

New data on *Pinctada radiata* (Leach, 1814) (Bivalvia: Pteriidae) in the Adriatic Sea

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*The first recorded population of *Pinctada radiata* in the Adriatic Sea was observed on the pier in Porto Montenegro marina (Tivat, Montenegro), in August 2016. Numerous individuals inhabited pier walls at a depth of 5 m. The shell height (SH) values for the 15 randomly collected individuals of *P. radiata* ranged between 32.2 mm and 52.1 mm with an average SH value of 38.3 mm (standard deviation ± 6.1). Further surveys in Montenegro will provide information on the establishment of the observed population and what is its impact on local biodiversity.*

Key words: alien species, *Pinctada radiata*, morphometric parameters, Adriatic Sea

INTRODUCTION

Pinctada radiata (Leach, 1814) known as 'pearl oyster', is widespread in shallow waters of the tropical and subtropical continental shelf regions and particularly abundant in the Indo-Pacific (WADA & TĚMKIN, 2008). Shell morphology of this species varies with salinity, usually is up to 50-65 mm but could exceed 100 mm in length and it is protandric hermaphrodite species with sex inversion occurring in shells 32-57 mm (ZENETOS *et al.*, 2003). Furthermore, it is one of three alien species from family Pteriidae spread in the Mediterranean Sea. Other two species are *Pinctada margaritifera* (Linné, 1758) and *Electroma vexillum* (Reeve, 1857) (ÇEVİK *et al.*, 2005; ZENETOS *et al.*, 2010).

Pinctada radiata is considered as the first lessepsian bivalve species reported for the Mediterranean Sea, being described from Egypt in 1884 under the synonym *Meleagrina savignyi* (MONTEROSATO, 1878). Since then the species

has successfully spread throughout the Mediterranean Sea, colonizing new habitats and becoming very abundant in the Levantine Sea, Greece, Libya, Turkey, Syria, Tunisia, Malta and France (DEIDUN *et al.*, 2014). It was also intentionally imported for mariculture in many areas of Greece and Italy during the last century (KATSANEVAKIS *et al.*, 2008). For better understanding on biometric, reproductive, demographic and genetic features of this bivalve species several detailed studies on the Mediterranean populations of *P. radiata* were performed in Tunisia (TLIG-ZOUARI & ZOUALI, 1995; DERBALI *et al.*, 2011; BELLAAJ-ZOUARI *et al.*, 2012), Egypt (YASSIEN *et al.*, 2000), Turkey (GOKOGLU *et al.*, 2006) and Malta (DEIDUN *et al.*, 2014).

In the Adriatic Sea, only few specimens were recorded up to date. VIO & DE MIN (1996) described this species in Trieste Bay as live individuals attached to an oil platform originating from the Sicilian Channel. In the Gulf of Trieste, the species has never been recorded again and

further researches in the area seem to confirm that it did not survive in the area (CROCETTA *et al.*, 2009). Recently, two juvenile specimens (less than 3 mm in shell length) from 59 m on a silty-sand bottom in the Croatian waters were identified as *Pinctada radiata* by DOĞAN & NERLOVIĆ (2008). A very recent record from the Italian Adriatic Sea (Torre Guaceto) was also published (SCUDERI & TERLIZZI, 2012).

Here we present the first record of *P. radiata* population from the Adriatic Sea as a basis for future monitoring of this species, listed as one of the 100 worst invasives (STREFTARIS & ZENETOS, 2006).

MATERIALS AND METHODS

Research was performed in Porto Montenegro marina (Tivat, Montenegro) (Fig. 1) as a part of Biological monitoring program, in August 2016. Fouling material from the piers was surveyed and photographed by SCUBA diving, while some organisms were collected for further analysis in laboratory. In the holes between the concrete blocks of the pier, at 5 m depths, 15 randomly selected individuals of *P. radiata* were collected. Measurements were taken using an electronic digital calliper (precision of 0.01 mm) so that comprised shell height (SH), shell length (SL), hinge length (HL) and shell width (SW) were measured. The material was preserved in 70% ethanol.

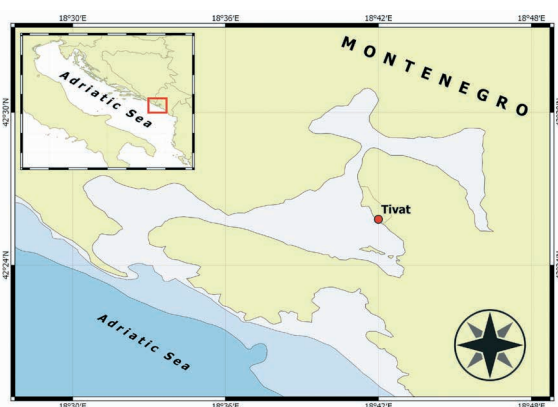


Fig. 1. Sampling location of *P. radiata* in Porto Montenegro marina (Tivat, Montenegro)

RESULTS AND DISCUSSION

This record of *P. radiata* is the first one for the south Adriatic and first data about large population in the Adriatic Sea. Values for the shell height (SH) ranged between 32 mm and 52 mm with an average SH value of 38.3 mm (standard deviation ± 6.1) (Table 1). Similar individual size is also found in Maltese island (DEIDUN *et al.*, 2014), while a maximum value reported from other central Mediterranean localities, including Linosa 78.7 mm (LODOLA *et al.*, 2013), El Bibane Lagoon in Tunisia 85.0 mm (SEURAT, 1929), Bizerte Lagoon in Tunisia 100.5 mm (TLIG-ZOUARI *et al.*, 2010), Hammamet in Tunisia 104.3 mm (BELLAAJ-ZOUARI *et al.*, 2012) and the Gulf of Gabes in Tunisia 96.0 mm (DERBALI *et al.*, 2011) is markedly different.

Table 1. Biometric parameters of the *P. radiata* specimens sampled in Porto Montenegro marina, Montenegro

Biometric parameters	Mean values (\pm st dev in mm)
Shell length (SL)	38.3 (± 7.3)
Hinge length (HL)	39.7 (± 5.3)
Shell height (SH)	38.3 (± 6.1)
Shell width (SW)	11.4 (± 2.1)

Studying spatial patterns of marine alien species across the Ionian–Adriatic boundary, KATSANEVAKIS *et al.*, (2011) found one *P. radiata* alive in the north part of Ionian Sea at only a single site (Saranda, Albania). Our record of new population in the south Adriatic Sea, together with the global warming signals (COLL *et al.*, 2010), looks like spreading on the north, as a result of natural dispersal via larval transport by currents, but we should also have in mind possible dispersal by fouling. Interesting is also that *P. radiata* was found in Porto Montenegro marina only on newly constructed parts of the pier 1 (constructed in 2015), confirming its high ability in competition for space with native species (Fig. 2).

Because of its adaptation to subtropical environment and tolerance to chemical contami-

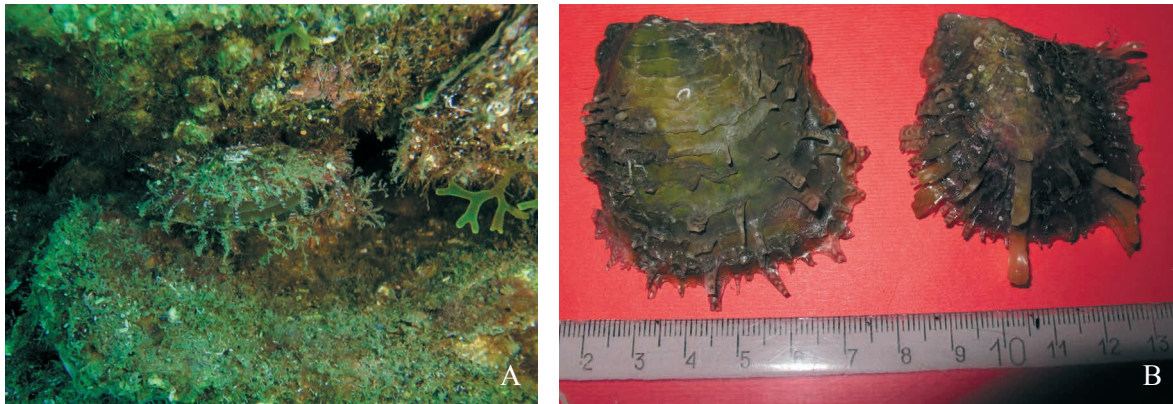


Fig. 2. *Pinctada radiata* in situ (A) and bivalve collected for morphometric analyses (B)

nation (KATSANEVAKIS *et al.*, 2008) it is to expect that this population will survive. Our findings justify the setting up of a monitoring program in Porto Montenegro marina, while further surveys will provide more accurate information on its abundance, distribution in marina (and possibly in the surrounding) as well as possible impact on native biodiversity.

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Novi podaci o vrsti *Pinctada radiata* (Leach, 1814) (Bivalvia: Pteriidae) u Jadranskom moru

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SAŽETAK

Prvi nalazi populacije *Pinctada radiata* u Jadranskom moru se odnose na dokove marine Porto Montenegro (Tivat, Crna Gora), u kolovozu 2016. godine. Na zidovima dokova zabilježene su brojne jedinke na dubini od 5m. Visina ljušture (SH) za 15 slučajno odabranih jedinki *P. radiata* je kolebala od 32.2 mm do 52.1 mm sa srednjom vrijednošću od 38.3 mm (stand. dev. ± 6.1). Daljnja istraživanja u Crnoj Gori će omogućiti informacije o uspješnosti uspostavljanja ove populacije i njenom uticaju na lokalnu bioraznolikost.

Ključne riječi: unsene vrste, *Pinctada radiata*, morfometrijski parametri, Jadransko more

