ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies
Series Historia Naturalis, 27, 2017, 2

UDK 5 Annales, Ser. hist. nat., 27, 2017, 2, pp. 89-204, Koper 2017 ISSN1408-533X

UDK 5 ISSN 1408-533X

ANNALES

Anali za istrske in mediteranske študije
Annali di Studi istriani e mediterranei
Annals for Istrian and Mediterranean Studies

Series historia naturalis, 27, 2017, 2

KOPER 2017

ISSN 1408-533X UDK 5 Letnik 27, leto 2017, številka 2

Izdajatelj/*Editore/Published by:* Zgodovinsko društvo za južno Primorsko - Koper / *Società storica del Litorale - Capodistria*©

Za izdajatelja/*Per Editore/ Publisher represented by:* Salvator Žitko

Sedež uredništva/*Sede della redazione/ Address of Editorial Board:* Nacionalni inštitut za biologijo, Morska biološka postaja Piran / *Istituto nazionale di biologia, Stazione di biologia marina di Pirano / National Institute of Biology, Marine Biology Station Piran*
SI-6330 Piran /*Pirano*, Fornače/*Fornace* 41, tel.: +386 5 671 2900, fax 671 2901;
e-mail: annales@mbss.org, ***internet:*** www.zdjp.si

Redakcija te številke je bila zaključena 5. 12. 2017.

Sofinancirajo/*Supporto finanziario/ Financially supported by:* Javna agencija za raziskovalno dejavnost Republike Slovenije (ARRS), Luka Koper in Mestna občina Koper

Annales - series historia naturalis izhaja dvakrat letno.

Naklada/*Tiratura/Circulation:* 300 izvodov/copie/copies

Revija Annales series historia naturalis je vključena v naslednje podatkovne baze / *La rivista Annales series historia naturalis è inserita nei seguenti data base / Articles appearing in this journal are abstracted and indexed in*: BIOSIS-Zoological Record (UK); Aquatic Sciences and Fisheries Abstracts (ASFA); Elsevier B.V.: SCOPUS (NL).

Vsi članki so v barvni verziji prosto dostopni na spletni strani: http://zdjp.si/p/annalesshn/
All articles are freely available in color via website: http://zdjp.si/en/p/annalesshn/

ANNALES · Ser. hist. nat. · 27 · 2017 · 2

Anali za istrske in mediteranske študije - Annali di Studi istriani e mediterranei - Annals for Istrian and Mediterranean Studies

UDK 5 Letnik 27, Koper 2017, številka 2 ISSN 1408-533X

VSEBINA / *INDICE GENERALE / CONTENTS*

FLORA
FLORA
FLORA

Martina ORLANDO-BONACA, Borut MAVRIČ, Lovrenc LIPEJ, Sara KALEB & Annalisa FALACE
Coralline algae on biogenic formations in marine waters off Slovenia (northern Adriatic Sea)
Koraligene alge na biogenih formacijah v slovenskih morskih vodah (severni Jadran) 89

Aljaž KOŽUH, Mitja KALIGARIČ & Danijel IVAJNŠIČ
Potential distribution of silver fir (*Abies alba*) in south-eastern Alpine and Dinaric phytogeographic regions of Slovenia and Croatia in the light of climate change
*Potencialna razširjenost jelke (*Abies alba*) v jugovzhodno-alpskem in dinarskem fitogeografskem območju Slovenije in Hrvaške v luči klimatskih sprememb* 97

Amelio PEZZETTA
Le Orchidaceae di Bale-Valle (Istria, Croazia)
Kukavičevke okolice Bal (Valle, Istra, Hrvaška) 107

FAVNA
FAUNA
FAUNA

Lovrenc LIPEJ & Borut MAVRIČ
Range expansion of alien nudibranch *Melibe viridis* (Kelaart, 1858) in the northern Adriatic Sea
Širjenje areala tujerodnega gološkrgarja Melibe viridis *(Kelaart, 1858) v severni Jadran* 119

Emna SOUFI-KECHAOU, Ichrak SARIYA, Amine BEZAA, Neziha MARRAKCHI & Mohammed EL AYEB
Antitumoral activity in inks of *Sepia officinalis* and *Octopus vulgaris* (Cephalopoda) from the northern Tunisian coast (central Mediterranean Sea)
Protitumorska aktivnost črnila pri sipi Sepia officinalis *in hobotnici* Octopus vulgaris *(Cephalopoda) iz severne tunizijske obale (osrednje Sredozemsko morje)* 125

SREDOZEMSKI MORSKI PSI
SQUALI MEDITERRANEI
MEDITERRANEAN SHARKS

Hakan KABASAKAL
Remarks on incidental capture of deep-sea sharks in Marmara shelf waters
Opažanja o naključnem ulovu globokomorskih morskih psov na celinskem pragu v Marmarskem morju 137

Christian CAPAPÉ & Malek ALI
First record of velvet belly lantern shark *Etmopterus spinax* (Chondrichthyes: Etmopteridae) from the Syrian coast (eastern Mediterranean)
Prvi zapis o pojavljanju žametnega trneža Etmopterus spinax *(Chondrichthyes: Etmopteridae) iz sirskih voda (vzhodni Mediteran)* .. 145

Hakan KABASAKAL
On the jaws of a shortfIn mako shark, *Isurus oxyrinchus*, caught off the İzmir peninsula (central Aegean Sea, Turkey)
Čeljusti primerka atlantskega maka, Isurus oxyrinchus*, ujetega ob izmirskem polotoku (osrednje Egejsko morje, Turčija)* 151

IHTIOLOGIJA
ITTIOLOGIA
ICHTHYOLOGY

Malek ALI, Christian REYNAUD & Christian CAPAPÉ
Has a viable population of common lionfish, *Pterois miles* (Scorpaenidae), established off the Syrian coast (eastern Mediterranean)?
Se je viabilna populacija plamenke, Pterois miles *(Scorpaenidae), že uveljavila v vodah ob sirski obali (vzhodno Sredozemsko morje)?* 157

Mohamed Mourad BEN AMOR, Khadija OUNIFI-BEN AMOR & Christian CAPAPÉ
Occurrence of Sloane's viperfish *Chauliodus sloani* (Osteichthyes: Chauliodontidae) from the Tunisian coast (central Mediterranean)
O pojavljanju morskega gada Chauliodus sloani *(Osteichthyes: Chauliodontidae) iz tunizijskih voda (osrednje Sredozemsko morje)* 163

Claudia KRUSCHEL, Julia HARRAS, Irmgard BLINDOW & Stewart T. SCHULTZ
Do fish assemblages at sites featuring man-made concrete walls differ from those at natural rocky-reef sites?
Ali se ribje združbe na lokalitetah z betonskimi stenami razlikujejo od tistih v naravnem skalnatem okolju? 167

DELO NAŠIH ZAVODOV IN DRUŠTEV
ATTIVITÀ DEI NOSTRI ISTITUTI E SOCIETÀ
ACTIVITIES BY OUR INSTITUTIONS AND ASSOCIATIONS

Lovrenc LIPEJ & Martina ORLANDO-BONACA
Piran hosted the elite of marine biologists 183

Iztok ŠKORNIK
Letno srečanje mednarodne organizacije za vodne ptice The Waterbird Society (*Waterbird Society Annual meeting, Reykjavik, Iceland, August 8-12 2017*) 184

OCENE IN POROČILA
RECENSIONI E RELAZIONI
REVIEWS AND REPORTS

Matej VRANJEŠ
Book review: Tourism in Protected Areas of Nature in Serbia and Slovenia 189

Navodila avtorjem 191
Istruzioni per gli autori 193
Instruction to authors 195

Kazalo k slikam na ovitku 198
Index to images on the cover 198

Original scientific article
Received: 2017-09-14

DOI 10.19233/ASHN.2017.11

CORALLINE ALGAE ON BIOGENIC FORMATIONS IN MARINE WATERS OFF SLOVENIA (NORTHERN ADRIATIC SEA)

Martina ORLANDO-BONACA, Borut MAVRIČ & Lovrenc LIPEJ
Marine Biology Station, National Institute of Biology, SI-6330 Piran, Fornace 41, Slovenia
E-mail: martina.orlando@nib.si

Sara KALEB & Annalisa FALACE
Department of Life Sciences, University of Trieste, I-34127 Trieste, Via L. Giorgieri 10, Italy

ABSTRACT

*Two major biogenic formations, composed mainly by dead corallites of the Mediterranean stony coral (*Cladocora caespitosa*), have been recently studied in Slovenian marine waters. The paper presents new data about the presence of coralline algae on the biogenic formation situated off Cape Ronek and off Cape Debeli rtič. Coralline algae are very important for the creation, development and maintenance of calcareous bio-concretions that offer new niches for many invertebrates and other algae. They are listed as important builders of the coralligenous biocoenosis in the "Draft Lists of coralligenous/maërl populations and of main species to be considered by the inventory and monitoring" of the RAC-SPA, and should be further deeply studied and appropriately protected.*

Key words: coralline algae**,** biogenic formations**,** circalittoral, northern Adriatic Sea

ALGHE CORALLINE DELLE FORMAZIONI BIOGENICHE IN ACQUE MARINE SLOVENE (ADRIATICO SETTENTRIONALE)

SINTESI

*Due formazioni biogeniche, prevalentemente composte da coralliti morti della madrepora a cuscino (*Cladocora caespitosa*), sono state recentemente studiate nelle acque slovene. Nel presente lavoro vengono riportati nuovi dati relativi alle alghe coralline presenti al largo di Punta Ronco e Punta grossa. Le alghe coralline hanno un ruolo importante nello sviluppo e nel mantenimento delle concrezioni biogeniche, offrendo nicchie per invertebrati e altre alghe. Nel documento "Draft Lists of coralligenous/maërl populations and of main species to be considered by the inventory and monitoring" del RAC-SPA, le alghe coralline sono riportate come importanti organismi biocostruttori della biocenosi coralligena, meritevoli di ulteriori studi e di una appropriata protezione.*

Parole chiave: alghe coralline, formazioni biogeniche, circalitorale, Adriatico settentrionale

INTRODUCTION

The shallow northern Adriatic area is dominated by muddy and sandy bottoms (Lipej *et al.,* 2006) and for a long time it was believed that these are the only bottoms existing in this basin. More than 200 years ago Giuseppe Olivi (1792) was the first to mention that in this part of the Adriatic Sea exist also rocky outcrops. Northern Adriatic fishermen have been familiar with this kind of environments before marine scientists discovered them, since they are rich fishing points, called *tegnùe* along the Venetian coast (Casellato *et al.*, 2006), and *trezze* in the Gulf of Trieste. Around 250 such rocky outcrops, calcareous bio-concretions, have been counted in the Italian part of the Gulf of Trieste, derived from the building action of calcareous organisms on hard substrata of diverse geological origins (Falace *et al*., 2015). Similar formations were recently studied also in Slovenian marine waters (Lipej *et al*., 2016). Currently, two major biogenic formations are known for the Slovenian Sea, which were sampled within the Interreg project TRECORALA. These biogenic formations are located off Cape Ronek and off Cape Debeli rtič. Both have substantially larger dimensions than *trezze* and are linked to the presence of Mediterranean stony coral (*Cladocora caespitosa*), since they are formed entirely by dead corallites of this species.

During a scientific meeting on the coralligenous environment, which took place at the Marine Biology Station in Piran in March 2011, the Italian, Croatian and Slovenian researchers suggested that the northern Adriatic forms of coralligenous environment, such as trezze, tegnùe, the precoralligenous in the infralittoral belt and biogenic formations of Mediterranean stony coral *C. caespitosa* (Linnaeus, 1767), should be recognized as a specific element within the Mediterranean coralligenous biocoenosis. The expression "biogenic formation" refers to any formations that are the result of limestone loading by some marine organisms, known as bioconstructors, during their lifetime. Among

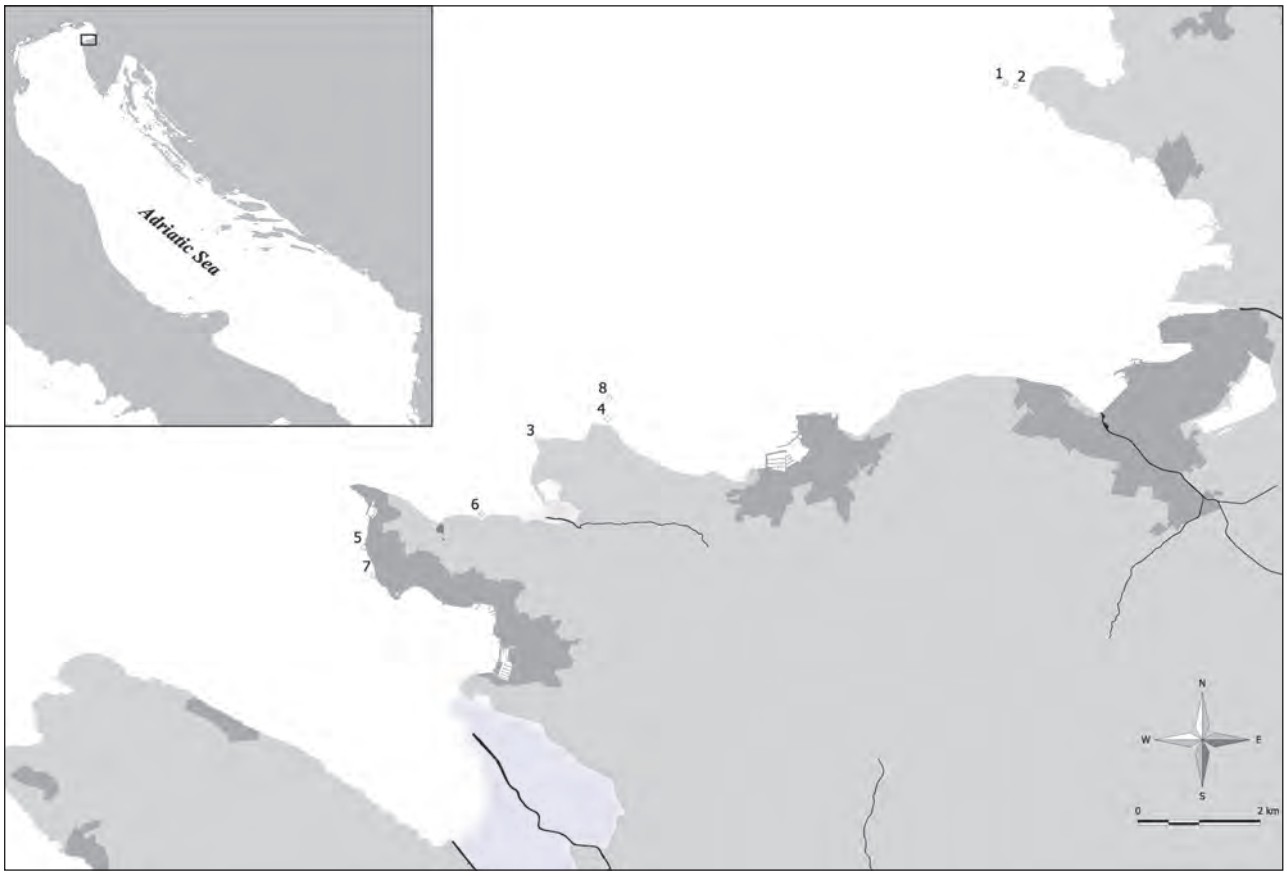

Fig. 1: Locations with Mediterranean stony coral *(Cladocora caespitosa)* ***colonies in the Slovenian coastal sea. Legend: 1 - Biogenic formation at Debeli rtič; 2 - Cape Debeli rtič; 3 - Cape Strunjan; 4 – Cape Ronek; 5 – Piranček; 6 – Pacug; 7 – Bernardin; 8 - Biogenic formation at Ronek.***
Sl. 1: Lokalitete s kolonijami sredozemske kamene korale *(Cladocora caespitosa)* ***v slovenskem morju. Legenda: 1 – Biogena formacija pred Debelim rtičem; 2 - Debeli rtič; 3 - rt Strunjan; 4 – rt Ronek; 5 – Piranček; 6 – Pacug; 7 – Bernardin; 8 – biogena formacija pred rtom Ronek.***

invertebrates the most well known bioconstructors are corals (Anthozoa), hydrozoans (Hydrozoa) and marine tube worms (Polychaeta Sedentaria) (Lipej *et al*., 2016). However, the precoralligenous and the coralligenous are primarily built by coralline algae (Laborel, 1961; Sartoretto, 1996). Among the eight action plans adopted by the Contracting Parties of the Barcelona Convention, one is devoted to the coralligenous habitat: the Action plan for the conservation of the coralligenous and other calcareous bio-concretions in the Mediterranean Sea, UNEPMAP-RAC/SPA (Ballesteros, 2008). Within this document, the coralligenous formations are considered a typical Mediterranean underwater seascape, comprising coralline algal frameworks that grow in dim light conditions and in relatively calm waters (Ballesteros, 2006).

Coralline algae are very important for the creation, development and maintenance of new niches for many invertebrates and other algae. Their habitat-building capacity is associated with the mechanism of mineralization of the cell wall with calcium and, to a lesser extent, magnesium carbonate. In red algae (Rhodophyta) from the family Corallinaceae, the carbonate is present in the crystalline calcite form mainly, while in red algae from the family Peyssonneliaceae and in green algae (Chlorophyta) from the family Halimedaceae it precipitates as aragonite. The occurrence of calcification helps to balance the carbon dioxide deficit in water, which is due to photosynthesis, and thus contributes to the maintenance of the alkaline potential in sea water (Andreoli *et al*., 2010).

Falace *et al*. (2011) reported on the presence of coralline algae in the Slovenian circalittoral belt, including the biogenic formation off Cape Ronek. The aim of the current paper is to report the first available data about the presence of coralline algal species on the biogenic formation located off cape Debeli rtič, and new data about their occurrence at Cape Ronek.

Tab. 1: Density of Mediterranean stony coral colonies in various areas of the Slovenian Sea (adopted from Lipej et al., 2016).
Tab. 1: Gostota sredozemske kamene korale v različnih predelih slovenskega morja (prirejeno po Lipej in sod., 2016).

Locality	Density of *C. caespitosa* colonies (n/100m^2)
Biogenic formation at Debeli rtič	3 (2-4)
Cape Debeli rtič	83 (70-96)
Cape Strunjan	85 (66-105)
Cape Ronek	108
Piranček	160 (128-192)
Pacug	186
Bernardin	285 (263-306)
Biogenic formation at Ronek	652 (498-806)

MATERIAL AND METHODS

Study area

The biogenic formation at Cape Debeli rtič (Figs. 1 and 2) is more or less of triangular shape with a rounded plateau, which looks like a knob. On the reef there is a relatively steep step where the coastal sandy-rocky bottom sweeps into muddy sediment, which happens very quickly in comparison with the near surroundings. The biogenic formation is mostly covered by a thin layer of mud and, therefore, the accurate assessment of its borders was very difficult. It starts at about 10 m of depth and sweeps down to 17.5 m. This biogenic formation is mainly composed of dead Mediterranean stony coral corallites, with only a few living colonies (Lipej *et al*., 2016).

The biogenic formation at Cape Ronek is located outside in the waters off Strunjan Nature Reserve (Fig. 1). Its shape is elliptical, with the longest axis in the west-east direction, and the shortest in the north-south direction (Fig. 3). The highest point of the biogenic formation is at 12.4 m depth, and it extends down to 21 m, where it shifts into a muddy bottom. It is entirely composed of dead, broken corallites of Mediterranean stony coral. This solitary structure is surrounded on all sides by a muddy bottom, significantly less rich in biodiversity (Lipej *et al*., 2016). This formation is not covered by a surface layer of mud, with the density of living colonies of Mediterranean stony coral considerably higher than in other areas of the Slovenian Sea (see Tab. 1).

Fieldwork and laboratory work

The surveys of coralline algae at biogenic formations were done in July 2013. Algae were randomly manually collected from the sea bottom, scraped when they were found attached, on a transect in a depth range from 10 m to 13 m at Cape Debeli rtič, and from 13 m to 16 m at Cape Ronek (Figs. 2 and 3). Samples were collected in plastic bags and all the material was transported to the laboratory of the Marine Biology Station of the National Institute of Biology. Algal samples were sorted in laboratory and fragments of material were air dried, mounted on aluminium stubs with acrylic adhesive and then analysed by scanning electron microscopy (SEM). Stubs were sonicated with a Vitec sonicator to remove sediments and diatoms and then coated with gold/palladium (with S150 Sputter Coater, Edwards) prior to viewing in a LEICA Steroscan 430i at 20 kV.

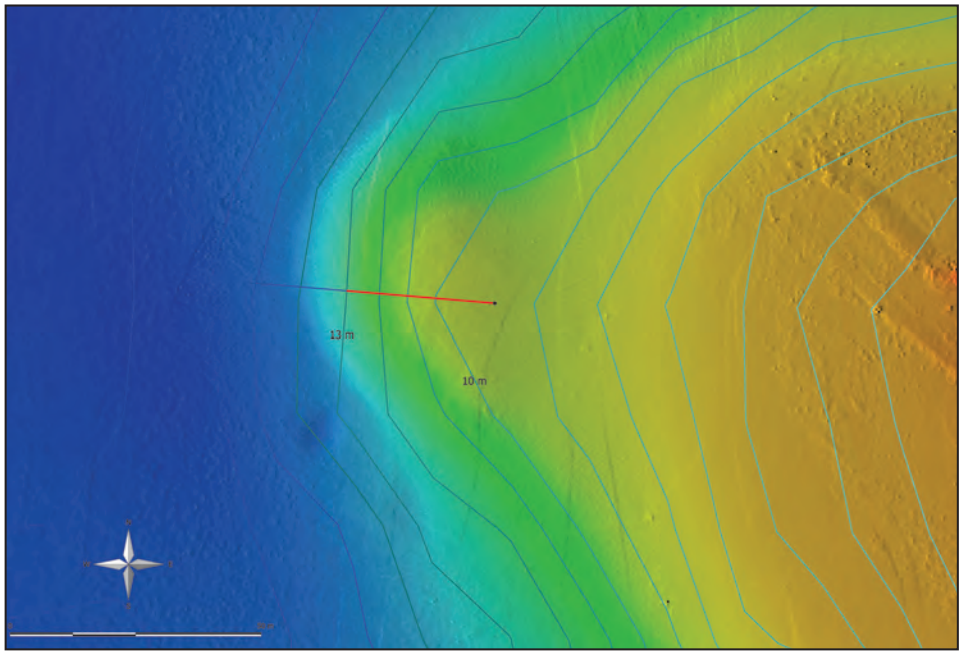

Fig. 2: Image of biogenic formation at Cape Debeli rtič generated from multi-beam ecosounder data (photo: E. Gordini). Coralline algae were collected along the red transect.
Sl. 2: Slika biogene formacije pred Debelim rtičem, narejena na podlagi podatkov iz ehosonderja (avtor E. Gordini). Koraligene alge so bile nabrane vzdolž transekta, označenega z rdečo črto.

RESULTS AND DISCUSSION

Over the surveys performed in 2013, six species of coralline algae were found at the biogenic formation of Cape Debeli rtič, while seven were found at Cape Ronek (Table 2). In samples collected in 2010 by Falace *et al.* (2011) at the biogenic formation of Cape Ronek, *Neogoniolithon brassica-florida* (Harvey) Setchell & L.R. Mason and *Titanoderma pustulatum* (J.V. Lamouroux) Nägeli were missing. However, in those samples they recorded *Lithothamnion philippii* Foslie, *Pneophyllum confervicola* (Kützing) Y.M. Chamberlain and *Pneophyllum fragile* Kützing that were not found at Cape Ronek in 2013.

During the present study, encrusting thalli of *Lithothamnion sonderi* Hauck, *N. brassica-florida* and *Phymatolithon lenormandii* (Areschoug) W.H.Adey were collected at both biogenic formations. *P. fragile* was found as an epiphyte on dead Mediterranean stony coral corallites only at Cape Debeli rtič, where also few encrusting thalli of *P. confervicola* were collected. Conversely, *Lithophyllum racemus* (Lamarck) Foslie, *Lithothamnion minervae* Basso and *T. pustulatum* were found only at the biogenic formation of Cape Ronek; the first only as non living sub-globular thalli (rhodoliths), the second both as encrusting form and live rhodoliths, and the third only as encrusting thalli. The term "rhodolith" includes all biogenic excrescences where calcareous red algae represent at least 50% of the nodule, which consists of the coralline alga together with the substrate/core (Bressan & Babbini, 2003). The fact that thalli of *L. minervae* were found alive on all sides of the rhodolith proves that the structure is occasionally rolled by marine currents, representatives of the vagile fauna and/or anthropogenic activities such as fisheries, diving and anchorage.

So far 31 species of coralline algae were reported for the Slovenian sea (Falace *et al.,* 2011). Among the 10 species collected in 2013 (Table 2), four were found for the first time in this coastal area in 2010: *Lithothamnion minervae* Basso, *L. philippii*, *Lithothamnion sonderi* and *N. brassica-florida* (Falace *et al.,* 2011). However, all of them were previously recorded in the Italian part of the Gulf of Trieste. Several species of coralline algae found in Slovenian marine waters are listed as important builders of the coralligenous biocoenosis in the "*Draft Lists of coralligenous/maërl populations and of main species to be considered by the inventory and monitoring*" of the RAC-SPA (UNEP(DEPI)/MED WG.362/3, 2011). In the Mediterranean Sea, the coralligenous biocoenosis comprises at least 315 algal species (Boudouresque, 1973; Ballesteros, 2006). Among them, some species are bioconstructors (coralline algae), others bore holes into hard structures (particularly certain green algae

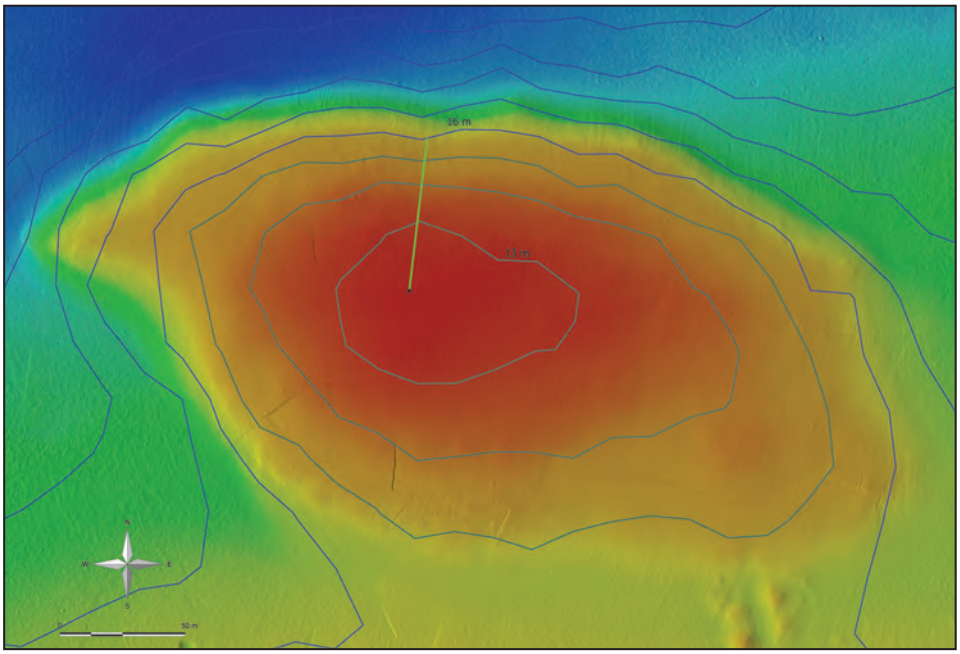

Fig. 3: Image of biogenic formation at Cape Ronek generated from multi-beam ecosounder data (photo: E. Gordini). Coralline algae were collected along the green transect.
Sl. 3: Slika biogene formacije pred rtom Ronek, narejena na podlagi podatkov iz ehosonderja (avtor E. Gordini). Koraligene alge so bile nabrane vzdolž transekta, označenega z zeleno črto.

and blue-green algae (Cyanobacteria)), and some are accompanying species, which include a number of exotic and invasive taxa (Andreoli *et al.*, 2010). The genus *Lithophyllum* is known to be the most species-diverse genus of coralline algae in the Mediterranean Sea and plays a key role in the formation of several widespread bioconstructions (Falace *et al.*, 2016). These taxa contribute with their growth to the construction of organogenic formations also in shallow northern Adriatic Sea (Bressan & Babbini, 2003; Bressan *et al.*, 2009; Giaccone *et al.*, 2009; Falace *et al.*, 2016). Among the 25 species of coralline algae reported for the northern Adriatic calcareous bio-concretions, *Lithophyllum incrustans* Philippi is one of the most important bioconstructors, in particular at the outcrops located at a depth of 23–25 m and at a distance ≥10 km from the coast (Falace *et al.*, 2015). Even though *L. incrustans* has been reported for the Slovenian area (Falace *et al.*, 2011) it was not observed at the biogenic formations near Cape Debeli rtič and Cape Ronek. Therefore, on the basis of the recent findings of coralline algae on biogenic formations in Slovenian waters, it is reasonable to expect that future researches in the area will reveal new species among algae and benthic invertebrates, as well.

In the light of the current (limited) knowledge about coralline algae, biogenic formations, and other infralittoral and circalittoral coralligenous environments in the Slovenian Sea, some recommendations can be made, according to Ballesteros (2003), for their conservation: a) prohibition of trawling in areas with coralligenous forms and their vicinity, to avoid both the physical damage of trawling and also the indirect effects due to increased turbidity and sedimentation rates; b) prohibition of other anthropogenic activities that lead to increased water turbidity and/or sediment removal (*e.g.* coastline modifications) in the vicinity of coralligenous forms; c) no waste water discharge in these areas; d) implementation of the management of traditional and recreational fisheries in order to prevent stock depletion of target species; e) controlled recreational diving pressures; f) urgent need for a protection law of coralligenous environments; g) further scientific research to increase the knowledge about biology and ecology of taxa inhabiting the coralligenous biocoenosis, to give a more accurate estimation of the coralligenous biodiversity.

ACKNOWLEDGEMENTS

The authors would like to thank dr. Emiliano Gordini, Milijan Šiško, Tihomir Makovec, Nicola Bettoso, Valentina Pitacco, Jernej Uhan and Marko Tadejević for their help during fieldwork. Special thanks are due to dr.

Tab. 2: Coralline algae found at biogenic formations at Cape Debeli rtič and Cape Ronek (* alive thalli, ** dead thalli). Data from 2010 were published in Falace** et al. **(2011).
Tab. 2: Koraligene alge, najdene na biogenih formacijah pred Debelim rtičem in rtom Ronek (* žive steljke, ** mrtve steljke). Podatki iz leta 2010 so bili objavljeni v delu Falace in sod. (2011).

Location	**Biogenic formation Cape Debeli rtič**	**Biogenic formation Cape Ronek**	**Biogenic formation Cape Ronek**
Taxa/ Year	**2013**	**2013**	**2010**
Lithophyllum racemus		**	**
Lithothamnion minervae		*	*
Lithothamnion sonderi	*	*	*
Lithothamnion sp.	*	*	
Lithothamnion philippii			*
Neogoniolithon brassica-florida	*	*	
Phymatolithon lenormandii	*	*	*
Pneophyllum confervicola	*		*
Pneophyllum fragile	*		*
Titanoderma pustulatum		*	

Emiliano Gordini and Milijan Šiško also for the preparation of figures. The surveys were carried out under the TRECORALA project (TREzze e CORalligeno dell'ALto Adriatico: valorizzazione e gestione sostenibile nel Golfo di Trieste), funded from the "Italy - Slovenia Cross-border Cooperation Operational Programme 2007-2013" – Programme under the European Territorial Cooperation Objective, co-funded by the European Regional Development Fund (ERDF) and by national funds (financial support from the Slovenian Research Agency (research core funding No. P1-0237)).

KORALIGENE ALGE NA BIOGENIH FORMACIJAH V SLOVENSKIH MORSKIH VODAH (SEVERNI JADRAN)

Martina ORLANDO-BONACA, Borut MAVRIČ & Lovrenc LIPEJ
Morska biološka postaja, Nacionalni Inštitut za biologijo, SI-6330 Piran, Fornace 41, Slovenija
E-mail: martina.orlando@nib.si

Sara KALEB & Annalisa FALACE
Department of Life Sciences, University of Trieste, I-34127 Trieste, Via L. Giorgieri 10, Italy

POVZETEK

*Pred kratkim so raziskovalci v slovenskem morju pričeli z raziskavami dveh velikih biogenih formacij, ki jih sestavljajo mrtvi koraliti sredozemske kamene korale (*Cladocora caespitosa*). Avtorji poročajo o novih podatkih o navzočnosti koraligenih alg na biogeni formaciji pri Ronku in biogeni formaciji pred Debelim rtičem. Koraligene alge so zelo pomembne pri ustvarjanju, razvoju in ohranjanju apnenčastih tvorb in nudijo življenjske niše za mnoge nevretenčarje in druge alge. So pomembni gradniki koraligene biocenoze, navedene tudi v seznamu populacij koraligenih/maërl alg, ki jih je potrebno popisati in redno spremljati na podlagi priporočil RAC-SPA, zato bi jih bilo potrebno natančno raziskati in primerno zavarovati.*

Ključne besede: koraligene alge**,** biogene formacije**,** cirkalitoral, severni Jadran

REFERENCES

Andreoli, E., F. Boscolo, A. Carlin, D. Curiel, E. Gordini, L. Mizzan, E. Molin, M. Ombrelli, G. Pessa, A. Rismondo, S. Rizzardi, S. Vanin & M. Zanetto (2010): *Le tegnùe dell'Alto Adriatico: valorizzazione della risorsa marina attraverso lo studio di aree di pregio ambientale*. ARPA Veneto – Settore Acque, 203 pp.

Ballesteros, E. (2003): *The coralligenous in the Mediterranean Sea. Definition of the coralligenous assemblage in the Mediterranean, its main builders, its richness and key role in benthic ecology as well as its threats*. RAC/SPA, Tunis, 82 pp.

Ballesteros, E. (2006): Mediterranean coralligenous assemblages: a synthesis of present knowledge. Oceanogr. Mar. Biol. Ann. Rev., 44, 123-195.

Ballesteros, E. (2008): *Action plan for the conservation of the coralligenous and other calcareous bioconcretion in the Mediterranean Sea*. RAC/SPA, 25 pp.

Boudouresque, C.F. (1973): Recherches de bionomie analytique, structurale et expérimentale sur les peuplements benthiques sciaphiles de Méditerranée Occidentale (fraction algale). Les peuplements sciaphiles de mode relativement calme sur substrats durs. Bulletin du Muséum d'Histoire Naturelle de Marseille, 33, 147–225.

Bressan, G. & L. Babbini (2003): Biodiversità marina delle coste Italiane: Corallinales del Mar Mediterraneo: guida alla determinazione. Biol. Mar. Medit., 10 (Suppl. 2), 237 pp.

Bressan, G, G. Giaccone & G. Relini (2009): *Proposte didattiche*. In: Biocostruzioni marine, Elementi di architettura naturale. Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Museo Friulano di Storia Naturale, Comune di Udine, 143-149.

Casellato, N., L. Massiero, E. Sichirollo & S. Soresi (2006): Hidden secrets of the northern Adriatic: »Tegnùe« – peculiar reefs. Central European Journal of Biology, 2(1), 122-136.

Falace, A., S. Kaleb, M. Orlando-Bonaca, B. Mavrič & L. Lipej (2011): First contribution to the knowledge of coralline algae distribution in the Slovenian circalittoral zone (Northern Adriatic). Annales Series Historia Naturalis, 21(1), 27-40.

Falace, A., S. Kaleb, D. Curiel, C. Miotti, G. Galli, S. Querin, E. Ballesteros, C. Solidoro & V. Bandelj (2015): Calcareous Bio-Concretions in the Northern Adriatic Sea: Habitat Types, Environmental Factors that Influence Habitat Distributions, and Predictive Modeling. PLoS ONE, 10(11), e0140931. https://doi.org/10.1371/journal.pone.0140931.

Falace, A., L. Pezzolesi, S. Kaleb, A. Alvito, L. Donnarumma, F. Di Stefano, M. Abbiati, F. Badalamenti, G. Bavestrello, L. Benedetti-Cecchi, F. Boero, R. Cannas, C. Cerrano, F. Mastrototaro, G. Chimienti, M. Ponti, G. F. Russo, R. Sandulli & F. Rindi (2016): Distribution of bioconstructor coralline algae of the genus *Lithophyllum* along the Italian shores. Biol. Mar. Medit., 23(1), 182-185.

Giaccone, T., G. Giaccone, D. Basso & G. Bressan (2009): Le alghe. In: Biocostruzioni marine, Elementi di architettura naturale. Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Museo Friulano di Storia Naturale, Comune di Udine, 29-44.

Laborel, J. (1961): Le concretionnement algal »coralligène« et son importance géomorphologique en Méditerranée. Recueil Travaux Station Marine d'Endoume, 23, 37-60.

Lipej, L., R. Turk & T. Makovec (2006): *Endangered species and habitat types in the Slovenian Sea*. Zavod RS za varstvo narave. Ljubljana, 264 pp.

Lipej, L., M. Orlando-Bonaca & B. Mavrič (2016): *Biogenic formations in the Slovenian sea*. National Institute of Biology, Marine Biology Station, Piran, 206 pp.

Olivi, G. (1792): *Zoologia Adriatica, ossia Catalogo ragionato degli animali del golfo e delle lagune di Venezia*. Bassano, 4 Volumes, 334 pp.

Sartoretto, S. (1996): Vitesse de croissance et bioérosion des concrétionnements »coralligènes« de Méditerranée nord-occidentale. Rapport avec les variations Holocènes du niveau marin. Thèse Doctorat d'Écologie, Université d'Aix-Marseille, II., 194 pp.

UNEP (2011): Draft Lists of coralligenous/maërl populations and of main species to be considered by the inventory and monitoring. Ed. RAC/SPA, Tunis, 11 pp.