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THE CONFIRMED OCCURRENCE OF *SCHEDOPHILUS MEDUSOPHAGUS* (COCCO, 1839) AND *PETROMYZON MARINUS* LINNAEUS, 1758 IN MALTESE WATERS, CENTRAL MEDITERRANEAN SEA

Alan DEIDUN
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: alan.deidun@um.edu.mt

Bruno ZAVA
Wilderness studi ambientali, via Cruillas 27, 90146 Palermo, Italy
Museo Civico di Storia Naturale di Comiso, Via degli Studi 9, Comiso (RG), Italy
e-mail: wildernessbz@hotmail.com

Alessio MARRONE
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: alessio.marrone@um.edu.mt

Johann GALDIES
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: johann.galdies@um.edu.mt

Arnold SCIBERRAS
The Exterminator Ltd. 5, The Service Hub, Triq San Gorg, Naxxar NXR 2541 Malta
e-mail: bioislets2@gmail.com

Maria CORSINI-FOKA
Institute of Oceanography, Hellenic Centre for Marine Research. Hydrobiological Station of Rhodes, Cos Street, 85100 Rhodes, Greece
e-mail: mcorsini@hcmr.gr

ABSTRACT

Specimens of two uncommon fish species, Schedophilus medusophagus *and* Petromyzon marinus*, were recently collected in nearshore waters off the island of Malta in the central Mediterranean. Several morphological and biological parameters for the specimens are described. The findings ascertain the occurrence of the two species in the area and corroborate furthermore the substantial contribution to wildlife sightings made through social media and by citizen scientists, thus further increasing knowledge on Mediterranean biodiversity.*

Keywords: Centrolophidae, Petromyzontidae, Malta, Mediterranean Sea, citizen science

PRESENZA CONFERMATA DI *SCHEDOPHILUS MEDUSOPHAGUS* (COCCO, 1839) E *PETROMYZON MARINUS* LINNAEUS, 1758 NELLE ACQUE MALTESI, MEDITERRANEO CENTRALE

SINTESI

Esemplari di due specie di pesci non comuni, Schedophilus medusophagus *e* Petromyzon marinus*, sono stati recentemente raccolti nelle acque dell'isola di Malta nel Mediterraneo centrale. Alcuni parametri morfologici e biologici degli esemplari sono descritti. I ritrovamenti accertano la presenza di queste due specie nell'area, corroborando inoltre l'importante contributo che i social media e i citizen scientists danno per quanto concerne le osservazioni in natura e quindi per un ulteriore incremento della conoscenza della biodiversità del Mediterraneo.*

Parole chiave: Centrolophidae, Petromyzontidae, Malta, Mediterraneo, citizen science

INTRODUCTION

In the Mediterranean Sea, four species of the family Centrolophidae are known: *Hyperoglyphe perciformis* (Mitchill, 1818), *Centrolophus niger* (Gmelin, 1789), *Schedophilus ovalis* (Cuvier, 1833) and *Schedophilus medusophagus* (Cocco, 1839) (Kovačić *et al*., 2021). According to Borg *et al*. (2023), in the waters around the Maltese archipelago, the occurrence of *C. niger* and *S. ovalis* is well documented, while the presence of *S. medusophagus* requires confirmation.

In the same basin, two species of Petromyzontidae occur, *Lampetra fluviatilis* (Linnaeus, 1758) and *Petromyzon marinus* Linnaeus, 1758, of which only the latter species has been previously reported from the Maltese Islands (Borg *et al*., 2023).

Through the cooperation with citizen scientists, individuals of *S. medusophagus* and *P. marinus* were collected from Maltese waters. The main morphological features and meristic characters of the individuals were described. The present note confirms the occurrence of both species in Maltese waters and adds knowledge on the characteristic fish diversity in this area of the central Mediterranean Sea.

MATERIAL AND METHODS

On 10 February 2023, a slowly-swimming individual of *S. medusophagus* was scooped by a fisher from the surface at Pieta yacht marina, island of Malta (coordinates 35°53'38.21"N, 14°29'52.49"E), by means of a handnet.

On 23 March 2023, a dead individual of *P. marinus* was observed stranded on the beach, after a severe storm, at Fomm ir-Rih, along the north-west coast of the island of Malta (35°54'24.17"N; 14°20'27.90"E); the individual was collected by an angler.

Both fishes were unusual to those who collected them, such that they immediately contacted one of the authors (A.D.) through the "Spot the Alien Fish" citizen science platform on Facebook (https://www.facebook.com/aliensmalta), a campaign implemented since 2017 within the Department of Geosciences at the University of Malta.

The samples of *S. medusophagus* and *P. marinus* are currently preserved in the collection of the Department of Geosciences at the University of Malta under the catalogue numbers OMRG/GS/01/2023 and OMRG/GS/02/2023, respectively.

Abbreviations used: Total length, TL; Standard length, SL; Head length, HL.

Fig. 1: The de-frozen specimen of** Schedophilus medusophagus **collected in Malta in 2023 (scale bar = 10 cm). [Detail: freshly caught specimen].
Sl. 1: Odmrznjen primerek meduzojedca** (Schedophilus medusophagus**), ujetega na Malti v letu 2023 (merilo = 10 cm). [Detajl: sveže ujeti primerek].

RESULTS

Schedophilus medusophagus (Cocco, 1839)

The specimen was a juvenile with TL 145 mm and weight 39.3 g. Brief description (Fig. 1): body compressed and high; a single long dorsal fin, its origin before pectoral fin origin; snout short, slightly less than eye diameter; pectoral and pelvic fins inserted at the same level; caudal fin bilobate; lateral line relatively curved anteriorly, over the operculum and the pectoral fin. Dorsal fin rays III+46; Anal fin spines plus soft rays 32; Pectoral fin rays 19; Ventral fin rays 5; Caudal fin rays 22; gill rakers 11+1+6 on first gill arch; 15 spines on preoperculum. Body depth 47, head length 28.3, predorsal 25.4, preventral 31, preanal 54.6, all as % of SL; caudal peduncle length 52.2, eye diameter 21.6, preorbital distance 18.8, postorbital 59.1, all as % of HL (Tab. 1). Colour of fresh and de-frozen specimen were similar: background of body light blue; irregular darker grey patches and wavy horizontal stripes on sides, some patches extending at the base of dorsal and anal fins; pectoral and pelvic fins dark; a continuous dark stripe at the middle of the dorsal and anal fins (Fig. 1).

Petromyzon marinus (Linnaeus, 1758)

The lamprey was an adult with TL 505 mm and weight 360 g. Main morphological characters: body anguilliform, two dorsal fins in the posterior half of the body (Fig. 2A), the base of the first 65 mm long, the base of the second 142 mm; eye length 5.9 mm. Six branchial openings on the left side (Fig. 2B), seven on the right; branchial length 48 mm; interbranchial opening distance 10.3 mm. Oral disc (Fig. 2C): length 38.5 mm; teeth on concentric series; one bicuspid supraoral tooth, 4 endolateral bicuspid teeth on each side, bilobed lingual teeth, infraoral lamina with 8 unicuspid teeth. Colour: body mottled black dorsally and laterally, in a marbled pattern and uniformly pale ventrally.

Tab. 1: Morphometric measurements (mm) of the** Schedophilus medusophagus **specimen from Malta.
Tab. 1: Morfometrične meritve (v mm) primerka meduzojedca (**Schedophilus medusophagus**) iz Malte.

Measurements	mm
Total length (TL)	145
Standard length (SL)	113
Maximum body depth	53
Minimum body depth	10.8
Caudal peduncle length	16.7
Head length (HL)	32
Eye diameter	6.9
Preorbital distance	6
Postorbital distance	18.9
Interorbital distance	12.6
Dorsal fin base length	88.1
Anal fin base length	42
Pectoral fin length	24
Ventral fin length	23.8
Predorsal length	28.7
Preventral length	35
Preanal length	61.7
Maximum height of dorsal fin	24.4
Maximum height of anal fin	14.8

DISCUSSION

The morphological and meristic characters as well as the colour of the Centrolophidae specimen under study were in full agreement with the description of *S. medusophagus* given by Tortonese (1959), Heidrich (1986), Fahay (2007) and Milana *et al.* (2011). Our specimen differed from its close relative *S. ovalis* by virtue of its soft and limp body (rigid and firm in *S. ovalis*) and based on differences in the dorsal fin count: *S. ovalis* is generally characterized by 30-32 rays in its dorsal fins, whilst our specimen displayed 46 dorsal fin rays (Heidrich, 1986; Rafrafi-Nouira *et al.*, 2015a).

The Cornish blackfish *S. medusophagus* is a mesopelagic fish encountered in the temperate waters of the north Atlantic and the Mediterranean, prevalently within the western half of the basin, but also in the Adriatic Sea and in the central Mediterranean, such as in Tunisia and within the Strait of Sicily (Bauchot, 1987; Dulčić, 1998; Dulčić & Lipej, 2002; Bradai *et al.*, 2004; Bañón *et al.*, 2012; Battaglia *et al.*, 2014; Rafrafi-Nouira *et al.*, 2015a; Hattour & Koched, 2017; Kovačić *et al.*, 2020). Up to date, no records of the species are documented in the eastern side of the basin (Golani *et al.*, 2006; Bilecenoğlu *et al.*, 2014; Akel & Karachle, 2017; Ali, 2018; Bariche & Fricke, 2020; Golani, 2021) and its presence in Hellenic waters is considered

Fig. 2: The whole de-frozen specimen of** Petromyzon marinus **collected in Malta in 2023 (A), the abnormal six gill openings in the left side (B) (scale bars in A and B= 10 cm) and the oral disc, 38.5 mm in length (C).
Sl. 2: V celoti odmrznjen primerek morskega piškurja (**Petromyzon marinus**), ujetega na Malti v 2023 (A), nenavadnih šest škržnih rež na levi strani (B) (merilo za A in B = 10 cm) in oralni disk, 38,5 mm v dolžino (C).

questionable (Papaconstantinou, 2014). It reaches a maximum TL of 50 cm; adult specimens are mainly found at 300-900 m of depth. Juveniles are usually detected at the surface, as in the present case, frequently associated with jellyfish (Haedrich, 1986; Bauchot, 1987), especially *Pelagia noctiluca* (family Pelagiidae), that constitute the main food source for adults and juveniles of this species (Garibaldi *et al*., 2010; Battaglia *et al*., 2014).

In March and May 2022, during a bloom of *Pelagia noctiluca*, unknown centrolophids, possibly *S. medusophagus*, were repeatedly observed in the surface waters around the Maltese Islands, and photos were submitted to the above-mentioned Maltese platform (cf. Deidun *et al*., 2022), but samples were not retained. The Cornish blackfish *S. medusophagus* and the Imperial blackfish *S. ovalis* may be sometimes confused with each other, especially at juvenile stage, or may be confused with species of other families (see Nour *et al*., 2022; Borg *et al*., 2023). In the case reported in the present study, the availability of a sample allowed the authors to ascertain the identity of the same as belonging to *S. medusophagus* and to confirm the occurrence of the species in Maltese waters. Therefore, *S. medusophagus* can be added to the list of 349 bony fish species that are to date confirmed as occurring in the same waters (Borg *et al*., 2023).

The morphological characters, dentition, and other associated structures of the oral disc, as well as the colour of the lamprey under study fully agreed with the description of *L. marinus* given by Bauchot (1987) and Renaud (2011). The latter cited literature and the work by Maitland (1972) allowed us to discard *L. fluviatilis* when identifying the specimen, by virtue of the marbled dark pattern on its back and along the sides (uniform colour pattern in *L. fluviatilis*), the occurrence of closely-packed teeth in radiating rows on the oral disc (teeth are widely-spaced in *L. fluviatilis*) as well as the occurrence of two large teeth in the supra-oral dental plate (one small tooth at most in *L. fluviatilis*). The number of branchial openings, six instead of seven on the left side of the body, was probably a morphological aberration. Six branchial openings on one side, generally on the left, as well as multiple tails, have been observed in rare cases in lampreys (Renaud, 2011;

Hume *et al*., 2014). It is to be noted that in the *P. marinus* specimen from Syria reported in Saad *et al*. (2021), the first dorsal fin appears positioned in the anterior half of the body, while in the Petromyzontidae both dorsal fins are usually positioned in the posterior half. This could perhaps be another type of morphological abnormality in lampreys, although, to our knowledge, this is as yet unreported in the literature.

The sea lamprey *P. marinus* occurs at depths ranging between 1 m and 4000 m, in the marine, freshwater and brackish waters of the north Atlantic Ocean, the western and central Mediterranean Sea and in the Adriatic (Catalano *et al*., 1997; Renaud, 2011; Milana *et al*., 2011; Karachle & Machias, 2014; Rafrafi-Nouira *et al*., 2015b; Tutman *et al*., 2020; Giglio & Sperone, 2021; Froese & Pauly, 2023; Antognazza *et al*., 2023). Scattered records of the species have also been reported from the eastern Ionian Sea (Karachle & Machias, 2014), the north Aegean (Economidis *et al*., 1999; Papaconstantinou, 2014) and the southeastern Aegean Sea (Filiz *et al*., 2012), as well as from the Levantine Sea waters of Turkey and Syria (Çevik *et al*., 2010; Saad *et al*., 2021).

Sea lampreys are parasitic on sharks, large bony fishes and marine mammals. The sample studied here probably has lost its host during the mentioned storm, and after death it was washed up on the beach.

The sea lamprey has been historically reported in coastal waters of the Maltese archipelago, but there are no recent records (Borg *et al*., 2023), suggesting that this species is uncommon. In the Tunisian coasts, close to the Maltese Islands, the species is recorded as an occasional visitor, and it is not considered to have established viable populations (Rafrafi-Nouira *et al*., 2015b). The finding described in the present study indicates that *P. marinus* occasionally occurs in the wider area around the Maltese islands. Nevertheless, it is difficult to ascertain if there is a viable population of this anadromous species established within Maltese waters given the non-retrieval of live individuals but only of a stranded one; in addition, along the Maltese coastline, there is a lack of freshwater systems suitable for its reproduction in the area.

The GBIF database was consulted on the 24th of August 2023 and, although several Mediterranean Atlantic findings exist within the database for both *S. medusophagus* and for *P. marinus*, no specimens of these species are listed for Maltese waters.

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POTRJENO POJAVLJANJE MEDUZOJEDCA, *SCHEDOPHILUS MEDUSOPHAGUS* (COCCO, 1839), IN MORSKEGA PIŠKURJA, *PETROMYZON MARINUS* LINNAEUS, 1758, V MALTEŠKIH VODAH, OSREDNJE SREDOZEMSKO MORJE

Alan DEIDUN
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: alan.deidun@um.edu.mt

Bruno ZAVA
Wilderness studi ambientali, via Cruillas 27, 90146 Palermo, Italy
Museo Civico di Storia Naturale di Comiso, Via degli Studi 9, Comiso (Rg), Italy
e-mail: wildernessbz@hotmail.com

Alessio MARRONE
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: alessio.marrone@um.edu.mt

Johann GALDIES
Department of Geosciences, University of Malta, Msida MSD 2080, Malta
e-mail: johann.galdies@um.edu.mt

Arnold SCIBERRAS
The Exterminator Ltd. 5, The Service Hub, Triq San Gorg, Naxxar NXR 2541 Malta
e-mail: bioislets2@gmail.com

Maria CORSINI-FOKA
Institute of Oceanography, Hellenic Centre for Marine Research. Hydrobiological Station of Rhodes, Cos Street, 85100 Rhodes, Greece
e-mail: mcorsini@hcmr.gr

POVZETEK

*V malteških vodah osrednjega Sredozemskega morja so avtorji pred kratkim ulovili primerke dveh manj pogostih vrst, meduzojedca (*Schedophilus medusophagus*) in morskega piškurja (*Petromyzon marinus*). Opisujejo številne morfološke in biološke parametre primerkov. Ugotovitve dokazujejo pojavljanje obeh vrst na obravnavanem območju in potrjujejo pomemben prispevek socialnih medijev in ljubiteljske znanosti, s čimer se dodatno povečuje poznavanje o biotski raznovrstnosti Sredozemskega morja.*

Ključne besede: Centrolophidae, Petromyzontidae, Malta, Sredozemsko morje, ljubiteljska znanost

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