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Palinurellus bericus n. sp. (Crustacea, Decapoda, Palinuridae) from the late Eocene (Priabonian) of San Feliciano (Orgiano, Vicenza, northeastern Italy)

Antonio De Angeli[1], Alessandro Garassino[2]

[1] Museo Civico Zannato, Piazza Marconi 15, 36075 Montecchio Maggiore (VI), Italia.
E-mail: antonio.deangeli@alice.it
[2] Corresponding author: Alessandro Garassino, Sezione di Paleontologia degli Invertebrati, Museo di Storia Naturale, Corso Venezia 55, 20121 Milano, Italia. E-mail: alessandro.garassino@comune.milano.it; alegarassino@gmail.com

Abstract - The rich decapod community from the late Eocene (Priabonian) of San Feliciano (Orgiano, Vicenza, northeastern Italy) was partially described by De Angeli & Garassino (2002). Anomurans and brachyurans are the main component of this community, whereas the macrurans are very scarce. The studied specimen is the first report of macrurans from this locality after twenty years of field research. Similar carapace morphological characters allow the studied specimen to be assigned to the extant *Palinurellus* von Martens, 1878, and differences with the two species of *Palinurellus* allow erection of a new species *P. bericus* n. sp. The report of *Palinurellus* in the fossil record is significant because it expands the stratigraphic range of this genus back to the late Eocene. It also represents the second report of the Palinuridae from the Eocene of Vicenza.

Riassunto - *Palinurellus bericus* n. sp. (Crustacea, Decapoda, Palinuridae) dell'Eocene superiore (Priaboniano) di San Feliciano (Orgiano, Vicenza, NE Italia).

La ricca fauna a crostacei decapodi dell'Eocene superiore (Priaboniano) di San Feliciano (Orgiano, Vicenza, NE Italia) é stata parzialmente descritta da De Angeli & Garassino (2002). I crostacei anomuri e brachiuri rappresentano la componente principale di questa fauna, mentre i crostacei macruri sono estremamente rari. L'esemplare oggetto di questa nota é il primo rinvenimento di un crostaceo macruro da questa località dopo vent'anni di ricerche. I caratteri morfologici del carapace permettono di assegnare l'esemplare studiato al genere vivente *Palinurellus* von Martens, 1878, con *P. bericus* n. sp. (Palinuridae Latreille, 1802). Il rinvenimento di *Palinurellus* nel record fossile riveste una particolare importanza in quanto estende la distribuzione stratigrafica di questo genere fino all'Eocene superiore. Inoltre, rappresenta la seconda segnalazione della famiglia Palinuridae nell'Eocene dell'area vicentina.

Key-words: Crustacea, Decapoda, Palinuridae, late Eocene, Italy.

INTRODUCTION

Cenozoic decapod crustaceans from Veneto (northeastern Italy) have been the subject of study since the last two centuries. The Museo Civico "G. Zannato" of Montecchio Maggiore (Vicenza) has collected a rich fossil decapod crustacean assemblage during the last thirty years. This collection includes a large number of fossil species, known from the Vicenza area. The first commented systematic catalogue of Vicenza species was drawn up by Fabiani (1910) and updated later by De Angeli & Beschin (2001) and De Angeli & Garassino (2006).

The studied specimen comes from a working quarry located near San Feliciano hill (Orgiano, Vicenza), on the southwestern side of Berici Mounts (Fig. 1).

The lower level of the quarry consists of well-stratified grey marly-calcareous deposits, rich in microfossils (nummulites), bivalves, echinoderms, and scarce brachyurans belonging to *Palaeocarpilius macrocheilus* (Des-

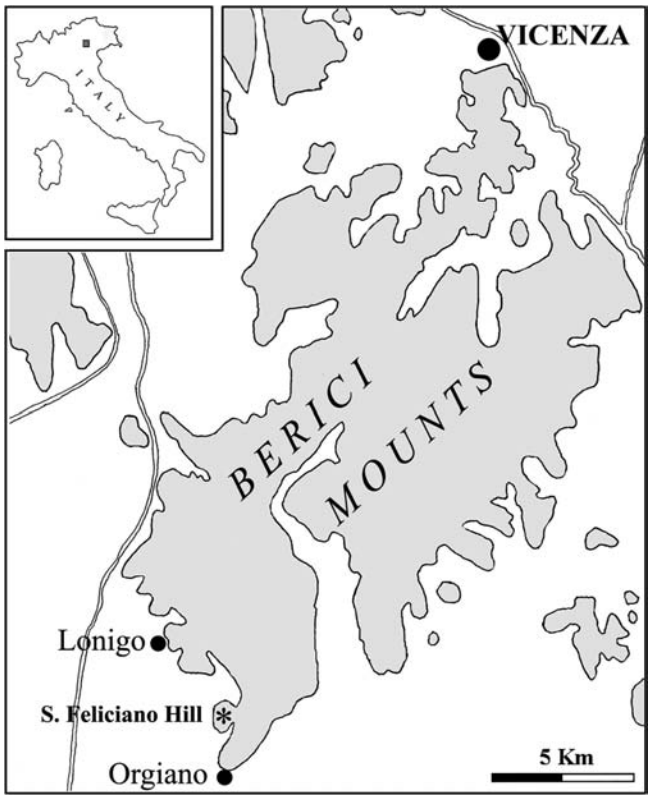

Fig. 1 - Berici Mounts with location of the fossiliferous site. / Mappa dei Monti Berici con localizzazione della località fossilifera.

marest, 1822). The middle level consists of yellow-white calcarenitic deposits, rich in coralligenous algae, corals (*Goniopora* de Blanville, 1830; *Astreopora* de Blanville, 1830; *Actinacis* d'Orbigny, 1849; *Trochoseris* Milne-Edwards & Haime, 1849; *Plocophyllia* Reuss, 1868), scarce molluscs and decapod crustaceans. Finally the upper level consists of marly calcareous deposits, rich in nummulites, bryozoans, bivalves, and echinoderms.

The calcarenitic levels of the quarry belong to the big marine transgression that allowed the sea to reconquer progressively the Bartonian volcanic ridge, well exposed on the western side of Berici Mounts between Meledo and Lonigo and in Liona Valley. The stratigraphic unit corresponding to this event is the "Formazione di Priabona" (late Eocene). According to Beccaro (2003) the stratigraphic section of this quarry has a Priabonian age. The geology and stratigraphhy of Berici Mounts have been studied by many authors in the last century (Fabiani, 1908, 1911a, 1911b, 1915; Ungaro, 1978; Frost, 1981; Mietto, 1988, 1997, 2003).

Fig. 2 - Quarry at San Feliciano hill. / Cava di SAn Feliciano. A) Calcarenitic levels including corals and decapod crustaceans / visione dei livelli calcarenitici contenenti coralli e crostacei. B) Detail of one calcarenitc level with branched corals (*Plocophyllia* sp.) / dettaglio di un livello calcarenititco con colonia di coralli ramificati (*Plocophyllia* sp.). C) Calcarenitic level with coral in section (*Plocophyllia* sp.) / livello calcarenitico con sezioni di coralli (*Plocophyllia* sp.).

Decapod community from San Feliciano

The rich decapod community from the late Eocene (Priabonian) of San Feliciano hill quarry (Orgiano, Vicenza, northeastern Italy) has been collected over twenty years of field research by collectors and scientific staff of the Museo Civico "G. Zannato" of Montecchio Maggiore (Vicenza). This community includes a diversified decapod fauna of coralligenous palaeoenvironment, including chiefly anomurans, brachyurans, and scarce macrurans. The first study of this decapod community was carried out by De Angeli & Garassino (2002) who described new genera and species of galatheid, chirostylid, and porcellanid crabs. Later De Angeli *et al.* (2010) reported the parthenopid *Eogarthambrus guinotae* De Angeli, Garassino & Alberti, 2010. Continued work on the decapod fauna will be carried out by De Angeli & Garassino (work in progress). Macrurans are very scarce, representing the lowest percentage of decapods of the whole community.

MATERIALS AND METHODS

One incomplete carapace, lacking the frontal region, preserved inside a small piece of coralligenous rock. Dorsal carapace morphology allows assignment to *Palinurellus* von Martens, 1878, described as *P. bericus* n. sp. (Palinuridae Latreille, 1802). The studied specimen is housed in the palaeontological collection of the Museo di Storia Naturale di Milano (MSNM).

For the higher-level classification, we follow the recent arrangement proposed by De Grave *et al.* (2009).

SYSTEMATIC PALAEONTOLOGY

Infraorder Achelata Scholtz & Richter, 1995
Family Palinuridae Latreille, 1802
Genus *Palinurellus* von Martens, 1878

Type species: *Palinurellus gundlachi* von Martens, 1878, by monotypy.

Included fossil species: *Palinurellus bericus* n. sp. (in this work).

Palinurellus bericus n. sp.
Figs. 3, 4

Diagnosis: Carapace cylindrical; dorsal surface of the carapace covered by small tubercles arranged uniformly in parallel lines; shallow cervical groove; well-developed postorbital spine; antero- and posterolateral margins of the carapace toothless.

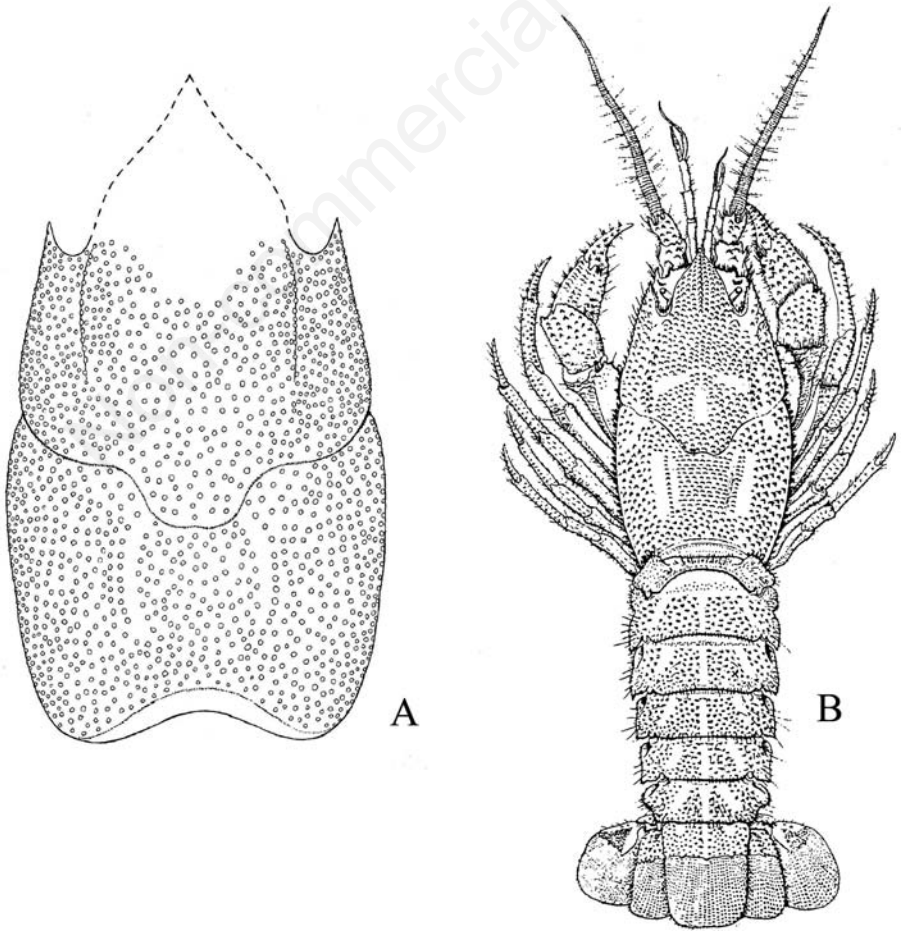

Fig. 3 - A) *Palinurellus bericus* n. sp., reconstruction of the carapace/ *Palinurellusa bericus* n. sp., ricostruzione del carapace. B) *Palinurellus wieneckii* (De Man, 1881) (after Holthuis, 1991).

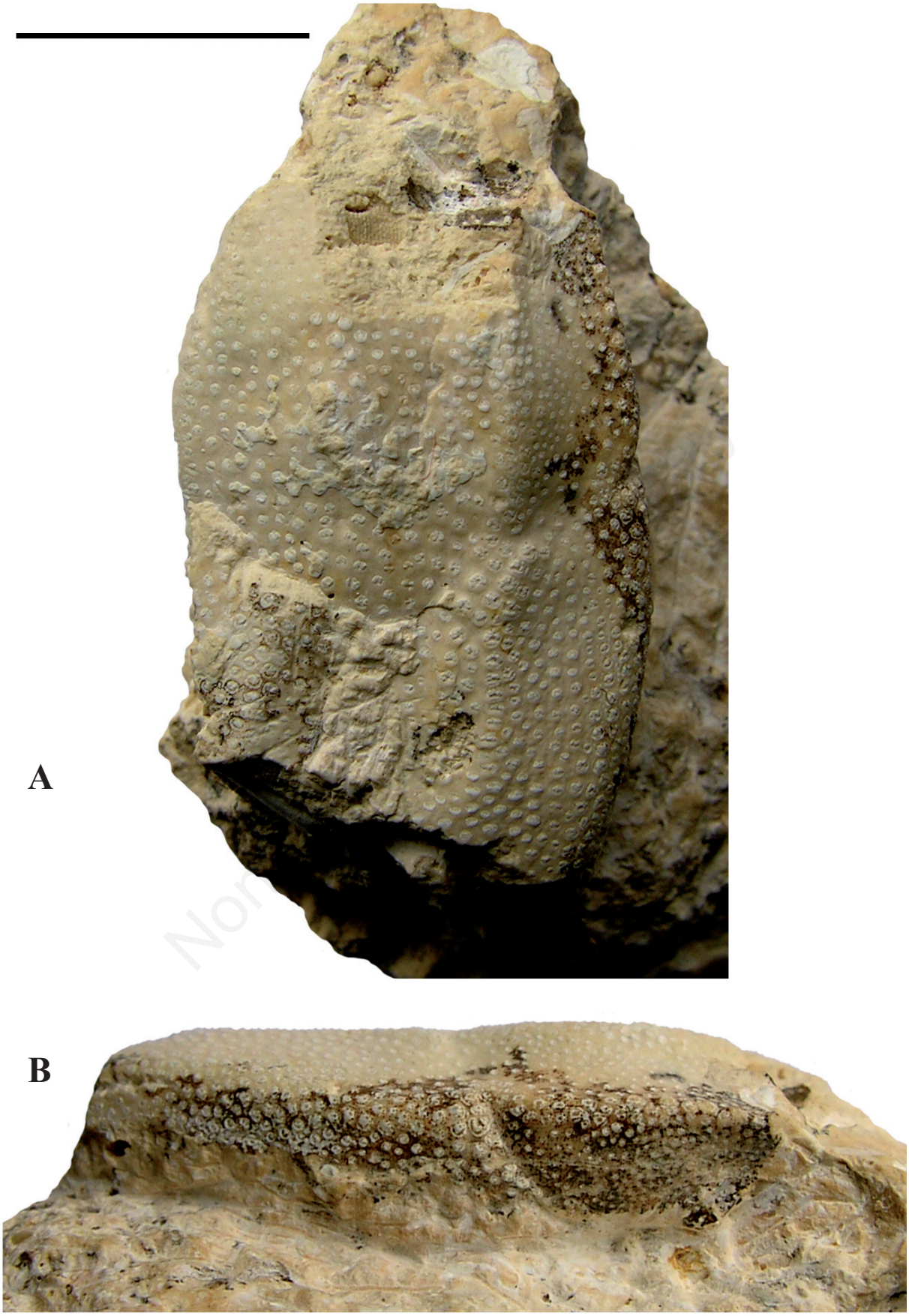

Fig. 4 - *Palinurellusa bericus* n. sp., es. MSNM i28011, holotype / olotipo. A) Dorsal view / visione dorsale. B) Lateral view / visione laterale. Scale bar equal: 10 mm.

Etymology: After Berici Mounts, where San Feliciano hill is located.

Holotype: MSNM i28011.

Material: One incomplete carapace lacking the front region and the left lateral margin.

Description: Carapace cylindrical with postorbital spine almost vertical; orbital incision deep and curved; shallow cervical groove with a wide V-shaped form, starting in the median part of the carapace, extending laterally to divide antero- and posterolateral margins; antero- posterolateral margins toothless behind the postorbital tooth; dorsal surface of the carapace covered by small closely spaced tubercles arranged uniformly in parallel lines.

DISCUSSION

Holthuis (1991) assigned the furry lobsters (sometimes called coral lobsters) to Synaxidae Bate, 1881, a family with just two extant genera *Palibythus* Davie, 1990 and *Palinurellus* von Martens, 1878. Later, Martins & Davis (2001) subsumed within the Palinuridae Latreille, 1802 these two genera. Molecular phylogenies supported the inclusion of the furry lobsters into the Palinuridae, as attested also by De Grave *et al.* (2009).

The Palinuridae includes 18 extant and fossil genera (for a complete list see De Grave *et al.* 2009). Based upon the main morphological carapace characters of each genus, we exclude the belonging of the studied specimen to 17 fossil and extant genera (*Palinurus* Weber, 1795; *Palinurina*, Münster, 1839; *Linuparus* White, 1847; *Panulirus* White, 1847; *Archaeocarabus* M'Coy, 1849; *Astacodes* Bell, 1863; *Palinustus* A. Milne-Edwards, 1880; *Jasus* Parker, 1883; *Puerulus*, Ortmann, 1897; *Justitia* Holthuis, 1946; *Pehuenchia* Rusconi, 1948; *Palaeopalinurus* Bachmayer, 1954; *Nupalirus* Kubo, 1955; *Projasus* George & Grindley, 1964; *Archaeopalinurus* Pinna, 1974; *Palibythus* Davie, 1990; *Sagmariassus* Holthuis, 1991), in having the antero- and posterolateral margins of the carapace toothless behind the postorbital tooth and the dorsal surface of the carapace covered by uniformly arranged small tubercles (*versus* antero- and posterolateral margins with teeth behind the postorbital tooth and dorsal surface of the carapace covered by uniformly or randomly arranged strong/weak spines and uniformly arranged tubercles in the above-mentioned genera).

The studied specimen shares some morphological characters with the extant genus *Palinurellus*. Indeed, according to Holthuis (1991) the main morphological carapace characters of *Palinurellus* are as follows: rostrum triangular, longer than wide; antero- and posterolateral margins of the carapace toothless behind the postorbital tooth; dorsal surface of the carapace covered by small uniformly arranged tububercles. The studied specimen has two characters, such as the antero- and posterolateral margins of the carapace toothless behind the postorbital tooth and the dorsal surface of the carapace covered by small uniformly arranged tubercles, typical of *Palinurellus* to which it is being assigned.

Palinurellus is an extant genus, including just two species *P. gundlachi* von Martens, 1878 and *P. wieneckii* (De Man, 1881), that are widespread in the western Atlantic and Indo-Pacific region respectively. Even though the studied specimen doesn't preserve the front, the incomplete carapace is similar to that of the extant species. They distinguish, however, from *P. bericus* in having a thicker ornamentation of the carapace, with smaller and homogeneous tubercles (*versus* dorsal surface of the carapace covered by small closely spaced tubercles arranged uniformly in parallel lines in *P. bericus*). Based upon the above-mentioned observations, the discovery of *P. bericus* n. sp. expands the stratigraphic range of this genus back to the late Eocene.

CONCLUSIONS

The decapod macrurans are very scarce from the Eocene levels of Veneto (northeastern Italy). Indeed, just two genera have been recorded, *Justitia* Holthuis, 1946, with *J. desmaresti* (Massalongo, 1854) from the early Eocene of Bolca (Verona) and *J. vicetina* Beschin, De Angeli & Garassino, 2001 from the middle Eocene of Chiampo Valley (Vicenza) and *Palinurellus* von Martens, 1878, with *P. bericus* n. sp. from the late Eocene of Berici Mounts (Vicenza) (Garassino & Novati, 2001; Beschin *et al.*, 2001). These fossil species lived along a continental platform with shallow warm and shaken waters, in lagoon environment (*J. desmaresti*) or in burrows within the bottom detritus (*J. vicentina*) or sheltered by coralligenous environment (*P. bericus* n. sp.). These fossil species share strict environmental correlations with the extant ones. *Justitia* has known to date with three species, *J. longimanus* (H. Milne Edwards, 1837) (Western Atlantic region), *J. japonica* (Kubo, 1955) and *J. mauritania* (Miers, 1882) (Indo-West-Pacific region) that live in shallow water (from 1 to 300 m) in the outer parts of coral reef slopes or in rocky or coral substrates (Holthuis, 1991), whereas *Palinurellus* with two species, *P. gundlachi* von Martens, 1878 (Western Atlantic region) and *P. wieneckii* (De Man, 1881) (Arabian coast of Red Sea, Indo-West Pacific region) that live in shallow water (from 1.5 to 35 m) on coral reefs and in marine caves (Holthuis, 1991). *Palinurellus bericus* n. sp. probably shared with both extant species the same environment in coral reef and in marine caves (from 9 to 27 m). *Justitia* and *Palinurellus* took origin probably from the Eocene of Europe, spreading through the Teths Sea.

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