



COLLINS and MORRIS, crabs

are concave. There is a distal spine on the upper inner carina, a smaller one on the first outer carina, and one proximal on the second. The upper margin is generally flat, although on a large natural pair of chelae, In. 59973, it is somewhat rounded. The lower outer carina extends the length of the fixed finger which is about two-thirds the length of the hand. The movable finger is bluntly carinated. The major claw seems to be generally on the right and is much the same length as the minor which is rather slimmer in transverse section. The fingers of the major claw gape rather more than the minor.

*Discussion.* *P. oblongus* closely resembles *P. gabbi* Rathbun (1919*b*), from the Lower Miocene of the Dominican Republic, particularly in the shape of the orbital margin and arrangement of the frontal spines; in the Trinidad specimens the front appears to differ from that of *P. gabbi* only in the inner pair of teeth being narrower across the base and slightly less divergent at their tips. Rathbun (1920) distinguished the two species largely on the larger carapace width of *P. oblongus* and the shape of the fifth lateral spine. So far, too little is known of the anterior part of the sternites of *P. gabbi* to allow a closer comparison of the two species.

*P. oblongus* differs from *P. haitensis* (Rathbun, 1923) (Lower Miocene of Haiti) in having a less-protruding frontal region, no nodes on the protogastric lobes, no median ridge, and the semicircular arrangement of the branchial nodes.

Among European forms *P. oblongus* closely resembles *P. viai* Secretan (1971) from the Burdigalian of Vaucluse, particularly in the dorsal arcolation of the carapace, but differs in having a shallower sinus between the median pair of frontal spines and in the shape of the orbital margin; the ridge across the anterior sternites is inclined at much the same angle to the mid-line in both species.

#### *Portunus (Portunus) gibbesii* (Stimpson)

Plate 20, figs. 9-11

1859 *Lupa gibbesii* Stimpson, p. 57 (11).

1900 *Portunus gibbesii* (Stimpson); Rathbun, p. 140.

1930 *Portunus (Portunus) gibbesii* (Stimpson); Rathbun, p. 49, pls. 16, 17.

*Range.* Pleistocene to Recent.

*Material.* Two fragments of chelae. In. 61204, In. 61205.

*Horizon and locality.* Pleistocene Coral Rock 104 m (340 ft); Highgate, Barbados.

*Remarks.* The proximal portion on the better-preserved specimen is missing so there is no evidence of a possible spine on the upper margin near the articulation with the carpus. In the nature of the other two upper marginal spines, the five granulated carinae on the outer surface, the blunt one on the inner edge of the lower surface, and the lines of granules along the inner surface, the specimen agrees closely with Rathbun's (1930) description and figures of Recent specimens.

*Present distribution.* Massachusetts to Texas and Venezuela.

#### *Portunus (Portunus) vocans* (A. Milne-Edwards)

Plate 20, fig. 12

1878 *Neptunus vocans* A. Milne-Edwards, p. 225 (6).

1930 *Portunus (Portunus) vocans* (A. Milne-Edwards); Rathbun, p. 60, pl. 25, fig. 8.

*Range.* Pleistocene to Recent.

*Material.* A right chela. In. 61206.

*Horizon and locality.* Pleistocene Coral Rock 104 m (340 ft); Highgate, Barbados.

*Remarks.* The supero-subdistal and more prominent proximal spines on the hand, together with the large strong outstanding tooth on either finger readily identifies this species and serves to distinguish it from other members of the genus within the region.

### Genus NECRONECTES A. Milne-Edwards, 1881

*Type species.* *N. vidalianus* A. Milne-Edwards by original designation.

*Range.* ?Upper Eocene to Miocene.

#### *Necronectes proavitus* (Rathbun)

Plate 19, fig. 9

1919 *Gatunia proavita* Rathbun, p. 168, pls. 54–56, p. 58, figs. 16, 17.

1966 *Necronectes proavitus* (Rathbun); Gordon, p. 184, fig. 1*a-c*.

1969 *Necronectes proavitus* (Rathbun); Glaessner, p. R512.

*Range.* Miocene.

*Material.* A fragmentary left chela. In. 59989.

*Horizon and locality.* Middle Miocene, Brasso Formation, 'Crab Claw' Beds; Manural River, near Caparo Saca Manteca, Trinidad.

*Remarks.* Although fragmentary, this left chela conforms well with Rathbun's (1919*a*) description and figures; proportional measurements of height to length agree reasonably well with those taken from the figures. The outer surface is worn and traces of the fine granulations are seen only towards the upper margin.

### Superfamily XANTHOIDEA Dana, 1851

#### Family XANTHIDAE Dana, 1851

#### Genus ACTAEA de Haan, 1833

*Type species.* *Cancer (Actaea) granulatus* Audouin, 1825 (non *C. granulatus* Linné, 1758) (*C. savignyi* H. Milne-Edwards, 1834) by subsequent designation Rathbun, 1922.

#### *Actaea rufopunctata nodosa* (Stimpson)

Plate 19, fig. 7

1860 *Actaea nodosa* Stimpson, p. 203.

1886 *Actaea rufopunctata* var. *nodosa* (Stimpson); Miers, p. 122.

1930 *Actaea rufopunctata nodosa* (Stimpson); Rathbun, p. 257, pl. 105, figs. 1, 2.

*Range.* Pleistocene to Recent.

*Material.* A carapace. In. 61359.

*Horizon and locality.* Part of the Trechmann Bequest, in a box subsequently labelled 'Barbados'; the matrix compares well with that of other Coral Rock material.

*Remarks.* The front is damaged but there is a sufficient gap between it and lobule 1F (after Dana) to distinguish the specimen from the specific analogue, *A. sulcata*

Stimpson, in which the lobule and the front are fused; similarly 4L and T are separate in *A. r. nodosa*. The nominative, Pacific, species differs in that the anterior median nodule of the mesogastric reaches as far as, or further than, the protogastric lobes; whereas in *A. r. nodosa* it extends to about the middle of that lobe. In specimen In. 61359 (Pl. 19, fig. 7) the anterior median nodule reaches to about the distal fourth of the protogastric lobe which indicates the two Recent forms were already diverging from a possible common ancestor and could therefore be considered as distinct species.

In other actaeids of the region the mesogastric and cardiac lobes are not divided by a median furrow.

#### Genus PILUMNUS Leach, 1815

*Type species.* *Cancer hirtellus* Linné, 1761 by original designation.

*Range.* Pleistocene to Recent.

#### *Pilumnus* sp.

Plate 19, fig. 10

*Material.* Chela and articulating carpus. In. 61360.

*Horizon and locality.* Pleistocene Coral Rock 91.5 m (300 ft); Clapham, Barbados.

*Remarks.* The specimen is a well-preserved left chela and freely articulating carpus, the movable finger is missing. There is a significant difference in size and structure of the major and minor chelipeds among pilumnids, with a tendency for the major cheliped to be on the right-hand side. The minor cheliped is usually the more spinose in juveniles and often so in mature females and the ornament of the Barbados specimen is approximate to several closely allied species inhabiting the Caribbean Region.

#### Family CARPILIIDAE Ortmann, 1894

#### Genus CARPIIUS Leach, 1823

*Type species.* *Cancer maculatus* Linné, 1758 by original designation.

#### *Carpilius corallinus* (Herbst)

Plate 19, fig. 3

1783 *Cancer corallinus* Herbst, p. 131; p. 5, fig. 40.

1825 *Carpilius corallinus* (Herbst); Leach in Desmarest, p. 104.

1930 *Carpilius corallinus* (Herbst); Rathbun, p. 240, pls. 97-99.

*Range.* Pliocene to Recent.

*Material.* A carapace. In. 61202.

*Horizon and locality.* Pliocene Coral Rock 30.5 m (100 ft); Gibbons, Barbados.

*Remarks.* The carapace agrees in all respects with Recent members of the species and the posterior margin to carapace width ratio of 20% suggests it to be that of a young male (Collins and Morris 1973).

#### Family PINNOTHERIDAE de Haan, 1833

#### Genus PINNIXA White, 1846

*Type species.* *Pinnotheres cylindricum* Say, 1818 by original designation.

Subgenus *PALAEOPINNIXA* Via, 1966

*Type species. Pinnixa eocenica* Rathbun 1926, by original designation.

*Range.* Eocene to ?Recent.

*Pinnixa (Palaeopinnixa) porornata* sp. nov.

Plate 19, fig. 4

*Diagnosis.* Carapace with a row of granules across hepatic and protogastric lobes, and three more on the cardiac region.

*Holotype.* A cast of a carapace. In. 61361.

*Horizon and locality.* Lower or Middle Eocene, Scotland Beds, Spa, Barbados.

*Description.* Carapace length about two-thirds of the width, the lateral margins are well rounded and the frontal and posterior margins nearly straight; it is moderately rounded longitudinally and nearly flat in transverse section. The orbits are ovate and occupy the outer thirds of the orbitofrontal margin which is rather narrow, being a little more than a third of the carapace width. The front is broken but appears to be depressed between two very small frontal lobes; the upper orbital margin is thin and sinuous and the weak outer orbital process is bluntly rounded. The anterolateral margin is much shorter than the posterolateral and the margin edges are acute; the posterolateral angle is sharply rounded into the posterior margin which is wider than the front and somewhat concave. The groove separating the hepatic from the gastric and branchial regions is broad and deep. Low circular nodes mark the epigastric lobes which form a line with two granules on each protogastric close to the gastro-hepatic furrow, these coincide with a pair of granules on the hepatic to form two transverse rows. Only the tip of the anterior mesogastric process is defined. The cervical groove bounding the small triangular hepatic lobes is traced by a line of fine granules. Two short elongated nodes separate the mesogastric from the urogastric which is represented by a single granule more or less absorbed into the cardiac region, the upper edges of which are drawn up into two low nodes bordering the epimeral adductor muscle scars. The surface is covered medially with fine granules which become coarser on the branchial region and towards the lateral margins.

*Discussion.* The only other member of *Palaeopinnixa* known from North America is *P. (P.) eocenica* Rathbun from the Eocene of Washington; it differs from *P. (P.) perornata* in having deeper gastro-hepatic grooves and the dorsal surface is devoid of granules. Absence of granules also distinguishes *P. (P.) perornata* from *P. (P.) mytilicola* Via from the Miocene of Barcelona, in which the cardiac region is trilobed. In discussing the phylogeny Via (1966) considered that *Pinnixa minuta* Rathbun formed a living representative of the subgenus and this opinion is possibly strengthened by the presence of weakly defined lateral portions of the cervical groove in *P. (P.) perornata*, but this character is shared to a greater or lesser extent by several other members of *Pinnixa*.

The trivial name, 'unusually ornamented', refers to the ornamentation of the carapace.

Family GONEPLACIDAE McLeay, 1838

Subfamily HEXAPODINAE Miers, 1886

Genus THAUMASTOPLAX Miers, 1881

*Type species.* *Thaumastoplax anomalipes* Miers, 1881, by original designation.

*Range.* Eocene to Recent.

*Thaumastoplax intermedia* sp. nov.

Plate 19, figs. 1, 2

1925b (?) *Thaumastoplax prima* Rathbun; Rathbun *in* Mansfield, p. 5.

*Range.* Middle Eocene.

*Diagnosis.* Carapace sub-oblong with front depressed; no furrows on dorsal surface.

*Holotype.* A part cast part decorticated carapace. In. 60008.

*Horizon and locality.* Middle Miocene, Brasso Formation, 'Crab Claw' Beds; 1½ km south of Brasso on road to Gauracara, Montserrat, Trinidad.

*Description.* Carapace sub-oblong in outline, about one and a half times as broad as long; longitudinally it is very convex, particularly anteriorly and nearly flat in transverse section. The orbits are ovate and occupy the outer thirds of the orbito-frontal margin which is depressed, barely visible from above and about one-third of the greatest carapace width. The front is missing. The lateral angles are sharply rounded and the sides are splayed a little outwards. The anterolateral margins are broadly rounded; the posterolateral margins are straight and diverge towards the slightly concave posterior margin which is wider than the front. The regions are poorly defined; the protogastric lobes are just sufficiently tumid to cause a median depression. Curved epimeral adductor muscle scars extend over the middle third of the carapace length; between the forwards part of the scars are two oblique mesogastric nodes and behind, on each mesobranchial lobe, is an almost obsolete node. There are two nodes of about the same size on the anterior part of the cardiac region.

Traces of outermost shell layer preserved on the dorsal surface show large crowded pits. Crowded granules occur on the cast surface; they are much coarser on the mid-branchial than other parts exposed.

The abdominal trough is very deep and narrow with the sides almost parallel and bluntly rounded apex, typical of males of the Recent species. A few pits are present on what remains of the shell surface of the sternites and a row of elongated granules lines the posterior border of the cast surface of each sternal segment.

*Remarks.* In the absence of dorsal furrows and relative positions of the epimeral adductor muscle scars to the mesogastric and mesobranchial nodes *T. intermedia* has affinities with *T. eocenica* Woods (1922) from which it differs in having straighter posterolateral margins and a depressed front. The general outline of the carapace of *T. intermedia* closely resembles that of *T. prima* Rathbun (1918) from the Oligocene of Panama, but this species also has a prominent front together with conspicuous dorsal furrows. There are no mesobranchial nodes on *T. prima*, the posterolateral margins are longer in relation to the carapace length and the distance between the forward gape of the mesogastric nodes is about a third of the carapace width compared to a fifth in *T. intermedia*.

Rathbun (1925*b*) listed, but neither described nor figured, *T. prima* from the Miocene of Trinidad; it is probable that this specimen rightly belongs to *T. intermedia*.

Compared with the Recent *T. anomalipes* (Miers, 1881), *T. intermedia* has shorter anterolateral margins and diverging not converging posterolateral margins.

The species name relates to affinities between *T. eocenica* and *T. anomalipes*.

#### CONCLUSIONS

The collection of crabs from the Caeozoic of Trinidad and Barbados in the Department of Palaeontology, British Museum (Natural History) not only allows five new species to be described but also representatives of extant species of *Mithrax* indicate the subfamily Mithracinae was firmly established by Pliocene times. *Herbstia*, a genus known by Recent species on both sides of America, is recorded for the first time as a fossil. Numerous specimens of both sexes of the Miocene species, *Portunus oblongus* Rathbun allow a more detailed description to be given and the geographical range is extended within the Central American Region. A new species each of *Thaumastoplax*, *Hepatus*, *Falconoplax*, and *Palaeopinnixa* add considerably to our knowledge of the history of these little-known genera.

Crabs are not very useful stratigraphic indicators but the Scotland Formation specimens do support Senn's (1948) contention that the Scotland Formation is of Lower or Middle Eocene age rather than Middle or Upper Eocene.

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