V.

WEST INDIAN TERTIARY DECAPOD CRUSTACEANS.

By Mary J. Rathbun.

With nine plates.

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Hitherto very little has been published on West Indian Tertiary decapod crustaceans. Two species only have been described, both belonging to the genus *Ranina* and occurring at Trinidad.

The material upon which this paper is based comprises (1) specimens obtained at Anguilla and St. Bartholomew by Dr. T. W. Vaughan; (2) a collection made about half a century ago by Mr. W. M. Gabb in Santo Domingo and now loaned by the Philadelphia Academy of Natural Sciences at the instance of Dr. H. A. Pilsbry; (3) a collection made in the spring of 1916 by Dr. Carlotta J. Maury and party in Santo Domingo and transferred to the United States National Museum; and (4) the type specimen of *Ranina porifera* Woodward, probably from the upper Eocene, although described from the Oligocene of Trinidad, which forms part of the United States National Museum collection.

The exact location of the Gabb specimens is not known. They are undoubtedly from some point or points in the lower half of the valley of the Yaqui del Norte River, which is near the middle of the northern part of Haiti, that is, in Santo Domingo. They were supposed to have come from the Oligocene series, but are now thought to be lower Miocene.

Dr. Maury's expedition attempted to cover the same ground as that visited by Gabb. Crustaceans were found in two spots and of these only one species was taken also by Gabb. Aside from *Petrochirus inequalis* from the Amina River, the specimens came from "Bluff No. 3," which is near Cercado, on the Mao River, one of the southern tributaries of the Yaqui River.

The bluff, according to Dr. Maury, is several hundred feet high, but the specimens were all obtained fairly near the base, not more than 30 to 50 feet above the river. The horizon is thought by Dr. Vaughan to be lower Miocene, but may be upper Oligocene. The specimens were almost entirely fingers or other small fragments to many of which it is inadvisable to assign even a generic name.

No species is common to the Vaughan and Santo Domingo collections, and the only genus represented in both is *Callianassa*. On the other hand, *Callinectes declivis* has been found in Costa Rica as well as Santo Domingo and is described in my bulletin on Panama fossils.[1]

[1]Bull. U. S. Nat. Mus. No. 103, p. 162, pl. 66, figs. 1–3, 1918.

Two of the Santo Domingan species are thought to be the same as Recent species, viz, *Calappa flammea* and *Cycloes bairdii*, the first also from the Pleistocene of Panama, as noted in the above-mentioned bulletin.

LIST OF WEST INDIAN TERTIARY DECAPODA.

Family Cragonidæ, gen. and sp. indet., Santo Domingo, lower Miocene (Maury).
Family Eryonidæ, gen. and sp. indet., Santo Domingo, lower Miocene (Maury).
Callianassa anguillensis, n. sp., Anguilla, Oligocene (Vaughan).
latidigita, n. sp., Santo Domingo, lower Miocene (Maury).
pellucida, n. sp., Anguilla, Oligocene (Vaughan).
miocenica, n. sp., Santo Domingo, probably lower Miocene (Gabb).
Family Paguridæ, gen. and sp. indet., Santo Domingo, lower Miocene (Maury).
Petrochirus inequalis, n. sp., Santo Domingo, lower Miocene (Maury).
Ranina porifera Woodward, Trinidad, probably upper Eocene.
cuspidata Guppy, Trinidad, "lower Miocene."
Lyreidus fastigatus, n. sp., Anguilla, Oligocene (Vaughan).
Calappa flammea (Herbst), Santo Domingo, lower Miocene (Maury).
Calappella (?) sp., Santo Domingo, lower Miocene (Maury).
Cycloes bairdii Stimpson, Santo Domingo, lower Miocene (Maury).
Persephona prepunctata, n. sp., Santo Domingo, lower Miocene (Maury).
Scylla costata, n. sp., Santo Domingo, probably lower Miocene (Gabb).
Portunus gabbi, n. sp., Santo Domingo, lower Miocene (Gabb and Maury).
Portunus tenuis, n. sp., Santo Domingo, lower Miocene (Maury).
Portunus, sp. indet., Santo Domingo, lower Miocene (Maury).
Callinectes declivis Rathbun, Santo Domingo, lower Miocene (Maury).
Callinectes, sp. indet., Santo Domingo, lower Miocene (Maury).
Podophthalmus domingensis, n. sp., Santo Domingo, probably lower Miocene (Gabb).
Zanthopsis bartolomæensis, n. sp., St. Bartholomew, Eocene (Vaughan).
Pilumnus subequus, n. sp., Santo Domingo, lower Miocene (Maury).
Archæopilumnus cælatus, gen. and sp. new, Santo Domingo, probably lower Miocene (Gabb).
Panopeus, sp. indet., Santo Domingo, lower Miocene (Maury).
Family Xanthidæ, gen. and sp. indet., Santo Domingo, lower Miocene (Maury).
Sandomingia yaquiensis, gen. and sp. new, Santo Domingo, probably lower Miocene (Gabb).
Parthenope (Platylambrus) obscura, n. sp., Santo Domingo, lower Miocene (Maury).
Parthenope, sp. indet., Santo Domingo, lower Miocene (Maury).
Mesorhœa mauryæ, n. sp., Santo Domingo, lower Miocene (Maury).

NOTES ON THE GENERA REPRESENTED.

The genus *Callianassa*[1] ranges from the Jurassic era to the present day and contains very numerous species, fossil[2] and Recent, distributed in both hemispheres.

Petrochirus[3] occurs in the waters on both sides of tropical America, and in the upper Tertiary of Panama.

Ranina[4] is known from more than a dozen species distributed from the Cretaceous to Recent, the fossil forms[5] ranging from central Europe to Japan, and occurring isolated in Trinidad. Only one species is now living and that is confined to the Indo-Pacific region.

Lyreidus[6] has been found in the Tertiary of Piedmont, Italy. Of its Recent species, one (*L. bairdii*)[7] inhabits deep water off the Atlantic and Gulf coasts of North America, while three others (*L. tridentatus*,[8] *L. elongatus*,[9] and *L. channeri*[10]) represent the Indo-Pacific region, the latter inhabiting the Indian Ocean at a depth of 200 to 400 fathoms.

Calappa[11] has a range from Eocene to Recent (Zittel).

Calappella[12] Rathbun is known from the Oligocene of Panama.

Cycloes[13] up to now known only as Recent on both sides of the American continent, the Bermudas, and the Indo-Pacific.

Persephona[14] hitherto recorded from the post-Tertiary of Celebes[15] (as *Myra*) and widely distributed in the warmer waters of the globe.

Scylla,[16] a genus of swimming crabs, is known at the present time from one living species only, which is widely distributed throughout the Indo-Pacific region. This species has also been found fossil on the coasts of Asia between the Red Sea and Japan, and in the Philippines; also in the island of Malta, at which place it is reported from the Oligocene or older Miocene. A second species, *S. michelini*,[17] occurs in the Miocene of Anjou.

Portunus Weber[18] (= *Neptunus* de Haan[19]), a comprehensive genus, makes its appearance in the Eocene and is represented in the recent fauna also by numerous species in all temperate and tropical seas.

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[1] Leach, Edin. Encyc., vol. 7, p. 400, 1814.
[2] See Böhm, Monatsber. deutsch. geol. Gesell., vol. 63, pp. 42–46, 1911.
[3] Stimpson, Proc. Acad. Nat. Sci. Philadelphia, vol. 10, p. 233 [71], 1858.
[4] Lamarck, Syst. Anim. sans Vert., p. 156, 1801.
[5] See Woodward, Quart. Jour. Geol. Soc. London, vol. 22, p. 591, 1866.
[6] De Haan, Fauna Japon., Crust., p. 138, 1841.
[7] Smith, Proc. U. S. Nat. Mus., vol. 3, p. 420, 1881.
[8] De Haan, Fauna Japon., Crust., p. 140, plate 35, fig. 6, 1841.
[9] Miers, Proc. Zool. Soc. London, p. 46, 1879.
[10] Wood-Mason, Proc. Asiat. Soc. Bengal, Aug. 1885 (issued Nov. 2, 1885), p. 104.
[11] Weber, Nomenclator entomologicus, p. 92, 1795.
[12] Bull. U. S. Nat. Mus. No. 103, p. 157, 1918.
[13] De Haan, Fauna Japon., Crust., pp. 67 and 68, 1837.
[14] Leach, Zool. Misc., vol. 3, pp. 18 and 22, 1817.
[15] De Man, Samml. Geol. Reichs-Mus. Leiden, ser. 1, vol. 7, p. 276, 1904.
[16] De Haan, Fauna Japon., Crust., pp. 3 and 11, 1833.
[17] A. Milne-Edwards, Ann. Sci. Nat., ser. 4, vol. 14, p. 136, plate 3, figs. 3, 3*a*, 1861.
[18] Nomenclator entomologicus, p. 93, 1795.
[19] Fauna Japon., Crust., pp. 3 and 7, 1833.

Callinectes,[1] the genus of our common edible blue crab, is abundant in America and West Africa, rarer in the Indo-Pacific, and has been found fossil in the Virginia Miocene.

Recent *Podophthalmus*[2] inhabit the Indo-Pacific region and one of the two living species occurs also in the post-Tertiary of Celebes and Java. Other fossil species placed in this genus have been later removed to different genera.

Zanthopsis[3] is wholly a fossil genus and contains various species, beginning in the Cretaceous and distributed in Europe and Brazil.

Pilumnus[4] is a Recent genus containing about 150 species and flourishes in nearly all temperate and tropical waters. It has not before been reported as fossil.

The new genus *Archæopilumnus* is a near relative of *Pilumnus*.

Panopeus[5] is said to occur from the Cretaceous to the present day. It is the principal genus of the mud crabs of our coasts, and occurs rarely in the eastern Atlantic.

The genus *Sandomingia* is erected for a form allied to the fiddler crabs (*Uca* = *Gelasimus*) which to-day have an almost world-wide distribution, especially in warmer regions, and are also found fossil in southern Asia.

Parthenope[6] (= *Lambrus*[7]) is a genus widely distributed in the sea, and dates from the Eocene.

Mesorhœa[8] is rare in middle America and has not before been found fossil.

NOTES ON THOSE FAMILIES REPRESENTED BY MATERIAL FOR WHICH IT IS IMPOSSIBLE TO DESIGNATE A GENUS.

The Cragonidæ originate in the Jurassic and are very abundant to-day. The telson described below is characteristic of the family, but of no one genus known.

The Eryonidæ are among the oldest decapods, going back to the Triassic. The West Indian specimen has the curious curved and bent form of the ischium of the large cheliped in that family.

RELATIONS OF THE WEST INDIAN FAUNA.

The greater number of the genera and families represented in the West Indian Tertiary fauna have to-day a wide distribution, as also have the genera most closely akin to the new or purely fossil genera, as *Calappella*, *Archæopilumnus*, *Sandomingia*, and *Zanthopsis*. A few

[1] Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, p. 220, 1860.
[2] Lamarck, Syst. Anim. sans Vert., p. 152, 1801.
[3] M'Coy, Ann. Mag. Nat. Hist., ser. 2, vol. 4, p. 162, 1849.
[4] Leach, Trans. Linn. Soc. London, vol. 11, pp. 309 and 321, 1815.
[5] Milne-Edwards, Hist. Nat. Crust., vol. 1, p. 403, 1834.
[6] Weber, Nomenclator entomologicus, p. 92, 1795.
[7] Leach, Trans. Linn. Soc. London, vol. 11, pp. 308 and 310, 1815.
[8] Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 135, 1871.

other genera are distinctively American, viz, *Petrochirus*, *Panopeus* (rarely eastern Atlantic), and *Mesorhœa*. Otherwise the West Indian fossil decapods have a strong affinity with the present Indo-Pacific fauna, as evidenced by *Ranina*, *Scylla* (both Recent Indo-Pacific genera but fossil in Europe), *Podophthalmus* (wholly Indo-Pacific), and *Lyreidus* (typically and chiefly Indo-Pacific, partly western Atlantic, and fossil in Europe). Moreover, *Portunus gabbi*, described below, is related to recent Indo-Pacific species more than to those now living in the West Indies.

DESCRIPTION OF THE MATERIAL.

Order DECAPODA.

Suborder NATANTIA.

Tribe CARIDES.

Superfamily CRAGONOIDA.

Family CRAGONIDÆ.

Genus and species indeterminable.

(Plate 9, Figure 3.)

Material.—The telson of a single specimen, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of this specimen:

Telson high, narrow, horizontal; tapering for its proximal half, then the sides parallel, tip broken off. On either side a deep groove running the whole length; above, three ridges separated for the basal third by two deep grooves; not far from the base a fine groove begins on the median ridge and is continued nearly to the tip; it divides this ridge in two, each half further on uniting with the submedian ridge of its side; on the outer side of each submedian ridge near its base there is a short ridge, partly visible in dorsal view. Below, the telson is broadly and deeply concave, the concavity narrowing along the middle. All the ridges are smoothly rounded.

Relationship.—This specimen is not referable to any known genus, as, while the general appearance is that of a cragonid, the grooves of the telson are much deeper than in any of the living forms.

Suborder REPTANTIA.

Tribe PALINURA.

Superfamily ERYONIDEA.

Family ERYONIDÆ.

Genus and species indeterminable.

(Plate 9, Figure 4.)

Material.—A fragment, representing seemingly the greater part of the ischium of the right cheliped of the first pair, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Description.—This piece has the typical Eryonid form of the ischium of the first cheliped, that is, it is much flattened, distally widened, and proximally curved. While the segment is commonly unarmed, the fossil joint has a row of irregular and immovable spines along its inner margin; it has also numerous scattered punctæ arranged partially in lines.

Tribe ANOMURA.

Superfamily THALASSINIDEA.

Family CALLIANASSIDÆ.

Genus CALLIANASSA Leach, 1814.

Callianassa anguillensis, new species.

(Plate 1, Figures 1 to 7.)

Type locality.—Anguilla: Crocus Bay, southwestern shore; from lowest 10 to 15 feet of fossiliferous marls; Anguilla formation; Oligocene series; T. W. Vaughan, collector; March 7, 1914; 6965; L. I. 100 *a* (1914).

Holotype.—One right manus and base of immovable finger. Cat. No. 166941, U. S. N. M.

Additional material.—One right manus (paratype *a*) and a separate piece of a finger (paratype *b*) from southwestern side of Crocus Bay, Anguilla; 30 to 50 feet above sea-level; Anguilla formation; T. W. Vaughan, collector; March 4, 1914; 6966; L. I. 100 *b* (1914). Cat. No. 166942, U. S. N. M.

A right (paratype *c*) and a left manus (paratype *d*) and a piece of a finger (paratype *e*), 3 specimens in all, from southwestern side of Crocus Bay, Anguilla; Anguilla formation; T. W. Vaughan, collector, March 1914; 6894; L. I. 100 (1914). Cat. No. 166943, U. S. N. M.

The following is a description of the holotype:

The specimen is embedded in the rock so that the lower half of the outer surface is exposed and a portion of the upper margin. Length through middle of palm, 18.6 mm., width at posterior third, 16 mm. Lower margin a thin, raised rim set off by a groove. Inside and a little below the rim may be seen a row of rather large sockets opening distally. The margin is sinuous, deepest near the proximal third, whence it rounds convexly upwards toward the wrist and forms a gently sinuous curve to the base of the fixed finger. The surface of the palm is partially covered with blister granules, which are large just behind the finger and get smaller, lower, and fewer toward the proximal end; they are separated by a narrow, smooth area from a few granules on the distal margin along the cavity separating the fingers. Among the granules there are a few punctæ or sockets of which 8 widely spaced ones form a row above the lower margin. The marginal rim soon fades out on the finger; the upper border of the finger is edged with flattened granules. The surface is chalky white. The white layer is broken off of the upper marginal portion of the palm; the surface thus exposed is blunt and transversely rugose, and on the inner side just below the margin and 3.7 mm. from the distal end there is a curved tubercle, pointing forward; also in the same line a spine at the distal extremity.

The following is a description of the paratypes:

Paratype *a*, right manus, No. 6966. This is free from the matrix and is much worn and incomplete at the ends, width at posterior third, 17.4 mm. It agrees with the holotype as far as the characters are preserved. The shape is similar, also the thin lower edge with a row of sockets just inside, the granulation of the lower part of the outer surface, and the single tubercle just below and within the upper margin, and, in this instance, 5 mm. behind the distal end.

Paratype *b*, finger, No. 6966. Lacks the tip and proximal end and is embedded in rock with its concave surface uppermost. Chalky white. Cross-section triangulate.

Paratypes *c* and *d*, right and left manus, No. 6894. These specimens are too bruised to refer definitely to any species. They have the general shape of the holotype of *C. anguillensis*. The left manus has the thin lower and the thick rounded upper margin, the latter with the submarginal tubercle distal to the middle, but not so near the forward end as in the holotype; it lacks details of granulation, sockets, etc. The right manus is even less adequately preserved.

Paratype *e*, finger, No. 6894. The distal portion of a finger embedded in rock, with convex surface partly exposed, should probably be referred here.

Callianassa latidigita, new species.

(Plate 9, Figures 10 and 11.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Material.—A movable and an immovable finger of the left chela; the latter is the holotype. Cat. No. 324470, U. S. N. M.

This species has granulation on the palm at the base of the immovable finger similar to that in *C. anguillensis* (compare plate 1, fig. 1, with plate 9, fig. 11); the finger itself is, however, broader at base and is subtriangular, while the finger of *anguillensis* tapers very gradually at base. The inferior, marginal rim is continued further toward the tip in the Cercado specimen, while the upper edge is furnished near the base with two shallow lobes which are lacking in *anguillensis*. The dactylus has the same general shape in the two forms, but both specimens are too incomplete for close comparison.

Callianassa pellucida, new species.

(Plate 1, Figures 8 to 13.)

Type locality.—Anguilla: Crocus Bay, from bluff on southwestern side; uppermost horizon, 125 feet above sea-level; Anguilla formation; Oligocene series; T. W. Vaughan, collector; March 4, 1914; 6967; L. I. 100 *c* (1914). One left movable finger (holotype); a portion of each of two right palms of very different sizes (paratypes).

Holotype and paratypes.—Cat. No. 166944, U. S. N. M.

The following is a description of the holotype:

The shape of the entire finger is shown, but the outer layer is almost all lacking. Upper margin arched, tip acute and strongly bent down; lower margin straight except near the tip and at the proximal end, where it is hol-

lowed out in a broad, shallow sinus. The general shape is subcylindrical, distally tapering, but the lower edge of the outer surface is acute. There are a few scattered granules or small tubercles, but it is impossible to tell how much these affected the outer shell: on the outer surface above the lower edge there is a row of 4 distant granules; 4 near the proximal end of the upper surface, and 1 near the distal end; 1 on the inner surface behind the middle.

Length, 20.4 mm.; greatest width, 5.3 mm.; thickness, 4.1 mm.

The two palms (paratypes) are too incomplete to show their proportions. The lower edge is thin, translucent (to which the specific name alludes), in the larger specimen (paratype *a*) slightly sinuous, that is, rounded up at the proximal end and bending down toward the fingers; below the true edge of the palm project the bases of sockets ranged in a row on the inner surface; there are about 17 of these sockets in the larger specimen. The cross-section at the base of the finger has the shape of a diamond very elongate below the angles (plate 1, fig. 10).

Callianassa miocenica, new species.

(Plate 2, Figures 1 to 6.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector.

Holotype.—Left manus of large cheliped. Cat. No. 2264, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of manus measured from sinus between fingers, 21.2; width of manus near proximal end, 17.4; width of manus near distal end, 15.2; greatest thickness of manus, 7 mm.

The following is a description of the left manus of this species:

The upper margin is straight and at right angles to the proximal end, while the lower margin is slightly convex and oblique, being inclined upward toward the distal end and inward toward the proximal end. Outer surface very convex from top to bottom, but from end to end flat in the middle and bent inward at the ends. On the outer surface are 3 large pits far apart in a line below the middle; the pits increase in size distally, the largest one being near the articulation of the dactylus; one pit higher up and midway of the length of the segment. Upper margin subacute in its proximal two-thirds; lower margin broken away. Inner surface uneven, concave in the lower distal portion; surface covered with small pits, visible without a lens, scanty near the distal end. Here there is a transverse curved line (concave forward) of 8 granules, just below the middle; the margin overlapping the dactylus is bordered with 15 tuberculiform teeth, the lowermost of which is the largest and much swollen and lies below the dactylus. Ten similar small teeth are visible on the distal end of the outer surface. Near the upper edge are 2 rows of large pits; one row consists of 5 pits and is wholly on the inner surface, bending downward distally; the other row shows 3 pits in a straight line which is slightly oblique.

Relationships.—From *C. anguillensis* this species differs in the smooth (non-granulate) surface of the manus; from *C. pellucida* in the straighter (viewed from below only) lower edge of the manus.

Superfamily PAGURIDEA.

Family PAGURIDÆ.

Genus and species indeterminable.

(Plate 9, Figures 6 and 7.)

Material.—Dactylus of left cheliped, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Description.—The upper surface of the dactylus is rounded from side to side, while the lower surface is narrower and flat and the inner surface oblique and sinuous (from end to end), the two surfaces separated by a line of tubercles. Upper surface covered with unequal granules, except near the prehensile edge; thick outer edge also granulate; a few granules on flat surface; oblique surface smooth. Eight prehensile teeth with brown tips; a shallow sinus near proximal end of margin. Tip of finger broken off, but there is no evidence that the finger is excavated at the tip.

While this is a left dactylus, it is not clear whether it belongs to a major or a minor cheliped.

Genus PETROCHIRUS Stimpson, 1858.

Petrochirus inequalis, new species.

(Plate 9, Figures 13 to 15.)

Type locality.—The Amina River, Yaqui Valley, Santo Domingo; lower Miocene; C. J. Maury, collector; May 22, 1916.

Material.—A pair of chelæ partially embedded. Cat. No. 324467, U. S. N. M.

Description.—The proximal end of both palms is lacking. The chelæ are very unequal, a similar cross-section of the palm of each showing that the width of the palm is two-thirds as great in the smaller as in the larger chela, while the inequality in the thickness of the two may be even more. Fingers of large chela broad at base, tapering gradually toward the tips, excepting that the dactylus has on its outer margin a sinus distad of the middle; measured on the prehensile edge, the dactylus is over twice as long as basal width, while the immovable finger is less than twice as long as basal width. The tip of the dactylus folds under the immovable finger and is apparently not so long. Fingers blunt-pointed. Most of the tubercles of the fingers are broken off, leaving the tessellated background formed by their crowded, many-sided bases. The tubercles which remain, especially those on the underside of the palm, trend slightly distad, each surrounded anteriorly by a few small tubercles, and the larger ones separated from one another by tubercles of medium size. Tubercles conical, tip subacute, defined by a line from the basal portion and easily broken off.

The fingers of the small chela as they stand scarcely reach beyond the proximal third of the large dactylus, but the chelæ may not be in their true relative position. The tubercles are similar to, but lower than, those of the larger chela.

Relationships.—This species has a smaller left chela than any *Petrochirus* yet described. The fingers of the right chela are exceptionally

long. In its ornamentation it is nearest *P. californiensis* Bouvier[1] (Lower California to Ecuador), but in that species the tubercles have broadly rounded knobs at the summit, instead of pointed tips as in *P. inequalis*.

Tribe BRACHYURA.

Subtribe OXYSTOMATA.

Family RANINIDÆ.

Genus RANINA Lamarck, 1801.

Ranina porifera Woodward.

Ranina porifera Woodward, in Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 572, plate 26, fig. 18, 1866; Quart. Jour. Geol. Soc. London, vol. 22, p. 591, 1866.

Type locality.—Trinidad; San Fernando beds; geologic age not positively known, probably upper Eocene.

Holotype.—Carapace without appendages. Cat. No. 115405, U. S. N. M.

Ranina cuspidata Guppy.

Ranina cuspidata Guppy, Bull. Agri. Dept. Trinidad, p. 5, plate, fig. 1, 1909; Agricultural Society of Trinidad and Tobago, Paper No. 440, p. 14, 1911.

Type locality.—Trinidad; Machipur, near Montserrat, in the Tamana district; "lower Miocene".

Genus LYREIDUS de Haan, 1841.

Lyreidus fastigatus, new species.

(Plate 3, Figure 1.)

Type locality.—Anguilla: Crocus Bay, southwestern side; 30 to 50 feet above sea-level; Anguilla formation; Oligocene series; T. W. Vaughan, collector; March 4, 1914; 6966; L. I. 100 *b* (1914).

Holotype.—Carpus joint of left cheliped. Cat. No. 166940, U. S. N. M.

The following is a description of this species:

The carpus is suboblong, about 11.6 mm. long by 5.6 mm. wide. The surface is crossed transversely by fine rugæ. A blunt ridge runs longitudinally through the middle, following the axis of the segment, that is, slightly curved, the concavity of the curve facing the left or outer side; this ridge is interrupted at its distal end by a tubercle. On the inner margin at about its middle there is a slender, curved spine standing well out from the segment; further back at about the posterior fourth there is a smaller spine, broken off at its base. Near the posterior end of the left side of the dorsal surface there is a tubercle, or, it may be, a spine, the top being broken off. It is difficult to say anything further of the details, as the margin is considerably obscured; the segment appears to be strongly produced at its inner distal angle, and the adjacent inner margin shows a small tooth.

Other species of the genus.—Crema[2] has described a *Lyreidus*, *L. paronæ*, from the Tertiary of Piedmont. He had, however, no part of the chelipeds.

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[1] Bull. Mus. Hist. Nat., Paris, p. 6, 1895.

[2] Atti R. Accad. Sci. Torino, vol. 30, p. 671, plate, fig. 11 (carapace), 1895.

Of recent species of *Lyreidus*, one, *L. bairdii* Smith[1] has been found in deep water off the Atlantic and Gulf coasts of the United States. Its carpus is less elongate and lacks the longitudinal ridge present in our fossil form; the principal spine of the inner margin is also further forward.

Family CALAPPIDÆ.

Genus CALAPPA Weber, 1795.

Calappa flammea (Herbst).

Cancer flammeus Herbst, Natur. Krabben u. Krebse, vol. 2, plate 40, fig. 2, 1794; vol. 3, pt. 3, p. 19, 1803.

Material.—Three dactyls of right or major chelæ; also a specimen showing the proximal half of both fingers of the right chela and their attachment to each other. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Range.—Recent specimens range from North Carolina, or occasionally farther north, to Colombia and Venezuela; also at Bermudas and Cape of Good Hope. Fossil fingers have been taken in the Pleistocene of Panama.

Genus CALAPPELLA Rathbun, 1918.

Calappella (?), species.

(Plate 9, Figure 12.)

Material.—A piece of the right manus and 4 loose spines, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of this species:

The specimen figured is a fragment showing a portion of the outer and of the under surface broken from the middle of the right manus of a species allied to *Calappa*. The specimen is rather closely granulated except above, and bears two tubercles, the larger and more distad conical, the smaller one more obtuse at end. Four single, elongate-conical, slightly curved spines, from 3 to 4.5 mm. long, are thought to belong to the same species; two of the spines belong at an articulation, probably at the lower distal angle of the merus of the chelipeds (right and left); another spine appears to have come from the proximal end of the manus.

Relationship.—The genus *Calappella* was erected for a species from the Oligocene of Panama. The type specimen shows only the carapace, which is armed with elongate, curved spines. On account of the spines the Santo Domingan fragments are referred tentatively to the same genus.

Genus CYCLOES de Haan, 1837.

Cycloes bairdii Stimpson.

(Plate 9, Figure 8.)

Cyclois bairdii Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, p. 237, 1860.

Material.—The lower distal portion of the outer surface of the left or secondary manus, with propodal finger. So far as can be judged

[1] Proc. U. S. Nat. Mus., vol. 3, p. 420, 1880.

from this small fragment, it is the same as Recent specimens. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Range.—Recent specimens range from Bahamas and west Florida to the West Indies; also Cape St. Lucas, Lower California, to Panama.

Family LEUCOSIIDÆ.

Genus PERSEPHONA Leach, 1817.

Persephona prepunctata, new species.

(Plate 9, Figure 5.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Material.—About 30 arm-joints, mostly incomplete. One of the best is made the holotype (Cat. No. 324425, U. S. N. M.).

Relationships.—In shape these specimens approach the corresponding segments of *P. punctata* (Linnæus)[1] but the granules are much more numerous and crowded than in *punctata*, resembling more those of *P. townsendi* (Rathbun),[2] from the west coast of tropical America.

Subtribe BRACHYGNATHA.

Superfamily BRACHYRHYNCHA.

Family PORTUNIDÆ.

Genus SCYLLA de Haan, 1833.

Scylla costata, new species.

(Plates 4 and 5; Plate 6, Figures 3 to 5.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector.

Holotype.—Male. Cat. No. 2267, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of carapace (approx.) 82 mm.; width of carapace 128 mm.; length of propodus of larger cheliped, above, 42 mm.; below (approx.) 111 mm.; height of same 41.3 mm.

Description.—Regions of carapace separated by very shallow depressions; no evidence of transverse, granulate ridges; the outer layer of shell is almost entirely lacking. The margin of the front is embedded in the matrix. Inner edge of orbit raised, marginate; outer tooth large, its outer margin oblique but almost longitudinal. The antero-lateral teeth are probably 9 and are alternately large and small, at least the sixth and the eighth are small, the second and the fourth are not visible. The teeth are curved forward at the end; the third, fifth, seventh, and ninth teeth dim nish in basal width in the order named.

Chelipeds very strong, unequal. Three spines are visible on the inner or anterior margin of the merus beyond the edge of the carapace; the most distal one is strong, conical, sharp; the most proximal one is smaller and more

[1] Syst. Nat., ed. 10, vol. 1, p. 630, 1758 (part).

[2] *Myra townsendi* Rathbun, Proc. U. S. Nat. Mus., vol. 16, p. 255, 1893.

slender; no spine visible on outer or posterior margin, but there is a transverse depression, which may indicate a tooth further down, in the matrix. The carpus is short and squarish; spine not visible. The propodus has a very convex lower margin; the manus is costate, having 3 blunt costæ on the outer surface; the middle one is the most prominent, straight, and directed toward the middle of the interdigital sinus, but stops short of it; the upper costa begins at the tooth at the articulation with the carpus, is slightly concave upward, and ends in a distally projecting lobe just above a large protuberance at the lateral articulation with the dactylus; the lower costa begins proximally near the middle costa, from which it gradually diverges and fades out near the middle of the immovable finger. A spine on inner surface near distal end, at least in major chela. On either side of the manus at its articulation with the dactylus there is a large, smooth, rounded protuberance, which is bounded proximally by a deep, narrow furrow; below this protuberance and distal to it there is, on the outer surface at least, a thick, subacute lobe, overlapping the dactylus. The prehensile teeth are very unequal, smoothly rounded, dark-colored; in the larger chela the basal tooth of the dactylus is very large and directed obliquely backward, and the fingers gape moderately.

Only the basal half of the first 3 ambulatory legs is present. The sternum and abdomen are visible, the latter being oblong-triangular and unusually wide for a male; the third, fourth, and fifth segments are fused; the sixth has rapidly converging sides; the seventh is wider than long.

Paratype.—Portion of a right cheliped, comprising the carpus, manus, and a small basal piece of each finger. Cat. No. 2258, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of manus above, excluding spine, 33 mm., length at middle of outer surface 44 mm., height of manus to base of superior spine 34 mm.

The following is a description of the paratype:

This cheliped shows some features better than the holotype. The carpus has 4 nearly equal sides; the inner spine is visible, though broken off near its base; also a cross-section of a smaller spine at the distal outer angle which is broken off quite at the base; there is a longitudinal obtuse ridge on the proximal half of the segment terminating bluntly not far from the middle; if continued, it would cross the distal upper angle.

The manus is much flattened on the inside. At the distal end of the inner upper margin there is a spine pointing distad and a little upward and inward; its tip is broken off. Costæ of outer surface much lower and flatter than in the holotype; the upper costa fades out altogether proximally. The large lobe at the articulation with the dactylus is broken away, but the lobe below it is large and projects distally well over the dactylus. On the inner surface of the manus, half-way up and at one-fifth the distance behind the distal end, there is a slender spine (with tip broken off) pointing inward and slightly distad. A similar spine has been partially uncovered on the major chela of the holotype. The dactylus has one large, low, dark-colored molariform prehensile tooth at its base (which shows that the cheliped is the minor one of the pair), and on the inner side a small crescentic, blackish, articulating knob. The corresponding protuberance on the manus has been broken off.

Relationships.—This species differs, it will be seen, from typical *Scylla* by having the hands costate. One sees in *Scylla serrata*[1] the vestige of a costa in the same place where the middle costa ends distally in *S. costata.* In other respects this is a true *Scylla,* as shown by the smooth carapace with 9 lateral teeth, the posterior of which is not elongate, and by the massive chelipeds. The large distal protuberances on the outer and inner surfaces of the hand are similar to those of *serrata.*

Genus PORTUNUS Weber, 1795.

Portunus gabbi, new species.

(Plate 3, Figures 2 to 7; Plate 6, Figures 1 and 2.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector.

Holotype.—Female. Cat. No. 2256, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of carapace, median, 45 mm., width of carapace in front of lateral spines 76 mm., width between outer angles of orbits 43 mm., length of manus above, 26.3 mm., distal height of manus 22.2 mm.

The following is a description of this species:

The carapace of the holotype is broken in the middle, whence a crack extends to the left margin between the fourth and fifth teeth; the large lateral spines are both broken off at their base. Carapace very convex; the two areoles at the inner angle of the branchial region are strongly marked. The granules, which are large and numerous on the more elevated portions, are scanty toward the second to fifth lateral teeth, inclusive, and along the postero-lateral margins, and are very small and flat behind the front and on the intestinal region. The anterior of the gastric ridges can be made out and is very irregular, the posterior ridge is obscured by the break. The four frontal teeth are subtriangular, blunt, those of the middle pair wider than those of the outer pair, and definitely more advanced; median sinus V-shaped, lateral sinuses U-shaped. The lateral teeth of the carapace (to be seen best on the left side) appear conical in dorsal view, their sides being straight; tips all broken off. Base of lateral spine granulate and lacking an axial line of granules.

The right chela is the only one remaining; its manus has the four customary longitudinal ridges on the outer surface, but these are so broken away that one can not tell if they are granulate; the distal extremity of the second ridge (counting from the top) is smooth and punctate. The development of the double lobe at the outer articulation with the dactylus indicates that this is the larger of the two chelipeds. The fingers are covered with such a fine granulation as to be smooth to the naked eye, and have a triangular gape between them; the molariform teeth are unequal and dark-colored; the end of the fixed finger has the same dark color; the terminal fourth of the dactylus is missing.

The female abdomen is very broad, as in adult *Portunus;* there is a blunt transverse ridge on the middle half of the fourth and fifth segments; outlines not well shown, but the sides of the sixth segment converge gradually.

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[1] See Alcock, Jour. Asiat. Soc. Bengal, vol. 68, p. 27, 1899.

Paratypes.—(*a*) A male taken at the type locality, much larger than the holotype. It lacks chelipeds. The lateral teeth of the carapace are narrower than in the smaller specimen, their sides somewhat concave. A curved transverse line of granules is seen on the branchial regions leading toward the lateral spine. Enough of the abdomen is exposed to show the sex and generic relation. Cat. No. 2566, Mus. Phila. Acad. Nat. Sci.

(*b*) A right chela, also from the type locality; the fixed finger is broken off not far from the base, the dactylus near its middle. Resembles in shape the chela of the holotype, but is much larger, having a maximum height of 32 mm. No other difference is apparent, excepting the slightly greater height of the middle intercostal space of the outer surface. The lobe at the distal end of this space is broken off. Cat. No. 2254, Mus. Phila. Acad. Nat. Sci.

Additional material.—A dactylus of left cheliped, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916. This finger is of much smaller size (about 16 mm. long) than those of the holotype and paratype (*b*); its grooves are more strongly marked, the deepest grooves being one on the upper half of the outer surface and one on the lower half of the inner surface; a short, shallow groove is at the proximal end of the lower half of the outer surface. (See plate 3, figs. 6 and 7.)

Relationships.—Although the genus *Portunus* (=*Neptunus* of authors) is represented in the West Indian region by several Recent species of moderate size, our Tertiary species suggests none of them, but is allied to the large Indo-Pacific species. It resembles especially *P. pelagicus*[1] in the configuration of the carapace and the shape of the female chela and abdomen; it differs from *pelagicus* in lacking the posterior of the transverse granulate gastric ridges, in the chela not being quite so deep at the base of the fixed finger, and in the sixth segment of the abdomen in both sexes having less rapidly convergent sides. The abdomen of the male in *gabbi* is nearest that of *P. trituberculatus*,[2] the sides of the coalesced (third to fifth) segment being even less convergent than in that species.

While the fossil species, owing to its wide male abdomen and feeble dorsal ridges, is a true *Portunus*, it has some features which link it with the genus *Callinectes; e. g.*, the four median frontal teeth are related to those of *C. bocourti*;[3] in *bocourti* the outer frontal teeth are larger than the inner, and are about as advanced or even more so; while in *gabbi* the inner teeth are larger and more advanced. The lateral teeth also resemble those of *bocourti* much more than they do any of the *Portunus* species.

Portunus tenuis, new species.

(Plate 7, Figure 7.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

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[1] *Cancer pelagicus* Linnæus, Syst. Nat., ed. 10, vol. 1, p. 626, 1758.

[2] *Neptunus trituberculatus* Miers, Ann. Mag. Nat. Hist., ser. 4, vol. 17, p. 221, 1876.

[3] A. Milne-Edwards, Crust. Rég. Mex., p. 226, 1879.

Material.—Two immovable fingers, both of the right side. The larger is holotype. Cat. No. 324478, U. S. N. M.

Description.—Finger slender, except at the base; grooves 5, 2 outside, 2 inside, 1 below; all are deep except the upper one on the outside; intervening ridges blunt, with a narrow longitudinal strip of squamiform granules along the middle. Prehensile teeth uneven, the large teeth as a rule alternating with 2 or 3 small ones.

Relationship.—This finger resembles that of *P. spinicarpus*,[1] except in shape, as in the latter it widens regularly from the tip to the palmar end.

Portunus, indeterminable species.

Material.—Two fingers incomplete, one a right major dactylus, the other larger and probably also a dactylus; if so, from the left side. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Description.—The right finger has 3 deep grooves, 2 outside, not far apart, and 1 inside; in addition there is a very shallow groove just above the teeth, both inside and out.

The left finger has the same number of grooves, the middle one of the outer surface fading out distally, and the grooves near the teeth almost imperceptible.

In both fingers there is a line of punctæ but no furrow on the upper margin.

Genus CALLINECTES Stimpson, 1860.

Callinectes declivis Rathbun.

(Plate 9, Figures 1 and 2.)

Callinectes declivis Rathbun, Bull. U. S. Nat. Mus. No. 103, p. 162, plate 66, figs. 1–3, 1918. (Type locality, Miocene of Banana River, Costa Rica; type, Cat. No. 324262, U. S. N. M.)

Material.—Seven fingers, mostly with the proximal end broken off, as follows: 2 right dactyls, 2 left dactyls, 2 right immovable fingers, 1 left immovable finger. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of these specimens:

The dactyli have a deep groove above the middle both outside and inside and a shallower groove on both sides a little way from the teeth; above there is an impressed line of numerous punctæ.

The holotype, which is the sole type, lacks a dactylus and its propodal finger is much larger than any of the Yaqui specimens, but allowing for size, the specimens from the two places agree.

Callinectes, indeterminable species.

Material.—A piece of a left dactylus or movable finger, with both ends broken off. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

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[1] *Achelous spinicarpus* Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, p. 148, 1871.

The following is a description of this species:

The dactylus has the characteristic grooving common to small specimens of most of the Recent species of *Callinectes*. Further than the genus it is impossible to identify the specimen. The grooves are as follows: 3 outside, about equally spaced, and the lowest very shallow; 1 above, fading out distally, but the punctæ are continued; 3 inside, the upper groove very short, proximal, the middle one deep.

Genus PODOPHTHALMUS Lamarck, 1801.

Podophthalmus domingensis, new species.

(Plate 2, Figures 7 and 8.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector.

Holotype.—Cat. No. 2265, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of carapace exclusive of rostrum 38.3 mm.; length including rostrum 42.4 mm.; width between tips of outer spines of orbits 66 mm.; width between tips of spines at middle of carapace 72.2 mm.; approximate length of propodus of cheliped 62 mm.; distal height of manus exclusive of spine 24 mm.; length of dactylus measured from external articulation with manus 40.2 mm.

The following is a description of this species:

Carapace transversely oblong, armed with a strong spine at the antero-lateral angle or outer angle of the orbit and a shorter spine at the lateral angle of the carapace, from which a transverse ridge bearing a single line of granules extends inward across one-third of the carapace; a blunt transverse ridge across the gastric region, and a rounded elevation on the inner part of the branchial region; surface granulate except near the posterior and postero-lateral margins and a narrow strip behind the anterior margin and occupying half the width of the carapace. The margins, so far as visible, have a single line of granules; the anterior margin, exclusive of the T-shaped front is straight and transverse for more than half the width of the carapace; it then curves rapidly backward, forming a deep sinus within the antero-lateral spine and is interrupted by a slight notch at the inner end of the sinus; the antero-lateral spine projects forward and very little outward and is less advanced than the anterior margin; the lateral spine projects obliquely outward and forward; the margin between the spines is embedded in the matrix. Frontal projection T-shaped, limits of the cross-piece ill-defined. The long eyes characteristic of the genus are not exposed in the unique specimen.

Chelipeds slightly unequal. Their brevity would seem to indicate that the specimen is a female. The distal half or more of the merus is lacking; there appear to be granules on the margins and also in longitudinal bands; on the anterior or inner margin there is an erect compressed spine which, when the merus is horizontally placed, is situated close to the end of the antero-lateral spine of the carapace. Of the carpus only the long inner spine shows on the left side (fig. 7); it is transversely placed when the cheliped is flexed and is convex above with the point turned downward. The chelæ are flattened externally and the outer shell, so far as preserved, is smooth, excepting on the obliquely longitudinal ridge, which leads from the distal articulating condyle, and on the upper margin of the dactylus and the lower part of the inner sur-

face of the palm. There is the base only of a good-sized spine at terminal end of upper margin of manus. On the outer face of the dactylus at the articulation there is a small, black, horny, outstanding knob. Prehensile edges of fingers furnished with very unequal, stout, rounded teeth with dark brown, horny caps. Tips of fingers acute.

Relationships.—The carapace of this species is considerably like that of *P. vigil* (Fabricius),[1] which to-day inhabits the East Indian region and is found also in the post-Tertiary of Celebes, but in the latter the anterior margin is arched, the antero-lateral spine projects strongly sideways, and the chelæ are not externally flattened. The smooth, flattened fingers of *P. domingensis* are suggestive of *Euphylax dovii*,[2] the podophthalmid which inhabits the west coast of tropical America. I have placed the new species in *Podophthalmus* rather than in *Euphylax*, by reason of the shape and distinct areolation of the carapace and the strong lateral spines.

Family XANTHIDÆ.

Genus ZANTHOPSIS M'Coy, 1849.

Zanthopsis bartholomæensis, new species.

(Plate 8, Figure 3.)

Material.—Represented by a single carapace, the margin of which is largely incomplete.

Holotype.—Cat. No. 166945, U. S. N. M.

Type locality.—St. Bartholomew: Orient Point; picked up at base, but probably from limestone at top, of the section; Eocene; T. W. Vaughan, collector; February 21, 1914; 6915; L. I. 72 (*c*) (1914).

The following is a description of this species:

Carapace approximately one-fifth wider than long, posterior half fairly level, anterior half curving strongly downward toward the front and antero-lateral margins. Mesogastric, protogastric, and cardiac regions well delimited. The mesogastric region becomes suddenly wide behind the narrow anterior part; this broad posterior pentagonal portion is elevated and smoothly rounded; on each protogastric region there is a pair of tubercles forming a transverse line of 4; in front of the inner tubercle of each pair, but a little further from the median line, there is another tubercle; the cardiac region is covered by an elevation smaller than that on the mesogastric region but similar, that is, its anterior slope is shorter and steeper than its posterior. The most conspicuous elevation is that on the branchial region at the widest part of the carapace; it consists of two large transverse tubercles placed one directly behind the other, or rather resembles a single elevation deeply bisected transversely; there is a low swelling on the branchial region opposite the gastro-cardiac suture. So far as can be made out, the antero-lateral margin is unarmed. Postero-lateral margins strongly convergent. Along these margins just behind the lateral angle there is a curved row of 3 upstanding tubercles; further back there is a lower, smaller tubercle, and between it and the posterior of the large tubercles there is still another, but minute, tubercle.

[1] *Portunus vigil* Fabricius, Entom. Syst., Suppl., p. 363, 1798. *Podophthalmus vigil* Leach, Zool. Misc., vol. 2, p. 149, plate 118, 1815.

[2] Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, p. 226, plate 5, fig. 5, 1860.

The width across front and orbits is about two-fifths of the entire width of the carapace. The orbit is narrow, about one-third as wide as the front and is probably subcircular. Only the upper margin of the left orbit remains and its characters are obscured by cracks in the carapace. Edge of front lacking.

Of the various species of *Zanthopsis* described, this one most resembles *Z. leachii* (Desmarest),[1] which also is very uneven. The nodules, however, are very differently disposed in the two forms. The marginal tubercles are antero-lateral in *leachii* and postero-lateral in *bartolomæensis*.

Genus PILUMNUS Leach, 1815.

Pilumnus subequus, new species.

(Plate 9, Figure 9.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Material.—Dactylus of right and major cheliped. Cat. No. 324484, U. S. N. M.

The following is a description of this species:

A dactylus of small size, dark-colored, stout, strongly curved, with about 5 lines of punctæ, and above at the proximal end 4 granules. Prehensile teeth few (4 large and 1 small), shallow, subtriangular. A common type of dactylus among the numerous recent species of *Pilumnus;* the basal granules or spinules are, however, usually more numerous.

ARCHÆOPILUMNUS, new genus.

The following is a description of this genus:

Near *Pilumnus*.[2] Carapace subquadrilateral, the penultimate tooth of the side margins most prominent; surface rough and deeply sculptured, posteriorly as well as anteriorly. Front bilobed, lobes concave, their outer angle produced but not dentiform. Orbit and basal antennal segment as in *Pilumnus*. Chelipeds stout, rough, unequal; fingers elongate, deflexed.

This genus is distinguished from *Pilumnus* chiefly by the fingers, which are long instead of short and stout; by the posterior part of the carapace being deeply sculptured, which is usually not the case in *Pilumnus;* and by the outer angle of the front not being separated from the remainder of the front.

Archæopilumnus cælatus, new species.

(Plate 6, Figures 6 and 7; Plate 7, Figures 10 to 13; Plate 8, Figures 4 to 7.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector.

Holotype.—Male. Cat. No. 2261, Mus. Phila. Acad. Nat. Sci.

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[1]Compare fig. 1, plate 1, of Bell's Monograph of the Fossil Malacostracous Crustacea of Great Britain, part 1, 1857.

[2]Leach, Trans. Linn. Soc. London, vol. 11, pp. 309 and 321, 1815. Type, *P. hirtellus* (Linnæus, 1761).

Paratypes.—The paratypes are from the same locality as the holotype: *a*, male, Cat. No. 2260; *b*, female, Cat. No. 2262; *c*, male, and *d*, female, Cat. No. 2263; all in Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of carapace of holotype on median line 34.3 mm., width of carapace 45.2 mm., width of front 13.2 mm., width between outer angles of orbits 25.3 mm.

The following is a description of this species:

The regions are surrounded by deep furrows and are more or less subdivided. The epigastric lobes are separated from the protogastric, and the crescentic urogastric lobe from the mesogastric; the hepatic lobe is separated from the dentate lateral border, while the branchial region is divided into an epibranchial lobe, which incloses the penultimate lateral spine, a mesobranchial lobe, which is divided in three, and a metabranchial lobe which is separated partly from the cardiac region by a sharp, thumb-nail impression, while it is anteriorly confluent with that region by a narrow connecting elevation; cardiac region truncate behind and longitudinally grooved in its anterior two-thirds; the elevation occupying the intestinal region is continued laterally across the branchial region; the frontal region is separated from the edge of the front by a shallow depression. The surface of the carapace is rough, except in the furrows and on the epigastric lobes, the roughness consisting of (1) subacute, somewhat imbricating, white-tipped tubercles, most evident on the sides and posterior half, and (2) a mixture of blunter tubercles and erosions on the middle of the anterior half. Antero-lateral teeth 5, thick, subconical; the first one, at the outer angle of the orbit, is small, little advanced; first interspace the greatest of all; fourth tooth largest, third tooth next in size, fourth and fifth curved. Above the posterior margin a row of fine bead granules. The marginal lobes of the front are bordered by 12 or 13 granules, the lobes are more advanced at the inner angles, the outer angles are slightly advanced, but not isolated, intermediate space concave, median sinus V-shaped. Margin of orbit granulate, upper margin raised, edge biemarginate, the notches continued backward in a furrow; a larger notch below the outer angle; lower margin more advanced than upper, furnished with 2 stout, granulated teeth, one of which is within the outer angle and the other at the inner angle, next to the antennal segment. This segment touches with its outer angle the bent-down edge of the front; it has a longitudinal granulated ridge. A piece of the eyestalk shows a few small granules above at the base.

The chelipeds are unequal, the smaller palm about four-fifths as high as the larger. Merus very broadly triangulate, not much longer than the distal width, outer surface sparsely covered with sharp granules and tubercles; upper margin with 3 spines, the distal one much the largest. Carpus rough with short spines; the spine at the inner angle is large and bears a spinule on its posterior margin. Manus armed with spines on the outer surface except near the fingers, the spines arranged mostly in 6 or 7 irregular rows. The lower edge of the propodus is sinuous, the distal half of the finger being strongly deflexed; the dactylus is longer than the upper margin of the palm; fingers with a few irregular teeth, a large tooth at the base of the dactyl in the larger chela; fingers not gaping; dactylus spinulous on the basal third of its upper margin; the dark color extends the full length of the prehensile edges, but elsewhere in the larger chela it spreads over all but the very base of the dactylus, in the smaller chela not so far; on the fixed finger the color extends about three-fifths the length on the lower edge. The anterior surface of the merus of the ambulatory legs and the posterior surface of the last leg are granulate, the upper margin spinous; remaining joints of legs not visible.

Abdomen (male) subtriangular, 7 segments separate, diminishing successively in width from the third to the seventh; fifth segment longest, seventh triangular.

Females: In the female the cheliped (only one is present) is smaller, the propodus and dactylus more spinous, the fixed finger more horizontal. In the male, the spines and tubercles of the manus disappear toward the lower margin, in the female they become more numerous but smaller. In the female there is not only a row of spines on the upper margin of the dactylus, but a row of tubercles or granules on the outer surface.

Abdomen of female oblong-oval, second segment narrower than first and third, sixth segment longer than fifth, seventh longer than sixth.

Variations.—In comparing the 5 specimens at hand the areoles of the carapace appear more sharply cut in the small specimens than in the large ones.

Genus PANOPEUS Milne-Edwards, 1834.

Panopeus, indeterminable species.

Material.—Distal end of the right immovable finger. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of this specimen:

This fragment might belong to any one of 3 common Recent species, viz, *P. americanus*,[1] *occidentalis*,[2] or *herbstii*.[3] There is a deep groove on either side not far above the lower margin, the grooves ending at the sinus above the terminal tooth; below there are 2 shallow grooves; not far from the prehensile teeth there is on either side a row of deep punctæ. Teeth unequal, only 10 preserved, and in general alternating large and small.

Genus and species indeterminable.

Material.—Distal end of a dactylus or movable finger. From the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of this specimen:

The fragment is not bent sideways, so that it is not clear whether it is a right or left finger; it is bent strongly downward toward the blunt, distal end, has no grooves, but a few punctæ arranged in lines; occupying less than half of the prehensile edge, at its proximal end are 4 tuberculiform teeth (2 large, 2 small, alternating) which are situated one side of the middle.

Family OCYPODIDÆ.

SANDOMINGIA, new genus.

The following is a description of this genus:

Carapace wide, wider at the antero-lateral than at the postero-lateral angles; anterior margin moderately arcuate, emarginate at the outer fourth. Front a narrow lobe, less than one-twelfth as wide as carapace. A lateral tooth behind the orbital tooth.

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[1] Saussure, Rev. Mag. Zool., ser. 2, vol. 9, p. 502, 1857.
[2] Saussure, *loc. cit.*
[3] Milne-Edwards, Hist. Nat. Crust., vol. 1, p. 403, 1834.

Orbits long, shallow trenches, extending the whole width of the carapace except for the front, and bordered above except for the outer third by a narrow surface of varying depth, similar to that in *Uca* (=*Gelasimus*).

Sandomingia seems to be nearest *Uca* Leach,[1] the genus of fiddler crabs. *Uca* has the same shape of carapace, with similar depressions, orbits occupying nearly the whole width of carapace, with a thickened, bimarginate upper edge. On the other hand, in *Sandomingia* the antero-lateral angle is bidentate, there is a definite notch in the upper margin of the orbit, the orbit is very shallow, and the chelipeds are large and equal.

The equality in the chelipeds suggests the possibility of this crab being a portunid allied to the long-eyed forms, *Podophthalmus* and *Euphylax*, but the latter have the orbits deeply hollowed at the outer ends to hold the corneæ and lack the facet-like upper margin of the orbit.

Sandomingia yaquiensis, new species.

(Plate 8, Figures 1 and 2.)

Type locality.—Lower half of the valley of the Yaqui del Norte River, in the northern part of Santo Domingo, Haiti; probably lower Miocene; W. M. Gabb, collector; 1 specimen.

Holotype.—Cat. No. 2257, Mus. Phila. Acad. Nat. Sci.

Measurements.—Length of carapace, exclusive of rostral lobe, 23 mm., width of carapace at antero-lateral angles (approximate, because tips of teeth are broken off) 42 mm., width of frontal lobe at base 3 mm.

The following is a description of this species:

Carapace flat in the middle, sloping rapidly down to the anterior and lateral margins; surface smooth and a little uneven; a shallow furrow defines the gastric region. Anterior margin finely granulate, granules not in a single row; lower edge of flat supraorbital space or "eyebrow" having a single row of granules; "eyebrow" very narrow, height about one-fifteenth of its length in a transverse direction, inner end at base of frontal lobe. Surface of orbit smooth and shallow. Antero-lateral tooth an equilateral triangle; it and the tooth behind it are separated by a U-shaped interspace and project about equally sideways; the tips are broken off, so that it is impossible to tell exactly about this.

Chelipeds equal; only a portion of the merus or arm-joint of each is visible; it is stout, triangular in cross-section, upper surface concave and smooth, posterior and inferior margins blunt and granulate, anterior margin subacute and furnished with tubercles of varying size arranged in two irregular rows.

Superfamily OXYRHYNCHA.

Family PARTHENOPIDÆ.

Genus PARTHENOPE Weber, 1795.

Parthenope (Platylambrus) obscura, new species.

(Plate 7, Figures 5 and 6.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3); Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

[1] Edinb. Encyc., vol. 7, p. 430, 1814.

Material.—Dactylus of right cheliped, holotype. Cat. No. 324487, U. S. N. M.

The following is a description of this species:

The distal portion of the dactylus is lacking. The proximal end of the upper surface is broad and flat and inclosed by 5 irregular granulated knobs; sides compressed, in the middle slightly concave, and unevenly granulate, granules most numerous on the inner surface. Prehensile teeth very low and flat, the proximal tooth more than twice as large as the next one.

Relationships.—In its general characters resembles the dactylus of the recent *P.* (*Platylambrus*) *serrata* (Milne-Edwards),[1] which has a shorter finger, prominences at proximal end above more spiniform, sides not concave.

Parthenope, indeterminable species.

(Plate 7, Figures 8 and 9.)

Material.—Dactylus of right cheliped, from the Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

The following is a description of this species:

Resembles the preceding, but less curved and more slender, sides flat but not concave, outer side more granulate than inner, and having an uneven, longitudinal line of coarse granules not far above the fingers on the proximal half; upper surface flattened along the proximal half, and bordered by stout spines and spinules; one of these spines projects outward above the condyle articulating with the palm on the outer side, and is seen at the top of figure 8 at the left-hand end; the condyle is broken off and shows in cross-section; prehensile tubercles 10, the proximal pair confluent; tubercles low but better developed than in the preceding species. Upper part of distal end of finger missing.

Genus MESORHŒA Stimpson, 1871.

Mesorhœa mauryæ, new species.

(Plate 7, Figures 1 to 4.)

Type locality.—The Yaqui Valley at Cercado de Mao (Bluff 3), Santo Domingo; lower Miocene; C. J. Maury, collector; 1916.

Material.—Two specimens, a right manus with propodal finger attached (holotype) and a right manus of smaller size, without fingers but with carpus attached (paratype). Cat. No. 324489, U. S. N. M.

Measurements.—Length of holotype on outer margin, this being the most complete, 8 mm.; greatest height, measured on inner surface, 4 mm.

The following is a description of this species:

The holotype has 8 teeth on the upper margin, 13 on the outer and 10 on the inner margin; teeth of outer and inner margins short, those of the outer margin the smallest, those of the inner margin intermediate in size. The inner surface widens greatly from the proximal to the distal end, lower surface

[1] *Lambrus serratus* Milne-Edwards, Hist. Nat. Crust., vol. 1, p. 357, 1834.

of equal width throughout, outer surface a little wider in middle third than toward ends.

Propodal finger short, slender, directed strongly inward and distad but scarcely downward. It does not, however, reach distad beyond the line of the upper margin of the palm.

The carpus has 5 low ridges which are finely tuberculate or granulate.

Relationship.—These short hands—short for the family Parthenopidæ—belong without doubt to the genus *Mesorhœa,* having considerable resemblance to the Recent species, *M. sexspinosa* Stimpson,[1] of the Florida Keys and West Indies. In the latter the palms are a little longer and slenderer and the inner and outer surfaces are concave.

BIBLIOGRAPHY OF WEST INDIAN TERTIARY DECAPODA.

1866. Guppy, R. J. Lechmere. On the relations of the Tertiary formations of the West Indies; with a note on a new species of *Ranina*, by Henry Woodward, Esq., F. G. S.; and on the Orbitoides and Nummulinæ, by Prof. T. Rupert Jones, F. G. S. Quart. Jour. Geol. Soc. London, vol. 22, pp. 570–592, plate 26, 3 text-figures.

Name only, *Ranina porifera*, listed by Guppy on p. 572; locality indicated (p. 571) as San Fernando beds, "lower Miocene," Trinidad, in "irregular dark-blue limestone, containing numerous fossils generally converted into calcspar, or replaced by semi-liquid asphalt."

1866. Woodward, Henry. (See above under Guppy.) Note on a new species of *Ranina* (*R. porifera*) from the Tertiary strata of Trinidad. Quart. Jour. Geol. Soc. London, vol. 22, pp. 591–592, plate 26, fig. 18.

List of the known species of *Ranina* (p. 591). Description of *R. porifera* (p. 592) and figure on plate 26, fig. 18.

1909. Guppy, R. J. Lechmere. Preliminary notice of a discovery of fossils in the Tamana District, Trinidad. Bull. Agric. Dept. Trinidad, pp. 5–6, 1 plate.

Describes the new species, *Ranina cuspidata*, and gives one figure (fig. 1) on the plate. From Tamana beds, "lower Miocene," Trinidad.

1911. Guppy, R. J. Lechmere. On a collection of fossils from Springvale, near Couva, Trinidad. Papers Agric. Soc. Trinidad and Tobago, No. 440, laid before the Society Dec. 20, 1910, pp. 1–15.

Ranina cuspidata listed (p. 14), with a reference to its original description.

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[1] Bull. Mus. Comp. Zoöl., vol. 2, 136, 1871.

DESCRIPTION OF PLATES.

PLATE 1.

FIGS. 1 to 7. *Callianassa anguillensis*, n. sp.

1. Holotype, outer side of right manus × 1.4.
2. Paratype (*a*), inner side of right manus, × 1.4.
3. Paratype (*a*), outer side of right manus, × 1.4.
4. Holotype, upper edge of right manus, × 1.4.
5. Paratype (*d*), outer side of left manus, × 1.4.
6. Paratype (*b*), finger, × 1.4.
7. Paratype (*a*), lower edge of right manus, × 1.4.

FIGS. 8 to 13. *Callianassa pellucida*, n. sp.

8. Paratype (*b*), outer side of right manus, × 2.8.
9. Paratype (*a*), outer side of right manus, × 2.8.
10. Paratype (*a*), distal view of right manus, × 5.
11. Paratype (*a*), lower edge of right manus, × 2.8.
12. Holotype, upper view of left movable finger (tip broken off), × 2.8.
13. Holotype, outer and slightly ventral view of left movable finger, × 2.5.

PLATE 2.

FIGS. 1 to 6. *Callianassa miocenica*, n. sp.

1. Holotype, outer side of left manus, × 1.9.
2. Holotype, proximal end of left manus, × 1.9.
3. Holotype, inner side of left manus, × 1.9.
4. Holotype, lower edge of left manus, × 1.9.

FIG. 5. Holotype, distal end of left manus, × 1.8.

6. Holotype, upper edge of left manus, × 1.9.

7, 8. *Podophthalmus domingensis*, n. sp.

7. Holotype, dorsal view, nat. size.
8. Holotype, anterior view, nat. size.

PLATE 3.

FIG. 1. *Lyreidus fastigatus*, n. sp. Holotype, dorsal view of carpus of left cheliped, × 3.

2 to 7. *Portunus gabbi*, n. sp.

2. Holotype, ♀, ventral view, slightly reduced.
3. Holotype, ♀, dorsal view, slightly reduced.

FIG. 4. Paratype (*a*), ♂, dorsal view, slightly reduced.

5. Paratype (*b*), outer view, slightly reduced.
6. Dactylus of left chela, inner view, × 2.
7. Same, outer view, × 2.

PLATE 4.

Scylla costata, n. sp.

FIG. 1. Holotype, ♂, dorsal view, × 0.85.

FIG. 2. Holotype, ♂, anterior view, × 0.85.

PLATE 5.

Scylla costata, n. sp.

FIG. 1. Holotype, ♂, ventral view, × 0.87.

FIG. 2. Holotype, ♂, posterior view, × 0.87.

PLATE 6.

FIGS. 1, 2. *Portunus gabbi*, n. sp.

1. Paratype (*a*), ♂, part of ventral view, nat. size.
2. Holotype, ♀, anterior view, slightly reduced.

3 to 5. *Scylla costata*, n. sp.

3. Paratype, dorsal view of cheliped, nat. size.

FIG. 4. Paratype, inner view of cheliped, nat. size.

5. Paratype, outer view of cheliped, nat. size.

6, 7. *Archæopilumnus cælatus*, n. sp.

6. Paratype (*b*), ♀, ventral view, × 1.33.
7. Paratype (*b*), ♀, dorsal view, × 1.33.

PLATE 7.

FIGS. 1 to 4. *Mesorhœa mauryæ*, n. sp.
1. Holotype, propodus of right chela, outer view, × 3.75.
2. Same, inner view, × 3.5.
3. Paratype, carpus and propodus of right cheliped, outer view, × 3.75.
4. Same, upper view. × 3.75.

5, 6. *Parthenope* (*Platylambrus*) *obscura*, n. sp.
5. Holotype, dactylus of right chela, inner view, × 3.
6. Same, outer view, × 3.

FIG. 7. *Portunus tenuis*, n. sp., holotype, immovable finger of right chela, outer view, × 3.

8, 9. *Parthenope*, sp. indet.
8. Dactylus of right chela, outer view, × 3.5.
9. Same, inner view, × 3.5.

10 to 13. *Archæopilumnus cælatus*, n. sp.
10. Paratype (*b*), ♀, anterior view, ×1.4.
11. Holotype, ♂, ventral view, × 1.33.
12. Holotype, ♂, dorsal view, × 1.33.
13. Holotype, ♂, anterior view, × 1.33.

PLATE 8.

FIGS. 1, 2. *Sandomingia yaquiensis*, n. sp., holotype.
1. Dorsal view, slightly enlarged.
2. Anterior view, nat. size.
3. *Zanthopsis bartolomæensis*, n. sp., holotype, dorsal view, × 1.4.

FIGS. 4 to 7. *Archæopilumnus cælatus*, n. sp.
4. Paratype (*c*), ♂, dorsal view, × 1.33.
5. Paratype (*c*), ♂, ventral view, × 1.4.
6. Paratype (*a*), ♂, dorsal view, × 1.37.
7. Paratype (*d*), ♀, ventral view, × 1.4.

PLATE 9.

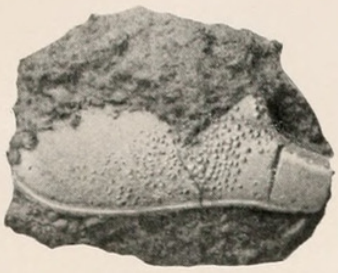
FIGS. 1, 2. *Callinectes declivis* Rathbun.
1. Dactylus of right chela, inner view, × 2.
2. Same, outer view, × 2.
3. Cragonidæ, gen. and sp. indet., telson, dorsal view, × 3.1.
4. Eryonidæ, gen. and sp. indet., ischium of first right cheliped, upper view, × 3.
5. *Persephona prepunctata*, n. sp., holotype, merus of right cheliped, upper view, × 3.

6, 7. Paguridæ, gen. and sp. indet.
6. Dactylus of left chela, upper side, × 3.
7. Same, lower side, × 3.
8. *Cycloes bairdii* Stimpson, piece of left manus with propodal finger, outer view, × 4.

FIG. 9. *Pilumnus subequus*, n. sp., holotype, dactylus of right chela, outer view, × 5.

10, 11. *Callianassa latidigita*, n. sp.
10. Paratype, dactylus of left chela, upper side, × 4.
11. Same, holotype, propodal finger of left chela, upper side, × 4.
12. *Calappella* (?), sp., piece of right manus, outer side, × 3.

13 to 15. *Petrochirus inequalis*, n. sp.
13. Holotype, right chela, outer view, × 1.5.
14. Same, showing dorsal view of both chelæ, × 1.5.
15. Same, ventral view (fingers pointing to bottom of plate), × 1.5.



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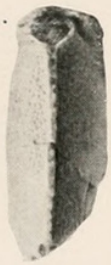

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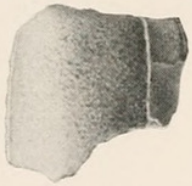

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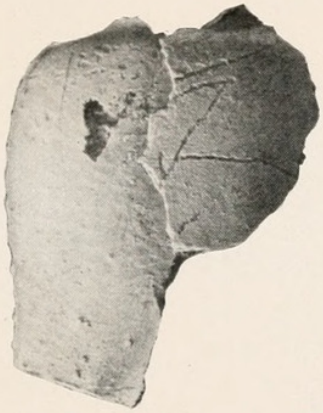

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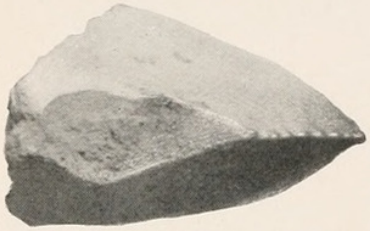

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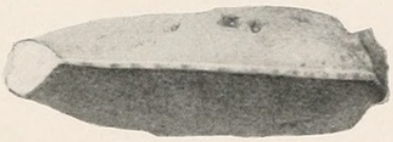

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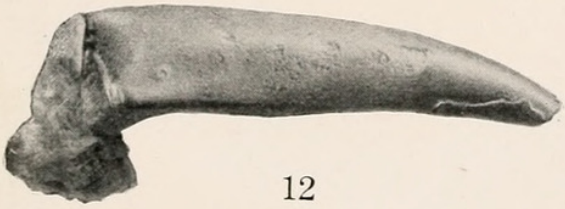

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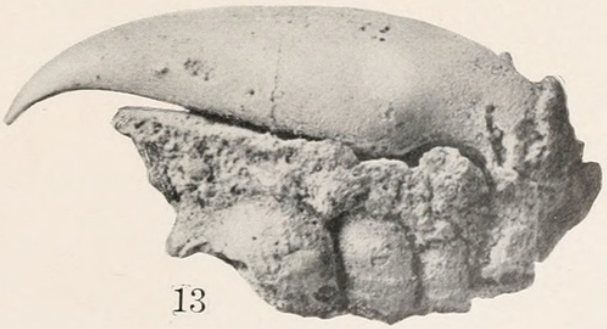

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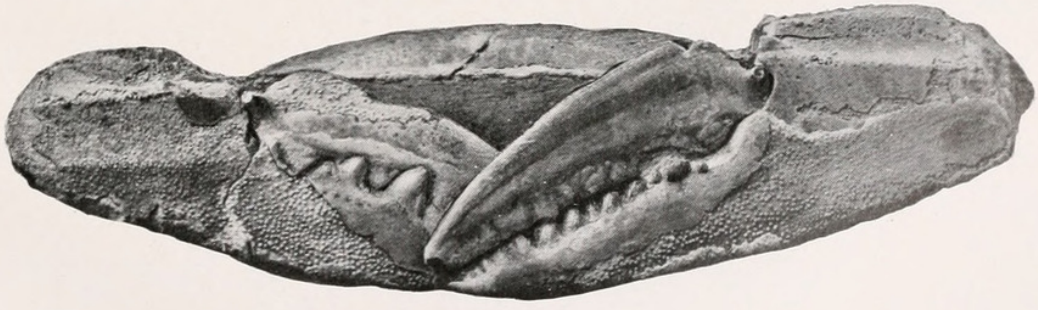

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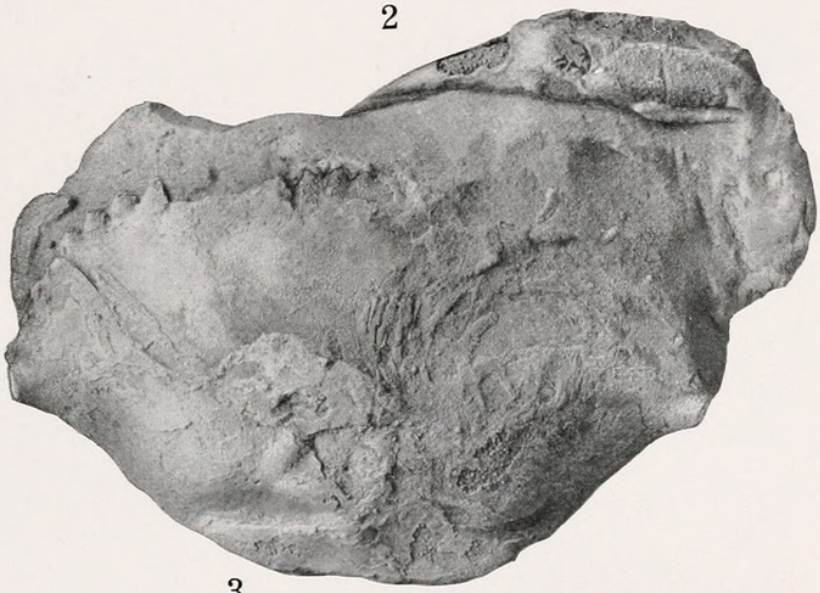

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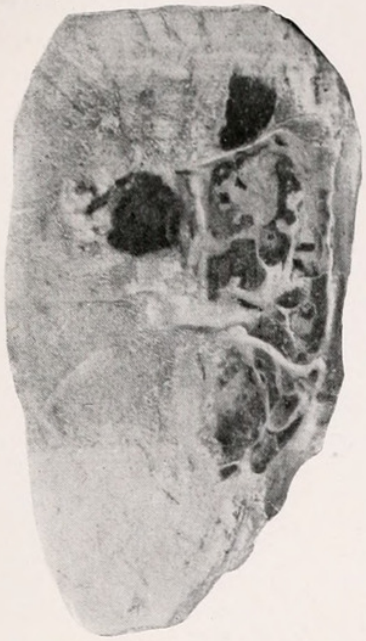

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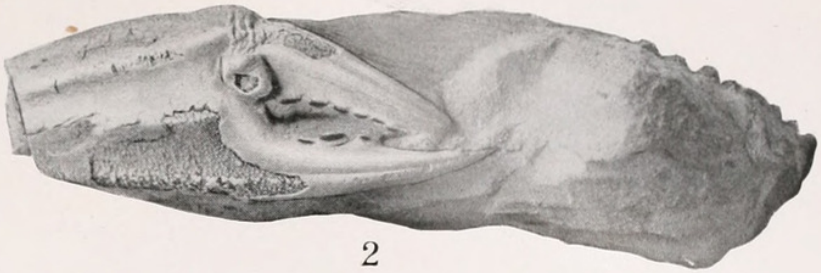

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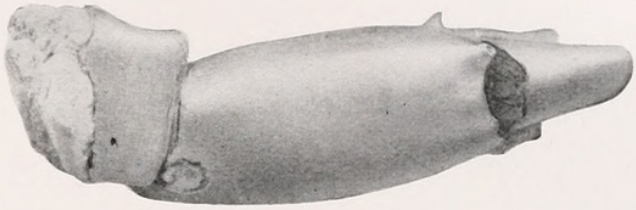

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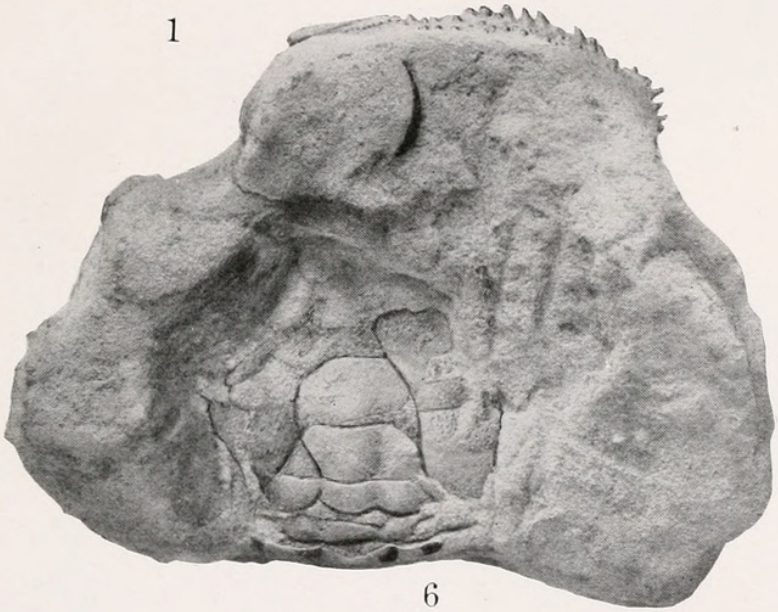

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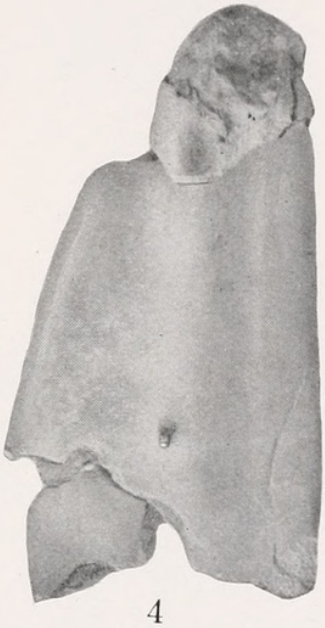

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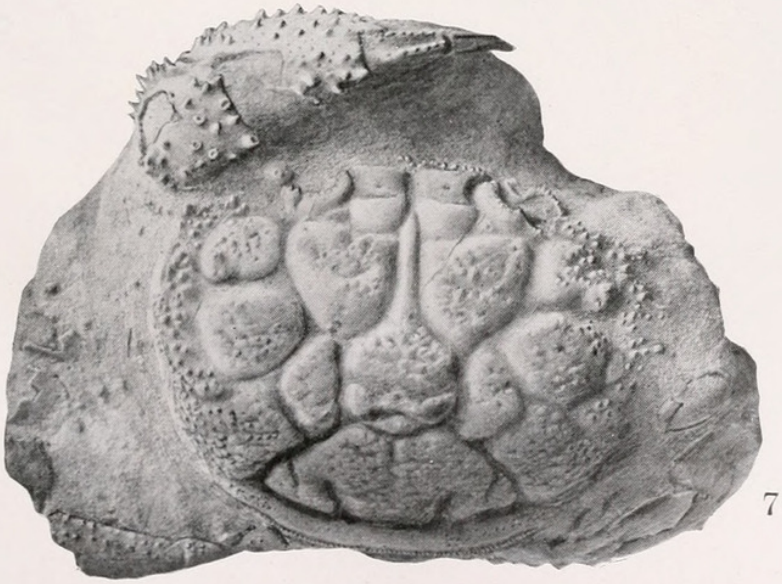

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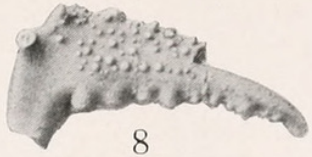

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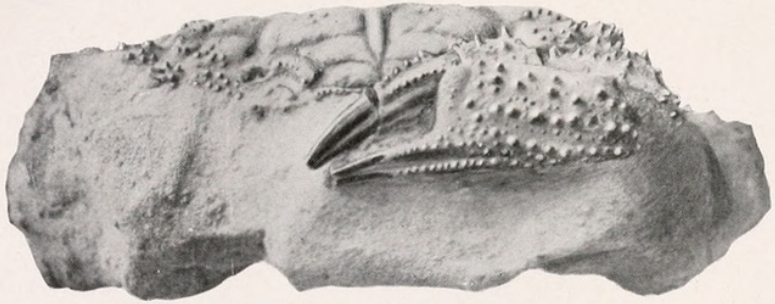

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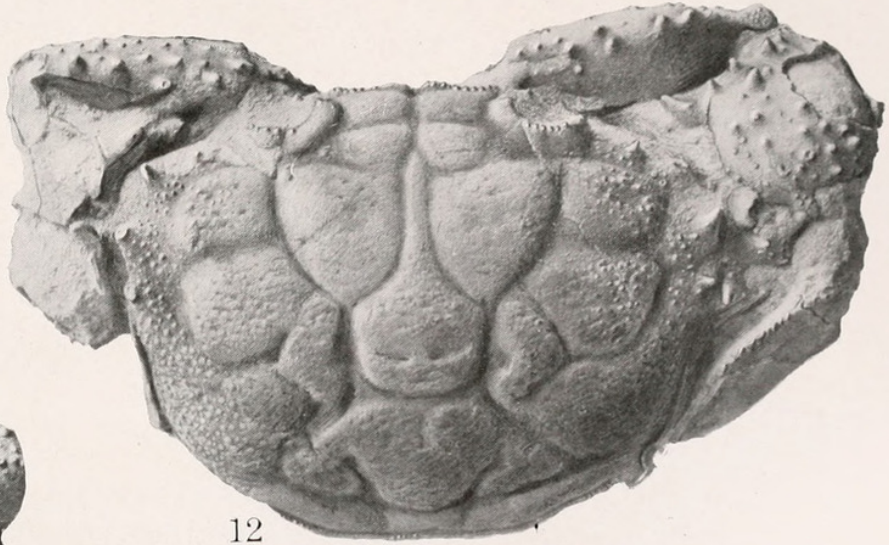

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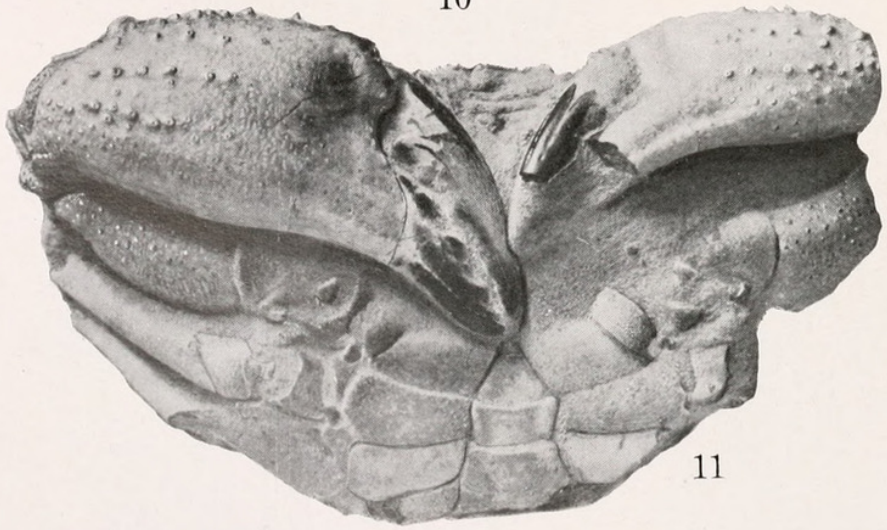

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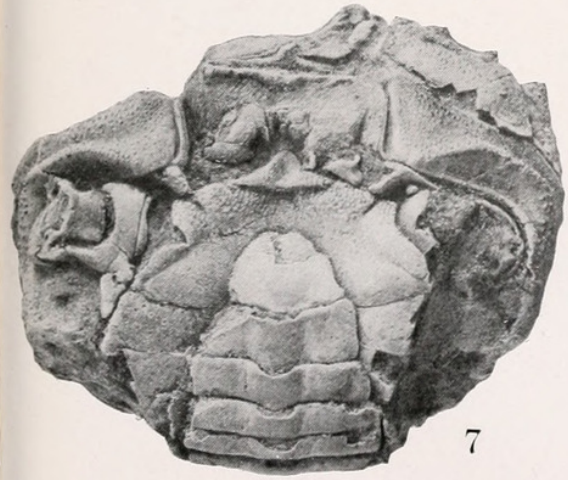

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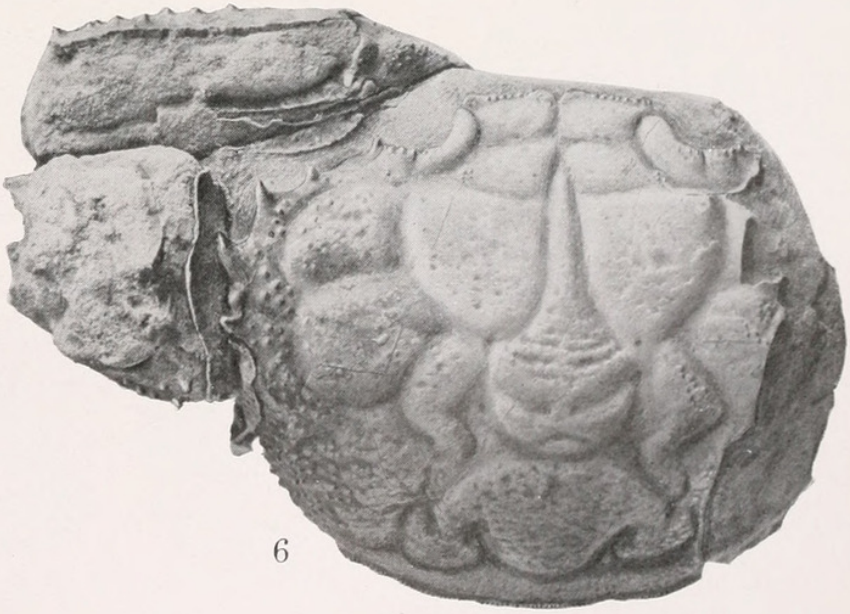

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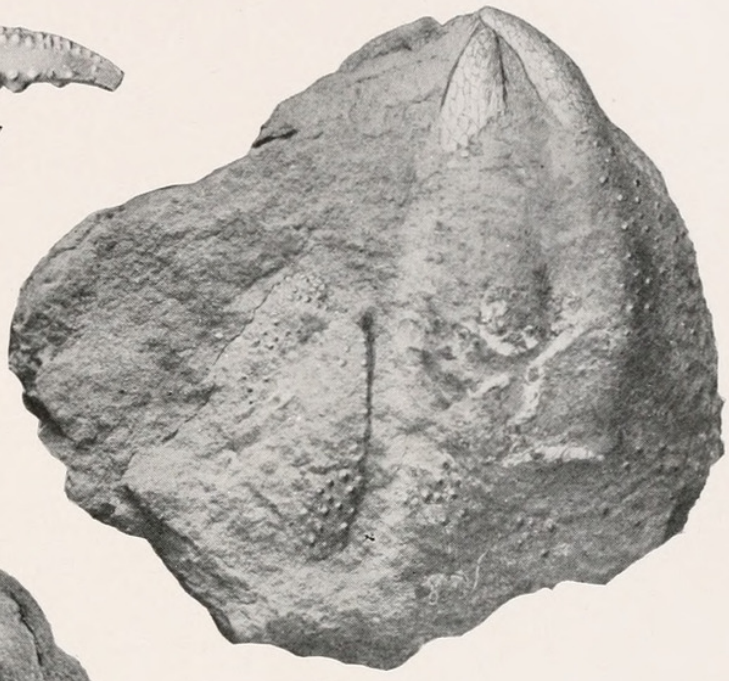

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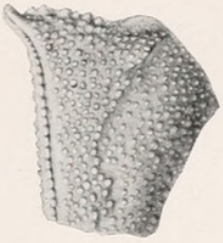

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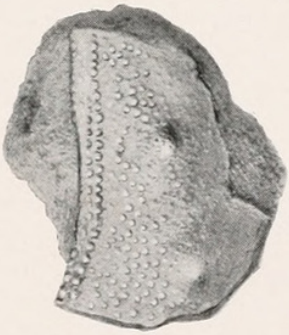

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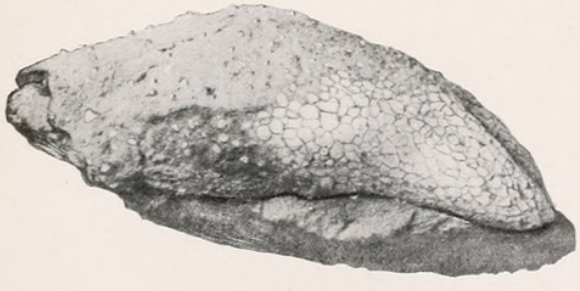

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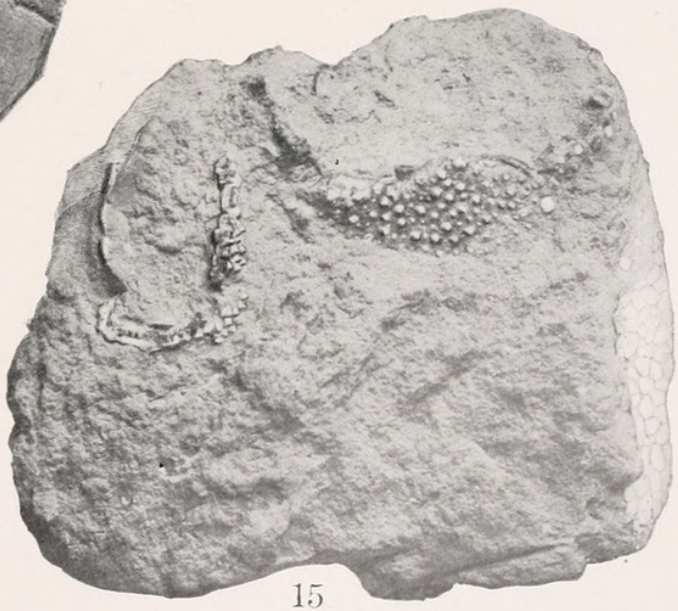

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