

A new genus and species of panopeid crab, *Zovocarcinus muelleri* (Decapoda, Brachyura), from the Eocene of Zovo di Bolca, Verona (northeast Italy)

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Key words – Xanthoidea, Panopeidae, Ypresian, new taxon, comparisons.

Zovocarcinus muelleri, a new genus and species of panopeid crab, is recorded from Eocene (upper Ypresian) strata at Zovo di Bolca (Verona, northeast Italy), on the basis of a single specimen from a rich fossiliferous and coral-reef deposit in the Lessini Mountains (Verona area).

Contents

| | |
|------------------------------------|-----|
| Introduction | 185 |
| Repository and abbreviations | 187 |
| Systematic palaeontology | 187 |
| Acknowledgements | 189 |
| References | 189 |

Introduction

The Bolca area (Verona, northeast Italy; Fig. 1) with the fossil-rich deposits of 'Pesciara' and Monte Postale, is renowned for the exceptional preservation of plants, invertebrates and vertebrates, chiefly fishes. For a detailed description of local geology and stratigraphy, reference is made to Fabiani (1914, 1915), Barbieri & Medizza (1969) and Medizza (1980a, b).

Above the Scaglia Rossa, of Late Cretaceous (Campanian) age, follow the so-called 'Calcari di Spilecco' (Late Paleocene-Early Eocene) which are in turn overlain by *Lithothamnium* and *Nummulites* limestones, the fish-bearing strata of 'Pesciara' and Monte Postale, and the *Alveolina* limestones, plus marine, brackish and terrestrial limestones of Monte Postale. Higher upsection follow *Alveolina* and *Nummulites* limestones (hamlet of Brusaferrì), a thick volcanic mass, inclusive of terrestrial plants and freshwater molluscs (Monte Vegroni), shales with shells of *Cypris* (Ostracoda), and a coal bed with crocodylian and turtle remains (Monte Purga). The highest unit, at the top of Monte Purga, comprises columnar basalts. The highest stratified limestones along the northern side of Purga di Bolca are dated as late Ypresian (Barbieri & Medizza, 1969). The age of the reptile-bearing coal beds still is uncertain, but could possibly be Lutetian (Middle Eocene).

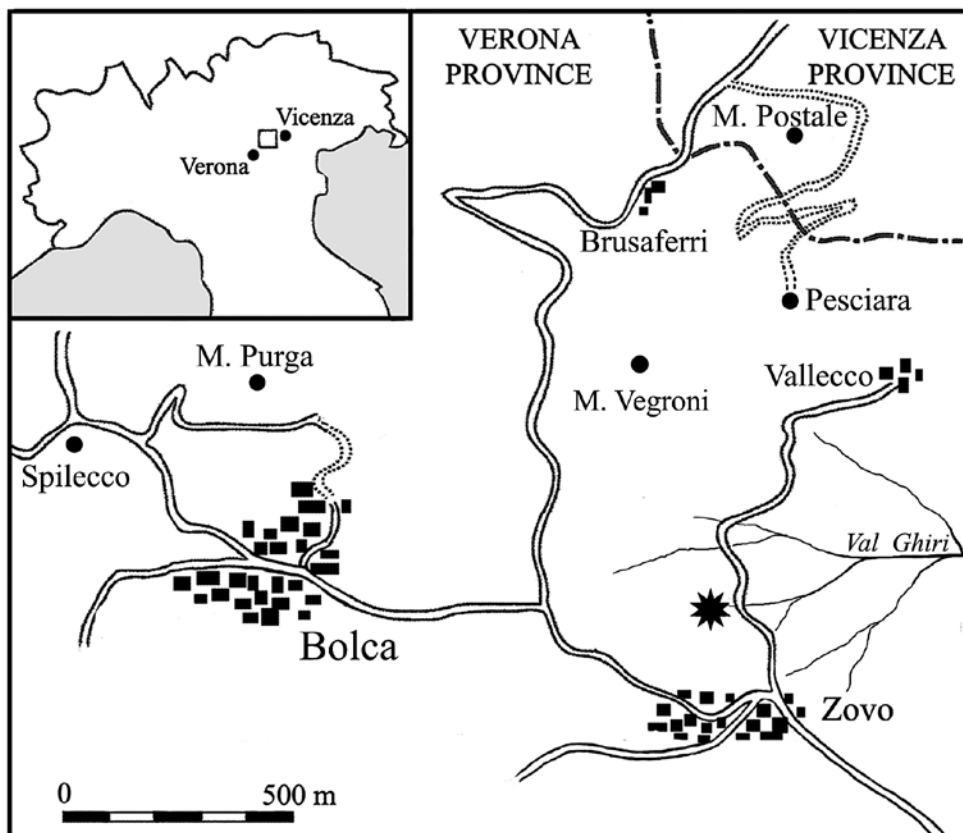


Fig. 1. Map of the Bolca area; the asterisk denotes the locality which has yielded the type specimen of *Zovocarcinus muelleri* nov. gen., nov. sp.

The new panopeid crab was collected from white crystalline limestones with alveolines and nummulitids (Brusaferrì Limestones), which also contain volcanic deposits to the southeast of Bolca, along the road connecting Zovo and the hamlet of Vallecco (Fig. 1). Associated decapod crustaceans include *Lessinigalatea regale* De Angeli & Garassino, 2002, *Cyamocarcinus angustifrons* Bittner, 1884, *Galenopsis similis* Bittner, 1875 and others (work in progress). From Zovo, Tessier *et al.* (2004) recorded the raninid *Cyrtorhina globosa* Beschin, Busulini, De Angeli & Tessier, 1988 (now *Antonioranina globosa*; see Van Bakel *et al.*, 2012), based on a specimen collected by Fabiani.

The fossiliferous level at Zovo, containing coralligenous algae, corals, microforaminifera, scarce molluscan internal moulds, and exuviae of small-sized decapod crustaceans, was associated to a bioherm or a small-sized coral reef, created inside the graben of Alpone-Agno. Formations such as this have been recorded from the Valle del Ciampo between Mussolino and Zovo di Castelvecchio (De Zanche, 1965) and in the eastern margin of Monti Lessini (Beschin *et al.*, 2007, De Angeli & Garassino, 2002; De Angeli & Ceccon, 2012).

Repository and abbreviations

The holotype, and sole specimen known to date, of *Zovocarcinus muelleri* nov. gen., nov. sp. is MCZ 3817-I.G.361673 in the palaeontological collections of the Museo Civico 'G. Zannato', Montecchio Maggiore, Vicenza (Italy).

Abbreviations in the text are as follows: cl – carapace length; cw – carapace width; ofw – orbito-frontal width; fw – frontal width.

Systematic palaeontology

Order Decapoda Latreille, 1802
Infraorder Brachyura Latreille, 1802
Subsection Heterotremata Guinot, 1977
Superfamily Xanthoidea MacLeay, 1838
Family Panopeidae Ortmann, 1893
Genus *Zovocarcinus* nov.

Type species – *Zovocarcinus muelleri* nov. sp., by monotypy.

Etymology – The name alludes to Zovo di Bolca, close to where the holotype specimen was discovered.

Diagnosis – Hexagonal carapace, slightly convex longitudinally, wider than long (cl/cw ratio 0.77); orbito-frontal margin about two-thirds of maximum carapace width; bi-marginate front, formed by distinct transverse anterior groove; quadrilobate frontal margin, divided medially by distinct incision; suboval orbits; supraorbital margins with two fissures; preorbital tooth separated from front by a groove; convex anterolateral margins, with four teeth (excluding postorbital tooth); short first tooth, located behind postorbital one; second tooth slightly stronger than first one; well-developed pointed third and fourth teeth; converging posterolateral margins longer than anterolateral ones; indistinct dorsal regions; cervical groove as slight transverse depression; shallow branchiocardiac grooves; smooth dorsal surface; anterior regions faintly granulated.

Discussion – The hexagonal carapace, with maximum length equalling three quarters of the width and maximum width at mid-carapace length, are features typical of some xanthoids, mainly of representatives of the family Panopeidae. Schweitzer & Karasawa (2004), Štević (2005), Karasawa & Schweitzer (2006) and Guinot *et al.* (2013) all discussed the characters of both constituent subfamilies, the Eucratopsinae Stimpson, 1871 and the Panopeinae Ortmann, 1893. De Grave *et al.* (2009) presented a check list of all known extinct and extant genera, while Schweitzer *et al.* (2010) focused on all known fossil species.

The carapace of *Zovocarcinus* nov. gen. resembles that of the extant *Panopeus* H. Milne Edwards, 1834 and *Lophopanopeus* Rathbun, 1898, as well as that of the fossil genus *Laevicarcinus* Lörenthey in Lörenthey & Beurlen, 1929. However, all of these have distinct carapace regions and transverse ridges on the gastric and hepatic regions. Morphologically, the new genus shows affinities with *Sereneopeus* Collins, 2002 (type

species: *Panopeus kemp* Quayle & Collins, 1981; Eocene, London Clay, Hampshire Basin, southern England) as well, in that it has the anterior carapace devoid of transverse ridges, unlike *Panopeus* (see Schweitzer, 2000). *Sereneopeus* has a hexagonal carapace which is wider than long and lacks ridges on the anterior part; and it also has an anterolateral margin with four teeth (excluding the postorbital tooth) in common with *Zovocarcinus* nov. gen. However, the former can be differentiated by having a wide, sinuous front which is well marked medially (*vs* a bimarginate front, formed by a distinct transverse anterior groove and quadrilobate frontal margin, divided medially by a distinct incision in the new genus) and a low, forwardly curved ridge, which is steeper anteriorly and extends across each epibranchial lobe. The latter is absent from *Zovocarcinus* nov. gen.

A bimarginate front generally occurs in genera such as the euryplacids *Eucrate* De Haan, 1835 and *Euryplax* Stimpson, 1859 and the xanthid *Chlorodiella* Rathbun, 1897. However, *Eucrate* and *Euryplax* have wider orbits and the inner orbital angle is well separated from the front by a deep incision (Castro & Ng, 2010). *Chlorodiella* has a wider carapace with long anterolateral teeth (Rathbun, 1930).

Zovocarcinus muelleri nov. sp.

Pl. 1.

Type – The holotype is MCZ 3817-I.G.361673, with the following dimensions: cl – 19.5 mm; cw – 25.2 mm; ofw – 15.5 mm; fw – 8.2 mm.

Diagnosis – As for genus.

Etymology – Named in honour of Pál Müller (Budapest, Hungary), who greatly increased our knowledge of Cenozoic decapod crustaceans from central and southern Europe.

Occurrence – Lower Eocene (upper Ypresian), Zovo di Bolca, Verona (northeast Italy).

Description – Hexagonal carapace, slightly convex longitudinally, wider than long (cl/cw ratio 0.77), with maximum width at level of fourth anterolateral tooth. Orbito-frontal margin moderately wide (ofw/cw ratio 0.61); bimarginate front, relatively narrow (fw/cw ratio 0.32), formed by distinct transverse anterior groove; quadrilobate frontal margin, divided medially by distinct incision; two median frontal lobes wider than lateral ones at level of frontal angles; suboval orbits, moderately wide; supraorbital margin slightly raised, with two short fissures; preorbital tooth separated from frontal angle by a groove; short triangular postorbital tooth. Convex anterolateral margins, with four spines (excluding postorbital tooth); short first tooth, located behind postorbital one; second tooth slightly stronger than first one; well-developed pointed third and fourth teeth; inclined rectilinear posterolateral margins longer than anterolateral ones; straight posterior margin of similar length to frontal one. No distinct regions; cervical groove forming slight transverse depression along margins, distinguishing hepatic regions from branchial regions; mesogastric region marked posteriorly by a curved line, with small

pits; shallow branchiocardiac grooves, with small pits. Smooth dorsal surface, with small-sized granules in anterior regions. Ventral parts and pereopods not preserved.

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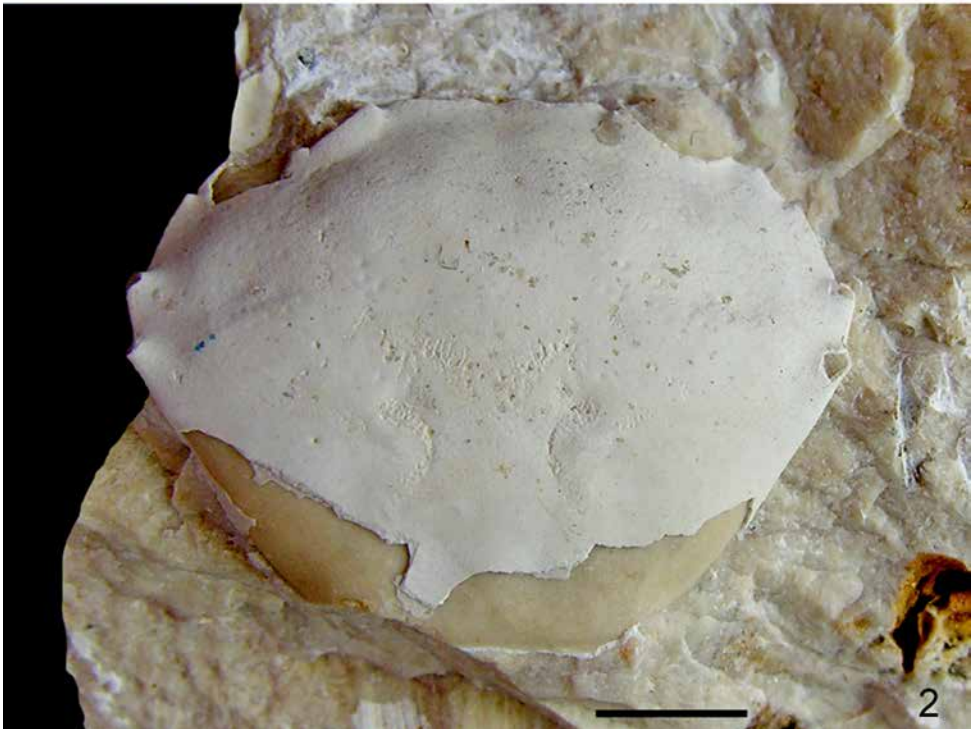


Plate 1

Figs. 1, 2. *Zovocarcinus muelleri* nov. gen., nov. sp., MCZ 3817-I.G.361673 (holotype). Carapace in frontal and dorsal views, respectively. Scale bar equals 5 mm.