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FIRST RECORD OF THE ECHIURID *MAXMUELLERIA GIGAS* (M. MÜLLER, 1852) IN SLOVENIAN WATERS (NORTHERN ADRIATIC)

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ABSTRACT

One specimen of the echiurid Maxmuelleria gigas *(M. Müller, 1852) was found in sediments at a depth of 23 m, during a monitoring campaign for macrobenthos in the northern Adriatic Sea in 2020. This finding represents the first record of the species for Slovenian waters.*

Key words: *Maxmuelleria gigas,* soft bottom, macrobenthos, northern Adriatic

PRIMA SEGNALAZIONE DELL'ECHIURIDE *MAXMUELLERIA GIGAS* (M. MÜLLER, 1852) NELLE ACQUE SLOVENE (NORD ADRIATICO)

SINTESI

Un esemplare dell'echiuride Maxmuelleria gigas *(M. Müller, 1852) è stato trovato nel sedimento a 23 m, durante una campagna di monitoraggio del macrobenthos nel nord Adriatico nel 2020. Questo ritrovamento rappresenta la prima segnalazione di questa specie nelle acque slovene.*

Parole chiave: *Maxmuelleria gigas,* fondo mobile, macrobenthos, nord Adriatico

INTRODUCTION

Echiurids, commonly known as "spoon worms" due to their tongue-like extensible proboscis, are a small and poorly known group, represented by 165 exclusively marine species of worldwide distribution (Tilic *et al.,* 2015). They occur in benthic habitats ranging from the littoral zone to the deep sea (Tilic *et al.,* 2015). Traditionally ranked as a phylum of their own, they are now, according to the most recent phylogenetical analyses (Goto *et al.,* 2020), considered as part of the phylum Annelida, even if they lack visible segmentation. In fact, it is now recognized, based on both molecular (Struck *et al.,* 2007; Weigert *et al.,* 2014; Struck *et al.,* 2015) and morphological (Hessling & Westheide 2002; Tilic *et al.*, 2015) evidence, that they are derived members of the Annelida, coming from a common ancestor that secondarily lost segmentation. Six species are currently known (Murina, 1984; Relini, 2008) in the Mediterranean Sea, but only two of them have been reported in the Adriatic Sea: *Bonellia viridis* Rolando, 1821, and *Maxmuelleria gigas* (M. Müller, 1852) both belonging to the family of Bonelliidae Baird, 1868 (Zavodnik, 2017). While both species are reported for Italian (Relini, 2008) and Croatian waters (Zavodnik, 2017), only *B. viridis* was until now reported from Slovenian waters (Lipej & Vrišer, 1999; Sket, 2003).

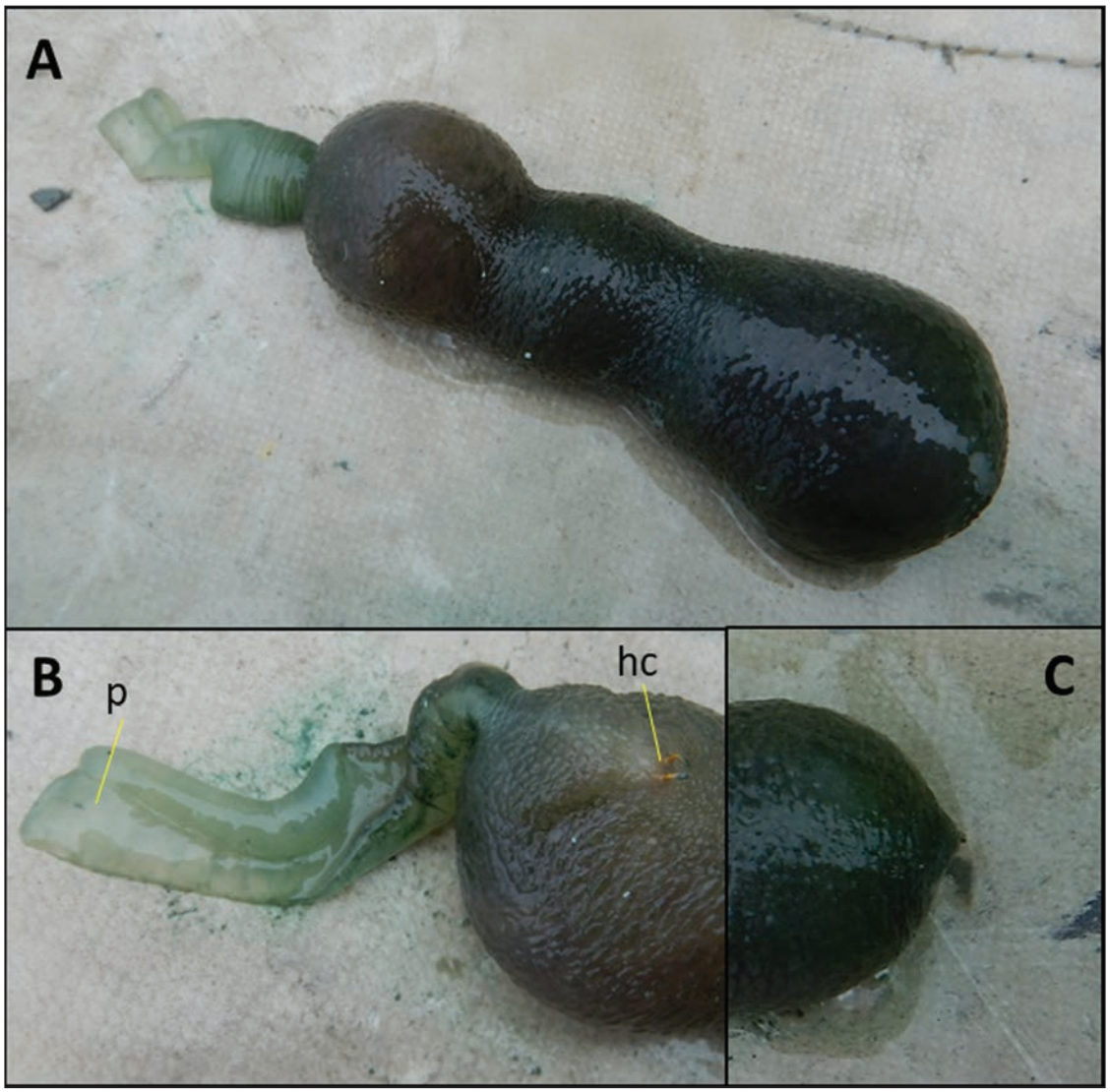

Fig. 1: *Maxmuelleria gigas.* ***A. Entire animal, dorsal view, B. Anterior ventral part, C. Posterior part. Hc = hooked chaetae, p = proboscis.***
Sl. 1: *Maxmuelleria gigas.* ***A. Cela žival s hrbtne strani, B. Sprednja trebušna stran, C. Zadnji del. Hc = kavljaste ščetine, p = rilec.***

MATERIAL AND METHODS

Sampling was performed during a benthic monitoring campaign in summer 2020 in the Gulf of Trieste (northern Adriatic) off the Slovenian coast. Sediment was collected with a Van Veen grab and sieved through a 1 mm mesh. The specimen was found at a depth of 23.5 m at one offshore location (Sed 6: 45°35′606″N, 13°37′456″E), in sediment composed of 53 % silt, 27 % clay, and 20 % sand (Ogorelec *et al*., 1991). The specimen was immediately photographed and fixed in 70 % ethanol. It is now stored at the Marine Biology Station in Piran.

RESULTS AND DISCUSSION

Taxonomic account

Phylum ANNELIDA, Class POLYCHAETA Grube, 1850

Order ECHIUROIDEA, Family BONELLIIDAE Lacaze-Duthiers, 1858

Genus *Maxmuelleria* Bock, 1942

Species *Maxmuelleria gigas* (M. Müller, 1852)

The specimen of *Maxmuelleria gigas* was about 15 cm in length, with green-coloured unsegmented, papillate sac-like trunk (Fig. 1A), and a single pair of hooked ventral chaetae (Fig. 1B), characteristic of all echiurid species (Tilic *et al*., 2015). The green colour is due to a pigment called "bonellin" (Goto *et al*., 2020). The species is distinguishable from other echiurids by the distinct highly expandable non-bifid proboscis (Fig. 1B), and posterior part of the trunk (Fig. 1C) without chaetae (Riedl, 1991). This species lives buried in silty or sandy bottoms, 20-50 m deep (Riedl, 1991). Like most echiurids, *M. gigas* is a deposit feeder (Goto, 2016), collecting organic particles from the sediments with its highly extensible proboscis (Riedl, 1991). Unlike *B. viridis*, which have been investigated more deeply, also in the Adriatic Sea (Zavodnik, 2017), the echiurid *M. gigas* is still poorly known. Originally described as *Thalassema gigas* M. Müller, 1852, and assigned to the family Thalassematidae, it was later moved to the family Bonellidae and assigned to the genus *Maxmuelleria* (WoRMS Editorial Board, 2020). In general, the taxonomy and phylogeny of the echiurids are still object of revision (Goto *et al.,* 2020). Most species belonging to the Bonellidae are characterized by marked sexual dimorphism, with dwarf males residing inside, or attached to, the body of the female (Riedl, 1991). Since this reproductive character is typical of echiurids at bathyal and abyssal depths, Goto (2016) suggested that it could represent a mechanism of adaptation to deep water environments, and that in shallow water echiurids it could be the result of a secondary adaptation of the species after expanding its distribution to shallow waters. But while this phenomenon is well documented for bonellid echiurids with a bifid proboscis, like for those belonging to the genus *Bonellia*, it has not been ascertained yet in the males of the genus *Maxmuelleria* (Goto *et al.,* 2020).

The echiurid *M. gigas* is reported as a Mediterranean and European Atlantic species (Bakalem *et al.*, 2020). Despite being reported as locally abundant by Riedl (1991), there are very few recent records of this species, and only restricted to certain areas of the Mediterranean: central Mediterranean (Relini, 2008; Massi *et al.,* 2011), western Mediterranean (Camp & Ros, 1980; Harriague *et al.,* 2019; Bakalem *et al.,* 2020), central Adriatic (Atkinson *et al.,* 1998; Morello *et al.,* 2007; Relini, 2008), and northern Adriatic (Simonini *et al.*, 2007; Relini, 2008; Zavodnik, 2017). Some records are based only on the burrow type (Atkinson *et al.*, 1998; Morello *et al.,* 2007). The present record is the first for this species in Slovenian waters.

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PRVI ZAPIS O POJAVLJANJU ZVEZDAŠA *MAXMUELLERIA GIGAS* (M. MÜLLER, 1852) V SLOVENSKIH VODAH (SEVERNI JADRAN)

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POVZETEK

Med vzorčenjem makrobentosa v severnem Jadranu v letu 2020 je bil na sedimentnem dnu na globini 23 najden primerek zvezdaša Maxmuelleria gigas *(M. Müller, 1852). Gre za prvo najdbo te vrste v slovenskih morskih vodah.*

Ključne besede: *Maxmuelleria gigas,* mehko dno, makrobentos, severni Jadran

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