

Pseudanthessiid Copepods
(Cyclopoida) Associated with
Crinoids and Echinoids
(Echinodermata) in the Tropical
Western Pacific Ocean

ARTHUR G. HUMES

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ABSTRACT

Humes, Arthur G. Pseudanthessiid Copepods (Cyclopoida) Associated with Crinoids and Echinoids (Echinodermata) in the Tropical Western Pacific Ocean. *Smithsonian Contributions to Zoology*, number 243, 43 pages, 25 figures, 1977.— Collections made in New Caledonia, the Moluccas, the Philippine Islands, and Eniwetok Atoll provide the basis for two new genera, eight new species, four new combinations, and several new host and locality records: *Senariellus diadematis*, new genus, new species, from *Diadema setosum*; *Senariellus latisetata*, new genus, new species, from *Heterocentrotus mammillatus* and *Tripneustes gratilla*; *Senariellus tensus*, new genus, new species, from *Echinothrix calamaris*; *Senariellus foliatus* (Stock, 1967), new combination; *Senariellus liber* (Brady, 1880), new combination; *Mecomerinx sewellana*, new genus, new species, from *Tripneustes gratilla*; *Mecomerinx heterocentroti*, new genus, new species, from *Heterocentrotus mammillatus*; *Mecomerinx notabilis* (Humes and Cressey, 1961), new combination, from *Echinometra mathaei*; *Pseudanthessius implanus*, new species, from *Phyllacanthus imperialis*; *Pseudanthessius pictus*, new species, from *Parasalenia gratiosa*; *Pseudanthessius vinnulus*, new species, from *Echinothrix diadema*; *Pseudanthessius madrasensis* Reddiah, 1968, from a new host, *Tropiometra afra*; and *Pseudanthessius major* Stock, 1968, from two new hosts, *Himerometra magnipinna* and *Stephanometra spicata*. *Mecomerinx luculenta* (Humes and Cressey, 1961), new combination, is partly redescribed from paratypes.

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Pseudanthessiid Copepods (Cyclopoida) Associated with Crinoids and Echinoids (Echinodermata) in the Tropical Western Pacific Ocean

Arthur G. Humes

Introduction

From the entire Pacific Ocean only four species of *Pseudanthessius* have been recorded. Three of these, *Pseudanthessius obscurus* A. Scott 1909 (from 0°24'S, 127°36'E in the Moluccas), *Pseudanthessius tenuis* Nicholls, 1944 (from South Australia), and *Pseudanthessius weberi* A. Scott, 1909 (from 5°26.7'S, 127°36.5'E in the Banda Sea) occurred in plankton or in general washings of dredged invertebrates. The fourth species, *Pseudanthessius comanathi* Humes, 1972, is associated with the crinoid *Comanthus bennetti* (J. Müller) at Eniwetok Atoll, Marshall Islands. In contrast to the small number of Pacific species reported to date, 11 species of *Pseudanthessius* are known at present from the Indian Ocean (Gulf of Aqaba, Madagascar, South India, Nicobar Islands), five from crinoids, and six from echinoids. All records of *Pseudanthessius*, with the exception of the more recently described *Pseudanthessius comanathi* Humes, 1972, have been listed by Humes and Stock (1973) in their revision of the Lichomolgidae.

The members of the family Pseudanthessiidae included in this work comprise two new genera and eight new species from New Caledonia, the

Moluccas, the Philippines, and Eniwetok Atoll. In addition there are four new combinations and three range extensions of species previously known only from the Indian Ocean. Those associated with echinoids are:

- Senariellus diadematis*, new genus, new species
from *Diadema setosum* (Leske), New Caledonia
- Senariellus latiseta*, new species
from *Heterocentrotus mammillatus* (Linnaeus) and *Tripneustes gratilla* (Linnaeus), New Caledonia
- Senariellus tensus*, new species
from *Echinothrix calamaris* (Pallas), Moluccas, Eniwetok
- Senariellus foliatus* (Stock, 1967), new combination
- Senariellus liber* (Brady, 1880), new combination
- Mecomerinx sewellana*, new genus, new species
from *Tripneustes gratilla* (Linnaeus), Moluccas, Philippine Islands
- Mecomerinx heterocentroti*, new species
from *Heterocentrotus mammillatus* (Linnaeus), New Caledonia, Moluccas
- Mecomerinx notabilis* (Humes and Cressey, 1961), new combination
from *Echinometra mathaei* (Blainville), New Caledonia
- Mecomerinx luculenta* (Humes and Cressey, 1961), new combination
- Pseudanthessius implanus*, new species
from *Phyllacanthus imperialis* (Lamarck), New Caledonia
- Pseudanthessius pictus*, new species
from *Parasalenia gratiosa* A. Agassiz, New Caledonia
- Pseudanthessius vinnulus*, new species
from *Echinothrix diadema* (Linnaeus), New Caledonia

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Those associated with crinoids are:

- Pseudanthessius madrasensis* Reddiah, 1968
from *Tropiometra afra* (Hartlaub), New Caledonia
Pseudanthessius major Stock, 1968
from *Himerometra magnipinna* A. H. Clark and *Stephanometra spicata* (P. H. Carpenter), New Caledonia

The field work in New Caledonia during June–August 1971 was supported by a grant (GB-8381X) from the National Science Foundation and the subsequent study of the copepods by another NSF grant (BMS 74 17652). The aid provided by the staff of the Centre ORSTOM de Noumea is gratefully acknowledged. The Eniwetok specimens were collected during field work made possible by the support and facilities of the Eniwetok Marine Biological Laboratory. The Moluccan specimens were collected during the *Alpha Helix* East Asian Bioluminescence Expedition, which was supported by the National Science Foundation under grants OFS 74 01830 and OFS 74 02888 to the Scripps Institution of Oceanography and NSF grant BMS 74 23242 to the University of California, Santa Barbara. I am especially indebted to Mr. Thomas Forhan, Scripps Institution of Oceanography, who collected many of the Moluccan hosts as well as the Philippine material during SCUBA dives.

I thank Dr. David L. Pawson of the National Museum of Natural History for the identifications of the echinoids, Miss Ailsa M. Clark of the British Museum (Natural History) for the determinations of the crinoids, and Dr. J. H. Stock for the loan of specimens of *Pseudanthessius liber* (Brady, 1880) from Europe.

All figures have been drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn. The abbreviations used are: A₁ = first antenna, A₂ = second antenna, L = labrum, P = paragnath, MXPDP = maxilliped, and P₁ = leg 1.

The measurements were made on specimens in lactic acid and are expressed in microns unless otherwise stated. The body length does not include the setae on the caudal rami. The lengths of the first antennal segments were measured along their posterior nonsetiferous margins.

Specimens that are deposited in the National Museum of Natural History (NMNH), Smithsonian Institution, Washington, D.C., are listed under the

catalog numbers of the former United States National Museum (USNM).

PSEUDANTHESSIIDAE Humes and Stock, 1972

Senariellus, new genus

DIAGNOSIS.—Pseudanthessiidae. Body cyclopiform. Urosome in the female 4-segmented, in the male 5-segmented. Caudal ramus with six setae. Rostrum not well developed. First antenna 7-segmented, both sexes having the armature 4, 13, 6, 3, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Second antenna 4-segmented, as long as or longer than the first antenna, with the formula 1, 1, 3, and two terminal claws +5.

Labrum incised medially. Mandible without a scalelike area on the convex side of the base. Paragnath a small lobe. First maxilla with four setae. Second maxilla and maxilliped of the usual pseudanthessiid type.

Legs 1–4 resembling *Pseudanthessius* except for six elements instead of five on the third endopod segment of leg 3, where the formula is I, II, I, 2 (or I, II, 1, 2 in one species).

Leg 5 without a free segment and bearing the usual three elements.

Leg 6 represented by two setae near the genital openings.

Other features as in the species below.

Associated with regular echinoids.

TYPE-SPECIES.—*Senariellus diadematis*, new species.

ETYMOLOGY.—The generic name is derived from *senarius* (Latin, = consisting of six things) and the diminutive suffix *-ellus*, alluding to the six elements on the third endopod segment of leg 3. Gender masculine.

COMPARISON WITH *Pseudanthessius*.—Among the five genera placed in the family Pseudanthessiidae by Humes and Stock (1973), *Pseudanthessius* Claus, 1889, is closest to *Senariellus*. The new genus has an outstanding character, however, by which it may be readily distinguished from *Pseudanthessius*, namely, the formula I, II, I, 2 on the third endopod segment of leg 3. In fact, the presence of six elements on this endopod segment is unique among lichomolgoid genera, where the formula is without exception I, II, 2.

Senariellus diadematis, new species

FIGURES 1a-j, 2a-k, 3a-i

TYPE MATERIAL.—125 ♀♀, 184 ♂♂, and 30 copepodids from 42 sea urchins, *Diadema setosum* (Leske), in 3 m, Anse Vata, Noumea, New Caledonia, 22°18'27"S, 166°26'30"E, 17 July 1971. Holotype female, allotype, and 250 paratypes (100 ♀♀, 150 ♂♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; 51 paratypes (21 ♀♀, 30 ♂♂) in the Zoölogisch Museum, Amsterdam; the remaining paratypes (dissected) in the collection of the author.

OTHER SPECIMENS.—18 ♀♀, 22 ♂♂, and 5 copepodids from 23 *Diadema setosum*, in 3 m, at the type-locality, 15 July 1971.

FEMALE.—Body (Figure 1a,b) moderately slender. Length 0.83 mm (0.79–0.86 mm) and the greatest width 0.32 mm (0.31–0.33 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.66:1. Ratio of the length of the prosome to that of the urosome 1.85:1. Segment of leg 1 separated from the head by a transverse furrow.

Segment of leg 5 (Figure 1c) 60 × 109. Genital segment in dorsal view 107 × 99, bulging slightly in its anterior third and tapering posteriorly. Genital areas located laterally behind the middle of the segment. Each genital area (Figure 1d,e) with two naked setae 22 and 11 and with an adjacent minute spiniform process. Three post-genital segments from anterior to posterior 36 × 73, 34 × 70, and 42 × 70. Anal segment with a smooth posteroventral margin.

Caudal ramus (Figure 1f) 51 × 33, ratio 1.55:1. Outer lateral seta 74 and the dorsal seta 42, both naked. Four terminal setae relatively short and stout, less than three times the length of the ramus. Outermost terminal seta 81, the innermost terminal seta 104, and the two median terminal setae 88 (outer) and 130 (inner). All terminal setae with lateral spinules as in Figure 1g.

Body surface with a few hairs (sensilla) as in Figure 1a,b.

Egg sac (Figure 1h) a loose cluster of 4–6 large eggs, each about 94 in diameter.

Rostrum (Figure 1i) broadly rounded, and in lateral view lobate (Figure 1b).

First antenna (Figure 1j) 195 long. Lengths of the seven segments: 19 (32 along the anterior mar-

gin), 66, 16, 39, 22, 9, and 11 respectively. Formula for the armature: 4, 13, 6, 3, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. All setae naked. Third segment with the sclerotization of the posterior surface extended ventrally (Figure 2a).

Second antenna (Figure 2b) slender and elongated, 247 long, exceeding the length of the first antenna. Formula: 1, 1, 3, and II +5. Third segment with a sclerotized band on the posterior surface and a few outer spinules. Fourth segment very long and slender, 105 along the outer margin, 80 along the inner margin, and 10 wide, bearing terminally two jointed claws 39 with bifid tips (Figure 2c) and five small setules. Outer surface of the fourth segment with small spinules. All elements naked.

Labrum (Figure 2d) with two divergent posteroventral lobes. Mandible (Figure 2e) having on its convex margin a row of denticles diminishing in size distally; on its concave margin a row of longer slender spinules. Lash moderately long with short lateral spinules. Paragnath (Figure 2d) a small smooth lobe. First maxilla (Figure 2f) with four smooth elements. Second maxilla (Figure 2g) with a large first segment. Second segment slender and elongated, bearing a naked seta on its anterior surface and produced to form a long lash with graded spines along one edge and a few minute distal spinules along the outer edge. Maxilliped (Figure 2h) 3-segmented, the first segment unarmed, the second segment having on its inner surface two naked setae (the proximal seta with a blunt tip) and a row of spinules, and the small third segment bearing two barbed setae and having a barbed spiniform tip.

Ventral area between the maxillipeds and the first pair of legs (Figure 2i) slightly protuberant (Figure 1b).

Legs 1–4 (Figures 2j,k, 3a,b) with the formula for the armature as follows (the Roman numerals indicating spines, the Arabic numerals representing setae):

P ₁	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 4
					enp	0-1;	0-1;	I-5
P ₂	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 5
					enp	0-1;	0-2;	I, II, 3
P ₃	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 5
					enp	0-1;	0-2;	I, II, I, 2
P ₄	coxa	0-1	basis	1-0	exp	I-0;	I-1;	II, I, 5
					enp	II		

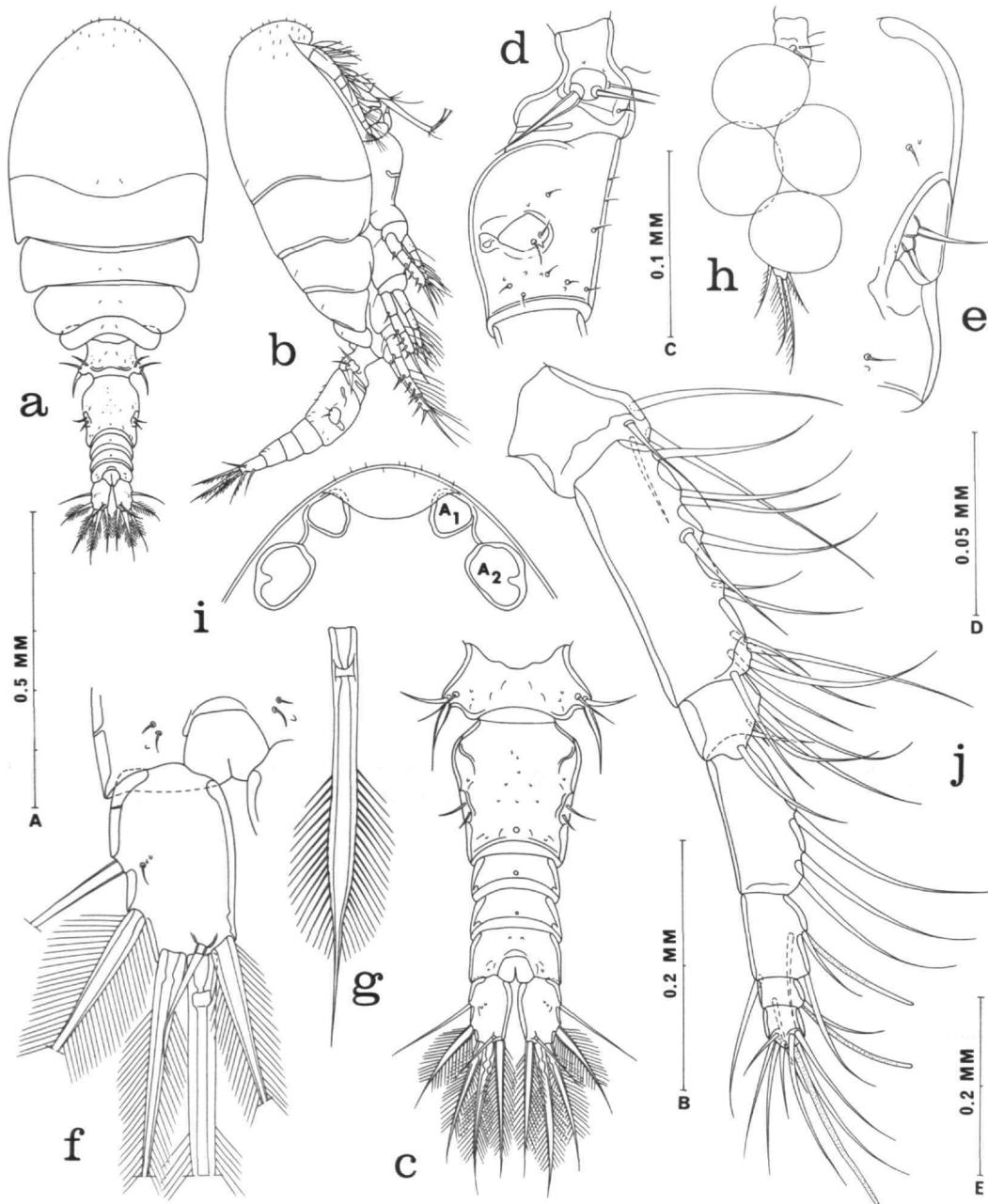


FIGURE 1.—*Senariellus diadematis*, new genus, new species, female: *a*, dorsal (A); *b*, lateral (A); *c*, urosome, dorsal (B); *d*, segment of leg 5 and genital segment, lateral (C); *e*, genital area, dorsal (D); *f*, caudal ramus, dorsal (D); *g*, inner median terminal seta on caudal ramus, dorsal (D); *h*, egg sac, with outline of urosome, lateral (E); *i*, rostrum, ventral (B); *j*, first antenna, dorsal (D).

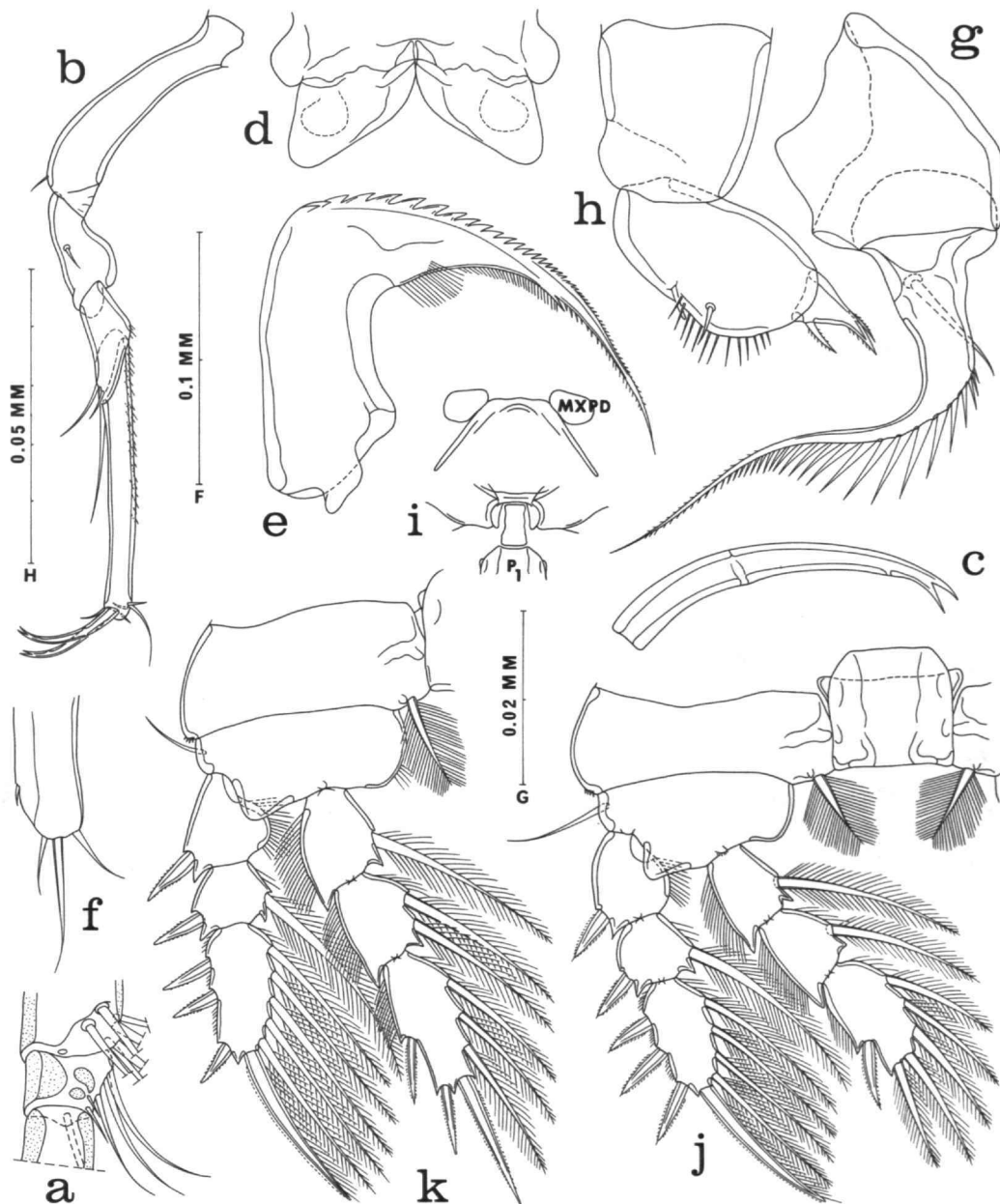


FIGURE 2.—*Senariellus diadematis*, new genus, new species, female: *a*, third segment of first antenna, ventral (D); *b*, second antenna, anterior (F); *c*, claw of second antenna, anterior (G); *d*, labrum, with position of paragnaths indicated by broken lines, ventral (D); *e*, mandible, posterior (H); *f*, first maxilla, anterior (H); *g*, second maxilla, posterior (H); *h*, maxilliped, inner (H); *i*, area between maxillipeds and leg 1, ventral (B); *j*, leg 1 and intercoxal plate, anterior (F); *k*, leg 2, anterior (F).

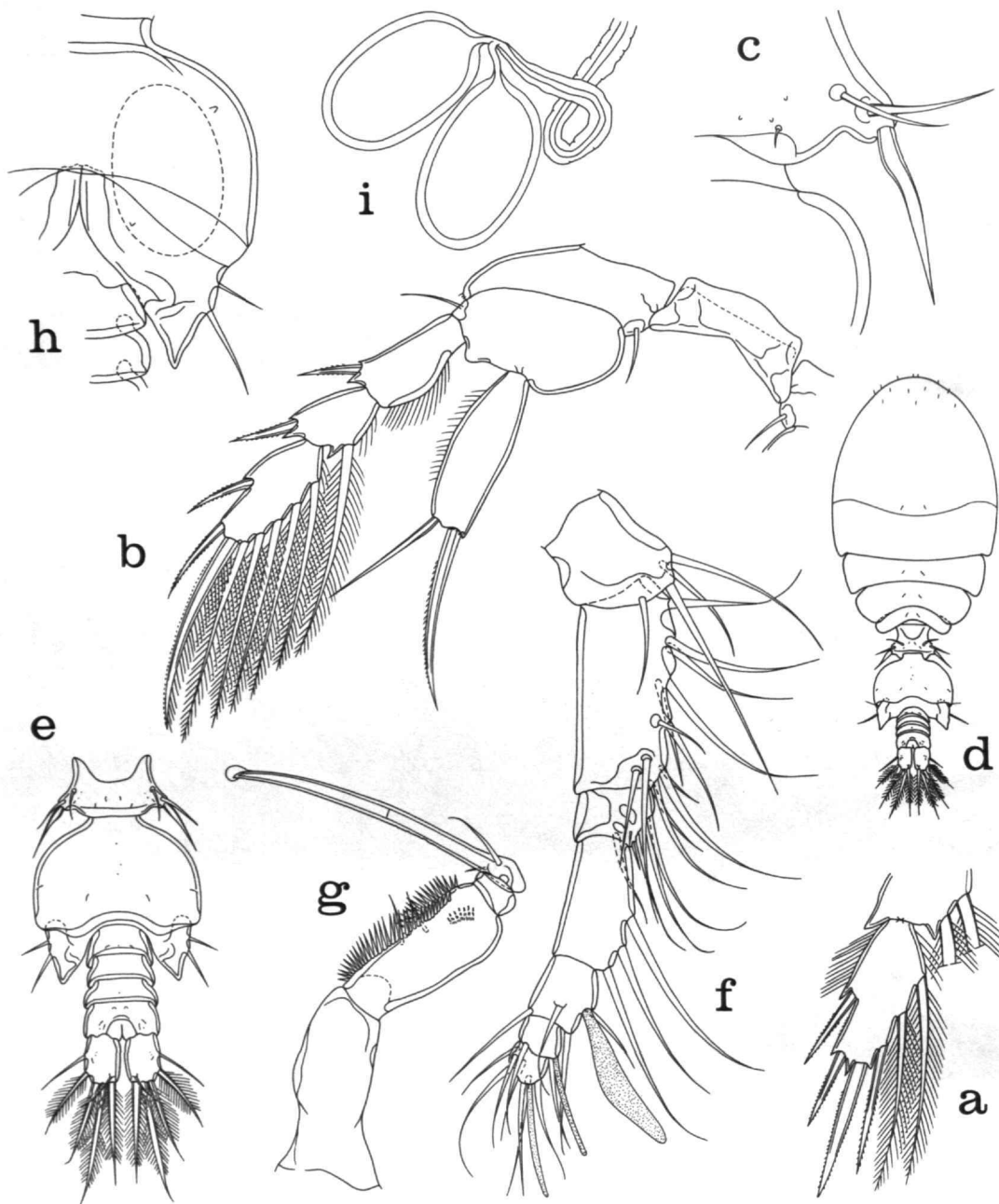


FIGURE 3.—*Senariellus diadematis*, new genus, new species, female: *a*, third segment of endopod of leg 3, anterior (F); *b*, leg 4 and intercoxal plate, anterior (F); *c*, leg 5, dorsal (D). Male: *d*, dorsal (A); *e*, urosome, dorsal (B); *f*, first antenna, ventral (D); *g*, maxilliped, inner (F); *h*, leg 6, ventral (F); *i*, spermatophores, attached to female, dorsal (F).

Setae on the rami relatively short, those on the third segment of the endopod of leg 1 almost spiniform (Figure 2j). Last segment of the endopod of leg 3 (Figure 3a) with an extra inner spine, so that the formula is I, II, I, 2, instead of I, II, 2 as in the related genus *Pseudanthessius* and many other lichomologoid genera. Leg 4 (Figure 3b) with the inner coxal seta 22 and naked, instead of plumose as in the preceding legs. Exopod of leg 4 120 long. Endopod 64×21 , with the outer margin having a row of hairs and with two terminal spines, the slender outer spine 51 and smooth, the stouter inner spine 68 and barbed along the outer margin; ratio between the two spines 1.33:1.

Leg 5 (Figures 1d, 3c) with three naked setae 50, 28, and 23.

Leg 6 represented by the two setae on the genital area (Figure 1d,e).

Living specimens in transmitted light pale brown, the eye red.

MALE.—Body (Figure 3d) slender. Length 0.65 mm (0.62–0.68 mm) and the greatest width 0.25 mm (0.23–0.26 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.50:1. Ratio of the length of the prosome to that of the urosome 1.68:1.

Segment of leg 5 (Figure 3e) 40×85 . Genital segment 130×130 , the length including the posteriorly pointed extensions of leg 6. Four postgenital segments from anterior to posterior 22×54 , 20×52 , 18×57 , and 30×59 .

Caudal ramus resembling that of the female but smaller, 40×28 ; ratio 1.43:1.

Body surface ornamented as in the female.

Rostrum like that of the female. First antenna (Figure 3f) resembling that of the female, but the aesthete on the fifth segment much stouter. Second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla like those of the female. Maxilliped (Figure 3g) slender and 4-segmented (assuming that the proximal part of the claw represents a fourth segment). First segment unarmed. Second segment bearing three rows of spines and two naked setae. Small third segment unarmed. Claw 121 along its axis (including the terminal lamella) showing a slight evidence of division about midway, with the concave margin slightly irregular proximal to the division, and bearing proximally two unequal naked setae.

Ventral area between the maxillipeds and the first pair of legs like that of the female.

Legs 1–4 resembling those of the female. Two spines on the endopod of leg 4 more unequal, 38 and 61, with the ratio 1.61:1.

Leg 5 similar to that in the female.

Leg 6 (Figure 3h) a posteroventral flap on the genital segment produced posteriorly and bearing two naked setae 17 and 36.

Spermatophore (Figure 3i) oval, 65×39 , not including the neck.

Living specimens colored as in the female.

ETYMOLOGY.—The specific name *diadematis* is the genitive form of the generic name of the host.

Senariellus latiseteta, new species

FIGURE 4a–j

TYPE MATERIAL.—3 ♀♀, 1 ♂ from one echinoid, *Heterocentrotus mammillatus* (Linnaeus), in 0.5 m, western side of Isle Maître, near Noumea, New Caledonia, $22^{\circ}20'05''S$, $166^{\circ}24'05''E$, 11 June 1971. Holotype ♀, allotype (with the left maxilliped removed), and 2 paratypic ♀♀ deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

OTHER SPECIMENS.—1 ♀ (dissected) from one echinoid, *Tripneustes gratilla* (Linnaeus), in 1 m, Rocher à la Voile, Noumea, $22^{\circ}18'24''S$, $166^{\circ}25'50''E$, 3 June 1971.

FEMALE.—Body (Figure 4a) with the prosome moderately broad. Length 0.80 mm (0.77–0.84 mm) and the greatest width 0.37 mm (0.35–0.39 mm), based on 4 specimens. Ratio of the length to the width of the prosome 1.39:1. Ratio of the length of the prosome to that of the urosome 1.69:1.

Segment of leg 5 (Figure 4b) 60×112 . Genital segment in dorsal view 117×107 , with the sides nearly parallel. Genital areas located dorsolaterally posterior to the middle of the segment. Setae on the genital area 29 and 16, both naked. Three postgenital segments from anterior to posterior 39×78 , 31×75 , and 26×73 .

Caudal ramus (Figure 4a) 47×34 , ratio 1.38:1. Outer lateral seta 99 and smooth. Dorsal seta 57, outermost terminal seta 137, innermost terminal seta 143, and the two median terminal setae 115 (outer) and 160 (inner). All these setae with lateral spinules.

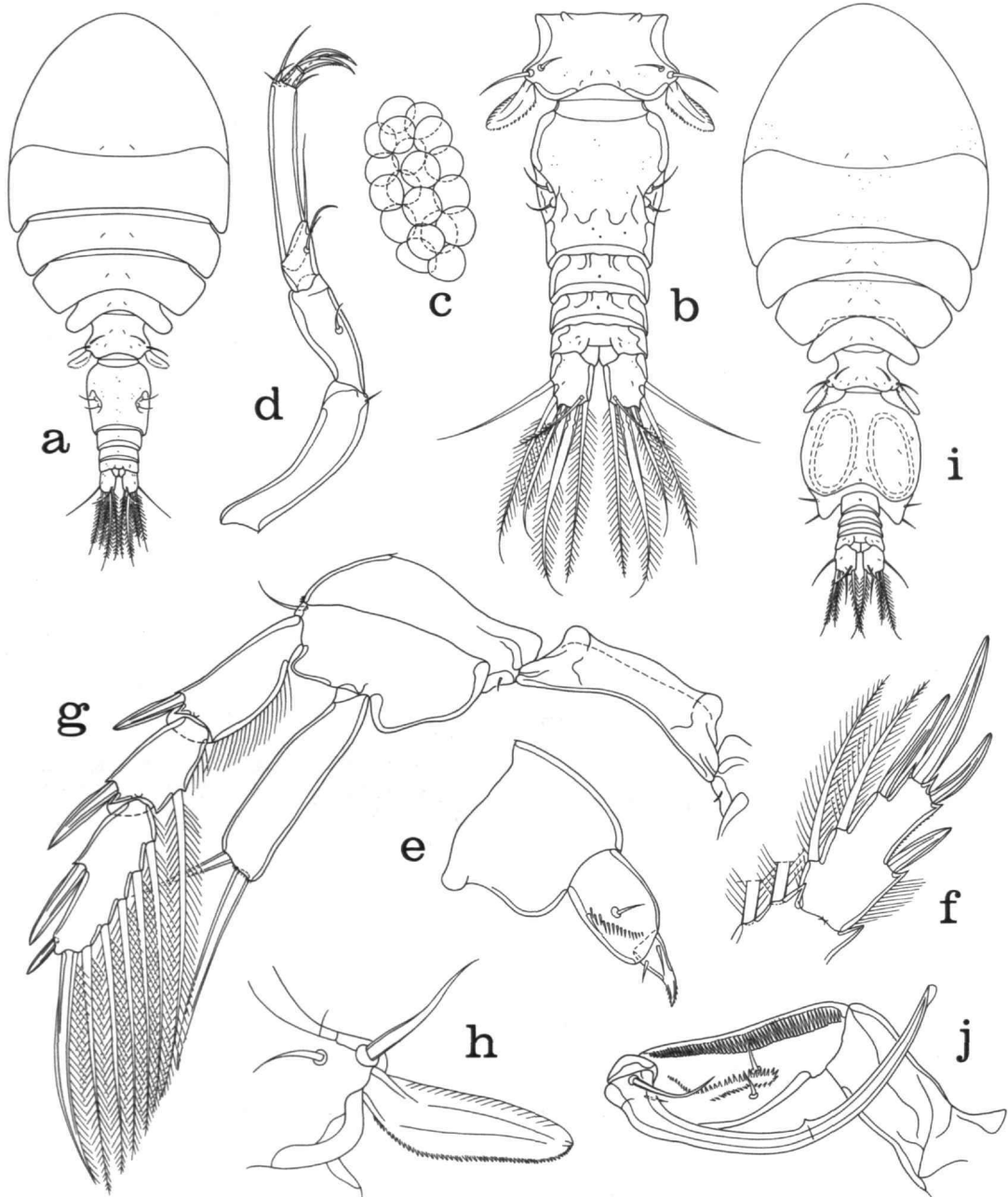


FIGURE 4.—*Senariellus latiseta*, new genus, new species, female: *a*, dorsal (A); *b*, urosome, dorsal (B); *c*, egg sac, dorsal (A); *d*, second antenna, anterior (C); *e*, maxilliped, inner (D); *f*, third segment of endopod of leg 3, anterior (F); *g*, leg 4 and intercoxal plate, anterior (F); *h*, leg 5, dorsal (D). Male: *i*, dorsal (E); *j*, maxilliped, inner (F).

Egg sac (Figure 4c) 320×170 , reaching to two-thirds of the length of the caudal setae, and containing 20–25 eggs about 55–62 in diameter.

Rostrum as in *Senariellus diadematis*.

First antenna 228 long, with the armature as in *S. diadematis*. Lengths of the seven segments: 17 (35 along the anterior margin), 69, 22, 41, 33, 15, and 13 respectively.

Second antenna (Figure 4d) slender and elongated, 250 long. Fourth segment 91 along the outer edge, 72 along the inner edge, and 14 wide, lacking the small spinules seen in *S. diadematis*. Two terminal claws about 35 long, with simple attenuated tips, and finely denticulated along their concave margin.

Labrum, mandible, paragnath, and first maxilla similar to those in *S. diadematis*. Second maxilla also as in that species except that the seta on the second segment is barbed. Maxilliped (Figure 4e) showing only minor differences from *S. diadematis*.

Legs 1–4 with the segmentation and armature as in *S. diadematis*. In leg 1 the proximal outer spine on the third exopod segment shorter than the adjacent spines, not subequal in length as in *S. diadematis*. All spines except those on the exopod of leg 1 with lamellate rather than barbed edges. Third segment of the endopod of leg 3 (Figure 4f) with the formula I, II, I, 2. Leg 4 (Figure 4g) with the inner coxal seta 8 and naked. Exopod 156 long. Distal outer spine on the third segment of the exopod distinctly smaller than the proximal outer spine. Endopod 78×34 with smooth margins. Two smooth terminal spines 39 (outer) and 81 (inner), ratio 2.08:1.

Leg 5 (Figure 4h) with three elements: a broad gladiolate seta 52×18 with a dentate inner margin and a striated outer margin, an adjacent smooth seta 40, and a dorsal seta (held erect and difficult to measure accurately).

Leg 6 represented by the two setae on the genital area.

Color of living specimens as in *S. diadematis*.

MALE.—Body (Figure 4i) with the prosome like that of the female. Length 0.62 mm and the greatest width 0.26 mm. Ratio of the length to the width of the prosome 1.42:1. Ratio of the length of the prosome to that of the urosome 1.57:1.

Genital segment 140×135 .

Caudal ramus (Figure 4i) 34×26 , ratio 1.31:1.

Inner of the two terminal setae unusually small and naked (compare with Figure 4a).

Rostrum and appendages, as far as determinable without dissection, similar to those of the female except for the maxilliped. Maxilliped (Figure 4j) with the second segment bearing two setae and two rows of spines, one row straight, the other row in the form of a compressed loop. Claw 135 along its axis, with a small pointed process about midway on the concave surface at the level of the weak subdivision, and bearing proximally two unequal setae.

Legs 1–5 similar to those of the female.

Leg 6 resembling that of *S. diadematis*.

Color as in the female.

ETYMOLOGY.—The specific name *latiseta* (Latin, *latus* = broad) and *seta*, referring to the broad gladiolate seta on leg 5.

COMPARISON WITH *Senariellus diadematis*.—*Senariellus latiseta* has several easily recognizable features that distinguish it from *S. diadematis*: (1) the second antennal claws with simple rather than bifurcated tips and with their concave margins finely denticulated, (2) the shorter caudal ramus, with the outer median terminal seta shorter than the outermost terminal seta, and in the male with the inner median terminal seta reduced to a small naked seta, (3) the distal outer spine on the third exopod segment of leg 4 distinctly smaller than the adjacent proximal spine, (4) the broad gladiolate seta on leg 5, and (5) the small pointed process on the concave surface of the claw of the male maxilliped.

Senariellus tensus, new species

FIGURES 5a–j, 6a–h, 7a–e

TYPE MATERIAL.—10 ♀♀ from 11 echinoids, *Echinothrix calamaris* (Pallas), in 1 m, in quarry at northern end of Eniwetok Island, Eniwetok Atoll, Marshall Islands, 14 June 1969. Holotype ♀ and 8 paratypic ♀♀ deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; one dissected ♀ in the collection of the author. 1 ♀, 1 ♂ (the allotype) from one *Echinothrix calamaris*, in 3 m, Gomumu Island, south of Obi, Moluccas, $1^{\circ}50'00''S$, $127^{\circ}30'54''E$, 30 May 1975; these two specimens also in the NMNH.

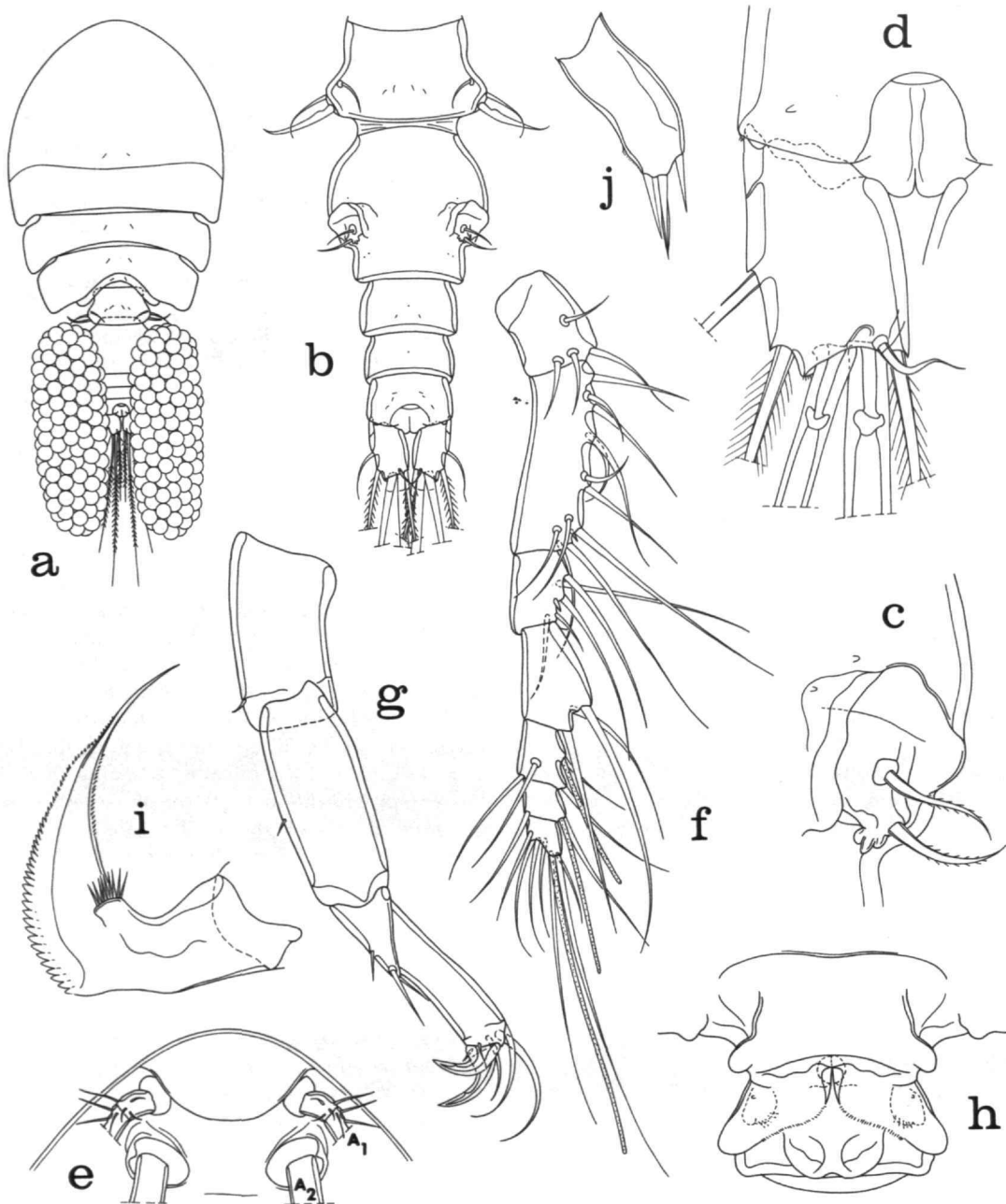


FIGURE 5.—*Senariellus tensus*, new genus, new species, female: *a*, dorsal (I); *b*, urosome, dorsal (E); *c*, genital area, dorsal (D); *d*, caudal ramus, dorsal (D); *e*, rostrum, ventral (A); *f*, first antenna, ventral (C); *g*, second antenna, posterior (C); *h*, labrum and postlabral area, with paragnaths indicated by broken lines, ventral (C); *i*, mandible, posterior (D); *j*, first maxilla, posterior (D).

FEMALE.—Body (Figure 5a) with a moderately slender prosome. Length 1.34 mm (1.22–1.49 mm) and the greatest width 0.65 mm (0.52–0.76 mm), based on 8 specimens. Ratio of the length to the width of the prosome 1.25:1. Ratio of the length of the prosome to that of the urosome 1.82:1.

Segment of leg 5 (Figure 5b) 112×180 . Genital segment in dorsal view 161×179 , with rounded sides anteriorly but with parallel sides in the posterior sixth. Genital areas located dorsolaterally behind the middle of the segment. Each genital area (Figure 5c) with two lightly haired setae and a small trilobate process. Three postgenital segments from anterior to posterior 65×107 , 52×96 , and 60×94 . Posteroventral margin of the anal segment with minute spinules.

Caudal ramus (Figure 5d) 64×40 , ratio 1.6:1. Outer lateral seta 90 and naked. Dorsal seta about 25 and smooth. Outermost lateral seta 174, innermost terminal seta 242, and the two median terminal setae 410 (outer) and 550 (inner), both inserted between dorsal (smooth) and ventral (with a row of spinules) flanges; all four of these setae with lateral spinules.

Body surface with a few hairs (sensilla) as in Figure 5a,b.

Egg sac (Figure 5a) elongated, 715×242 , with many small eggs about 48 in diameter.

Rostrum (Figure 5e) broadly rounded posteroventrally.

First antenna (Figure 5f) 312 long, with the armature as in *Senariellus diadematis*. Lengths of the seven segments: 26 (62 along the anterior margin), 96, 42, 44, 34, 16, and 18 respectively. Fourth segment unusually expanded on the anterior margin. All setae naked.

Second antenna (Figure 5g) 320 long. Formula 1, 1, 3, and II+5. Fourth segment 99 along the outer side, 64 along the inner side, and 25 wide. Two terminal claws 32 and 40, the longer claw more weakly sclerotized than the shorter claw.

Labrum (Figure 5h) with two widely divergent narrow posteroventral lobes. Inner margin of each lobe with a row of small spinules. Mandible (Figure 5i) of the usual pseudanthessiid type. Paragnath (Figure 5h) a small lobe with a few small hairs. First maxilla (Figure 5j) with three elements. Second maxilla (Figure 6a) generally like that of other pseudanthessiids. Maxilliped (Figure 6b) with the second segment expanded in ventral view (Figure

6c). Two elements on the small pointed third segment very small.

Ventral area between the maxillipeds and the first pair of legs (Figure 6c) not protuberant.

Legs 1–4 (Figure 6d–g) with the segmentation and armature as in *S. diadematis*. Inner margin of the basis in all four legs smooth. Third segment of the endopod of leg 3 with the formula, I, II, I, 2, the innermost spine being short and naked. Leg 4 with the exopod 135 long. Endopod 68×31 in maximum dimensions, with the outer margin bearing a proximal row of hairs and a prominent thorn-like process. Two delicately fringed terminal spines 29 (outer) and 57 (inner), ratio 1.97:1.

Leg 5 (Figure 6h) with three elements: a stout seta 73 with a narrow fringe on its anterior margin, an adjacent smooth seta 65, and a smaller naked dorsal seta 31.

Leg 6 represented by the two setae on the genital area (Figure 5c).

Color of living specimens in transmitted light pale reddish lavender, the eye red, the egg sacs reddish lavender.

MALE.—Body (Figure 7a) more slender than in the female. Length 0.82 mm and the greatest width 0.30 mm. Ratio of the length to the width of the female 1.56:1. Ratio of the length of the prosome to that of the urosome 1.70:1.

Caudal ramus similar to that of the female but smaller, 44×29 .

Rostrum and appendages, as far as could be determined without dissection, similar to those of the female, except for the maxilliped. Maxilliped (Figure 7b) with an elongated unornamented first segment. Second segment elongated with two small naked setae and patches of small spines. Small third segment unarmed. Claw 125 along its axis including the lamella, with two unequal setae proximally, a small prominent tooth about midway, and an irregular hyaline fringe along the concave margin.

Legs 1–4 like those of the female.

Leg 5 (Figure 7c) with three setae, the largest more prominently fringed than in the female.

Leg 6 (Figure 7d) a posteroventral flap on the genital segment bearing two smooth setae and terminating in a sharp point.

Spermatophore (Figure 7e) oval, 117×65 not including the neck, and attached to the female in pairs.

Color resembling that of the female.

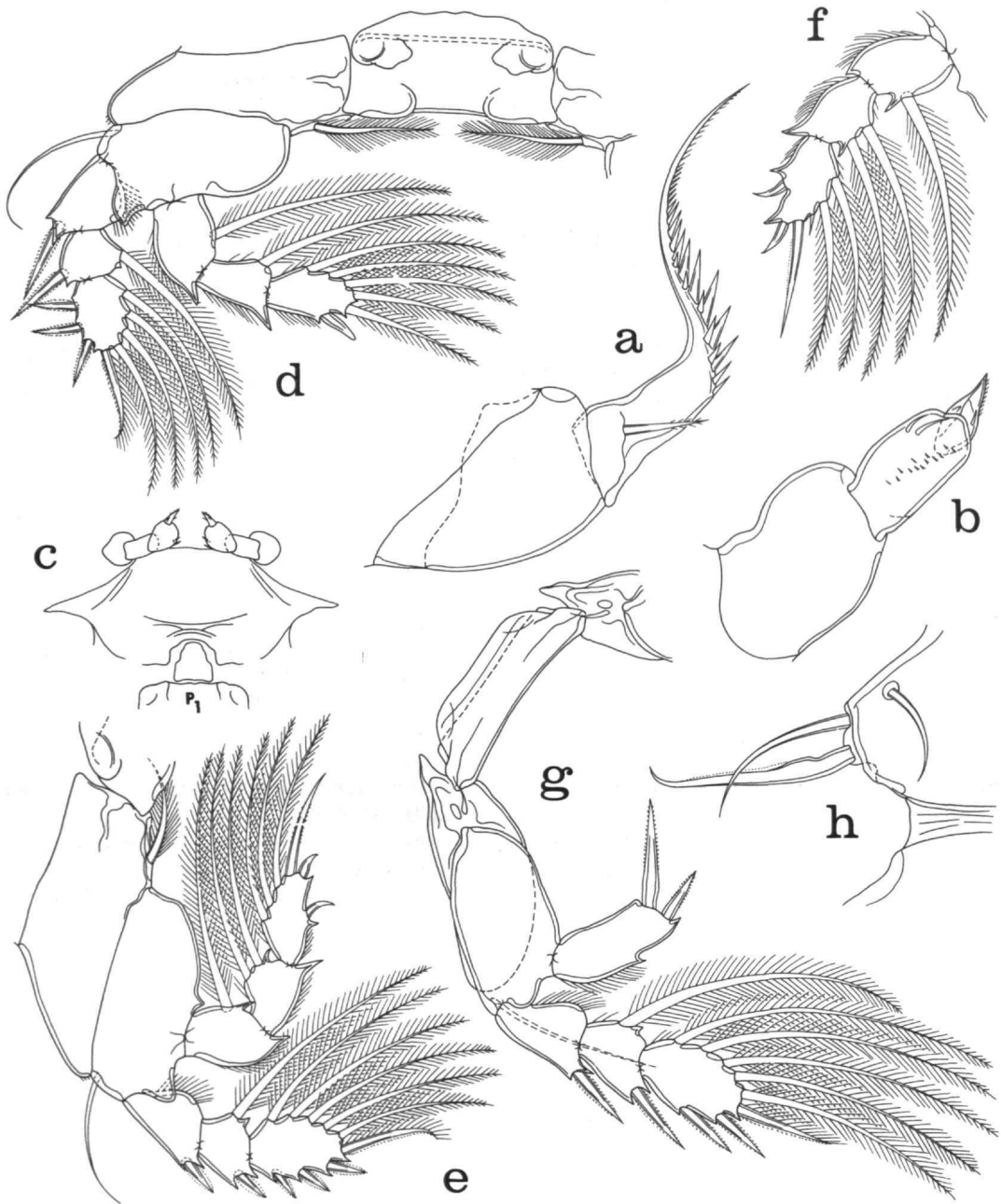


FIGURE 6.—*Senariellus tensus*, new genus, new species, female: *a*, second maxilla, postero-inner (D); *b*, maxilliped, antero-inner (D); *c*, maxillipeds and area in front of first pair of legs, ventral (E); *d*, leg 1 and intercoxal plate, anterior (C); *e*, leg 2, anterior (C); *f*, endopod of leg 3, anterior (C); *g*, leg 4 and intercoxal plate, anterior (C); *h*, leg 5, dorsal (F).

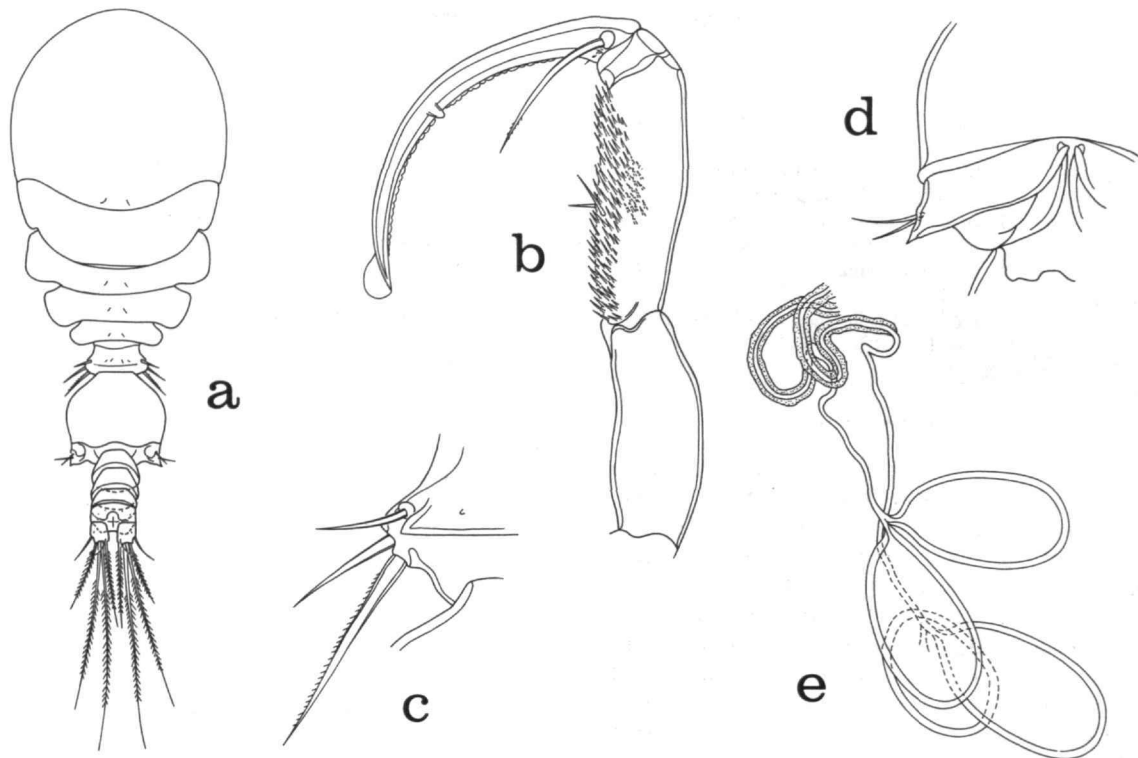


FIGURE 7.—*Senariellus tensus*, new genus, new species, male: a, dorsal (A); b, maxilliped, inner (F); c, leg 5, dorsal (D); d, leg 6, ventral (C); e, spermatophores attached to female, ventral (B).

ETYMOLOGY.—The specific name *tensus* (Latin, = spread out or extended) alludes to the expanded fourth segment of the first antenna in this species.

COMPARISON WITH OTHER SPECIES.—*Senariellus tensus* may be distinguished from all other species in the genus by the expanded fourth segment on the first antenna.

***Senariellus foliatus* (Stock, 1967), new combination**

This species, collected by Stock from the echinoid *Echinothrix calamaris* (Pallas) in the Gulf of Aqaba, was originally described as *Pseudanthessius foliatus*. The third endopod segment of leg 3 has six elements, the formula being I, II, I, 2 as in the three previous species.

***Senariellus liber* (Brady, 1880), new combination**

This species, originally described by Brady as *Lichomolgus liber* and later placed by T. and A.

Scott (1893) in the genus *Pseudanthessius*, has been collected many times in northwestern Europe (Channel coast of France, England, Scotland, Norway, Sweden). Although it has occasionally been reported as free-living, *Senariellus liber* is a frequent associate of regular echinoids (*Echinus sphaera* O. F. Müller = *Echinus esculentus* Linnaeus, *Strongylocentrotus droebakiensis* (O. F. Müller), *Paracentrotus lividus* (Lamarck), *Psammechinus miliaris* (Gmelin). Bocquet and Stock (1962) found a single female on the asteroid *Marthasterias glacialis* (Linnaeus) near Roscoff, France, but considered this association as probably only occasional.

The third segment of the endopod of leg 3 has six elements as in other species of *Senariellus* (Sars, 1917, pl. XCIV).

The association of this species with echinoids conforms to the host preference of the genus as a whole, where all members live on regular echinoids.

Key to the Species of *Senariellus*

1. First antenna with the fourth segment expanded *S. tensus*
 First antenna with the fourth segment not expanded 2
2. Claws on the second antenna denticulated; third exopod segment of leg 4 with the second outer spine distinctly shorter than the first 3
 Claws on the second antenna smooth; third exopod segment of leg 4 with the second outer spine as long as or longer than the first 4
3. Broad element on leg 5 dentate on both sides and pointed distally *S. foliatus*
 Broad element on leg 5 dentate on one side and rounded distally *S. latiseta*
4. Second antenna very long and slender, the fourth segment about ten times longer than wide *S. diadematis*
 Second antenna not greatly elongated, the fourth segment about four times longer than wide *S. liber*

Mecomerinx, new genus

DIAGNOSIS.—Pseudanthessiidae. Body cyclopidiform. Urosome in the female 4-segmented, in the male 5-segmented. Caudal ramus with six setae. Rostrum not developed. First antenna 7-segmented, the armature in the female 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete; one or two long setae on the first segment (these setae more than half the length of the first antenna). In the male a similar armature (though the setae on the first segment tend to be shorter), but two aesthetes added on the second segment and one on the fourth segment, so that the arrangement of the aesthetes is 0, 2, 0, 1, 1, 1, 1. Second antenna 4-segmented, with the formula 1, 1, 3, and two claws + 5.

Labrum incised medially. Mandible slender without a scalelike area on the convex side of the base. Paragnath a small lobe. First maxilla, second maxilla, and maxilliped in general aspect like those of *Pseudanthessius*.

Legs 1-4 segmented and armed as in *Pseudanthessius*.

Leg 5 without a free segment and bearing the usual three elements.

Leg 6 represented by the two setae near the genital openings, one of these setae feathered.

Other features as in the species below.

Associated with regular echinoids.

TYPE-SPECIES.—*Mecomerinx sewellana*, new species.

ETYMOLOGY.—The generic name is formed from *μηκος* (length) and *μηρινξ* (bristle), referring to the long setae on the first segment of the first antenna. Gender feminine.

COMPARISON WITH *Pseudanthessius* AND *Senariel-*

lus.—The new genus, though close to *Pseudanthessius* Claus, 1889, is distinguished by (1) the long setae on the first segment of the first antenna, (2) one of the setae on the genital area of the female being feathered, and (3) two aesthetes on the second segment of the first antenna of the male.

From *Senariellus* the new genus may be distinguished by the formula I, II, 2 on the third exopod segment of leg 3.

Mecomerinx sewellana, new species

FIGURES 8a-h, 9a-j, 10a-h

Pseudanthessius liber (Brady, 1880), sensu Sewell, 1949:121, fig. 32 A-G.

TYPE MATERIAL.—36 ♀♀, 34 ♂♂, and 1 copepodid from 22 *Tripneustes gratilla* (Linnaeus) in 2 m, Natsepa, Ambon, Moluccas, 3°37'05"S, 128°17'00"E, 11 May 1975. Holotype ♀, allotype, and 63 paratypes (32 ♀♀, 31 ♂♂), and the copepodid deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypes (dissected) in the collection of the author.

OTHER SPECIMENS.—3 ♀♀, 7 ♂♂ from 15 *Tripneustes gratilla*, in 1 m, Natsepa, Ambon, 24 April 1975; 55 ♀♀, 61 ♂♂, and 70 copepodids from 2 *Tripneustes gratilla*, in 3 m, Bohol Island, Philippine Islands, 10°16.8'N, 124°10.8'E, 22 September 1975, Thomas Forhan collector.

FEMALE.—Body (Figure 8a) with a moderately broad prosome not greatly thickened dorsoventrally. Length 1.11 mm (1.09–1.16 mm) and the greatest width 0.54 mm (0.53–0.56 mm), based on 10 specimens. Epimeral areas of the segments of

legs 1, 2, and 4 rounded, those of leg 3 rather truncated. Ratio of the length to the width of the prosome 1.26:1. Ratio of the length of the prosome to that of the urosome 1.67:1.

Segment of leg 5 (Figure 8*b*) 91 × 148. Between this segment and the genital segment no ventral sclerite. Genital segment 151 × 138, in dorsal view with rounded sides in its anterior two-thirds but with parallel sides in the posterior third. Genital areas located dorsolaterally behind the middle of the segment. Each genital area (Figure 8*c*) with two smooth setae 22 and 12, and a small spiniform process. Three postgenital segments from anterior to posterior 47 × 86, 40 × 86, and 40 × 83. Posteroventral border of the anal segment smooth.

Caudal ramus (Figure 8*d*) 66 × 39, ratio 1.69:1. Outer lateral seta 94 and naked. Dorsal seta 32 with a few short hairs. Outermost terminal seta 170, the innermost terminal seta 224, and the two long median terminal setae 268 (outer) and 340 (inner), both inserted between smooth dorsal and ventral flanges; all four terminal setae with lateral spinules.

Body surface with a few hairs (sensilla) and refractile points (Figure 8*a*).

Egg sac (Figure 8*e*) elongated, 627 × 231, reaching a little beyond the longest setae on the caudal rami and containing numerous eggs about 80 in diameter.

Rostrum (Figure 8*f*) broad with delicate median longitudinal creases.

First antenna (Figure 8*g*) 313 long. Seven segments 10 (65 along the anterior margin), 86, 21, 51, 42, 27, and 21 respectively. Formula as in *M. heterocentroti*. Two elements on the first segment unusually long, 140 and 260, with blunt tips. All setae naked.

Second antenna (Figure 8*h*) 275 long. Formula I, 1, 3, and II + 5 slender elements. Fourth segment 127 along the outer side, 86 along the inner side, and 22 wide. Two terminal claws unequal, one strongly clawlike and 44, the other more spinelike with a blunt tip and 24. All elements naked.

Labrum (Figure 9*a*) with the two posteroventral lobes having serrated inner margins. Mandible (Figure 9*b*) slender, the distal part of the base having an outer serrated fringe and an inner oblique row of spinules. Lash short, smooth, and rather abruptly set off from the rest of the mandible. Paragnath (Figure 9*a*) a small lobe with a few

hairs. First maxilla (Figure 9*c*) with four elements. Second maxilla (Figure 9*d*) with an unornamented first segment. Second segment elongated with a seta on the posteroinner surface. Lash with a series of graduated slender spines. Maxilliped (Figure 9*e*) with a large unornamented first segment. Second segment with two setae and a row of small spinules. Third segment spiniform, with two naked setae and a row of small spinules.

Ventral area between the maxillipeds and the first pair of legs (Figure 9*f*) not protuberant.

Legs 1-4 (Figures 9*g,i,j*, 10*a*) with the formula for the armature as follows (the Roman numerals indicating spines, the Arabic numerals representing setae):

P ₁	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 4
					enp	0-1;	0-1;	I, 5
P ₂	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 5
					enp	0-1;	0-2;	I, II, 3
P ₃	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III, I, 5
					enp	0-1;	0-2;	I, II, 2
P ₄	coxa	0-1	basis	1-0	exp	I-0;	I-1;	II, I, 5
					enp	II		

In the exopod of leg 1 the distalmost outer spine on the third segment with a hyaline naked tip (Figure 9*h*). Inner coxal seta of leg 4 minute, 6 long, and naked. Inner margin of the basis of this leg smooth. Exopod of leg 4 192 long. Endopod 109 × 27, with a small notch midway on the outer margin; proximal to this notch a few marginal spinules. Two terminal spines 60 (outer) and 103 (inner).

Leg 5 (Figure 10*b*) with three elements, a broad spine 55 with an inner lamella, a naked seta 44, and a naked dorsal seta.

Leg 6 represented by the two setae on the genital area (Figure 8*c*).

Color in life in transmitted light pale tan, the eye red, the egg sacs gray.

MALE. Body (Figure 10*c*) more slender than in the female. Length 0.82 mm (0.80-0.83 mm) and the greatest width 0.34 mm (0.32-0.35 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.47:1. Ratio of the length of the prosome to that of the urosome 1.69:1.

Segment of leg 5 (Figure 10*d*) 47 × 91. Genital segment 146 long including leg 6 (114 in the midline without the posterolateral extensions of leg 6) and 146 wide. Four postgenital segments from

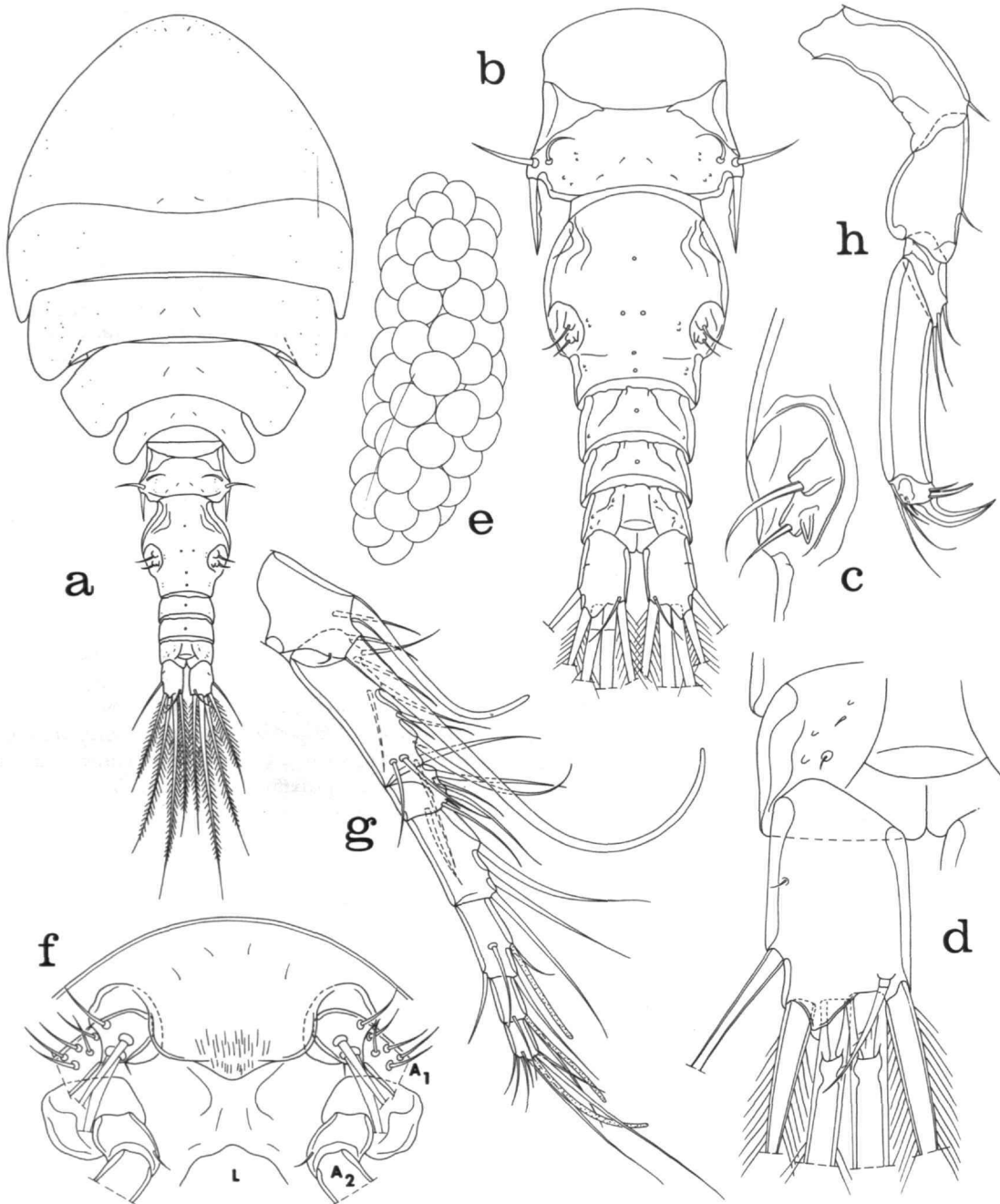


FIGURE 8.—*Mecomerinx sewellana*, new genus, new species, female: a, dorsal (A); b, urosome, dorsal (B); c, genital area, dorsal (D); d, caudal ramus, dorsal (D); e, egg sac, dorsal (A); f, rostrum, ventral (B); g, first antenna, ventral (C); h, second antenna, posterior (C).

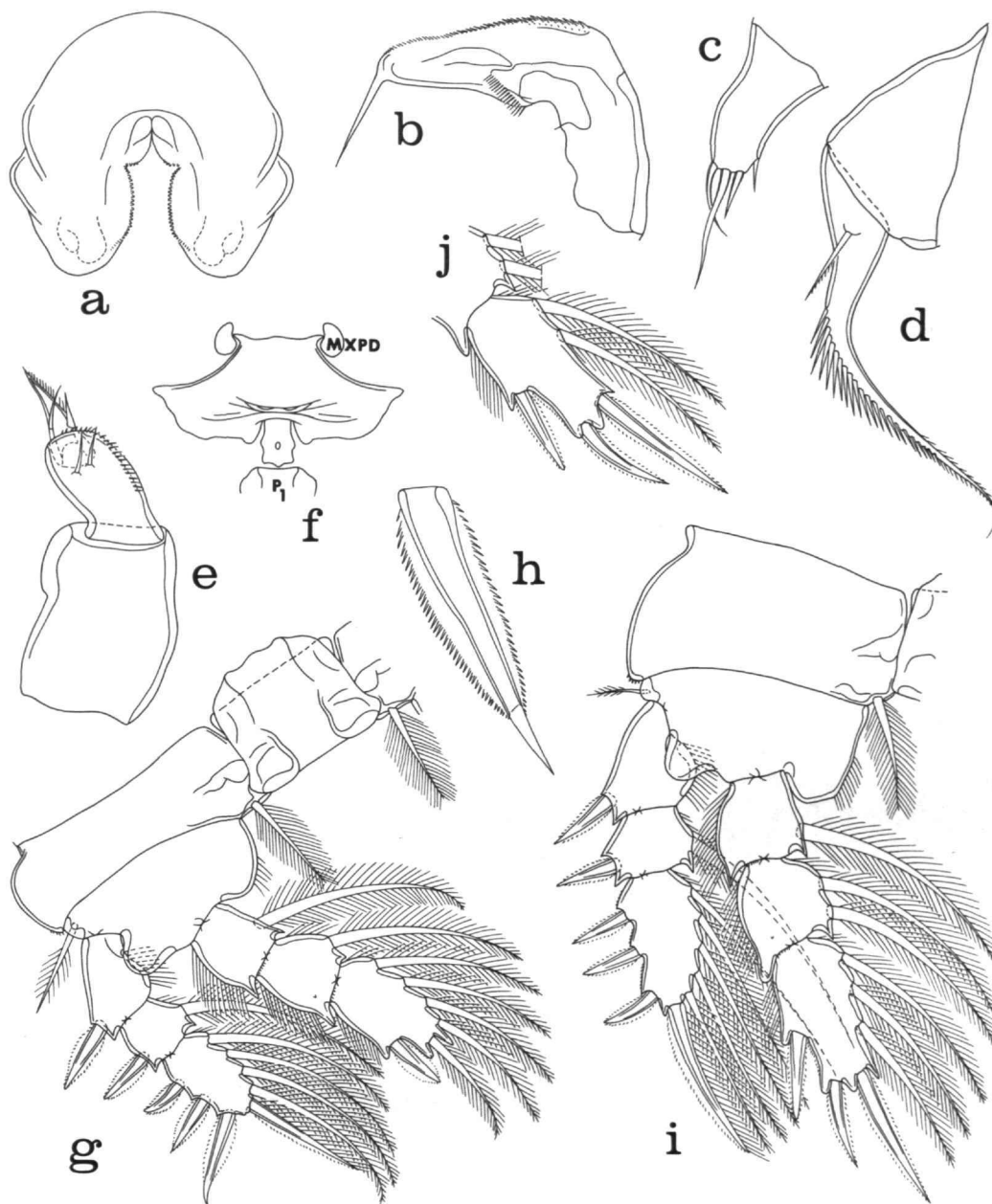


FIGURE 9.—*Mecomerinx sewellana*, new genus, new species, female: *a*, labrum, with paragnaths indicated by broken lines, ventral (F); *b*, mandible, posterior (D); *c*, first maxilla, posterior (D); *d*, second maxilla, postero-inner (D); *e*, maxilliped, antero-inner (D); *f*, area between maxillipeds and first pair of legs, ventral (E); *g*, leg 1 and intercoxal plate, anterior (C); *h*, third lateral spine on third segment of exopod of leg 1, anterior (H); *i*, leg 2, anterior (C); *j*, third segment of endopod of leg 3, anterior (C).

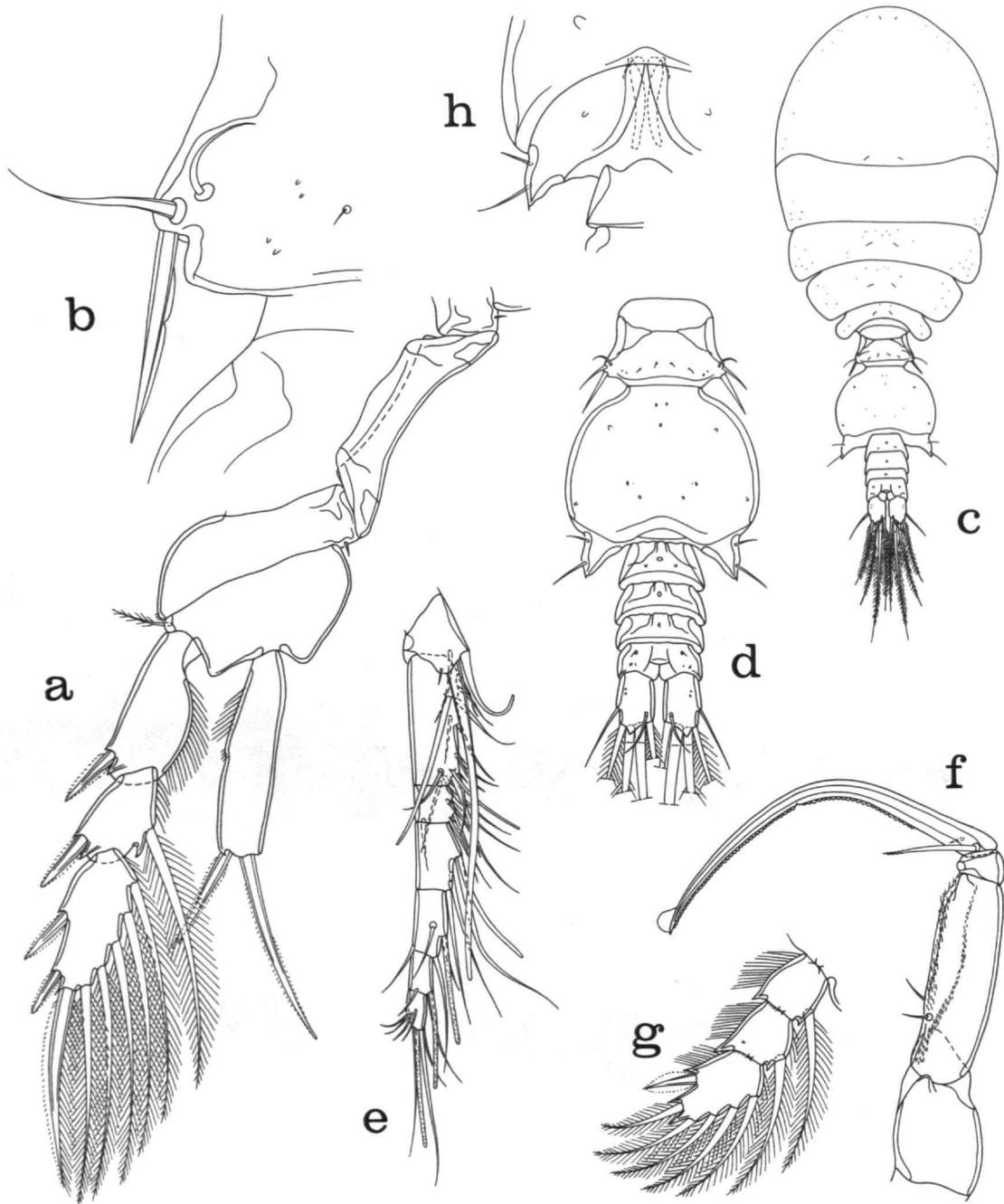


FIGURE 10.—*Mecomerinx sewellana*, new genus, new species, female: *a*, leg 4 and intercoxal plate, anterior (C); *b*, leg 5, dorsal (D). Male: *c*, dorsal (A); *d*, urosome, dorsal (B); *e*, first antenna, ventral (C); *f*, maxilliped, inner (C); *g*, endopod of leg 1, anterior (C); *h*, leg 6, ventral (C).

anterior to posterior 31×62 , 26×65 , 23×64 , and 26×64 .

Caudal ramus resembling that of the female but smaller (Figure 10d), 47×31 .

Body surface ornamented with a few hairs (sensilla) and refractile points.

Rostrum as in the female. First antenna (Figure 10e) 225 long, segmented and armed as in the female, but the two long elements on the first segment 47 and 177, more unequal than in the female. Three aesthetes added, so that the formula is the same as in the male of the following species. Second antenna as in the female.

Labrum, mandible, paragnath, first maxilla, and second maxilla as in the female. Maxilliped (Figure 10f) slender. First segment unarmed. Second segment with two naked setae and two rows of small slender spinules. Third segment unarmed. Claw 187 along its axis, rather angularly bent. Weak indication of division about midway. Proximally with two very unequal setae. Concave margin of the claw with a hyaline scalloped fringe.

Legs 1-4 as in the female, but the spiniform processes on the endopods of legs 1-3 more pointed (Figure 10g).

Leg 5 resembling that of the female.

Leg 6 (Figure 10h) a posteroventral flap on the genital segment bearing two naked setae 12 and 25.

Spermatophore not seen except inside the genital segment of the male.

Color in life similar to that of the female.

ETYMOLOGY.—The specific name *sewellana* is intended to call to mind the fact that the late Dr. R. B. Seymour Sewell first saw specimens of this species.

REMARKS.—For 25 years the identity of "*Pseudanthessius liber*" briefly described by Sewell (1949) from a short-spined, regular echinoid at Nankauri Harbor, Nicobar Islands, has remained obscure. Sewell's description was incomplete and he confused leg 2 with leg 3. A comparison of his species with true *Pseudanthessius liber* (Brady, 1880) from Europe shows immediately that the two copepods are not conspecific.

The "numerous specimens" that Sewell collected and identified as *Pseudanthessius liber* are, according to my best information, no longer in existence. Dr. Sewell wrote me in 1958 that the *Investigator* collections were deposited in the Indian Museum,

Calcutta. During World War II the collections of the Zoological Survey of India, which then included the *Investigator* copepods, were transferred to Benares for safekeeping. There they were submerged during a flood, during which bottles containing specimens were broken and microscope slide labels were washed off. It therefore is impossible to designate one of Sewell's specimens as the holotype, which would otherwise be done following Article 73, Recommendation 73B, of the *International Code of Zoological Nomenclature* (XV ICZ).

The new collections made in the Moluccas in 1975 contain abundant specimens of Sewell's copepod. There is virtually no doubt that Sewell's lost material and the newly collected specimens are the same species. Meager though Sewell's figures are, they fit almost exactly the Moluccan specimens.

Mecomerinx heterocentroti, new species

FIGURES 11a-i, 12a-i, 13a-f

TYPE MATERIAL.—41 ♀♀, 20 ♂♂, and 9 copepodids from one pencil urchin, *Heterocentrotus mammillatus* (Linnaeus), in 0.5 m, western side of Isle Maitre, near Noumea, New Caledonia, $22^{\circ}20'05''S$, $166^{\circ}24'05''E$, 11 June 1971. Holotype ♀, allotype, and 50 paratypes (35 ♀♀, 15 ♂♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypes in the collection of the author.

OTHER SPECIMENS (all from *Heterocentrotus mammillatus*).—10 ♀♀, 6 ♂♂ from 5 hosts, in 0.5-1 m, 5 km south of Yaté, southeastern New Caledonia, $22^{\circ}11'00''S$, $166^{\circ}50'00''E$, 23 June 1971; 6 ♀♀, 12 ♂♂, and 1 copepodid from 10 hosts, in 10 cm, on reef at Goro, southeastern New Caledonia, $22^{\circ}18'00''S$, $167^{\circ}02'00''E$, 6 August 1971; 4 ♀♀, 1 ♂ from 2 hosts purchased from native boys at Poelau Naira, Banda Islands, Moluccas, $4^{\circ}31'45''S$, $129^{\circ}53'12''E$, 29 April 1975; 2 ♀♀ from 2 hosts, in 2 m, Gomumu Island, south of Obi, Moluccas, $1^{\circ}50'00''S$, $127^{\circ}30'54''E$, 30 May 1975.

FEMALE.—Body (Figure 11a) with a moderately broad flattened prosome. Length 1.01 mm (0.96-1.06 mm) and the greatest width 0.52 mm (0.51-0.56 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.10:1. Ratio of the length of the prosome to that of the urosome

1.38:1. Segment of leg 1 separated from the head by a prominent transverse furrow.

Segment of leg 5 (Figure 11b) 81×125 . Genital segment in dorsal view 125×138 with rounded lateral margins. Genital areas located dorsolaterally posterior to the middle of the segment. Each genital area (Figure 11c) with two setae, one 28 with lateral hairs, the other 14 and naked, and a minute spiniform process. Three postgenital segments from anterior to posterior 42×81 , 39×78 , and 36×75 . Anal segment with a row of very small spinules along the posteroventral margin on both sides.

Caudal ramus (Figure 11d) 50×33 , ratio 1.51:1. Outer lateral seta 39. Dorsal seta 33, the outermost terminal seta 138, and the innermost terminal seta 185. Two median terminal setae 341 (outer) and 495 (inner), both inserted between dorsal (smooth) and ventral (with a marginal row of minute spinules) flanges. All setae with lateral spinules except the outer lateral seta, which is naked.

Body surface with a few hairs (sensilla) as in Figure 11a.

Egg sac (Figure 11a) elongated, 748×210 , reaching to the tips of the ramal setae. Each egg about 57 in diameter.

Rostrum (Figure 11e) not developed.

First antenna (Figure 11f) 330 long. Lengths of the seven segments: 24 (55 along the anterior margin), 96, 34, 57, 39, 25, and 27 respectively. Formula for the armature as in *Senariellus diadematis*. Two setae on the first segment very long, 177 and 198. All setae naked.

Second antenna (Figure 11g) rather slender, 340 long. Formula: 1, 1, 3, and II + 5. Fourth segment 102 along the outer side, 65 along the inner side, and 31 wide, bearing terminally two unequal claws 73 and 36, the shorter claw less unguiform than the longer claw, and five setae. All setae naked except one outer subterminal seta, which is delicately haired.

Labrum (Figure 11h) with two posteroventral lobes. Mandible (Figure 11i) with an elongated basal area and a relatively short lash. Paragnath (Figure 11h) a small lobe. First maxilla (Figure 12a) with four naked setae. Second maxilla (Figure 12b) with a crest of long setae on the elongated second segment. Maxilliped (Figure 12c) with the second segment bearing a crescentic row of small blunt spines distal to the two naked setae. Third segment

bearing a finely barbed spine and a naked seta, and extended distally in a long spiniform process with spinules.

Ventral area between the maxillipeds and the first pair of legs (Figure 12d) not protuberant.

Legs 1-4 (Figure 12e-h) with the segmentation and the formula for the armature as in *Mecomerinx sewellana*. Outer spines on the exopod of leg 1 longer than those in the succeeding legs. Outer distal processes on the endopod segments in legs 1-3 obtuse rather than spiniform. Leg 4 with the inner coxal seta 17 and naked rather than plumose as in the preceding legs. Leg 4 exopod 162 long. Endopod 91×24 , with the two terminal spines 36 and 74; hairs along the irregular outer margin of the endopod.

Leg 5 (Figure 12i) with a spine 35 having a finely dentate fringe along the inner side, a naked seta 63, and an adjacent dorsal seta (held erect and not measurable with accuracy).

Leg 6 probably represented by the two setae on the genital area (Figure 11c).

Living specimens in transmitted light pale brown dorsally, with narrow dark brown bands along the furrows separating the pedigerous segments and a pair of brown areas on the tergum of the segment of leg 4. Eye red, the egg sacs gray.

MALE.—Body (Figure 13a) with the prosome more slender than in the female. Length 0.87 mm (0.84-0.92 mm) and the greatest width 0.36 mm (0.34-0.37 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.30:1. Ratio of the length of the prosome to that of the urosome 1.22:1.

Segment of leg 5 (Figure 13b) 55×83 . Genital segment 117×135 . Four postgenital segments from anterior to posterior 42×68 , 36×65 , 29×63 , and 29×63 .

Caudal ramus (Figure 13b) like that of the female but smaller, 42×28 , ratio 1.5:1.

Body surface ornamented as in the female.

Rostrum as in the female. First antenna (Figure 13c) 265 long. Three aesthetes added, making the formula: 4, 12 + 2 aesthetes, 6, 3 + 1 aesthete, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Two long setae on the first segment 52 and 65, relatively shorter than in the female.

Second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla like those in the

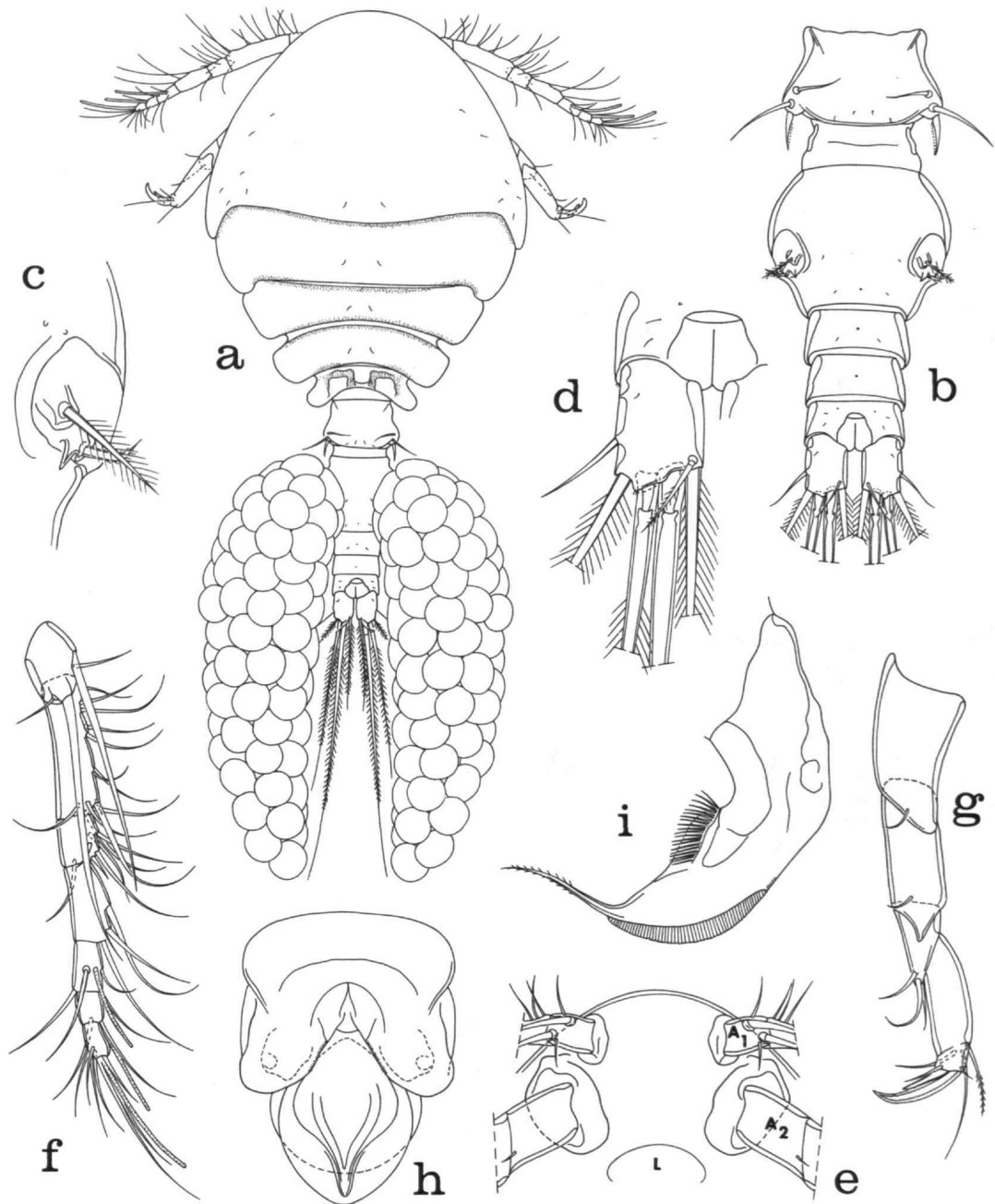


FIGURE 11.—*Mecomerinx heterocentroti*, new genus, new species, female: a, dorsal (A); b, urosome, dorsal (B); c, genital area, dorsal (D); d, caudal ramus, dorsal (F); e, rostrum, ventral (E); f, first antenna, ventral (B); g, second antenna, posterior (B); h, labrum and postlabral area, ventral (C); i, mandible, posterior (D).

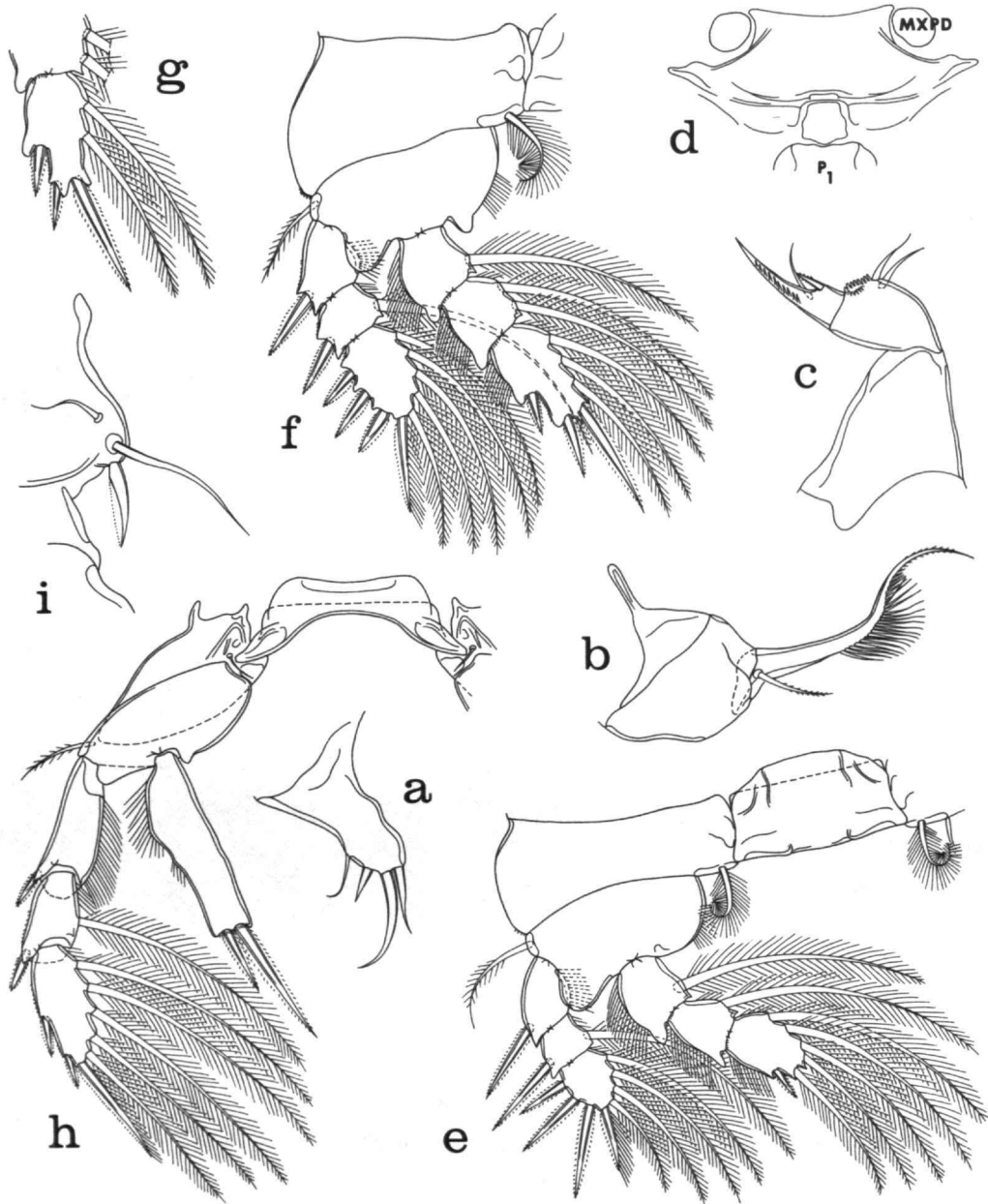


FIGURE 12.—*Mecomerinx heterocentroti*, new genus, new species, female: *a*, first maxilla, posterior (D); *b*, second maxilla, postero-inner (F); *c*, maxilliped, posterior (D); *d*, area between maxillipeds and first pair of legs, ventral (B); *e*, leg 1 and intercoxal plate, anterior (C); *f*, leg 2, anterior (C); *g*, third segment of endopod of leg 3, anterior (C); *h*, leg 4 and intercoxal plate, anterior (C); *i*, leg 5, dorsal (F).

female. Maxilliped (Figure 13d) slender, with two setae and two rows of slender spinules on the second segment. Claw 143 along its axis including the terminal lamella, bearing proximally two very unequal setae. Ventral area between the maxillipeds and the first pair of legs as in the female.

Legs 1-4 resembling in major respects those of the female. Outer distal processes on the endopod segments of legs 1-3 tending to be more pointed than in the female. Leg 4 with the exopod 130 long. Endopod (Figure 13e) 58×16 , the two spines 30 and 65.

Leg 5 as in the female.

Leg 6 (Figure 13f) a posteroventral flap on the genital segment, bearing two naked setae 24 and 36 and a spiniform process with a finely drawn-out tip.

Spermatophore not observed outside the body of the male.

Living specimens colored as in the female.

ETYMOLOGY.—The specific name *heterocentroti* is the genitive form of the generic name of the host.

COMPARISON WITH *Mecomerinx sewellana*.—Several points of distinction may be made between

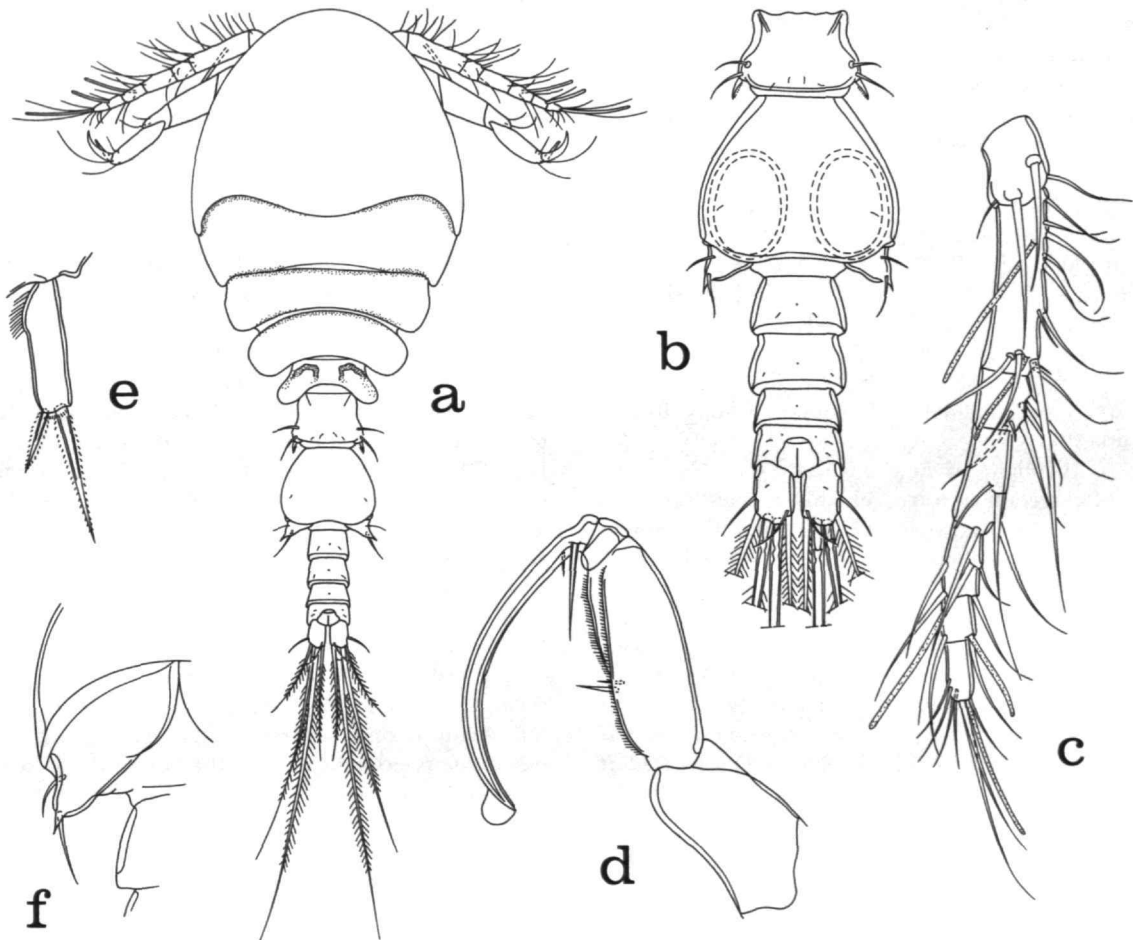


FIGURE 13.—*Mecomerinx heterocentroti*, new genus, new species, male: a, dorsal (A); b, urosome, dorsal (B); c, first antenna, ventral (C); d, maxilliped, inner (C); e, endopod of leg 4, anterior (C); f, leg 6, ventral (C).

M. heterocentroti and the preceding species. In *M. heterocentroti* the larger of the two claws on the female second antenna is distinctly longer (73) than in *M. sewellana* (44). The genital segment of the female is slightly wider than long, rather than longer than wide as in *M. sewellana*. The fourth segment of the female second antenna is relatively longer (ratio 5.8:1) than in *M. sewellana* (ratio 3.3:1). The claw of the male maxilliped is shorter (143) than in *M. sewellana* (187).

***Mecomerinx notabilis* (Humes and Cressey, 1961),
new combination**

FIGURE 14a-i

This species, originally named *Pseudanthessius notabilis*, is known from the echinoid *Echinometra mathaei* (Blainville) in Madagascar (Humes and Cressey, 1961) and in the Gulf of Aqaba (Stock, 1967).

SPECIMENS COLLECTED (all from *Echinometra mathaei* (Blainville)).—4 ♀♀, 5 ♂♂ from 1 host, intertidal, Ricaudy Reef, near Noumea, New Caledonia, 22°19'00"S, 166°26'44"E, 9 June 1971; 4 ♀♀ from 5 hosts, Ricaudy Reef, 10 July 1971; 108 ♀♀, 38 ♂♂ from 27 hosts, Isle Maître, near Noumea, 22°20'35"S, 166°25'45"E, 17 July 1971; 1 ♂, 1 copepodid from 3 hosts, Ricaudy Reef, 5 June 1971.

In the light of new material from New Caledonia, certain features of this species are redescribed with the intent of emending the original description. Although the drawings are based on New Caledonian specimens, all characters have been verified on paratypes from Madagascar. The dissections upon which the original description was based were made in glycerine and covered with cover glasses. The pressure of the cover glass produced a variable amount of distortion in certain parts. The current material has been dissected in lactic acid and studied uncovered according to the method of Humes and Gooding (1964).

FEMALE.—Segment of leg 5 (Figure 14a) 78 × 133. Genital segment 156 × 143, slightly longer than wide. First antenna (Figure 14b) 320 long, the formula for the armature being: 4, 13, 6, 3, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Second antenna (Figure 14c) 320 long, with the formula 1, 1, 3, and II + 5. Fourth segment 122 along

the outer side, 81 along the inner side, and 31 wide. Mandible as in Figure 14d. First maxilla (Figure 14e) with four setae. Caudal ramus (Figure 14a) 68 × 35, a little longer than in the Madagascan specimens (49 × 39).

MALE.—Segment of leg 5 (Figure 14f) 56 × 94. Genital segment 139 long including leg 6, 126 long in the midline, and 146 wide. First antenna (Figure 14g) 247 long, with the two long elements on the first segment 230 and 125. Formula for the armature: 4, 13+2 aesthetes, 6, 3+2 aesthetes. 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Mandible (Figure 14h) with the fringe on the convex side more strongly dentate than in the female. Maxilliped as in Figure 14i.

COMMENT ON THE IDENTITY OF THE NEW CALEDONIAN COPEPODS FROM *Echinometra*.—The only significant difference observed between the Madagascan and New Caledonian specimens is in the caudal ramus. This is a little longer in the New Caledonian specimens. However, in view of the otherwise close similarity between the two groups of specimens, it seems best at the moment to consider the New Caledonian copepods as *M. notabilis*. The longer caudal ramus is apparently a variant feature of the New Caledonian population.

COMPARISON OF *M. notabilis* WITH OTHER SPECIES.—*Mecomerinx notabilis* differs from both *M. sewellana* and *M. heterocentroti* in several ways. From *M. sewellana* it may be distinguished by the following features: (1) the larger claw on the female second antenna is longer, (2) the fourth segment of the female second antenna is relatively shorter (ratio 3.9:1 instead of 5.8:1 as in *M. sewellana*). From *M. heterocentroti* it may be separated by the following characters: (1) the two long setae on the first segment of the female first antenna are relatively a little longer, (2) the fourth segment of the female second antenna is relatively longer, (3) one of the proximal spines on the lash of the second maxilla is more strongly developed than the others, (4) the three outer spines on the third segment of the exopod of leg 1 are about equal in length and shorter than the terminal spine, (5) the endopod of leg 4 in the female is relatively shorter, (6) the genital segment of the female is a little longer than wide (146 × 140, the discrepancy with the original description of Humes and Cressey being the result of pressure of the cover glass in a glycerine mount),

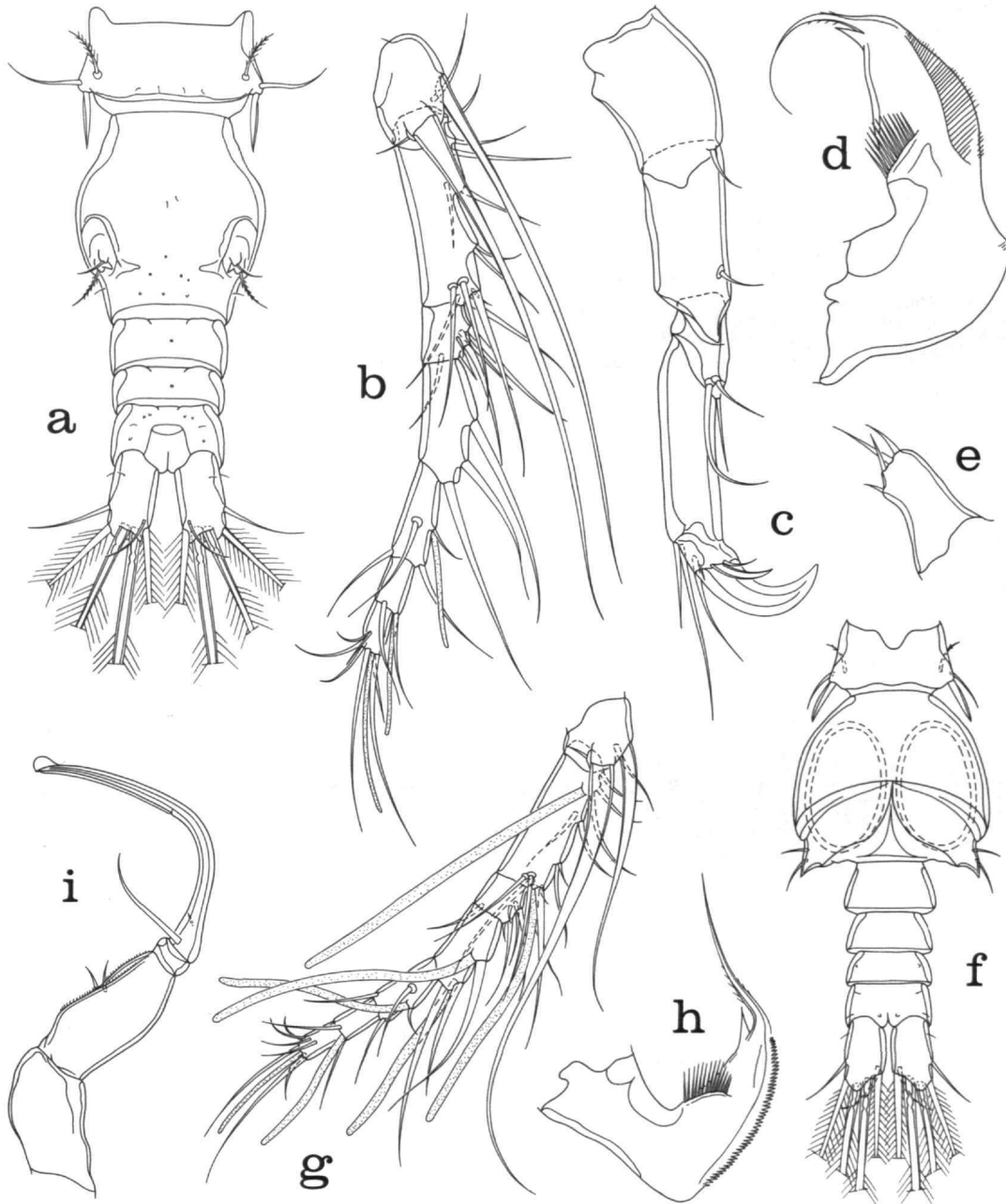


FIGURE 14.—*Mecomerinx notabilis* (Humes and Cressey, 1961), new combination, female: *a*, urosome, dorsal (B); *b*, first antenna, ventral (C); *c*, second antenna, posterior (C); *d*, mandible, posterior (D); *e*, first maxilla, posterior (D). Male: *f*, urosome, ventral (B); *g*, first antenna, ventral (C); *h*, mandible, posterior (D); *i*, maxilliped, inner (C).

and (7) the claw of the male maxilliped is longer and recurved angularly.

***Mecomerinx luculenta* (Humes and Cressey, 1961),
new combination**

FIGURES 15a-f, 16a-c

This species, originally named *Pseudanthessius luculentus*, is associated with the echinoid *Stomopneustes variolaris* (Lamarck) in Madagascar. Ummerkutty (1962) described the species as *Pseudanthessius agilis* from sponge washings in the Gulf of Mannar, southeastern India. He later recognized the synonymy of his Indian specimens with the Madagascar species (see Stock, Humes, and Gooding, 1963:10).

In order to clear up certain points in the original description, paratypes of both sexes (USNM 107392) have been dissected in lactic acid and studied uncovered.

FEMALE.—Segment of leg 5 (Figure 15a) 78 × 127. Genital segment 169 × 132, longer than wide. First antenna (Figure 15b) 330 long. Long element on the first segment 385, the seta corresponding to the other long element seen in other species short, 52. Formula as in *M. notabilis*. Second antenna

(Figure 15c) 355 long. Fourth segment 153 along the outer side, 90 along the inner side, and 39 wide. Mandible as in Figure 15d. First maxilla (Figure 15e) with four elements. Leg 1 as in Figure 15f. Caudal ramus 68 × 31.

MALE.—Segment of leg 5 (Figure 16a) 52 × 83. Genital segment 143 long including leg 6, 120 in the midline, and 148 wide. First antenna (Figure 16b) 250 long. Long element on the first segment 230, the seta corresponding to the other long element seen in other species 42. Formula: 4, 13+1 aesthete, 6, 3+1 aesthete, 4+1 aesthete, 2+1 aesthete, and 7+1 aesthete. Maxilliped as in Figure 16c. Caudal ramus 47 × 26.

COMPARISON OF *M. luculenta* WITH OTHER SPECIES.—Although *M. luculenta* conforms to the generic diagnosis of *Mecomerinx* and properly belongs in this genus, it shows certain features that place it somewhat apart from the other three species in *Mecomerinx*. Principal among these features are: (1) the two claws on the second antenna being subequal rather than distinctly unequal, (2) the first segment of the female first antenna bearing only one greatly elongated element, and (3) in dorsal view the sides of the female genital segment being subparallel rather than expanded with a rounded contour.

Key to the Females of *Mecomerinx*

1. Two claws on the second antenna long and subequal; in dorsal view the sides of the genital segment subparallel and not expanded; only one elongated element on the first segment of the first antenna ***M. luculenta***
Two claws on the second antenna distinctly unequal in length; in dorsal view the sides of the genital segment expanded with a rounded contour; two elongated elements on the first segment of the first antenna 2
2. Longer claw on the second antenna about 44 long; fourth segment of the second antenna with the greatest dimensions about 5.8:1 ***M. sewellana***
The longer claw on the second antenna at least 64, up to 73 long; fourth segment of the second antenna with the greatest dimensions about 3-3.9:1 3
3. Genital segment slightly longer than wide, its sides in dorsal view gently rounded; two long elements on the first segment of the first antenna about 270-285 ***M. notabilis***
Genital segment slightly wider than long, its sides in dorsal view strongly rounded; two long elements on the first segment of the first antenna about 175-200 ***M. heterocentroti***

***Pseudanthessius* Claus, 1889**

***Pseudanthessius implanus*, new species**

FIGURES 17a-p, 18a-e, 19a-e

TYPE MATERIAL.—8 ♀ ♀, 4 ♂ ♂ from 7 pencil

urchins, *Phyllacanthus imperialis* (Lamarck), in 0.5-1 m, western side of Isle Maitre, near Noumea, New Caledonia, 22°20'05"S, 166°24'05"E, 11 June 1971. Holotype ♀, allotype, and 7 paratypes (5 ♀ ♀, 2 ♂ ♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washing-

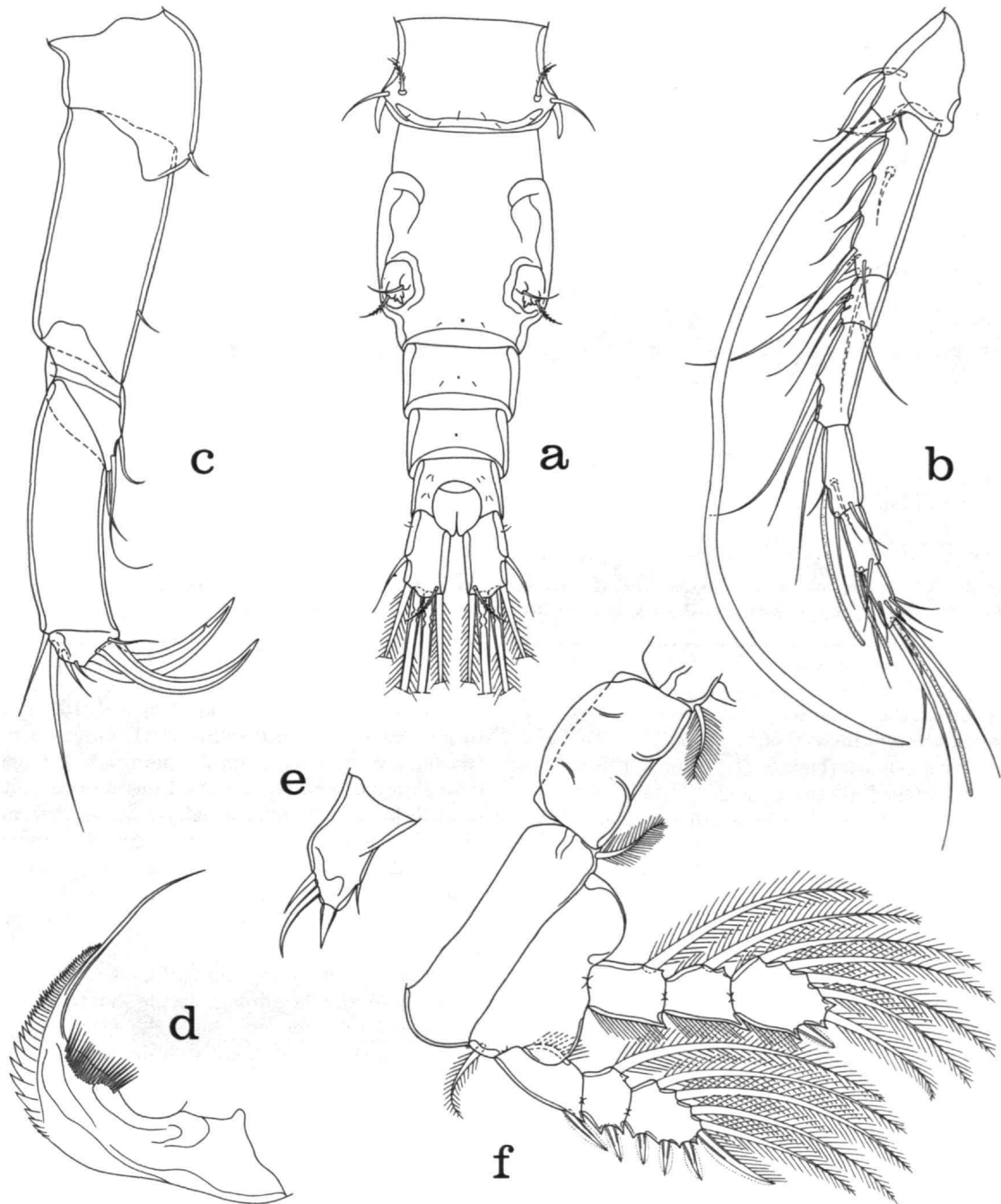


FIGURE 15.—*Mecomerinx luculenta* (Humes and Cressey, 1961), new combination, female: *a*, urosome, dorsal (B); *b*, first antenna, ventral (C); *c*, second antenna, posterior (C); *d*, mandible, posterior (D); *e*, first maxilla, posterior (D); *f*, leg I and intercoxal plate, anterior (C).

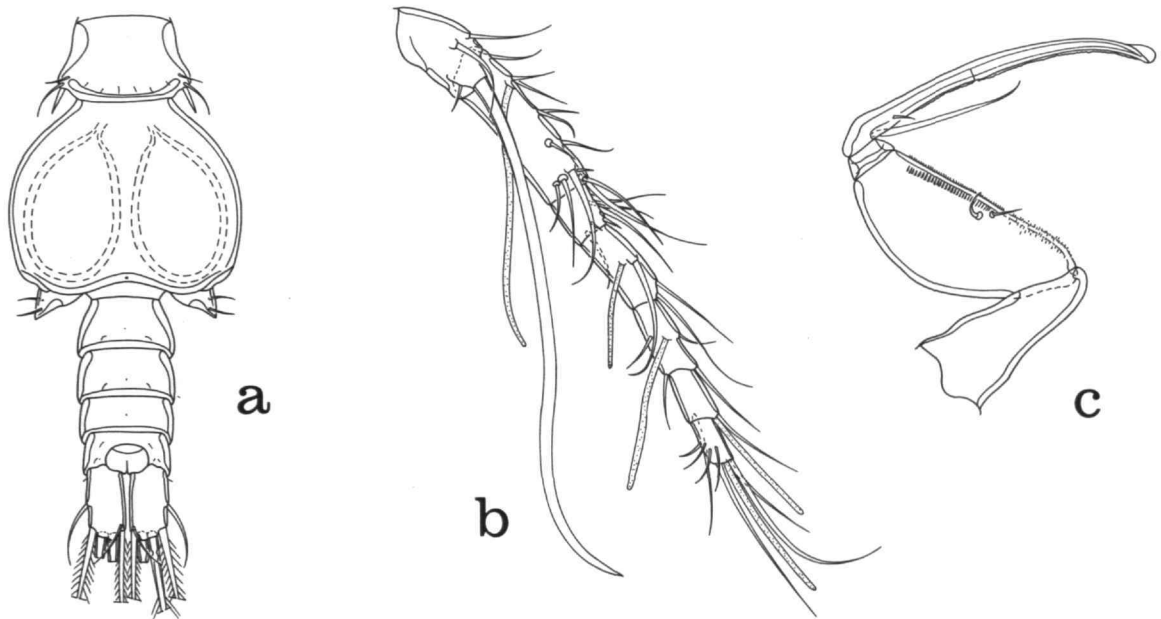


FIGURE 16.—*Mecomerinx luculenta* (Humes and Cressey, 1961), new combination, male: a, urosome, dorsal (B); b, first antenna, ventral (C); c, maxilliped, outer (C).

ton, D.C.; the remaining paratypes (dissected) in the collection of the author.

FEMALE.—Body (Figure 17a) with a moderately broad flattened prosome. Length 1.13 mm (1.11–1.16 mm) and the greatest width 0.61 mm (0.58–0.64 mm), based on 8 specimens. Ratio of the length to the width of the prosome 1.18:1. Ratio of the length of the prosome to that of the urosome 1.56:1. Segment of leg 1 separated from the head by a dorsal transverse furrow. Epimera of the segments of legs 1–4 rounded, those of leg 4 with a notched margin (Figure 17b).

Segment of leg 5 (Figure 17c) 60×159 . Between this segment and the genital segment a weak ventral sclerite. Genital segment in dorsal view 140×143 , broadened anteriorly. Genital areas situated dorsolaterally in the posterior half of the segment. Each genital area (Figure 17d) bearing two naked setae 6 and 8 and a minute spiniform process. Three postgenital segments from anterior to posterior 52×78 , 44×79 , and 86×82 . Posterior margin of the anal segment ventrally with minute spinules and dorsally with small crenulations.

Caudal ramus (Figure 17e) elongated, 107×38 in greatest dimensions, ratio 2.82:1. Outer lateral seta 65 and the dorsal seta 24, both naked. Outermost terminal seta 68 and the innermost terminal seta 78, both with delicate lateral hairs. Two median terminal setae 148 (outer) and 265 (inner), both with lateral spinules. Inner margin of the ramus irregularly notched in its midregion.

Body surface with many hairs (sensilla) and refractile points.

Egg sac (Figure 17f) elongated oval, 263×148 , reaching to the beginning of the caudal ramus. Eggs 52–57 in diameter.

Rostrum (Figure 17g) not well defined.

First antenna (Figure 17h) 312 long and slightly bent at the level of the third segment. Lengths of the seven segments: 28 (50 along the anterior margin), 114, 25, 46, 36, 21, and 20 respectively. Formula for the armature as in *Pseudanthessius procurrens* Humes, 1966. All setae naked.

Second antenna (Figure 17i) 280 long. Formula: 1, 1, 3, and II + 5. All setae naked. Two claws unequal, 39 and 54. Third segment with a scler-

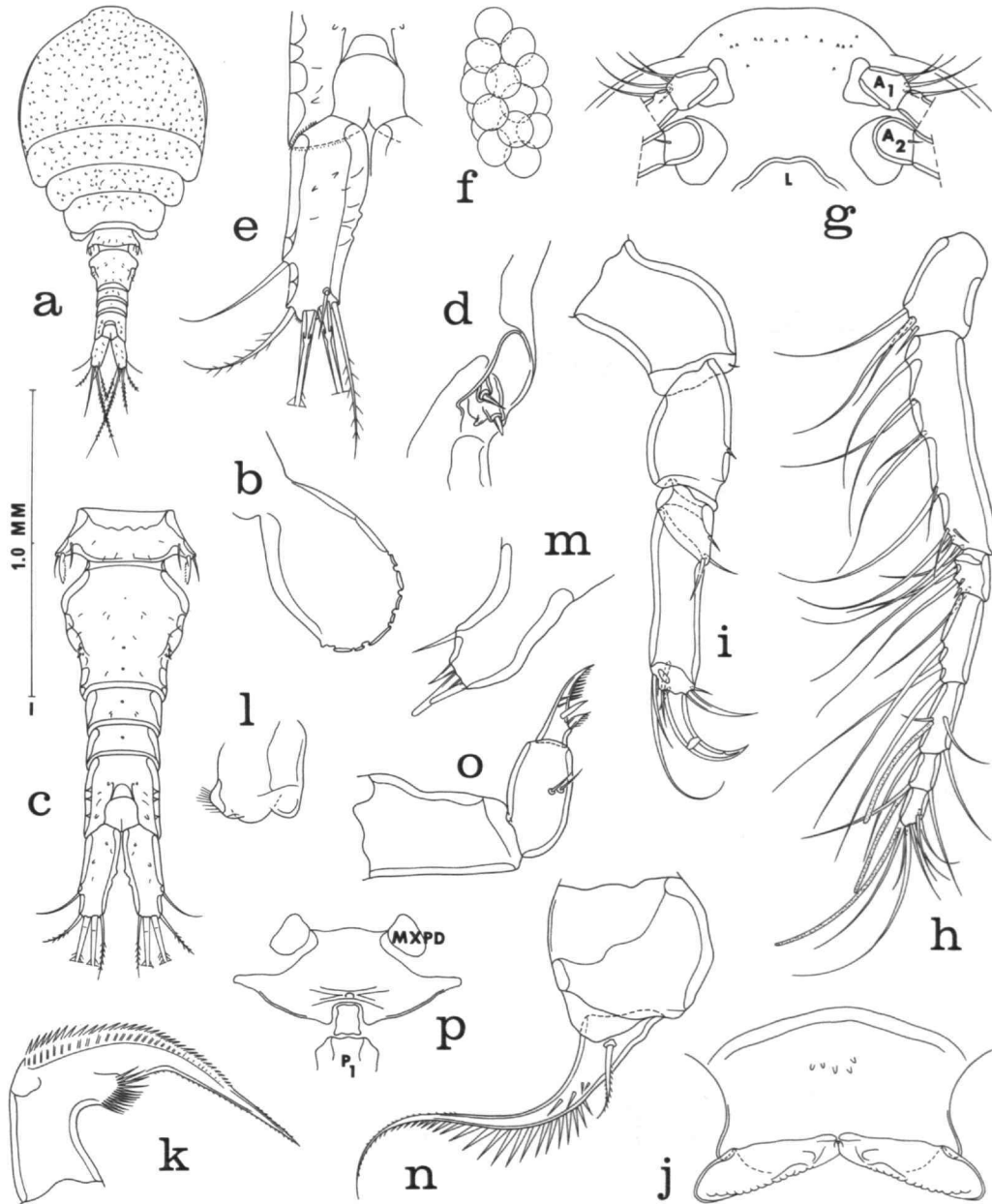


FIGURE 17.—*Pseudanthessius implanus*, new species, female: *a*, dorsal (I); *b*, epimeron of segment of leg 4, ventral (F); *c*, urosome, dorsal (E); *d*, genital area, dorsal (D); *e*, caudal ramus, dorsal (C); *f*, egg sac, ventral (A); *g*, rostral area, ventral (E); *h*, first antenna, ventral (C); *i*, second antenna, anterior (C); *j*, labrum, ventral (C); *k*, mandible, posterior (F); *l*, paragnath, ventral (D); *m*, first maxilla, posterior (D); *n*, second maxilla, inner (F); *o*, maxilliped, inner (F); *p*, area between maxillipeds and leg 1, ventral (E).

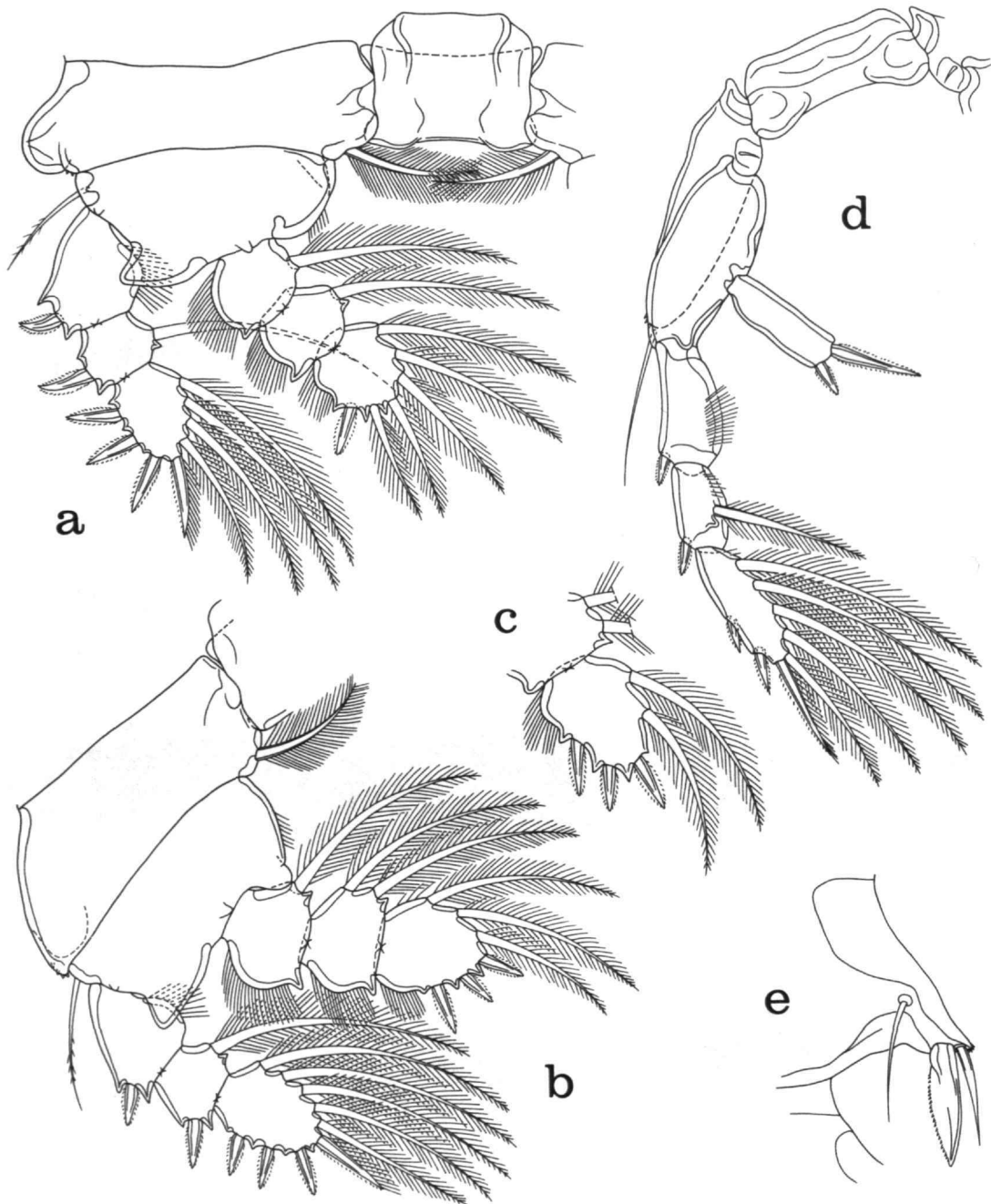


FIGURE 18.— *Pseudanthessius implanus*, new species, female: *a*, leg 1 and intercoxal plate, anterior (F); *b*, leg 2, anterior (F); *c*, third segment of endopod of leg 3, anterior (F); *d*, leg 4 and intercoxal plate, anterior (F); *e*, leg 5, dorsal (D).

rotized band across the posterior surface. Fourth segment 94 along the outer edge, 72 along the inner edge, and 24–27.5 wide.

Labrum (Figure 17j) with two widely divergent lobes crenated along the posterior margin. Mandible (Figure 17k), paragnath (Figure 17l), first maxilla (Figure 17m), second maxilla (Figure 17n), maxilliped (Figure 17o), and the ventral area between the maxillipeds and the first pair of legs (Figure 17p) similar in major respects to those of *P. procurrens*.

Legs 1–4 (Figures 18a–d) armed and ornamented as in *P. procurrens*. Leg 4 with the exopod 130 long. Endopod 45×16.5 , its two terminal spines 14 and 38. Inner seta on the coxa of leg 4 very small, 8 long, and naked.

Leg 5 (Figure 18e) with a broad spine-33 finely dentate along its inner edge, a naked seta 24, and an adjacent dorsal naked seta 33.

Leg 6 probably represented by the two setae on the genital area (Figure 17d).

Living specimens in transmitted light pale brown, the eye red, the egg sacs opaque gray.

MALE.—Body (Figure 19a) resembling in general form that of the female. Length 0.89 mm (0.85–0.92 mm) and the greatest width 0.41 mm (0.32–0.44 mm), based on 5 specimens. Ratio of the length to

the width of the prosome 1.19:1. Ratio of the length of the prosome to that of the urosome 1.38:1.

Segment of leg 5 (Figure 19b) 52×117 . No ventral intersegmental sclerite. Genital segment 120×148 . Four postgenital segments from anterior to posterior 39×61 , 39×58 , 27×60 , and 60×83 .

Caudal ramus (Figure 19b) resembling that of the female, but smaller and with different proportions, 88×43 , ratio 2.05:1.

Body surface ornamented as in the female.

Rostrum, first antenna, second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla as in the female. Maxilliped (Figure 19c) resembling that of *P. procurrens*. Distal concave surface of the claw with a crenated fringe. Claw 130 along its axis including the terminal lamella. Ventral area between the maxillipeds and leg 1 as in the female.

Legs 1–4 resembling those of the female except for slight sexual dimorphism in the third segment of the endopod of leg 2 (Figure 19d).

Leg 5 similar in general form to that of the female.

Leg 6 (Figure 19e) a posteroventral flap on the genital segment, bearing two slender naked setae 20 and 16.

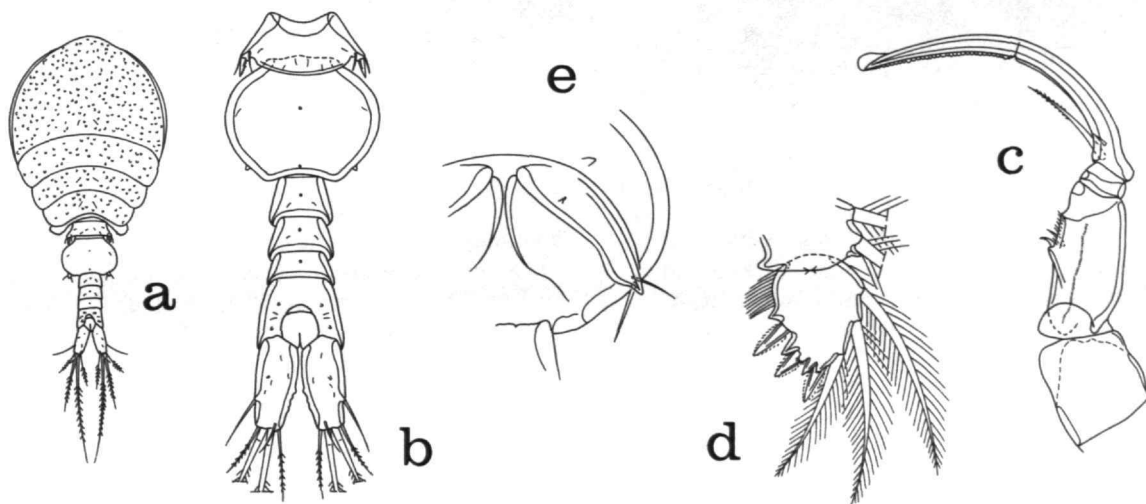


FIGURE 19.—*Pseudanthessius implanus*, new species, male: a, dorsal (I); b, urosome, dorsal (E); c, maxilliped, anterior (C); d, third segment of endopod of leg 2, anterior (F); e, 6 ventral (C).

Spermatophore not observed.

Living specimens colored as in the female.

ETYMOLOGY.—The specific name *implanus* (Latin, = uneven) alludes to the irregularly notched inner margin of the caudal ramus.

COMPARISON WITH RELATED SPECIES.—The irregularly notched inner margin of the caudal ramus is distinctive of this species. In all other *Pseudanthessius* this margin as far as known is smooth.

The new species is similar in certain respects to *Pseudanthessius procurrans*, associated with *Phyllacanthus imperialis* in Madagascar. Strong resemblances between the two species are to be found in the body form, the female genital segment, the second antenna, the labrum, the mouthparts, leg 1, leg 5, and the male maxilliped. Among the ways that *P. implanus* differs from the Madagascar species are the form of the female genital segment, the length of the caudal rami, the weak rostral area, the relative length of the third endopod segment of leg 3, and the form of the spine in leg 5.

Species of *Pseudanthessius* from *Phyllacanthus imperialis* have thus far been reported only from two widely separated areas (Madagascar and New Caledonia). Although the collections of *P. procurrans* and *P. implanus* are small in number, it would appear that these two related species have evolved from a common ancestral species on *Phyllacanthus*, with subsequent diverging into the two present-day species in distant parts of the range of the host.

Pseudanthessius pictus, new species

FIGURES 20a-g, 21a-h, 22a-e

TYPE MATERIAL.—4 ♀♀ from 10 echinoids, *Parasalenia gratiosa* A. Agassiz, in 1 m, eastern side of Isle Maître, near Noumea, New Caledonia, 22°20'35"S, 166°25'45"E, 8 June 1971. Holotype and two paratypes deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypic female (dissected) in the collection of the author.

OTHER SPECIMENS.—3 ♀♀ from 23 *Parasalenia gratiosa*, in tidal pools, Ricaudy Reef, near Noumea, 22°19'00"S, 166°26'44"E, 10 July 1971.

FEMALE.—Body (Figure 20a) with a relatively broad prosome. Length 1.10 mm (0.99–1.14 mm) and the greatest width 0.54 mm (0.53–0.56 mm), based on 7 specimens. Ratio of the length to the

width of the prosome 1.36:1. Ratio of the length of prosome to that of the urosome 1.88:1. Segment of leg 1 separated from the head by a dorsal transverse furrow.

Segment of leg 5 (Figure 20b) 73 × 151. Genital segment in dorsal view 156 × 140, widest at its midregion and abruptly narrowed in its posterior fourth. Genital areas located dorsolaterally behind the widest part of the segment. Each genital area (Figure 20c) bearing two naked setae 30 and 14 and a small spiniform process. Three postgenital segments from anterior to posterior 42 × 95, 36 × 91, and 52 × 99. Anal segment with a few very small spinules on its posteroventral margin.

Caudal ramus (Figure 20d) 63 × 44, ratio 1.43:1. Outer lateral seta 95 and naked. Dorsal seta 42, outermost terminal seta 264, the innermost terminal seta 253, and the two median terminal setae 385 (outer) and 506 (inner); all these setae with lateral spinules.

Body surface with a few hairs (sensilla) and refractile points. A complex pattern of brown markings over the dorsal surface of the prosome (indicated by stippling in Figure 20a).

Egg sac (Figure 20e,f) variable in length, in the two ovigerous females seen 484 × 190 and 1023 × 242, containing numerous eggs about 70 in diameter.

Rostrum (Figure 20g) broad and weakly developed.

First antenna (Figure 21a) 345 long. Lengths of the seven segments: 44 (55 along the anterior margin), 113, 22, 50, 50, 31, and 24 respectively. Formula for the armature as in *Pseudanthessius procurrans* Humes, 1966. Long seta on the first segment 150 long. All setae naked.

Second antenna (Figure 21b) moderately slender, 400 long. Formula as in *P. procurrans*. Third segment with a sclerotized band on the posterior surface. Fourth segment 170 long along its outer side, 112 along its inner side, and 34 wide; bearing terminally two very unequal claws, one slender and only weakly unguiform, 34 long, the other massive and strongly unguiform, 68 along its axis; segment with five setules near the claws. All elements naked.

Labrum (Figure 21c) with two broad posteroventral lobes, the inner margin of each lobe indented and having a row of small teeth proximally and distally to the indentation. Mandible

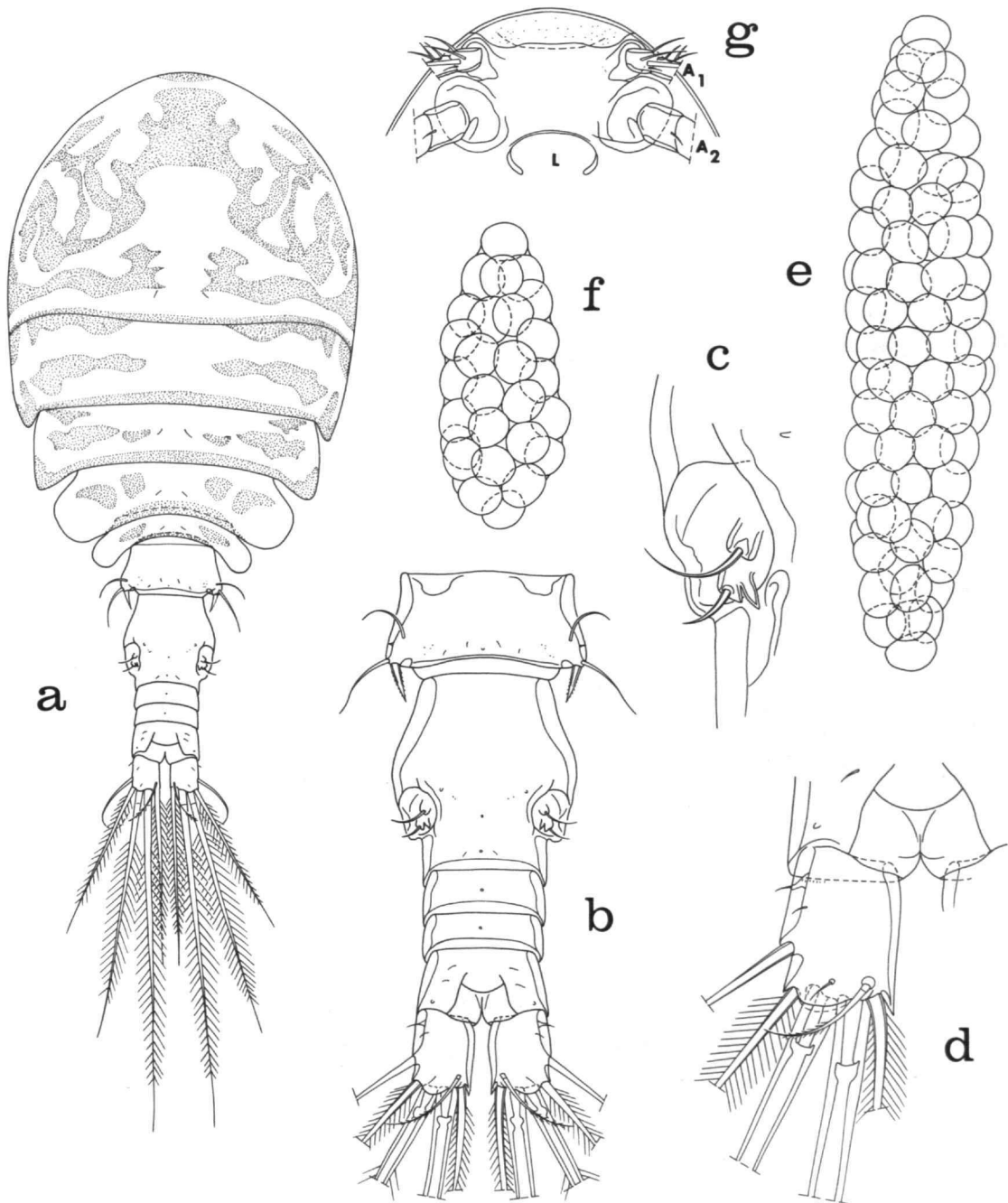


FIGURE 20.—*Pseudanthessius pictus*, new species, female: a, dorsal (A); b, urosome, dorsal (B); c, genital area, dorsal (D); d, caudal ramus, dorsal (F); e, egg sac, ventral (A); f, egg sac, ventral (A); g, rostrum, ventral (A).

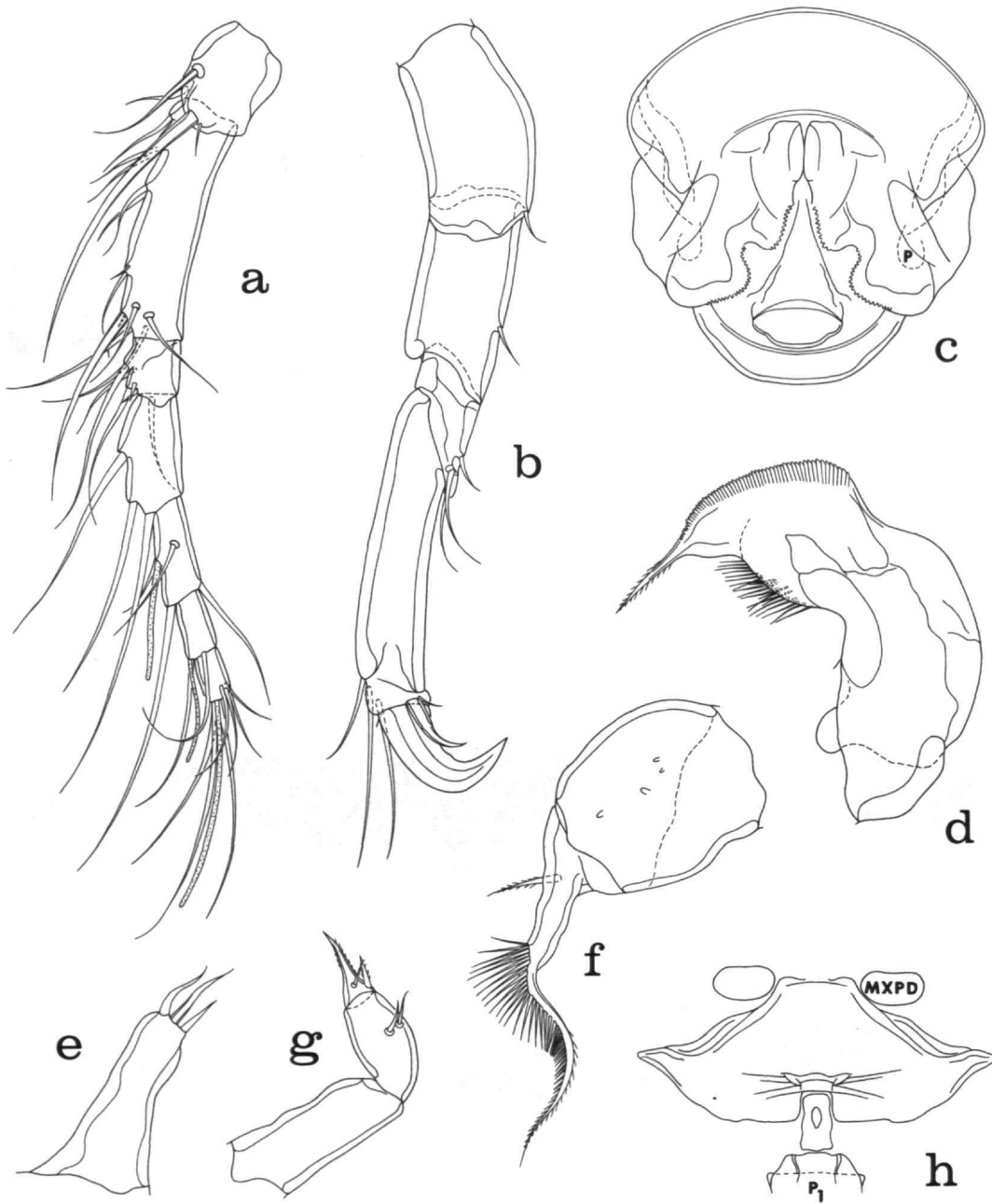


FIGURE 21.—*Pseudanthessius pictus*, new species, female: *a*, first antenna, ventral (C); *b*, second antenna, posterior (C); *c*, labrum and postlabral region, with paragnaths indicated by broken lines, ventral (F); *d*, mandible, anterior (D); *e*, first maxilla, posterior (D); *f*, second maxilla, inner (F); *g*, maxilliped, inner (F); *h*, area between maxillipeds and leg 1, ventral (B).

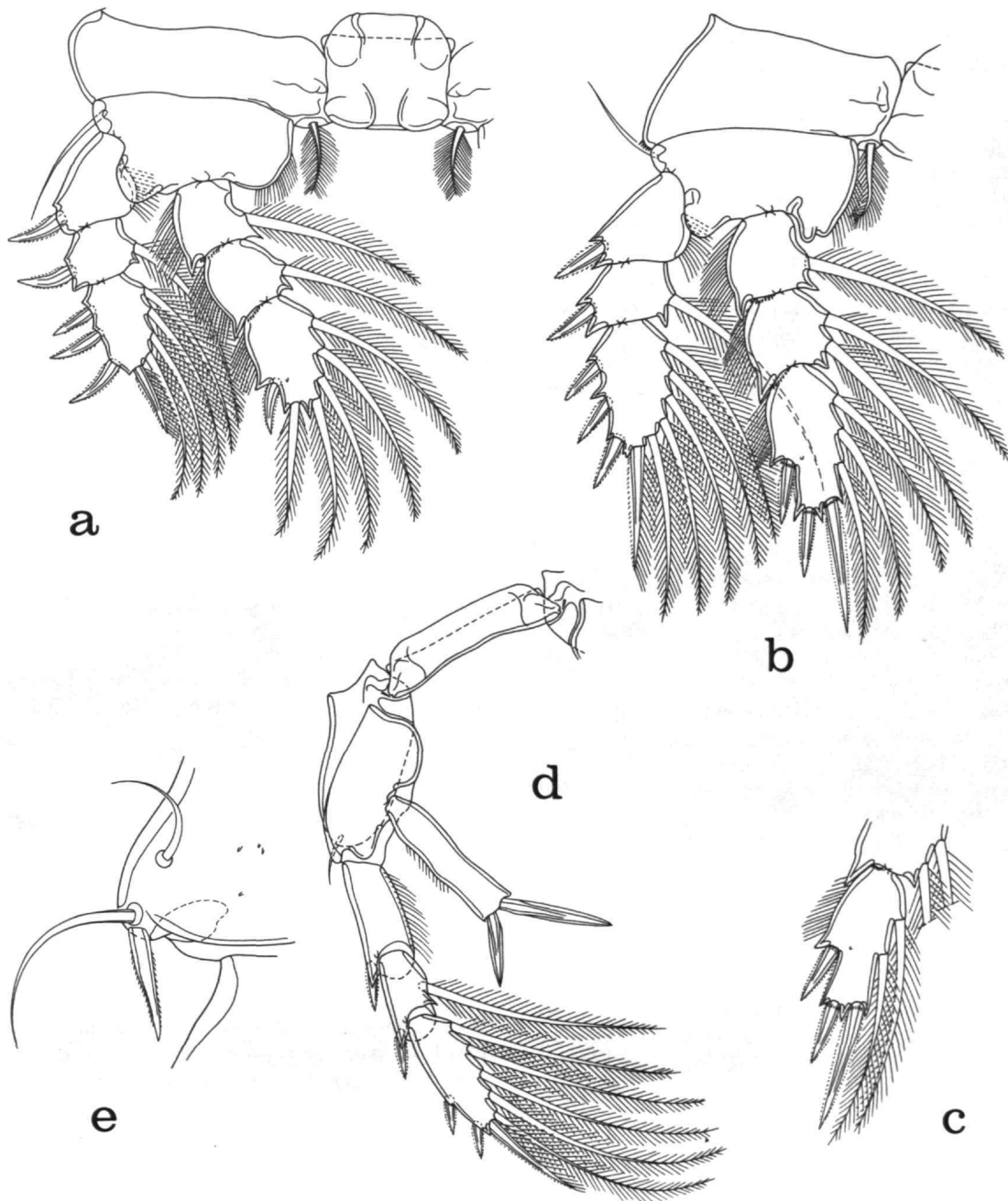


FIGURE 22.—*Pseudanthessius pictus*, new species, female: a, leg 1 and intercoxal plate, anterior (C); b, leg 2, anterior (C); c, third segment of endopod of leg 3, anterior (C); d, leg 4 and intercoxal plate, anterior (C); e, leg 5, dorsal (D).

(Figure 21d) with a constricted basal area. Beyond the constriction an inner group of long slender spinules and an outer serrated fringe. Lash unusually short. Paragnath a small lobe. First maxilla (Figure 21e) with three naked setae. Second maxilla (Figure 21f) with a few refractile points on the inner surface of the large first segment. Second segment slender and elongated, bearing a finely barbed seta on its outer surface and produced to form a long sinuous lash with a row of very long slender spines along the convex edge grading into short spinules distally. Maxilliped (Figure 21g) with the first segment long and unarmed, the second segment somewhat shorter and bearing two naked setae, and the small third segment having a barbed seta and a naked seta, and attenuated and finely barbed distally.

Ventral area between the maxillipeds and the first pair of legs (Figure 21h) not protuberant.

Legs 1-4 (Figure 22a-d) segmented and armed as in other species of *Pseudanthessius*. Leg 4 with a very small inner coxal seta about 6 long. Exopod 156. Endopod 81×16 , with a row of hairs proximally along the outer side. Two terminal spines 39 and 55, apparently with smooth rather than barbed fringes. Ratio between the spines 1.41:1.

Leg 5 (Figure 22e) with a slender finely barbed spine 29, a smooth seta 60, and a smooth dorsal seta (held erect and not measurable).

Leg 6 represented by the two setae on the genital area (Figure 20c).

Living specimens in transmitted light pale brown, with brown markings on the dorsal surface of the prosome. (These brown markings remain in specimens cleared in lactic acid). Eye red, the egg sacs opaque gray.

MALE.—Unknown.

ETYMOLOGY.—The specific name *pictus* (Latin, = painted) alludes to the elaborate brown markings on the dorsal surface of the prosome.

COMPARISON WITH RELATED SPECIES.—A survey of the females of the several species of *Pseudanthessius* shows that all but ten have a caudal ramus that is at least 2:1, and thereby can be quickly distinguished from the new species. In seven of the 10 remaining species where the labrum has been described the inner margins of the two lobes are smooth, not indented and dentate as in *P. pictus*. These seven species are: *P. pectinifer* Stock, Humes,

and Gooding, 1963; *P. pusillus* Humes, 1969; *P. minor* Stock, 1967; *P. major* Stock, 1967; *P. madrasensis* Reddiah, 1968; *P. angularis* Humes and Ho, 1970; and *P. rostellatus* Humes and Ho, 1970. The remaining three species from southeastern India may be separated from *P. pictus* on other grounds. In *P. minutus* Reddiah, 1968, the cephalosome is wider, the contour of the genital segment is different, the caudal rami appear to be shorter, and the claws on the second antenna are subequal. In *P. brevicauda* Ummerkutty, 1966, the caudal ramus is nearly as long as broad, the claws on the second antenna are slender and subequal, and the teeth on the lash of the second maxilla are strong. In *P. anormalus* Ummerkutty, 1966, the caudal rami are hardly as long as broad, the fourth segment of the second antenna is relatively shorter, and the lash of the second maxilla apparently lacks the crest of long spines seen in *P. pictus*.

Pseudanthessius vinnulus, new species

FIGURES 23a-l, 24a-g, 25a-h

TYPE MATERIAL.—14 ♀♀, 11 ♂♂ from 4 sea urchins, *Echinothrix diadema* (Linnaeus), intertidal on reef at Yaté, southeastern New Caledonia, $22^{\circ}11'00''S$, $166^{\circ}59'00''E$, 23 June 1971. Holotype ♀, allotype, and 18 paratypes (10 ♀♀, 8 ♂♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypes (dissected) in the collection of the author.

FEMALE.—Body (Figure 23a) with the prosome moderately broadened and flattened. Length 0.96 mm (0.92–1.01 mm) and the greatest width 0.42 mm (0.40–0.44 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.45:1. Ratio of the length of the prosome to that of the urosome 1.56:1. Segment of leg 4 much narrower than the preceding segments, its tergum partly concealed beneath the segment of leg 3. Segment of leg 1 separated from the head by a well-developed transverse furrow.

Segment of leg 5 (Figure 23b) 55×117 . Between this segment and the genital segment a well-formed ventral sclerite. Genital segment in dorsal view subquadrate, 109×117 . Genital areas located dorsolaterally at the middle of the segment. Each genital area (Figure 23c) with two naked setae 22

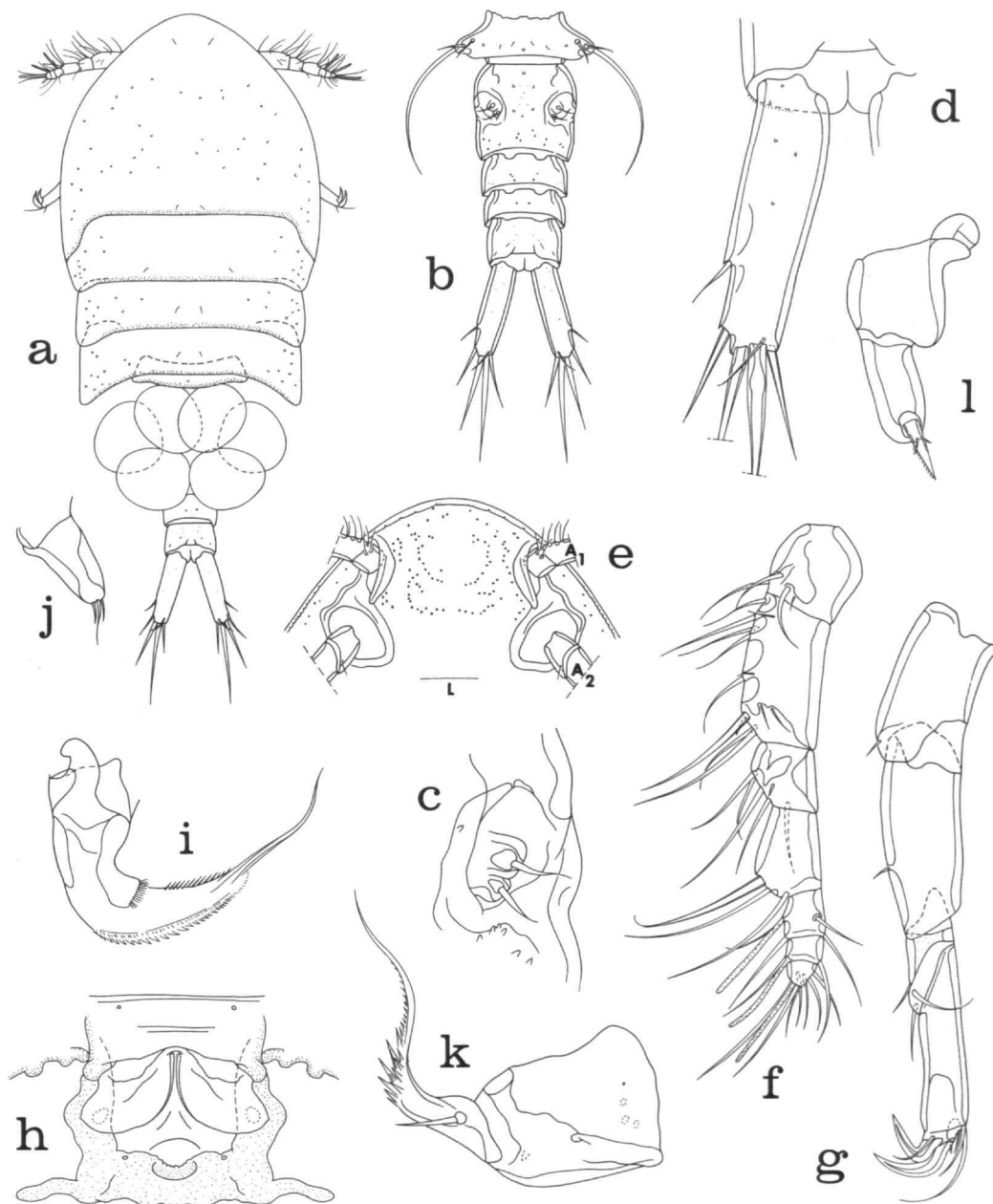


FIGURE 23.—*Pseudanthessius vinnulus*, new species, female: *a*, dorsal (A); *b*, urosome, dorsal (E); *c*, genital area, dorsal (D); *d*, caudal ramus, dorsal (F); *e*, rostrum, ventral (E); *f*, first antenna, ventral (F); *g*, second antenna, posterior (F); *h*, labrum and postlabral area, with paragnaths indicated by broken lines, ventral (F); *i*, mandible, posterior (D); *j*, first maxilla, posterior (D); *k*, second maxilla, inner (D); *l*, maxilliped, postero-outer (D).

and 17. Three postgenital segments from anterior to posterior 49×99 , 42×91 , and 55×81 . Anal segment with a row of minute spinules on the posteroventral margin on both sides.

Caudal ramus (Figure 23*d*) elongate, 109×29 , with relatively short setae. Ratio 3.76:1. Outer lateral seta 22, the dorsal seta 24, the outermost terminal seta 43, the innermost terminal seta 48, and the two median terminal setae 83 (outer) and 125 (inner). All setae naked.

Body surface with numerous hairs (sensilla) as in Figure 23*a*.

Egg sac (Figure 23*a*) in the single ovigerous specimen seen a group of three large slightly oval eggs 99–120 in diameter.

Rostrum (Figure 23*a*) not developed.

First antenna (Figure 23*f*) short, 180 long. Lengths of the seven segments: 36 (30 along the anterior margin), 50, 25, 30, 13, 11, and 10 respectively. Formula for the armature as in *Pseudanthessius procurrrens* Humes, 1966. All setae naked.

Second antenna (Figure 23*g*) 213 long, longer than the first antenna. Formula: 1, 1, 3, and II + 5. Fourth segment 75 along the outer margin, 48 along the inner margin, and 17 wide. Two terminal claws 21 and 27. All elements naked.

Labrum (Figure 23*h*) with two outwardly flaring lobes. Mandible (Figure 23*i*) with a slender basal part bearing on the convex side a row of hyaline teeth and on the inner side a transverse row of spinules and more distally a row of spinules; lash moderately long. Paragnath (Figure 23*h*) a small lobe. First maxilla (Figure 23*j*) with three small setae. Second maxilla (Figure 23*k*) with a few refractile points on the outer surface of the large first segment. Second segment bearing a smooth seta on the inner surface and prolonged to form a long lash with graduated teeth along one side. Maxilliped (Figures 23*l*, 24*a*) 3-segmented, the first segment unarmed, the second segment slender and bearing two small naked setae, and the very small third segment inset on the postero-outer surface of the second segment and bearing a finely barbed spine and two very small setae.

Ventral area between the maxillipeds and the first pair of legs (Figure 24*b*) not protuberant.

Legs 1–4 (Figure 24*c–f*) segmented and armed as in *Pseudanthessius procurrrens*. Endopod of leg 1 directed medially. Outer spines on the exopod of leg 1 (Figure 24*c*) slender, the spine on the first

segment unusually long. Outer spines on the exopod of leg 2 (Figure 24*d*) stouter than in leg 1, the spine on the first segment very long, about three times longer than the spine on the second segment. Inner terminal spine on the endopod slenderer than the outer spine. Spines on leg 3 (Figure 24*e*) similar to those in leg 2. Exopod of leg 4 (Figure 24*f*) 123 long. Outer spines on the exopod elongated. Endopod of same leg 54×13 , its outer margin with hairs proximal to a small thornlike process. Two terminal spines 47 (outer) and 27.5 (inner). Ratio between the two spines 1.7:1. Inner coxal seta very small, 4 long.

Leg 5 (Figure 24*g*) with three setae, one very long, 146, finely barbed, and extending to the middle of the first postgenital segment. Other two setae short and naked, about 20 and 35.

Leg 6 represented by the two setae on the genital area (Figure 23*c*).

Living specimens in transmitted light pale brown, with narrow brown bands along the posterior borders of the head and the four metasomal segments. Eye red, the eggs lightly opaque.

MALE.—Body (Figure 25*a*) more slender than in the female. Length 0.86 mm (0.83–0.89 mm) and the greatest width 0.29 mm (0.28–0.30 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.56:1. Ratio of the length of the prosome to that of the urosome 1.09:1.

Segment of leg 5 (Figure 25*b*) 31×133 . No ventral intersegmental sclerite. Genital segment 156×169 . Four postgenital segments from anterior to posterior 49×87 , 39×74 , 34×65 , and 43×64 .

Caudal ramus (Figure 25*b*) 91×29 , shorter than in the female. Ratio 3.14:1.

Body surface ornamented as in the female.

Rostrum, first antenna, second antenna, and labrum similar to those in the female. Sclerotization of the postlabral area (Figure 25*c*) different from that of the female (Figure 23*h*). Mandible, paragnath, first maxilla, and second maxilla like those in the female. Maxilliped (Figure 25*d*) slender, with two small setae and two groups of small spinules on the second segment. Claw 120 along its axis, including the terminal lamella, bearing proximally two unequal setae. Near the base of the convex side of the claw a small proximally directed thornlike process. Tip of the claw opposite the lamella with an irregular hyaline flange.

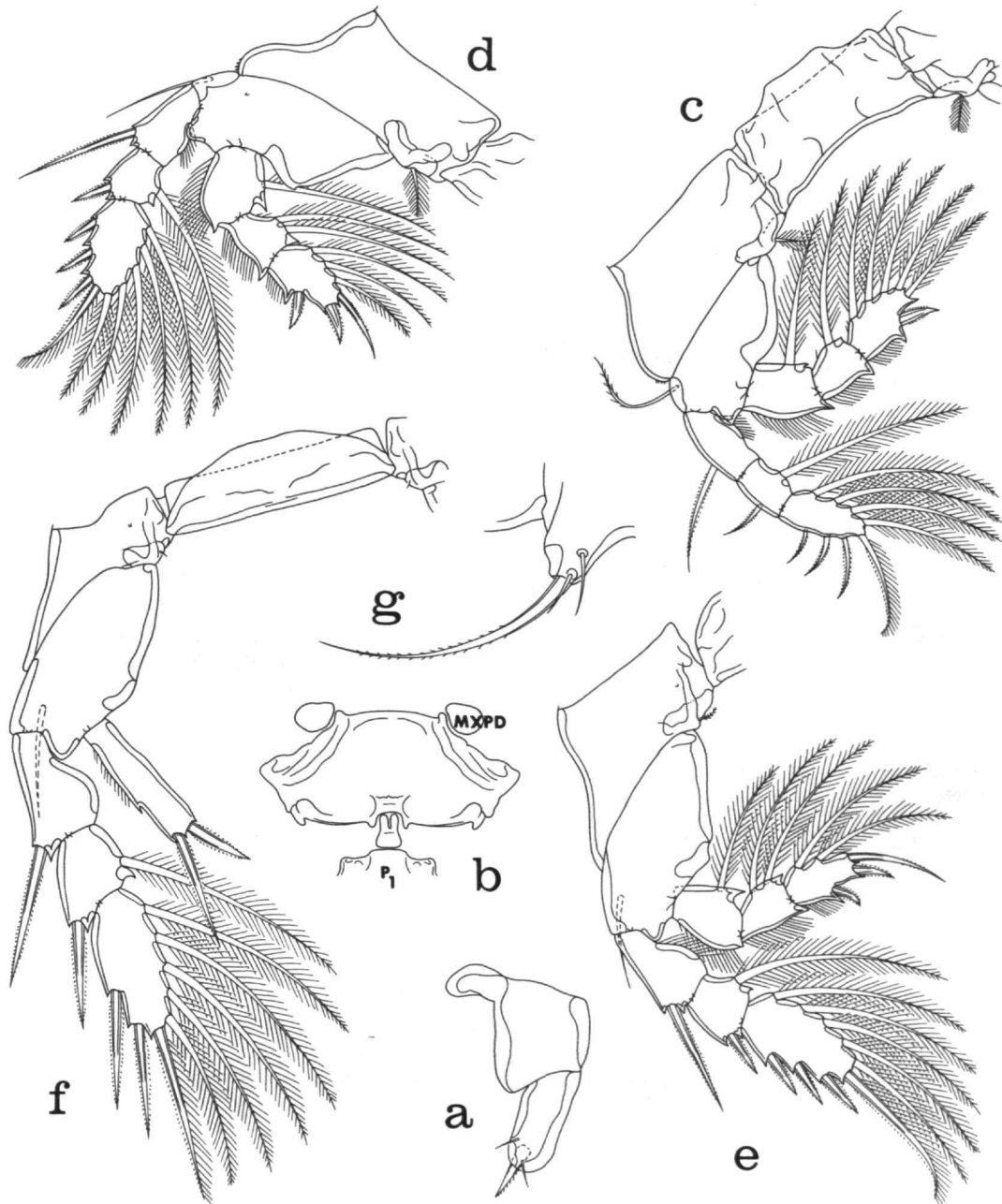


FIGURE 24.—*Pseudanthessius vinnulus*, new species, female: *a*, maxilliped, antero-inner (D); *b*, area between maxillipeds and leg 1, ventral (B); *c*, leg 1 and intercoxal plate, anterior (F); *d*, leg 2, anterior (F); *e*, leg 3, anterior (F); *f*, leg 4 and intercoxal plate, anterior (F); *g*, leg 5, dorsal (C).

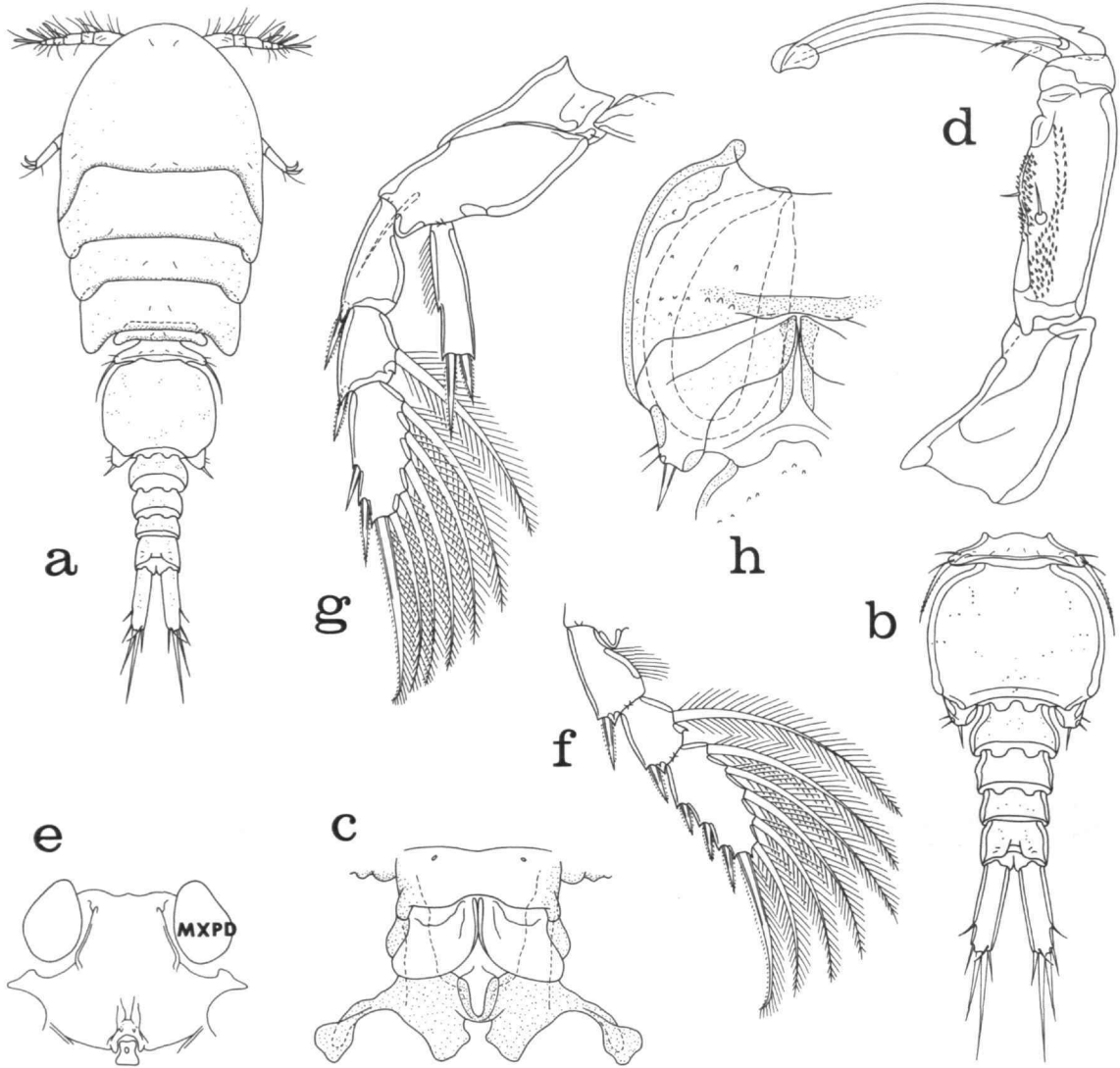


FIGURE 25.—*Pseudanthessius vinnulus*, new species, male: *a*, dorsal (A); *b*, urosome, dorsal (E); *c*, labrum and postlabral area, ventral (F); *d*, maxilliped, posterior (F); *e*, area between maxillipeds and leg 1, ventral (B); *f*, exopod of leg 3, anterior (F); *g*, leg 4, anterior (F); *h*, leg 6, ventral (C).

Ventral area between the maxillipeds and the first pair of legs as in Figure 25e.

Legs 1 and 2 like those of the female. Leg 3 similar to that of the female but the outer spine on the first segment of the exopod not elongated (Figure 25f). Leg 4 (Figure 25g) also resembling that of the female but the exopod spines shorter. Endopod 46×11 , the two spines 19 and 33.

Leg 5 resembling that of the female but the long seta shorter, 70 long.

Leg 6 (Figure 25h) a posteroventral flap on the genital segment, bearing two small setae about 5.5 and a spine 10. Two median sclerotized internal rods below the edge of the flap in ventral view.

Spermatophore not observed outside the body of the male.

Living specimens colored as in the female.

ETYMOLOGY.—The specific name *vinnulus* (Latin, = delightful or charming) alludes to the graceful nature of the long seta on leg 5.

COMPARISON WITH RELATED SPECIES.—*Pseudanthessius vinnulus* may be readily distinguished from the majority of species of *Pseudanthessius* where the caudal ramus in the female is clearly much shorter or much longer. Four species have the caudal ramus between 3:1 and 4:1, thus approaching the condition in the new species. These may be separated from *P. vinnulus* on the basis of other characters, however. In *P. tortuosus* Stock, Humes, and Gooding, 1963, the outer spine on the first exopod segment of leg 1 is not much longer than the next distal spine. In *P. assimilis* G. O. Sars, 1917, the female genital segment is much longer than wide. In *P. obscurus* A. Scott, 1909, the second antenna has three slender claws. In *P. mucronatus* Gurney, 1927, the second antenna has six curved setae, none of them clawlike. In all four of these species the longest element of leg 5 is relatively short, not longer than the genital segment as in *P. vinnulus*.

Pseudanthessius madrasensis Reddiah, 1968

SPECIMENS COLLECTED (all from the crinoid *Tropiometra afra* (Hartlaub)).—12 ♀♀, 25 ♂♂, 2 copepodids from 1 host, in 2 m, Rocher à la Voile, Noumea, $22^{\circ}18'24''S$, $166^{\circ}25'50''E$, 3 June 1971; 458 ♀♀, 147 ♂♂, 47 copepodids from 4 hosts, in

1.5 m, Rocher à la Voile, 28 June 1971; 46 ♀♀, 53 ♂♂, 15 copepodids from 1 host, in 2 m, western end of Ricaudy Reef, near Noumea, $22^{\circ}19'05''S$, $166^{\circ}26'28''E$, 6 June 1971; 9 ♀♀, 14 ♂♂, 11 copepodids from 1 host, in 3 m, west of Isle Mando, near Noumea, $22^{\circ}18'59''S$, $166^{\circ}09'30''E$, 26 June 1971; 19 ♀♀, 25 ♂♂, 2 copepodids from 1 host, in 3 m, Ricaudy Reef, $22^{\circ}19'00''S$, $166^{\circ}26'44''E$, 20 July 1971.

REMARKS.—*Tropiometra afra* is a new host of this copepod.

Pseudanthessius major Stock, 1967

SPECIMENS COLLECTED.—2 ♀♀, 2 ♂♂ from one crinoid, *Himerometra magnipinna* A. H. Clark, in an intertidal pool, Ricaudy Reef, near Noumea, New Caledonia, $22^{\circ}19'00''S$, $166^{\circ}26'44''E$, 10 July 1971; 30 ♀♀, 32 ♂♂, 2 copepodids from one crinoid, *Stephanometra spicata* (P. H. Carpenter), in 3 m, eastern end of Isle Maître, near Noumea, $22^{\circ}20'35''S$, $166^{\circ}25'45''E$, 8 June 1971.

REMARKS.—Both crinoids are new hosts for this copepod.

List of Western Pacific Echinoids with Their Pseudanthessiid Associates

CIDARIDAE

Phylacanthus imperialis (Lamarck)

Pseudanthessius implanus, new species

DIADEMATIDAE

Diadema setosum (Leske)

Senariellus diadematis, new genus, new species

Echinothrix diadema (Linnaeus)

Pseudanthessius vinnulus, new species

Echinothrix calamaris (Pallas)

Senariellus tensus, new genus, new species

TOXOPNEUSTIDAE

Tripneustes gratilla (Linnaeus)

Senariellus latiseta, new genus, new species

Mecomerinx sewellana, new genus, new species

PARASALENIDAE

Parasalenia gratiosa A. Agassiz

Pseudanthessius pictus, new species

ECHINOMETRIDAE

Echinometra mathaei (de Blainville)

Mecomerinx notabilis (Humes and Cressey, 1961), new combination

Heterocentrotus mammillatus (Linnaeus)

Senariellus latiseta, new genus, new species

Mecomerinx heterocentroti, new genus, new species

**List of Western Pacific Crinoids
with Their Pseudanthessiid Associates**

COMASTERIDAE

Comanthus bennetti (J. Müller)

Pseudanthessius comanthi Humes, 1972

HIMEROMETRIDAE

Himerometra magnipinna A. H. Clark

Pseudanthessius major Stock, 1967

MARIAMETRIDAE

Stephanometra spicata (P. H. Carpenter)

Pseudanthessius major Stock, 1967

TROPIOMETRIDAE

Tropiometra afra (Hartlaub)

Pseudanthessius madrasensis Reddiah, 1968

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