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A new family, genus and species of crab (Crustacea, Decapoda, Brachyura) from the Cretaceous (middle Albian) of Texas

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Abstract

In having a relatively narrow front, a single spine on the anterolateral margin, a more advanced cervical furrow and absence of a median ridge, a new palaeocorystoid crab, from the Walnut Clay Formation of Texas, is readily distinguished from superficially similar species contained within the palaeocorystoids to warrant separation and is placed in a new monotypic family Junglocarcinidae. The new genus and species, *Juglocarcinus tumidus* is only the sixth known species of decapod to be described from the Walnut Clay Formation.

Key words: Systematics, Decapoda, Brachyura, *Juglocarcinus tumulus*, Walnut Clay Formation, Fredericksburg Group

Introduction

Until recently, few occurrences of fossil decapod crustaceans have been reported from the Fredericksburg Group of Texas. These specimens include a manus of *Homarus travisensis* (Stenzel, 1945: 423) and, more recently, *Cenomanocarcinus cookseyi* Ossó, Jackson, and Vega, 2015, *Palaedromites xestos* Schweitzer, Feldmann, and Rader, 2016, and *Karyosia apicava* Schweitzer, Feldmann, and Rader, 2016, all from the Walnut Clay Formation. Additionally, *Trachynotocarcinus naglei* (Bishop, 1983), originally described from the underlying Glen Rose Formation (Albian), was reported from the Walnut Formation (Schweitzer *et al*., 2016). Searching web sites from the fossil collecting community revealed an occurrence of pagurid chelea from the Comanche Peak Formation and ?necrocarcinid chelae from the Walnut Clay Formation, both from Williamson County in Texas (www.MBFossilcrabs.com, accessed 23 May 2015). The collections of the Texas Natural Science Center from the Edwards Formation include one indeterminate decapod chela, which has been replaced by calcite. The remains of fossil decapods from the underlying Glen Rose Formation are better known with fourteen taxa reported (Bishop, 1983; Schweitzer *et al*, 2016). The new well-preserved specimen, with a rounded, subhexagonal carapace with anterolateral and posterolateral spines, two upper orbital margin fissures, moderately defined regions, a surface ornament composed of tubercles arranged in horizontal and transverse rows, exhibits the basic diagnostic characters of both *Necrocarcinus* Bell, 1863 (Necrocarcinidae), and *Orithopsis* Carter, 1872 (Orithopsidae), within Palaeocorystoidea Lőrenthey in Lőrenthey and Beurlen, 1929. However, it is immediately distinguishable in having only a single anterolateral spine, rather than three or four, one at the lateral angle followed by three or four tubercles diminishing in size on the posterolateral margin; the lateral branchial ridges are formed by two tumid nodes on each metabranchial lobe conjoined by linear granules, and there is a complete absence of a median ridge essential to *Orithopsis*. Furthermore, the new species has a relatively narrower, orbitofrontal margin occupying less than one third of the carapace width, instead of about a half or more, and the cervical furrow crosses the midline about one third distant from the front, whereas in the other two genera it is about mid-length to two thirds distant from the front. Herein a new family is erected with a new monotypic genus and species under Palaeocorystoidea sensu Van Bakel *et al*. (2012).

Geology and environmental setting

The name Walnut was given to an outcrop of "alternating

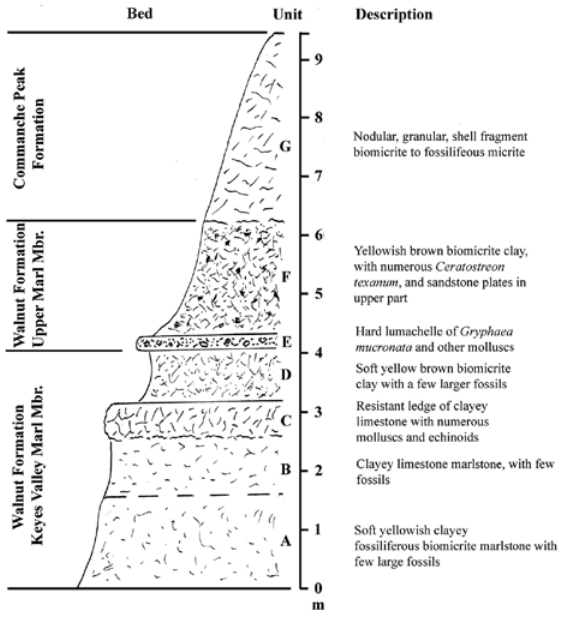


Fig. 1. Profile of the type locality on County Road 318, Coryell County, Texas.

strata of thin limestone flags and yellow clay marls, accompanied by inconceivable numbers of *Exogyra texana* …" at Walnut Springs, Bosque County, Texas (Hill, 1891: 504, 512). In central Texas the Fredericksburg Group begins with a regressive phase characterized by fluvial sandstones and an intertidal to tidal flat environment, continuing with terrestrial deposits (Paluxy Formation). This was followed by a transgression characterized by clastic deposits conformably overlain by carbonate beds (the beginning of the Walnut Clay Formation). Basal Walnut Formation deposition includes both brackish and marine deposits under shallow water depths; the middle of the formation is associated with less clastic rocks and more limestone, beds of the oyster *Texigryphaea* Stenzel, 1959, and a diverse marine fauna. The upper Walnut Formation was deposited under fully marine conditions with increased water depth and increased faunal diversity. Corwin (1982), Hayward and Brown (1967), and Trippet and Garner (1976) may be consulted for further information. The Walnut Clay Formation has been divided into five members by Jones (1966), who also gave faunal lists for each member; the biota of the upper members is the more diverse with Jones (1966) listing 13 genera in the most productive member. The macrofauna includes, gastropods, bivalves, cephalopods, echinoids, and annelids. However, in numerous collecting trips over many years, C. L. Garvie has determined that the diversity given by Jones (1966) seriously underrepresents the actual faunal diversity; for example, at this one locality where the crab was found, over 50 genera have already been identified. In the same central Texas area, the formation ranges in thickness from about 55 to 180 ft (16 – 55 m) and consists mainly of argillaceous, nodular limestone beds with a few thin beds of calcareous clay. It was most likely deposited in low energy shallow marine conditions (Corwin, 1982), in which the seabed was composed of a muddy sediment. The Walnut Clay Formation is dated as middle Albian, about 105 Ma (Mancini and Scott, 2006). A composite stratigraphic profile is given for the locality in Fig. 1.

The crab was found in scree a short distance below the scarp, but obviously derives from Unit C in the Keyes Valley Marl Member (Fig. 1). The closest published section to this crab locality is found on a bluff on Owl Creek at Cold Springs, Coryell County (Moore, 1964:19), 7 miles (11.2 km) distance away, where the Keyes Valley Marl Member is also separated from the overlying Upper Marl Member by the *Texigryphaea* lumachelle (Unit E). Below Unit A, and southward, the stratigraphy is obscured by ranchland, but near the bottom of the hill are exposed massive oyster beds of *Texigryphaea mucronata* Gabb, 1869, which are typical of the middle Walnut Formation.

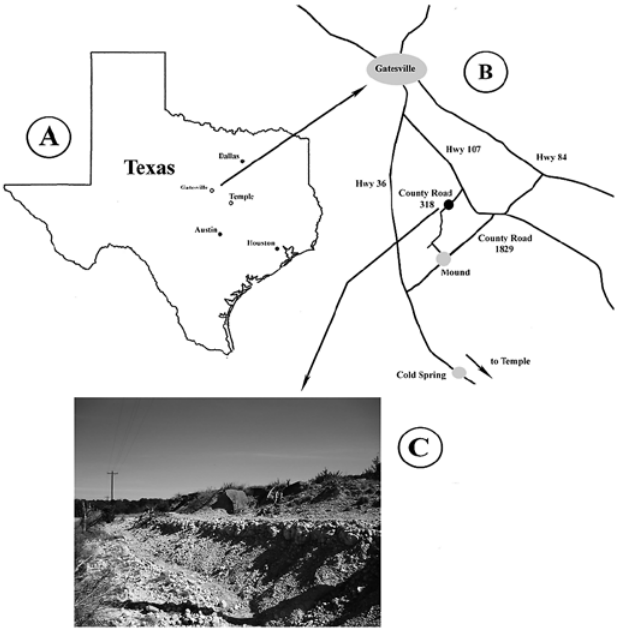


Fig. 2. Map detailing location of type locality. A: Outline of the map of Texas with type locality and some nearby cities. B: Detail of road map near the town of Gatesville and location of the type locality. C: View of the Keyes Valley Marl Member at the type locality.

Systematics

By J. S. H. Collins, C. L. Garvie, and C. J. T. Mellish

Infraorder Brachyura Latreille, 1802

Section Raninoida Ahyong *et al*., 2007

Superfamily Palaeocorystoidea Lőrenthey in Lőrenthey and Beurlen, 1929 sensu Van Bakel *et al*. (2012)

Family Juglocarcinidae fam. nov.

Diagnosis: Carapace rounded hexagonal in outline, wider than long, widest two fifths distant from the front; longitudinal and transverse sections moderately arched; orbitofrontal margin slightly produced, little less than two thirds width of carapace; two closed fissures in upper orbital margin; anterolateral margin gently convex with a spine at the cervical notch, a sharp spine at lateral angle followed by three or four smaller ones; lobes weakly tumid, a weak tubercle on each protogastric lobe, stronger ones on urogastric, epibranchial and mesobranchial lobes, metabranchial lobe with two flattened nodes conjoined by coarse linear granules forming subdued 'ridges' extending to the posterolateral angles; anterior node on cardiac region followed by three in an inverted triangle; cervical furrow faint across midline about one third distant from front; two tumid, coarsely granulated nodes on each metabranchial lobe form parallel rows either side of the midline. Exfoliated nodes clearly reveal inner and outer cuticle layers, outer surface ornament of fine granules, becoming coarser posteriorly.

Genus *Juglocarcinus* gen. nov.

Diagnosis: As for family.

Type species: *Juglocarcinus tumulus* gen. et sp. nov., by monotypy.

Derivation of name: From the Latin *juglans*, walnut, thereby indicating the Walnut Formation, and *carcinus*, crab.

Range: Cretaceous, middle Albian, of Keyes Valley Marl Member, Upper Walnut Clay Formation, Fredericksburg Group.

***Juglocarcinus tumulus* gen. et sp. nov.**

(Fig. 3)

Etymology: The specific name *tumulus* (= Latin, mound), notes the occurrence of the species in the vicinity of the village of Mound, Coryell County, Texas.

Material: Holotype, TMM NPL 51914, the only one specimen known. A carapace embedded in a small limestone block containing a limb fragment and indeterminate fragments anteriorly. Some preparation of this specimen was performed but it was found to be difficult as the matrix is similar in colour to the crab, and also harder.

Locality: Roadside exposure on County Road 318, 2.88 miles (4.6 km) from intersection with county road FM1829 in the village of Mound, Coryell County, Texas. Texas Natural Science locality no. 50-T-10. GPS coordinates: 31° 22'58.68"N, 97° 39'07.91"W (Fig. 2).

Diagnosis: As for superfamily.

Description: The carapace is rounded subhexagonal in outline; the width, at base of the lateral spines, is slightly longer than carapace length; widest third distant from the front; moderately arched in both transverse and longitudinal sections. The slightly produced orbitofrontal margin occupies rather less than one third (31%) of the carapace width, of which the front takes up a little less than a half. There are two closed notches in the short upper orbital margin, the outer one next to a triangular outer orbital spine. The rostrum is not preserved; at its base, epigastric lobes are present as short, parallel ridges either side of a median groove. Weakly convex anterolateral margins lead to a sharp spine before a wide cervical notch; a larger spine at the lateral angle is followed by three, possibly four, tubercular spines diminishing in size on the gently convex posterolateral margin. The posterior margin, as indicated by a pre-marginal depression, was moderately concave and bounded by a thickened, granulated rim. From the marginal notch the broad cervical furrow runs forward to unite with a short hepatic furrow then, curving broadly round the protogastric lobes, it becomes almost obsolete between a pair of gastric pits at the base of the mesogastric lobe about one third distant from the front. Shallower branchiocardiac furrows follow much the same course towards the midline; branchial furrows barely define the median lobes. The trapezoidal mesogastric lobe is depressed between almost circular, slightly tumid protogastric lobes on which there is a low tubercle; The anterolateral angles of the rectangular urogastric lobe extend along the base of the mesogastric lobe, a median tubercle is in line with one of equal size on each epibranchial lobe. The tumid, elongate cardiac region has a large anterior tubercle a little behind a smaller one on the mesobranchial lobes, and three, granular ones in an inverted triangle posteriorly; two, tumid, coarsely granulated areas on the metabranchial lobes, form broad parallel lines either side of the midline extending to the posterolateral angles. An outer surface ornament consisting of fine granules, becomes coarser posteriorly.

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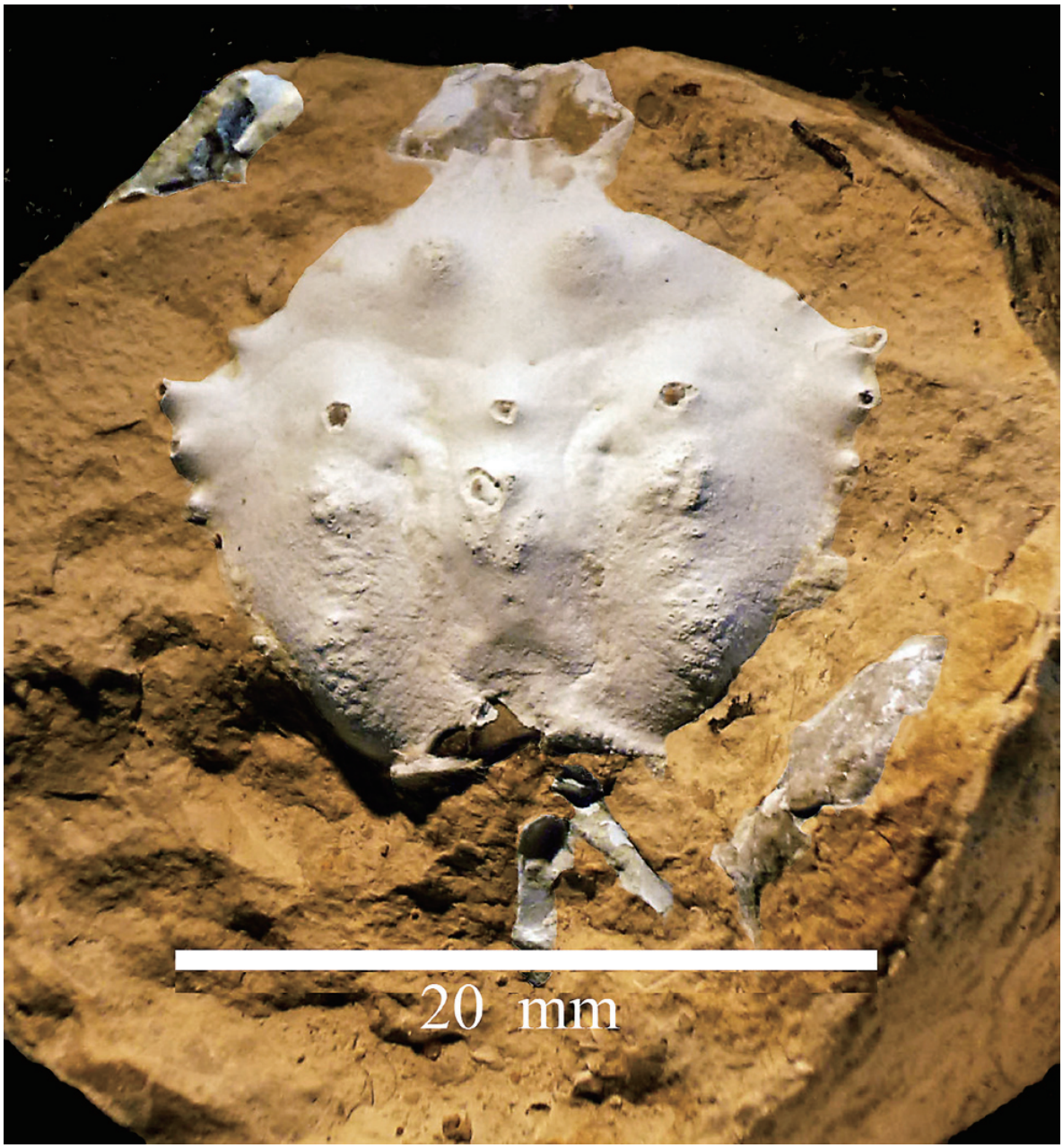


Fig. 3 *Juglocarcinus tumidus* gen. et sp. nov., from the Albian, Walnut Formation of Texas. Dorsal view of carapace with scale bar. Surface of nodule tinted for contrast.

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