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The first record of *Oculina patagonica* (Cnidaria, Scleractinia) in the Adriatic Sea

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Scleractinian coral Oculina patagonica *De Angelis 1908, non-indigenous species for the Adriatic Sea, was for the first time recorded during biological baseline survey in the harbour of Split (eastern coast of the Central Adriatic Sea), in May 2011. Colony was found in fouling community at depth of 3 m on concrete vertical wall. The surface of single colony was approximately 200 cm². This record could be the base for future monitoring of possible spreading of this species, and to observe its behaviour in competition with the algal community and sedentary benthic invertebrates that were dominant on the surfaces of harbour walls.*

Key words: *Oculina patagonica*, non-indigenous species, Adriatic Sea

INTRODUCTION

In the Mediterranean Sea the scleractinian coral *Oculina patagonica* De Angelis 1908, was for the first time recorded in Gulf of Genoa in Italy in 1966 (ZIBROWIUS, 1974). The origin of the species and its identification still remains tentative (SARTORETTO *et al.*, 2008), even it was believed that is probably of Southwest Atlantic origin, introduced in the Mediterranean Sea by shipping (ZIBROWIUS, 1974). In last decades it spreads its area of distribution from the western coasts of the Mediterranean Sea to the Levant area by the intense maritime traffic inhabiting polluted harbours and pristine natural shores (FINE *et al.*, 2001; SARTORETTO *et al.*, 2008). According to published records, the species inhabits, with the difference in abundance, many locations over Mediterranean basin in Spain, Italy, France, Algeria, Tunis, Egypt, Israel, Lebanon, Turkey and Greece (ZIBROWIUS & RAMOS, 1983; BITAR & ZIBROWIUS, 1997; FINE *et al.*, 2001; ÇINAR *et al.*, 2006; IZQUIERDO *et al.*, 2007; SARTORETTO *et al.*, 2008). According to FINE *et al.* (2001) successful proliferation of this species in the Mediterranean basin may be related to its biological characteristics such as early reproductive age, sexually and asexually reproduction, high growth rate in variable conditions and ability to survive in extreme conditions.

The aim of this paper is to present the first record of this non-indigenous coral, *O. patagonica*, in the Adriatic Sea. In the past, scleractinian fauna in the Adriatic Sea was well studied and recent investigations completed knowledge about diversity of this taxonomic group (PAX & MÜLLER, 1962; ZIBROWIUS & GRIESHABER, 1975 (1977); KRUŽIĆ *et al.*, 2002; KRUŽIĆ, 2008). Since now, only one other non-indigenous species of Anthozoa, *Diadumene cincta* Stephenson, 1925, was recorded in the area of Venice in the Northern Adriatic Sea (BIRKEMEYER, 1996). According to recent review by ZENETOS *et al.* (2012), the total number of non-indigenous species that were recorded in the Adriatic Sea was 190.

MATERIAL AND METHODS

Sample of colony of *Oculina patagonica* was collected during biological baseline survey in harbour of Split in the Central Adriatic Sea, important Croatian harbour for international maritime transport, in May 2011. Sampling was performed in the area of three terminals of the harbour: Sveti Kajo, Sveti Juraj and Sjeverna luka (Fig. 1).

Sampling methodology was based on CRIMP protocol (HEWITT & MARTIN, 1996, 2001). Samples were collected on each terminal from three transects, from concrete vertical walls, 15 m apart from each other, at depths of 0.5 m, 3 m and 7 m. All sampling areas were photographed before scraping.

Specimens collected during the sampling were fixed in 5% formaldehyde solution in seawater. Part of the colony of *O. patagonica* was preserved in 70% ethanol.

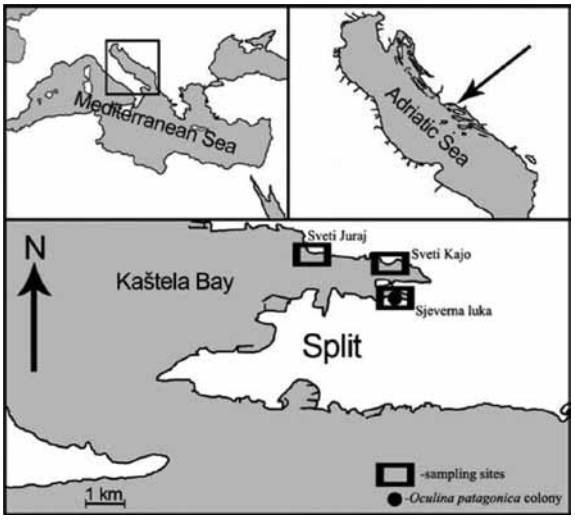

Fig. 1. Sampling sites (terminals Sveti Kajo, Sveti Juraj and Sjeverna luka in the harbour of Split in the eastern Adriatic Sea, Croatia) and the location of Oculina patagonica colony

RESULTS

In the harbour of Split only one incrusting colony of *Oculina patagonica* was found on terminal Sjeverna luka (43°31'42''N; 16°27'56'') on transect near the entrance to the harbour (Fig. 1). Colony was found in fouling community at depth of 3 m on concrete vertical wall (Fig. 2). The surface of single colony was approximately 200 cm^2.

In the area of this terminal total of 45 macrozoobenthic species and 41 benthic algae were recorded. At the shallowest part of the transect mussel *Mytilus galloprovincialis* Lamarck, 1819 dominated in fouling community. Mussels' shells were covered with sedentary polychaetes, cirripeds and bryozoans. At depth of 3 m, where *O. patagonica* colony was found, mussels were still present but the dominant species (mass and abundance) was tunicate *Microcosmus vulgaris* Heller, 1877. Aggregations of oyster, *Ostrea edulis* Linnaeus, 1758, were also sporadically present on that depth, and the same community composition continued to the deeper parts of transect. Among the recorded macrozoobenthic species the most diverse were molluscs (19 species) and crustaceans (11 species). In algal community Rhodophyta were the most numerous (23 species).

DISCUSSION

This study, in which we recorded scleractinian *Oculina patagonica*, was the first investigation of benthic communities in the harbour of Split, situated in the eastern part of Kaštela Bay in the Central Adriatic Sea. The only survey in the area near the harbour was performed in 1970s, but all recorded species were autochthonous and common for the central part of the Adriatic Sea (ZORE-ARMANDA, 1976). In the wider area of Kaštela Bay fauna of Anthozoa was detailed investigated by PAX & MÜLLER (1953) and KORNMANN (1968) but *O. patagonica* was not found at that time. Additionally, in the second half of the 20th century in the area of Kaštela Bay several investigations of benthic communities were performed but also without any record of *O. patagonica* (ŠIMUNOVIĆ, 1992; GRUBELIĆ & ŠIMUNOVIĆ, 1997). Intensive samplings in shallow waters in the area of the western part of the Central and Southern Adriatic coast and islands have been carried out since 1980s but also without any record of this scleractinian. Since it was found inside the harbour

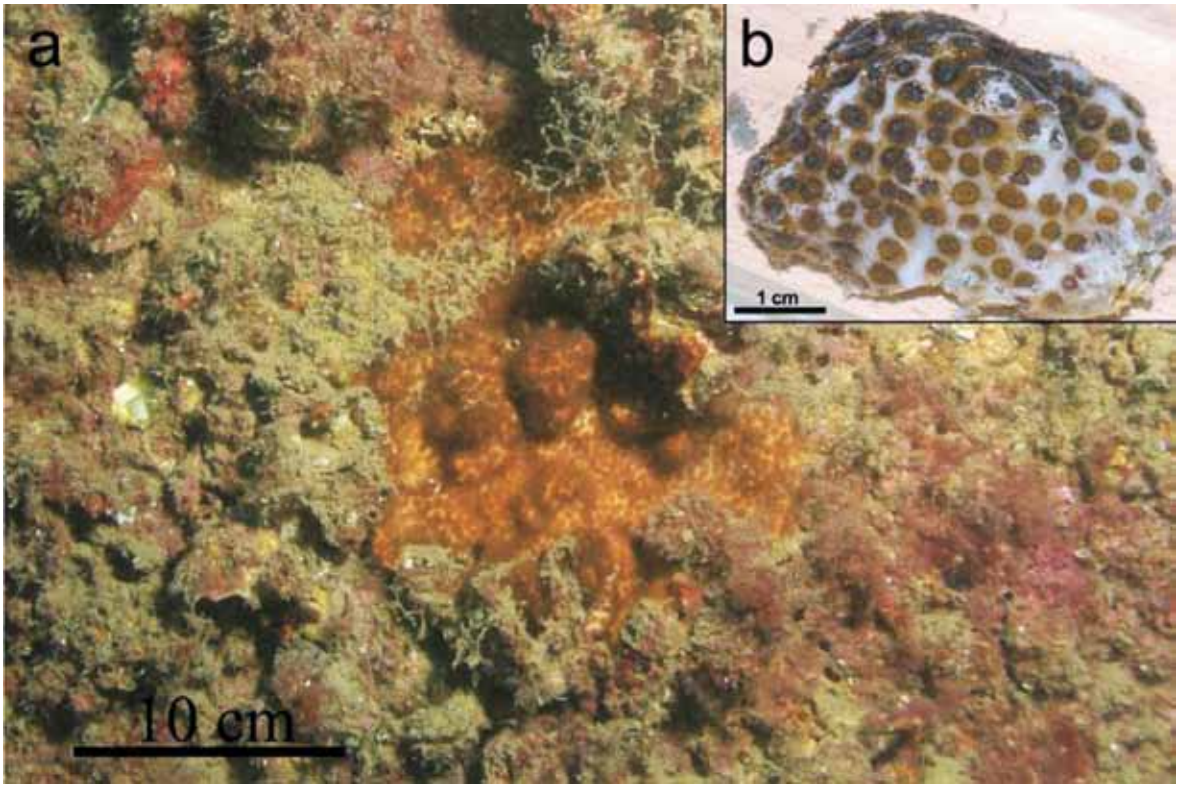

Fig. 2. Oculina patagonica in the fouling benthic community at depth of 3 m in the harbour of Split in the eastern Adriatic Sea (a); part of the colony after sampling (b)

of Split, it is the most probably that the shipping was mechanism of species introduction.

The surface of single colony found in 2011 was approximately 200 cm^2, suggesting that the species was introduced in the harbour over a decade ago, if we estimate its growth according to FINE *et al.* (2001). Since this is the first observation of the species, even it is obvious that it was present in the harbour for more than a decade, it is hard to make any predictions how it will behave in competition with the other species on hard substrate communities in the next future. In the area of Israeli coast *O. patagonica* exhibited low mortality and low recruitment, result from high incidence of bleaching (FINE *et al.*, 2001), and the bleaching events are recognised as one of the factors that effects reproduction in corals (SZMANT & GASSMAN, 1990; BROWN, 1997; HOEGH-GULDBERG, 1999). In the last few years in the area near Split bleaching events were observed sporadically on autochthonous scleractinian *Cladocora caespitosa* (Linnaeus, 1767) (authors unpublished data), so it is possible that it would affect also *O. patagonica* and act as a limiting factor on its reproduction and possible spreading.

The data collected in this study could be the base for future monitoring of possible spreading of this species in the area of harbour and surrounding areas, and to observe its behaviour in competition with the algal community and sedentary benthic invertebrates that were dominant on the surfaces of harbour walls.

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Prvi nalaz vrste *Oculina patagonica* (Cnidaria, Scleractinia) u Jadranskom moru

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SAŽETAK

Kameni koralj *Oculina patagonica* De Angelis 1908, strana vrsta u Jadranskom moru, prvi je put zabilježen za vrijeme biološkog istraživanja nultog stanja u luci Split (istočna obala srednjeg Jadrana) u svibnju 2011. godine. Kolonija je pronađena u obraštajnoj zajednici na dubini od 3 m na vertikalnom zidu. Površina ove kolonije je bila oko 200 cm^2. Ovaj nalaz može biti osnova za buduće praćenje mogućeg širenja vrste, te za promatranje njenog ponašanja u kompeticiji sa zajednicom algi i sedentarnih bentoskih beskralješnjaka koji su bili prevladavajući na površinama zidova luke.

Ključne riječi: *Oculina patagonica*, strane vrste, Jadransko more