Crustaceans of the upper Miocene August Town Formation of southeastern Jamaica

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Crustaceans remain poorly known from the Miocene of Jamaica. Herein, we report three species from the upper Miocene August Town Formation of Fowl House Spring, parish of St. Thomas, southeast Jamaica; poorly preserved propodi of a mud shrimp, "*Callianassa*" sp.; the anterior part of the carapace of *Mithraculus* sp. aff. *Mithraculus coryphe* (Herbst); and the cirripede *Tetraclita* sp. cf. *T. stalactifera* (Lamarck). *Mithraculus* sp. aff. *M. coryphe* at Fowl House Spring considerably extends the stratigraphic occurrence of the genus in the Antillean region down into the Miocene. Hitherto, fossil *T. stalactifera* in the Caribbean was known from the Plio-Pleistocene of Curaçao and the Pleistocene of Venezuela.

Contents

Introduction 177
Locality and horizon 178
Systematic palaeontology 179
Acknowledgements 181
References 182

Introduction

The only nominal Miocene crustaceans from Jamaica are restricted to decapods (crabs) found at one site in the Montpelier Formation, White Limestone Group, from the coral rock assemblage exposed at Duncans quarry, parish of Trelawny (Portell & Collins, 2004). This occurrence is peculiar, decapods originating from allochthonous slide blocks of reefal limestone that are preserved in deeper water chalk deposits. Until now, reports of at least parautochthonous Miocene crustaceans have been limited to balanid barnacles and fragments of mud shrimps. Therefore, the discovery of tetraclitid cirripede remains, together with a portion of a majid carapace, both representing the earliest known members of their respective genera, is a significant contribution to the fossil record of the island.

Specimens discussed herein are deposited in the NCB Naturalis, Leiden, The Netherlands (NNM RGM). Our philosophy of open nomenclature follows Bengtson (1988). The terminology of the decapod exoskeleton is explained in Glaessner (1969).

Locality and horizon

The sedimentary succession of the Neogene August Town Formation, Lower Coastal Group, in southern central and southeastern Jamaica, rests unconformably on the White Limestone Group (Matley, 1951, pp. 40, 61). This represents a notable change of depositional environment. White Limestone deposition had occurred over much of what is today the Jamaican land area for over 40 million years (Robinson, 1994, fig. 6.6). In contrast to the pure white limestones that typify this mid-Cenozoic succession, the August Town Formation is characterised by impure yellow limestones, with conglomerates and other siliciclastic rocks, and a macrofauna dominated by scleractinian corals and benthic molluscs (Robinson, 1963, p. 46).

The study of the palaeontology of the August Town Formation has lagged behind that of many other fossiliferous units of the Jamaican Neogene. In part this is because the type area, in the Hope River gorge, has a bad reputation for criminal activity. Therefore, those studies of the fossils of the August Town Formation that have appeared during the past 25 years have concentrated on sections exposed on the south coast such as Round Hill, parish of Clarendon (for example, Littlewood & Donovan, 1988; Pickerill *et al*., 1993). The present contribution follows this pattern.

The studied locality (Fig. 1) is found on the coast east of Morant Bay, St. Thomas in the Lyssons District (GPS N17^0 52.541′ W76^0 22.932′) (about NGR 535 358, 1:50,000 topographic sheet 19, 'Morant Bay'). It lies at the mouth of a small stream labeled Fowl House Spring on the 1:12,500 topographic map of the area, though local inhabitants do not commonly use this name.

The exposure consists of bedded limestone and sandstone dipping to the south at roughly 8-10^0. A yellow impure, pebbly, bioclastic limestone makes up the basal unit here with approximately 2 m of thickness exposed above tide level. It contains abundant casts of large molluscs, and branched and free living corals, as well as the large benthic foraminiferan *Sphaerogypsina,* a common taxon in the August Town Formation. This lower limestone is capped by an irregular erosive boundary with associated overturned, large (~0.5 m diameter) coral heads and is overlain by brown, pebbly, coarse- to medium-grained, lithic-rich sandstone. The sandstone is irregularly bedded with scattered molluscs, corals, crustaceans and echinoids, and generally less pebbly and coarse grained upward. At the coast, the sandstone unit is 1.8-2.0 m thick and grades into a weathered soil cover.

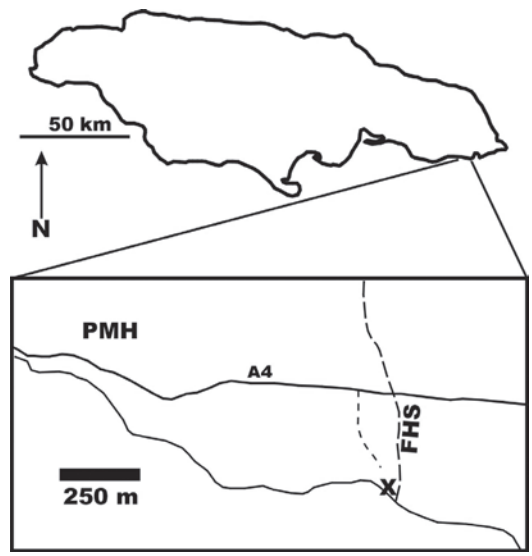

Fig. 1. Map showing studied fossil locality (X) at the mouth of Fowl House Spring (FHS). The approximate coastline, the main coastal road (A4) and the location of the Princess Margaret Hospital (PMH) are also shown.

Systematic palaeontology

Order Decapoda Latreille, 1802
Infraorder Thalassinidea Latreille, 1831
Family Callianassidae Dana, 1852
Genus *Callianassa* Leach, 1814

Type species.—*Cancer* (*Astacus*) *subterraneus* Montagu, 1808, by monotypy.

Remarks.—We follow the suggestion of Collins *et al*. (1997, p. 52) to include indeterminate fossil callianassids in "*Callianassa*" sp. within the Callianassidae *sensu lato*.

"*Callianassa*" sp.

Material.—Two imperfectly preserved propodi, NNM RGM 544 494 and 544 495.

Locality and horizon.—Neogene (upper Miocene) August Town Formation, Lower Coastal Group, Lyssons area, parish of St. Thomas, southeast Jamaica.

Remarks.—Although adequate to confirm the presence of callianassids at Fowl House Spring, these specimens are not worthy of description or illustration. The only previous record of decapods from the August Town Formation was a report of "rare crab chelae" from Alligator Pond, parish of Manchester, southern central Jamaica (Donovan *et al*., 1994, p. 173). These are similarly based on indeterminate callianassids.

Infraorder Brachyura Linnaeus, 1758
Superfamily Majoidea Samouelle, 1819
Family Majidae Samouelle, 1819
Subfamily Mithracinae MacLeay, 1838
Genus *Mithraculus* White, 1847

Type species.—*Mithraculus coronatus* White, 1847, p. 7 (=*Maia sculpta* Lamarck, 1818, *non Cancer coronatus* Herbst, 1785), by monotypy (Ng *et al*., 2008, p. 120).

Mithraculus sp. aff. *Mithraculus coryphe* (Herbst, 1785)
Fig. 2A.

Material. – Anterior part of a dorsal carapace, NNM RGM 544 496 (Fig. 2A).

Locality and horizon.— Neogene (upper Miocene) August Town Formation, Lower Coastal Group, Lyssons area, parish of St. Thomas, southeast Jamaica.

Description. – Carapace nodose. The anterolateral margins are lined with two smooth, round, widely spaced and even-sized lobes; an apparent third lobe is the distal part of the epibranchial lobe.

The orbitofrontal margin occupies 73.0 % of the carapace width, measured behind the second lobe. The very small rostrum has two truncated nodes separated by a U-shaped sinus; the thickened sides leave a space before thickened upper orbital margins, each with a single fissure, the larger inner angle being in advance of the outer. Rounded median parts of the lower orbital margin extend slightly beyond the rostrum. Fused epigastric lobes form an ovate post-rostral lobe. A deep furrow separates this lobe from the rounded tip of a broad antero-mesogastric process. The protogastric lobes are formed by three nodes set in a triangle within a crescentric lobe. Sharp, tapering anterior extensions of the mesogastric lobe project almost to the outer edge of the protogastric lobes and are bounded by a large, medially directed, mesobranchial lobe.

Remarks. – There appears to be a close correspondence of the lobes to those of *Mithraculus coryphe* (Rathbun, 1925, pl. 153, fig. 1). The Jamaican upper Miocene carapace has more even-sized anterolateral lobes and a complete union of the epigastric lobes rather than the, apparent, median sinus of Rathbun's figured specimen.

Hitherto, the fossil record of *Mithraculus* from Jamaica has been limited to the Plio-Pleistocene, most notably the recording of an exceptionally well-preserved carapace of *Mithraculus* sp. aff. *M. forceps* A. Milne-Edwards, 1875, from the upper Pleistocene Falmouth Formation (Morris, 1993, fig. 2.11). A right chelacarpus from the upper Pleistocene Port Morant Formation was identified as *M. forceps* (Collins *et al*., 2009a, pl. 4, fig. 1). Elsewhere, *Mithraculus ruber* (Stimpson, 1871), as *Mithrax* (*Mithraculus*) *ruber*, was recorded from the Pleistocene Coral

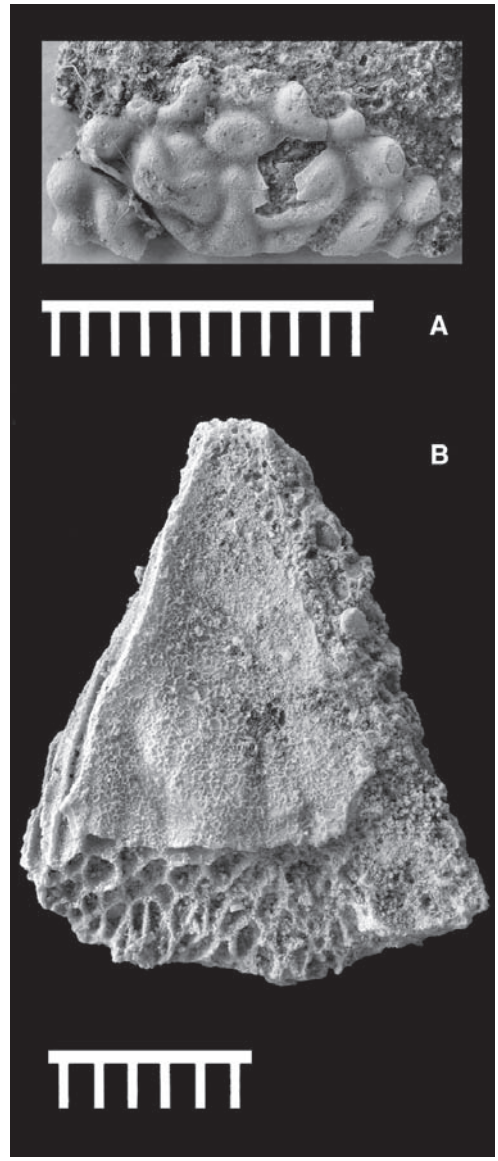

Fig. 2. Crustaceans from the upper Miocene August Town Formation from just west of Fowl House Spring, near Lyssons, parish of St. Thomas, southeast Jamaica. (A) *Mithraculus* sp. aff. *Mithraculus coryphe* (Herbst, 1785), NNM RGM 544 496, anterior part of a carapace. (B) *Tetraclita* sp. cf. *T. stalactifera* (Lamarck, 1818), NNM RGM 544 497, inner surface of a fragmentary compartment showing characteristic pores. Specimens whitened with ammonium chloride. Scale bars in mm.

Rock of Barbados (Collins & Morris, 1976, pl. 17, fig. 8). Thus, the discovery of a carapace from the Miocene considerably extends the stratigraphic occurrence of the genus in the Antillean region (Collins *et al*., 2009b, tables 2-4).

Class Cirripedia Burmeister, 1834
Order Balanomorpha Pilsbry, 1916
Family Tetraclitidae Gruvel, 1903
Subfamily Tetraclitinae Gruvel, 1903
Genus *Tetraclita* Schumacher, 1817

Type species. – *Tetraclita squamulosa* Schumacher, 1817, p. 91, by original designation (= *Balanus squamosus* Bruguière, 1789, p. 170) (Newman *et al*., 1969, p. R287).

***Tetraclita* sp. cf. *Tetraclita stalactifera* (Lamarck, 1818)**
Fig. 2B.

Material. – Fragments of two compartments, NNM RGM 544 497 (Fig. 2B) and 544 498.

Locality and horizon. – Neogene (upper Miocene) August Town Formation, Lower Coastal Group, Lyssons area, parish of St. Thomas, southeast Jamaica.

Remarks. – A Recent taxon that was formerly regarded as a subspecies of *Tetraclita squamosa* Bruguière, 1789, *Tetraclita stalactifera* was first listed as a distinct species by Newman & Ross (1976, p. 48), and therein recorded from the Plio-Pleistocene of Curaçao and the Pleistocene of Venezuela. The stratigraphic and geographic range is now extended down to the upper Miocene of Jamaica.

Fragmented as they are, the two compartmental pieces provide clear indication of the arrangement of the pores. The larger fragment has pores, averaging three in a row (Fig. 2B); the smaller, possibly growth-crowded compressed piece, has two distinctly separated rows. Both arrangements compare favourably with those of specimens illustrated by Pilsbry (1916, pl. 59, figs. 1-5). Traces of fine, evenly ribbed surface sculpture are preserved on both pieces. The Recent distribution of *T. stalactifera* includes the Caribbean, Cape Peninsular, South Africa and the Arabian Sea (Newman & Ross, 1976, p. 48).

Other barnacles reported from the August Town Formation include *Balanus improvisus* Darwin, 1854, and *Balanus eburneus* Gould, 1841 (Littlewood & Donovan, 1988, pp. 1019-1020) from the Round Hill beds at Round Hill, parish of Clarendon, on the central south coast. Both species are also known from the upper Pleistocene Port Morant Formation in the parish of St. Thomas, southeast Jamaica (Collins *et al*., 1997, p. 58).

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