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**CORALAXIUS ABELEI, NEW GENUS AND NEW SPECIES
(CRUSTACEA: DECAPODA: THALASSINIDEA:
AXIIDAE): A CORAL-INHABITING SHRIMP
FROM THE FLORIDA KEYS AND THE
WESTERN CARIBBEAN SEA**

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Abstract.—*Coralaxius abelei*, gen. et sp. nov., is described from specimens collected from 11 to 76 m on coral reefs or coralline rock habitat, off Carrie Bow Cay, Belize, and Key Largo in the Florida Keys. The new genus closely resembles *Axiopsis* (*Paraxiopsis*) but is separated chiefly by the reduced gill formula, a broad bilobed appendix masculina in the male, biunguiculate dactyls on the last 3 pereopods, and eyestalks longer than the rostrum. The species also exhibits striking cheliped armature, differing from all other Axiidae in the western Atlantic.

In May and early June 1979 the Office of Coastal Zone Management undertook a geophysical and biological survey for NOAA of the deep water coral reefs within the Key Largo Florida Marine Sanctuary. The Sanctuary extends from the State of Florida Territorial Sea, off Key Largo in the upper Florida Keys, seaward to the 100 m isobath, and encloses an area 20 miles long by 5 miles wide (approximately 33 × 8 km). The 53 specimens of decapod crustaceans collected during reconnaissance dives using a manned submersible in this survey were placed at the ^{second} ~~first~~ author's disposal. The collection contained several important range extensions and at least 4 new species. One of the specimens, a female, was a thalassinidean shrimp with affinities to the genus *Axiopsis* (*Paraxiopsis*), which differed from the 19 other axiids recorded from the western North Atlantic (de Man 1925; Boesch & Smalley 1972; Williams 1974) in the genera *Axius*, *Axiopsis*, and *Calocaris* *s.l.*

The description of the new species had already been accepted for publication when the second author, in conversation with the first, discovered that the latter had found and prepared a description of the same species using material collected by the Smithsonian Institution's Investigations of Marine Shallow-Water Ecosystems team at Carrie Bow Cay, Belize. The first author had placed his material in a new genus based primarily on branchial formula and the form of the male pleopod 2. Accordingly, we combined our respective descriptions into this report, thereby preventing certain synonymy.

Abbreviations are as follows: **Rcl** (rostral spine-carapace length), **cw** (widest part of carapace), **ch** (highest part of carapace), **Tl** (rostral spine tip to telson posterior margin). Paratypes have been deposited in the Rijksmuseum van Natuurlijke Historie, Leiden (RNHL) and British Museum (Natural History) (BMNH).

Coralaxius, new genus

Diagnosis.—Uropodal exopod with distinct, spined suture; posterior dorsal carapace region rounded, smooth, without median carina; rostrum sharply produced, triangular, margins unarmed, shorter than eyestalks, situated at lower level from and discontinuous with gastric region; antennal acicle small, flattened, distally trispinose; eyes pigmented; pereopods 3–5 biunguiculate; chelipeds unequal, fingers of larger chela longer or shorter than palm; maxilliped 2 with simple epipodite; maxilliped 3 with simple podobranch and epipodite; 2 arthrobranches on maxilliped 3, and pereopods 1–4, gills hardly branched; pleopod 1 of male bilobed, with reduced stylamblys, pleopod 2 with rod-shaped appendix interna and broad, bilobed appendix masculina.

Remarks.—The new genus is close to *Calocaris* Bell, 1853, *Calastacus* Faxon, 1893, and the genus *Axiopsis* s.l. Borradaile, 1903. For *Coralaxius*, the greatest weight is given to the very different gill arrangement (Table 1), to the unusual form of the appendix masculina of pleopod 2 in the male, and to the presence of biunguiculate dactyls on the last 3 pairs of pereopods. These and other differences are summarized in Table 2 using data from original descriptions or examination of type-specimens in the taxa under consideration. For several of the characters information was not available in the description, and the figures provided could be misconstrued, hence the data are somewhat provisional.

Etymology.—The generic name is derived from "Coral" where the shrimp were found, the "axius" from the type-genus in the Axiidae. Gender: masculine.

Coralaxius abelei, new species

Figs. 1–6

Material.—Holotype: female, Rcl 4.5, cw 2.6, ch 2.7, Tl 12.8 mm; Atlantic Ocean, French Reef, off Key Largo, Monroe Co., Florida; 25°02'N, 80°19'W; 76 m; by manipulator from Research Submersible Johnson-Sea-Link I; 3 June 1979; G. Shinn collector. USNM 173629.

Allotype: Male, Rcl 2.7, cw 1.3, ch 1.4, Tl 7.6 mm; Caribbean Sea, Carrie Bow Cay, Belize; 11 m; by hand, from live specimen of *Porites* coral; 2 February 1978; R. Larson collector. USNM 170857.

Paratypes: (All localities Carrie Bow Cay, Belize.) 1 female, Rcl 3.5, cw

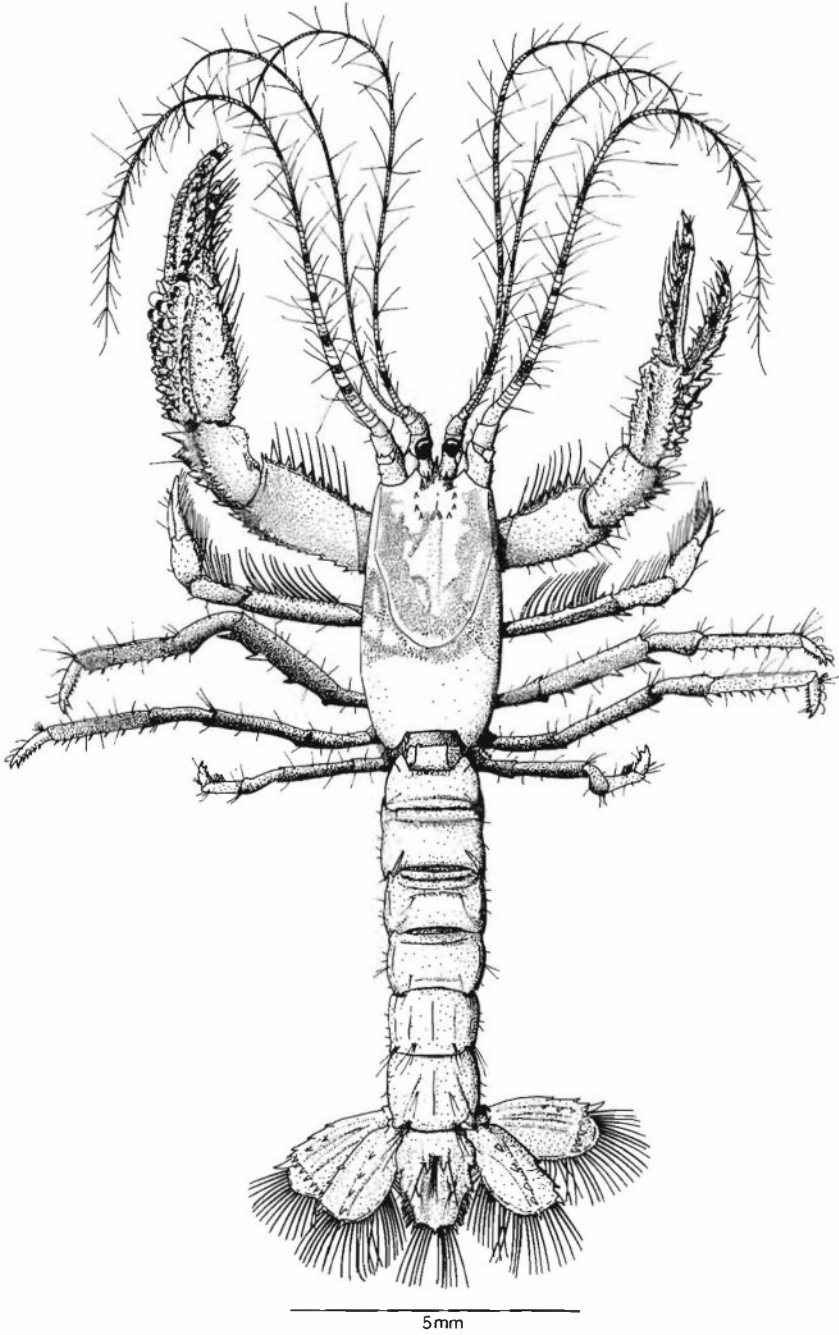


Fig. 1. *Coralaxius abelei*: Holotype female in dorsal view.

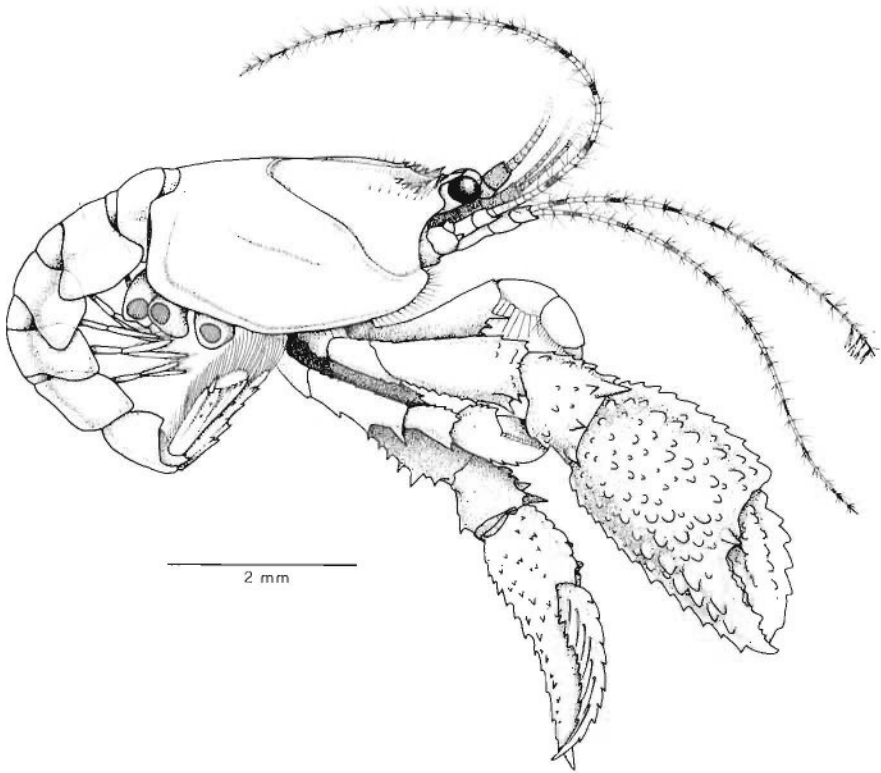


Fig. 2. *Coralaxius abelei*: Adult in lateral view, pereopods 3-5 removed.

1.7, ch 1.7, Tl 9.6 mm; 15 m; 7 February 1978; R. Larson & B. Kensley collectors. USNM 170856.—1 male (dissected & illustrated), Rcl 2.8, cw 1.3, ch not available, Tl 9.5 mm; 2 females, Rcl 3.3, 2.6, cw 1.5, 1.1, ch 1.6, 1.4, Tl 9.6, 7.5 mm, respectively; 15 m; 7 February 1978; R. Larson & B. Kensley collectors. USNM 170858.—1 male, Rcl 2.9, cw 2.1, ch 1.5, Tl 9.0; 2 females, Rcl 4.5, 4.3, cw 1.8, 2.4, ch 2.5, 2.2, Tl 13.4, 10.5 mm, respectively; 26 m; 23 March 1978; R. Larson & B. Kensley collectors. USNM 171765.—1 male, Rcl 2.7, cw 1.4, ch 1.5, Tl 7.7 mm; 26-30 m; 26 March 1978; R. Larson & B. Kensley collectors. USNM 171766.—1 male, Rcl 2.3, cw 0.9, ch 1.3, Tl 6.4 mm; 1 female, Rcl 3.8, cw 1.5, ch 2.0, Tl 9.9 mm; 26 m; 27 March 1978; R. Highsmith & B. Kensley collectors. USNM 171764.—1 male, Rcl 3.5, cw 1.5, ch 2.0, Tl 9.0 mm; 13 m; 28 March 1978; R. Highsmith & B. Kensley collectors. USNM 171763.—2 males, Rcl 4.5 (gonopod illustrated), 4.4, cw 1.4, 2.2, ch 2.0, 2.2, Tl ca. 10.5 (telson broken), 12.2



Fig. 3. *Coralaxius abelei*: Live adult from Carrie Bow Cay, Belize (Photograph by R. Larson).

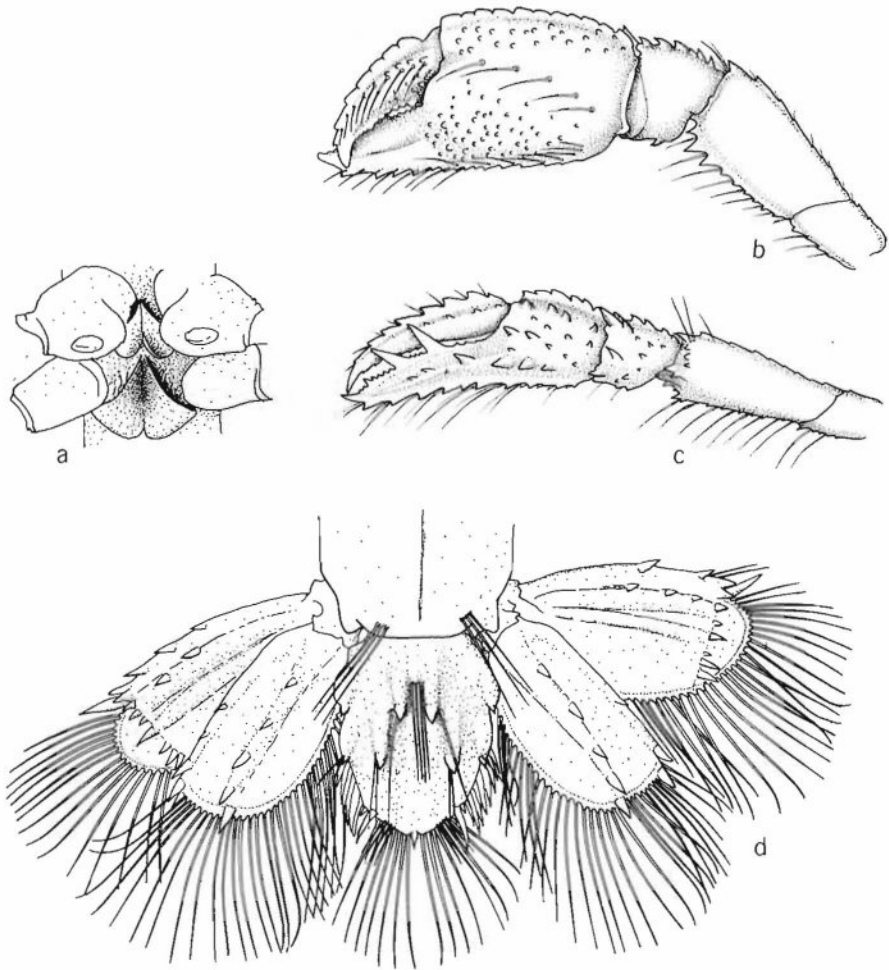


Fig. 4. *Coralaxius abelei*: a, Sternal anterior and posterior processes; b, Larger cheliped, inner view; c, Smaller cheliped, outer view; d, Telson and uropoda.

mm, respectively; 3 females (1 ovigerous), Rcl (5.0), 4.3, 2.5, cw (2.2), 2.2, 1.3, ch (2.2), 2.1, 1.7, Tl (12.5), 11.0, 6.3 mm, respectively; 21 m; 22 March 1979; B. Kensley collector. RMHNL.—2 males, Rcl 4.1, 3.8, cw 2.1, 1.9, ch 1.7, 2.1, Tl 11.8, 11.3 mm, respectively; 28 m; 12 March 1980. B. Kensley collector. BMNH.

Diagnosis.—Characters as for genus with the following additions, suspected to be diagnostic at the species level: gastric region with low, thin,

median carina joining raised, posteriorly bifurcate tooth from which extends posteriorly a rounded ridge; 2 semicircular rows of 5 spines each join with rostral spine and pyramidal tooth to form distinct gastric corona; minor chela with 3 elongate fanglike teeth on cutting edge of fixed finger; major and minor chelipeds heavily armed with short sharp spines and tubercles.

Description.—Carapace smooth, shining; cervical groove distinct, no posterior median carina dorsally; rostrum sharply produced, acutely triangular, margins entire, curving anterodorsally, reaching about half length of eyestalk; carapace in lateral view with dorsum depressed posterior to rostrum, but rising to meet gastric tooth; gastric region sloping anteroventrally, a low median carina joining raised tooth, latter bifurcating gently posteriorly, merging along dorsal midline of carapace into low, rounded, carinate ridge becoming obsolete towards cephalic groove; shallow depression either side of this ridge; on either side of rostral spine, a semicircular row of 5 spines, extending posteriorly and forming with the rostral spine and gastric tooth, a sparsely setose gastric corona; outer orbital angle produced into blunt tooth; anterior carapace margin smooth, oblique ventrally, unarmed; posterior margin rounded dorsally, becoming sinuously concave below, with row of small, plumose setae extending dorsally along this margin to just inside large median notch of posterodorsal margin.

Abdominal somites smooth, shining, with scattered setae dorsally and laterally, either singly or in small tufts; somites 1–5 of about equal length middorsally, somite 6 slightly longer; fifth and sixth, medially carinate, carina of sixth stronger than fifth. Ventrolateral margins of all somites except first and sixth truncately rounded, fringed with hairs; pleuron of first produced posteroventrally into bluntly rounded tooth, that of sixth with posteroventral margin angled, emarginate to accommodate uropodal base.

Eyestalk subglobose proximally, becoming more or less cylindrical distally; cornea well developed, pigmented, wider than stalk, just reaching distal end of basal antennular segment.

Antennular peduncle 3-segmented, extending well beyond tips of eyes; basal article equal to, or slightly overreaching eyestalk, with small spine distoventrally, 3 short spines on medial margin, single spine on convex outer margin; stylocerite about half eyestalk length, with single spinule on distal margin; second article subequal to, third article about $\frac{1}{3}$ of, eyestalk length, both unarmed. Flagella longer than carapace length, heavily setose throughout, inner flagellum thicker than outer.

Antennal peduncle compressed, 3-segmented, basal article with single ventral spine medial to antennal gland opening; second article about half length of first, dorsally bearing small, flattened, bi- or trispinose scalelike acicle, second small articulating scale ventrolaterally; third subequal to first, unarmed; terminal article $\frac{2}{3}$ length of first; flagella heavily setose throughout length, about twice carapace length.

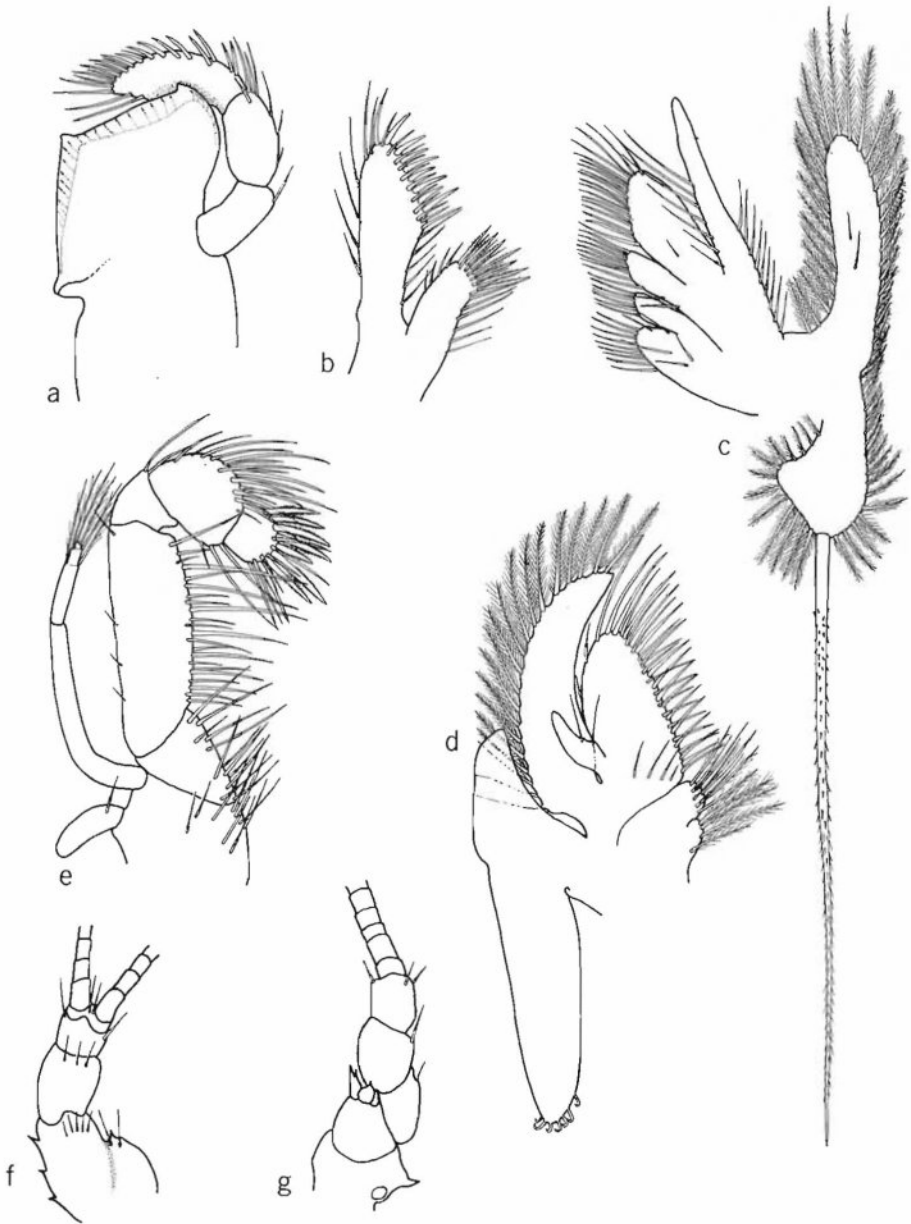


Fig. 5. *Coralaxius abelei*: a, Mandible; b, Maxillule; c, Maxilla; d, Maxilliped 1; e, Maxilliped 2; f, Antennular peduncle; g, Antennal peduncle.

Mandibular palp 3-segmented, 2 basal segments subequal in length, terminal segment somewhat longer, armed with simple marginal setae; cutting edge with straight hyaline border, short triangular tooth at outer and inner distal angles.

Maxillule bilobed, endopod lacking, basal endite armed with simple spines and setae, coxal endite tipped with fringed spines. Maxilla well developed, endopod present, basal and coxal endites bilobed, heavily armed with numerous setae and spines; scaphognathite as illustrated, posterior lobe bearing elongate modified seta armed with tiny spinules proximally, becoming setulose distally. Maxilliped 1 bearing well developed epipod, posterior lobe carrying several hooked spines; exopodal lobe elongate, endopod much reduced; basal and coxal endites armed with numerous processes. Maxilliped 2 with unbranched epipod; exopod distally setose, endopod heavily setose and spinose, terminal segment bearing fringed spines. Maxilliped 3 with unbranched podobranch plus epipod and 2 arthrobranchs; endopod pediform, outer 5 segments densely setose ventrally and mesially, with long translucent setae; coxa with tuft of setae plus single large spine mediodistally, basis similarly armed, ischium and merus with row of several spines along inner margin, merus with additional spine at outer distal angle, carpus with large spine at inner distal angle, dactyl with same at tip; exopod 2-segmented, unarmed, extending nearly to tip of antennal peduncle.

First pereopods large, inflated, chelate, asymmetrical; larger robust, smaller more scissorslike, both heavily covered with numerous large teeth, spines, and sharp or rounded tubercles; merus thin, flattened, armed on medial margin with about 10 large, forward-directed spines, increasing in size distally, with interspersed translucent setae; posterior margin noticeably dentate, more spinulose; carpus about half meral length, inflated, armed dorsomedially and posteriorly with irregular rows of acute spines, largest at dorsodistal margin, and outer distal angle. Smaller chela slightly shorter, much narrower than larger chela; elongate, outer surface of hand with numerous large and small, forward-directed, blunt or sharp tubercles, placed generally in 3 longitudinal rows; dorsal margin a thin, crenulate crest formed by connected blunt, inwardly-curving teeth; inner palm with scattered curved spinelike teeth and larger tubercles, 5 long, translucent setae extending from oblique posterior row of spines; similar row of setae along inner ventral margin, arising from bases of acute curved teeth delineating ventral margin of palm and fixed finger; fingers up to twice as long as palm, tips curved inward, meeting along entire length except for small gape near articulation; outer surface of fixed finger with 2 rows of elongate, thin, knifelike tubercles, cutting edge irregularly dentate, with 3 long, thin, fang-like spines, curving outwardly and over upper outer margin of dactyl; inner surface with longitudinal row of small, blunt teeth extending to finger tip; dactyl with high, thin longitudinal crest formed by series of about 9 sharp

inwardly-curving, connected teeth; thin rounded ledge with series of blunt teeth paralleling those on both outer and inner surfaces; second series of subacute tubercles along lower inner margin of dactyl; immediately above latter, 9 elongate, translucent setae curving down and inwardly over gape, meshing with lower setae on propodus with fingers closed. Larger chela robust, inflated proximally, thinning distally; outer surface of hand armed with numerous, thick, rounded or subacute, raised tubercles, those on lower margin and near gape more acute, directed obliquely forward; dorsal margin a crenulate crest of inwardly-curving tubercles; inner palm covered with small, pustular tubercles and spinules; row of thin, translucent setae extends from lower inner margin of palm upward toward dactylar-propodal junction, this area distinguished by large, blunt white tooth in some specimens; fingers short, about equal to or shorter than length of palm, curved inward, upper tip crossing over lower, meeting along entire length, without gape; outer surface of fixed finger with irregular row of elongate tubercles; cutting edge bluntly dentate in addition to 2 large rounded teeth; inner surface with several small, elongate blunt teeth; dactyl with superior dorsal crest formed by overlapping platelike teeth; inner surface flattened, smooth, with scattered tubercles and long, translucent setae as in minor chela; outer surface with rough, longitudinal ridge formed by irregularly fused, blunt tubercles, becoming thin rounded ridge distally toward finger tip; cutting edge irregularly dentate, with 3 large teeth proximally at propodal junction.

Second pereopod chelate, more or less flattened, almost reaching distal margin of carpus of pereopod 1. Ischium with distoventral spine; merus thin, anteriorly with 3 or 4 unequal ventral spines, plus another at posteroventral angle; carpus somewhat expanded, dentate dorsal crest supporting long, translucent setae, single strong ventral spine; hand inflated, with dentate, setose dorsal crest, plus crenulate ridge on outer surface at dactylar junction; fingers slightly longer than palm, serrate on cutting edges, upper tip crossing over lower, without gape; fixed finger with several large teeth along ventral margin; dactyl with dentate crest bearing translucent setae.

Pereopods 3 and 4 generally flattened, subequal in length; ischia with rectangular lobe on ventrodistal margin; pereopod 3 merus similar to that of pereopod 2, but 3 ventral spines on posterior margin instead of anteriorly, lacking spine on posteroventral angle; carpus unarmed, about half length of propodus; propodus with 7-9 ventral spinules plus 2 larger spines at distoventral angle; dactyl $\frac{2}{5}$ length of propodus, with 5 movable spinules, biunguiculate.

Pereopod 4 merus and carpus unarmed; propodus with 6 or 7 ventral spinules, plus 3 elongate fringed spines and thick tuft of setae posteriorly at distoventral angle; dactylus half length of propodus, otherwise similar in armature to pereopod 3; biunguiculate.

Pereopod 5 shortest, more cylindrical than preceding, reaching to about

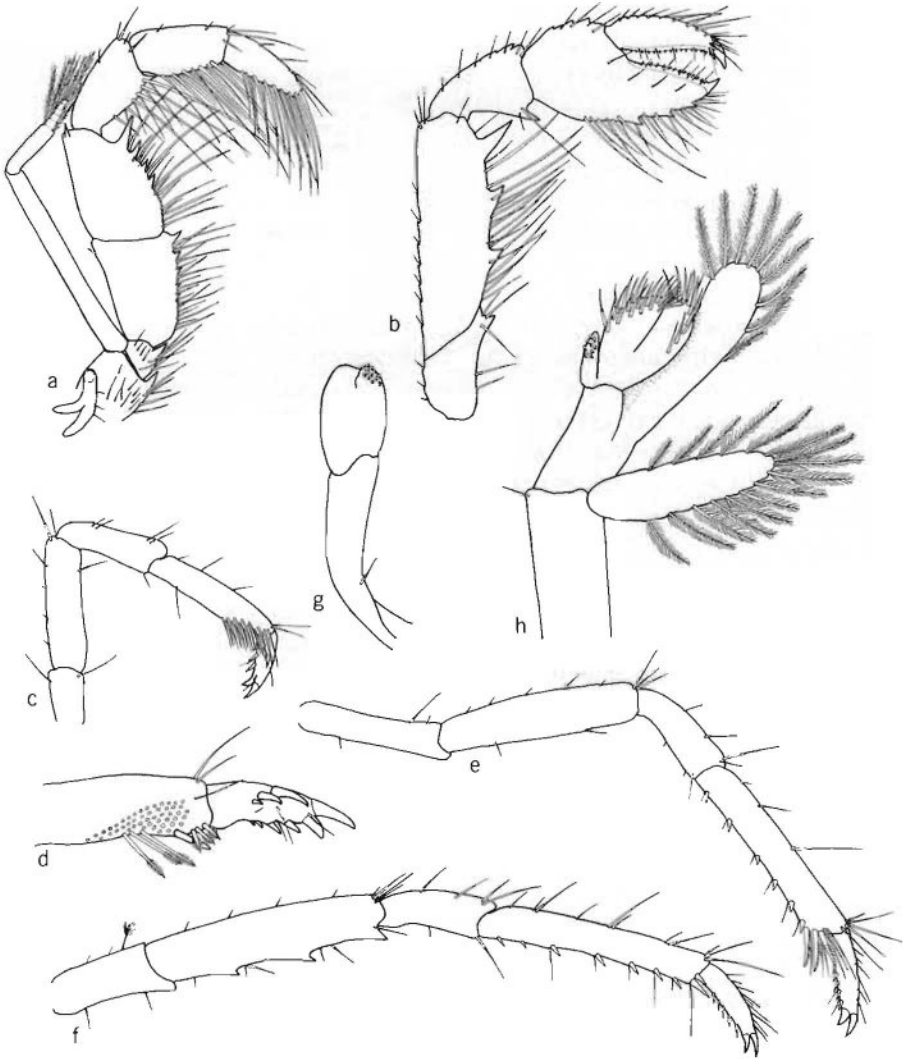


Fig. 6. *Coralaxius abelei*: a, Maxilliped 3; b, Pereopod 2; c, Pereopod 5; d, Pereopod 5, distal propodus (some spines removed) and dactylus; e, Pereopod 4; f, Pereopod 3; g, Pleopod 1 ♂; h, Pleopod 2 ♂.

end of carpus of pereopod 4, all segments unarmed except propodus, latter bearing ventrodistal cluster of simple spines, and distoventral tuft of setae more elongate than preceding leg; dactylus slightly less than half propodal length, biunguiculate, with 2 ventral and 2 lateral spinules. Pereopods 1–4 each with 2 arthrobranches, gills absent from pereopod 5.

Large sternal plate situated between coxae of pereopods 3 and 4; anterior process smaller, raised, appearing inversely cordate, strongly bifurcate, with 2 pronounced median ridges coalescing anteriorly into point; posterior process much larger, similarly shaped, with bifurcation less pronounced, developed posteriorly into 2 inflated lobes meeting with deep medial cleft.

Pleopods on somites 1 through 5; those on somite 1 uniramous in female, bilobed in male, remaining pleopods biramous in both sexes, longer endopods of each with appendix interna. Male pleopod 1 2-segmented, distally spatulate, distal inner marginal lobe with about 12 tiny hooked spines (reduced stylamblys); pleopod 2 endopod with short cylindrical appendix interna bearing several tiny hooked spines, appendix masculina broad, bilobed, armed with numerous simple distal spines.

Tail fan heavily spinose/setose, number and position of spines somewhat variable. Uropodal exopod with 2-4 spines on outer margin, larger movable spine at transverse suture; latter with 5-7 heavy spines of varying size; dorsal surface with 2 distinct, rounded longitudinal ridges, outer bearing 2-4 spines, inner unarmed; uropodal endopod with single dorsal ridge medially, bearing 4 spines plus spine on endopodal margin; no transverse suture. Telson armed with 2 proximal spines terminating submedial carinae, 2 distal spines terminating intermedial carinae, 2 marginal spines on each side; posterior margin with 5 movable spines, longest submarginally at posterolateral angle; series of stiff setae on posterolateral margin from level of second marginal spine distally to posterolateral angle; 4 or 5 short setae on each side of posterior median spine, superior to elongate marginal setae; several long setae arising from dorsal surface of telson at or between bases of dorsal spines.

Color.—The specimens from Carrie Bow Cay when alive were blood red, with the legs and antennal and antennular flagella having alternating red and white bands. The Florida specimen when received was overall light ochreous yellow, overlain with a marbled pattern of cadmium yellow on the cephalothorax. The antennular and antennal flagella were irregularly banded with dark reddish-purple. Tubercles, sharp spines, and the superior crests on either hand of the first chelipeds were variously red, reddish-brown, reddish-tan, or shining white. The elongate translucent setae on the meri of pereopods 1 and 2, as well as on the telson, appeared clear golden under the microscope. Eye corneas were black. These colors, with the exception of the banding on the sensory flagella, have almost completely faded in alcohol.

Remarks.—*Coralaxius abelei* is immediately distinguishable from all other western Atlantic axiids by a combination of morphological characters. These include the short, sharp rostrum, the reduced, trispinose antennal acicle, the corona of gastric spinules, the lack of submedian and lateral carinae on the gastric region, by the armature of fanglike spines on the

minor cheliped, the heavy spinous and tuberculate armature on both hands of pereopod 1, by the reduced gill formula (Table 1) and by the shape of the male second pleopod. From a perusal of the literature, it seems possible that the minor cheliped of the first pereopod may eventually assume greater taxonomic importance when genera of the group are subsequently redefined. Certainly, the species described here is distinct from all other axiids in this respect.

Sexuality.—Some axiids exhibit hermaphroditism, but the specimens of *C. abelei* gave no indication of such. The males all possessed an appendix masculina, the females ovipores on the coxae of the third pereopods. The presence in females of a small pair of uniramous pleopods on the first abdominal somite is also easily discernible. The latter feature, however, is not always restricted to females in other axiid genera. For example, according to de Man (1925), *Axiopsis* (*Paraxiopsis*) *brocki* males may have rudimentary first pleopods, but are distinguished by the appendix masculina on pleopod 2; females have uniramous first pleopods and ovipores on pereopod 3 coxae. *Axiopsis* (*Paraxiopsis*) *bisquamosa* males lack first pleopods, possess an appendix masculina, while the females bear uniramous first pleopods and the usual ovipores. The female gonopores were not described for either species. In *Coralaxius*, the male first pleopod is simple, but is certainly not rudimentary.

The situation is more variable in *Calocaris* and *Calastacus*. Boesch & Smalley (1972) noted the presence of uniramous pleopods on the first abdominal somite of *Calocaris* (*Calastacus*) *hirsutimanus*, but stated that all five of their specimens were males, based on the presence of an appendix masculina on pleopod 2. Williams (1974) found uniramous pleopods only in (apparently) functional females of *Calocaris* (*Calastacus*) *jenneri*; the males of that species, and those of *C.* (*Calastacus*) *oxypleura*, lacked pleopods on the first abdominal somite. St. Laurent (1972) described as an hermaphroditic male the new species *Calastacus laevis*, which had a modified uniramous first pleopod, no appendix masculina on pleopod 2, easily observed gonopores on the coxae of both pereopods 3 and 5, and (based on remnants of ovulatory membranes on the pleopods) had apparently been ovigerous shortly before its capture. Clearly, there is substantial variation in regard to this feature within the genera as presently defined in the Axiidae.

Ecology.—The Belize specimens inhabit living coral, especially species of *Porites*, living on the outer slope of the barrier reef off Carrie Bow Cay. The Florida specimen inhabited a crevice in a piece of coralline limestone rock collected from a bottom of coralline rubble and shell hash, with localized dense algal cover. The depth range for the species extends from 11–76 m.

The long, forward-directed setae along the lower margins of the meri of the first and second chelipeds, and the basketlike effect produced by similar

Table 1.—Comparison of morphological characters in type-species of selected genera and subgenera in the Axiidae.

	<i>Calocaris</i>	<i>Calastacus</i>	<i>Axiopsis</i>		<i>Coralaxius</i>
			(<i>Axiopsis</i>)	(<i>Paraxiopsis</i>)	
Type-species	<i>C. macandreae</i> Bell, 1853	<i>C. stillirostris</i> Faxon, 1893	<i>A. (A.) serratifrons</i> (A. Milne Edw., 1873)	<i>A. (P.) brocki</i> (de Man, 1888)	<i>C. abelei</i> , sp. nov.
Rostrum	Triangular, margins dentate	Styliform, margins unarmed	Triangular, margins dentate	Triangular, margins dentate	Triangular, margins unarmed
Carapace	Keeled to posterior border	Not posteriorly keeled	Not posteriorly keeled	Not posteriorly keeled	Not posteriorly keeled
Eyestalk:rostrum	Rostrum longer than eyestalk	Rostrum longer than eyestalk	Rostrum equal or slightly longer than eyestalk	Rostrum longer than eyestalk	Rostrum shorter than eyestalk
Eyes	Unpigmented	Unpigmented	Pigmented	Pigmented	Pigmented
Acicle	Short	Long	Long	Short	Short
Chelipeds (First pair)	Unequal; fingers longer than palm	Symmetrical; fingers shorter than palm	Unequal; fingers shorter than palm	Unequal; fingers shorter than palm	Unequal; fingers longer or shorter than palm
Pleopod 1	Single lobe, no stylamblys	Bilobed, subspatulate; no stylamblys	Absent	Rudimentary, no stylamblys	Bilobed, reduced stylamblys
Pleopod 2					
Appendix masculina	Absent	Absent	Rod-shaped	Rod-shaped	Broad, bilobed
Appendix interna	Short Hermaphroditic	Reduced Not hermaphroditic	Slender, thin Not hermaphroditic	Absent Not hermaphroditic	Rod-shaped Not hermaphroditic
Telson	With spinose dorsal keels	Without spinose dorsal keels	With spinose dorsal keels	With spinose dorsal keels	With spinose dorsal keels
Pereopods 3–5 dactyls	Simple	Simple	Simple	Simple	Biunguiculate

setae on the fingers of the major chelipeds, suggest that *C. abelei* uses such setae either as a mechanical or sensory aid, perhaps by shovelling and sifting through benthic detritus as it moves along the bottom. The large, fanglike spines on the minor cheliped also suggest a carnivorous habit. The rocky, limestone habitat seaward of a large, deep, coral bioherm is a biotope that has been little sampled by conventional trawling and dredging gear from the surface. Further collections by SCUBA or submersible may produce more specimens and concomitant observations on their ecology.

Discussion.—*Coralaxius* shares with the subgenus *Paraxiopsis* several characters which allow both taxa to be distinguished from other genera and subgenera. This combination includes 1) the transverse suture on the uropodal exopods; 2) the reduced antennal acicle; 3) the pigmented, well-developed eyes; and 4) the depressed gastric region of the cephalothorax (*vide* de Man 1925). The absence of a median dorsal keel on the posterior carapace surface is also a character shared by *Coralaxius* and *Paraxiopsis*, and may remain a valid character within both these taxa, although Boesch & Smalley (1972), and Williams (1974) deprecate its taxonomic value in the closely related *Calocaris* and *Calastacus*. There remains much uncertainty, however, regarding the limits of these genera and subgenera, with *Calocaris* (*Calocaris*), *Calocaris* (*Calastacus*), *Axiopsis* (*Axiopsis*), and *Axiopsis* (*Paraxiopsis*) being defined on characters which for the most part are exclusive, but which also seem to be shared by 1 or 2 species within each taxon (see Tables 1 and 2). Boesch & Smalley, for example, point out that the similarities between some members of *Calocaris* (*Calastacus*) and *Axiopsis* (*Axiopsis*) are greater than those between the former taxon and the nominate subgenus of *Calocaris*. Recently St. Laurent (1972), in describing a new species of *Calastacus*, provided an emended diagnosis and re-established the genus *Calastacus*, *sensu* Faxon (1893). However, in applying her emended definitions and thereby separating the genera *Calocaris* and *Calastacus*, only 2 of the 9 species known at that time could be relegated to *Calastacus*. The remaining 7 species of *Calocaris* (*Calastacus*) *s.l.* plus the 2 subsequently described by Williams (1974), await the establishment of one or more new genera, if St. Laurent's revision is to be accepted.

The subgenus *Axiopsis* (except *A. (A.) habereri* Balss) is at present separated from *Calocaris/Calastacus* chiefly by the absence of a postcephalic-groove carina on the cephalothorax. Unfortunately, *Calocaris* (*Calocaris*) *aberrans* Bouvier also lacks this carina, thus differing from other members of its genus. *Axiopsis* (*Axiopsis*) differs from *A. (Paraxiopsis)* in possessing an elongate, well-developed antennal acicle, a character which also distinguishes species of *C. (Calastacus)* from *C. (Calocaris)*. It is clear that these genera and subgenera have been established using ambivalent morphological characters, a fact long noted by students of the family, including de Man himself (1925).

Table 2.—Branchial formulae in selected genera and subgenera of the family Axiidae.

		Maxillipeds			Pereopods				
		1	2	3	1	2	3	4	5
<i>Calocaris macandreae</i> *	Epipod & Podobranch	—	E + 1	E + 1	E + 1	E + 1	E + 1	E	—
	Arthrobranchs	—	1	2	2	2	2	2	—
<i>C. macandreae</i> †	Epipod & Podobranch	E	O + 1	O + 1	E + 1	E + 1	E + 1	E	—
	Arthrobranchs	—	1	2	2	2	2	2	—
<i>Calastacus stilirostris</i> (Faxon, 1893)	Epipod & Podobranch	—	E	E + 1	E + 1	E + 1	E + 1	E	—
	Arthrobranchs	—	—	2	2	2	2	2	—
<i>Axiopsis</i> (A.)	Epipod & Podobranch	—	E + 1	E + 1	E + 1	E + 1	E + 1	E	—
	Arthrobranchs	—	—	2	2	2	2	2	—
<i>A. (Paraxiopsis)</i>	Epipod & Podobranch	—	E + 1	E + 1	E + 1	E + 1	E + 1	E + 1	—
	Arthrobranchs	—	—	2	2	2	2	2	—
<i>Coralaxius abelei</i>	Epipod & Podobranch	—	E	E + 1	—	—	—	—	—
	Arthrobranchs	—	—	2	2	2	2	2	—

* Data from St. Laurent, 1972.

† Data from Ortmann, in Faxon, 1893.

Although creation of subgenera within the family Axiidae serves to indicate close relationships, the characters presently used (as noted by St. Laurent, 1972) may eventually prove to be superficial, or of such variability within populations of shrimp as to be practically without value. In her comparison of *Calocaris* and *Calastacus*, for example, St. Laurent (1972:353) defined *Calocaris macandreae* as possessing symmetrical chelipeds. However, a specimen of this species from the Firth of Clyde (USNM 19614) shows unequal chelae. Squires (1965:7) in describing the closely related *Calocaris templemani*, noted that in this species, as well as in *C. macandreae* "both chelae of the first pereopods in the same species are essentially similar but may be slightly unequal in some." Thus, a prerequisite to taxonomic stability in the family is evaluation of several morphological features presently shared at both the generic and subgeneric levels.

Etymology.—The species is named for Dr. Lawrence G. Abele, noted carcinologist and esteemed colleague.

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Literature Cited

- Bell, T. 1853. A history of the British stalk-eyed Crustacea.—London.
- Boesch, D. F., and A. E. Smalley. 1972. A new axiid (Decapoda, Thalassinidea) from the northern Gulf of Mexico and tropical Atlantic.—*Bulletin of Marine Science* 22:45–52.
- Borradaile, L. A. 1903. On the classification of the Thalassinidea.—*Annals and Magazine of Natural History* (7) 12:534–551.
- de Man, J. G. 1888. Bericht über die im indischen Archipel von Dr. J. Brock gesammelten Decapoden und Stomatopoden.—*Archiv für Naturgeschichte* 53:215–600.
- . 1925. The Decapoda of the Siboga-Expedition. Part IV. The Axiidae collected by the Siboga-Expedition.—*Siboga-Expedition Monograph* 39a5:1–127.
- Faxon, W. 1893. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, by the U.S. Fish Commission Steamer "Albatross," during 1891 VI. Preliminary descriptions of new species of Crustacea.—*Bulletin of the Museum of Comparative Zoology, Harvard University* 24:149–220.

- Milne Edwards, A. 1873. Description de quelques crustacés nouveaux ou peu connus provenant du Musée de M. C. Godeffroy.—*Journal des Muséum Godeffroy* 4:77–88.
- de Saint Laurent, M. 1872. Un Thalassinide nouveau de Golfe de Gascogne, *Calastacus laevis* sp. nov. Remarques sur le genre *Calastacus* Faxon (Crustacea Decapoda Axiidae).—*Bulletin de Muséum d'Histoire Naturelle, Paris* (3) Zoologie 29:347–356.
- Squires, H. J. 1965. A new species of *Calocaris* (Crustacea: Decapoda, Thalassinidea) from the northwest Atlantic.—*Journal of the Fisheries Research Board of Canada* 22:1–11.
- Williams, A. B. 1974. Two new axiids (Crustacea: Decapoda: Thalassinidea: *Calocaris*) from North Carolina and the Straits of Florida.—*Proceedings of the Biological Society of Washington* 87:451–464.

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