

Short Communication

New report of the box crab *Calappa granulata* (Linnaeus, 1758) from the Pliocene of Borgomanero (NW Italy), with remarks on its fossil distribution

Giovanni Pasini¹, Alessandro Garassino^{2*}

Abstract - We report a small carapace and palm from the Pliocene of Borgomanero (Novara, Piedmont, NW Italy), herein assigned to the extant and fossil box crab *Calappa granulata* (Linnaeus, 1758) (Calappidae De Haan, 1833). This is the northernmost report for the species, enlarging its palaeogeographic distribution, although *Calappa granulata* has been already reported from the Plio-Pleistocene Mediterranean outcrops among several Italian localities. An updated map of the fossil localities of *C. granulata* is also provided.

Key words: Brachyura, Calappidae, Crustacea, Italy, palaeogeographic distribution, Pliocene.

Riassunto - Nuova segnalazione di *Calappa granulata* (Linnaeus, 1758) del Pliocene di Borgomanero (NO Italia) con osservazioni sulla sua distribuzione paleogeografica.

Viene segnalato un carapace e un chelipede isolato assegnati alla specie *Calappa granulata* (Linnaeus, 1758) (Calappidae De Haan, 1833) rinvenuti nel Pliocene di Borgomanero (Novara, Piedmont, NO Italia). Si tratta della segnalazione più settentrionale della specie, allargando la sua distribuzione paleogeografica. *Calappa granulata* è già segnalata nel Plio-Pleistocene in numerose località italiane. Viene fornita una mappa aggiornata delle località fossilifere di *C. granulata*.

Parole chiave: Brachyura, Calappidae, Crustacea, distribuzione paleogeografica, Italia, Pliocene.

INTRODUCTION

Recently Pasini *et al.* (2018) reported some decapod specimens collected in a new locality nearby Borgomanero (Novara, NW Italy), generically assigned to the Pliocene *s.l.*, based on the geographic proximity and sedimentological affinities with correlated layers and paleontological evidences, supported by the mollusc associated fauna, includ-

ing species limited to the early Pliocene (Damarco pers. comm., 2017) (for complete data see Pasini *et al.*, 2018). The scarce brachyuran assemblage includes *Macropipus* cf. *M. tuberculatus* (Roux, 1830), *Mursia* sp., and one poorly preserved loose chela referred generically to *Calappa* sp.

The studied specimen collected from the same Borgomanero outcrop of the above-mentioned brachyurans is herein assigned to the extant and fossil *Calappa granulata* (Linnaeus, 1758) (Calappidae De Haan, 1833), already known in several Italian localities dating between the Pliocene and Pleistocene. This represents the northernmost fossil record of this fossil-extant species.

Calappa granulata is widespread in the Mediterranean Sea and part of the Western Atlantic, whereas its fossil record seems to be limited to the early Pliocene to the late Pleistocene outcrops located from northern to southern Italy only. Currently no fossil evidences have been reported from others fossiliferous localities around the Mediterranean basin.

MATERIALS AND METHODS

The studied specimen is a small partially crushed dorsal carapace with and incomplete right chela preserved ventrally.

Due to the delicate nature of the thin cuticle and incoherence of the sandy matrix, the specimen was fixed with a film of polyvinyl acetate solution for study and preservation. The specimen is housed in the palaeontological collections of the Museo di Storia Naturale di Milano (MSNM).

SYSTEMATIC PALAEONTOLOGY

Section Eubrachyura de Saint Laurent, 1980
Subsection Heterotremata Guinot, 1977
Superfamily Calappoidea De Haan, 1883
Family Calappidae De Haan, 1833
Genus *Calappa* Weber, 1795

Type species: *Cancer granulatus* Linnaeus, 1758, by subsequent designation by Latreille (1810).

Included fossil species: see Schweitzer *et al.* (2010: 82, 83) and Pasini & Garassino (2017: 74).

Geological range: lowermost Pliocene-Recent.

¹ Via Alessandro Volta 16, 22070 Appiano Gentile (CO) Italia.

E-mail: giovannialdopasini@gmail.com

² Research Adjunct, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, California 93250, USA.

* Corresponding author: alegarassino@gmail.com

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Calappa granulata (Linnaeus, 1758)

Figs. 1 A-C, 2

[synonym list restricted to the fossil record]

Cancer granulatus Linnaeus, 1758: 627.*Cancer granulatus* – Linnaeus, 1767: 533.

Calappa granulata – Gemmellaro 1914: 80, pl. 1, figs. 9, 10. – Garassino & De Angeli 2004: 38, fig. 4 (1-3). – Garassino *et al.* 2004: 264, fig. 7 a-c. – De Angeli & Garassino 2006: 40. – De Angeli *et al.* 2009: 176, 177, 195, 196, fig. 8a, b. – Schweitzer *et al.* 2010: 82. – Garassino *et al.* 2012: 51. – Pasini & Garassino 2013:

320, 321. – Garassino & Pasini 2013: 330, 331, fig. 1. – Baldanza *et al.* 2013: 344, fig. 9. – Garassino *et al.* 2014: 125, 126, fig. 2D, E.

Material. One carapace with nearly complete right propodus and incomplete dactylus of right cheliped (MSNM i 29338 - carapace length: *c.* 25 mm).

Description. Carapace – Small convex carapace, wider than long; frontal and orbital margins not preserved; right anterolateral margin crushed, pressed transversely;



A



B



C

Fig. 1 - *Calappa granulata* (Linnaeus, 1758), MSNM i 29338. A) carapace in dorsal view / carapace in norma dorsale, x2.8; B) ventral view showing the right palm and dactylus / norma ventrale con palmo destro e dactylus, x10; C) extant adult male, Palermo (Sicily) / esemplare adulto attuale, Palermo (Sicilia), x0.5.

left convex posterolateral margin with six flat, triangular teeth protruding laterally, slightly increasing in size posteriorly, the fifth larger; teeth appear to be separated by narrow indentations; posterior margin nearly straight, slightly inflated medially, lacking median teeth; carapace regions well marked by two longitudinal parallel grooves dividing dorsal surface into three main parts bearing blunt tubercles, decreasing in size posteriorly, aligned longitudinally; dorsal surface covered by small tubercles uniformly arranged, larger in the metabranchial and intestinal regions.

Cheliped – Subtriangular, flattened, and wide palm higher anteriorly, with some blunt rounded tubercles proximally; upper margin with a rim of triangular spines; outer palm surface and upper and lower margins with small granulations; dactylus broken proximally and translated, strongly curved and pointed distally, fringed with granulations along the upper margin, and a typical, strong, molariform proximal prominence protruding outward on the basis of the outer margin; short, triangular index broken transversally, with tip directed upward and occlusal margin with triangular short teeth.

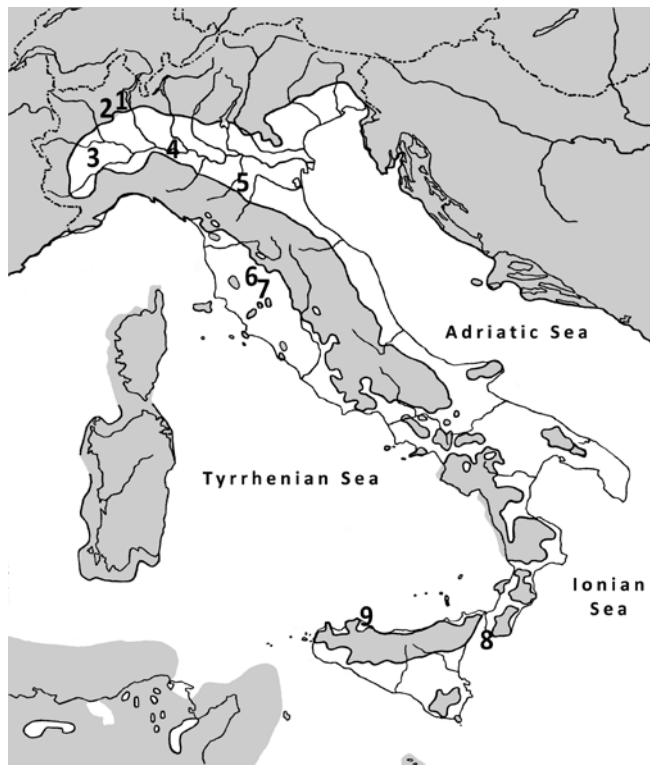


Fig. 2 - Palaeogeographic map reconstruction of Italy during the Pliocene and the localities of *Calappa granulata*. Lands above sea level are indicated in grey (modified after Pinna, 1976). Occurrences from the Pliocene (•) and the Pleistocene (+). / Ricostruzione paleogeografica dell'Italia durante il Pliocene e le località di *Calappa granulata*. Le terre emerse sono indicate in grigio (modificato da Pinna, 1976). Rinvenimenti del Pliocene (•) e del Pleistocene (+). 1) Borgomanero (Novara, Piedmont / Piemonte) (•) (herein). 2) Candelo, Cossato, and Masserano (Biella, Piedmont / Piemonte) (• +). 3) San Pietro (Asti, Piedmont / Piemonte) (•). 4) Arda River / Fiume Arda (Piacenza, Emilia Romagna) (• +). 5) Monticello di Quattro Castella, (Reggio Emilia, Emilia Romagna) (•). 6) Presciano and Stroncoli (Siena, Tuscany / Toscana) (•). 7) Poggi i Sodi (Siena, Tuscany / Toscana) (+). 8) Trumbacà (Reggio Calabria, Calabria) (+). 9) Altavilla and Monte Pellegrino (Palermo, Sicily / Sicilia) (• +).

Discussion. The studied specimen similar in shape, ornamentation, and number of posterolateral spines with the small carapace and dactylus reported from the Pliocene of Tuscany (De Angeli *et al.*, 2009: 177, fig. 8 A, B) and the carapace and complete chela from the Pleistocene of Calabria (Garassino *et al.*, 2014: 124, fig. 2 D, E) fits well within the morphological characters and intraspecific variability of the extant and fossil *C. granulata* (Linnaeus, 1758) to which is herein assigned, probably pertaining to a juvenile or immature individual due to the small-sized carapace for the species.

Zariquiey-Álvarez (1968) pointed out the main characters of this species, such as the convex carapace wider than long; rounded anterolateral margins with small poorly developed teeth wider at the base, followed on the posterior third by larger teeth pointed medially; straight posterior margin poorly produced, lacking teeth on the median portion; mesogastric and cardiointestinal regions fused, forming a prominent longitudinal ridge delimited laterally by two marked longitudinal grooves; at each side of these two grooves, generally four longitudinal grooves not reaching the posterior margin and delimiting other ridges; all the ridges bear longitudinally nodules of decreasing size, with the larger sizes in the mesogastric region. Later, Müller (1984: 67) pointed out the presence of “six big (marginal) lobes [teeth]...” in *C. granulata* is recognised as a useful character to distinguish this species from the highly similar *C. praelata* Lörenthey in Lörenthey & Beurlen, 1929, from the Mediterranean Miocene bearing four main posterolateral teeth only.

PREVIOUS FOSSIL RECORDS OF *C. GRANULATA*

Fossil reports assigned to *C. granulata* were mainly based on the identification of characters of loose chelae or dactyli and only three almost complete carapaces were reported to date from the fossil record of Italy.

Gemellaro (1914) was the first to report *Calappa granulata* (Linnaeus, 1758) from the Pliocene of Altavilla and the Pleistocene of Monte Pellegrino (Palermo, Sicily) based on two loose dactyli having similar morphological characters with those of the living species. Garassino & De Angeli (2004: 38) reported three fragmentary chelae from the early Pliocene and lower-middle Pleistocene of Arda River (Castell'Arquato, Emilia Romagna). Garassino *et al.* (2004: 264) reported several fragmentary chelae from the Pliocene of Candelo, Cossato, and Masserano (Biella, Piedmont). De Angeli *et al.* (2009: 176) reported one complete carapace and one dactylus from the early Pliocene of Presciano and Stroncoli (Siena, Tuscany) respectively. Pasini & Garassino (2013: 320) reported one dactylus from the earliest Pliocene of Monticello di Quattro Castella (Reggio Emilia, Emilia Romagna). Garassino & Pasini (2013: 350) reported one carapace from the late Pliocene of San Pietro (Asti, Piedmont). Baldanza *et al.* (2013: 344) reported one loose chela from the early Pleistocene of Poggi i Sodi (Siena, Tuscany). Finally, Garassino *et al.* (2014: 124) reported one carapace and one chela from the late Pleistocene of Trumbacà (Reggio Calabria) (Fig. 2).

Currently our knowledge of the fossil record of *C. granulata* is restricted to the Mediterranean basin. Indeed, this species seems to be restricted to the marine coasts of Italy with their oldest fossil record from the earliest Pliocene. *Calappa granulata* is derived from a quite similar *C. praelata* which is probably spread in the Mediterranean area during the middle and late Miocene (Pasini *et al.*, 2012: 138).

Nowadays the extant *C. granulata* is a largely widespread in the Mediterranean Sea from 10-15 to 400 or more meters deep, and in the adjacent Atlantic Ocean including Madera, Canary, and Cape Verde Islands and it represents an infaunal active predator, burrowing in bottoms of sandy or muddy detritus (Zariquiey-Álvarez, 1968).

CONCLUSIONS

This report enlarges the poorly knowledge of the decapod community from the Borgomanero outcrop, representing the fourth crab assigned to *C. granulata*, extending the palaeogeographic distribution for the species to the northernmost paleo-Mediterranean basin. Moreover, the fossil record of the species would seem to support the hypothesis of an original restricted central Mediterranean area of distribution during the Plio-Pleistocene of Italy from the northernmost paleo-Adriatic gulf to the southern Tyrrhenian outcrops, suggesting, in our personal opinion, a possible later and wider diffusion in the Mediterranean area and adjacent Atlantic Ocean. Of course, this hypothesis needs closer future palaeontological investigations in the Mediterranean outcrops and new confident records to be supported. Finally, an updated map showing the fossil records of *C. granulata*, is herein provided (Fig. 2).

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