Bulletin of the Mizunami Fossil Museum, no. 42 (2016), p. 23–28, 2 figs.
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Giant spider crab from the St. Marys Formation (Miocene) in Calvert County, Maryland, USA

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Abstract

An extremely large spider crab from Miocene deposits of the St. Marys Formation, Calvert County, Maryland, is referred to *Libinia* Leach, 1815, as a new species, *L. amplissimus*. Although severely crushed, the specimen preserves a nearly complete carapace and several of the pereiopods, and it is nearly twice the maximum size of its extant congenors.

Key words: Decapoda, Brachyura, Epialtidae, Miocene, Maryland, USA

Introduction

The Miocene rocks exposed along the Chesapeake Bay in Maryland are known worldwide as yielding an enormous variety of fossils, including molluscs, bryozoans, echinoderms, ostracods, and vertebrates. Indeed, the first fossil reported and illustrated from North America was *Ecphora quadricostata* (Say, 1824). An unnamed specimen readily referable to the species was illustrated by Martin Lister in 1685 (fide Shattuck, 1904). Throughout the 19th and 20th centuries paleontologists as well as amateur collectors have been drawn to the cliffs along the bay where the St. Marys Formation is exposed. As a result, the fauna has been well documented. A comprehensive study of the fossils then known was published as early as 1904 in a summary of the paleontology and stratigraphy of the Maryland Miocene (Clark, 1904). Notably underrepresented in this and subsequent works are the decapod crustaceans. A single notice in Clark's compendium (1904, p. 94) documented claw remains attributed to an unknown genus of cancroid crab. Rathbun (1935, p. 109) noted, but did not illustrate, *Cancer irroratus* Say, 1817, from the Calvert Formation at Plum Point, Calvert County, Maryland. The Calvert Formation lies stratigraphically below the St. Marys Formation and separated from it by the Choptank Formation (Cooke *et al*., 1943: Ward and Andrews, 2008). Rathbun (1935, p. 111) also reported *Panopeus herbstii* H. Milne Edwards, 1834) from Nomini cliffs, Westmoreland County, Virginia, probably from the Calvert Formation. Thus, the discovery of a remarkably large and nearly complete spider crab by Bill Counterman in 2003 from the St. Marys Formation constitutes a significant increase in our understanding of Miocene decapods. The purpose of this work is to name and describe the fossil.

Systematic Paleontology

Infraorder Brachyura Linnaeus, 1758
Section Eubrachyura de Saint Laurent, 1980
Superfamily Majoidea Samouelle, 1819
Family Epialtidae MacLeay, 1838

Diagnosis: Carapace elongate, cuneate, sometimes with unusually projected anterolateral margins; rostrum bifid or singular, long or short; eyes without true orbits, supraorbital eave weak, without intercalated spine, eyestalks short or absent, eyes protected by very long rostrum or preorbital spine, sometimes a postorbital spine present but not cupped to protect eye; merus and ischium of maxilliped equally wide; pereiopods 3-5 often very short compared to 1 and 2 (abstracted and modified from Davie, 2002, and Poore, 2004).

Remarks: Placement of the specimen in question within Epialtidaeis not without some reservation. Possession of a short, bifid rostrum is consistent with the placement. Further, the overall form is like that of typical epialtids. The specimen is crushed, and the detail of the orbital region and the development of carapace regions is difficult, or impossible, to interpret. The first and second pereiopods are longer than the posterior ones that are preserved. Overall, the Chesapeake specimen more closely conforms to Epialtidae than to any other majoid family.

Assignment of the specimen to Epialtidae is consistent with the definition of the family by Davie (2002) and Poore

(2004) and sustained by Ng *et al*. (2008) and De Grave *et al*. (2009). This placement was based upon adult morphologic characters. Recent studies based upon larval morphological characters (Marques and Pohle, 2003) concluded that Epialtidae should be restricted. Taxa assigned to Pisinae within Epialtidae, as considered by Ng *et al*. (2008) and Deretererces add Grave *et al*. (2009), should be embraced within Pisidae. Based upon molecular data, Hultgren and Stachowicz (2008) concluded that their results conformed to the phylogenies based on larval data. Classifications based on adult morphology might be subject to issues of convergence. However, the Bayesian consensus tree of Hultgren and Stachowicz (2008) shows that their Pisidae is clearly polyphyletic. Thus, until and unless these issues can be resolved, and because it is not possible to apply larval or molecular evidence to the fossil record, it is most prudent to follow a classification based upon adult morphologic characters.

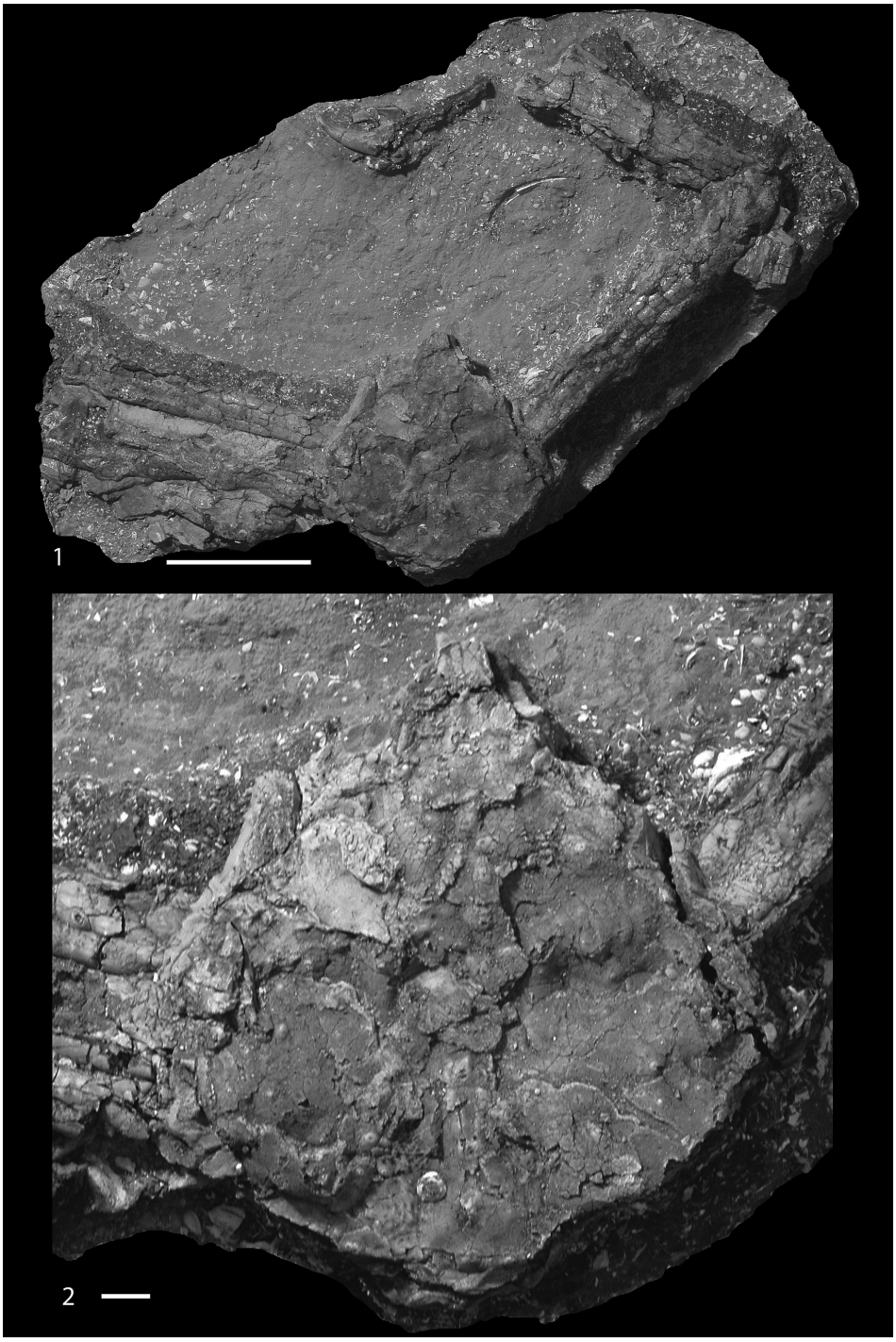


Fig. 1. *Libinia amplissimus* n. sp., CMM-I-3817, from the Miocene St. Marys Formation, Maryland. 1. Entire specimen. Scale bar = 10 cm. 2. Close-up view of carapace. Scale bar = 1.0 cm.

Subfamily Pisinae Dana, 1851

Diagnosis: Rostrum bifid, long or short; orbit always with post-orbital spine or lobe, usually cupped but never concealing eye in dorsal view, sometimes with preorbital spine; carapace triangular, often rounded posteriorly, sometimes with posterior spine (abstracted and modified from Davie, 2002, and Poore, 2004).

Remarks: Within Epialtidae, the specimen is best assigned to Pisinae based upon the conformation of the rostrum, and overall outline. Although as indicated above, the orbital region is difficult to interpret, there do not seem to be any strongly developed spines or eaves. The placement must remain tentative pending discovery of more complete material.

Genus *Libinia* Leach, 1815 [in 1814–1817]

Type species: *Libinia emarginata* Leach, 1815 [in 1814–1817], by monotypy.

Included species: See Ng *et al*. (2008) and Schweitzer *et al*. (2010).

Diagnosis: Carapace cordate, as wide as long; rostrum short, singular or with bifid tip; orbits small, supraorbital eave short, postorbital spine short; lateral margins typically regularly convex, with small spines; axial regions well defined; carapace surface ornamented with widely spaced tubercles.

Libinia amplissimus n. sp.

(Figs. 1, 2)

Diagnosis: Extremely large, with pentagonal outline, short, bifid rostrum, relatively few carapace tubercles, and long, strong first pereiopods. Pereiopods 1 and 2 longer than 3-5.

Etymology: The trivial name is the superlative form of the Latin *amplus* = large in reference to the great size of the specimen.

Description: Extremely large pisinine, carapace length 163.8 mm, width 145.5 mm measured 95 mm from front, pentagonal. Frontal width 16.2 mm, bearing short, 16.0 mm long, bifid rostrum with blunt tips. Posterior width 48.6 mm. Carapace surface highly fractured, decorticated over most of surface. Cervical groove expressed as subtle concave-forward arc crossing midline at about mid-length. Several moderately large tubercles situated on metagastric region. Cardiac region pyriform with one central tubercle. Remaining axial regions not recognized. One large tubercle on hepatic region and finer granules on undifferentiated branchial region.

Pereiopods long and generally strongly developed. Right pereiopod 1 with long, 202 mm, and broad, 31.8 mm merus becoming higher distally into inner and outer nodes, and bearing a few blunt nodes along upper surface. Carpus short, 41.9 mm, and broad, 33.6 mm, broadens distally and may bear a longitudinal ridge. Propodus longer than 180 mm. Width varies from 37.1 mm proximally to 44.9 mm distally. Termination of propodus broken, displaced, and incomplete. A small fragment of fixed finger bears domed denticles similar to those on the dactylus. Dactylus 60.6 mm long, curved, terminating in blunt point. Denticles small, domes, 6.8 mm long proximally to 2.5 mm long distally. Left cheliped merus 198 mm long and 22.0 mm wide proximally, increasing to 30.2 mm wide distally and widening to 41.4 at distal articulation. Upper surface nodose as on right merus. Walking legs decrease in length posteriorly; two preserved posterior legs (3 and four?) shorter than 1 and 2. Dactylus of P3 weakly curved, pointed.

Ventral surface and pleon not exposed.

Holotype: The holotype, and sole specimen, CMM-I-3817, is deposited in the Calvert Marine Museum, Solomons, Maryland.

Occurrence: The holotype was collected by Bill Counterman from Bed "E" of Ward and Andrews (2008) in the Little Cove Point Member of the St. Marys Formation, north from Driftwood Beach, Chesapeake Ranch Estates, Calvert County, Maryland. The age of the formation is Miocene.

Remarks: The specimen, although badly crushed, is remarkable. It is extremely large compared to typical spider crabs. The total width of the specimen as it is situated spans about 520 mm. Coupled with the paucity of decapod material from the St. Marys Formation, the specimen clearly warrants naming.

Because the orbital structures are not discernable on the specimen and the frontal region is not complete, placement within a known genus within Pisinae is speculative. However, certain points serve to exclude it from most previously named genera and support placement in *Libinia*, at least tentatively. *Libinia* spp. are characterized by having a relatively short, bifid rostrum and long and strong first pereiopods, carrying a very long propodus. These features are clearly present on the new species.

Several genera within Pisinae, including *Chorilia* Dana, 1851; *Grolamaia* Beschin, De Angeli, Checchi, and Zarantonello, 2012; and *Hyastenus* White, 1847, bear long rostral spines that are divergent. *Chorilia* and *Grolamaia*, along with *Loxorhynchus* Stimpson, 1857 [1856–1859] [imprint 1859]; *Pisa* Leach, 1816 [imprint 1815]; *Rochinia* A. Milne-Edwards, 1875 [1873–1881]; and *Tylocarcinus* Miers, 1879, embrace species that are more coarsely ornamented than species of *Libinia* including the new species. Species of *Herbstia* H. Milne Edwards, 1834 [in 1834–1840] are long and slender and bear prominent post-orbital spines. Typical *Pisoides* H. Milne Edwards and Lucas, 1843, are round with the greatest width in the posterior one-third and possess short legs and a prominent supraorbital eave. Flattened rostral horns, compressed an carinate mani, and swollen carapace regions characterize species of *Tylocarcinus* Miers, 1879. Thus, none of the fossil or extant genera, except *Libinia*, can accommodate the new species.



Fig. 2. *Libinia amplissimus* n. sp., CMM-I-3817, from the Miocene St. Marys Formation, Maryland. 1. Oblique frontal view of carapace showing downturned, bifid rostrum. Scale bar = 5.0 cm. 2. Dactylus of right pereiopod 1 showing denticles on the occlusal surface. Scale bar = 1.0 cm. 3. Oblique view of dactylus of right pereiopod 1 and fragment of fixed finger showing denticles similar to those on dactylus. Scale bar = 1.0 cm. 4. Termination of merus of left pereiopod 1 and dactylus of left pereiopod 3. Scale bar = 1.0 cm.

As discussed above, the placement within *Libinia* reflects the most parsimonious assignment given the state of preservation. Nonetheless, the single Chesapeake specimen is distinguished from other known species by being pentagonal rather than rounded in outline and in its great size. The anterolateral and posterolateral margins of the carapace are somewhat more linear than rounded, but the most distinctive feature is clearly the great size of the individual. The largest specimen within the genus as recorded by Rathbun (1925) was a specimen of *L. emarginata* Leach, 1815, which has a carapace length of 107.2 mm and a width of 95.3 mm. The length of *Libinia amplissimus* is 163.8 mm and the width is 145.5 mm.

Acknowledgments

John R. Nance, Assistant Curator of Paleontology, Calvert Marine Museum, made the specimen collected by Bill Counterman, past Assistant Curator of Paleontology, available for study. The specimen was carefully prepared and consolidated with PaleoBond Penetrant by Nance.

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Manuscript accepted on June 19, 2015