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The first confirmed record of *Pomatoschistus marmoratus* (Risso, 1810) (Actinopterygii: Gobiiformes: Gobiidae) from Malta

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The first confirmed record of Pomatoschistus marmoratus *(Risso, 1810) is reported from Malta. The gobiid species richness of Malta and the geographic distribution of this species are discussed.*

Key words: Malta; *Pomatoschistus marmoratus*; first record; morphology; ecology

INTRODUCTION

The family Gobiidae is the species richest family of fishes in the Mediterranean (KOVAČIĆ, 2020). The marbled goby, *Pomatoschistus marmoratus* (RISSO, 1810), is a widespread gobiid species with a distribution from the south of Portugal in the eastern Atlantic, along the northern Mediterranean coast to the Black and Azov Seas (MILLER, 1986). It inhabits sandy, inshore, shallow waters and sometimes brackish and hypersaline waters (MILLER, 1986). It was also recorded south of the Aegean Sea along the Levant coast to the Suez Canal in Egypt (MILLER, 1986). Along the southern Mediterranean coast between the Alboran Sea and Suez Canal in Egypt (MILLER, 1986), the species was only confirmed from northern and southern Tunisia (MEJRI *, ET AL.* 2009).

The aim of the present paper is to report the confirmed presence of *P. marmoratus* from Malta, expanding the known species distribution.

MATERIAL AND METHODS

The terminology of head canal pores and head rows of sensory papillae followed SANZO (1911) and MILLER (1986). Meristic methods followed methodology in SCHLIEWEN & KOVAČIĆ (2008). The specimen was reversibly stained in a 2% solution of Cyanine Blue in distilled water (SARUWATARI ET AL., 1997) for positive confirmation of data on scales, head canals and sensory papillae rows. The diagnosis is a minimum combination of characters that positively identify specimens of *P. marmoratus* among marine genera and species of the family Gobiidae in the Mediterranean area (MILLER, 1986; KOVAČIĆ, 2020).

Material. Male, 28.1 + 5.4 mm, PMR VP5349, Malta, Għadira Bay, 22 June 2022, 35º 58' 05.14'' N, 14º 21' 07.84'' E (Fig. 1). Collected by M.A. Falzon. The specimen was deposited in the Prirodoslovni muzej Rijeka (PMR).

Fig. 1. Pomatoschistus marmoratus. *Male, 28.1 + 5.4 mm, PMR VP5349, Malta, Għadira Bay, preserved specimen, slight remnant of bluish staining still visible, photo by M. Kovačić.*

RESULTS

Morphology

Diagnosis. 1) head suborbital sensory papillae with row *a* below eye with single transverse row *atp*; 2) pelvic disc with anterior transverse membrane present, rear edge of pelvic fin anterior membrane crenate to villose (present specimen with crenate edge); 3) head canals and pores present with anterior and posterior oculoscapular canals and preopercular canal, anterior oculoscapular canal extends to the snout to the paired pore pores *σ*; 4) the base of the first and second dorsal fins completely scaled, predorsal area naked; 5) four or more suborbital transverse rows *c* of sensory papillae having four or more papillae in the row (present specimen with six transverse *c* rows and *cp* row, count of papillae from rows *c1* to *cp*: 2, 3, 3, 6, 7, 5, 12); 6) scales in lateral series 37-48 (present specimen both sides: 37 and 39).

Fins. First dorsal fin VI, second dorsal fin I+8, anal fin I+8, pectoral fins 19 and 18 (left and right side).

Scales. Scales ctenoid, head naked, breast with cycloid scales, prepectoral naked, belly with cycloid scales, scales in transversal series 9 (both sides).

Lateral line system. Head with anterior and posterior oculoscapular, and preopercular canals, with pores *σ, λ, κ, α, ρ, ρ*^{1}*, ρ*^{2}, and *γ, δ, ε* respectively. Suborbital longitudinal row *b* reaching to below row *a* and to posterior eye edge. The row *cp* is only suborbital transverse row below row *b*.

Remarks. The specimen fits well the short description in MILLER (1986). However, the pore *ω* was absent in the studied specimen, contrary to the data published by MILLER (1986); but pore *ω* absence was already noted in *P. marmoratus* published morphology (e.g. MEJRI ET AL ., 2009).

Ecological and geographical distribution

The present specimen was collected in shallow water (*ca*. 0.8m) characterised mainly by sand, but also by shallow outcrops of rock sparsely covered with algae. The location is the inner shore of a bay that extends for *ca*. 3km along either side and is *ca*. 800m long at its narrowest (inshore). The bottom of the bay is characterised by sand, with significant growth of *Posidonia oceanica* and to a lesser extent *Cymodocea* sp. A number of fish that shared the field characteristics and general shape and coloration of the collected specimen were present in the area, at the time of collection and also regularly since 2012. Assuming these to be *P. marmoratus*, the species appears to be fairly common at Għadira and at least one other location, Golden Bay (Ramla tal-Mixquqa) on the west coast of Malta (Fig. 2). The observed diurnal benthic fish assemblage for the locality and depth where the present specimen was collected includes *Parablennius sanguinolentus* (Pallas, 1814), *Microlipophrys dalmatinus* (Steindachner & Kolombatović, 1883), *Gobius incognitus*

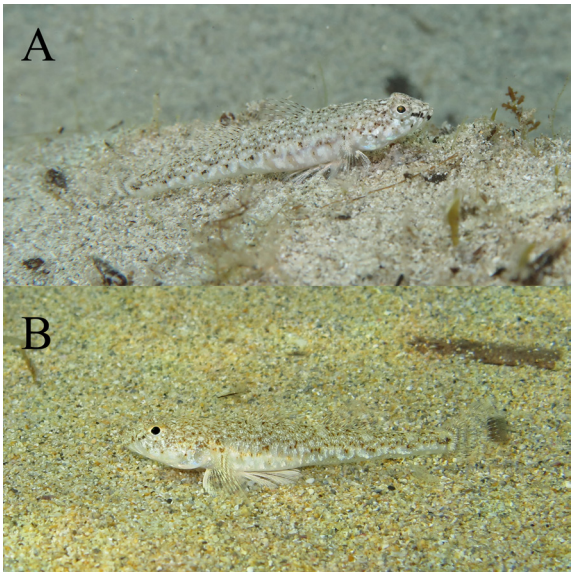

Fig. 2. Underwater photographs of presumed specimens of Pomatoschistus marmoratus*. A) Ghadira Bay, 5 July 2022. B) Golden Bay, 11 June 2014. Both photographed by M. A. Falzon.*

Kovačić & Šanda, 2016, *Mullus surmuletus* Linnaeus, 1758, *Callionymus pusillus* Delaroche, 1809, *Tripterygion tripteronotum* (Risso, 1810), *Muraena helena* Linnaeus, 1758, *Bothus podas* (Delaroche, 1809) and *Dasyatis pastinaca* Linnaeus, 1758.

DISCUSSION

The present material is positively distinguished from other similar small *Pomatoschistus* species that are now known for the Mediterranean by applied diagnosis e.g. from *P. adriaticus* Miller, 1973 by rear edge of pelvic fin anterior membrane crenate; from *P. anatoliae* Engin & Innal, 2017 by suborbital sensory papillae row *a* with single transverse row *atp*; from *P. microps* (Krøyer, 1838) by scaled first dorsal fin base; and from *P. tortonesei* Miller, 1969) by scale count in lateral series.

The present record represents the first confirmed record of *P. marmoratus* from Malta, increasing the total number of confirmed gobiid species from Malta to 22, while eight more gobiid species remain questioned for the area, still lacking the evidence from voucher specimens or from photographs (present data, KOVAČIĆ & SCHEMBRI, 2019; KOVAČIĆ & KOVTUN, 2022). *Pomatoschistus marmoratus* was previously listed for Maltese waters in FARRUGIA RANDON & SAMMUT (1999). However, that source cited no diagnosis based on actual material, no photographs and no data on the voucher specimens stored; the listing is therefore to be considered spurious, since it lacks any evidence on the species' presence and proper identification.

The present Malta record connects the species distribution between the southern records at Tunisia and those for the northern Mediterranean (MILLER, 1986; MEJRI *ET AL.,*2009). However, the expected continuous northern distribution of *P. marmoratus,* from the south Portugal coast in the Atlantic Ocean, along the entire Mediterranean north coast to the Black Sea, as presented on MILLER'S (1986) minimap, including the Sicilian presence of this species which is the closest to Malta, was not supported by references in MILLER (1986). The older records of *P. marmoratus*, reviewed in MILLER (1973), usually lack enough diagnostic characters to distinguish *P. marmoratus* from other similar small *Pomatoschistus* species that are now known for the Mediterranean (*P. adriaticus*, *P. anatoliae*, *P. microps*, *P. tortonesei*). We can only presume that MILLER (1986) used interpolations from those records to describe geographic distribution and to draw his minimap. Since MILLER (1986), the only morphologically verified report of *P. marmoratus* with diagnostic characters distinguishing *P. marmoratus* from similar small *Pomatoschistus* species was published in MEJRI *et al.,* (2009). The material used in recent phylogenetic analyses as *P. marmoratus* (e.g. IN ENGIN & INNAL (2017), TOUGARD *et al.,* (2021) was also morphologically identified, although the morphological details were not published. It could be concluded that the entire *P. marmoratus* distribution range needs recheck and verification, lacking verified records. In addition, the unpublished phylogenetic data further complicate the geographic distribution of "real" *P. marmoratus* (Julien Renoult, personal communication), suggesting that *P. marmoratus* is a complex of species, which are presently indistinguishable one from another based on the published morphological knowledge on this species.

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Prvi potvrđeni nalaz glavočića mramogastog *Pomatoschistus marmoratus* (Risso, 1810) (Actinopterygii: Gobiiformes: Gobiidae) na Malti

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SAŽETAK

Prvi potvrđeni nalaz vrste *Pomatoschistus marmoratus* zabilježen je za Maltu. Raspravljeni su podaci o bogatstvu vrsta glavoča u vodama Malte i o zemljopisnoj rasprostranjenosti vrste *Pomatoschistus marmoratus*.

Ključne riječi: Malta; *Pomatoschistus marmoratus*; prvi nalaz; morfologija; ekologija