family. Maxilliped 2 endopodal propodus broader than carpus and dactylus; exopod narrow, reaching beyond merus of endopod. Maxilliped 3 ischium without crista dentata; merus without mesial tooth; ischium-merus with mesial row of long setae; carpus-dactylus longer than ischium-merus, widest point of carpus 0.24 carpal length; exopod with flagellum reaching to middle of merus; epipod narrow-foliaceous, with podobranch.

Chelipeds equal; merus with weak tooth on lower margin, upper margin strongly convex, especially proximally; carpus unarmed; propodus swollen proximally and tapering; fixed finger 0.4 length of propodus, its cutting edge with strong tooth at proximal third; dactylus cutting edge curved distally, equal to fixed finger.

Pereopod 2 merus-propodus with lower marginal rows of long setae; carpus 0.8 length of merus; propodus little shorter than carpus with setal-row of six short setae; fixed finger cutting edge with thirteen well-spaced spiniform setae; dactylus as long as fixed finger, with five spiniform setae in middle of cutting edge.

Pereopod 3 propodus 1.5 times as long as wide, strongly lobed on upper and lower margins; one

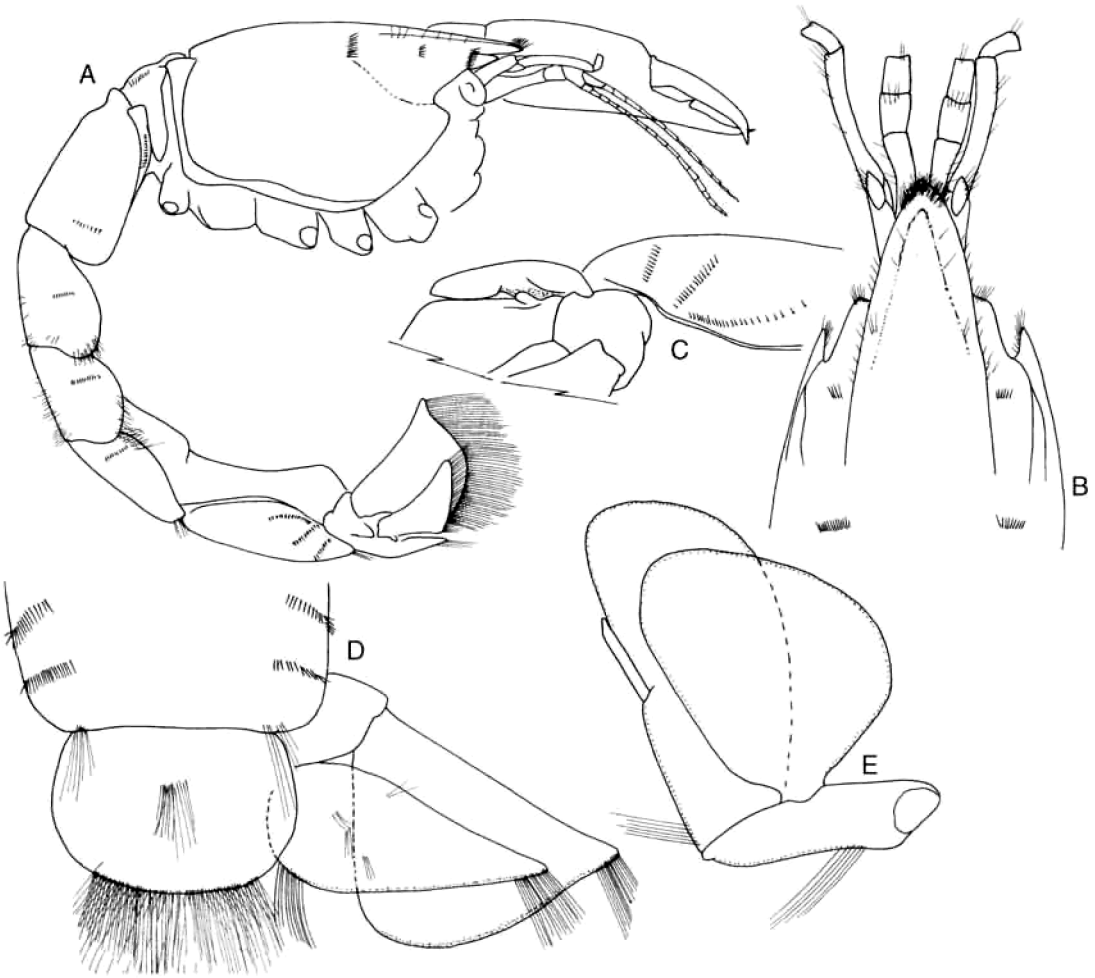

FIG. 7. — *Marcusiaxius wamsoi* n.sp. **A**, habitus; **B**, dorsal view of anterior cephalothorax; **C**, abdominal somite 6, telson and base of right uropod; **D**, abdominal somite 6, telson and uropod; **E**, pleopod 2. All figures from holotype.

transverse setal-row of about thirty setae; dactylus setose.

Pereopod 4 carpus with distal lobe on upper margin; propodus little narrower than long; with single setal-row of about forty setae along upper margin; dactylus setose, narrow.

FIG. 8. — *Marcusiaxius wamsoi* n.sp. **A**, maxilliped 2; **B**, maxilliped 3; **C**, larger left cheliped; **D**, pereopod 2; **E**, detail of propodus and dactylus; **F**, pereopod 3; **G**, pereopod 4 and **H**, setal-row on upper margin of propodus. All figures from holotype.

Pleopod 1 of male unknown. Pleopod 1 of female nearly midventral, 2-articled. Pleopod 2 endopod rounded distally and along lateral margin; appendix interna about 8 times as long as wide; exopod little longer than wide, inner margin straight, lateral margin convex. Pleopods 3-5 essentially similar to pleopod 2.
Uropodal endopod tear-shaped, lateral apex acute, 2.3 times as long as wide; exopod with straight anterior margin ending sharply, deeply curved posteriorly, 1.5 times as long as wide. Telson length two-thirds width, laterally and distally convex.

REMARKS
Marcusiaxius wamsoi is distinguished by the relatively small patch of setae on the tip of the rostrum, the long maxillipedal exopods, and the unusual crest on the upper margin of the carpus of pereopod 4. The uropodal endopod is especially narrow and acute.
Markham (1995) described the new bopyrid isopod parasite *Castrione digiticaudata* from the holotype of this species citing its manuscript name in the "Material examined".

Marcusiaxius sp.

MATERIAL EXAMINED. — **England.** Gault, Folkestone, BMNH In.61812 (fossil partly in matrix, rostrum-cervical groove 9 mm).

REMARKS
The anterior cephalothorax is clean dorsally and on the right side some limbs are visible in the matrix. The rostrum is broad with an elevated triangular post-rostral area with sharp median carina leading to the base of the rostrum. This is typical of the genus. Anteriorly there is an oblique row of twelve setal-pits, a row of three transversely near the cervical groove, but the intermediate area where other pits may occur is damaged. The geological age of the specimen is not known.

Genus *Meticonaxius* de Man, 1905

Meticonaxius de Man, August 1905: 592; 1925: 53, 54; 1928: 18, 21, 30, 53. – Barnard 1950: 499. – Balss 1957: 1579. – Le Loeuff & Intès 1974: 23. – De Saint Laurent 1973: 515; 1979: 1397. – Sakai & de Saint Laurent 1989: 9. – Kensley & Heard 1991: 507, 510-512, table 2. – Sakai 1992: 20-21.

Metaxius Bouvier, November 1905: 804. – De Man 1925: 8; 1928: 18, 20. – Bouvier 1925: 469, 470. – Balss 1957: 1582 (type species by monotypy *Metaxius microps* Bouvier, 1905).

TYPE SPECIES. — By monotypy: *Meticonaxius monodon* de Man, 1905.

DIAGNOSIS
Rostrum acute, usually medially and laterally carinate. Eyes visible in dorsal view. Anterolateral cephalothorax with at least one vertical setal-row close to lateral carina. Abdominal somites 1-5 each with one lateral setal-row, abdominal somite 6 with two-three converging lateral setal-rows; abdominal somites 3-5 with dense dorsal patches of plumose setae. Antenna 1 peduncle article 1 moderately elongate. Scaphocerite less than half length of antenna 2 peduncle article 4. Maxilliped 1 exopod a single article. Maxilliped 3 crista dentata sometimes reduced; merus with strong mesial row of setae; exopod very short or absent. Pereopod 1 fixed finger with at least a sharp curved tooth two-thirds way along. Pereopod 2 fixed finger with even contiguous spiniform setae; dactylus as long as fixed finger. Pereopods 3 and 4 without lateral spiniform setae on propodus and dactylus (rarely one or two on dactylus 4). Pereopod 4 carpus without distal ridge on upper margin; propodus with one or two transverse setal-rows. Uropodal endopod with anterolateral margin bending, ending squarely, shorter than broad. Pleopods 2-5 without marginal lamellae. Uropodal exopod anterolateral margin ending squarely, as broad as endopod. Telson longer than broad, clearly constricted, distally rounded. Epipods well developed and with podobranchs well developed, except on last. Arthrobranchs well developed. Pleurobranchs 5-7 present.

Branchial formula (r = rudimentary):

Thoracomere	1	2	3	4	5	6	7	8
Epipod	1	1	1	1	1	1	1	-
Podobranch	-	r	1	1	1	1	-	-
Arthrobranch	-	-	2	2	2	2	2	-
Pleurobranch	-	-	-	-	1	1	1	-

COMPOSITION

M. bouvieri Kensley *et* Heard, 1991; *M. capricorni* Coelho, 1987; *M. longispina* (Stebbing, 1920); *M. microps* (Bouvier, 1905); *M. monodon* de Man, 1905; *M. noumea* n.sp.; *M. soelae* Sakai, 1992; *M. spicatus* n.sp.

REMARKS

The genus was most recently diagnosed by Kensley & Heard (1991) and Sakai (1992). The new diagnosis differs only because the number of setal-rows on the cephalothorax varies from one to three, according to species, not only two or two-three as stated by these authors. Most species have the branchial arrangement given above but one, *M. microps,* is without pleurobranchs (Kensley & Heard 1991).

Kensley & Heard (1991) gave a key to five species, excluding *M. minutus* because of lack of information. This species is a member of *Marcusiaxius*. The number of described species in now eight plus one not yet described.

KEY TO SPECIES OF *Meticonaxius*

1. Rostrum apex round 2

— Rostrum apex acute 3

2. Maxilliped 3 with spine on merus, with minute exopod ..... *Meticonaxius longispina* (South Africa)

— Maxilliped 3 without spine on merus, without exopod ..... *Meticonaxius microps* (Caribbean Sea)

3. Rostrum shorter than eyestalk; pereopod 1 fingers as long as palm and carpus ..... *Meticonaxius spicatus* (Caribbean Sea)

— Rostrum as long or longer than eyestalk 4

4. Telson shorter than wide ..... *Meticonaxius capricorni* (Brazil)

— Telson much longer than wide 5

5. Uropodal endopod acute; rostrum as long as eyestalk ..... *Meticonaxius noumea* (New Caledonia)

— Uropodal endopod round; rostrum longer than eyestalk 6

6. Telson much longer than wide; pereopod 1 merus without spine ..... *Meticonaxius soela* (Coral Sea)

— Telson as long or little longer than wide; pereopod 1 merus with 1-2 spines 7

7. Pereopod 1 fingers as long as palm ..... *Meticonaxius bouvieri* (Caribbean Sea)

— Pereopod 1 fingers shorter than palm ..... *Meticonaxius monodon* (Tanzania, Indonesia)

Meticonaxius bouvieri Kensley *et* Heard, 1991
(Figs 9, 10)

Meticonaxius bouvieri Kensley *et* Heard, 1991: 496, 512, 513, figs 11, 12.

MATERIAL EXAMINED. — **Caribbean Sea.** 432 m, (*Atlantis*, stn 3427), 1.V.1939, MCZ (♀, cl. 10.5 mm). — 423 m (*Atlantis*, stn 3721), 30.IV.1939, MCZ (2 ♀♀, cl. 10.3 and 21.6 mm, both very damaged and incomplete).

DISTRIBUTION. — Caribbean Sea; 180-768 m depth.

DESCRIPTION

Female (stn 3427)

Cephalothorax 0.27 total length, about 1.4 times as deep as wide; rostrum acute, slightly upturned distally, without dorsal setae, longer than broad at base, lateral margins concave such that eyes are visible from dorsal view, 1.8 times as long as eyestalks; lateral carinae extending weakly on to

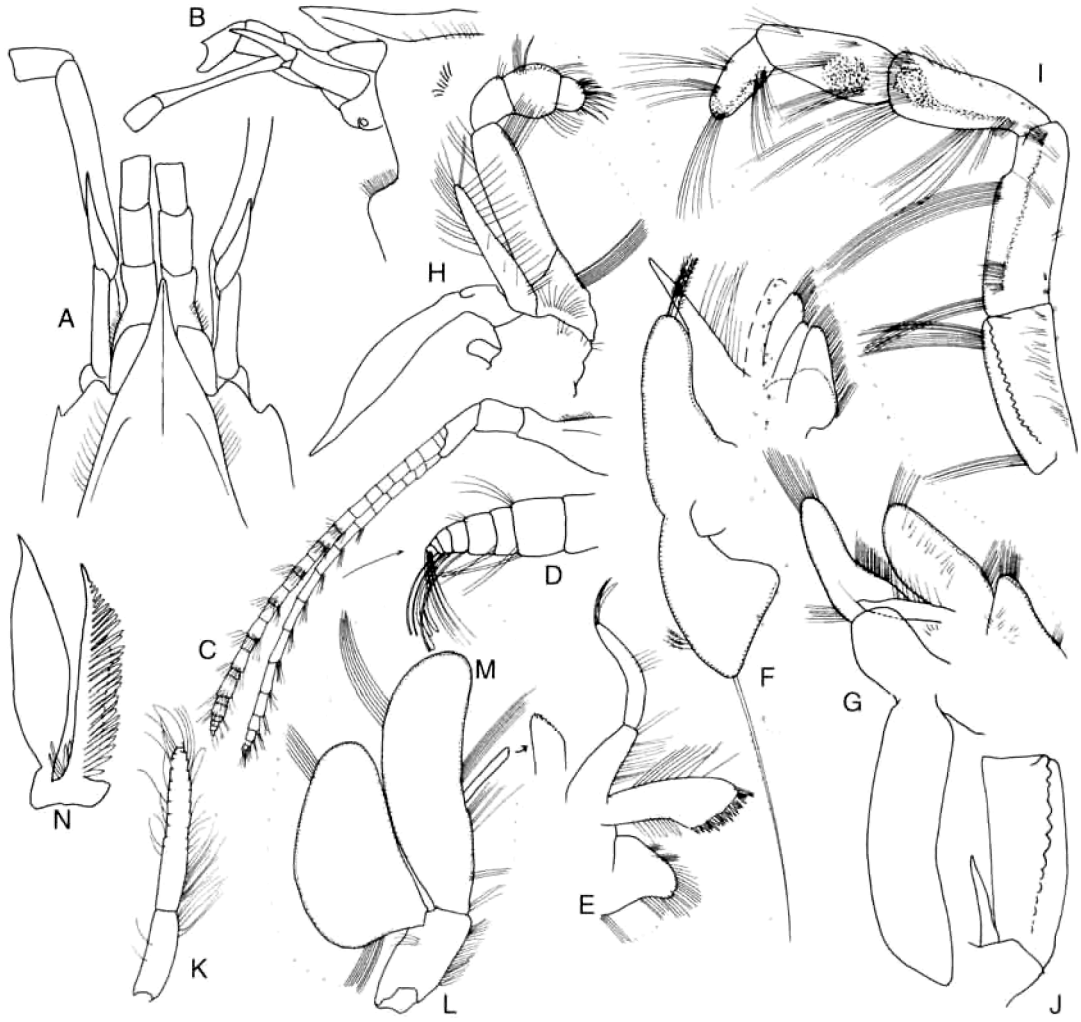

FIG. 9. — *Meticonaxius bouvieri* Kensley *et* Heard. **A**, **B**, anterior of cephalothorax; **C**, antenna 1 and **D**, detail of tip of flagellum; **E**, maxilla 1; **F**, maxilla 2; **G**, maxilliped 1; **H**, maxilliped 2; **I**, maxilliped 3; **J**, ischium and exopod of maxilliped 3; **K**, ♀ pleopod 1; **L**, pleopod 3; **M**, apex of appendix interna of pleopod 3; **N**, podobranch of pereopod 1. Figure J from *Atlantis* stn 3721; others from *Atlantis*, stn 3427.

FIG. 10. — *Meticonaxius bouvieri* Kensley *et* Heard. **A**, right cheliped; **B**, right pereopod 2; **C**, setal-row from right pereopod 2; **D**, left pereopod 3; **E**, propodus and dactylus of left pereopod 4; **F**, right pereopod 5; **G**, details of finger and dactylus; **H**, right view of abdominal somite 1; **I**, dorsum of abdominal somite 1; **J**, abdominal somite 6, telson and uropod; **K**, left setal-rows of abdominal somite 6; **L**, setae on margin of uropodal endopod. Figure E from *Atlantis*, stn 3721; others from *Atlantis*, stn 3427.

cephalothorax, medial carina reaching to apex of rostrum; cervical groove weakly defined, reaching 0.6 length of cephalothorax; dorsoposterior margin a square medial lobe, separated from posterolateral margins; marginal setal-row absent; longitudinal setal-row of ten setae under lateral carina; setal-row of six setae set well back from anterolateral margin.

Abdominal somite 1 little narrower than second, with anterolateral lobes overlying posterolateral margins of cephalothorax; pleuron rounded; dorsolateral setal-row of nine setae. Abdominal somite 2 twice as long as first, pleuron overlapping first somite; transverse setal-row of about twenty setae. Abdominal somites 3-5 with long transverse setal-rows. Abdominal somite 6 with marginal setal-row of thirty-five setae diverging anteriorly from edge of pleuron, oblique setal-row of about twenty setae, and transverse setal-row of about seventeen setae.

Eyestalks angular mesiodistally, cornea distolateral.

Antenna 1 with short-waisted article 1, slightly exceeding rostrum; articles 2 and 3 subequal, each about half length of article 1; flagella of about eighteen and twenty-five articles, longer than peduncle. Antenna 2 with long distinct articulating acicle, about length of article 2; article 4 exceeding article 3 of antenna 1 by half its length; article 5 short; flagellum almost twice as long as peduncle.

Mandible incisor process with smooth cutting edge, excavate on right, broadly acute on left [see Fig. 11D (*M. noumea*)]. Maxilla 2 endopod tapering; scaphognathite with one long posteriorly-directed seta. Maxilliped 1 with endopod 0.6 length of basal endite, exopod longer than basal endite, epipod lobes narrow, proximal lobe much longer. Maxilliped 2 exopod almost as long as endopodal merus; epipod well-developed, with vestigial podobranch. Maxilliped 3 ischium with crista dentata of eighteen blunt teeth; merus without mesial tooth but inner margin distally constricted; ischium to merus with dense mesial rows of long setae; carpus to dactylus as long as ischium to merus, widest point of carpus 0.3 carpal length; exopod almost half length of ischium; epipod foliaceous, with podobranch.

Chelipeds with merus having two-three teeth on lower margin, upper margin strongly convex; carpus unarmed; propodus swollen; fixed finger 0.4 length of propodus, its cutting edge with obsolete proximal blade and strong tooth two-thirds along; dactylus cutting edge curved distally, just longer than fixed finger.

Pereopod 2 merus to propodus with lower marginal rows of long setae; carpus 0.8 length of merus; propodus 0.4 length of carpus with setal-row of six short setae; fixed finger cutting edge with numerous contiguous spiniform setae; dactylus longer than fixed finger, straight.

Pereopod 3 propodus about as long as wide, upper margin lobed distally, lower margin convex, without spiniform setae; two oblique setal-rows of twenty-twenty-five setae; dactylus short, slender and tapering.

Pereopod 4 propodus twice as long as wide, without spiniform setae; one oblique setal-row of nine setae, another submarginal setal-row of seven setae on upper margin; dactylus finely tapering.

Pereopod 5 weakly subchelate; dactylus closing on three spiniform setae at apex of a short fixed finger.

Pleopods 1 (female) 2-articled. Pleopod 2 endopod 3.5 times as long as wide; appendix interna 6 times as long as wide; exopod almost twice as long as wide, inner margin straight, lateral margin convex. Pleopods 3-5 essentially similar to pleopod 2.

Uropodal endopod with anterior margin convex, ending abruptly, posterior margin strongly lobed, 1.3 times as long as wide, with marginal short spiniform setae distally; exopod subtriangular, width distally equal to length. Telson a little longer than wide, with constriction one-third way along, distally rounded.

ADDITIONAL NOTES

Maxilliped 3 exopod minute; pleopod 1 of male 2-articled, second article elongate, triangular, with minute hooks on medial lobe; appendix masculina more robust and twice as long as appendix interna (*fide* Kensley & Heard 1991).

REMARKS

Kensley & Heard (1991) provided a diagnosis of this species and some figures. It is illustrated here in detail as a species typical of the genus. The specimens do not possess the anterior marginal

setal-row on the carapace figured by Kensley & Heard but, instead, have a short row set a little more posteriorly. There are subtle differences between this material and the figures of the holotype, notably in a narrower more upturned rostrum, a longer exopod on maxilliped 3, three rather than two spines on the merus of pereopod 1, and more acute uropodal endopod but because all the material comes from much the same region I hesitate to erect a new species for these specimens.

Two specimens are very damaged but differ slightly from the one figured. They possess a meral spine on maxilliped 3 but this may be broken in the figured specimen and the holotype. There is a second, more posterior setal-row as in the holotype but the figured specimen is damaged in this region.

Meticonaxius capricorni Coelho, 1987 (Fig. 11A)

Meticonaxius sp. – Coelho & Ramos-Porto 1987: 33.

Meticonaxius capricorni Coelho, 1987: 63-69, figs 1-3. – Kensley & Heard 1991: 513.

MATERIAL EXAMINED. — **Brazil.** (23°52'S - 43°11'W), 156 m, (*Almirante Saldanha*, stn 10), 27.III.1972, MZUSP-7113 (holotype, ♀, cl. 22 mm). — Cabo Sao Tomé, 214 m, (*Almirante Saldanha*, stn 9), 11.II.1969, MZUSP-7114 (paratype, ♂, cl. 13 mm).

DISTRIBUTION. — Brazil, 156-214 m depth.

REMARKS

The generic placement of this species was confirmed by examination of the type material. I figure the thoracic sternite 7 and the coxae of pereopod 4 which show a small episternite spine and a condylar surface. The male pleopod 1 is elongate and its second article has a small mesial lobe with minute hooks.

Meticonaxius longispina (Stebbing, 1920)

Axius longispina Stebbing, 1920: 265, 266, 26B, 27 (Crustacea pls 106B, 107).

Meticonaxius ?longispina. – De Man 1925: 5.

Meticonaxius longispina. – Barnard 1950: 500, fig. 93a-c. – Kensley 1981: 30. – Coelho 1987: 63. – Kensley & Heard 1991: 496-514, 516, fig. 13.

MATERIAL EXAMINED. — **South Africa.** 7 miles NNW off Cape Morgan, 126 m, SAM A957 (holotype, sex indeterminate, cl. 10 mm).

DISTRIBUTION. — South Africa; 91-126 m depth.

REMARKS

The generic placement of this species was confirmed by examination of the holotype. Kensley & Heard (1991) figured new material from the same region. The broadly rounded rostrum and moderately truncate telson are diagnostic.

Meticonaxius microps (Bouvier, 1905)

Metaxius microps Bouvier, 1905: 804; 1925: 470-472, fig. 28. – De Man 1925: 1, 2, 8; 1928: 18, 20, 21, 30. – Balss 1925: 210. – Schmitt 1935: 192, fig. 53. – Balss 1957: 1582. – Coelho 1987: 63.

Meticonaxius microps. – Kensley & Heard 1991: 496, 516, fig. 14.

MATERIAL EXAMINED. — **Lesser Antilles.** St Croix, 210 m (*Blake*, stn 123), MCZ (holotype, ♂, cl. 3.6 mm).

DISTRIBUTION. — Caribbean Sea, 186 m depth.

REMARKS

The synonymy of *Metaxius* with *Meticonaxius* was first suggested by de Man (1928) and examination of the type specimen confirmed this. The species is the only one of the genus without pleurobranchs but this is insufficient to warrant resurrection of *Metaxius*. The holotype was refigured by Kensley & Heard (1991). The short rounded rostrum barely exceeding the eyestalks distinguishes this species.

Meticonaxius monodon de Man, 1905

Meticonaxius monodon de Man, 1905: 593; 1925: 54-60, pls 4, 5, figs 10-10t; 1928: 20, 21, 30. – Balss 1925: 210. – Coelho 1987: 63. – Kensley & Heard 1991: 516-519, fig. 15.

Callianassa (*Calliactites*) *coeca* Balss, 1921: 175, 176.

Callianassa (*?Scallasis*) *coeca*. – Balss 1925: 212, 213 (28, 29), fig. 16. – De Man 1928: 30.

MATERIAL EXAMINED. — **Indonesia.** Off NE point of

Java (7°46'S - 114°30.5'E), 330 m (*Siboga*, stn 5), ZMA (holotype of *Meticonaxius monodon* de Man, ♂, not ♀ as stated by de Man, cl. 8 mm, tl. 23 mm).
Tanzania. Dar es Salaam (06°34'S - 39°35'E), 404 m (*Valdivia*, stn 242), 20.III.1899, trawl, ZMB (holotype of *Callianassa* (*Calliactites*) *coeca* Balss, ♂, cl. 9 mm).

DISTRIBUTION. — Tanzania and Indonesia, 330-404 m depth.

REMARKS
The junior synonymy of *Callianassa coeca* and the generic characters of this, the type species, were confirmed. The holotype was reillustrated and the species diagnosed by Kensley & Heard (1991). The species is best recognised by the combination of acute rostrum and moderately truncate, rather than rounded, telson.

Meticonaxius noumea n.sp.
(Fig. 11B-K)

MATERIAL EXAMINED. — **New Caledonia.** SSE of Yaté (22°13'S - 167°08'E), 275-320 m (BIOCAL, stn CP110), 9.IX.1985, beam trawl, MNHN Th-1224 (holotype, ♀, cl. 13 mm, in fragments).

DISTRIBUTION. — Off south-eastern corner of main island of New Caledonia, 275-320 m depth.

ETYMOLOGY. — For Nouméa, capital city of New Caledonia (noun in apposition).

DIAGNOSIS
Rostrum acute, as long as eyestalks; longitudinal setal-row indistinct; setal-row of four setae close to anterolateral margin. Eyestalks rounded mesiodistally. Antenna 1 with article 1 longer than rostrum. Antenna 2 with long distinct articulating scaphocerite, about two-thirds length of article 4; article 4 reaching as far as article 3 of antenna 1. Maxilliped 3 exopod minute.
Chelipeds equal; merus with one tooth on lower margin. Pereopod 3 propodus about 1.4 times as long as wide, two oblique setal-rows of fifteen-eighteen setae. Pereopod 4 propodus 1.7 times as long as wide, one oblique setal-row of eleven setae, another submarginal setal-row of five setae on upper margin.
Uropodal endopod 1.2 times as long as wide; exopod subtriangular, 1.7 times as long as wide. Telson a little longer than wide, with clear constriction one-third way along, distally tapering to rounded apex.

REMARKS
Although this specimen is not in good condition it could not be reconciled with any other species. *Meticonaxius noumea* is notable for the short acute rostrum, no longer than the eyestalks, shorter only in *M. spicatus*. The mandibular incisors are figured *in situ* to show their asymmetry. The species is most similar to *M. soelae* Sakai which occurs in the same region but differs in shorter rostrum, spine on merus of pereopod 1, narrower pereopod 1, more oval pereopod 3 propodus, more acute uropodal exopod and shorter telson.

Meticonaxius soelae Sakai, 1992

Meticonaxius soelae Sakai, 1992: 21-25, figs 6-8.

DISTRIBUTION. — Coral Sea, 300 m depth.

REMARKS
The species is very similar to *M. noumea* n.sp., from which it is distinguished above, and to *M. monodon*.

Meticonaxius spicatus n.sp.
(Fig. 12)

MATERIAL EXAMINED. — **Caribbean Sea.** 351 m (*Atlantis*, stn 3418), 30.IV.1939, MCZ (holotype, immature ♂, cl. 7.2 mm).

ETYMOLOGY. — From *spica* (L.), a spike, alluding to the nature of the fingers of the cheliped.

DISTRIBUTION. — Caribbean Sea (exact location unknown), 351 m depth.

DIAGNOSIS
Rostrum acute, with broad median carina, shorter than eyestalks; longitudinal setal-row indistinct; setal-row of four setae set back from anterolateral margin; oblique setal-row of eight setae short distance posterior; plus setal-row of three near cervical groove. Eyestalks rounded mesiodistally. Antenna 1 with article 1 longer

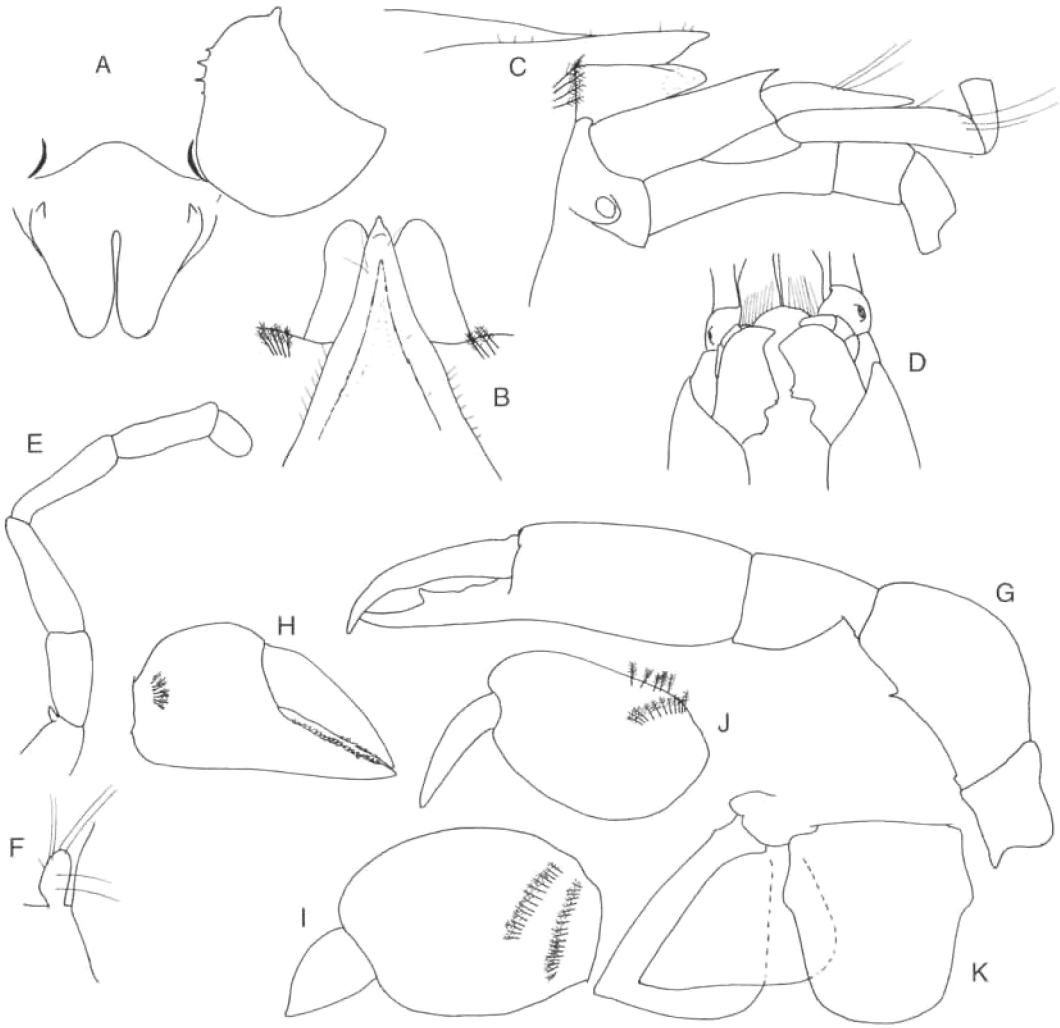

FIG. 11. — *Meticonaxius capricorni* Coelho. **A**, sternum and coxa of pereopod 4, from MZUSP-7114. *Meticonaxius noumea* n.sp. **B**, **C**, dorsal and right view of anterior cephalothorax; **D**, ventral view of mandibular incisors *in situ*; **E**, maxilliped 3; **F**, exopod of maxilliped 3; **G**, right cheliped; **H**, propodus and dactylus of right pereopod 2; **I**, propodus and dactylus of left pereopod 3; **J**, propodus and dactylus of left pereopod 4; **K**, telson and uropod. All figures from holotype.

than eyestalks. Antenna 2 with long distinct articulating scaphocerite, about one-third length of article 4; article 4 reaching beyond article 3 of antenna 1. Maxilliped 3 exopod half length of ischium.

Chelipeds equal; merus unarmed; fixed finger longer than body of propodus, with eight irregular teeth on cutting edge. Pereopod 3 propodus about 1.8 times as long as wide, two oblique setal-rows of five and ten setae. Pereopod 4 propodus twice as long as wide, without oblique setal-row, submarginal setal-row of three setae on upper margin; dactylus with two small spiniform setae.

Uropodal endopod 1.4 times as long as wide; exopod subtriangular, distal width equal to length. Telson a little longer than wide, with clear constriction one-third way along, tapering to distally truncate-convex apex.

REMARKS

Meticonaxius spicatus is distinguished from others in the extreme elongation and dentition of the cheliped fingers, and the very short rostrum.

Meticonaxius sp.

MATERIAL EXAMINED. — **Philippines.** Exact position and depth unknown (*Albatross* stn), USNM not regis-

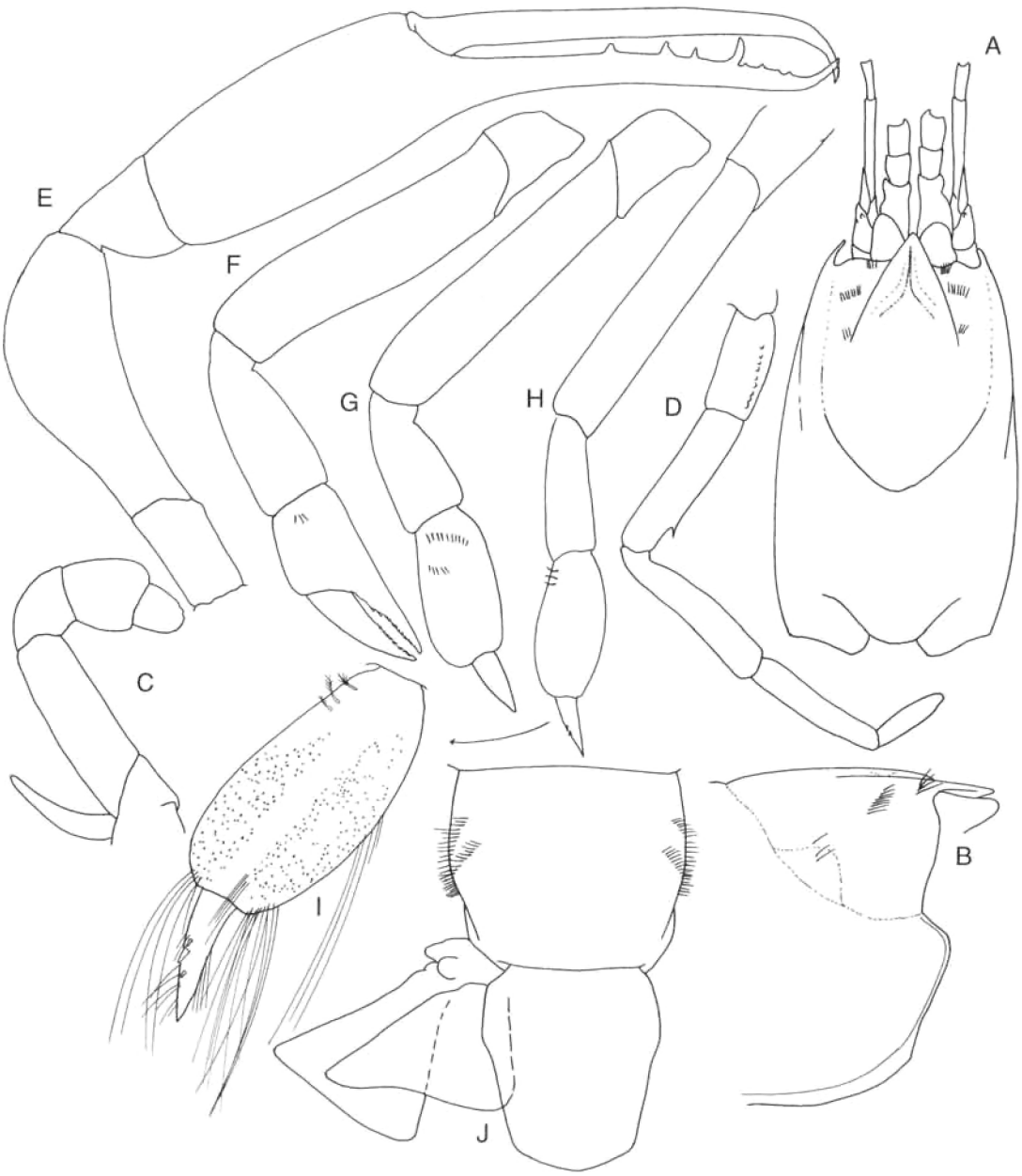

FIG. 12. — *Meticonaxius spicatus* n.sp. **A**, dorsal cephalothorax; **B**, anterior cephalothorax; **C**, maxilliped 2; **D**, maxilliped 3; **E**, left cheliped; **F**, left pereopod 2; **G**, left pereopod 3; **H**, left pereopod 4; **I**, detail of propodus and dactylus; **J**, abdominal somite 6, telson and uropod. All figures from holotype.

tered (damaged specimen without carapace, length of abdomen 62 mm).

REMARKS

A single large specimen from the collections of the *Albatross* in the Philippines could be assigned to *Meticonaxius* but was too damaged to be described in sufficient detail to be worthwhile. It does not appear to belong to a known species. Its exact provenance is also uncertain. The specimen is by far the largest individual of the genus so far captured.

Genus *Michelea* Kensley *et* Heard, 1991

Michelea Kensley *et* Heard, 1991: 519.

TYPE SPECIES. — By original designation: *Callianidea vandoverae* Gore, 1987.

DIAGNOSIS

Rostrum obsolete or obscurely dentate, not carinate. Eyes visible in dorsal view. Anterolateral cephalothorax with one longitudinal, one marginal and one vertical setal-row. Abdominal somites 1-5 each with one lateral setal-row, abdominal somite 6 with three pairs of setal-rows of which two are in line along posterior margin; abdominal somites 3-5 with sparse paired dorsal patches of long simple setae. Antenna 1 peduncle article 1 extremely elongate. Antenna 2 scaphocerite small. Maxilliped 1 exopod without second article. Maxilliped 3 with teeth of crista dentata reduced; merus with strong mesial row of setae; exopod exceeding end of ischium. Pereopod 1 fixed finger with bicuspidate blade (sometimes obsolete) about one-third way along. Pereopod 2 fixed finger with few separate spiniform setae; dactylus longer than fixed finger. Pereopods 3 and 4 with lateral spiniform setae on propodus and dactylus. Pereopod 4 propodus with two transverse setal-rows. Pleopods 2-5 with marginal lamellae at least on endopod and frequently on both rami. Uropodal endopod with anterolateral margin not defined, ovate, longer than broad. Uropodal exopod anterolateral margin continuous to apex, ovate, broader than endopod. Telson broader than long, obscurely constricted, distally rounded. Epipods on maxilliped 2 to pereopod 4 weakly developed or absent, podobranchs a single filament, reduced or lost. Branchiae well developed, reduced or absent.

Branchial formula (maximum numbers given, reduced in many species):

Thoracomere	1	2	3	4	5	6	7	8
Epipod	1	1	1	1	1	1	1	-
Podobranch	-	-	1	1	1	1	-	-
Arthrobranch	-	-	2	2	2	2	2	-
Pleurobranch	-	-	-	-	-	-	1	-

COMPOSITION

M. abranchiata n.sp.; *M. devaneyi* n.sp.; *M. hortus* n.sp.; *M. lamellosa* Kensley *et* Heard, 1991; *M. lepta* (Sakai, 1987); *M. leura* (Poore *et* Griffin, 1979); *M. microphylla* n.sp.; *M. novaecaledoniae* n.sp.; *M. paraleura* n.sp.; *M. pillsburyi* Kensley *et* Heard, 1991; *M. vandoverae* (Gore, 1987).

REMARKS

Michelea is the most distinctive of all micheleid genera. The rostrum is absent but obsolete dentition in *M. vandoverae* suggests derivation from a rostrate ancestor. The uropodal rami are more ovate than in the other genera and the scaphocerite is slightly reduced. The lateral surfaces of the propodus and dactylus of pereopods 3 and 4 bear rows of spiniform setae similar to those seen in many axiid genera; these are not found (with rare exception) in other micheleids.

Most importantly, the pleopods of *Michelea* bear marginal lamellae, at least on the lateral edge of the endopod but usually on margins of both rami. The lamellae are simply ovate in most species but in *M. vandoverae* each lamella has a second distal segment.

Branchiae are frequently lost in this genus and the formula given above is for the maximum number of gills. Several grades from partial to total loss of branchiae are seen; in fact a pleurobranch on thoracic somite 7, usual in other members of the family, is seen in only *M. vandoverae*. Branchial formulae are given for each species. The mouthparts figured for *M. leura* are typical for all members of the genus.

Kensley & Heard (1991) gave a key to the five species then known. The number of described

species is now eleven and another undescribed species is known from an incomplete specimen from Montgomery Reef, northern Western Australia (Queensland Museum, Brisbane, W20365). Identification is probably best made first on geographic likelihood and then comparison with published figures. The species are very similar but some can be easily recognised by the number of branchiae or pleopodal lamellae. However, each species is known from so few specimens that nothing is known of variability in these or other characters.

KEY TO SPECIES OF *Michelea*

1. Gills reduced or absent 2

— Gills well developed or rudimentary only posteriorly 4

2. Pleopods 2-5 with almost 100 lamellae on both rami ..... *Michelea lamellosa* (Jamaica)

— Pleopods 2-5 with 20 or fewer lamellae on both rami 3

3. Gills absent; telson as long as wide ..... *Michelea abranchiata* (Caribbean Sea)

— Gills minute; telson longer than wide ..... *Michelea microphylla* (S Australia)

4. Pleopods 2-5 with 7 or fewer lamellae on endopod only 5

— Pleopods 2-5 with lamellae on both rami 7

5. Telson tapering to truncate apex ..... *Michelea lepta* (Japan)

— Telson tapering to sharply rounded apex 6

6. Pleopod 2 endopod without lamellae; antenna 1 articles 2 and 3 third length of article 1 ..... *Michelea hortus* (W Australia)

— Pleopod 2 endopod with four lamellae; antenna 1 articles 2 and 3 sixth length of article 1 ..... *Michelea novaecaledoniae* (New Caledonia)

7. Pleopods 2-5 with numerous 2-segmented lamellae on both rami ..... *Michelea vandoverae* (Caribbean Sea)

— Pleopods 2-5 with 20 or fewer 1-segmented lamellae on both rami 8

8. Pleopod 2 endopod with lamellae on lateral and distal half of medial margin; telson semicircular ..... *Michelea leura* (Great Barrier Reef, Australia)

— Pleopod 2 endopod with lamellae on lateral and apical margins only; telson triangular or with truncate apex 9

9. Telson longer than wide; maxilliped 3 merus with strong spine ..... *Michelea pillsburyi* (Caribbean coast of Panama)

— Telson as long as wide; maxilliped 3 merus with weak spine 10

10. Telson tapering to rounded apex .....
..... *Michelea paraleura* (Great Barrier Reef, Australia)

— Telson tapering to truncate-angled apex ..... *Michelea devaneyi* (Marshall Islands)

Michelea abranchiata n.sp.
(Figs 13, 14)

MATERIAL EXAMINED. — **Caribbean Sea.** British West Indies, Barbuda, Spanish Point (17°41'N - 61°48'W), shore (Smithsonian Bredin Expedition, stn 122a.58), 28.IV.1958, USNM 122447 (holotype, ♂, cl. 3.3 mm, tl. 16 mm, with 1 slide). — Puerto Rico, 23.VI.1915, USNM 3664 (paratype, ♂, cl. 4.3 mm, tl. 19 mm).

ETYMOLOGY. — The specific name alludes to the absence of gills.

DISTRIBUTION. — Caribbean Sea; intertidal.

DESCRIPTION

Cephalothorax 0.21 total length; rostrum flat, narrowly produced, about half as long as eyestalks; cervical groove weakly defined, dorsally reaching 0.6 length of cephalothorax; longitudinal setal-row level with lateral margin of eyestalk, of seven setae; marginal setal-row of five setae at base of eyestalk; lateral setal-row of six setae.
Abdominal somite 1 with dorsolateral setal-rows

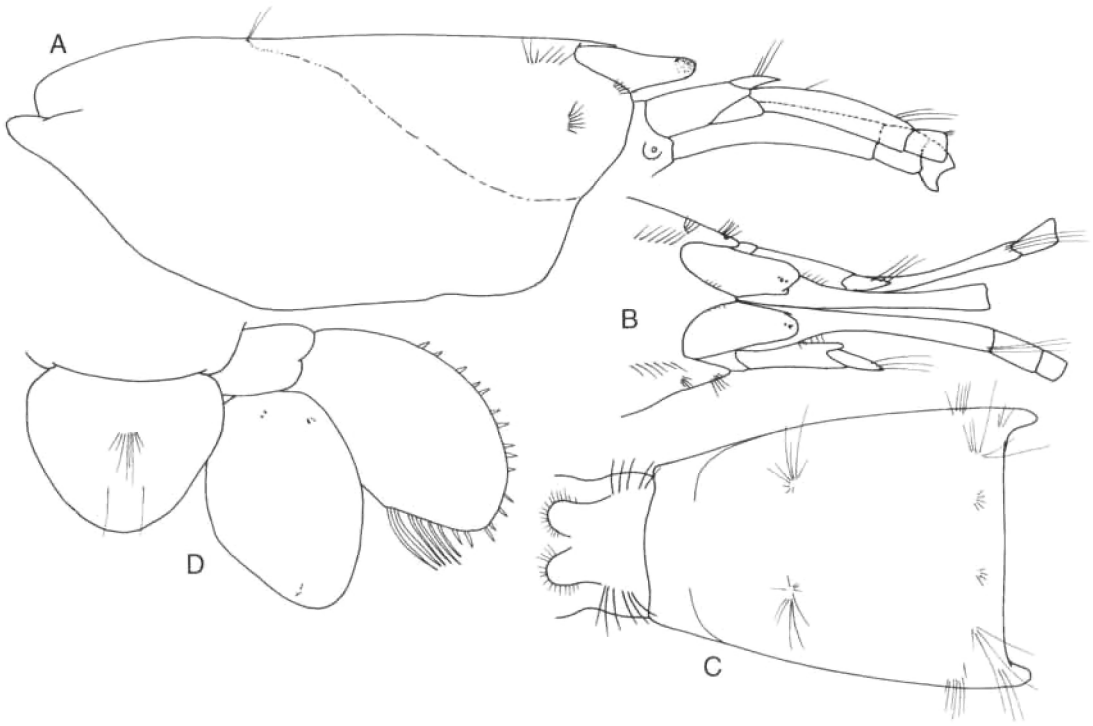

FIG. 13. — *Michelea abranchiata* n.sp. **A**, cephalothorax; **B**, anterior cephalothorax; **C**, abdominal somites 1 and 2; **D**, telson and uropod. All figures from holotype.

of six setae. Abdominal somites 2-5 with transverse setal-rows of nine, six, six, six setae respectively. Abdominal somite 6 without marginal setal-row along edge of pleuron, oblique setal-row of about six setae, and transverse setal-row of about five+four setae in two groups. All abdominal somites with groups of long setae dorsally.
Eyestalks slightly flattened, with small distomesial lobe; cornea distal.
Antenna 1 with elongate waisted article 1, about 0.4 length of cephalothorax; article 2 longer than 3, together about 0.3 length of article 1.
Antenna 2 with distinct articulating acicle, about half length of article 2; article 4 reaching almost to end of peduncle of antenna 1; article 5 short.
Maxilliped 1 epipod lobes reduced, equal.
Maxilliped 2 exopod minute; epipod minute.
Maxilliped 3 ischium with obsolete crista dentata of eight blunt teeth; merus without mesial tooth; exopod with flagellum reaching to base of merus; epipod absent.
Chelipeds with ischium with weak lower tooth; merus with weak tooth on slightly convex lower margin, upper margin convex; carpus unarmed; propodus swollen proximally and tapering; fixed finger 0.4 length of propodus, its cutting edge obsoletely toothed; dactylus curved evenly, with sinuous cutting edge, equal to fixed finger.
Pereopod 2 essentially as in *M. leura*.
Pereopod 3 propodus 2.2 times as long as wide, with four spiniform setae on lower margin, clusters of two and three spiniform setae distally on mesial face; dactylus with two spiniform setae on upper-mesial margin.
Pereopod 4 propodus 3.0 times as long as wide, weakly aligned transverse rows of spiniform setae on mesial face, concentrated near margins and strongest on lower margin and distally, and two transverse setal-rows of four and two setae; dactylus with five spiniform setae on upper-mesial margin.
Pleopod 1 of male, second article a rounded-triangular distal blade. Pleopod 2 of male endopod with twelve marginal lamellae distally and laterally; appendix interna club-shaped, 2.5 times as long as wide; appendix masculina 3 times as long as appendix interna; exopod with about ten lamellae distolaterally. Pleopods 3-5 essentially similar to pleopod 2.
Uropodal endopod ovate, 1.6 times as long as wide, without blade-like setae; exopod ovate, 1.7 times as long as wide, with lateral row of spiniform setae becoming longer and blade-like mesially. Telson 0.75 times as long as wide, distally tapering to rounded apex.

Branchial formula (r = rudimentary):

Thoracomere	1	2	3	4	5	6	7	8
Epipod	r	r	-	-	-	-	-	-

REMARKS
Michelea abranchiata is notable for the complete absence of gills and takes one step further the reduction seen in *M. microphylla* from Australia and *M. lamellosa* Kensley *et* Heard from Jamaica.

Michelea devaneyi n.sp.
(Fig. 15)

MATERIAL EXAMINED. — **Marshall Islands.** N of Sand Island (near Eniwetok Island), Eniwetok Atoll (11°30'S - 162°15'E), under rock on sand, 2 m, A. D. Havens, 10.VIII.1968, MNHN Th-1305 (holotype, ovigerous ♀, cl. 7.5 mm, tl. 33 mm). — Rigili, Eniwetok Atoll (11°30'S - 162°15'E), D. M. Devaney, 25.II.1957, MNHN Th-1307 (paratype, ♂, cl. 3.9 mm, tl. 15 mm); same locality (59/16) 21 July, D. M. Devaney, MNHN Th-1306 (paratype, ♀, cl. 6.5 mm, tl. 29 mm).

ETYMOLOGY. — For the late D. M. Devaney who collected and donated the paratypic specimens.

DISTRIBUTION. — Marshall Islands, subtidal.

DESCRIPTION
Cephalothorax 0.23 total length; rostrum flat, broad, about third as long as eyestalks; cervical groove very weakly defined, reaching 0.6 length of cephalothorax; longitudinal setal-row level with lateral margin of eyestalk, of nine setae; marginal setal-row of six setae at base of eyestalk; lateral setal-row of six setae.
Abdominal somite 1 with dorsolateral setal-rows of twelve setae. Abdominal somites 2-5 each with transverse setal-row of about seven setae. Abdominal somite 6 without marginal setal-row along edge of pleuron, oblique setal-row of about seven setae, and transverse setal-row of about

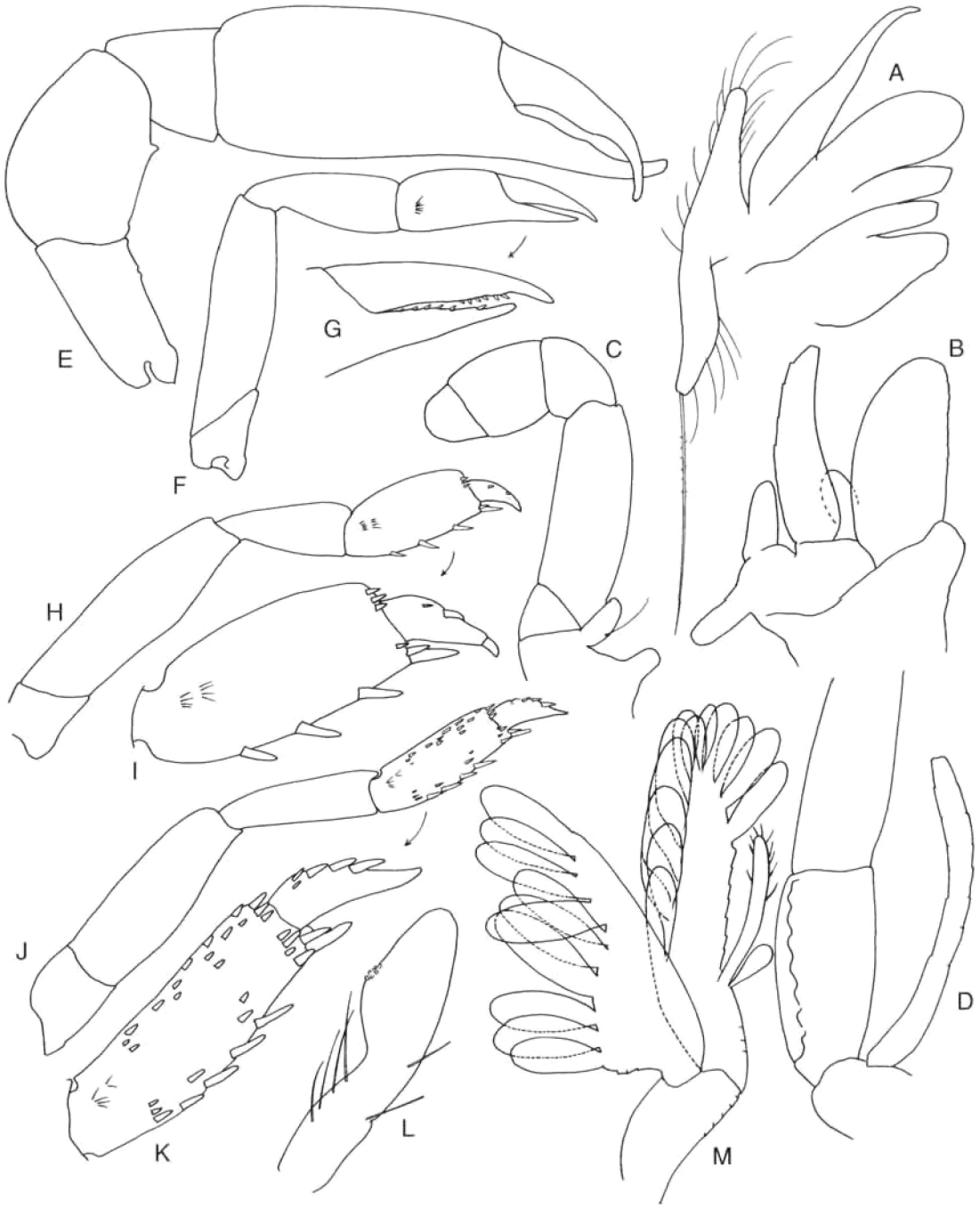

FIG. 14. — *Michelea abranchiata* n.sp. **A**, maxilla 2; **B**, maxilliped 1; **C**, maxilliped 2; **D**, ischium and exopod of maxilliped 3; **E**, left cheliped; **F**, right pereopod 2; **G**, details of fingers; **H**, right pereopod 3; **I**, propodus and dactylus; **J**, right pereopod 4; **K**, propodus and dactylus; **L**, ♂ pleopod 1; **M**, ♂ pleopod 2. Figures A-C, L, M from holotype; others from USNM 3664.

five+six setae in two groups. All abdominal somites with groups of long setae dorsally.
Eyestalks slightly flattened, cornea distolateral.
Antenna 1 with elongate waisted article 1, about 0.6 length of cephalothorax; articles 2 and 3 equal, together about 0.3 length of article 1.
Antenna 2 with distinct articulating acicle, almost as long as article 2; article 4 reaching almost to end of article 2 of antenna 1; article 5 short.
Maxilliped 1 epipod lobes narrow, proximal lobe longer. Maxilliped 2 exopod 0.4 length of merus; epipod well-developed. Maxilliped 3 ischium with obsolete crista dentata of ten blunt teeth; merus with mesial tooth; exopod with flagellum reaching to middle of merus; epipod present.
Chelipeds equal; ischium with weak lower tooth; merus with weak tooth on slightly convex lower margin, upper margin convex proximally; carpus unarmed; propodus swollen proximally and tapering; fixed finger 0.4 length of propodus, its cutting edge moderately toothed; dactylus curved apically.
Pereopod 2 essentially as in *M. leura* but with nine spiniform setae on fixed finger, six on dactylus.
Pereopod 3 propodus 2.3 times as long as wide, with five spiniform setae on lower margin, clusters of three and four spiniform setae distally on mesial face; dactylus with four spiniform setae on upper-mesial margin.
Pereopod 4 propodus 3.6 times as long as wide, with about six weakly aligned transverse rows of spiniform setae on mesial face, concentrated near margins and strongest on lower margin and distally, and two transverse setal-rows of four and five setae; dactylus with nine spiniform setae on upper-mesial margin.
Pleopod 1 of male with a triangular distal blade.
Pleopod 2 of male endopod with three marginal lamellae distally and five proximolaterally; appendix interna linear, 10 times as long as wide; appendix masculina twice as long as appendix interna; exopod with one distal lamella.
Pleopod 1 of female weakly divided into two articles, second longer and with marginal setae.
Pleopod 2 of female endopod with three-four marginal lamellae distally and six-ten proximolaterally, appendix interna broad, 4 times as long as wide, with apical lobe; exopod with five-six lamellae distolaterally. Pleopods 3-5 essentially similar to pleopod 2 of female.
Uropodal endopod broadly ovate, 1.3 times as long as wide, without blade-like setae, with minute apical spine; exopod ovate, 1.7 times as long as wide, with lateral row of minute spiniform setae. Telson 0.9 times as long as wide, distally with a broadly angled apex.

Branchial formula (r = rudimentary):

Thoracomere	1	2	3	4	5	6	7	8
Epipod	1	1	1	1	r	r	r	-
Podobranch	-	-	f	f	f	f	-	-
Arthrobranch	-	-	1	2	2	2	2	-

Epipods broader anteriorly than posteriorly; podobranchs filamentous (f).

REMARKS
This species has unusual pleopods on which the lamella are grouped distally and laterally. There is some size-related differences in the number of lamella between individuals. The characteristic form of the mandibular incisor, typical of the genus, is figured for this species. The exopod of maxilliped 2 is better developed, reaching almost halfway along the merus, in *M. devaneyi* than in other species.

Michelea hortus n.sp.
(Fig. 16)

MATERIAL EXAMINED. — **Western Australia.** 1.5 miles W of S end of Garden Island (32°12'S - 115°40'E), R. W. George on *Bluefin*, 13.VIII.1962, WAM 57-75 (holotype ♀, cl. 3.6 mm, tl. 14.3 mm, with pereopods 1, left pereopod 2, right pereopod 5).

ETYMOLOGY. — From *hortus* (L.), a garden, alluding to the type locality (noun in apposition).

DISTRIBUTION. — South Western Australia; shelf.

DESCRIPTION
Cephalothorax 0.25 total length; rostrum flat, about 0.6 length of eyestalks; cervical groove weakly defined, reaching 0.55 length of cephalothorax; longitudinal setal-row level with middle of eyestalk, of six setae; marginal setal-row of two setae; two lateral setal-rows each of two setae.

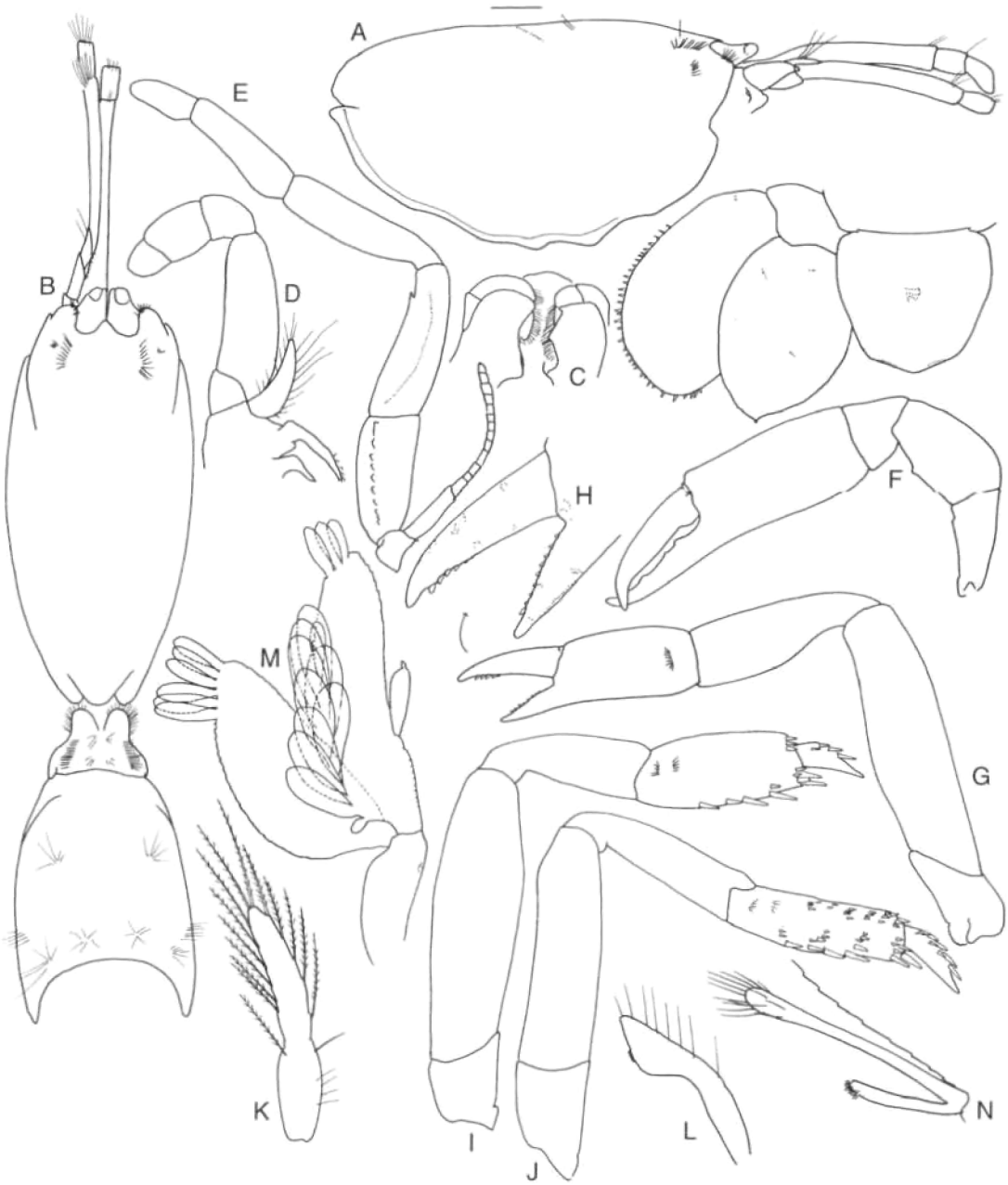

FIG. 15. — *Michelea devaneyi* n.sp. **A**, cephalothorax; **B**, cephalothorax, abdominal somites 1 and 2; **C**, mandibles *in situ*; **D**, maxilliped 2; **E**, maxilliped 3; **F**, right cheliped 1; **G**, left pereopod 2; **H**, details of fixed fingers; **I**, right pereopod 3; **J**, right pereopod 4; **K**, ♀ pleopod 1; **L**, ♂ pleopod 1; **M**, ♀ pleopod 2; **N**, ♂ appendices interna and masculina. Figures L, N, from MNHN Th-1307; all others from holotype.

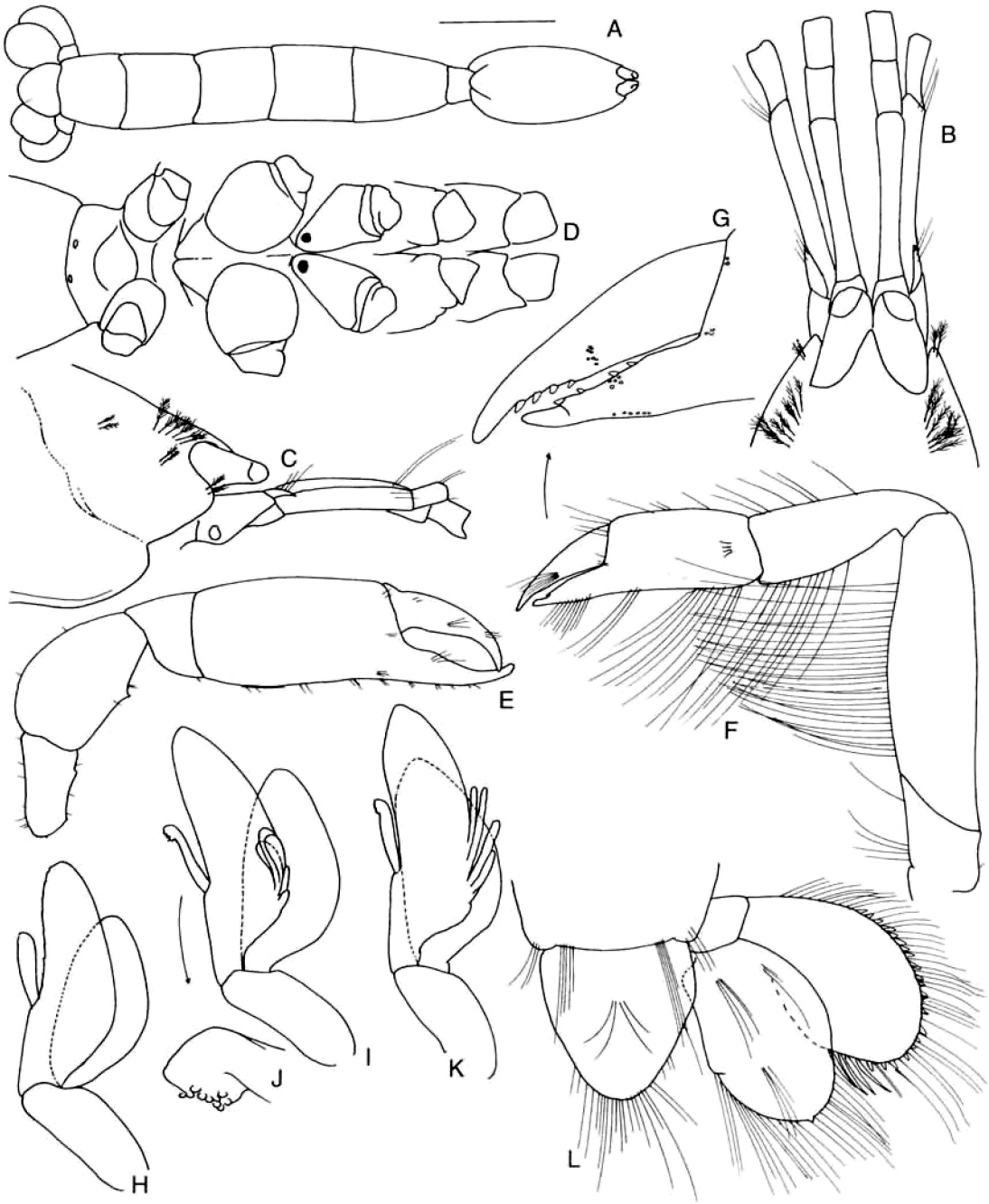

FIG. 16. — *Michelea hortus* n.sp. **A**, habitus sketch; **B**, **C**, anterior of cephalothorax; **D**, sternum and coxae of pereopods 1-5, abdominal somite 1; **E**, right cheliped; **F**, left pereopod 2; **G**, detail of fingers; **H**, pleopod 2; **I**, pleopod 3; **J**, detail of appendix interna; **K**, pleopod 4; **L**, telson and uropod. All figures from holotype.