

ON THE RARE AND LESS KNOWN SHAMEFACED CRAB  
*CALAPPA GRANULATA* (BRACHYURA, CALAPPIDAE)  
IN THE NORTHERN ADRIATIC SEA

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ABSTRACT

*On 1<sup>st</sup> August 2016 and 23<sup>th</sup> July 2017 two specimens of the shamefaced crab Calappa granulata (Linnaeus, 1758) were caught in the northernmost area of the Adriatic Sea and represent the second and third official record, respectively. More recently the records of this commercial species start to be no more unusual in this northern region. It is too early to express any reliable comment regarding whether or not this species established a breeding population in this area, however we could consider its northward extension as another consequence of global warming.*

**Key words:** shamefaced crab, *Calappa granulata*, northern Adriatic, global warming

IL RARO E POCO CONOSCIUTO GRANCHIO MELOGRANO *CALAPPA GRANULATA*  
(BRACHYURA, CALAPPIDAE) NELL'ADRIATICO SETTENTRIONALE

SINTESI

*Il primo agosto 2016 e il 23 luglio 2017 sono stati catturati due esemplari di granchio melograno Calappa granulata (Linnaeus, 1758) nell'area più settentrionale del mare Adriatico e ne rappresentano rispettivamente la seconda e la terza segnalazione ufficiale. Attualmente le catture di questa specie commerciale non sembrano più inconsuete come nel passato. È ancora troppo presto per avanzare ipotesi riguardo al suo insediamento in pianta stabile su quest'area, tuttavia l'espansione verso nord di questa specie può costituire un'ulteriore conseguenza del riscaldamento globale dei mari.*

**Parole chiave:** granchio melograno, *Calappa granulata*, Adriatico settentrionale, riscaldamento globale

## INTRODUCTION

The shamefaced crab *Calappa granulata* (Linnaeus, 1758) is a sublittoral species known from the Mediterranean Sea and adjacent Atlantic Ocean from Portugal to Mauritania, including the Azores, Madeira, the Canary Islands and the Cape Verde Islands (Manning & Holthuis, 1981; Štević, 1990). More recent records in the Mediterranean Sea are the Gulf of Taranto (Ionian Sea) (Pastore, 1995), the Strait of Sicily (Spanò *et al.*, 2004), the coastal waters of the Sea of Marmara (Artüz, 2006) and Edremit Bay (Aegean Sea) (Balkis & Kurun, 2008). In the Adriatic Sea, Stossich (1880) mentioned this species as rare in Split, Hvar, Vis and Korčula. After 110 years Štević (1990) confirmed the rarity of this crab in the Middle and South Adriatic where it was recorded in waters off Šibenik, Split, Dubrovnik, Sestrunje, Hvar, Korčula and Vis. The last records from the southern Adriatic arises to Ungaro *et al.* (2005) who found some



**Fig. 1: Records of *Calappa granulata* in the Adriatic Sea: Piran 2016 and Funtana 2017 (the present work), Umag 2010 (Dulčić & Tutman, 2012), Cres 1996 and Dubrovnik 2012 are referred to specimens deposited in the Natural History Museum of Rijeka; the circle shows the geographic area indicated by Stossich (1880) and Štević (1990).**

**Sl. 1: Podatki o pojavljanju vrste *Calappa granulata* v Jadranskem morju: Piran 2016 in Funtana 2017 (pričujoče delo), Umag 2010 (Dulčić & Tutman, 2012), Cres 1996 in Dubrovnik 2012 pa se nanašajo na primerke v zbirki Prirodoslovnega muzeja na Reki; krogec označuje območje, ki ga navajata Stossich (1880) in Štević (1990).**

individuals during trawling operations in the framework of the E.U. Project MEDITS, moreover Marković *et al.* (2017) recorded this species also in Montenegrin waters in Kotor Bay and Herceg Novi Bay. On December 2010, a specimen was caught in the northern Adriatic Sea northwest off Umag, on the western coast of the Istrian Peninsula, a region substantially further North than any previous records in the Adriatic (Dulčić & Tutman, 2012). In 2016 and 2017 another two specimens were collected off Istrian Peninsula and more recently the records of this commercial species start to be no more unusual in this northern region.

## MATERIAL AND METHODS

On 23<sup>th</sup> July 2017, a specimen of *Calappa granulata* was caught 4 Nm [nautical miles: approx. 7.4 Km] off Funtana by a trammel net at about 20 m depth on a muddy sand bottom. Previously another specimen was caught on 1<sup>st</sup> August 2016 in bottom-set gillnet 2 Nm [nautical miles: approx. 3.7 Km] off Piran (Fig. 1).

Specimens were identified following Holthuis (1987) and compared to the two other deposited in the Natural History Museum of Rijeka (Catalogue numbers: C195 and C1540). C195 was deposited on January 1996 and collected in the waters near Cres Island, whereas C1540 was sampled in July 2012 from Dubrovnik; the latter caught by trawling at 200 m depth (Fig. 1). Four investigated specimens were sexed and the following morphometric measurements were performed: Rostrum Width (RW), Carapace Width (CW), Carapace Length (CL), Posterior Margin Width (PMW), Abdomen Length (AL), Abdomen Width (AW), Dactilo-claws Length (DL), Propodium Length (PL), Cheliped Length (ChL), Cheliped Height (ChH), Cheliped Width (ChW) and 1<sup>st</sup> male Gonopod Length (G1L). Isomorphism between specimens was tested by Pearson linear correlation coefficient (PCC).

## RESULTS AND DISCUSSION

Morphometric measurements of *Calappa granulata* are showed in Tab. 1 and Pearson linear correlation coefficient revealed a complete isomorphism between specimens (Tab. 2). All specimens were adult males, as well as that recorded by Dulčić & Tutman (2012). The species can reach 8 cm CL and 11 cm CW (Coudre *et al.*, 2013). In the Mediterranean, it lives on sandy mud and muddy detritus at depths between 13 and 400-700 m (Manning & Holthuis, 1981; Abelló *et al.*, 1988). The specimens from Piran and Funtana (Fig. 2) represent the second and third official records respectively in the northernmost area of the Adriatic Sea. Among oldest fishermen in the Istrian peninsula, they do not remember any such crabs in the past. Until now the species was not recorded in the checklists of decapod fauna in Gulf of Trieste (*sensu* Manning & Štević, 1982) and in the Rijeka Bay (*sensu* Zavodnik & Kovačić, 2000).

**Tab. 1: Morphometric measurements of *Calappa granulata* (in mm).**

**Tab. 1: Morfometrične meritve primerkov vrste *Calappa granulata* (v mm).**

Specimen	C 195	C 1540	Piran	Funtana
SEX	M	M	M	M
RW	10.6	10.1	10.6	9.9
CW	104.5	80.3	97.7	103.5
CL	77.7	59.8	73.7	77.5
PMW	33.9	28.4	28.5	34.4
AL	55.7	41.9	46.1	48.3
AW	21.3	15.3	19.9	20.4
DL	38.9	28.6	35.9	36.4
PL	69.9	54.1	60.8	67.2
CIL	58.1	45.4	53	58.8
CIH	59.1	43.2	54.8	54.9
CIW	18.1	13.2	17	17.9
G1L	27.3	20.6	25.7	25.9

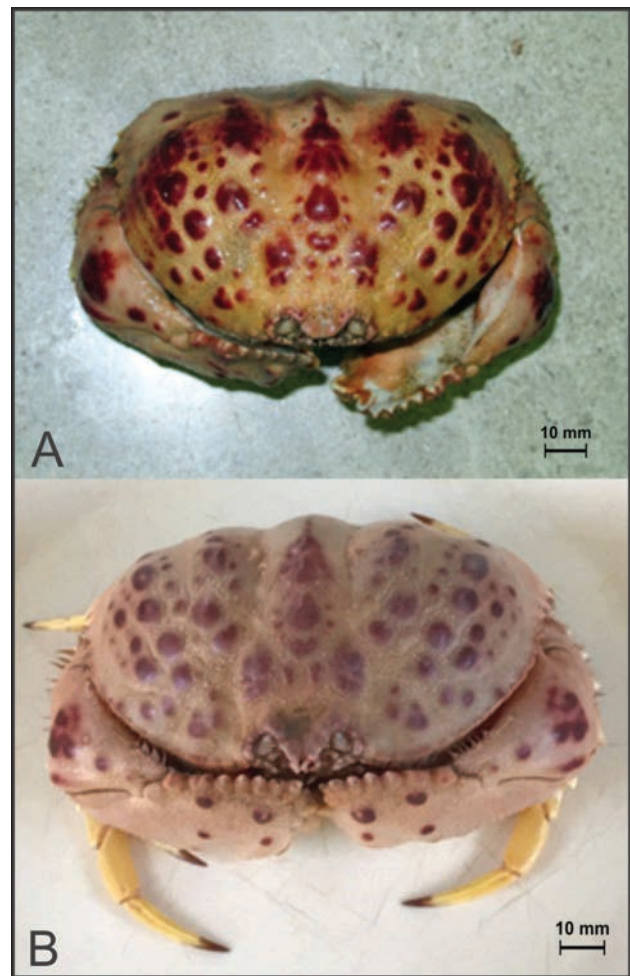
It is too early to express any reliable comment regarding whether or not this species established a breeding population in the area as suggested by Dulčić & Tutman (2012). The same authors hypothesized that pelagic larvae of the shamefaced crab could be transported by currents, since the hydrodynamic characteristics of the Adriatic Sea support a hypothesis of passive transport. These records could be also explained by the effect of the Ionian water ingressions in the Adriatic (Dulčić & Grbec, 2000) and further support the decadal variability of water mass properties of the basin (Civitaresse et al., 2010). Nevertheless *C. granulata* shows a preference for tropical waters (Spanò et al., 2004) and its northward extension could be another consequence of global warming. Thanks to palaeontological records, we know that *C. granulata* populated the Pliocene sea in correspondence to the present Po Plain (Garassino & Pasini, 2013; Pasini & Garassino, 2013), which was a wide and deep gulf much warmer than today (Marchetti et al., 2017). Climate change and the impacts of commercial fishing are shifting the benthic community structure, in particular bottom trawling has caused a widespread decline of traditional exploited stocks (Bastari et al., 2017) being replaced by newcomer, although shipping as a potential vector of arrival cannot be excluded (Dulčić & Tutman, 2012). In the trawling ground of the meso-Adriatic depression (Pomo pit), in fact, the previously dominant squat lobster *Munida intermedia* has been totally replaced by the newcomer *M. rutilanti*, the latter being first recorded in 2003 for Italian seas. In the same period the shrimp *Parapenaeus longirostris* became an important fisheries resource, while the

**Tab. 2: Pearson linear correlation coefficient (PCC).**

**Tab. 2: Primerjava primerkov s Pearsonovim koeficientom korelacije (PCC).**

PCC	C 195	C 1540	Piran
C 1540	1.00		
Piran	1.00	0.99	
Funtana	1.00	1.00	1.00

traditional Norway lobster stock (*Nephrops norvegicus*) dramatically decreased, partly due to a long-lasting over-fishing (Frogliia, 2017).



**Fig. 2: *Calappa granulata* (Linnaeus, 1758): A specimen from Piran ( $CL_{\delta} = 73.7$  mm,  $CW_{\delta} = 97.7$  mm,  $Wt = 186$  g). B specimen from Funtana ( $CL_{\delta} = 77.5$  mm,  $CW_{\delta} = 103.5$  mm,  $Wt = 195.7$  g).**

**Sl. 2: *Calappa granulata* (Linnaeus, 1758): A - Primerek iz Pirana ( $CL_{\delta} = 73,7$  mm,  $CW_{\delta} = 97,7$  mm,  $Wt = 186$  g). B - primerek iz Funtane ( $CL_{\delta} = 77,5$  mm,  $CW_{\delta} = 103,5$  mm,  $Wt = 195,7$  g).**

The decapod fauna of the northernmost part of the Adriatic was not given any particular scientific attention in the past in comparison with other Adriatic areas (Lipej *et al.*, 2010). Only few works have been published such as the paper published by Manning & Števcic (1982) on the decapod fauna of Piran. Additional records of decapods from the Piran area were given in older works by Stossich (1880), Graeffe (1902) and Pesta (1918). Most of the time, in fact, we get rare and/or alien fish and crabs thanks to the precious collaboration with fishermen, who experience daily work at sea. In the future *C. granulata* could become a new resource, a new stable component of the northern Adriatic fauna and/or a new competitor for other decapods species. For these reasons an establishment of a network of different groups

who are somehow dealing with the biodiversity of the marine environment such as scientists, conservators, fishermen, divers, underwater photographers and others should be an important step towards the assessment of populations of *C. granulata* and other interesting and commercial newcomer species in the area (*sensu* Lipej *et al.*, 2010).

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O REDKI IN MANJ ZNANI VRSTI RAKOVICE *CALAPPA GRANULATA* (BRACHYURA, CALAPPIDAE) V SEVERNEM JADRANU

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POVZETEK

*Dva primerka kalape Calappa granulata (Linnaeus, 1758) sta bila ujeta 1. avgusta 2016 in 23. julija 2017 na skrajnem severu Jadrana in predstavljata drugi in tretji podatek o pojavljanju te vrste v severnem Jadranu. V zadnjih letih so podatki o pojavljanju te komercialno pomembne rakovice v Jadranu pogostejši. Za zdaj je še prezgodaj ugotavljati, ali se vrsta na tem območju že razmnožuje, vsekakor pa gre za še en primer širjenja vrst proti severu zaradi globalnega segrevanja.*

**Ključne besede:** kalapa, *Calappa granulata*, severni Jadran, globalno segrevanje

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