

A new porcellanid genus (Crustacea, Decapoda) to accommodate the Late Cretaceous *Paragalathea africana* Garassino, De Angeli & Pasini, 2008 from southeast Morocco

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The galatheid *Paragalathea africana*, from the Late Cretaceous (Cenomanian-Turonian) of Gara Sbaa (Kem Kem, Morocco), is revised, based on the holotype and one additional specimen. A new genus, *Muelleristhes*, is here erected to accommodate this species; it is placed in the family Porcellanidae Haworth, 1825.

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Introduction

To date, a rich marine fauna is known from strata recently identified at the top of the Gara Sbaa slope in southeast Morocco, along the 'Hamada des Kem Kem', close to the border with Algeria (Garassino *et al.*, 2008). These fossiliferous levels, which have been referred to in previous literature sources as the Upper Cretaceous Kem Kem beds (Sereño *et al.*, 1996), occur in a wide arc, trending northeast to southeast and extending over 250 km. In the north, they crop out in the Tafilalt area, in the east they have been recorded from the 'Hamada du Guir', and in the south from the 'Hamada des Kem Kem'. These strata are bordered in the west by Precambrian and Palaeozoic units of the Anti-Atlas. In the study area, situated southwest of Taouz, 26 km south-southwest of Taфраout, on the western border of the Hamada and along the Oued Sbaa, a series of sedimentary rocks is exposed at the top of a small mesa, known locally as Gara Sbaa. These limestones, which overlie the upper unit of the Kem Kem beds, are of Cenomanian-Turonian age (Garassino *et al.*, 2008); their areal extent is about 500 square metres and the thickness amounts to 1.80 m. Near the base, sublithographic laminated limestones (60-70 cm in

thickness) occur. In addition to decapod crustaceans, xiphosurans (recorded for the first time from North Africa), isopods, tanaideacean peracarids, rare insects (Orthoptera and Omoptera), traces of marine worms, rare free-living (comatulid) crinoids, rare teeth of lamniform sharks, numerous well-preserved actinopterygian fish, plus aquatic angiosperms occur (Garassino *et al.*, 2008; Martill *et al.*, 2011; Engel *et al.*, 2012; Krassilov & Bacchia, 2013). Amongst marine vertebrates, many amiiform fish (still indeterminate) are present. All material is well preserved and mostly articulated, thus resembling the taphonomic signature of other lagerstätten. The decapod crustaceans have been studied in detail by Garassino *et al.* (2006, 2008) and Guinot *et al.* (2008). The species that have so far been identified are listed in Table 1.

Garassino *et al.* (2008) described and illustrated *Paragalathea africana* Garassino, De Angeli & Pasini, 2008, considered to be a galatheid at the time. This attribution is here reviewed, on the basis of the holotype and an additional specimen; a new genus, *Muel-leristhes*, is erected in order to accommodate *P. africana* and this is transferred to the family Porcellanidae.

Repository and abbreviations

In addition to the holotype of *Paragalathea africana*, MSNM i26863a, b, a single additional specimen, MSNM i27538a, b, has been studied; both are housed in the palaeontological collections of the Museo di Storia Naturale di Milano (MSNM), Milano, Italy. Abbreviations in the text are as follows: cl – carapace length, rostrum excluded; crl – carapace length, including rostrum; P1-P5 – pereopods 1 to 5; s1-s6 – pleonal somites 1 to 6; cw – carapace width.

Table 1. Decapod crustacean taxa recorded to date from the Cenomanian-Turonian of Gara Sbaa, south-east Morocco (data from Garassino *et al.*, 2006, 2008; Guinot *et al.*, 2008?; Charbonnier *et al.*, 2013).

Family Penaeidae Rafinesque, 1815

Cretapenaeus berberus Garassino, Pasini & Dutheil, 2006

Family Glypheidae von Zittel, 1885

?*Glyphea garaasbaensis* Garassino, De Angeli & Pasini, 2008

Family Galatheidae Samouelle, 1819

Galathea sahariana Garassino, De Angeli & Pasini, 2008

Paragalathea africana Garassino, De Angeli & Pasini, 2008

Family Munididae Ah Yong, Baba, Macpherson & Poore, 2010

Cretagalathea exigua Garassino, De Angeli & Pasini, 2008

Family Necrocarcinidae Förster, 1968

Corazzatocarcinus cf. *C. hadjoulae* (Roger, 1946)

Family Dorippidae MacLeay, 1838

Telamonocarcinus cf. *T. gambalatus* Larghi, 2004

Family Marocarcinidae Guinot, De Angeli & Garassino, 2008

Marocarcinus pasinii Guinot, De Angeli & Garassino, 2008

Systematic palaeontology

Order Decapoda Latreille, 1802

Infraorder Anomura MacLeay, 1838

Superfamily Galatheaidea Samouelle, 1819

Family Porcellanidae Haworth, 1825

Note – Extinct genera currently assigned to this family are listed in Table 2.

Genus *Muelleristhes* nov.

Type species – *Paragalathea africana* Garassino, De Angeli, Pasini, 2008, by original designation.

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

Diagnosis – Carapace subsquare, wider than long (without rostrum), convex transversely, wider posteriorly; convex continuous lateral margins; wide, weakly concave posterior margin; wide triangular rostrum, with convex apex; raised concave supraorbital margin; dorsal regions weakly marked; cervical groove present; well-raised epigastric lobes; dorsal surface of carapace with small tubercles and striations aligned transversely; short P1 with square stout chela; robust P2-P4 ending in lanceolate dactyli.

Discussion – The new genus clearly belongs to the Porcellanidae on account of the raised concave supraorbital margins, the lack of well-developed transverse striae or other distinct ornamentation, robust P2-P4 as well as reduced P5. According to Fraaije *et al.* (2008), Schweitzer *et al.* (2010) and Schweitzer & Feldmann (2012), only three Early and Late Cretaceous porcellanid genera are known to date, namely *Annieporcellana* (late

Table 2. Fossil porcellanid genera (data from De Grave *et al.*, 2009; Ceccon & De Angeli, 2012).

Family Porcellanidae Haworth, 1825

Annieporcellana Fraaije, Van Bakel, Jagt & Artal, 2008 (Early Cretaceous: Albian)

Beripetrolisthes De Angeli & Garassino, 2002 (Late Eocene: Priabonian)

Cretacolana Schweitzer & Feldmann, 2012 (Late Cretaceous: Cenomanian)

Eopetrolisthes De Angeli & Garassino, 2002 (Late Eocene: Priabonian)

Jurellana Schweitzer & Feldmann, 2010 (Late Jurassic: Tithonian)

Lobipetrolisthes De Angeli & Garassino, 2002 (Late Eocene: Priabonian)

Longoporcellana Müller & Collins, 1991 (Late Eocene: Priabonian)

***Muelleristhes* n. gen.**

Pachycheles Stimpson, 1858 (also extant)

Petrolisthes Stimpson, 1858 (also extant)

Pisidia Leach, 1820 (also extant)

Polyonyx Stimpson, 1858 (also extant)

Spathagalathea De Angeli & Garassino, 2002 (Late Eocene: Priabonian)

Albian; Navarra, northern Spain), *Cretacolana* (Cenomanian; Sarthe, France) and *Petrolisthes* (late Maastrichtian; southern Limburg, the Netherlands). Even though *Muelleristhes* n. gen. has uninterrupted spineless lateral carapace margins in common with *Cretacolana*, the latter differs in having a triangular rostrum, more convex posterolateral margins, a narrower posterior margin, a dorsal carapace ornament with fine transverse striae and a well-developed, elongate P1. The new genus can be differentiated from *Annieporcellana* in having spineless lateral margins and a weak cervical groove; in addition, the branchiocardiac groove is absent, and from *Petrolisthes* in that carapace regions are not marked by branchiocardiac grooves, the lateral carapace margins are not incised by branchiocardiac grooves and the rostrum is narrower and more elongate. Finally, *Muelleristhes* n. gen. differs from remaining porcellanid genera in having spineless lateral carapace margins and a tuberculate dorsal carapace ornament. Other fossil porcellanids have spines or projections on lateral margins, better-developed dorsal grooves, more strongly developed carapace ornament or none at all (Müller, 1984; De Angeli & Garassino, 2002).

***Muelleristhes africanus* (Garassino, De Angeli & Pasini, 2008) n. comb.**

Pl. 1.

Paragalathea africana Garassino, De Angeli & Pasini, 2008, p. 55, figs. 13, 14.

Paraglypheo africana; Ahyong et al., 2011, fig. 3.8C.

Diagnosis – As for genus (see above).

Dimensions – MSNM i26863: cl – 5.7 mm (excluding rostrum); crl – 7 mm (including rostrum); cw – 6.3 mm; MSNM i27538: cl – 4.5 mm (excluding rostrum); crl – 6 mm (including rostrum); cw – 4.3 mm.

Occurrence – Late Cretaceous (Cenomanian-Turonian), Gara Sbaa (Kem Kem, Morocco).

Note – MSNM i27538 preserves two morphological characters, such as the rostrum (partially preserved in the holotype) and the P1 propodus (lacking in the holotype), which is why a revised description of the species is supplied below.

Description – Carapace subsquare, wider than long, convex transversely and wider posteriorly; orbito-frontal margin occupying entire anterior margin; rostrum enlarged at base, with continuous spineless supraorbital margins, rounded distal extremity, and spineless lateral margins; dorsal surface of rostrum with a longitudinal median depression and small granulate, transverse cristae; concave supraorbital margin, with one postorbital spine; elongate convex continuous spineless lateral margins, superficially carinate; wide posterior margin, weakly concave; dorsal regions weakly marked; shallow cervical groove, marking hepatic and gastric regions; gastric regions weakly raised; epigastric lobes divided by a median groove extending posteriorly along narrow mesogastric anterior process; dorsal surface with small granules aligned in transverse cristae, more evident on branchial regions. Pleon wide, s1-s4 with transverse cristae, curved

ventrally; smooth s1-s4 terga and pleurae. Cephalic appendages not preserved. Thoracic appendages, P1 homochelous with short merus, short square carpus, short stout square chela, with dactylus and index equal in size; strong elongate P2-P4, with subcylindrical merus having one granulated carina along outer upper margin; propodus elongate, depressed longitudinally with a small proximal spine; subtriangular short dactylus; reduced P5. Pleonal appendages not preserved.

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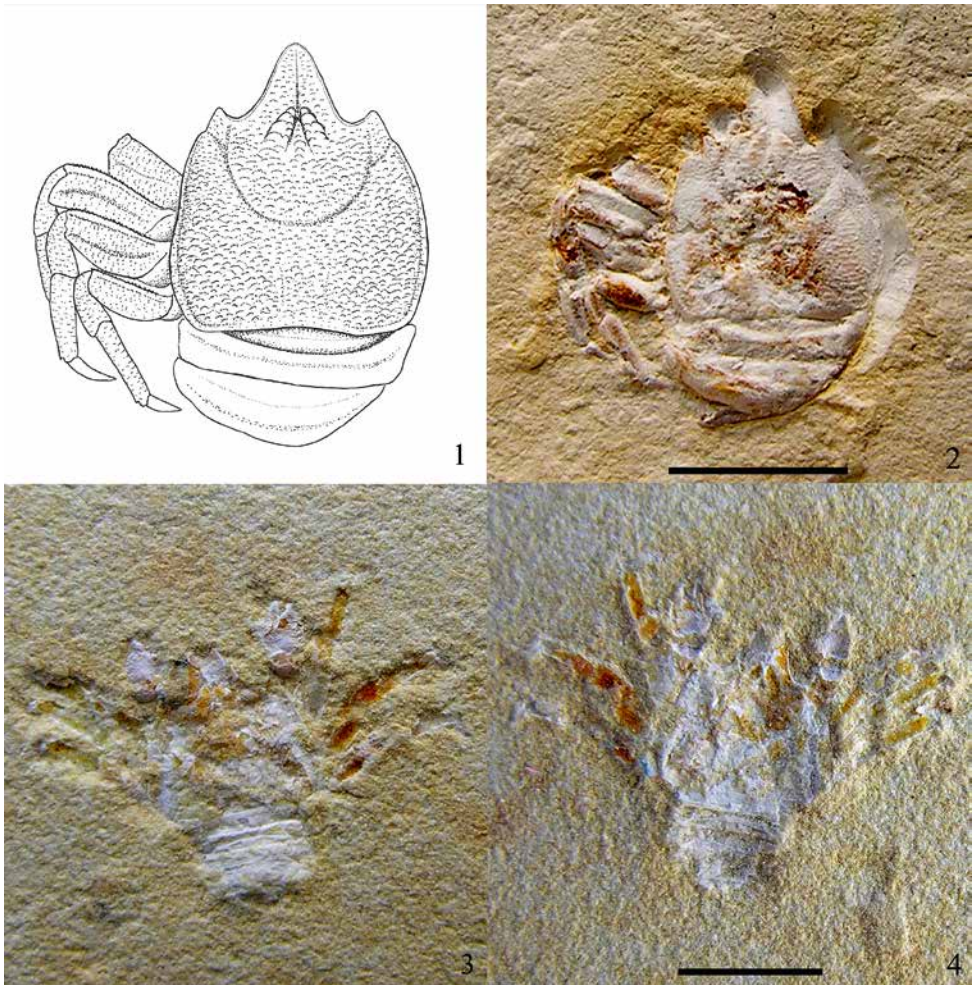


Plate 1

Muelleristhes africanus (Garassino, De Angeli & Pasini, 2008) n. comb.

Fig. 1. Reconstruction (after Garassino *et al.*, 2008).

Fig. 2. MSNM i26863 (holotype).

Figs. 3, 4. MSNM i27538, part and counterpart.

Scale bar equals 5 mm.