ancona, Italy

Alessandro NOTA

Department of Biology and Biotechnology, University of Pavia, Pavia, Italy
Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy

Emanuele MANCINI

Department of Biological and Environmental Sciences and Technologies (DiSTeBA), University of Salento, 73100 Lecce.
NBFC, National Biodiversity Future Center, 90133 Palermo, Italy
Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy

Luigi MUSCO

Department of Biological and Environmental Sciences and Technologies (DiSTeBA), University of Salento, 73100 Lecce
NBFC, National Biodiversity Future Center, 90133 Palermo, Italy

ABSTRACT

Fish bites at sea are typically attributed to aggressive and large-sized species, such as sharks, while reports of attacks by smaller, non-aggressive species are usually rare. This study presents the first documented cases of Diplodus sargus (the White Seabream) bites on humans. Two episodes involving minor injuries to swimmers, while in one of the cases medical treatments were needed. The bites affected the limbs and resulted in medium/small though relatively deep wounds. Over the last 15 years, similar cases have been reported elsewhere in the Mediterranean Sea, raising some alarm among beach users and stakeholders. Anecdotal speculation, unsupported by experimental evidence, has been made on the role of factors such as heatwaves and increased water temperatures in the shift toward aggressive behavior in typically non-threatening species. This study provides the first account of three such incidents of this kind and prompt scientific research aimed at unveiling their causes.

Key words: fish attacks, behavioral change, coastal water, Sparidae, wounds

FERITE INFERTE ALL'UOMO DAL SARAGO MAGGIORE (*DIPLODUS SARGUS*): PRIMA SEGNALAZIONE SCIENTIFICA DI COMPORTAMENTO AGGRESSIVO

SINTESI

I morsi di pesci in mare sono tipicamente associati a specie aggressive e di grandi dimensioni come gli squali, mentre le segnalazioni di attacchi da parte di specie più piccole e non aggressive sono solitamente rare. Questo studio presenta i primi casi documentati di morsi di Diplodus sargus (il sarago maggiore) su esseri umani. Due episodi hanno coinvolto lievi ferite ai nuotatori, mentre in uno dei casi sono stati necessari trattamenti medici. I morsi hanno interessato gli arti e hanno provocato ferite di media/piccola entità, ma relativamente profonde. Negli ultimi 15 anni, casi simili sono stati segnalati altrove nel Mar Mediterraneo, suscitando una certa preoccupazione tra i bagnanti e gli operatori del settore. Speculazioni aneddotiche, non supportate da prove sperimentali, hanno suggerito il potenziale ruolo di fattori come le ondate di calore e l'aumento delle temperature dell'acqua nello sviluppo di comportamenti aggressivi in specie tipicamente non pericolose. Questo studio mira a fornire un primo resoconto dettagliato di questi incidenti e a stimolare la ricerca scientifica per svelare le cause dei comportamenti osservati.

Parole chiave: attacchi di pesci, variazioni comportamentali, acque costiere, Sparidae, ferite

INTRODUCTION

Encounters with dangerous marine organisms can be harmful to or even deadly for humans, potentially involving stings, bites, blunt trauma, and other types of injuries, envenomation or accidental ingestion (James & Mark, 2019; Geng et al., 2023). Fish bites are generally rare, especially in the Mediterranean Sea, and are often attributed to species with well-documented aggressive behavior, such as sharks (Lowry et al., 2009); some species of fish and other marine fauna are known to be potentially aggressive if manipulated (e.g., during fishing activities) (Nascimiento Da Costa et al., 2020). Reports of bites by common, typically non-aggressive fish species have been scarce or undocumented in scientific literature, although the study of such unexpected behavior could represent an intriguing aspect of marine biology.

Lesions in fishermen and bathers caused by fish bites primarily affect the hands and limbs, resulting in pain and bleeding (Berkowitz & Goldsmith, 2016; Nascimiento Da Costa et al., 2020). In addition to physical damage – which, depending on the species involved and its size, can also affect tendons and nerves, requiring thus sutures – the wounds can become infected due to bacteria (both Gram-positive and Gram-negative) and mycobacteria (von Graevenitz et al., 2020; Strutt & Avendano, 2022), as is the case with any wound exposed to seawater. It is worth mentioning that, in most cases, individuals bitten by fish are unable to identify the species responsible, as they are often not experts and, especially in the case of recreational swimmers, may find it difficult to even locate the individual(s) responsible for the bite underwater (Vanni et al., 2022).

The White Seabream (*Diplodus sargus*) is a sparid species widely distributed in the Mediterranean Sea and the adjacent northeastern Atlantic waters. It is a coastal fish that primarily feeds on crustaceans, bivalves, and sea urchins, with larger specimens also preying on bigger species, such as other fish (Guidetti, 2006; Osman & Mahmoud, 2009; Miccoli et al., 2021). It is primarily known for its importance in commercial and recreational fisheries (e.g., Tiralongo et al., 2023), while its aggressive behavior toward humans and the related safety risks have not been treated in scientific literature yet.

In this study, we present the first documented scientific records of *D. sargus* attacks resulting in injury to humans. The incidents, which occurred along the Italian coasts during recreational activities, highlighted unexpected behavioral interactions between this species and bathers. A total of three cases were recorded and documented photographically in summer 2024, providing concrete evidence of this uncommon behavior. To the best of our knowledge, there are no scientific reports of similar events involving the White Seabream.

However, newspapers from Spain, Israel, and Croatia have reported several cases of humans being attacked by fish often referred to as *D. sargus*. The objective of this work is to describe these incidents in detail, analyze factors potentially contributing to such unusual interactions, discuss their possible causes, and consider the implications they may have for human activities in the Mediterranean region. This report aims to fill a gap in the current understanding of *D. sargus* behavior and contribute to a better understanding of human–wildlife interactions in marine environments.

MATERIAL AND METHODS

The data for this study were collected through detailed, unstructured telephone interviews with individuals involved in fish biting attacks or, in the case of one minor, their relatives. These interviews were complemented by photographic evidence of the injuries, providing comprehensive and accurate documentation of each case. The photos were initially shared by the interviewees within the Fauna Marina Mediterranea Facebook group, which currently has over 28,000, mostly Italian, members. Administered by one of the authors (FT), the group is frequented by specialists and researchers in marine biology, as well as a diverse community of marine enthusiasts, including divers, recreational and professional fishermen, and beachgoers. The photographic posts prompted further inquiry and facilitated accurate documentation and validation of each case.

The fish bite injuries of the first case were documented on 21 August 2024, at Lido Arenella, Syracuse (Mediterranean Sea, Ionian Sea, southeastern Sicily - 36.99641 N, 15.26467 E), in shallow waters approximately 1 m deep. The area features a small beach, about 200 m long, located south of the city of Syracuse and the Plemmirio Marine Protected Area. The seabed here is very shallow, with small rocky formations and patches of *Posidonia oceanica* (L.) Delile located a bit further offshore and along the sides. The beach is very popular during the summer months. The incident involved a 70-year-old female swimmer entering deeper waters. A single fish, approximately 15–20 cm in size (total length), repeatedly attacked her legs at multiple spots and followed her to the shore. At the time of the incident, the water conditions were calm and clear.

A second case was recorded on 5 September 2024 at Morghella Beach, Portopalo di Capo Passero (Mediterranean Sea, Ionian Sea, southeastern Sicily - 36.70297 N, 15.12330 E), involving an 11-year-old boy who suffered multiple bites from White Seabreams (*Diplodus sargus*) over several days, always at the same location, in waters approximately 1 meter deep. The father of the boy observed a single fish biting the boy during snorkeling, each time in

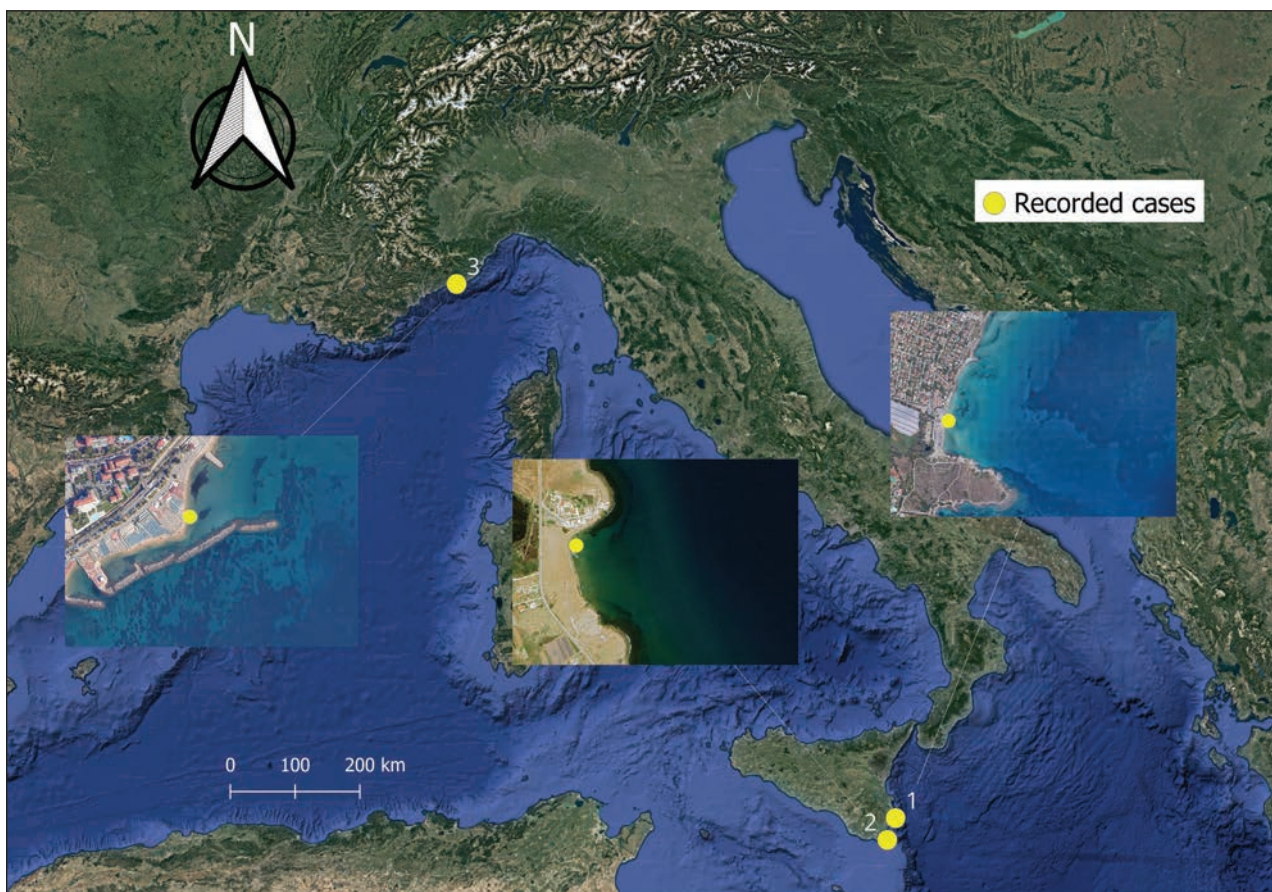


Fig. 1: Documented records (yellow circles) reported in this study of wounds inflicted on humans by *Diplodus sargus* in the Mediterranean Sea (1: Syracuse; 2: Portopalo di Capo Passero; 3: Sanremo).

Sl. 1: Dokumentirani zapisi (rumeni krogi), ki jih v tej študiji avtorji poročajo o ranah, ki jih je *Diplodus sargus* prizadejal ljudem v Sredozemskem morju (1: Sirakuze; 2: Portopalo di Capo Passero; 3: Sanremo).

the same spot, and was able to identify the species responsible for the injuries. Morghella Beach is very similar to Lido Arenella in Syracuse in size and environmental features: it is shallow, with a mix of sandy stretches and small rocky areas that provide a habitat for *P. oceanica*. Morghella is a popular summer destination, attracting many visitors due to its beautiful setting and accessible location.

A third case was documented on 4 August 2024 near Sanremo, in the Ligurian Sea (Mediterranean Sea, Italy, 43.81023 N, 7.76619 E). The incident involved a 60-year-old man who was bitten once by an unidentified fish near the shoreline (in waters approximately 0.5 m deep). The beach where the incident occurred is about 400 m long and protected by a breakwater made of artificial blocks. This, too, is a very crowded location during the summer months and characterized by calm waters.

The locations of the three recorded cases are shown in Figure 1 and discussed below in order of relevance based on the severity of the reported injury.

RESULTS AND DISCUSSION

First case – 21 August 2024

The attacking fish was almost certainly a White Seabream (*D. sargus*), with an estimated total length of 15–20 cm. It was described as having an oval-shaped body, white coloration, distinctive vertical grey stripes, and a black spot on the caudal peduncle – all diagnostic features of the White Seabream. Its identity was confirmed by the individual who was bitten, upon examining photos of sparid species which typically inhabit shallow beach waters, including the White Seabream (*D. sargus*), the Sand Steenbras (*Lithognathus mormyrus*), and the Saddled Seabream (*Oblada melanura*). After the initial bite, the fish continued to follow the woman to the shore, repeatedly and violently biting her. The most severe wound the woman suffered was to her left calf, measuring approximately 4–5 cm in diameter and likely resulting from multiple bites (Fig. 2a).

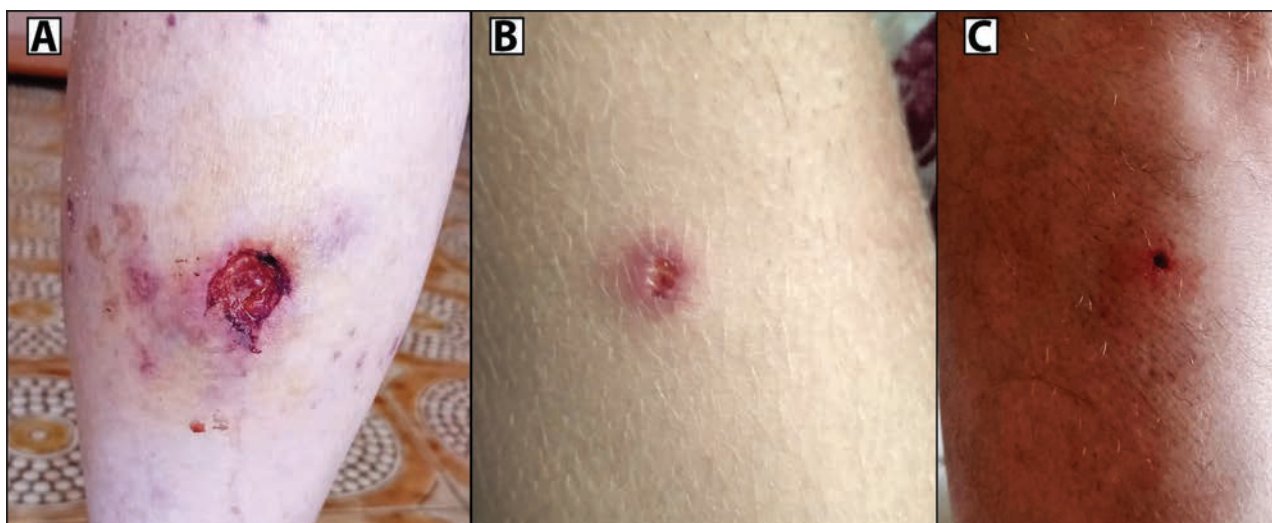


Fig. 2: Wounds inflicted on humans by *D. sargus* (A= 1 in map; B= 2 in map; C= 3 in map).

Sl. 2: Rane, ki jih je *D. sargus* prizadejal ljudem (A= 1 na zemljevidu; B= 2 na zemljevidu; C= 3 na zemljevidu).

She also sustained smaller injuries on her right leg, around 1 cm in diameter. She was bleeding profusely from all her wounds as she exited the water, screaming for help. Medical treatment included the application of antibiotic and healing ointments (e.g., connectivine) following a medical consultation. There was no need for hospitalization. The 70-year-old woman reported coagulopathy, advanced age, fragile skin, and a propensity for easy bruising and micro-injuries. These factors, combined with the repeated aggressive behavior of the fish, underscore the severity of the incident.

Second case - 5 September 2024

The injury in this case was located on the right shin, consisting of a single wound approximately 5 mm in diameter and caused by the repeated biting actions of the fish (Fig. 2b). The phenomenon of White Seabream (*D. sargus*) attacks in this area has been known for over 10 years, with increases in the frequency during warmer water periods. But the trend concerning the individuals involved has shifted from smaller to larger seabreams reaching sizes of up to a hand (15–20 cm) and inflicting more severe wounds. The studied biting attacks were not isolated incidents, but occurred repeatedly over several days, with the fish targeting the boy's pre-existing minor wounds, such as mosquito bites, scabs, and other skin abrasions. Despite the presence of various fish species in the area, the boy's father confirmed that only White Seabreams were seen engaging in this aggressive behavior toward swimmers. Immediate care for the wounds involved cleaning and monitoring for signs of infection, but no major medical intervention was needed.

Third case - 4 August 2024

The man sustained a single, relatively deep wound below the right knee, measuring approximately 3 mm (Fig. 2c). Despite its small size, the wound was notably deep, but no medical treatment was necessary. The fish's attack near the shore highlights the potential for such incidents to occur even in shallow, sheltered waters. After conducting research online, the man who was bitten concluded that it might have been a Saddled Seabream (*O. melanura*) rather than a White Seabream (*D. sargus*); however, the lack of direct observation makes the identification uncertain.

Considerations

Fish bites, although relatively rare compared to other injuries caused by marine animals – especially in the Mediterranean Sea – raise medical concerns due to their potential for severe tissue damage and subsequent infections (Berkowitz & Goldsmith, 2016; Lowry *et al.*, 2009; Nascimiento Da Costa *et al.*, 2020; Geng *et al.*, 2023). These injuries are primarily associated with predatory or aggressive fish species, such as sharks and bluefish (*Pomatomus saltatrix*). Although the Bluefish – a species widely distributed in the Mediterranean Sea – despite it is smaller than potentially dangerous sharks, it has very sharp teeth. Its bite can result in deep lacerations and even amputations (Vanni *et al.*, 2022).

A rather emblematic event in the Mediterranean Sea was the recent attack of a *Lagocephalus sceleratus* (pufferfish), a non-indigenous Lessepsian species, on an 8-year-old girl. The fish bite resulted in the partial amputation of the girl's finger. This incident

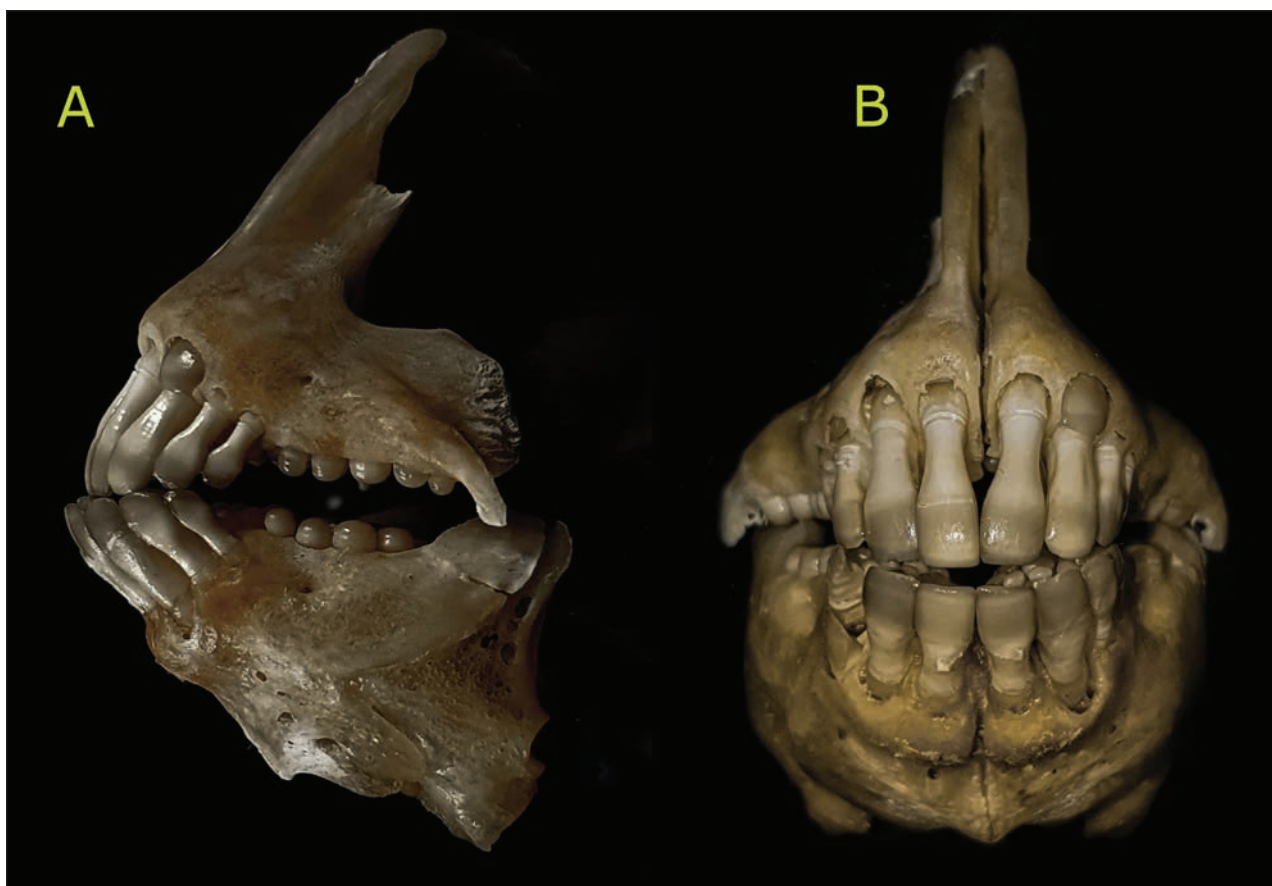


Fig. 3: Jaws and dentition of the White Seabream (*D. sargus*) in lateral (A) and frontal (B) view. Note that this specimen is much larger than those which attacked the swimmers. It was caught in September 2024 in southeastern Sicily (Avola) and weighed 924 grams (photo by F. Tiralongo).

Sl. 3: Čeljusti in zobovje šarga (*D. sargus*) s strani (A) in od spredaj (B). Upoštevajte, da je ta primerek veliko večji od tistih, ki so napadli plavalce. Ujet je bil septembra 2024 na jugovzhodni Siciliji (Avola) in je tehtal 924 gramov (foto: F. Tiralongo).

highlights how anthropogenic changes in biodiversity can directly and indirectly increase the occurrence of such accidents (Sümen & Bilecenoğlu, 2019).

Anecdotal evidence from media interviews in newspapers and websites indicates that *D. sargus* specimens of various sizes have occasionally been involved in biting incidents with swimmers in summer vacation areas of the Mediterranean Sea. It is speculated that such events occur particularly during warm periods or heatwaves, when the fish may be more active or agitated. However, it is not possible to determine whether increased aggressiveness of *D. sargus* is in direct correlation with rising seawater temperatures, also considering that holiday vacation sites in the Mediterranean Sea are typically overcrowded with tourists during the warmer season, increasing the likelihood of encounters between fish and humans. Focused experiments are needed to ascertain the effect of rising seawater temperatures on the behavior of the White Seabream.

Young *D. sargus* are not as elusive as other juvenile fish and typically do not flee from humans. It is common for curious young fish of both *D. sargus* and *O. melanura* species to approach bathers along the sandy shores of the Italian coast, often nibbling on human limbs without causing injury – only mild pain. This was confirmed by an informal survey conducted among knowledgeable Italian marine biologists, who reported that young specimens typically target individuals standing still on the sandy bottom in shallow waters (LM, pers. obs.). Other Mediterranean experts, interviewed by newspapers and websites, suggest that avoiding proximity to other swimmers and minimizing stationary positions in shallow waters could help prevent this behavior (UltimaHora, 2003; LaOpiniónDeMurcia, 2016; Austin, 2017; Menorca, 2023; CroatiaWeek, 2024; CrónicaBalear, 2024). A topic worth further investigation is why adult specimens of *D. sargus*

exhibit the juvenile-like behavior of biting humans, as this can result in more serious consequences. One of the most critical complications following a fish bite is the risk of bacterial infection (Strutt & Avendano, 2022), which may occur when wounds are inflicted by wild animals or come in contact with seawater. Additionally, the anatomical features of certain fish, such as bluefish or pufferfish, influence the extent and nature of the wounds they inflict. For example, the bluefish has powerful jaws and razor-sharp teeth, therefore its bite can cause significant tissue damage, often requiring surgical repair for tendon and nerve lesions. The need for forensic analysis to accurately identify the species responsible for a biting attack is critical in both medical and ecological studies, as it informs proper management and prevention strategies. With its well-developed forward-pointing incisor-like teeth at the front of the jaws, this sparid can cause relatively small (depending on the fish size) but deep wounds that may require medical care and could even result in permanent scars (Fig. 3).

Given the ever-increasing human interaction with marine environments, including the expansion of coastal activities, there has been a rising incidence of fish bite injuries (Newsom *et al.*, 2023). Despite this new and aggressive behavior, clearly attributable to at least one species (*D. sargus*), no targeted scientific studies have been conducted to date. Moreover, all three beaches where interactions with humans occurred shared similar characteristics: they were small, nestled in rocky surroundings, and featuring a combination of rocky substrates and patches of *P. oceanica* in their immediate vicinity. Identifying the types of environments where these

incidents are more likely to occur can help prevent them. White Seabreams are known to inhabit both rocky bottoms and mixed environments (sand and rock) but are seldom found in purely sandy areas far from other substrates.

The merit of this study lies in documenting attacks on humans by species commonly considered unharmed and providing detailed information on the dynamics and effects of the related injuries. The recurrence of these attacks along the Italian coasts in 2024, along with similar incidents observed elsewhere in the Mediterranean over the past 15 years, highlights a potential shift in adult White Seabream behavior toward aggressive interaction with humans. This calls for further investigation into the causes, potential environmental triggers, and the role of humans in behavioral changes.

ACKNOWLEDGEMENTS

We sincerely thank Fabio Biondi, Rosa Manferlotti, and Riccardo Rossetti for their invaluable cooperation and willingness to share their experience, which allowed us to understand and document such rare and apparently new incidents.

Financial support was partially provided by the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.4 - Call for tender No. 3138 of 16 December 2021, rectified by Decree n.3175 of 18 December 2021 of Italian Ministry of University and Research funded by the European Union – Next Generation EU. Project code CN_00000033, Concession Decree No. 1034 of 17 June 2022 adopted by the Italian Ministry of University and Research, CUP D33C22000960007, Project title “National Biodiversity Future Center - NBFC”.

RANE, KI JIH LJUDEM ZADAJAJO ŠARGI (*DIPLODUS SARGUS*): PRVO ZNANSTVENO POROČILO O AGRESIVNEM VEDENJU

Francesco TIRALONGO

Department of Biological, Geological and Environmental Sciences, University of Catania, Catania, Italy
francesco.tiralongo@unict.it

Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy
CNR-IRBIM - National Research Council, Institute of Biological Resources and Marine Biotechnologies, Ancona, Italy

Alessandro NOTA

Department of Biology and Biotechnology, University of Pavia, Pavia, Italy
Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy

Emanuele MANCINI

Department of Biological and Environmental Sciences and Technologies (DiSTeBA), University of Salento, 73100 Lecce.
NBFC, National Biodiversity Future Center, 90133 Palermo, Italy
Ente Fauna Marina Mediterranea – Scientific Organization for Research and Conservation of Marine Biodiversity, Avola, Italy

Luigi MUSCO

Department of Biological and Environmental Sciences and Technologies (DiSTeBA), University of Salento, 73100 Lecce
NBFC, National Biodiversity Future Center, 90133 Palermo, Italy

POVZETEK

*Ugrize rib v morju običajno pripisujejo agresivnim in velikim vrstam, kot so morski psi, medtem ko so poročila o napadih manjših, neagresivnih vrst običajno redka. Avtorji poročajo o prvih dokumentiranih primerih ugrizov vrste *Diplodus sargus* pri ljudeh v italijanskih vodah. V dveh primerih je šlo za lažje poškodbe plavalcev, v enem od primerov pa je bila potrebna zdravniška oskrba. Ugrizi so prizadeli okončine in povzročili srednje/majhne, a relativno globoke rane. V zadnjih 15 letih so o podobnih primerih poročali tudi drugod v Sredozemskem morju, kar je sprožilo nekaj preplaha med uporabniki plaž in zainteresiranimi stranmi. Obstajajo nezanesljive špekulacije, ki niso podprte z eksperimentalnimi dokazi, o vlogi dejavnikov, kot so vročinski valovi in višje temperature vode, ki vplivajo na agresivno vedenje pri tipično nenevarnih vrstah. Ta študija predstavlja prvo poročilo o treh incidentih te vrste in hitro znanstveno raziskavo, katere cilj je razkriti njihove vzroke.*

Ključne besede: napadi rib, vedenjske spremembe, priobalne vode, Sparidae, rane

REFERENCES

- Austin, G. (2017):** Why is this fish biting swimmers at Mediterranean beaches? The Times of Israel. Online Journal: <https://www.timesofisrael.com/why-is-this-fish-biting-swimmers-at-mediterranean-beaches/>.
- Berkowitz, T. & M.P. Goldsmith (2016):** An unexpected fish bite. *Pediatric Emergency Care*, 33, 258–259. <https://doi.org/10.1097/PEC.0000000000000692>.
- CroatiaWeek (2024):** Why fish are biting swimmers more this summer in Croatian Sea? Online Journal: <https://www.croatiaweek.com/why-fish-are-biting-swimmers-more-this-summer-in-croatian-sea/>.
- CrónicaBalear (2024):** Qué peces son los que están mordiendo a los bañistas en Baleares. Online Journal: <https://www.cronicabalear.es/baleares/que-peces-son-los-que-estan-mordiendo-a-los-banistas-en-baleares/>.
- Geng, X-Y., M-K. Wang, J-H. Chen & J-S. Yang (2023):** Marine biological injuries and their medical management: A narrative review. *World Journal of Biological Chemistry*, 14, 1–12. <http://dx.doi.org/10.4331/wjbc.v14.i1.1>.
- Guidetti, P. (2006):** Estimating body size of sea urchins, *Paracentrotus lividus* and *Arbacia lixula*, from stomach contents of *Diplodus sargus*, a Mediterranean predatory fish. *Journal of Applied Ichthyology*, 22, 91–93.
- James, A. & B. Mark (2019):** The world as it is: A diver's guide to subaquatic envenomation in the Mediterranean. *Diving and Hyperbaric Medicine*, 49(3), 225–228. <https://doi.org/10.28920/dhm49.3.225-228>.
- LaOpiniónDeMurcia (2016):** Decenas de afectados por un tipo de pez que muerde a los bañistas en la playa de Benidorm. Online Journal: <https://www.laopiniondemurcia.es/sucesos/2016/10/14/decenas-afectados-tipo-pez-muerde-31986683.html>.
- Lowry, D., A.L.F. de Castro, K. Mara, L.B. Whitenack, B. Delius, G.H. Burgess & P. Motta (2009):** Determining shark size from forensic analysis of bite damage. *Marine Biology*, 156, 2483–2492. <http://dx.doi.org/10.1007/s00227-009-1273-3>.
- Menorca (2023):** Un bañista, herido por la mordedura de un pez en la playa de Cala Blanca. Online Journal: <https://www.menorca.info/menorca/sucesos/2023/07/14/1976379/banista-herido-por-mordedura-pez-cala-blanca.html>.
- Miccoli, A., E. Mancini, M. Boschi, F. Provenza, V. Lelli, F. Tiralongo, M. Renzi, A. Terlizzi, S. Bonamano & M. Marcelli (2021):** Trophic, chemo-ecological and sex-specific insights on the relation between *Diplodus sargus* (Linnaeus, 1758) and the Invasive *Caulerpa cylindracea* (Sonder, 1845). *Frontiers in Marine Science*, 8, 680787. <http://doi.org/10.3389/fmars.2021.680787>.
- Nascimento Da Costa, T.N., T.R.F. Jacó, A.L.S. Casas & P.S. Bernarde (2020):** Injuries caused by fish to fishermen in the Vale do Alto Juruá, Western Brazilian Amazon. *Revista da Sociedade Brasileira de Medicina Tropical*, 53, e20180495. <https://doi.org/10.1590/0037-8682-0495-2018>.
- Newsom, A., Z. Sebesvari & I. Dorresteijn (2023):** Climate change influences the risk of physically harmful human-wildlife interactions. *Biological Conservation*, 286, 110255.
- Osman, A.M. & H.H. Mahmoud (2009):** Feeding biology of *Diplodus sargus* and *Diplodus vulgaris* (Teleostei, Sparidae) in Egyptian Mediterranean waters. *World Journal of Fish and Marine Sciences*, 1, 290–296.
- Sümen, S.G. & M. Bilecenoğlu (2019):** Traumatic finger amputation caused by *Lagocephalus sceleratus* (Gmelin, 1789) bite. *J. Black Sea/Mediterranean Environment*, 25, 333–338.
- Strutt, J. & P. Avendano (2022):** Carnivorous fish bite. *Visual Journal of Emergency Medicine*, 27, 101297.
- Tiralongo, F., S. Marino, S. Ignoto, R. Martellucci, B.M. Lombardo, E. Mancini & U. Scacco (2023):** Impact of *Hermodice carunculata* (Pallas, 1766) (Polychaeta: Amphinomididae) on artisanal fishery: A case study from the Mediterranean Sea. *Marine Environmental Research*, 192, 106227. <https://doi.org/10.1590/0037-8682-0495-2018>.
- UltimaHora (2003):** Alarma entre los bañistas por las mordeduras de peces en playas de Llevant. Online Journal: <https://www.ultimahora.es/noticias/part-fora-na/2003/09/01/706631/alarma-entre-los-banistas-por-las-mordeduras-de-peces-en-playas-de-llevant.html>.
- Vanni, S., A.L. Acciaro, M. Menozzi, M.C. Gagliano & R. Adani (2022):** Unexpected Bluefish attack on human: surgical implications and forensic bite analysis. *Rivista Italiana di Chirurgia della Mano*, 59, 50–54. <https://doi.org/10.53239/2784-9651-2022-7>.
- von Graevenitz A., J. Bowman, C. Del Notaro & M. Ritzler (2000):** Human infection with *Halomonas venusta* following fish bite. *Journal of Clinical Microbiology*, 38, 3123–3124.