

DECAPOD, STOMATOPOD AND CIRRIPEDE CRUSTACEA FROM THE PLIOCENE BOWDEN SHELL BED, ST THOMAS PARISH, JAMAICA

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Twenty eight decapods have been identified from the Pliocene Bowden shell bed, Bowden Formation of southeast Jamaica. They consist mostly of dactyli and fixed fingers, and represent the greatest known concentration of Pliocene crustaceans recorded from any one locality within the Caribbean. A stomatopod, which consists of a partial raptorial claw, and three barnacle genera, *Arcoscalpellum*, *Conopea*, and *Ceratoconcha*, are also present in this deposit. The stomatopod and *Conopea* represent the first known occurrence of these taxa in the Caribbean fossil record.

Key words — Bowden shell bed, Pliocene, Decapoda, Stomatopoda, Cirripedia.

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INTRODUCTION

This paper completes a major review of the Plio-Pleistocene decapod and cirripede crustaceans of Jamaica, begun by Morris (1993) with a survey of species from the late Pleistocene Falmouth Formation of Jamaica's central north coast, followed by a report on the crabs and barnacles from the coeval Port Morant Formation, as exposed on the southeast coast of the island (Collins *et al.*, 1997). In addition, notice is given of the first fossil stomatopod remains from the Caribbean region.

The fragmentary preservation of much of the Pliocene Bowden shell bed crab material (consisting largely of dactyli and fixed fingers), together with the proximity of these parts within closely allied genera, has greatly influenced the broad

identification adopted herein. The continuing refinement of phylogenetic lines, as presently recognised, since the Pliocene must also be taken into consideration.

Nevertheless, the number of taxa (28 in 26 genera) here recognised from the Bowden shell bed, is not only greater than that recorded from either of the other two formations mentioned above, but represents the greatest known concentration of Pliocene crustacean species recorded from any one locality within the Caribbean region. As presently ascertained, twelve of the genera are new to the fossil record of Jamaica, seven are common to the Falmouth Formation, eleven are common to the Port Morant Formation, and five are common to all three formations (see Table 1). One genus, *Chlorilia*, presently occurs on the Pacific coast of Central America, and the species here attributed to *Platylambrus* and *Portunus* are more closely related to Pacific coast forms. The only other known fossil species of *Mesorhoea* is *Mesorhoea maurayae*, described by Rathbun (1919) from the Miocene of Santo Domingo, and is, according to Rathbun, related to the form here attributed to *Mesorhoea* aff. *sexspinosa* Stimpson, 1871.

Two other genera of note among those new to the fossil record of Jamaica are *Cancer* and *Hyas*. *Cancer* species are

known from the Plio-Pleistocene of eastern North America. According to Nations (1975), *Cancer* species are sensitive to water temperature and the distribution of Recent eastern North American species extends only to the Bermudas. Similarly, Recent *Hyas* occurs only in more northerly waters. Hence the (possible) occurrence of these two genera in the Jamaican Pliocene suggests either a cooler climate or a subsequent preference of the two genera for a cooler habitat.

As in the previous works cited, the crab fauna is dominated by species of xanthids (35.7%), followed by majids (17.9%), portunids (10.7%), callianassids (7.1%), pagurids (7.1%), calappids (7.1%), parthenopids (7.1%), leucosiids (3.6%), and cancrids (3.6%). Unlike the other late Cenozoic formations of Jamaica, callianassids are quite rare in the Bowden shell bed.

The fossil arthropod specimens discussed in this paper are deposited in the Invertebrate Paleontology Division of the Florida Museum of Natural History (FLMNH, Gainesville, Florida), unless otherwise noted. All are identified by a University of Florida (UF) catalogue number. Most of the specimens discussed herein were derived from sieved bulk matrix samples collected from unit 2 of the Bowden shell bed (*sensu* Pickerill *et al.*, 1998) in May 1990 and June 1994 by a field crew from the FLMNH. Additional materials were obtained from the collections of Tulane University (TU) and the Geology Museum, University of the West Indies, Kingston, Jamaica (UWIGM). Reference is made to Pickerill *et al.* (1998) for a discussion of the sedimentology and palaeo-environment of the Bowden shell bed.

SYSTEMATIC PALAEOLOGY

- Order Decapoda Latreille, 1803
- Infraorder Anomura H. Milne Edwards, 1832
- Superfamily Thalassinoidea Latreille, 1831
- Family Callianassidae Dana, 1852 *s. lat.*
- Genus *Callianassa* Leach, 1814 *s. lat.*

'Callianassa' sp.
Pl. 1, Fig. 1

Material — Two partial fingers, UF 68120 and UF 68125.
Remarks — Collins *et al.* (1997) recognised two genera, *Neocallichirus* and *Glypturus*, from the Pleistocene Port Morant Formation, while Morris (1993) reported many specimens of *Callianassa* spp. from the Pleistocene Falmouth Formation at Rio Bueno Harbour, St Ann Parish. However, in comparison with these deposits, callianassid remains are an exceedingly rare occurrence in the Bowden shell bed.

- Genus *Ctenocheles* Kishinouye, 1926

Ctenocheles sp.

- 1966 *Platybalone* sp. — Caldwell, p. 339, fig. 1.
- 1979 *Ctenocheles* sp. — Blow in Clark & Fitch, p. 495.

Material — One finger; see Caldwell (1966, p. 340) for figure. No additional specimens of this genus were located in the collections of the FLMNH, TU or UWIGM.

Remarks — Caldwell (1966) recorded a needlefish jaw that was subsequently re-identified as the claw of a callianassid shrimp by W.C. Blow (*in* Clarke & Fitch, 1979). The specimen was collected from the Bowden series, that is, the Bowden Formation, Old Pera beds and Port Morant Formation in modern usage. Caldwell's locality suggests that the specimen was collected from either the Old Pera beds or the Bowden Formation. Because of the uncertainty of the location and horizon at which it was collected, it is doubtful that this specimen was derived from the Bowden shell bed. However, it is included here for completeness.

- Superfamily Paguroidea Latreille, 1802
- Family Diogenidae Ortmann, 1892
- Genus *Petrochirus* Stimpson, 1859

Petrochirus cf. bahamensis (Herbst, 1791)
Pl. 1, Fig. 2a, b

Material — Two partial left fixed fingers, UF 68149 and UF 68160.

Remarks — Morris (1993) recorded *Petrochirus* sp. from the east shore of Rio Bueno Harbour, St Ann parish. Collins *et al.* (1997) reported *P. bahamensis*, the largest of the Recent Caribbean hermit crabs, to be common in the Port Morant Formation at Old Pera, St Thomas parish.

- Genus *Paguristes* Dana, 1852

Paguristes sp.
Pl. 1, Fig. 3

Material — Left dactylus, UF 68215.

Remarks — This specimen is a dactylus which, while distinct, is close to *Paguristes lymani* A. Milne Edwards & Bouvier, 1893, a common extant Caribbean species which is found at 27 to 1,600 m depth. The single specimen of *Paguristes* sp. from the Bowden shell bed represents its first occurrence in the Jamaican fossil record. Elsewhere in the Caribbean region, Rathbun (1935) reported the genus from the early Miocene Chipola Formation of northern Florida.

- Infraorder Brachyura Latreille, 1803
- Superfamily Calappoidea de Haan, 1833
- Family Calappidae de Haan, 1833
- Genus *Calappa* Weber, 1795

Calappa aff. springeri Rathbun, 1931
Pl. 1, Fig. 4

Material — Fourteen right dactyli, UF 68087, UF 68095, UF 68096, UF 68097, UF 68112, UF 68122, UF 68134, UF 68161, UF 68165, UF 68172, UF 68175, UF 68183, UF 68186 and UF 68193.

Remarks — *Calappa springeri*, a common Recent Caribbean species, is also known from the Pleistocene Port Morant Formation (Collins *et al.*, 1997). Generally, the Bowden shell bed dactyli have a smoother surface than specimens from the Port Morant Formation, with a single row of fine granules on the upper margin. *Calappa* aff. *springeri* was the most common decapod taxon found in the Bowden shell bed.

Genus *Hepatus* Latreille, 1802

Hepatus sp.
Pl. 1, Fig. 5a, b

Material — Partial left propodus, UF 75751, and partial right propodus, UF 75752.

Remarks — The propodus of *Hepatus princeps* Herbst, 1794, the species presently occurring in Jamaican waters (Rathbun, 1897), differs from the Bowden shell bed specimens in that the two basal rows of granules are relatively smoother. The Port Morant Formation *Hepatus praecox* Collins *et al.*, 1997, described from a carapace, has affinities with both *H. princeps* and its Pacific analogue, *Hepatus kossmanni* Neumann, 1878.

Family Leucosiidae Samouelle, 1819
Genus *Persephona* Leach, 1817

Persephona aff. punctata punctata (Linné, 1758)
Pl. 1, Fig. 6

Material — Seven meri of chelae and pereopods, UF 68088, UF 68102, UF 68132, UF 68150, UF 68166, UF 68173 and UF 77750.

Remarks — *Persephona p. punctata* is well known from the Recent of Jamaica. Rathbun (1935) described fossils of this taxon from the Miocene and Pleistocene of the Atlantic coast, North America. Collins *et al.* (1997) reported *P. p. punctata* from the Pleistocene Port Morant Formation and Collins & Morris (1976) recorded *P. cf. p. punctata* from the Miocene of Trinidad.

Superfamily Majoidea Samouelle, 1819
Family Majidae Samouelle, 1819
Genus *Hyas* Leach, 1814

aff. **Hyas sp.**
Pl. 1, Fig. 7

Material — Right dactylus, UF 68135.

Remarks — This taxon is new to the fossil record of Jamaica. Rathbun (1935) recorded *Hyas araneus* (Linné, 1758) as occurring in the Pleistocene Leda Clay of Maine. The genus is also known from Pleistocene deposits in Scotland (A. Bell, 1896). Today, along the east coast of the United States, *Hyas* occurs from Maine to Cape Hatteras, North Carolina (Rathbun, 1925).

Genus and subgenus *Mithrax (Mithrax)* Desmarest, 1823

Mithrax (Mithrax) sp.
Pl. 1, Fig. 8a, b

Material — A partial right fixed finger, UF 68201.

Remarks — A common Recent genus throughout the Caribbean region, this taxon is represented by limb fragments in both the Falmouth and Port Morant Formations of Jamaica (Table 1). Exceptionally well-preserved carapaces of several species of this genus have been described from the Pleistocene of Barbados (Collins & Morris, 1976). The single Bowden specimen has a milled cutting edge typical of *Mithrax (M.) caribbaeus* Rathbun, 1920, and *M. (M.) spinosissimus* (Lamarck, 1818), but lacks the ridge on the inner surface that is typical of the latter.

Genus *Pitho* T. Bell, 1836

Pitho sp.
Pl. 1, Fig. 9

Material — Three right dactyli, UF 68083, UF 68121 and UF 68196; a left dactylus, UF 68169; and a partial finger, UF 68216.

Remarks — The genus was previously recorded in the fossil record of Jamaica from the Port Morant Formation (Collins *et al.*, 1997), where it is represented by a carapace of *Pitho anisodon* (von Martens, 1872). However, the present specimens appear to approximate more closely the dactyli of another extant Jamaican species, *P. aculeata* (Gibbes, 1850).

Genus *Chlorilia* Dana, 1851

aff. **Chlorilia sp.**
Pl. 1, Fig. 10

Material — A partial left dactylus, UF 68202.

Remarks — This genus presently inhabits waters off the Pacific coast of North America from Alaska to San Diego, California and Japan.

Genus *Rochinia* A. Milne Edwards, 1875

aff. *Rochinia* sp.
Pl. 1, Fig. 11

Material — Two right dactyli, UF 68094 and UF 68104.
Remarks — This taxon is new to the fossil record of Jamaica and, although not among Recent crabs recorded from the island, it is a widely distributed genus present on both the Atlantic and Pacific coasts of America. The teeth on the Bowden specimens appear more coalesced than those of Recent species.

Family Parthenopidae H. Milne Edwards, 1834
Genus *Platylambrus* Stimpson, 1871

Platylambrus sp.
Pl. 1, Fig. 12

Material — A partial right fixed finger, UF 75828.
Remarks — The Bowden shell bed material has a superficial resemblance to *P. (P.) depressiuscula* Stimpson, 1871, a Pacific coast form ranging from Manzanilla, Mexico, to Panama, but differs in a brief continuation of spinules along the basal margin and arrangement of cusps along the opposing margin.

Genus *Mesorhoea* Stimpson, 1871

Mesorhoea aff. *sexspinosa* Stimpson, 1871
Pl. 1, Fig. 13

Material — A partial merus, UF 75826.
Remarks — The present range of this species extends from southeast Cape Lookout, North Carolina, to the Virgin Islands, at depths of between 8-100 m (Williams, 1984).

Family Cancridae Linné, 1758
Genus *Cancer* Linné, 1758

aff. *Cancer* sp.
Pl. 1, Fig. 14

Material — Two partial fingers, UF 68157 and UF 68220.
Remarks — While this genus is not known to inhabit the Caribbean region south of the Bermudas, Nations (1975) recorded three fossil species from the Plio-Pleistocene of eastern North America.

Genus *Callinectes* Stimpson, 1860

Callinectes aff. *sapidus* Rathbun, 1896
Pl. 1, Fig. 15

Material — A partial left propodus, UF 68212; three right

dactyli, UF 68081, UF 68086 and UF 68188; and a left dactylus, UF 68131.

Remarks — Although this common Recent species is known from neither the Falmouth nor Port Morant formations, it occurs in the early Miocene Chipola Formation of Florida and in Pleistocene deposits of the eastern Atlantic states. However, the genus is represented in the Port Morant Formation by *Callinectes* cf. *toxodes* Ordway, 1863, a Pacific coast species, and *C. jamaicensis* Withers, 1924, in the middle Eocene Chapelton Formation of Hanover parish, Jamaica.

Genus *Ovalipes* Rathbun, 1898

aff. *Ovalipes* sp.
Pl. 2, Fig. 1

Material — Two partial fingers, UF 68133 and UF 68206.
Remarks — This widely distributed genus was not recorded from the Recent fauna of Jamaica by Rathbun (1930) and has not before been reported from the Jamaican fossil record. Although somewhat worn, the distinct convex occludent margin of the figured specimen is typical of living members of the genus.

Genus *Portunus* Weber, 1795

Portunus sp.
Pl. 2, Fig. 2

Material — Three right dactyli, UF 68092, UF 68128 and UF 68145.

Remarks — The genus is common in the Caribbean region, but not frequently reported as a fossil. The Bowden shell bed material appears to be its first known occurrence in the Jamaican fossil record. Elsewhere, it has been recorded from the Plio-Pleistocene of Barbados (Collins & Morris, 1976), and the Miocene of Florida and the Dominican Republic (Rathbun, 1919, 1935). The Bowden shell bed specimens share characters with *P. panamensis* (Stimpson, 1871) and *P. asper* (A. Milne Edwards, 1861), both of which are Recent Pacific coast species.

Superfamily Xanthoidea McLeay, 1838
Family Xanthidae McLeay, 1838
Genus *Eurypoda* A. Milne Edwards, 1880

aff. *Eurypoda* sp.
Pl. 2, Fig. 3

Material — A right dactylus, UF 68091; and a left fixed finger, UF 68210.

Remarks — The genus does not appear to have been previ-

ously reported from the Caribbean fossil record.

Genus *Eurytium* Stimpson, 1859

Eurytium aff. *limosum* (Say, 1818)
Pl. 2, Fig. 4a, b

Material — A right propodus, UF 77650; and a right fixed finger, UF 68115.

Remarks — This species is also present in the Pleistocene of Jamaica (Table 1), and was recorded by Rathbun (1935) from the early Miocene Chipola Formation in northern Florida and from the Pliocene Duplin Formation in North Carolina.

Genus *Eriphia* Latreille, 1817

Eriphia sp.
Pl. 2, Fig. 5

Material — Three right dactyli, UF 68142, UF 68144 and UF 68151; and a partial left fixed finger, UF 75827.

Remarks — The large occludent tubercle and scattering of dorsal granules strongly suggest inclusion of this specimen in *Eriphia*. This extant Jamaican genus does not appear to have been previously recorded as a fossil from the Caribbean region.

Genus *Eurypanopeus* A. Milne Edwards, 1880

Eurypanopeus sp.
Pl. 2, Fig. 6

Material — Two partial fingers, UF 68100 and UF 68140.

Remarks — The genus is represented in the Falmouth Formation of Jamaica by *Eurypanopeus abbreviatus* Stimpson, 1860 (Morris, 1993) and in the Port Morant Formation by *E. cf. depressus* (Smith, 1869) (Collins *et al.*, 1997).

Genus *Micropanope* Stimpson, 1871

Micropanope aff. *nuttingi* (Rathbun, 1898)
Pl. 2, Fig. 7

Material — A right dactylus, UF 68138; and three partial fingers, UF 68123, UF 68205 and UF 68224.

Remarks — See below.

Micropanope aff. *spinipes* A. Milne Edwards, 1880
Pl. 2, Fig. 8

Material — A right fixed finger, UF 68106.

Remarks — *Micropanope nuttingi*, recorded as *Xanthias nuttingi* by Rathbun (1897) among the Recent Jamaican crabs, has not before been recognised as a fossil from Jamaica. However, *M. spinipes* A. Milne Edwards, 1880, recorded from the Falmouth Formation (Table 1), was not identified by Rathbun (1930) from Jamaica waters. Another species, *M. polita* Rathbun, 1893, recorded by Morris (1993) from the Falmouth Formation, is now restricted to the Pacific Central American region.

Genus *Neopanope* A. Milne Edwards, 1880

Neopanope sp.
Pl. 2, Fig. 9

Material — A left fixed finger, UF 68093; and a partial finger, UF 68108.

Remarks — This genus has not been reported previously from the fossil record of the Caribbean region.

Genus *Panopeus* H. Milne Edwards, 1834

Panopeus aff. *herbstii* H. Milne Edwards, 1834
Pl. 2, Fig. 10

Material — A right partial propodus, UF 73183; three right dactyli, UF 68099, UF 68111 and UF 68155; and a partial finger, UF 68180.

Remarks — The genus is represented by *P. herbstii* in the Falmouth Formation, and by *P. herbstii* and *P. rugosus* A. Milne Edwards, 1880, in the Port Morant Formation.

Genus *Pilumnus* Leach, 1815

Pilumnus aff. *pannosus* Rathbun, 1896
Pl. 2, Fig. 11

Material — A partial left dactylus, UF 68153; and a partial finger, UF 68189.

Remarks — The upper margin of the dactylus is smooth and the three low cusps of the occludent margin closely approximate Recent forms.

Pilumnus aff. *spinossimus* Rathbun, 1898
Pl. 2, Fig. 12a, b

Material — A partial right propodus, UF 68127; five right dactyli, UF 68139, UF 68141, UF 68190, UF 68208 and UF 68225; two left dactyli, UF 68171 and UF 68174; and a partial finger, UF 68177.

Remarks — *Pilumnus sayi* Rathbun, 1897 occurs in the Port

Morant Formation (Collins *et al.*, 1997) and, together with *P. pannosus*, were recorded among the Recent Jamaican crab fauna by Rathbun (1897). The present distribution of *P. spinosissimus* ranges from the Florida Keys to Dry Tortugas (Abele & Kim, 1986).

Order Stomatopoda Latreille, 1817

Stomatopoda gen. et sp. indet.
Pl. 2, Fig. 13

Material — Distal end of dactylus of raptorial claw with three teeth, UF 68209.

Remarks — Stomatopod crustaceans are important members of tropical and subtropical sublittoral communities (Camp, 1973). However, they are very rare in the fossil record. Besides the Bowden occurrence, no other fossil stomatopods have thus far been reported from the Caribbean. Elsewhere, Rathbun (1935) listed two species, *Gonodactylus oerstedii* Hansen, 1895, from the Miocene St Mary's Formation of North Carolina and *Chloridella empusa* (Say, 1818) from the Pleistocene Talbot Formation of Maryland. Additionally, Rathbun (1926) recorded *Chloridella sonomana* from the (probable) Pliocene of California. Holthuis & Manning (1969) stated *C. sonomana* may belong in the genus *Squilla*.

Class Cirripedia Burmeister, 1834
Family Arcoscalpellidae Hoek, 1907
Genus *Arcoscalpellum* Hoek, 1907

Arcoscalpellum arawakianum Collins & Donovan, 1996
Pl. 2, Fig. 14

Material — A single carina broken apically, BMNH IC 18.

Remarks — The single carina of *A. arawakianum* has much in common with that of the Recent North Atlantic species, *A. latidorsum* (Pilsbry, 1907). *Arcoscalpellum arawakianum* is the youngest fossil member of the genus known from the Caribbean region. For further discussion of this species see Collins & Donovan (1996).

Suborder Balanomorphia Pilsbry, 1916
Family Balanidae Leach, 1817
Genus *Conopea* Say, 1822

***Conopea* sp.**
Pl. 2, Fig. 15a, b

Material — Four shells, UF 68143 (2 shells), UF 68227 and UF 68228.

Remarks — *Conopea* is a genus which lives attached to

gorgonian corals and, therefore, usually has a distinct, boat-shaped basis. Several of the Bowden specimens still have remnants of the gorgonian embedded in their bases and all retain their characteristic reddish colour with faint white stripes. None of the Bowden *Conopea* shells contained opercular plates. These are the first Caribbean fossil *Conopea* to be reported. The genus is also known from the Miocene of the southeast U.S.A. Today, only one species, *C. galeatus* (Linné, 1771), inhabits American waters.

Family Pyrgomatidae Gray, 1825
Subfamily Ceratoconchinae Newman & Ross, 1976
Genus *Ceratoconcha* Kramberger-Gorjanovič, 1889

***Ceratoconcha* sp.**
Pl. 2, Fig. 16

Material — One shell with partial basis, UF 66902.

Remarks — No opercular plates were associated with this coral-inhabiting barnacle nor were isolated opercular plates of this taxon picked from bulk samples. The single, well-preserved shell, lacking any remnant of its coral host, was found in the Bowden shell bed collection of the UWIGM. No other Pliocene occurrences of Jamaican coral-inhabiting barnacles are known. However, Pleistocene *Ceratoconcha* have been reported from the island by Morris (1993) and Collins *et al.* (1997), and are referable to *C. aff. barbadiensis* (Withers, 1926). These specimens were collected from the Falmouth Formation at Round Hill Bluff, Hanover parish and the Port Morant Formation at Old Pera, St Thomas parish, respectively. Newman & Ladd (1974) described the early Miocene coral-inhabiting barnacles, *Eoceratoconcha renzi*, *E. sp.*, and *Ceratoconcha creusioides* from the Newport Formation near Santa Cruz, St Elizabeth parish and *C. jungi* from the Montpelier Formation near Discovery Bay, Trelawny parish.

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	PLIOCENE		PLEISTOCENE	
	BSB		PMF	FF
Callianassidae				
<i>'Callianassa'</i> genus et spp. indet.	x			x
<i>Ctenocheles</i> sp.	?			
<i>Glypturus acanthochirus</i> Stimpson, 1866			x	
<i>Neocallichirus peraensis</i> Collins et al., 1997			x	
Diogenidae				
* <i>Paguristes</i> sp.	x			
<i>Petrochirus</i> sp.				x
<i>P.</i> cf. <i>bahamensis</i>	x			
<i>P. bahamensis</i> (Herbst, 1791)			x	
Porcellanidae				
<i>Petrolisthes</i> sp.				x
Albuneidae				
<i>Albunea</i> sp.				x
Calappidae				
<i>Calappa</i> cf. <i>gallus</i> (Herbst, 1803)				x
<i>C.</i> aff. <i>springeri</i>	x			
<i>C. springeri</i> Rathbun, 1931			x	
<i>Hepatus</i> sp.	x			
<i>H. praecox</i> Collins et al., 1997			x	
Leucosiidae				
<i>Persephona</i> aff. <i>punctata punctata</i> (Linné, 1758)	x			
<i>P. punctata punctata</i> (Linné, 1758)			x	
<i>Uhlias</i> cf. <i>limbatus</i> Stimpson, 1871				x
Majidae				
*aff. <i>Chlorilia</i> sp.	x			
*aff. <i>Hyas</i> sp.	x			
<i>Mithraculus</i> cf. <i>forceps</i> A. Milne Edwards, 1875				x
<i>Mithrax</i> sp.	x			
<i>M.</i> cf. <i>caribbaeus</i> Rathbun, 1920				x
<i>M. hispidus</i> (Herbst, 1790)			x	
<i>M. spinosissimus</i> (Lamarck, 1818)				x
<i>M. verrucosus</i> H. Milne Edwards, 1832			x	
<i>Pitho</i> sp.	x			
<i>P. anisodon</i> (von Martens, 1872)			x	
*aff. <i>Rochinia</i> sp.	x			
Parthenopidae				
* <i>Mesorhoea</i> aff. <i>sexspinosa</i> Stimpson, 1871	x			
* <i>Platylambrus</i> sp.	x			
Cancridae				
*aff. <i>Cancer</i> sp.	x			

	PLIOCENE		PLEISTOCENE	
	BSB		PMF	FF
Portunidae				
<i>Callinectes</i> cf. <i>sapidus</i> Rathbun, 1896	x			
<i>C.</i> cf. <i>toxodes</i> Ordway, 1863			x	
*aff. <i>Ovalipes</i> sp.	x			
* <i>Portunus</i> sp.	x			
Xanthidae				
<i>Carpilius corallinus</i> Herbst, 1783			x	
* <i>Eriphia</i> sp.	x			
<i>Eurypanopeus</i> sp.	x			
<i>E.</i> cf. <i>depressus</i> (Smith, 1869)			x	
<i>E. abbreviatus</i> (Stimpson, 1860)				x
*aff. <i>Eurypoda</i> sp.	x			
<i>Eurytium</i> aff. <i>limosum</i> (Say, 1818)	x		x	
<i>Hexapanopeus</i> cf. <i>caribbaeus</i> (Stimpson, 1871)			x	
<i>Micropanope</i> aff. <i>nuttingi</i> (Rathbun, 1898)	x			
<i>M.</i> cf. <i>polita</i> Rathbun, 1893				x
<i>M.</i> aff. <i>spinipes</i> A. Milne Edwards, 1880	x			x
* <i>Neopanope</i> sp.	x			
<i>Panopeus</i> aff. <i>Herbstii</i> H. Milne Edwards, 1834	x			
<i>P.</i> cf. <i>rugosus</i> A. Milne Edwards, 1880			x	
<i>P. herbstii</i> H. Milne Edwards, 1834			x	x
<i>Phymodius</i> cf. <i>maculatus</i> (Stimpson, 1860)				x
<i>Pilumnus</i> aff. <i>pannosus</i> Rathbun, 1896	x			
<i>P.</i> cf. <i>sayi</i> Rathbun, 1897			x	
<i>P.</i> aff. <i>spinossimus</i> Rathbun, 1898	x			
Grapsidae				
<i>Pachygrapsus</i> sp.				x
Ocypodidae				
<i>Uca</i> sp.			x	x

Table 1. Jamaican fossil decapods from the Pliocene Bowden shell bed (BSB), late Pleistocene Port Morant Formation (PMF), and late Pleistocene Falmouth Formation (FF); data were derived from the present study, Collins *et al.* (1997), and Morris (1993), respectively. *Ctenocheles* sp. from the Bowden Formation was reported by Clarke & Fitch (1979, p. 495). Occurrence of each taxon is denoted by an 'x' in the appropriate column. An asterisk (*) indicates a genus is new to the fossil record of Jamaica. '?' is an indication that this species is known from the Coastal Group of the Bowden district, although not necessarily from the Bowden shell bed.

PLATE 1

- Fig. 1. *'Callianassa'* sp., UF 68125, partial finger, inner view, x 4.5.
Fig. 2a, b. *Petrochirus* cf. *bahamensis* (Herbst, 1791), UF 68149, partial left fixed finger, a - outer view; b - inner view; both x 5.5.
Fig. 3. *Paguristes* sp., UF 68215, left dactylus, inner view, x 6.4.
Fig. 4. *Calappa* aff. *springeri* Rathbun, 1931, UF 68186, right dactylus, outer view, x 4.8.
Fig. 5a, b. *Hepatus* sp., UF 75752, right propodus with damaged upper margin, a - outer view; b - inner view; both x 3.5.
Fig. 6. *Persephona* aff. *punctata punctata* (Linné, 1758), UF 77750, merus, x 2.7.
Fig. 7. aff. *Hyas* sp., UF 68135, right dactylus, inner view, x 7.7.
Fig. 8a, b. *Mithrax* (*Mithrax*) sp., UF 68201, partial right fixed finger, a - outer view; b - inner view, x 4.1.
Fig. 9. *Pitho* sp., UF 68121, right dactylus, inner view, x 4.4.
Fig. 10. aff. *Chlorilia* sp., UF 68202, partial left dactylus, inner view, x 11.
Fig. 11. aff. *Rochinia* sp., UF 68104, right dactylus, inner view, x 4.
Fig. 12. *Platylambrus* sp., UF 75828, partial fixed finger, outer view, x 6.6.
Fig. 13. *Mesorhoea* aff. *sexspinosa* Stimpson, 1871, UF 75826, partial merus, x 8.5.
Fig. 14. aff. *Cancer* sp., UF 68157, partial finger, outer view, x 4.1.
Fig. 15. *Callinectes* aff. *sapidus* Rathbun, 1896, UF 68086, right dactylus, outer view, x 4.5.

PLATE 1

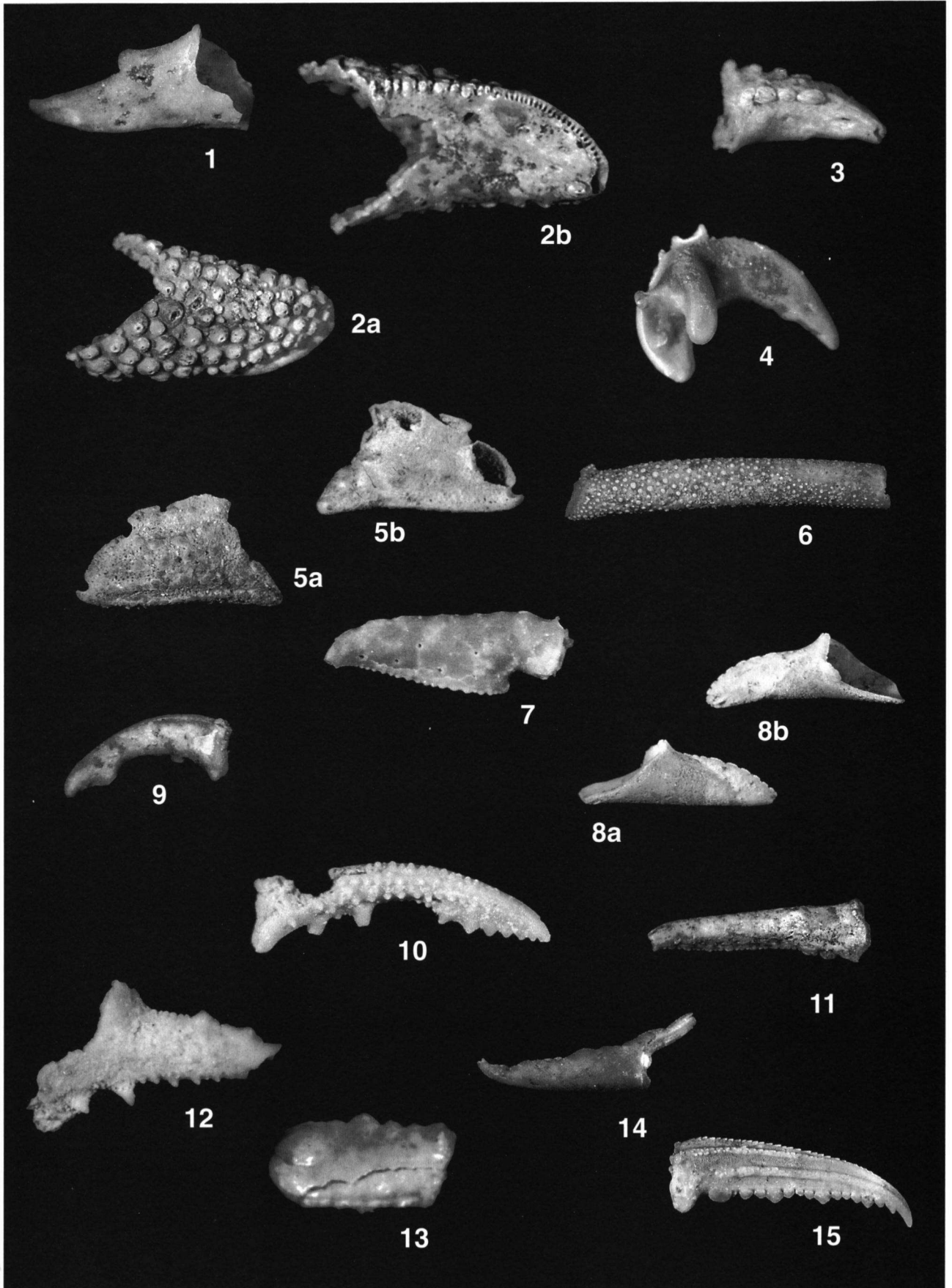


PLATE 2

- Fig. 1. *aff. Ovalipes* sp., UF 68133, partial finger, inner view, x 4.1.
- Fig. 2. *Portunus* sp., UF 68092, right dactylus, outer view, x 10.5.
- Fig. 3. *aff. Euryopoda* sp., UF 68210, left fixed finger, outer view, x 8.
- Fig. 4a, b. *Eurytium* *aff. limosum* (Say, 1818), UF 77650, right propodus, a - outer view; b - inner view; both x 3.2.
- Fig. 5. *Eriphia* sp., UF 68142, right dactylus, outer view, x 6.4.
- Fig. 6. *Eurypanopeus* sp., UF 68100, partial finger, inner view, x 5.5.
- Fig. 7. *Micropanope* *aff. nuttingi* (Rathbun, 1898), UF 68205, right dactylus, outer view, x 7.4.
- Fig. 8. *Micropanope* *aff. spinipes* A. Milne Edwards, 1880, UF 68106, right fixed finger, inner view, x 8.
- Fig. 9. *Neopanope* sp., UF 68093, left fixed finger, outer view, x 6.3.
- Fig. 10. *Panopeus* *aff. herbstii* H. Milne Edwards, 1834, UF 73183, right partial propodus, outer view, x 4.7.
- Fig. 11. *Pilumnus* *aff. pannosus* Rathbun, 1896, UF 68153, partial left dactylus, outer view, x 6.
- Fig. 12a, b. *Pilumnus* *aff. spinosissimus* Rathbun, 1898, UF 68127, right partial propodus, a - outer view; b - inner view; both x 7.3.
- Fig. 13. Stomatopoda gen. et sp. indet., UF 68209, distal end of dactylus of raptorial claw with three teeth, x 4.6.
- Fig. 14. *Arcoscalpellum arawakianum* Collins & Donovan, 1996, BMNH IC18, carina, outer view of holotype, x 4 (scanning electron micrograph after Collins & Donovan, 1996).
- Fig. 15a, b. *Conopea* sp., UF 68227, a - lateral view of shell; b - bottom of shell showing characteristic boat-shaped basis; both x 3.3.
- Fig. 16. *Ceratoconcha* sp., UF 66902, top view of shell, x 3.4.

PLATE 2

