

New and interesting records of marine fishes (Actinopterygii) from the Maltese Islands (central Mediterranean)

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Abstract

The occurrence of three bony ray-finned fishes, *Thorogobius ephippiatus* (Lowe, 1839), *Chlopsis bicolor* Rafinesque, 1810, and *Grammonus ater* (Risso, 1810) is reported for the first time in the scientific literature from Maltese coastal waters. The leopard-spotted goby, *T. ephippiatus*, was mostly recorded within the 8–32 m depth range on soft sediment and rocky bottoms within caves, but one individual was recorded on a rocky bottom with a thin layer of silt at a depth of 117 m where no cave was present. The bicour eel, *C. bicolor*, was recorded within the 318–518 m depth range on rocky bottoms covered with a thin layer of muddy-detrilic sediment; and the cusk-eel *G. ater* was recorded at a depth of 10 m within a cave. Notes on these three species as well as on another bony fish, the Azores rockling, *Gaidropsarus granti* (Regan, 1903), including new information on their bathymetric range and habitat association, are presented.

Keywords

bathymetric distribution, demersal fish, fish-habitat associations, Malta, marine caves, marine surveys, new records

Introduction

Knowledge of the indigenous marine fish fauna of the Maltese Islands has improved in recent years, especially following new investigations of previously poorly known habitats such as cobble habitats, marine caves, and deep-sea habitats (e.g., Kovačić et al. 2013; Castriota and Deidun 2014; Evans et al. 2016; Kovačić and Schembri 2019; Tsagarakis et al. 2021). Surveys made in 2015 and 2016 during the LIFE BaHAR for N2K project (<https://lifebahar.org.mt>) have contributed new records of fishes as well as provided information on some interesting species that have been recently recorded but whose ecology in the central Mediterranean is not well known.

Methods

The presently reported study is based on surveys using SCUBA diving and underwater photography, and on videography using a Remotely Operated Vehicle (ROV; Saab Seaeye Falcon DR) undertaken within the 25-nautical mile Fisheries Management Zone around the Maltese Islands during the summer of 2015 and 2016 as part of the LIFE BaHAR for N2K project. The SCUBA dives were carried out within the 0–40 m depth range in fully submerged caves along the southwestern, western, and northern coasts of the Maltese Islands where the shore is characterized by sheer cliffs. The ROV surveys were made at depths between 50 m and 1030 m in coastal areas characterized by rhodolith/maerl beds, offshore along the edges of the

southeastern end of the Malta Graben, and off the western, northwestern, and northern parts of the island of Gozo.

Apart from images and geographical coordinates, data on the benthic habitats and water depth were collected. Photographs and videos were analysed in the laboratory to identify the imaged fish. Identification was based on morphological and coloration characters visible in the imagery. The Kovačić and Svensen (2018) stringent version of Bello et al. (2014)'s best practice protocol for first records, which includes species diagnosis, was applied. The diagnoses correspond to the minimum combination of characters that differentiate the species from confamilials in the area (Nielsen 1986; Kovačić et al. 2022; also, the photographs of Bythitidae from figures in Dulčić and Kovačić 2020). Taxonomic nomenclature follows Fricke et al. (2022).

Results and discussion

Thorogobius ephippiatus (Lowe, 1839)

Figs 1, 2

Diagnosis. Base coloration greyish with blue-green sheen on back; covered with large, round dark spots. Head, including predorsal area, covered with brown to dark orange, smaller round spots, usually lighter in colour and more reddish than blotches on body. Five to six large, dark brown or brown-purple to black midlateral blotches. Dark blotches above midline smaller than midlateral blotches.

Remarks. In the SCUBA surveys there were six occurrences of this species from depths of between 8 and 32 m within caves, with four occurrences on soft sediment bottoms and two on rock (see Table 1). An additional single record from the ROV surveys was from a depth of 117 m on a rocky bottom having a thin layer of silt (Table 1 and Fig. 2). No cave or rock fissure or any other similar feature was present in the vicinity of this individual. Given that the literature indicates that *T. ephippiatus* is typical of cave habitats, crevices, overhangs or deep gullies (Bussotti and Guidetti 2009; Bussotti et al. 2015; Ragkousis et al. 2021; Kovačić et al. 2022), the occurrence of this species outside this type of habitat is unusual. *Thorogobius ephippiatus* is a new record for Maltese coastal waters; it is a NE Atlantic and Mediterranean species. In the Mediterranean its distribution appears to be mostly along the northern shores of both west and east basins including the Aegean Sea, Cyprus, and Israel (Kovačić et al. 2022). According to Froese and Pauly (2022), the depth range for *T. ephippiatus* is 6–40 m, with the fish being commonest in the 6–12 m range. The record from a depth of 117 m is therefore noteworthy, especially as the present authors are aware of only one previous deep-water record of this species, by Stern et al. (2018), who recorded it from a depth of 156 m off the north Israeli coast. Stern et al. (2018) attribute the deep-water occurrence of *T. ephippiatus* to its requirement for dark and cold conditions, which in the eastern Levantine Sea only occur in deep water. However, the species is present



Figure 1. Photograph of *Thorogobius ephippiatus*, taken on 27 June 2016 at a depth of 24 m within a cave (36°04.879'N, 014°14.110'E). Photograph: OCEANA/Carlos Minguell© LIFE BaHAR for N2K.

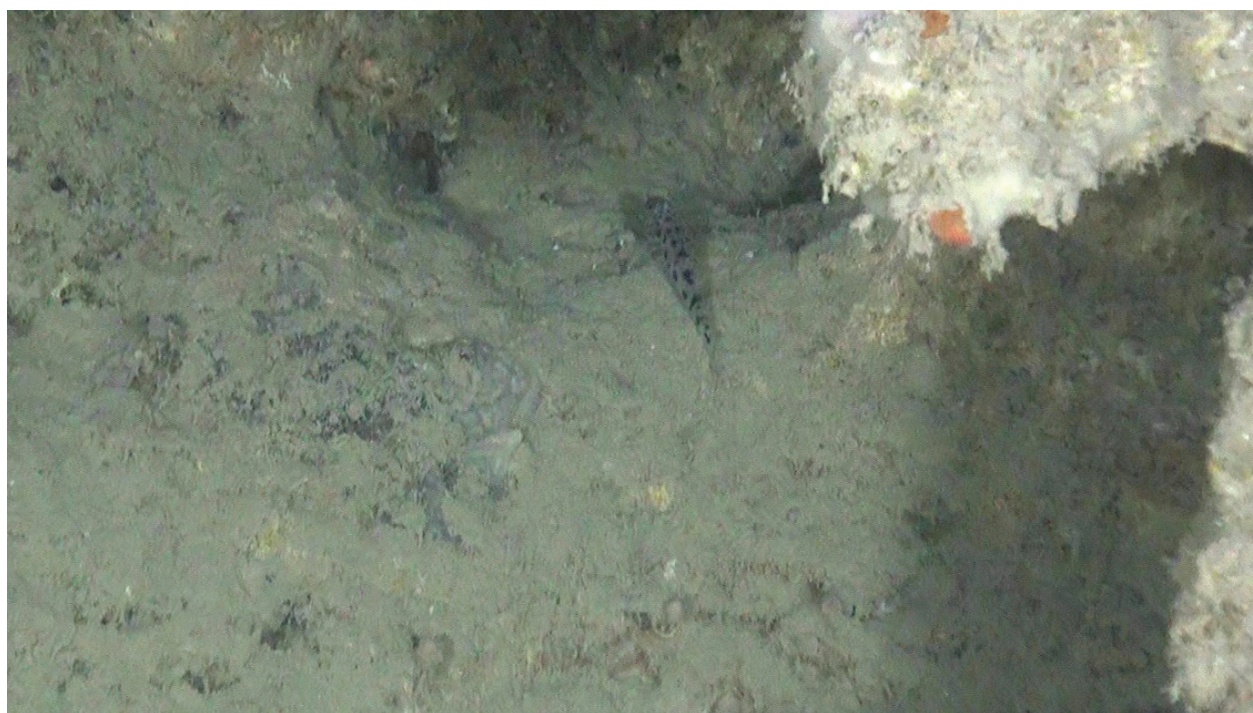


Figure 2. Image grab from ROV footage collected on 7 July 2016 at a depth of 117 m (36°00.776'N, 014°50.517'E) showing an individual of *Thorogobius ephippiatus*. Image: OCEANA® LIFE BaHAR for N2K.

in shallow water in Cyprus (Gerovasileiou et al. 2017), which raises doubts about this hypothesis. On the other hand, the present deep-water record from Malta confirms that *T. ephippiatus* has a much wider bathymetric range than previously thought. It may be significant that both the Maltese and Israeli deep-water records were from open rocky bottoms and not from caves, suggesting that the association with caves in shallow water is due to the fish's requirement for a dark habitat, while in deep water the species can occur in the open. In fact, Kovačić (1997) had already noted that this species occurs deep within caves in very shallow waters, but closer to the mouth at the deeper end of the depth range studied by this author (32 m). It therefore also occurs outside of caves in deeper water.

Chlopsis bicolor Rafinesque, 1810

Fig. 3

Diagnosis. Body highly elongated. Snout rounded, slightly projecting beyond tip of lower jaw. Anterior nostril tubular, located near tip of snout. Eyes well developed. Pectoral and pelvic fins absent; dorsal and anal fins confluent with caudal fin. Body distinctly bicoloured, with grey-brown dorsal region and cream-white ventral section; in head region boundary between two-colour bands located at lower edge of pupil.

Remarks. There were five occurrences of this species, all from the ROV surveys and within the 318–528 m depth range (Table 2). This newly recorded species appears

Table 1. Individuals of *Thorogobius ephippiatus* recorded from the LIFE BaHAR for N2K marine benthic surveys.

Survey method	Date	Geographical coordinates	Water depth [m]	Habitat type
SCUBA diving	8 June 2015	35°52.021'N, 014°21.174'E	32	Rock covered with a thin layer of detritus within cave
SCUBA diving	10 July 2015	36°00.813'N, 014°15.883'E	8	Soft sediment covered with a thin layer of detritus within cave
SCUBA diving	12 June 2016	36°04.879'N, 014°14.110'E	24	In rock fissure within cave
SCUBA diving	12 June 2016	36°04.879'N, 014°14.110'E	24	Soft sediment bottom within cave
SCUBA diving	27 June 2016	36°04.879'N, 014°14.110'E	24	Soft sediment bottom within cave
ROV	7 July 2016	36°00.776'N, 014°50.517'E	117	Rock covered with a thin layer of detritus
SCUBA diving	25 July 2016	35°50.969'N, 014°23.050'E	20	Soft sediment bottom within cave

Table 2. Individuals of *Chlopsis bicolor* recorded from the LIFE BaHAR for N2K marine benthic surveys.

Survey method	Date	Geographical coordinates	Water depth [m]	Habitat type
ROV	2 June 2016	35°34.354'N, 014°30.444'E	486	Muddy bottom
ROV	2 June 2016	35°34.369'N, 014°30.755'E	494	Muddy bottom
ROV	26 June 2016	35°32.060'N, 014°13.220'E	458	Rock covered with a thin layer of sediment
ROV	28 July 2016	36°13.090'N, 013°47.860'E	318	Rock covered with a thin layer of muddy-detritic sediment
ROV	28 July 2016	36°10.496'N, 013°52.855'E	528	Rock covered with a thin layer of muddy-detritic sediment



Figure 3. Image grab from ROV footage collected on 26 June 2016 at a depth of 458 m, (35°32.060'N, 014°13.220'E) showing an individual of *Chlopsis bicolor*. Image: OCEANA® LIFE BaHAR for N2K.

to predominantly prefer rocky bottoms covered with a thin layer of muddy-detritic sediment. Froese and Pauly (2022) give a depth range of 80–365 m for *C. bicolor*, while Erguden and Bayhan (2015) recorded a single individual from a depth of 513 m from off Mersin Bay, Turkey, which is the same depth as the majority of our records (Table 2). This suggests that the species habitually occurs in waters that are deeper than previously reported. *Chlopsis bicolor* is native to the Mediterranean, where it is widely distributed and reported to occur on muddy bottoms (Froese and Pauly 2022). Our records show that the species also occurs on bottoms of muddy sediment intermixed with patches of hard substrata (Table 2).

***Grammonus ater* (Risso, 1810)**

Fig. 4

Diagnosis. Head not strongly depressed, eyes directed mainly laterally. No sharp spines at lower angle of preopercle. Opercle triangular, posterior edge angled and pointed only at upper edge. Snout blunt. Posterior angle of jaws ending behind vertical of eye posterior margin. Body and head uniformly dark brown.

Remarks. A single individual of this species was recorded from the SCUBA surveys at a depth of 10 m within a cave (Fig. 4 and Table 3). Froese and Pauly (2022) give the depth range for this species as 5–30 m and in-

Table 3. Individuals of *Grammonus ater* and *Gaidropsarus granti* recorded from the LIFE BaHAR for N2K marine benthic surveys.

Species	Survey method	Date	Geographical coordinates	Water depth [m]	Habitat type
<i>Grammonus ater</i>	SCUBA diving	20 June 2016	36°01.106'N, 014°14.730'E	10	Rocky wall within cave
<i>Gaidropsarus granti</i>	ROV	23 June 2015	35°52.880'N, 014°07.351'E	871	Muddy bottom and rocky outcrops
<i>Gaidropsarus granti</i>	ROV	9 July 2016	36°00.185'N, 013°59.860'E	748	Muddy bottom and rocky outcrops

dicating that *G. ater* is associated with reef habitats. The present record, as well as two other local records reported in social media*, refer to this species as occurring within caves in shallow water. The occurrence of *G. ater* in the Maltese Islands has not been previously reported in the scientific literature. The majority of authors (e.g., Bussotti and Guidetti 2009; Bussotti et al. 2015) consider this species to be speleophilic, while Ragkousis et al. (2021) commented that it is only found in exclusively dark conditions. Froese and Pauly (2022) state that *G. ater* occurs in the eastern Atlantic, and from the Balearic Islands to the Adriatic in the Mediterranean. On the other hand, Ragkousis et al. (2021) note that its occurrence in the Azores Archipelago remains unconfirmed, while recent studies give records for this species from Crete and Cy-

* https://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=174828;
<https://www.facebook.com/photo/?fbid=10226466313230014&set=pcb.10226466366111336>



Figure 4. Image grab from ROV footage collected on 20 June 2016 at a depth of 10 m (36°01.106'N, 014°14.730'E) showing an individual of *Grammonus ater*. Image: Enrique Talledo/OCEANA® LIFE BaHAR for N2K.

prus. The distribution of *G. ater*, which is considered to be a Mediterranean endemic, has therefore been updated to extend from Spain to Cyprus, having been reported from 23 marine caves in Spain, France, Italy, Croatia, Greece, and Cyprus (Ragkousis et al. 2021), and from at least one cave in Malta (Table 3).

***Gaidropsarus granti* (Regan, 1903)**

Fig. 5

Diagnosis. Dorsal part of head reddish-brown with cream reticulations. Rest of body with three longitudinal brown bands (one dorsal and one dorsolateral band on either side) separated by thin, undulating cream stripe. Dorsolateral brown bands interrupted by thin cream stripes in the posterior region, breaking up into spots towards the caudal peduncle. Lower surfaces including head, ventral part of flank, and belly, all cream-coloured.

Remarks. This species has recently been recorded from Malta by Tsagarakis et al. (2021), based on a single individual caught off west Gozo (coordinates: 36.00°N, 014.10°E) at a depth of 290 m. Bello (2018) gives another record as “*W of Malta (ANDALORO et al. 2011)*” but this online article (Anonymous, not dated) does not include details of the record apart from a point on a map. From this map, it appears that the fish originated from waters some 75 km west of the island of Gozo. Two individuals of *G. granti* (Fig. 4) were recorded from the presently reported ROV surveys, one in 2015 and one in 2016, which antedate the record by Tsagarakis et al. (2021).

Both individuals occurred on a muddy bottom with rocky outcrops, one at a depth of 748 m and the other at 871 m. Froese and Pauly (2022) give the typical depth range for *G. granti* as 20–250 m but there are many Mediterranean records of this fish from deeper waters (e.g., Orsi-Relini and Relini 2014; Bello 2018; Spinelli and Castriota 2019; Tsagarakis et al. 2021). However, the depth of the presently reported findings (748 m and 871 m, Table 3) far exceeds almost all previous Mediterranean depth reports, and the 871 m depth is substantially greater than the deepest known record for the species, from the Galician Bank (Atlantic), where this species occurred at 823 m (Bañón et al. 2002). *Gaidropsarus granti* is native to the eastern and central Atlantic and its first record (cf. Bello 2018) from the Mediterranean in 1995 (Zachariou-Mamalinga 1999) sparked a debate as to whether it is an overlooked native or an Atlantic species that had recently expanded its range. The species’ status in the Mediterranean is best given as cryptogenic, although the prevailing opinion is that it is an Atlantic range-expanding species (Orsi-Relini and Relini 2014; Bello 2018).

The present note adds knowledge to the fish faunal diversity of the Maltese Islands: *Thorogobius ephippiatus* and *Chlopsis bicolor* are new records for Malta; *Grammonus ater* has not yet been reported from Malta in the scientific literature; and *Gaidropsarus granti* has only been reported once from close to the Maltese islands in the published literature. In addition, the present findings include the deepest records of *G. granti* and *C. bicolor*,



Figure 5. Image grab from ROV footage collected on 23 June 2015 at a depth of 871 m (35°52.880'N, 014°07.351'E) showing an individual of *Gaidropsarus granti*. Image: OCEANA © LIFE BaHAR for N2K.

and the second deepest record of *T. ephippiatus* for the entire Mediterranean Sea.

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