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RANGE EXPANSION OF ALIEN NUDIBRANCH *MELIBE VIRIDIS* (KELAART, 1858) IN THE NORTHERN ADRIATIC SEA

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ABSTRACT

The alien nudibranch Melibe viridis (Kelaart, 1858) was recorded in the waters of Slovenia (Gulf of Trieste, northern Adriatic Sea). A specimen was photographed and filmed on rocky hard bottom of the Natural Monument Cape Madona in October 2016. This is the first record of this large sized nudibranch for Slovenia and for the Gulf of Trieste, as well, and a new one among otherwise rare records on this species in the Adriatic Sea.

Key words: Mollusca, Gastropoda, Nudibranchia, Slovenia, non indigenous species, Adriatic Sea

ESPANSIONE DELL'AREALE DEL NUDIBRANCO ALIENO *MELIBE VIRIDIS* (KELAART, 1858) NELL'ADRIATICO SETTENTRIONALE

SINTESI

Il nudibranco alieno Melibe viridis (Kelaart, 1858) è stato trovato nel mare della Slovenia (Golfo di Trieste, Adriatico settentrionale). Un esemplare è stato fotografato e filmato sul fondale roccioso all'interno del Monumento naturale Punta Madonna, nell'ottobre del 2016. Si tratta del primo ritrovamento di questo nudibranco di grandi dimensioni per la Slovenia e per il Golfo di Trieste, e di una delle poche segnalazioni di questa specie per il mare Adriatico.

Parole chiave: Mollusca, Gastropoda, Nudibranchia, Slovenia, specie non-indigena, mare Adriatico

INTRODUCTION

Melibe viridis (Kelaart, 1858) (Tethydididae: Nudibranchia) is a large sized tropical nudibranch with a typical head hood and inflated cerata. It is widespread across the west Indo-Pacific region. The first Mediterranean record of this species (as *Melibe fimbriata*) was reported from the island of Cephalonia in the Ionian Sea in 1970 (Moosleitner, 1986), but it has also been recorded from the coastal waters off peninsular Greece (Tzouval & Pettas, 2005), Aegean waters off the island Milos (Kotsoubas & Cinelli, 1997), both the Ionian (Thompson & Crampton, 1984; Cariglio *et al.*, 2004; Mastrototaro *et al.*, 2004) and Tyrrhenian coasts of Calabria (Crocetta *et al.*, 2009), the waters off Sardegna (Doneddu & Trainito, 2008), the waters off Cyprus (Sanchez Villarejo, 2007; Tsiakkios & Zenetos, 2011), the Strait of Messina (Mojetta, 1998), north-eastern Sicily (Scuderi & Russo, 2003), Maltese islands (Borg *et al.*, 2016), southern Turkey (Van Bragt, 2001; Yokes & Rudman, 2004), off Israeli coast (Mienis, 2010) and the island of Djerba in the Gulf of Gabes (Cattaneo-Vietti *et al.*, 1990) (maps and references in Despalatović *et al.*, 2002; Zenetos *et al.*, 2004).

Despalatović *et al.* (2002) published the first records of *M. viridis* for the Adriatic Sea in waters off the island of Hvar (Croatia) and Jančić (2004) reported it close to the city of Herceg Novi (Montenegro). Recently, Mandić *et al.* (2016) reported on spawning of this species in Boka Kotorska Bay (Montenegro) in October 2014.

In this note we report on the first record of *M. viridis* in the Slovenian part of the Adriatic Sea, which also represent the first finding for the Gulf of Trieste.

MATERIAL AND METHODS

On the 25th of October 2016 diver Kristijan Murn photographed and filmed a 10 cm long specimen of *Melibe viridis* with Go-Pro camera at the location of Natural Monument of Punta Madona in Piran (Slovenia) (Fig. 1). The specimen was sighted at 7 m depth, creeping on rocks at the sea bottom (Fig. 2) in front of the Norik diving club Piran. Photographs and film shots of the studied specimen are stored as a part of species record collection of Marine Biology Station (National Institute of Biology) in Piran.

RESULTS AND DISCUSSION

The observed seaslug was easily determined due to the typical shape, large and dilated buccal hood and other diagnostic features (Thompson & Crampton, 1984; Gosliner & Smith, 2003). This is the first record of this nudibranch in the Slovenian part of Adriatic and at the same time in the Gulf of Trieste and the northernmost record in the Adriatic Sea, as well. The specimen was photographed in rocky environment while crawling over the substrate and scanning the sediment between rocks with its oral veil. The habitat was not typical one for this species, since in most reports *M. viridis* was found in seagrass meadows of *Cymodocea nodosa*. However, it is also true that the rocky habitat host a high abundance of many small sized decapods and other crustaceans.

The occurrence of *M. viridis* in the waters off Piran occurred in October, where temperatures are still rather high (above 20°C). At the end of summer the Gulf of Trieste is facing the intrusion of southern water masses into the area (Adriatic ingression) which could affect the occurrence of thermophilous faunistic elements (Dulčić *et al.*, 2004). The possibility that *M. viridis* could be related with the ingression of southern Adriatic water masses was previously already pointed by Mandić *et al.* (2016) for Montenegrin waters. Tsiakkios & Zenetos (2011) considered the ballast waters as a probable vector of *M. viridis* introduction into the Mediterranean Sea, since this species was not reported neither from the Levantine waters nor from the Red Sea.

The new Adriatic record on this species proved again the importance of an effective cooperation between SCUBA diving organisations and scientific institutes.

In Slovenian coastal sea at least nine alien mollusks were recorded (Tab. 1) prior the finding of *M. viridis* (De Min & Vio, 1997, 1998; Lipej *et al.*, 2008., Mavrič *et al.*, 2010; Crocetta, 2011; Dailanis *et al.*, 2016; Lipej *et al.*, 2017). Six of them are bivalves, while other are gastropods with three of them being seaslugs (*Bursatella*



Fig. 1: Map of the northern Adriatic Sea with the studied area. The sampling locality of *Melibe viridis* is presented with a circle.

Sl. 1: Zemljevid Jadranskega morja z obravnavanim območjem. Lokaliteta, kjer je bil najden primerek vrste, *Melibe viridis* je označena s krogcem.

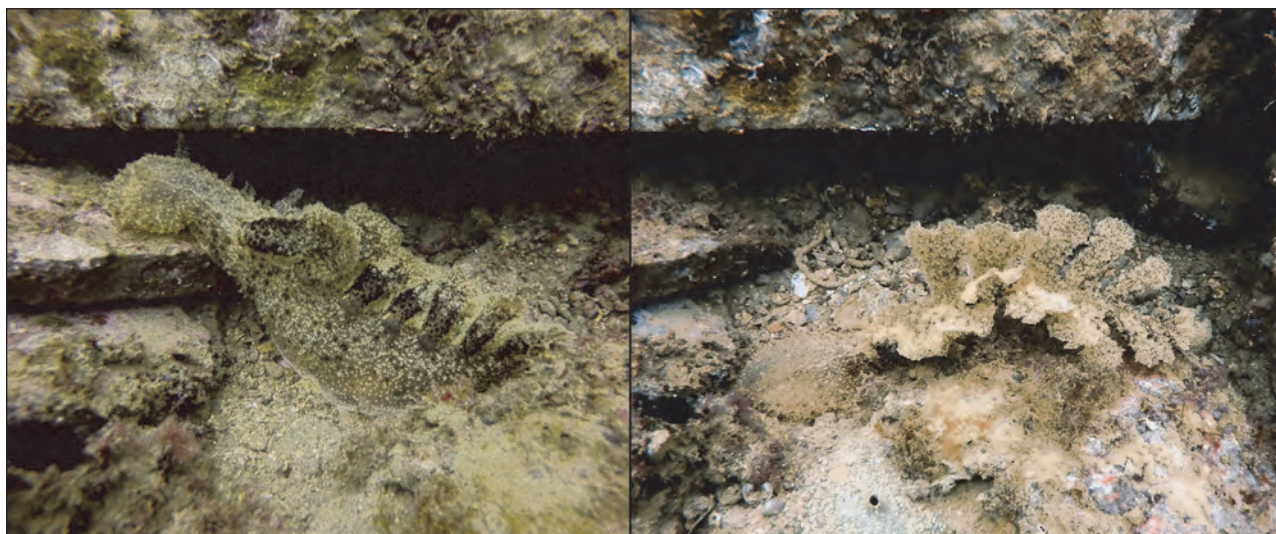


Fig. 2: A specimen of *Melibe viridis* photographed on hard bottom in the Nature Monument Punta Madona, Piran in October 2016 (Photo: K. Murn).

Sl. 2: Primerek vrste *Melibe viridis*, fotografiran na skalnatem dnu znotraj naravnega spomenika Rt Madona v Piranu oktobra 2016 (Foto: K. Murn).

Tab. 1: Alien mollusks up to date recorded in the Slovenian part of the Adriatic Sea with the locality, year of first record and literature reference.

Tab. 1: Tujerodni mehkužci v slovenskem delu Jadranskega morja s podatki o lokaliteti, prvem zapisu in literaturnih virih.

Alien mollusk	Pathway/ Probable vector	Locus	year	source
<i>Arcuatula senhousia</i> (Benson, 1842)	mariculture	Gulf of Koper	2005	Mavrič et al. (2010)
<i>Magallana gigas</i> (Thunberg, 1793)	mariculture	Sečovlje Bay	1971	De Min & Vio (1998)
<i>Ruditapes philippinarum</i> (Adams & Reeve, 1850)	mariculture	Sečovlje salina	1993	Lipej (1994)
<i>Anadara kagoshimensis</i> (Tokunaga, 1906)	Shipping/ Ballast waters	Gulf of Trieste (Slo) sandy environments	1996	De Min & Vio (1997)
<i>Anadara transversa</i> (Say, 1822)	Shipping/ Ballast waters	Piran, Debeli rtič	2011	Crocetta (2011)
<i>Brachidontes pharaonis</i> (P. Fischer, 1870)	Shipping/ Ballast waters or fouling	Cape Strunjan	2012	Lipej et al. (2017)
<i>Bursatella leachi</i> Blainville, 1817	Suez Canal/ spreading	Marine Biology Station, Piran	2001	Lipej et al. (2008)
<i>Rapana venosa</i> (Valenciennes, 1846)	Shipping/Ballast waters	Many infralittoral sites	1983?	De Min & Vio (1997)
<i>Polycera hedgpethi</i> Er. Marcus, 1964	Shipping/fouling and/ or mariculture	Škocjan Inlet	2015	Dailanis et al., (2016)
<i>Melibe viridis</i> (Kelaart, 1858)	Shipping/ Ballast waters?	Cape Madona, Piran	2016	This paper

leachi de Blainville, 1817, *Polycera hedgpethi* Marcus, 1964, *M. viridis*). The introduction of the bulk of them is related to shipping or to mariculture (Zenetos *et al.*, 2004). Some of them such as *B. leachi*, *Rapana venosa* (Valenciennes, 1846), *Arcuatula senhousia* (Benson, 1842), *Magallana gigas* (Turnberg, 1893), and *Ruditapes philippinarum* Adams & Reeve, 1850 could already be considered as established in the area. The fate of *M. viridis* in the northernmost Adriatic area remains questionable, since these waters are facing low winter temperatures (<10 °C), which have an important impact on the survival of newcomers and probably prevent the

establishment of viable populations. For now the occurrence of this seaslug species in the Gulf of Trieste should be considered purely as a casual one.

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ŠIRJENJE AREALA TUJERODNEGA GOLOŠKRGARJA *MELIBE VIRIDIS* (KELAART, 1858) V SEVERNI JADRAN

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POVZETEK

Tujerodnega morskega polža gološkrjarja vrste *Melibe viridis* (Kelaart, 1858) so v oktobru 2016 opazili v slovenskih vodah (Tržaški zaliv, severni Jadran). Potapljač je primerek fotografiral in posnel s filmsko kamero na skalnatem dnu znotraj akvatorija Naravnega spomenika Rt Madona. To je prvi zapis o pojavljanju te velike vrste gološkrjarja v Sloveniji in eden izmed maloštevilnih opažanj te vrste v Jadranskem morju.

Ključne besede: Mollusca, Gastropoda, Nudibranchia, Slovenija, tujerodna vrsta, Jadransko morje

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