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A new calappid crab (Crustacea: Decapoda) from the Lutetian (middle Eocene) of Alicante (Spain)

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Abstract

A new species of decapod crustacean, assigned to *Bittnerilia* De Angeli and Garassino, 2003, is described from outcrops of Lutetian age from Alicante (Spain). The new taxon is compared with all the species assigned to the genus, all of them recovered until now from Italy.

Key words: Decapod, Calappidae, new species, Eocene

1. Introduction

Lutetian decapod faunas are scarcely cited in the Alicante province. Only few short recordings have been made, such as Van Straelen (1927), Vía (1969), Via Boada (1965, 1991), Ossó-Morales (2011), and Ossó (2019). All the known studies to date, together with the present paper, confirm the scarce fauna of decapod crustaceans in number and diversity in the study area. Similar habitats, with similar lithology, in Catalonia (Barcelona, Vic, Berga, and Girona areas) exhibit larger crustacean faunas, in number and diversity (Solé and Via, 1989).

The genus *Bittnerilia* De Angeli and Garassino, 2003 was erected to accommodate *Lambrus eocaenus* Bittner, 1883 which is exclusively known from Italy. Since then, three more species for this genus have been recorded, all of them from only Italian outcrops. For the first time a new species of *Bittnerilia* is recorded in Spain.

Repository: Museu Geològic del Seminari de Barcelona (Catalonia), under acronym MGSB.

2. Geological setting

The outcrops from Callosa d'en Sarrià village (Fig. 1) are characterized by marls and limestones of gray, brown, and mainly yellowish colors. The lithology and the abundant fauna correspond to the typical outcrops of Lutetian age in the area of Alicante and can be assigned to the same geological age to the well-studied levels in Agost (Ortiz et al., 2008); see also Ossó-Morales (2011), and Ossó (2019). The 1960 IGME Chart (848-Altea) mentions the numerous fossiliferous sites close to the Callosa d'En Sarrià village, being fairly rich in macrofauna and of confirmed Lutetian age. The sites and the typical Lutetian macrofauna was also mentioned from early studies of Cotteau (1892), Nicklés (1895), Jiménez de Cisneros (1906) and Darder (1945).

The local fossil fauna in all the Lutetian sites (Agost, Orxeta, Aspe, Callosa d'en Sarrià) is constant, being characterized by large foraminiferans, echinoderms from small to very large size (i.e.

Schizaster Agassiz, 1836, *Conoclypus* Agassiz, 1839, *Linthia* Desor, 1853) and scarce crustaceans (i.e. *Dromilites* Bell, 1858, *Montezumella* Rathbun, 1930, *Micromaia* Bittner, 1875, *Calappilia* A. Milne-Edwards in de Bouillé, 1873, *Kromtitis* Müller, 1984) see Via Boada (1965, 1991), Vía (1969), Ossó-Morales (2011), and Ossó (2019).



Fig. 1. Map of the study area (fossil locality indicated by a star in Alicante province).

3. Systematics

Order Decapoda Latreille, 1802

Infraorder Brachyura Latreille, 1802

Superfamily Calappoidea De Haan, 1833

Family Calappidae De Haan, 1833

Genus *Bittnerilia* De Angeli and Garassino, 2003

Type species: *Lambrus eocaenus* Bittner, 1883 by original designation.

Species included: *Bittnerilia lucentumensis* n. sp. (this study); *B. dentata* Beschin, De Angeli and Zarantonello, 2005; *B. eocaena* (Bittner, 1883); *B. granosa* Beschin, De Angeli, Checchi and Zarantonello, 2016; *B. pentagonalis* Beschin, De Angeli and Zarantonello, 2013.

Bittnerilia lucentumensis n. sp.

(Fig. 2)

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Etymology: From Lucentum, the Latin name of Alicante.

Type locality: Tossal de les Banderes, Callosa d'en Sarrià, comarca de la Marina Baixa (Alicante, Valencian Country, Spain).

Stratigraphical horizon: Lutetian (middle Eocene).

Diagnosis: Small sized crab, subpentagonal in outline, front subtriangular, downturned, orbits small, subcircular, supraorbital margin with two short fissures, infraorbital margin visible from dorsal view; anterolateral margin broadly arched, posterolateral margin bearing five subtriangular teeth; posterior margin slightly concave, narrow, with two small lateral granules; dorsal regions of carapace strongly swollen and raised, bearing numerous tubercles; gastrophatic grooves well marked, fairly deep.

Material and measurements (in mm): A sole complete dorsal carapace, the Holotype, with cuticle preserved, MGSB88569; length = 20.2; width = 22.2.

Description: Small sized crab, carapace from subhexagonal to subpentagonal in outline, somewhat wider than long, L/W ratio about 0.91, strongly vaulted in both directions. Maximum width of carapace at the level of the epibranchial region. Front subtriangular, downturned, nearly straight, and axial sulcus when seen from dorsal view. Orbits small, subcircular, supraorbital margin slightly raised, with two fissures, inner and outer teeth rather acute; infraorbital margin with one fissure, and inner long spine visible from dorsal view. Anterolateral margin broadly arched, with four lobes bearing small granules, each lobe bounded by faint notches. Posterolateral margins bearing five small subtriangular teeth, posterolateral corner acute. Posterior margin short, slightly concave, bounded by two small granules. Dorsal regions of carapace strongly swollen, markedly raised, bearing numerous tubercles; epigastric region small, ridged; protogastric region small, subcircular; mesogastric region fairly small, tuberculated; metagastric region differentiated, subcircular, raised, bearing six small granules, urogastric region depressed, with a medial small granule; epibranchial region large, strongly swollen and

raised bearing numerous large tubercles; cardiac region transversely subelliptical. Sterno-pleonal elements and appendages not preserved.

Remarks: The main characters of the new species perfectly match the general diagnosis of the genus *Bittnerilia* (see De Angeli and Garassino, 2003, pp. 15, 16). Some common features are the subpentagonal outline of the carapace, the downturned subtriangular front, the construction of the lateral margins, and the swollen, raised dorsal regions bearing numerous tubercles. Nevertheless, the well-defined set of characters exhibits numerous detailed differences that allow the record of a new species. The most similar species are *B. eocaena* and *B. pentagonalis*. The characters of *B. dentata* show more distinct features.

B. dentata exhibits a nearly quadrangular shape of carapace, the frontal subtriangular margin is stouter, with a broader base; the dorsal regions are differently defined; the granulations in regions are less numerous whereas in *B. lucentumensis* n. sp. the outline is more subpentagonal; the dorsal regions are clearly subdivided, more raised and with more tuberculation (see Beschin et al., 2005, pp. 17, 18, fig. 11, t. 3.7a, b).

B. eocaena is characterized by a more subpentagonal outline of carapace, a triangular frontal margin, faintly projecting; the anterolateral margins are less arched, straighter, the dorsal regions are clearly distinct, as the more elongated protogastric regions, bearing uneven larger tubercles, whereas in *B. lucentumensis* n. sp. the frontal margin is weakly projecting, the axis slightly concave; the anterolateral margins are broadly arched; the posterolateral margin exhibits a posterior corner with five laterally projected subtriangular teeth; the dorsal regions are more distinctly defined, as the gastric and branchial areas, bearing more uniform granules (see Bittner, 1883, t. 1, figs. 7a–c; De Angeli and Garassino, 2003, figs. 2–4).

B. granosa exhibits a more subcircular outline of the carapace, with a nearly straight and more projecting frontal margin in dorsal view; the dorsal regions are less subdivided, more uniform, less raised, and the granulation over the regions is more dense and evenly distributed, while in *B. lucentumensis* n. sp. the frontal margin is less protruding; the posterolateral margin presents a posterior concave portion bearing five similar teeth; the posterior margin is short and straight

(see Beschin et al., 2016, pp. 49, 50, fig. 48, t. 8, figs. 3–5).

B. pentagonalis presents a more subpentagonal outline, the frontal margin more projecting, subtriangular from frontal view, the posterolateral margins longer, with a straight first portion, the dorsal regions distinctly positioned with scarce tubercles, while in *B. lucentumensis* n. sp. the outline is subhexagonal, with a straight frontal margin in dorsal view, the anterolateral margins are broadly concave, the posterolateral corners bearing a less protruding subtriangular teeth; the dorsal regions more raised and more tuberculated (see Beschin et al., 2013, pp. 18–20, fig. 7, t. 3, figs. 4a, b).

4. Discussion

Bittnerilia was initially assigned to the Calappidae De Haan, 1833 by De Angeli and Garassino (2003). Subsequently, Beschin et al. (2012) transferred the genus to Parthenopidae MacLeay, 1838 without explanations on this new assignation; this assignment was followed by subsequent authors. Finally, also without explanation, the genus it was moved again to Calappidae (Schweitzer et al., 2019, pp. 1, 2). We concur with the original placement of *Bittnerilia* within Calappidae instead of Parthenopidae, based on its dorsal morphology that strongly recall some calappids such as *Calappilia* A. Milne-Edwards in de Bouillé, 1873. For instance, its more rounded carapace (vs. almost subtriangular in Parthenopidae); their arched anterolateral margins (vs. usually straight or concave in Parthenopidae); clearly defined posterolateral margins, bearing prominent teeth in the posterolateral corner; lateral angle weakly defined at half of carapace length (vs. usually placed much posteriorly in Parthenopidae); as well as their orbits, larger than the Parthenopidae ones. However, Calappidae is also diagnosed as having the “anterolateral margin never distinctly dentate” (Davie et al., 2015, p. 1071), whereas *Bittnerilia lucentumensis* n. sp. presents anterolateral margins with lobes bounded by faint notches, in fact closed fissures ending in a subcircular hole—features shared by several genera and species of Parthenopidae (cf. Tan and Ng, 2003, 2007a, 2007b; Poore and Ahyong, 2023). In

any case, the lack of preserved sternopleonal features in specimens of *Bittnerilia* spp. hampers a conclusive familial placement; therefore, we provisionally retain *Bittnerilia* within Calappidae. A thorough revision of the genus is required, in particular research on sternopleonal elements, whether in the field or in collections, in order to establish a proper familial placement of the genus.

Additional crustacean fauna in Callosa — Together with the new genus described in this paper, some scarce remains of decapod fauna were

recovered from the same outcrops. It consists of small, disarticulated and incomplete crustaceans. A couple of carapaces could be assigned to the genus *Lophoranina* Fabiani, 1910, a single partial carapace of a smooth raninid, a small carapace provisionally assigned to *Harpactoxanthopsis* Vía Boada, 1959, a small portion of a pagurid, possibly *Petrochirus* Stimpson, 1858, a small palm of a possible paguroid, and an isolated palm that may represent *Montezumella* Rathbun, 1930 were collected after several visits to the outcrops.

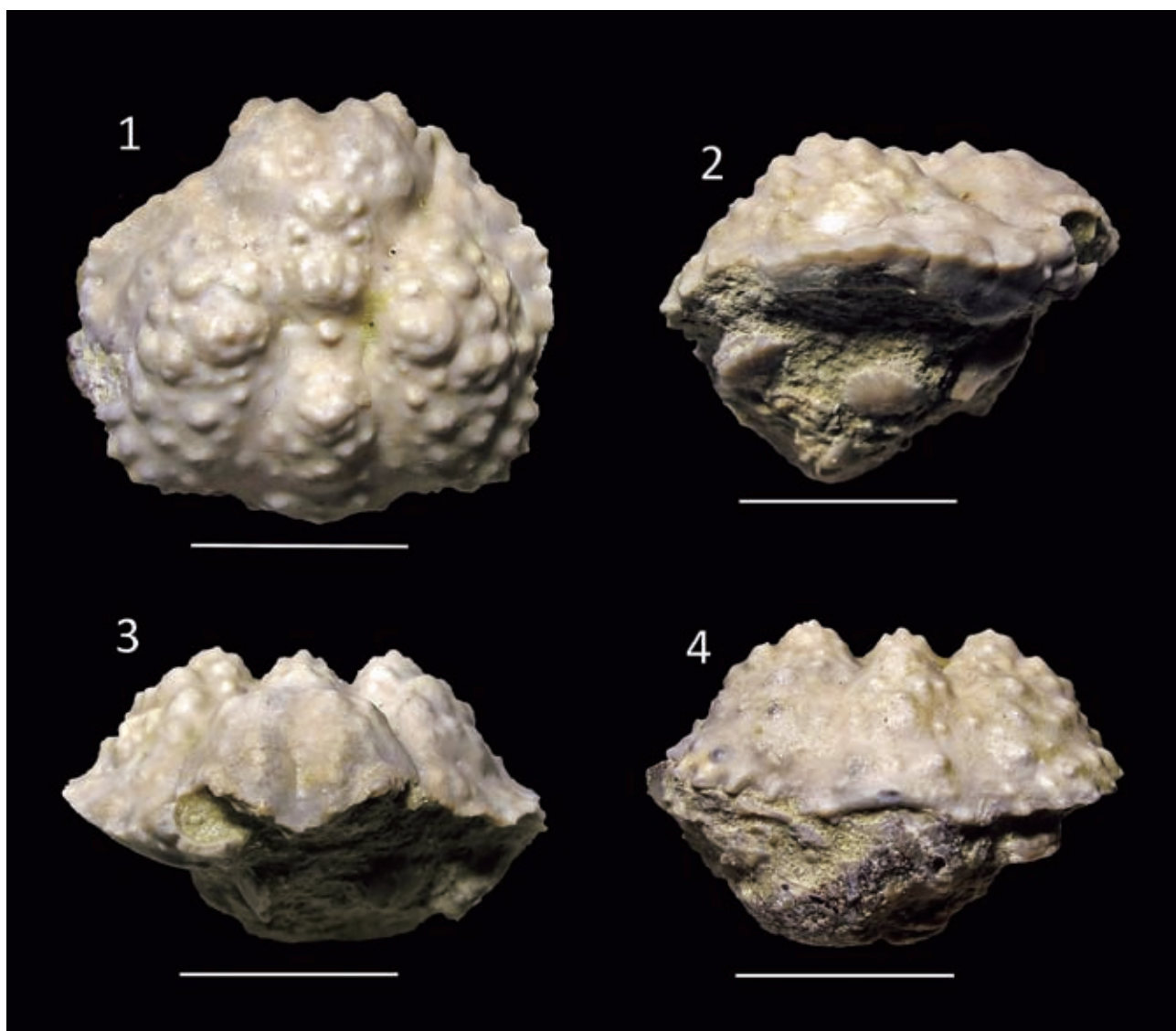


Fig. 2. *Bittnerilia lucentumensis* new species, from the Lutetian of Callosa d'en Sarrià (Alicante, Spain). Holotype MGSB88569 1, Dorsal view. 2, Right lateral view. 3, Frontal view. 4, Posterior view. Scale bar = 10 mm.

5. Conclusions

The decapod crustacean faunas in the Alicante province are confirmed once more as few abundant and apparently few diverse. Despite the systematic collections, the number of specimens collected and the scarce number of genera recorded is strikingly low compared with other faunas in the Iberian Peninsula. The commonest genus is the genus *Lophoranina* Fabiani, 1910, with at least two species and a relatively larger number of specimens (Via Boada, 1965, 1991; Vía, 1969). Some species previously discovered, and most of the newly recorded species consist of no more than one or a few specimens, as *Eocalcinus* Via-Boada, 1959, *Dromilites* H. Milne Edwards, 1837, *Micromaia*, *Montezumella*, *Harpactoxanthopsis* Vía Boada, 1959, *Paleocarpilius* A. Milne-Edwards, 1862, *Laeviranina* Lörenthey in Lörenthey and Beurlen, 1892, *Galénopsis* A. Milne-Edwards, 1865, *Agostella* Ossó-Morales, 2011, *Kromtitis*, *Retrocypoda* Vía Boada, 1959, *Calappilia* A. Milne-Edwards in de Bouillé, 1873, and *Bittnerilia* (see Vía, 1969; Vía Boada 1965, 1991; Ossó-Morales, 2011; Ossó, 2019; Khodaverdi et al., 2016; and the present paper). Vía Boada (1991, p. 181) suggested that the area of Catalonia and Alicante consist of two different biotopes during the middle Eocene. The assemblages of the decapod fauna are mainly differentiated by the relative number of specimens and by the diversity of genera, with the faunas in the Lutetian of the Alicante area being more similar to the Italian genera. This paper enlarges our knowledge on the middle Eocene decapod fauna of Alicante with one additional genus, which hitherto was known only from Italy.

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