A new species of portunid crab from the early Pleistocene Old Pera beds of Jamaica

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COLLINS, J. S. H., DONOVAN, S. K., LINDSAY, W. & SIMPSON, G. A. 2001. A new species of portunid crab from the early Pleistocene Old Pera beds of Jamaica. *Proceedings of the Geologists' Association*, **112**, 7–12. The Plio-Pleistocene of the Coastal Group, Jamaica, contains a diverse fauna of crabs, superior to that known from this interval on any other Antillean island. A new species described herein is the first crab from the early Pleistocene Old Pera beds, Manchioneal Formation. This taxon, *Euphylax fortispinosus* sp. nov., has a subovate carapace, a long orbitofrontal margin with deep corneal depressions and four pairs of anterolateral spines; the first pair are diminutive. It represents the first record of the genus *Euphylax* Stimpson in the Jamaican fossil record, whose present distribution is confined to the Pacific coast of tropical Central America and the eastern tropical Pacific.

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1. INTRODUCTION

Until the early 1990s, the literature of fossil crabs in the Jamaican fossil record gave a lopsided view of its true richness and variety (an interesting parallel can be drawn with Florida; Agnew *et al*., 1999). Earlier papers had described a few, well preserved specimens from the Upper Cretaceous and Lower(?)–Middle Eocene (reviewed in Morris, 1993). Crabs had not been recorded from overlying deposits, consisting of the mid-Cenozoic White Limestone Group and the overlying Coastal Group (Upper Miocene–Pleistocene; Robinson, 1994). However, since 1993, a wealth of fossil crabs has been recorded from the Pliocene and Pleistocene of the Coastal Group, based mainly on disarticulated chelae and a few rare carapaces, making it the best known, late Cenozoic, crab-rich deposit in the Antillean region (Table 1). Herein, we add a new species to this faunal list, from a unit, the Old Pera beds, that has hitherto failed to yield crabs.

The genus *Euphylax* Stimpson, 1860, was erected to contain a single Recent species, *Euphylax dovii* Stimpson, 1860, which ranges from the west coast of Mexico(?), Panama to Chile (Rathbun, 1930) and the eastern tropical Pacific (Jerde, 1967). Later, Milne Edwards (1874) described a second extant species, *Euphylax robustus*, from Mazatlan, Mexico. Described from a single specimen, Rathbun (1930, p. 148) remarked upon the uniqueness of *E. robustus* and considered it might be conspecific with *E. dovii*, 'Its peculiarities due to its greater size'. The discovery of *Euphylax* in the Pleistocene Old Pera beds, Manchioneal Formation, provides the first evidence of crabs from this unit and constitutes an important addition to the fossil record of Jamaica. It is also the youngest known fossil member of the genus. Two other fossil species, *Euphylax callinectias* Rathbun, 1919a, and *Euphylax fortis* Rathbun, 1919a, have been described from the Miocene of Costa Rica, although Rathbun (1919a, p. 167) expressed some doubt regarding the generic position of the latter species. The geographical range of fossil species was extended with the description of *Euphylax septendentatus* Beurlen, 1958, from the Miocene of Brazil. Beurlen (1958) also transferred *Podophthalmus domingensis* Rathbun, 1919b, from the Oligocene or Lower Miocene of Haiti to *Euphylax*.

2. PREPARATION OF SPECIMEN

Partial mechanical preparation of the specimen revealed much of the distal ends of the chelae and some of the carapace. The specimen areas exposed most easily were, as is usually the case, smooth surfaced. The matrix remaining was the more obdurate.

The heterogeneous nature of the matrix – small worn pebbles of igneous rock, clay pellets and sand – suggested that wet chemical methods of preparation might be successful. Attempts were made to break down the clay component by immersion in water and, subsequently, a dilute solution of the surfactant Synperonic N. While these both loosened large and small particles of the enclosing matrix, no real effect was observed on the matrix against the fossil surface. A 1% solution of acetic acid did produce a reaction with a carbonate component of the matrix, but the obvious effervescence where it came into contact

Table 1. The fossil record of decapod crustaceans in the Plio-Pleistocene Coastal Group of Jamaica

Age	Unit	Number of taxa	References
Late Quaternary	Fissure fill	1	Donovan & Dixon (1998)
Late Pleistocene	Cave deposit	1	Collins pers. comm. in Donovan & Veltkamp (1994)
Late Pleistocene	Port Morant Formation	22	Collins *et al.* (1997), Collins & Donovan (1998)
Late Pleistocene	Falmouth Formation	16*	Morris (1993)
Early Pleistocene	Old Pera beds	1	Herein
Late Pliocene	Bowden Shell bed	28	Collins & Portell (1998)

Derived, in part, from Collins & Portell (1998, table 1).
Key: *, this is an underestimate by perhaps 50% based on new collections examined by R. W. Portell (pers. comm.).

with the specimen prohibited the use of any acid preparation technique.

Preparation was completed by the use of pneumatic engraving pens (Desoutter VP2, Fiam PM1) operating at pressures of 40–60 psi (2.5–4 bar). These removed matrix quickly and could be controlled when close to the specimen surface. However, the outermost layer of the specimen was particularly weak and prone to separation from the underlying layers; in places it appeared to be cemented to the overlying matrix. Attempts to work with fine, hand-held, tungsten carbide points against the specimen surface proved impractical, since the force required to dislodge the matrix invariably caused the point to reach the fossil surface. Regrettably, it was concluded that the surface layer had to be sacrificed in order to reveal any of the hidden features. This resulted in a pock-marked appearance where the uppermost portions of the tubercular sculpture of flattened granules broke away with the outer surface.

Exposed surfaces were left uncoated with any consolidant as far as possible. However, where necessary, a dilute solution of Paraloid B72 (polyethylmethacrylate/ methylacrylate) in acetone was used. Although this was used in attempts to retain the fragile exposed outer surface of the specimen by floating the solution under the surface, the weakness of this layer and its attachment to the overlying matrix generally proved insurmountable.

3. SYSTEMATIC PALAEONTOLOGY

Section HETEROTREMATA Guinot, 1977
Superfamily PORTUNOIDEA Rafinesque, 1815
Family PORTUNIDAE Rafinesque, 1815
Subfamily PODOPHTHALMINAE Dana, 1851
Genus EUPHYLAX Stimpson, 1860

Type species

Euphylax dovii Stimpson, 1860, by monotypy.

Generic diagnosis

See Rathbun (1930, pp. 143, 147) or, less comprehensively, Glaessner (1969, R514).

Range

Oligocene(?) or Lower(?) Miocene to Recent (Glaessner, 1969, R514).

Euphylax fortispinosus sp. nov.
(Figs 1, 2)

Etymology

With reference to the strong anterolateral spines, from the Latin *fortis*, strong, and *spina*, thorn.

Material

Holotype, a partial carapace, Natural History Museum (NHM) IC.117a, b, the only specimen known. IC.117b (not illustrated) includes some fragments of legs, but has not been developed.

Locality and horizon

A locality map and measured section have appeared elsewhere, and will not be repeated herein (see Donovan *et al.*, 1994, figs 1, 2; Collins *et al.*, 1997, figs 1, 2). Old Pera beds, Manchioneal Formation, Upper Coastal Group; early Pleistocene. This specimen was found by G.A.S. in early 1998, within the top 2 m of unit 0 (Collins *et al.*, 1997, fig. 2) [NGR 601 766, Jamaican 1:50 000 topographic sheet 19, ‘Morant Bay’, metric (new) edition; about 76°19′14″W 17°52′19″N]. The Old Pera beds are a siliciclastic unit, in contrast to the Manchioneal Formation *sensu stricto*, which is a limestone deposited under forereef conditions (Robinson, 1969; Kohl, 1992; Harper *et al.*, 1995). The Old Pera beds were deposited under storm conditions, as indicated by the presence of amalgamated sandstone beds and fossils preserved in unusual orientations, such as vertical sand dollars. The associated macrofauna includes colonial scleractinians, benthic molluscs, sand dollars (uncommonly encrusted by bryozoans) (Donovan *et al.*, 1994) and large burrows, with rare vertebrates (Purdy *et al.*, 1996) and crabs.

Diagnosis

Carapace subovate with deep corneal depression, anteriorly directed outer orbital spines and four pairs

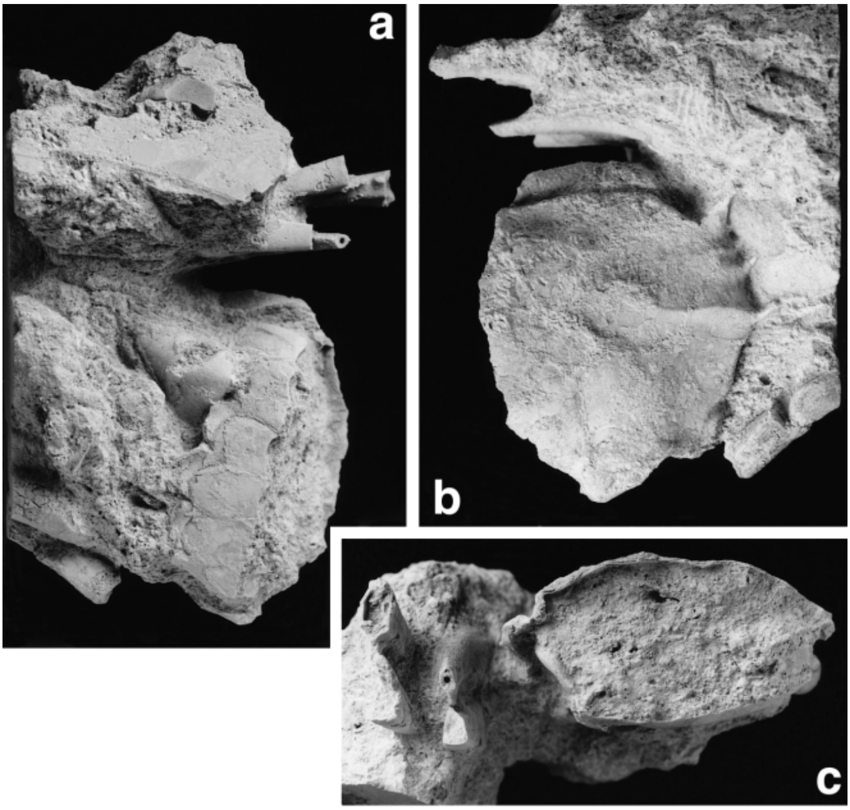

Fig. 1. *Euphylax fortispinosus* sp. nov., holotype, NHM IC.117a: (**a**) ventral view; (**b**) dorsal view; (**c**) lateral view of broken surface of specimen, showing profile of carapace (anterior to left). All ×1. Specimen coated with ammonium chloride sublimate.

Fig. 2. *Euphylax fortispinosus* sp. nov. Partial reconstruction of carapace in dorsal view based on the holotype; left side produced by reversing negative. ×1. Specimen coated with ammonium chloride sublimate.

Table 2. Fossil crab taxa of Jamaica with close affinity to Pacific taxa

Taxon	Age	Unit	Pacific geminate species
Hepatus praecox Collins *et al.*, 1997	Late Pleistocene	Port Morant Formation	*Hepatus kossmani* Neumann, 1878
Callinectes sp. cf. *C. toxodes* Ordway, 1863	Late Pleistocene	Port Morant Formation	Species ranges from Mexico to Chile
Euphylax fortispinosus sp. nov.	Early Pleistocene	Old Pera beds, Manchioneal Formation	See text
aff. *Chlorilia* sp. in Collins & Portell (1998)	Late Pliocene	Bowden shell beds, Bowden Formation	Genus inhabits waters off Pacific coast of North America from Alaska to San Diego, California, and Japan
Platylambrus sp. in Collins & Portell (1998)	Late Pliocene	Bowden shell beds, Bowden Formation	*Pl. depressiuscula* Stimpson, 1871
Portunus sp. in Collins & Portell (1998)	Late Pliocene	Bowden shell beds, Bowden Formation	*Po. panamensis* (Stimpson, 1871), *Po. asper* (A. Milne Edwards, 1861)
Micropanope sp. cf. *M. polita* Rathbun, 1893	Late Pleistocene	Falmouth Formation	Restricted to Pacific Central America

References as in Table 1.

of anterolateral spines; a weak latero-posteriorly directed, epigastric ridge and stronger medio-anteriorly directed epibranchial ridge.

Description

The carapace is transversely subovate, length about three-quarters of the width in front of the fourth anterolateral spines, gently arched in transverse section, longitudinally steeply downturned in front, gently curved behind, and with a shallow urogastic depression. The orbitofrontal margin occupies about two-thirds of the carapace width; the upper margin is sinuous medially, deeply excavated (corneal depression) laterally and terminates in a stout, obliquely directed spine; the median length is finely granulated. The fore-edge of the prominent, advanced suborbital margin is broadly rounded and deep. Short, almost straight anterolateral margins are much shorter than the posterolateral margins, which are nearly straight and converge to deep coxigeal embayments. The first anterolateral spine is minute and attached to the base of the outer orbital spine; it is followed by three stout, obliquely directed, isosceles-triangular spines increasing in length posteriorly. The basal distance between the second and third spines equals the distance between the third and fourth spines. Shortly behind the upper orbital margin a low, tumid epigastric ridge reaches back towards the median extension of the epibranchial ridge. Broad, obscure ‘ridges’ unite behind the second and third spines, and become obsolete behind the corneal depression. The more conspicuous epibranchial ridge extending from the fourth spine runs forward and medially to about one fourth distant from the margin. Behind and medial to this is an obscure ‘mesobranchial ridge’. Narrow, broadly curved hatchuring across the midline opposite the tips of the fourth lateral spines marks the attachment of the internal mandible adductor muscles. Behind the front a slight depression occurs either side of a weakly tumid mesogastric region.

Lateral parts of left sternites 4–8 are preserved; there is no evidence of a transverse ridge on the 4th sternite (as is developed on *E. fortis* and, less prominently, on *E. callianectias*).

A partly exposed inner surface of the right chela shows the tridentate cusps common to the genus. Dorsal surface and peduncular cavities are sculpted with flattened granules of several diameters, becoming smaller and more numerous laterally on the metabranchial lobes.

Discussion

The length/width (between the spine at the lateral angle and that preceding it) ratio for the new species, *E. fortispinosus*, is 62.5, which compares favourably with measurements taken from the Recent *E. dovii* (58.3) and *E. robustus* (59.3) (*vide* Rathbun, 1930, pls 65, 66), and with the fossil species *E. callinectias* (61.3) (Rathbun, 1919a, pl. 65, fig. 3). That for *E. domingensis* is 59.4, while the reconstructed figure of *E. septendentatus* (Beurlen, 1958, pl. 4, fig. 3) suggests a ratio of 58.4. *Euphylax fortis* was founded on a single specimen preserving only parts of the underside and the cheliped.

The anterolateral spines of *E. dovii* are much reduced and they are not in evidence in *E. callinectias* (Glaessner, 1969, fig. 323.3a, b). Both *E. dovii* and *E. fortispinosus* have deep corneal depressions, whereas they are very shallow in *E. robustus*, in which species only two pairs of lateral spines are present; a diminutive first spine occurs midway between a recurved outer orbital spine and the second spine. The second spine, at the lateral angle, has an epibranchial ridge extending in like manner to that of *E. fortispinosus*, but with subdivisions that are pendant, rather than isolated as in *E. fortispinosus*, and the epigastric ridge is directed anteriorly. The peduncular cavities of *E. dovii* are smooth and only the upper surface of the advanced lower margin of *E. granulatus* is reported to be granulate (Rathbun, 1930). The carapace outline of *Euphylax domingensis* has much in common with *E. fortispinosus*, particularly in having deep corneal depressions and an almost identical arrangement of the anterolateral spines, but they are equitriangular and proportionally shorter, and the first spine is more in evidence against the base of the outer orbital spine; the 'epigastric' ridge is placed broadly across the mesogastric/protogastric lobes. The nature of the lateral spines (including the outer orbital spine) readily distinguishes *E. septendentatus* from *E. fortispinosus* and, indeed, all other known members of the genus.

The specimen was found in a cliff face after the rock containing the left side of the carapace had already been eroded away. In an attempt to reconstruct, as far as is possible, the appearance of the complete carapace, Fig. 2 has been compiled as a composite using a reversed print of the right side to represent the left.

With the addition of *Euphylax*, seven Jamaican fossil crab genera or species are known which are endemic to, or have a closer affinity to, Recent Pacific coast forms, rather than those from the Caribbean or Atlantic coast (Table 2). The Isthmus of Panama has only been fully emergent since the late Pliocene (Coates & Obando, 1996), that is, about the last 3 million years, and geminate species of marine invertebrates are well known from the Caribbean Sea and Pacific Ocean on either side of this barrier (Jones, 1972), including crabs (Abele, 1972). These all suggest that a detailed comparison of the coeval, late Cenozoic decapod faunas from the Caribbean and eastern Pacific may be an instructive study with respect to their palaeobiogeographical evolution.

The only coeval fossil crabs from Jamaica are rare, mainly indeterminate fragments from the type section of the Manchioneal Formation *sensu stricto*, including an indeterminate galatheid (Morris, 1993, p. 123). A claw of *Cardisoma guanhumi* Latreille has been reported from within the outcrop area of the Manchioneal Formation, but this was collected from a late Quaternary fissure fill deposit (Donovan & Dixon, 1998).

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