

First record of the blue crab *Callinectes sapidus* (Crustacea, Decapoda, Portunidae), a non-indigenous species in the central/southern Tyrrhenian Sea

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Four individuals of the non-indigenous blue crab, Callinectes sapidus Rathbun, 1896 (Crustacea, Decapoda, Portunidae) were collected during commercial trammel net operations in fall 2019 and winter 2020 along the coast of NW Sicily. The crabs were collected in very shallow waters on a sandy bottom close to the coast. Although blue crabs are now widespread along most eastern, western and northern Mediterranean coasts, this is the first record of this species from the central and southern Tyrrhenian Sea.

Key words: Alien species, invasive species, Mediterranean Sea

INTRODUCTION

The blue crab *Callinectes sapidus* Rathbun, 1896 (Crustacea, Decapoda, Portunidae) is a brachyuran crab whose native distribution extends along the northwestern Atlantic coasts from Nova Scotia to Argentina, where it makes a major fishery resource (WILLIAMS, 1984). Its morphology, taxonomy, fisheries, biology and ecology were reviewed by WILLIAMS (1974, 1984).

This crab has shown a highly invasive potential, likely mediated by transport in ballast waters, and is considered one of the most widespread non-indigenous species in European waters (GALIL *et al.*, 2014), and a key species able to impact the native biota in the invaded areas (CARDECCIA *et al.*, 2018).

The first blue crab records in the Mediterranean date back to 1949 and 1950 from the northern Adriatic Sea (GIORDANI SOIKA, 1951), misidentified as *Neptunus pelagicus*). Earlier records of this species were reported from the northern Aegean Sea in 1935 (RIEDL, 1983) and from Egyptian waters (in 1940), but erroneous identification is very likely because of the confusion with the other non-indigenous portunid crab *Portunus segnis* (NEHRING, 2011). Successively blue crabs have been recorded from many Mediterranean localities, especially along the northern and eastern sectors, the western basin (e.g., GARCIA *et al.*, 2018) and the Black Sea (LABRUNE *et al.*, 2019), with recent findings on the southern rim in Algeria (BENABDI *et al.*, 2019) and Morocco (CHARTOSIA *et al.*, 2018). Besides many occasional records of single or few specimens, established

populations are known to occur in several Mediterranean coastal areas, especially in the Levant Sea and the northern and eastern Aegean Sea (NEHRING, 2011). In Italian waters the blue crab has been recorded extensively along the Adriatic coast and less often in the Ligurian and northern Tyrrhenian seas (LABRUNE *et al.*, 2019). LIPEJ *et al.* (2017) reported the collection of three specimens along the southern Sicily coast in October 2016, which represent the first Sicilian record of this species.

This paper reports the collection of four blue crab individuals along the coast of northern Sicily, which is also the first finding of this species in the central and southern Tyrrhenian waters.

MATERIAL AND METHODS

Four adult individuals of blue crab were collected between 29 October 2019 and 1 February 2020 by a professional fisherman at Balestrate (Gulf of Castellammare, NW Sicily, southern Tyrrhenian Sea: 38°03'13" N, 13°00'48" E, Fig. 1) during four different fishing operations in strictly coastal waters. The crabs were collected with a trammel net deployed at night in two areas located on the east and two on the west of the harbour over a sandy bottom with scattered stones between 2 and 10 m depth. All areas are characterized by moderate organic pollution, especially on the eastern side. The easternmost fishing area is at 300 m distance from the outlet

of the Jato river, a small torrential creek with a very limited flow during the dry seasons.

RESULTS AND DISCUSSION

The four crabs were used for personal food consumption by the fisherman, who kindly provided only the photos, the collection details and the weight of each individual. For this reason, the authors were unable to observe, measure and preserve the specimens. Their identification was based on the literature, which allows for an easy recognition of the main morphological characters (WILLIAMS, 1974).

The colour of the chelae propodi (WILLIAMS, 1984) and/or the shape of the abdomen in our photos suggest that the crabs were three males (between 400 and 600 g) and one female (400 g). A male and a female are shown in Figs. 2 and 3, respectively. According to interviews made in January 2020 by the authors to professional and recreational fishermen in Balestrate and in the nearby harbours of Trappeto and Castellammare, no other blue crabs had been collected prior to that date. It is noteworthy that the fisherman who caught the four crabs in Balestrate is the only one, among the interviewed fishermen, who regularly fishes in very shallow waters in winter, and he never caught blue crabs previously in the same or adjacent areas. Indeed, most Mediterranean blue crab occurrences have been recorded in summer and fall, with few records in spring and almost none in winter (CARROZZO *et al.*, 2014).

Blue crab is a strongly euryhaline, eurythermal species whose habitat in the native areas includes different types of bottom - mainly sandy and muddy - in oceanic and brackish waters from the coast to 90 m depth, more frequently less deep than 35 m (WILLIAMS, 1984). Many, although not all of the Mediterranean records, come from estuaries and lagoons. In some cases, a river mouth was close to the collection site, like in the easternmost site described in this paper and in the previous blue crab record from Sicily (LIPEJ *et al.*, 2017).

Brackish waters play an important role in the blue crab life cycle, since mating and hatching

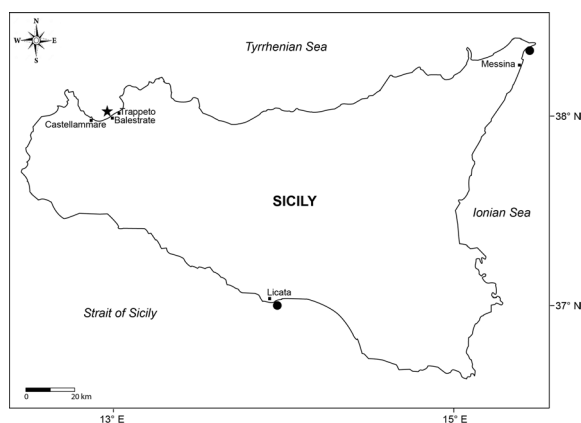


Fig. 1. Map of Sicily with the published records of *Callinectes sapidus*. Solid circle: first record. Star: current record



Fig. 2. *Callinectes sapidus* in NW Sicily, female



Fig. 3. *Callinectes sapidus* in NW Sicily, male

generally occur in estuarine habitats, with males tending to remain in low salinity environments longer than females (WILLIAMS, 1984). The high environmental tolerance coupled with wide dietary preferences (MANCINELLI *et al.*, 2017b) could explain at least partially the invasive success of the blue crab. A clear indicator of such success in the Mediterranean is given by the comparison of distribution maps of this species in the literature, like e.g. those provided by GALIL *et al.* (2002), GONZALEZ-WANGUEMERT & PUJOL (2016) and LABRUNE *et al.* (2019), which clearly depict the increase of records and the widening of their distribution through time. Also, the remarkable size and appearance of the blue crab, coupled to its potential appeal as sea food, have led to a large number of informal reports on web sites¹ and newspapers (FROGLIA, 2017).

Blue crab yields obtained by small-scale fishermen in the Mediterranean have been highly variable across time, although they are regarded as a valuable addition to the catch (e.g., ABDEL RAZEK *et al.*, 2016; HARLIOGLU *et al.*, 2018). Besides being a resource, blue crabs may also have an impact on the autochthonous biota (CARDECCIA *et al.*, 2018) and on fishing nets and netted fish (STREFTARIS & ZENETOS, 2006). Both aspects deserve special attention and possibly an integrated management approach in the areas of higher abundance (MANCINELLI *et al.*, 2017a). To this purpose the abundance and distribution

of this species should be monitored, especially where local environmental conditions are potentially favourable to the establishment of new populations.

ACKNOWLEDGEMENTS

The authors wish to thank the fisherman Mr. Salvatore Provenzano, who kindly provided the details and photos of the collected crabs.

REFERENCES

- ABDEL RAZEK, F., M. ISMAIEL & M. AMERAN. 2016. Occurrence of the blue crab *Callinectes sapidus*, Rathbun, 1896, and its fisheries biology in Bardawil Lagoon, Sinai Peninsula, Egypt. *Rapp. Comm. int. Mer Médit.*, 41:420.
- BENABDI, M., A.E. BELMAHI & S. GRIMES. 2019. First record of the Atlantic blue crab *Callinectes sapidus* Rathbun, 1896 (Decapoda: Brachyura: Portunidae) in Algerian coastal waters (southwestern Mediterranean). *BioInv. Rec.*, 8: 119-122.
- CARDECCIA, A., A. MARCHINI, A. OCCHIPINTI AMBROGI, B. GALIL, S. GOLLASCH, D. MINCHIN, A. NARSCIUS, S. OLENIN & H. OJAVEER. 2018. Assessing biological invasions in European Seas: biological traits of the most widespread non-indigenous species. *Est. Coast. Mar. Sci.*, 201: 17-28.
- CARROZZO, L., L. POTENZA, P. CARLINO, M.L. COSTANTINI, L. ROSSI & G. MANCINELLI. 2014. Seasonal abundance and trophic position of

¹ A Google search in November 2019 yielded about 70 Italian web pages mentioning records of blue crabs made by common citizens along the coasts of Italy.

- the Atlantic blue crab *Callinectes sapidus* Rathbun 1896 in a Mediterranean coastal habitat. *Rend. Fis. Acc. Lincei*, 25: 201-208.
- CHARTOSIA, N., D. ANASTASIADIS, H. BAZAIRI, F. CROSETTA, A. DEIDUN, M. DESPALATOVIC, V. DI MARTINO, N. DIMITRIOU, B. DRAGICEVIC, J. DULCIC, F. DURUCAN, D. HASBEK, V. KET-SILIS-RINIS, P. KLEITOU, L. LIPEJ, A. MACALI, A. MARCHINI, M. OUSSELMAN, S. PIRAINO, B. STANCANELLI, M. THEODOSIOU, F. TIRALONGO, V. TODOROVA, D. TRKOV & S. YAPICI. 2018. New Mediterranean Biodiversity Records (July 2018). *Medit. Mar. Sci.*, 19: 398-415.
- FROGLIA, C. 2017. Cambiamenti recenti nella comunità dei crostacei decapodi dell'Adriatico (Recent changes in the Adriatic decapod crustacean community). In: MARINI, M., G. BOMBACE & G. IACOBONE (Editors.). *Il Mare Adriatico e le sue risorse*. Carlo Saladino Editore. Palermo, pp. 149-162.
- GALIL, B., C. FROGLIA & P. NOEL. 2002. *CIESM Atlas of exotic species in the Mediterranean*. Vol. 2. Crustaceans: decapods and stomatopods. CIESM. Monaco, 192 pp.
- GALIL, B.S., A. MARCHINI, A. OCCHIPINTI AMBROGI, D. MINCHIN, A. NARSCIUS, H. OJAVEER & S. OLENIN. 2014. International arrivals:widespread bioinvasions in European Seas. *Ethol. Ecol. Evol.*, 26: 152-171.
- GARCIA, L., S. PINYA, V. COLOMAR, T. PARIS, M. PUIG, M. REBASSA & J. MAYOL. 2018. The first recorded occurrences of the invasive crab *Callinectes sapidus* Rathbun, 1896 (Crustacea: Decapoda: Portunidae) in coastal lagoons of the Balearic Islands (Spain). *BioInv. Rec.*, 7: 191-196.
- GIACOBBE, S., M. LO PICCOLO & G. SCADUTO. 2019. Forty-seven years later: the blue crab *Callinectes sapidus* Rathbun, 1896 (Crustacea Decapoda Portunidae) reappears in the Strait of Messina (Sicily, Italy). *Biodiv. Jour.*, 10: 365-368.
- GIORDANI SOIKA, A. 1951. *Il Neptunus pelagicus* (L.) nell'Alto Adriatico (*Neptunus pelagicus* in the northern Adriatic). *Natura*, 42: 18-20.
- GONZÁLEZ-WANGÜEMERT, M. & J.A. PUJOL. 2016. First record of the Atlantic blue crab *Callinectes sapidus* (Crustacea: Brachyura: Portunidae) in the Segura River mouth (Spain, southwestern Mediterranean Sea). *Turk. J. Zool.*, 40: 615-619.
- HARLIOGLU, M.M., A. FARHADI & A.S. ATES. 2018. A review of the marine crab fisheries in the Turkish seas. *Croat. Jour. Fish.*, 76: 124-134.
- LABRUNE, C., E. AMILHAT, J.M. AMOUROUX, C. JABOUIN, A. GIGOU & P. NOEL. 2019. The arrival of the American blue crab, *Callinectes sapidus* Rathbun, 1896 (Decapoda: Brachyura: Portunidae), in the Gulf of Lions (Mediterranean Sea). *BioInv. Rec.*, 8: 876-881.
- LIPEJ, L., I. ACEVEDO, E.H.K. AKEL, A. ANASTASOPOULOU, A. ANGELIDIS, E. AZZURRO, L. CASTRIOTA, M. CELIK, L. CILENTI, F. CROSETTA, A. DEIDUN, A. DOGRAMMATZI, M. FALAUTANO, F.A. FERNANDEZ ALVAREZ, R. GENNAIO, G. INSACCO, S. KATSANEVAKIS, J. LANGENECK, B.M. LOMBARDO, G. MANCINELLI, C. MYTILINEOU, L. PAPA, V. PITACCO, M. PONTES, P. D., E. PRATO, S.I. RIZKALLA, P.C. RODRIGUEZ FLORES, C. STAMOULI, J. TEMPESTI, F. TIRALONGO, S. TIRNETTA, K. TSIRINTANIS, C. TURAN, D. YAGLIOGLU, G. ZAMINOS & B. ZAVA. 2017. New Mediterranean Biodiversity Records (March 2017). *Medit. Mar. Sci.*, 18: 179-201.
- MANCINELLI, G., P. CHAINHO, L. CILENTI, S. FALCO, K. KAPIRIS, G. KATSELIS & F. RIBEIRO. 2017a. On the Atlantic blue crab (*Callinectes sapidus* Rathbun 1896) in southern European coastal waters: time to turn a threat into a resource? *Fish. Res.*, 194: 1-8.
- MANCINELLI, G., M.T. GUERRA, K. ALUJEVIC, D. RAHO, M. ZOTTI & S. VIZZINI. 2017b. Trophic flexibility of the Atlantic blue crab *Callinectes sapidus* in invaded coastal systems of the Apulia region (SE Italy): a stable isotope analysis. *Est. Coast. Mar. Sci.*, 198: 421-431.
- NEHRING, S. 2011. Invasion history and success of the American blue crab *Callinectes sapidus* in European and adjacent waters. In: GALIL, B.S. (Ed.) *In the Wrong Place - Alien Marine Crustaceans: Distribution, Biology and Impacts*. Springer, pp. 607-624.
- RIEDL, R. 1983. *Fauna und Flora des Mittelmeeres*. Verlag Paul Parey. Hamburg und Berlin.
- STREFTARIS, N. & A. ZENETOS. 2006. Alien Marine

- Species in the Mediterranean - the 100 'Worst Invasives' and their Impact. *Medit. Mar. Sci.*, 7: 87-118.
- WILLIAMS, A.B. 1974. The swimming crabs of the genus *Callinectes* (Decapoda: Portunidae). *Fish. Bull.*, 72: 685-798.
- WILLIAMS, A.B. 1984. Shrimps, lobsters and crabs of the Atlantic coast of the eastern United States, Maine to Florida. Smithsonian Institution Press. Washington, D.C., 550 pp.

Received: 13 February 2020

Accepted: 10 March 2020

Prvi nalaz plavog raka *Callinectes sapidus* (Crustacea, Decapoda, Portunidae) u središnjem i južnom Tirenskom moru

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SAŽETAK

Četiri jedinke authtonog plavog raka, *Callinectes sapidus* Rathbun, 1896, (Crustacea, Decapoda, Portunidae) prikupljena su tijekom komercijalnog ulova u jesen 2019. i zimu 2020. uz obalu sjeverozapadne Sicilije. Jedinke su sakupljane u vrlo plitkim vodama, na pješčanom dnu, te u blizini obale. Iako su plavi rakovi danas rašireni duž većine istočne, zapadne i sjeverne obale Sredozemlja, ovo je prvi nalaz ove vrste iz središnjeg i južnog Tirenskog mora.

Ključne riječi: strane vrste, invazivne vrste, Sredozemno more

