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Caloxanthus kavanaghi sp. nov. (Decapoda, Brachyura) from the Del Rio Formation (Albian/Cenomanian boundary) of central Texas

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Abstract

A new species of crab, *Caloxanthus kavanaghi*, found at the base of the Del Rio Formation in central Texas, USA, has characters referring to *Caloxanthus*.

Key words: Decapoda, Brachyura, *Caloxanthus*, Washita Group, Cretaceous, USA

Introduction

A new species of crab has been found at the base of the Del Rio Formation in central Texas, USA, just above a condensed iron pyritic layer that defines the junction between the Georgetown and Del Rio formations in the vicinity of the town of Belton. The Del Rio Formation was first called the Grayson Marl by Cragin (1895: 40–43). Subsequently Hill and Vaughan (1898: 236) gave the name Del Rio to its southward extension towards the Rio Grande valley; the name Del Rio clay is usually used for those areas where the formation consists of a dark bluish/grey clay. Both the Georgetown and Del Rio formations are within the Washita Group of central Texas, which encompasses the Upper Albian and many of the lower Cenomanian stages. In the central Texas area, the uppermost part of the Del Rio Formation consists of platy siltstone layers transitioning into the Buda Formation, which is marginal marine facies. The bulk of the Del Rio Formation is composed of a plastic, calcareous and gypsiferous, pyritic clay, dark blue when fresh, weathering to a light grey, which in most areas transitions downward to the underlying

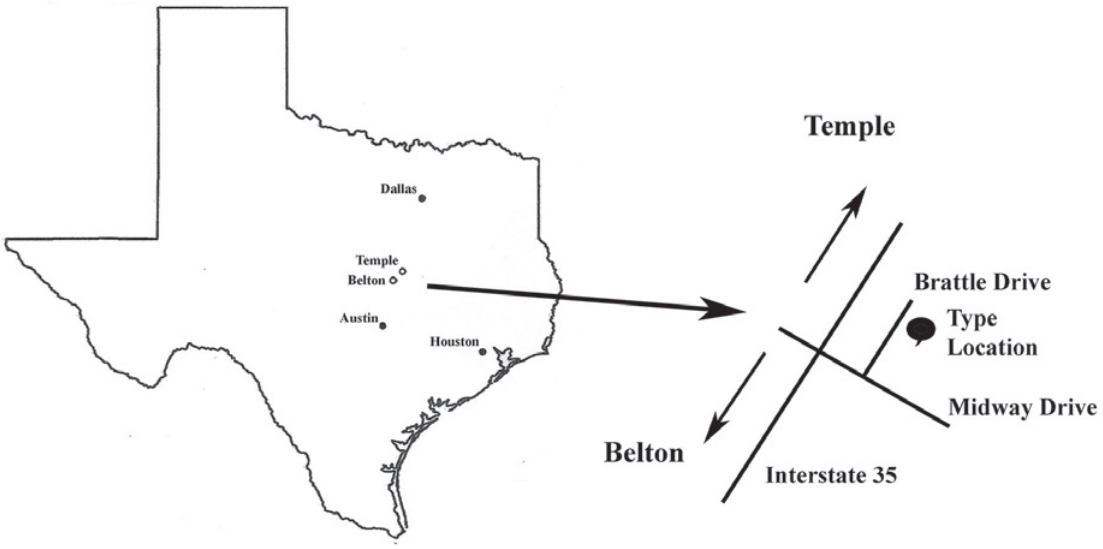

Fig. 1. Locality map showing where the specimen was found.

Georgetown Formation with alternating marlstones and marly limestones. Young (1977) interpreted the depositional environment of the Del Rio Formation to be lagoonal with abnormal bottom conditions due to the large amount of pyrite and the dwarfed fauna. In West Texas the nearshore facies persists but shows a transition to a shallow-marine to brackish environment (Hover *et al*., 2008). The Georgetown Formation is fully marine, of five members, of which the uppermost is the Main Street Member, which forms a hard cap in this region and is quite thin at the type locality of the crab. Lithologically, this cap is composed of a hard, cemented, hematitic, sandy conglomerate of rounded pebbles and oyster hash, showing all the signs of a high-energy scour environment. Shark teeth are not uncommon, which has resulted in this locality being a favourite collecting site for the fossil collecting community. Compared to the exposures of the Del Rio Formation near Waco, the fauna at this level is rather depauperate with the following species being commonly found: *Goniophorus scotti* Lambert, 1926, *Neithea subalpina* (Böse, 1910), *Spondylus hilli* Craigin, 1893, *Texigryphaea navia* (Hall, 1856), and *Texigryphaea mucronata* (Gabb, 1869), all species indicative of a shallow water, nearshore, low energy environment. A useful guide to the geology and fauna of this level may be found in Adkins and Arick (1930: 41–59). Recent work (Phelps *et al*., 2013) places the Georgetown-Del Rio formations junction in planktonic foraminiferal zone 13, at the Albian–Cenomanian boundary.

Systematic Palaeontology

Infraorder Brachyura Linnaeus, 1758
Superfamily Etyoidea Guinot and Tavares, 2001
Family Feldmannidae Schweitzer, Feldmann, Franțescu, and Klompmaker, 2012

Genus *Caloxanthus* A. Milne-Edwards, 1864

Type species: *Caloxanthus formosus* A. Milne-Edwards, 1864, by monotypy.

Caloxanthus kavanaghi sp. nov.

(Fig. 2)

Diagnosis: Carapace subcircular in outline, wider than long, longitudinally and transversely gently arched; orbitofrontal margin weakly curved, orbits circular, entire and forwardly directed; fine grooves outline cardiac region. Somites 1 and 2 of female abdomen visible from above. Dorsal surface tuberculated, tubercles becoming smaller posteriorly; ventral surface with coarse to fine granules. Outer surface of chelae mani more coarsely granulated, fingers smooth.

Derivation of name: The species is named for Michael Kavanagh Smith who found the type specimen and kindly donated it to the University of Texas at Austin.

Material: Holotype: a single female carapace and originally associated chelae in the collections of the Non-vertebrate Paleontology Laboratory, University of Texas, catalogue number NPL00085565.000. The specimen was from the base of the Del Rio Formation, Washita Group, Albian/Cenomanian boundary and found in the lower section of grey shale from a small hill, 300ft from the N.E. corner of the intersection between Battle and Midway Drives, Bell County, Temple, Texas. GPS co-ordinates: 31.080023-97.406566.

Description: The pleural suture is entire, indicating the specimen is a corpse. The carapace is subcircular in outline, length about two thirds of the width, widest about two-fifths distance from the front: gently tumid in longitudinal section, the mesogastric region is raised above the general flattened curvature of the transverse section. The anterolateral margin and lateral angle are boldly rounded and the weakly convex posterolateral margins converge to a nearly straight posterior margin, about half the width of the orbitofrontal margin. Separated by a slight notch from the anterolateral margin, the gently curved orbitofrontal margin takes up rather more than half the carapace width, of this, small, rounded, entire orbits occupy the outer fourths. Granules lining the upper orbital margin are slightly raised laterally for about half their length. About half the length of cylindrical orbital peduncles are blackened by the corneal surface.

Very fine, parallel grooves, hooked anteriorly between the granules, delineate a broad, vaguely lyre-shaped, weakly tumid cardiac region. Dense granules cover the entire dorsal surface, of which the largest, covering the anterior half, are cratered and interspersed by smaller, entire ones which continue posteriorly. The lateral edge is finely beaded; weakly sinuous sides slope inwards and curve towards the midline. The frame of the buccal region is overlapped by the 3rd maxillipeds which are almost twice as long as the endopodite; the narrower exopodite rests on a subtriangular basiopodite and extends marginally into the (broken) meropodite.

The sides of the sharply pointed subtriangular thoracic sternite 2 are weakly concave and bounded by a distinct granular rim. Basal angles are bluntly rounded and the convex base is marked by a faint groove between subrectangular sternites 3–4.

Fig. 2. ***Caloxanthus kavanaghi* sp. nov.**, holotype, female carapace and attributed chela: NPL00085565.000. a, outer surface of left chela; b, inner surface of left chela; c, dorsal surface; d, ventral surface; e, frontal view; f, posterior view.

Somites 1–2 of the relatively small ovate (female) abdomen are visible in dorsal view; somites 3–6 are of much the same length and the broadly rounded triangular telson extends just into sternite 5. As with the dorsal surface, the entire underside is densely granulated, the coarsest dispersed over the branchiostegites.

The originally associated left and right chela suggest the specimen is heterochelate. Left chela: the height of the manus is about three fourths the length, the upper margin is more strongly convex than the basal margin which is indented before the fixed finger and sharply rounded at the carpal angle; there is a prominent dorsal articulation boss on the oblique carpal margin, slightly deflexed from the lower margin. The fixed finger is as long as the manus and half the interdigital margin length; of two cusps on the occludent margin, the distal one is larger and there is a terminal pit to receive the dactylus; dactylus stout and rounded in section, has one occludent cusp. With the exception of the fingers, which are smooth, the surface is covered by rather more evenly distributed cratered and/or entire tubercles. The granulation is coarser on the outer surface. As preserved, the incomplete right chela is the larger; the manus is almost as broad as long.

Discussion

An exceptionally preserved specimen from the Grayson Formation, Waco, Texas (Vega *et al*., 2014) was referred to *C. americanus* Rathbun, 1935, but differs in having a straighter orbito-frontal margin, less deeply divided apically (in dorsal view); virtually absent parallel cardiac grooves, as well as less coarsely and less evenly distributed surface ornament. In these respects the description of *C. americanus*, as emended by Vega, more closely resembles *Caloxanthus kavanaghi* sp. nov.

No crabs have hitherto been described from the Del Rio Formation. Very recently the second author has learnt that several crabs have been found in the Del Rio Formation by some assiduous local collectors and these will form the subject of a future paper.

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Obituary for Joe S. H. Collins

It is with profound regret that the co-authors report the death of Joe S. H. Collins in January, shortly after this paper was submitted. One of Britain's greatest advocates for fossil decapods, he had a formidable publication record, particularly on Brachyura, but also other groups of Crustacea, notably cirripedes. His interests were not limited geographically and included published works on crustaceans from around the globe. Joe was an extraordinary man; he had no formal training in palaeontology but he achieved more research, fieldwork and awards than most professionals, even before he retired. A familiar sight at UK fossil festivals, Joe was as keen to impart knowledge to non-specialists as to his research collaborators. Kindly and modest, he was a real inspiration to many generations of palaeontologists. Such was Joe's determination; he worked right up until he died at 91 years old. He will be greatly missed.

February 6, 2019

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