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THE decapod crustacean fauna of the Florida Eocene has received little attention since the studies by Rathbun (1929, 1935) and Roberts (1953). Recently, Ross and Scolaro (1964) described a new species of *Calappilia* from the Williston Member of the Ocala Limestone of late Eocene age. Further studies on the Florida fauna disclose two additional new species from the Williston, one of the genus *Calappa* and the second interpreted as belonging to an undescribed but related genus.

The genus *Calappa* is well represented in sediments of middle and late Tertiary age (Fig. 1), but Eocene representatives of this group are virtually unknown. Predicated on the existing literature, the authors infer that the *Calappa* complex arose near the end of the Eocene. The new genus probably arose from the same stock during the early or middle Eocene and presumably became extinct toward the close of this epoch.

The morphological terminology employed throughout this study follows that proposed by Rathbun (1918) and modified subsequently by Holthuis (1958).

Institutional abbreviations used are as follows: Paleontological Research Institution, Ithaca, P.R.I.; Florida State Museum, F.S.M.

All of the specimens here described and figured were collected by Dr. Harold K. Brooks from the bottom of a limestone sink in the Williston Member of the Ocala Limestone locally referred to as "Devil's Den." The sink is in the S.E. ¼, Sec. 26, T. 12 S., R. 18 E., about two miles north and one mile west of Williston, Levy County, Florida. A stratigraphic section of the sink has been presented by Floyd (1962).

Family **Calappidae** Dana, 1852

Subfamily CALAPPINAE Alcock, 1896

Genus *Calappa* Weber, 1795

Calappa robertsi, new species

Figs. 2a-d

Diagnosis. Outer surface of the propodus is distinctly zoned, bearing tubercles and granules. The upper zone (3) bears 15

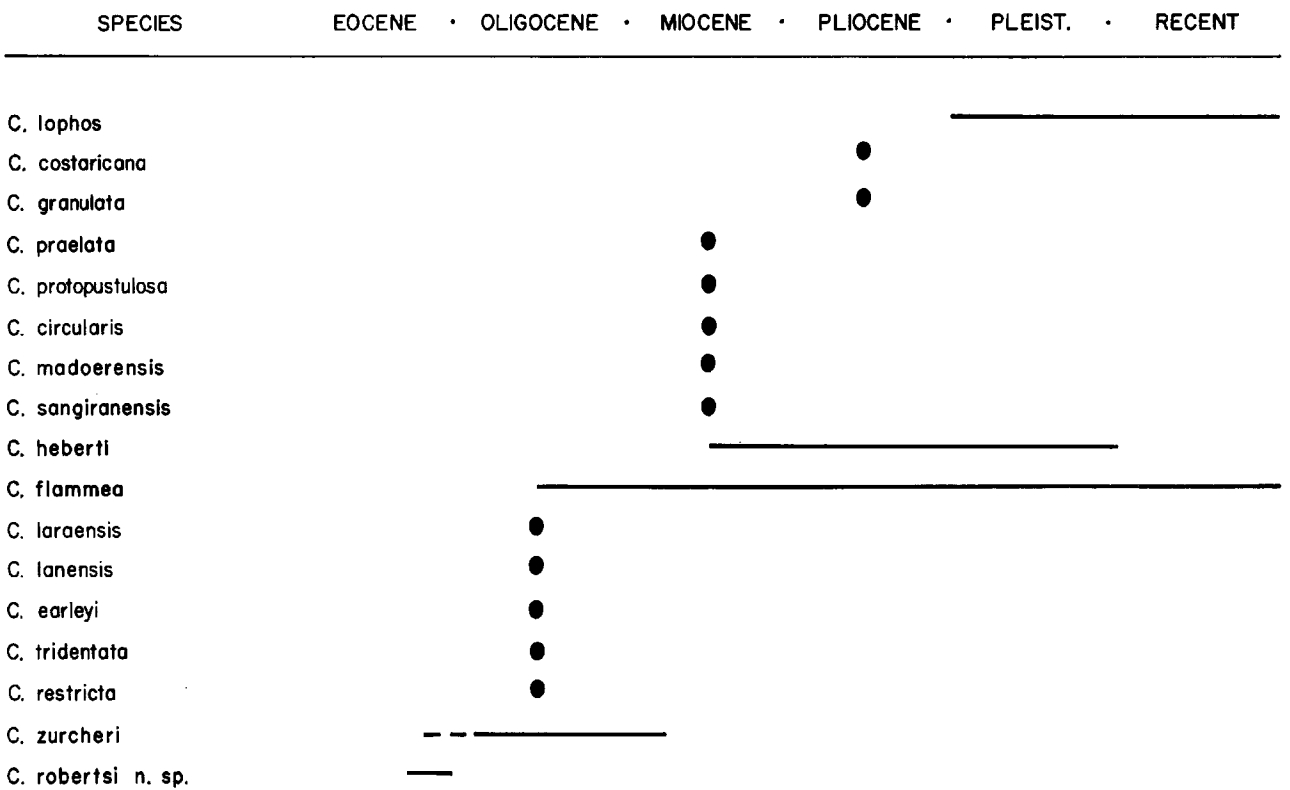

Fig. 1. Stratigraphic distribution of species of *Calappa*.

pustulose tubercles arranged in four rows. Zone 1 is delimited from zone 3 by a sparsely granulated trough. The cristate superior margin of both propodites carries six prominent teeth.

Description. The outer surface of the manus is divided into three distally widening zones which are slightly oblique to the inferior margin. The lowermost zone (1) bears numerous medium granules arranged in sub-parallel rows and is set off from the next higher, second zone by an indistinctly defined ridge. The ridge carries one minor and two major tubercles; the minor tubercle is proximal. On the major (right) propodus, the stout, lobular projection bears the distal major tubercle on its superior slope. The tubercles are finely granular, creating a pustulose appearance. The second zone (2) occupies a shallow trough or sulcus and bears randomly oriented granules similar to, although less abundant than, those in zone 1. The uppermost zone (3) occupies approximately two-thirds of the outer surface and bears 15 major and minor pustulose tubercles arranged in four irregular, sub-parallel rows set among randomly oriented medium granules. The first of these rows delimits zone 3 from zone 2 and consists of one minor and four major tubercles; the minor tubercle adjoins the proximal one. The other three rows, in ascending order, consist of three major tubercles, one minor and three major tubercles, and one minor and two major tubercles, respectively. The minor tubercle in row three adjoins the distal one. The minor tubercle in row four lies on the base of the first (distal) crestal tooth, while the associated major tubercles are situated on the surface of the manus, inferior to and between the third and fourth teeth and the fifth and sixth teeth.

The distal extremity of the propodus bears a large, laterally compressed supra-dactylar projection, the margin of which is finely crenate. The cockscomb crowning the superior margin of both major and minor propodites bears six erect, pointed teeth. A seventh, low, two-topped tooth is situated on the supero-proximal slope. The articular sockets of the propodus, which correspond to processes on the carpus, are deep, and the processes are prominent. A pointed, triangular, lamellated tooth is situated at the infero-proximal extremity of the outer surface. The inferior margin is almost straight and is widest at the infero-proximal extremity, where it is confluent with the lamellar tooth. The margin gradually thins distally for about two-thirds of its overall length until

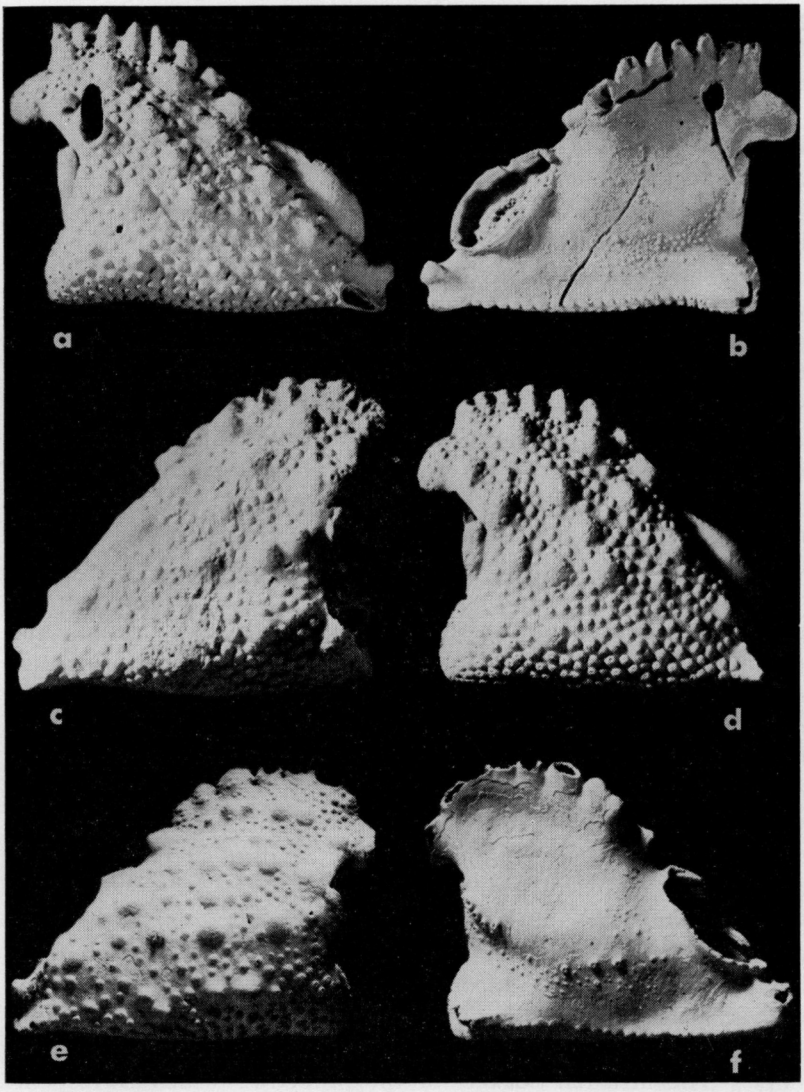

Fig. 2. *Calappa robertsi*, new species. *a*, *b*, external and internal views of left propodus, holotype, P.R.I. No. 6064 (actual height 20.9 mm.); *c*, external view of right propodus, paratype, P.R.I. No. 6065 (actual height 13.5 mm.); *d*, external view of left propodus, paratype, F.S.M. No. 1334 (actual height 16.4 mm.). *Aparnocondylus ocalanus*, new genus and species. *e*, *f*, external and internal views of right propodus, holotype, F.S.M. No. 1338 (actual height, 20.1 mm.).

it begins to grade into the fixed finger, where it is flexed sharply downward and inward. Granulation is random over the broad portion of the margin, becoming resolved at the point of flexure into three parallel rows, which continue on the finger. The inferior inner margin of the propodus is crenate, marked by a slightly elevated row of closely spaced, bead-like granules. The inner surface of the manus is very finely granulated, the granules becoming larger in a concentration adjacent to the inter-digital depression, where they are suggestive of a stridulating organ. An obscure line of widely spaced, larger granules emerges from the center of the concentration and extends diagonally across the upper inner surface of the fixed finger to meet the primary teeth distally. Traces of five primary teeth remain on the superior margin of the finger, extending from the inferior margin of the dactylar orifice to the point where the extremity of the finger has been destroyed. A low, flat, obliquely inclined ridge, extending along the inner surface of the finger adjacent to the inferior margin, emanates from a small node midway between the point of flexure and the extremity.

Granules on the inner and outer surfaces of the fixed finger and along the distal inferior margin of the propodus are punctate, probably having facilitated passage of tufts of sensory hairs during life.

The upper outer surface of the carpus bears medium granules and at least one row of pustulose tubercles sub-parallel to the superior margin; the inner surface bears fine granules only. The superior margin is arcuate and crenate, bearing an elevated row of closely spaced, small granules which become progressively larger distally. The supero-distal extremity terminates in a short, sharp spine. The articular process at the superior margin of the propodal orifice is elongate and prominent. The outer edge of the orifice bears a poorly defined row of small, bead-like granules.

The supero-distal external surface of the merus is coarsely granular between the transverse, wing-like expansion and the distal margin. The upper portion of the expansion is depressed and flat. The expansion bears at least three broad, prominent, pustulose teeth which are inclined ventrally. Like the carpus, the superior margin and the outer edge of the carpal orifice are both finely crenate.

Remarks. At the present time *Calappa robertsi* n. sp. is the only identifiable North American Eocene representative of the

genus *Calappa*. Of the Recent species examined, only two show close affinities with this new species. *Calappa gallus* (Herbst) differs in the less distinct zonation of the manus; no zone 2 sulcus; fewer teeth comprising the cockscomb, which is more highly elevated; and the greatly reduced infero-proximal spine and supra-dactylar projection. The propodus of *C. angusta* Milne-Edwards is much more tuberculate; zone 2 is not depressed and bears several tubercles in addition to granules; the inferior margin is sharp and crenate; and the cockscomb extends distally farther, relative to the supra-dactylar projection.

Measurements of Holotype. Overall length 24.9, height 20.9, sub-length 21.9, sub-height 7.4 mm. The overall length of the propodus, as defined here, is the distance along the inferior margin from the distal end of the fixed finger to the infero-proximal extremity. The height is the greatest perpendicular distance between the superior and inferior margins. The distance between the inferior margin of the dactylar orifice and the inferior point of articulation with the carpus is referred to as the sub-length. The sub-height is the shortest distance between the inferior margin of the dactylar orifice and the inferior margin of the propodus.

Measurements of Paratypes. The measurements of paratype F.S.M. No. 1334 (left propodus) are as follows: overall length 19.5, height 16.4, sub-length 17.3, sub-height 6.0 mm. The remaining specimens in the paratypic lot are fragments. All of the fragments appear to belong to individuals of the same size as, or smaller than, the specimen represented by the holotype.

Type Depositories. The holotype and one paratype have been deposited in the Paleontological Research Institution collections, catalogue numbers 6064 (left propodus) and 6065 (right manus), respectively. The remaining paratypes are in the Florida State Museum collections at the University of Florida, catalogue numbers 1334 (left propodus), 1335 (left manus; fragment), 1336 (left merus; fragment), and 1337 (right carpus; fragment).

Distribution. One left propodus was collected by the senior author from a limerock quarry at the town of Haile, Sec. 13, T. 9 S., R. 17 E., Alachua County, Florida; Williston Member, Ocala Limestone, Upper Eocene.

Etymology. The authors take great pleasure in naming this new species in honor of Henry B. Roberts of the United States National Museum.

Subfamily indet.

Genus *Aparnocondylus,* new genus

Definition. The calappid genus *Aparnocondylus* is closely related to the genus *Calappa* Weber, 1795. The new genus may be easily distinguished from all genera in the subfamily Calappinae by the absence of a stout, lobular projection on the outer surface of the propodus in the region where the fixed finger joins the manus. The propodus is laterally compressed, arcuate in cross-section, and the superior margin of the manus forms a high dentate crest.

Etymology. From Greek, *aparnos* (denying utterly) and *kondylos* (masculine, a knob or prominence).

Type Species. Aparnocondylus ocalanus, new species.

Remarks. Based on the limited material available, the authors do not feel justified in assigning the monotypic genus *Aparnocondylus* to a subfamily at this time, although the observed characteristics appear to warrant the erection of a new subfamily. That the asymmetry of propodites exhibited in all living genera of Calappinae had become established in the Eocene is confirmed by *Calappa robertsi* new species (see Fig. 2c). However, *Aparnocondylus* is interpreted as indicative of a more primitive evolutionary condition. It is improbable that the type of *A. ocalanus* represents a reversal of asymmetry associated with pathological malformation.

Aparnocondylus ocalanus, new species
Figs. 2e-f

Diagnosis. The outer surface of the propodus has low tubercles and granules. Zone 2 is a non-depressed plain. Zone 3 bears 25 tubercles; the zone is divisible into four rows of minor and major tubercles. The areas between rows three and four and row four and the crest are arcuate and devoid of tubercles.

Description. The outer surface of the manus is divided into three major zones, which are oriented slightly oblique to the plane of the inferior margin. The lowermost zone (1) bears many large, closely spaced, randomly arranged granules, which also cover the outer surface of the fixed digit. Proximally, the zone is narrow, originating distal to the infero-proximal tooth but rapidly widening and terminating distally at the inferior margin of the dactylar orifice. Zone 1 is delimited from the next higher zone by a row of

five very finely granular tubercles. The proximal pair is composed of one minor and one, slightly inferior and distal, major tubercle; the distal triplet has one major tubercle between two minor tubercles. Zone 2 occupies a flat, narrow plain of uniform width and bears few small and fewer medium granules. The uppermost zone (3) includes a little over one-half of the outer surface and bears 25 major and minor tubercles arranged in four irregular rows in a ground-mass of medium and small granules. The first of these rows sets off zone 3 from zone 2 and consists of four major and two minor tubercles. The minor distal tubercle is adjacent to the outer dactylar furrow; the other minor tubercle adjoins the proximal major one. Row two contains two groups of three tubercles, a proximal group of one major between two minors, and a medial group of three minor tubercles. Of the seven major tubercles in row three, the distal two are joined, one obliquely above the other, and a smaller major tubercle lies above and between two large ones in the central portion of the manus. Row four consists of one minor and five major tubercles arranged in three groups. The minor tubercle is proximal and is associated with two smaller major ones; a single major tubercle occurs on the inferior basal slope of the supra-dactylar projection; a medial pair of major tubercles lies between the other groups. While the first two rows are straight and parallel, the third curves slightly and the fourth is strongly arcuate, parallel to the superior margin of the manus. Rows one, two, and three are closely spaced, but row four is separated from the underlying row and the overlying cockscomb by uniformly wide, arcuate, granulated areas.

The superior margin of the propodus bears a cockscomb of seven teeth. The distal pair appear to have been partially fused and the proximal tooth is bifid. A prominent, laterally compressed, supra-dactylar projection marks the supero-distal extremity. The outer surfaces of the teeth and the supra-dactylar projection bear medium to small granules.

The inferior margin of the propodus is broadly arcuate. The proximal portion occupies approximately two-thirds of the overall length of the propodus and is broad, flat, and weakly granulated; the distal one-third is tapered and rounded. Strong granules on the distal third form two parallel rows which continue along the inferior margin of the fixed digit. A third, weaker row, parallel to the other two, delimits the entire inferior margin from the inner

surface of the manus. It is more strongly developed toward both extremities, and is terminated distally, immediately below the emergence of a salient ridge on the inner surface of the fixed finger. A broad, triangular, lamellar tooth rises from the infero-proximal extremity. The fixed digit curves sharply and obliquely inward.

The articular processes on the proximal slope of the propodus, which correspond to depressed areas on the carpus, are triangular and bulbous. Each process bears a deep pit on its expanded articulating surface, probably accommodating a comparable projection on the corresponding carpal process.

The inner surface of the propodus is locally granular. Two rows of granules emerge from the top of the inner dactylar furrow, curving a short distance obliquely downward and proximally. The superior row contains one small and four large granules; the proximal large granule is inserted immediately above the small one. The inferior row consists of medium granules grading into a weak concentration of randomly oriented, small granules which occupies the distal one-half of a shallow trough. The trough is almost straight and extends from the inferior margin of the dactylar orifice, where it is grooved, to the inferior articular socket on the proximal slope. A weakly defined ridge, bearing widely spaced medium granules, originates on the inferior slope of the trough at the base of the fixed finger and extends distally along the axis of the digit. A broad, slightly elevated, arcuate platform curves across the manus, above the trough, from the supra-dactylar projection to the inferior margin of the carpal orifice. A horizontal row of three large, well separated granules is situated on the inferior slope of the platform, midway between the extremities. A broad, shallow, irregularly ovate depression occupies the distal area between the cockscomb and the arcuate platform.

Granules on the outer surface of the fixed finger, as well as the ones on and near the inferior and distal margins of the propodus, are punctate, indicating the presence of heavy concentrations of sensory hairs during life. The larger granules on the inner surface are punctate also.

Remarks. Although *Aparnocondylus ocalanus* bears in common with species of *Calappa* similar proportions, high cristate superior margin, and a tuberculate zoned surface, the absence of a lobular projection on the right propodus of *A. ocalanus* should serve to distinguish the new species.

Measurements of Holotype. Overall length 24.1 mm., height 20.1 mm., sub-length 21.5 mm., sub-height 7.2 mm.

Type Depository. The holotype has been placed in the Florida State Museum collections at the University of Florida, catalogue number 1338.

Etymology. The specific name, *ocalanus,* reflects the fact that the species is from the Ocala Limestone.

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