

Cyclopoid Copepods (Lichomolgidae)
Associated with Alcyonaceans
in New Caledonia

ARTHUR G. HUMES

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ABSTRACT

Humes, Arthur G. Cyclopoid Copepods (Lichomolgidae) Associated with Alcyonaceans in New Caledonia. *Smithsonian Contributions to Zoology*, number 191, 27 pages, 13 figures, 3 tables, 1975.—*Notoxynus mundus*, new genus, new species, *Metaxymoligus praelongipes*, new species, and *Metaxymoligus comparatus*, new species, are described from *Xenia membranacea*; and *Metaxymoligus cincinnatus*, new species, and *Metaxymoligus mimicus*, new species, from *Cladiella pachyclados*. The two species of *Metaxymoligus* from *Xenia* and the two from *Cladiella* represent pairs of species. Fifteen other species are reported also from New Caledonia, ten of these from new hosts. Eleven of these species are recorded for the first time in the Pacific Ocean. Twenty lichomolgids are now known from soft corals in New Caledonia.

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Cyclopoid Copepods (Lichomolgidae) Associated with Alcyonaceans in New Caledonia

Arthur G. Humes

Introduction

In tropical waters cyclopoid copepods are frequently associated with soft corals. Humes and Stock (1973) listed 37 species of Lichomolgidae from Alcyonacea in northwestern Madagascar. In New Caledonia, however, copepods living with these cnidarian hosts have not been investigated. In this paper three new copepods are described from *Xenia membranacea* Schenk and two from *Cladiella pachyclados* (Klunzinger). In addition, records of fifteen other species are given, ten of them from new hosts. Eleven of these species are reported for the first time in the Pacific Ocean.

The fieldwork in New Caledonia during June–August, 1971, and the subsequent study of the copepods were supported by a grant (GB-8381X) from the National Science Foundation. Mr. Roger C. Halverson from the University of California at Santa Barbara aided in making the collections. The generous aid given by the staff of the Centre ORSTOM de Noumea is acknowledged with thanks.

I am indebted to Dr. J. Verseveldt, Zwolle, The Netherlands, for the identification of the alcyonacean hosts.

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: A_1 = first an-

tenna, A_2 = second antenna, MXP = maxilliped, and P_1 = 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.

Notoxymus, new genus

DIAGNOSIS.—Lichomolgidae. Urosome in the female 5-segmented, in the male 6-segmented. Caudal ramus with six setae. Rostrum broadly rounded posteroventrally. First antenna 7-segmented, in the female with the formula 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete; in the male 4, 13 + 2 aesthetes, 6, 3 + 1 aesthete, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna 4-segmented, with the armature 1,1,3 and I + 6, there being a single terminal claw.

Labrum with two lobes separated by a median cleft. Mandible with the base divided by an indentation into proximal and distal parts; convex edge with a scalelike area bearing a row of small spinules and leading to a pointed apex. Lash moderately long. Paragnath a small hairy lobe. First maxilla with three elements and a small thornlike process. Second maxilla of the usual lichomolgid type, but the second segment set at an angle to the first. Maxilliped 3-segmented in the female, 4-segmented in the male (assuming that the proximal part of the claw represents a fourth segment).

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TABLE 1.—Comparison of *Notoxynus* with other lichomolgid genera having more than two elements on the 2-segmented endopod of leg 4

Genera	Number of segments in second antenna	Number of claws on last segment of second antenna	Formula for second segment of leg 4 endopod
<i>Notoxynus</i> , new genus	4	1	II,1
<i>Ascidioxynus</i> Humes and Stock, 1972	4	2	II,1
<i>Astericola</i> Rosoll, 1889	3	2 or 3	2,1
<i>Indomolgus</i> Humes and Ho, 1966	4	2	II,2; I,3; II,3
<i>Paclabius</i> Kossmann, 1877	3	1	II,1
<i>Stellicola</i> Kossmann, 1877	3	1	II,1 (II in S. pollex Humes and Ho, 1967c)
<i>Synstellicola</i> Humes and Stock, 1972	3	1	II,1

Legs 1–4 with 3-segmented rami, except for the endopod of leg 4 which is 2-segmented. Armature of the usual lichomolgidiform type, but leg 4 endopod 0–1; II,1. Third segment of leg 4 exopod II,1,5. No sexual dimorphism in leg 1. Leg 5 with a small free segment bearing two setae.

Other features as in the species described below. Associated with alcyonaceans.

TYPE-SPECIES.—*Notoxynus mundus*, new species.

ETYMOLOGY.—The name is a combination of the Greek νότος (=the south), alluding to its occurrence in the southern hemisphere, and ξυνος (= a companion).

COMPARISON WITH RELATED GENERA.—Six genera of the Lichomolgidae have, as in *Notoxynus*, a 2-segmented endopod in leg 4 with the second segment bearing more than two elements. *Notoxynus* may be distinguished from these genera by the features compared in Table 1.

Notoxynus mundus, new species

FIGURES 1, 2, 3a–h

TYPE MATERIAL.—19 ♀♀, 21 ♂♂ from 6 colonies of the alcyonacean *Xenia membranacea* Schenk, in 15 cm, on the reef about 5 km south of Yaté, southeastern New Caledonia, 22°11'00"S, 166°59'00"E, 23 June 1971. Holotype ♀, allotype, and 28 paratypes (13 ♀♀, 15 ♂♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (under the catalog numbers of the old United States National Museum: USNM); the remaining paratypes in the collection of the author.

FEMALE.—Body (Figure 1a) moderately large,

with the prosome neither greatly expanded nor flattened. Length 2.00 mm (1.76–2.18 mm) and the greatest width 0.82 mm (0.76–0.86 mm), based on 10 specimens. Segment of leg 1 separated from the head by a dorsal transverse furrow. Epimera of the segments of legs 1–3 elongated posteriorly. Segment of leg 4 with a rectangular dorsum without pronounced epimera. Ratio of the length to the width of the prosome 1.32:1. Ratio of the length of the prosome to that of the urosome 1.31:1.

Segment of leg 5 (Figure 1b) 130 × 352. Between this segment and the genital segment no ventral sclerite. Genital segment elongated, 297 long and 266 in greatest width (in its anterior third). Genital areas situated laterally near the junction of the anterior two-thirds of the segment. Each area (Figure 1c) with two small naked setae 12 and 6. Three postgenital segments from anterior to posterior 101 × 156, 57 × 136, and 104 × 150. Posteroventral border of the anal segment smooth.

Caudal ramus (Figure 1d) elongated, 200 × 50, or 4 times longer than wide. Six setae relatively short, none longer than the ramus, and naked. Outer lateral seta 78 and placed distally. Dorsal seta 50 and placed marginally. Outermost terminal seta 112, innermost terminal seta 130, outer median terminal seta 170, and inner median terminal seta 180.

Body surface with a few very small hairs (sensilla).

Egg sac (Figure 1a) oval 440 × 330, containing about 22 eggs, each approximately 110 in diameter but of rather irregular shape.

Rostrum (Figure 1e) weak and broadly rounded in ventral view.

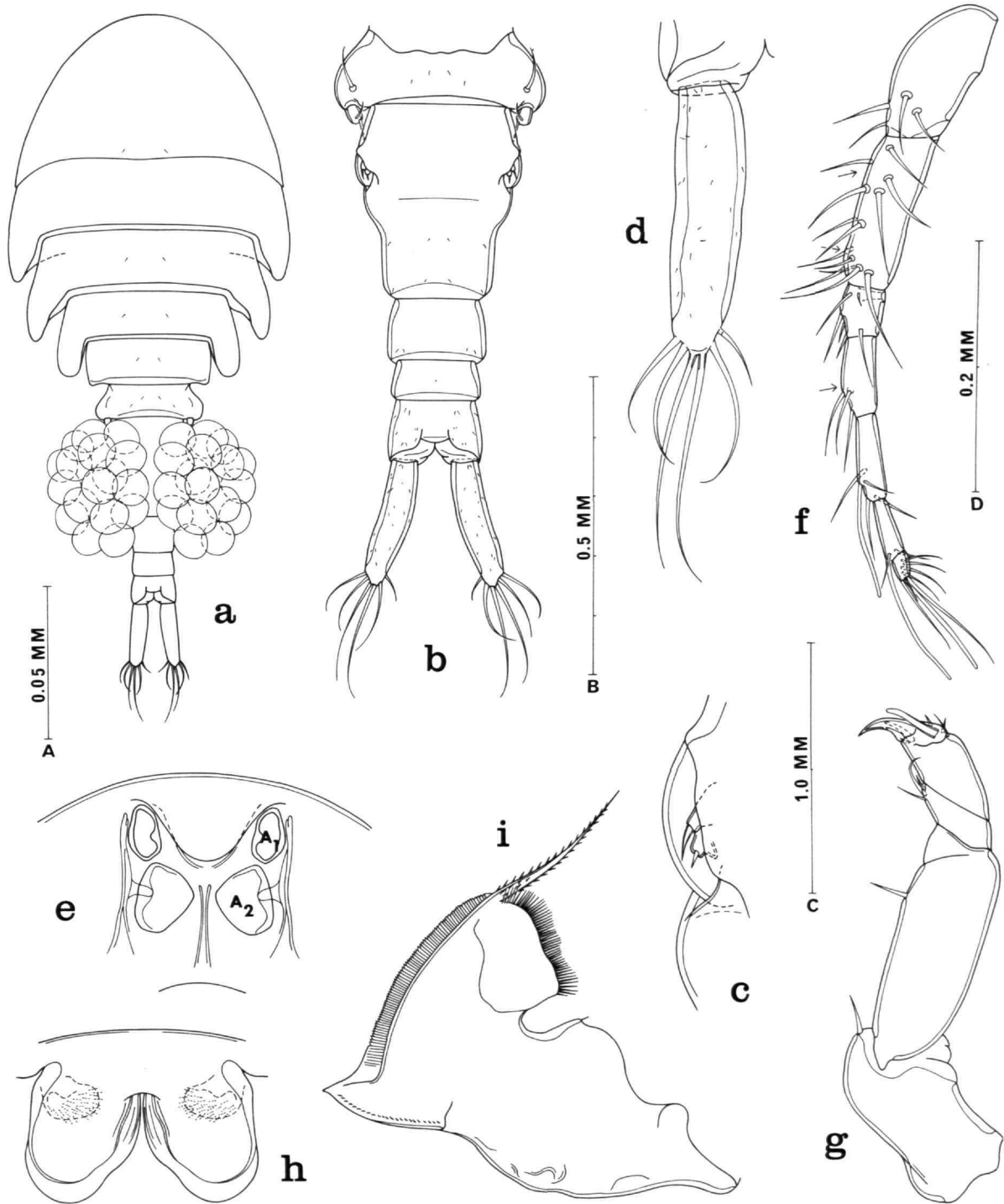


FIGURE 1.—*Notoxynus mundus*, new genus, new species, female: *a*, dorsal (A); *b*, urosome, dorsal (B); *c*, genital area, dorsal (C); *d*, caudal ramus, dorsal (D); *e*, rostrum, ventral (B); *f*, first antenna, with arrows indicating positions of three aesthetes added in male, anterodorsal (D); *g*, second antenna, anterior (D); *h*, labrum, with paragnaths indicated by broken lines, ventral (D); *i*, mandible, posterior (C).

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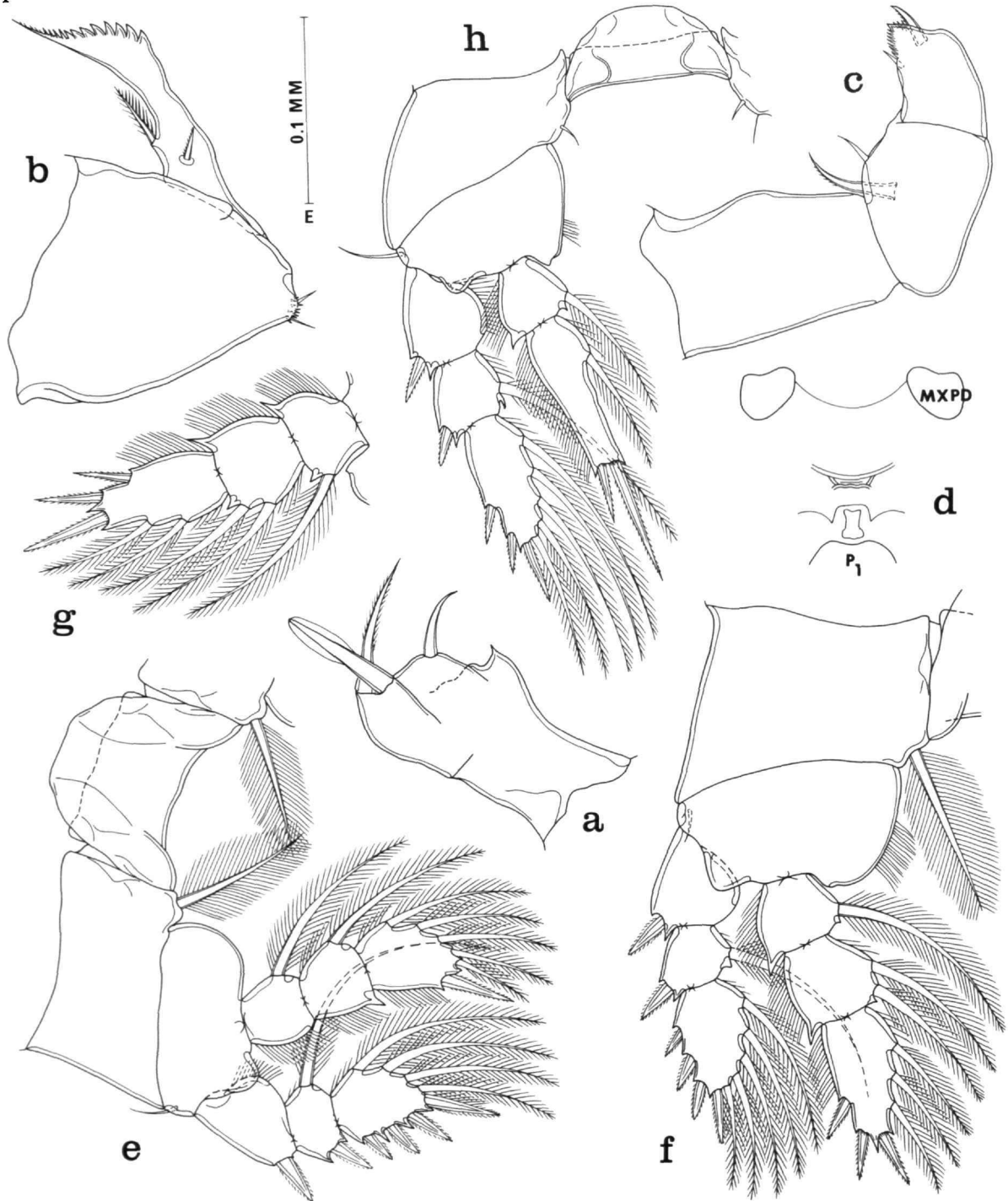


FIGURE 2.—*Notoxynus mundus*, new genus, new species, female: *a*, first maxilla, anterior (C); *b*, second maxilla, posterior (E); *c*, maxilliped, antero-outer (E); *d*, area between maxillipeds and first pair of legs, ventral (B); *e*, leg 1 and intercoxal plate, anterior (D); *f*, leg 2, anterior (D); *g*, endopod of leg 3, anterior (D); *h*, leg 4 and intercoxal plate, anterior (D).

First antenna (Figure 1f) 450 long. Lengths of the seven segments: 5 (115 along the anterior margin), 117, 35, 58, 65, 43, and 18 respectively. Formula for the armature: 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All setae naked.

Second antenna (Figure 1g) 4-segmented and 375 long, with the formula 1, 1, 3, and 1 + 6. Fourth segment 88 along the outer side, 41 along the inner side, and 39 wide. Terminal claw short, 44 along its axis. Other terminal elements consisting of two large obtuse setae and four minute setules. All setae naked.

Labrum (Figure 1h) with two rounded posteroventral lobes. Mandible (Figure 1i) with its concave margin having an indentation followed by a row of slender spinules; with its convex margin bearing a scalelike area with a row of minute spinules leading to a pointed apex followed by a striated serrate fringe. Lash moderately long and barbed. Paragnath (Figure 1h) a small hairy lobe. First maxilla (Figure 2a) relatively large, with three elements and a small thornlike process. Second maxilla (Figure 2b) 2-segmented. First segment with a group of outer distal setules. Second segment set at an angle to the first and bearing a conspicuously barbed inner (dorsal) seta and a surficial posterior barbed seta; the segment terminating in a swollen lash dentate along its outer (ventral) margin and bilaterally barbed distally. Maxilliped (Figure 2c) 3-segmented. First segment unarmed. Second segment with two unequal setae, the longer one finely barbed. Third segment bearing two unequal setae and terminating in a bilaterally spinulose pointed apex.

Ventral area between the maxillipeds and the first pair of legs (Figure 2d) not protuberant. Sclerotized line connecting the bases of the maxillipeds.

Legs 1-4 (Figure 2e-h) with 3-segmented rami except for the endopod of leg 4 which is 2-segmented. Armature as follows:

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	0-1; II,1	

Inner element on the coxa of legs 1-3 a large feathered seta, but in leg 4 reduced to a small

naked seta 20. Inner margin of the basis in leg 1 smooth, but with a row of hairlike spinules in legs 2-4. Exopod of leg 4 with a length of 234. First segment of the endopod 52 × 54 (not including the spiniform processes) and the inner distal plumose seta 117. Second segment 117 long (without the spiniform processes); greatest width 47 and least width 26. Two terminal barbed spines 46 (outer) and 99 (inner). Both segments with an outer row of hairs and the second segment with a row of inner hairs proximal to the seta.

Leg 5 (Figure 3a,b) with a small unornamented free segment 33 × 22. Two terminal setae 39 and 25. All setae naked.

Leg 6 represented by the two setae on the genital area (Figure 1c).

Color of living specimens in transmitted light slightly brownish, the eye red, the egg sacs gray.

MALE.—Body (Figure 3c) resembling in general form that of the female. Length 1.59 mm (1.50-1.70 mm) and the greatest width 0.61 mm (0.56-0.65 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.36:1. Ratio of the length of the prosome to that of the urosome 1.21:1.

Segment of leg 5 (Figure 3d) 65 × 247. No ventral intersegmental sclerite. Four postgenital segments from anterior to posterior 44 × 94, 44 × 91, 29 × 86, and 65 × 96.

Caudal ramus similar to that of the female but smaller, 161 × 39, ratio 4.13:1.

Body surface ornamented with hairs as in the female.

First antenna as in the female but three long aesthetes added, two on the second segment and one on the fourth segment, so that the formula is 4, 13 + 2 aesthetes, 6, 3 + 1 aesthete, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. Second antenna as in the female.

Labrum, mandible, paragnath, first maxilla, and second maxilla similar to those in the female. Maxilliped (Figure 3e) 4-segmented (assuming that the proximal part of the claw represents a fourth segment). First segment lacking elements but with an inner distal recurved thornlike process. Second segment with two naked setae and a group of short spines. Small third segment unarmed. Claw 250 along its axis (including the small terminal lamella) and without trace of subdivision; proximally

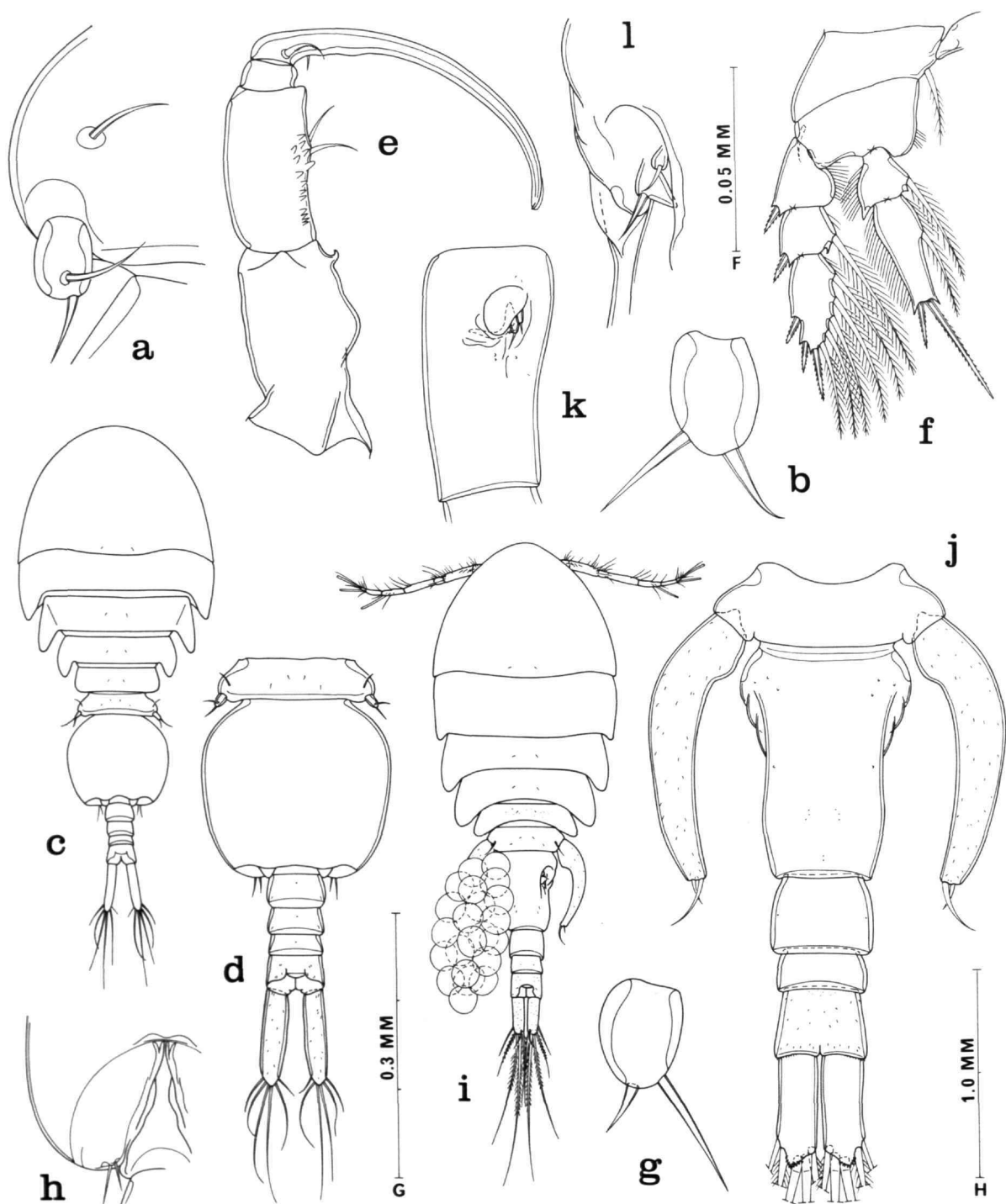


FIGURE 3.—*Notoxynus mundus*, new genus, new species. Female: *a*, leg 5, dorsal (C); *b*, free segment of leg 5, flat outer view (F). Male: *c*, dorsal (A); *d*, urosome, dorsal (B); *e*, maxilliped, inner (D); *f*, leg 4, anterior (D); *g*, free segment of leg 5, flat outer view (F); *h*, leg 6, ventral (G). *Metaxymolgus praelongipes*, new species, female: *i*, dorsal (H); *j*, urosome, ventral (B); *k*, genital segment, lateral (B); *l*, genital area, dorsal (E).

bearing two unequal setae, the longer one with minute barbules.

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

Legs 1–4 segmented and armed as in the female. No sexual dimorphism in leg 1. Inner coxal element of leg 4 a sparsely feathered seta 60 (Figure 3f). Two terminal spines on the endopod of leg 4, 36 (outer) and 84 (inner).

Leg 5 resembling that of the female. Free segment (Figure 3g) 28×21 , with the two terminal setae 14 and 33.

Leg 6 (Figure 3h) a posteroventral flap on the genital segment bearing two naked setae 39 and 26.

Spermatophore not observed.

Color in living specimens as in the female.

ETYMOLOGY.—The specific name *mundus* from Latin (= neat, elegant) recalls the well-proportioned form of this species.

Metaxymolgus praelongipes, new species

FIGURES 3i–l, 4, 5, 6a–d

TYPE MATERIAL.—15 ♀♀, 9 ♂♂ from 6 colonies of *Xenia membranacea* Schenk, in 15 cm, on the reef about 5 km south of Yaté, southeastern New Caledonia, $22^{\circ}11'00''S$, $166^{\circ}59'00''E$, 23 June 1971. (These are the same colonies from which *Notoxynus mundus* was recovered.) Holotype ♀, allotype, and 17 paratypes (11 ♀♀, 6 ♂♂) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (under the catalog numbers of the former United States National Museum: USNM); the remaining paratypes (dissected) in the collection of the author.

FEMALE.—Body (Figure 3i) moderately elongated with the prosome not unusually thickened dorsoventrally. Length 2.14 mm (1.76–2.30 mm) and the greatest width 0.79 mm (0.67–0.86 mm), based on 10 specimens. First pedigerous segment separated dorsally from the cephalosome by a transverse suture. 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 1.35:1.

Segment of leg 5 (Figure 3j) 122×363 . Between this segment and the genital segment no ventral sclerite. Genital segment in dorsal view elongated, 374 long, 286 in greatest width anteriorly and 197 wide posteriorly; in lateral view (Figure 3k) not

swollen. Ratio of the length to the average width about 1.55:1. Genital areas located dorsolaterally in the anterior half of the segment. Each area (Figure 3l) with two small naked setae 22 and 20 and a spiniform process. Three postgenital segments from anterior to posterior 125×159 , 70×140 , and 117×148 . Anal segment bearing on each side a posteroventral row of minute spinules.

Caudal ramus (Figure 4a) elongated, 177 in greatest dorsal length, 187 in greatest ventral length, and 65 wide. Ratio of dorsal length to width 2.72:1. Outer lateral seta 160 and naked. Dorsal seta 44 and naked. Outermost terminal seta 230, innermost terminal seta 340, and the two median terminal setae 510 (outer) and 780 (inner), both inserted between dorsal (smooth) and ventral (with marginal denticles) flanges. All four terminal setae plumose.

Body surface with a few hairs (sensilla) and refractile points (Figure 3i,j).

Egg sac (Figure 3i) elongated oval, 780×415 in the specimen drawn, reaching to the middle of the caudal ramus and containing approximately 25 eggs about 125–140 in diameter though of irregular shape.

Rostrum (Figure 4b) subtriangular in ventral view.

First antenna (Figure 4c) 682 long. Lengths of the seven segments: 60 (130 along the anterior margin), 169, 42, 143, 112, 81, and 31 respectively. Formula for the armature: 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. All the setae naked.

Second antenna (Figure 4d) 429 long and 4-segmented, with the armature 1, 1, 3, and II + 5. Fourth segment 82 along the outer side, 46 along the inner side, and 36 wide. Two terminal claws very unequal, the larger 46 along its axis, the smaller 17. Five small subterminal setules.

Labrum (Figure 4e) with two broadly rounded posteroventral lobes. Mandible (Figure 4f) having a strongly constricted base. Distal to the constriction on the convex margin a scalelike area with a row of blunt spinules followed by two small teeth or none (Figure 4g) and then a serrated fringe; on the convex margin a row of long slender spinules. Lash long and barbed. Paragnath (Figure 4e) a small hairy lobe. First maxilla (Figure 4h) relatively large; terminally with two slender setae, a stout hyaline element, and subterminally having a small

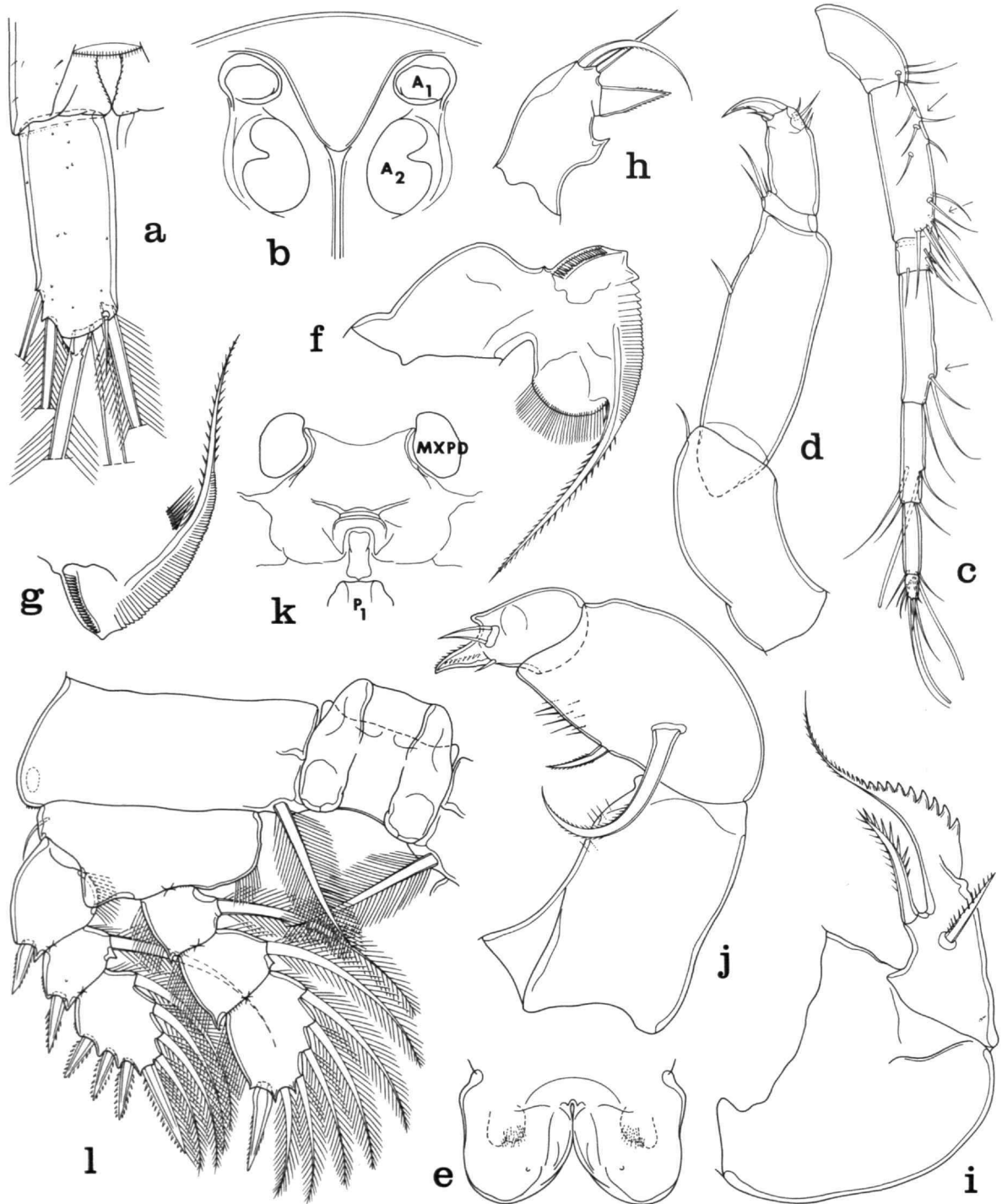


FIGURE 4.—*Metaxymolgus praelongipes*, new species, female: *a*, caudal ramus, dorsal (D); *b*, rostrum, ventral (G); *c*, first antenna, with arrows indicating positions of three aesthetes added in male, dorsal (G); *d*, second antenna, postero-inner (D); *e*, labrum, with paragnaths indicated by broken lines, ventral (D); *f*, mandible, posterior (E); *g*, distal edge of mandible, posterior (E); *h*, first maxilla, posterior (E); *i*, second maxilla, posterior (E); *j*, maxilliped, postero-inner (E); *k*, area between maxillipeds and first pair of legs, ventral (B); *l*, leg 1 and intercoxal plate, anterior (D).

fingerlike process. Second maxilla (4i) with a large unarmed first segment. Second segment armed with a small setule on its proximal outer (ventral) surface, a surficial posterior seta barbed along one edge, and an inner (dorsal) distal spine bilaterally with spinules. This segment produced to form a lash whose proximal half is expanded on the outer (ventral) side, where it bears strong marginal teeth grading into small barbules distally. Maxilliped (Figure 4j) 3-segmented. First segment with an inner cluster of slender spinules. Second segment with two unequal finely barbed setae and a similar cluster of spinules. Third segment with a smooth spine, a small naked seta, and a stout terminal bilaterally barbed spiniform process (lacking a distinct articulation with the segment); in addition to the three elements a small but distinct adjacent marginal knob.

Area between the maxillipeds and the first pair of legs (Figure 4k) not protuberant.

Legs 1-4 (Figures 4l, 5a-c) segmented and armed as in other species in the genus. Coxa of leg 1 with an outer prominence on the posterior surface (Figure 4l). Leg 4 (Figure 5c) with the inner coxal seta 50 and naked. Inner margin of the basis smooth. Exopod 290 long. First segment of the endopod 65 long without the spiniform processes and 68 wide, its distal inner seta plumose and 100. Second endopod segment 161 long without the processes (172 including the processes), 58 in greatest width, 43 in least width; outer terminal spine 57, inner spine 73 with a bifurcated tip; both spines barbed.

Leg 5 (Figure 5d) elongated, reaching to the first postgenital segment. Free segment in dorsal view 424 long, 95 in greatest width proximally at the slight expansion. In flat ventral view the free segment as in Figure 5e. Two naked terminal setae 40 and 117.

Leg 6 represented by the two setae on the genital area (Figure 3l).

Living specimens in transmitted light opaque, the eye red, the egg sacs grayish to opaque.

MALE.—Body (Figure 5f) more slender than in the female. Length 1.77 mm (1.66–1.86 mm) and the greatest width 0.54 mm (0.51–0.54 mm), based on 8 specimens. Ratio of the length to the width of the prosome 1.73:1. Ratio of the length of the prosome to that of the urosome 1.07:1.

Segment of leg 5 (Figure 5g) 73 × 187. No ventral intersegmental sclerite. Genital segment elon-

gated, 363 × 297. Four postgenital segments from anterior to posterior 73 × 125, 75 × 110, 44 × 94, and 84 × 104.

Caudal ramus resembling that of the female, but smaller, 112 in greatest dorsal length, 122 in greatest ventral length, and 44 wide.

Body surface sparsely ornamented as in the female.

Rostrum as in the female. First antenna like that of the female but three long aesthetes added, two on segment 2 and one on segment 4. Second antenna similar to that of the female except for numerous short spines on the inner surface of the first and second segments (Figure 5h).

Labrum, mandible, and paragnath like those of the female. First maxilla (Figure 5i) with the stout terminal element less enlarged than in the female and relatively longer. Second maxilla similar to that in the female. Maxilliped (Figure 5j) with the first and third segments unarmed. Second segment ornamented with two rows of spines and bearing two setae, one smoothly tapered, the other with a hyaline inset distal portion. Claw 360 along its axis including the terminal lamella, showing a weak subdivision about midway, and bearing proximally two very unequal setae, the larger one with an obliquely striated tip.

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

Legs 1-4 segmented as in the female and with the same spine and setal formula as in that sex except for the third segment of the endopod of leg 1 (Figure 6a) where the formula is I,1,4 instead of I,5 as in the female. Rest of leg 1, legs 2 and 3, and the exopod of leg 4 resembling the female. Second segment of the endopod of leg 4 (Figure 6b) a little shorter than in the female, 117 long including the processes, 43 in greatest width, 32 in least width. Two terminal spines more unequal than in the opposite sex, outer 34, inner 52.

Leg 5 (Figure 6c) with the free segment 70 × 18, the two terminal setae 28 and 17.

Leg 6 (Figure 6d) the usual posteroventral flap on the genital segment, bearing two naked setae 33 and 24.

Spermatophore not observed.

Color in living specimens like that of the female.

ETYMOLOGY.—The specific name *praelongipes*, from Latin *praelongus* (= very long) and *pes* (= foot), alludes to the elongated fifth leg.

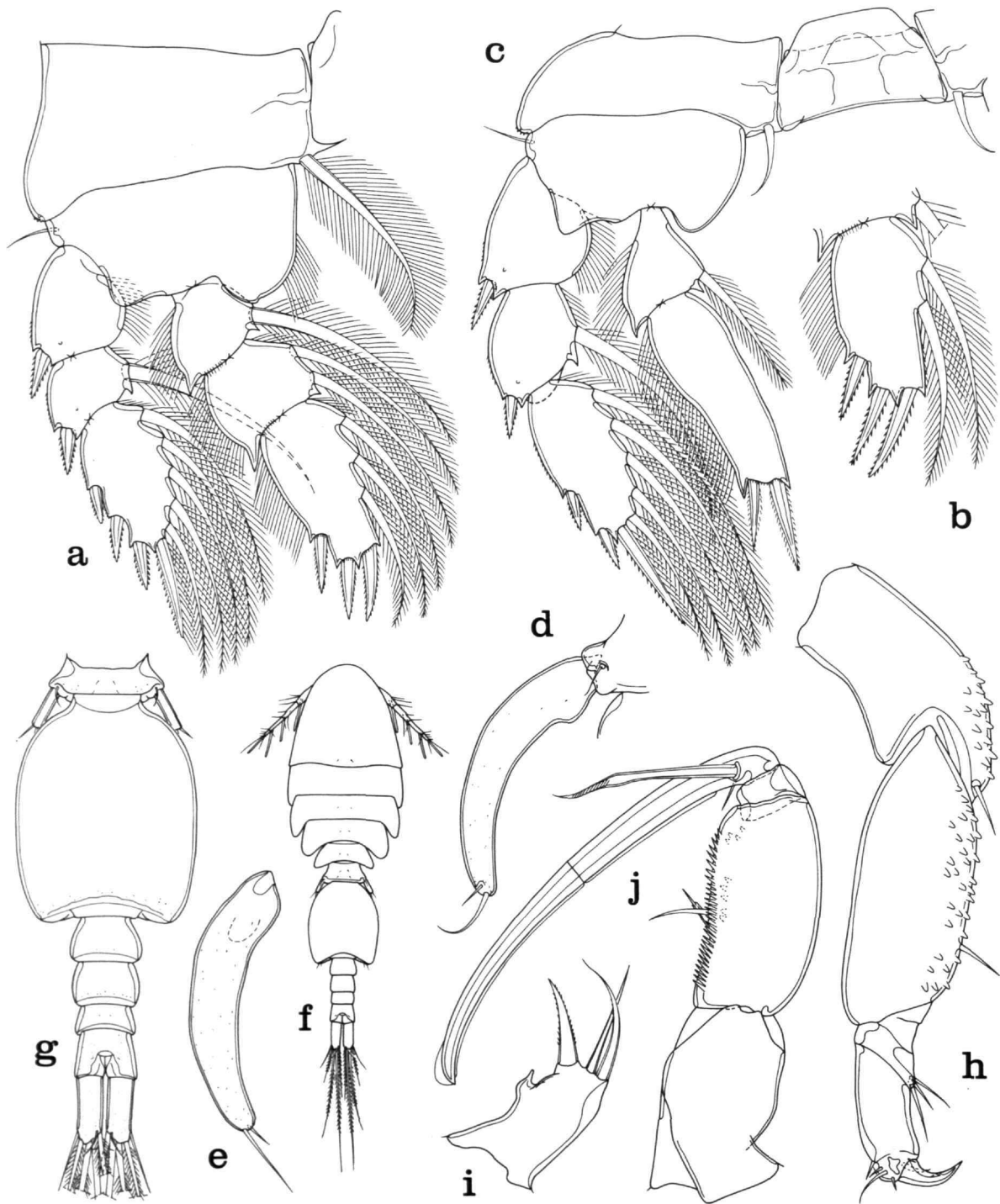


FIGURE 5.—*Metaxymolgus praelongipes*, new species. Female: *a*, leg 2, anterior (D); *b*, third segment of endopod of leg 3, anterior (D); *c*, leg 4 and intercoxal plate, anterior (D); *d*, leg 5, dorsal (B); *e*, free segment of leg 5, flat ventral view (B). Male: *f*, dorsal (H); *g*, urosome, dorsal (B); *h*, second antenna, antero-outer (E); *i*, first maxilla, posterior (C); *j*, maxilliped, inner (D).

COMPARISON WITH OTHER SPECIES IN THE GENUS.—The genus *Metaxymolgus* contains 25 species. Twenty-three of these were listed by Humes and Stock (1973). Two new species have since been described: *M. echinasteris* Humes, in press, from the asteroid *Echinaster luzonicus* (Gray) in New Caledonia, and *M. micropus* Humes, 1973a, from the ophiuroid *Astroboa nuda* (Lyman) in Madagascar.

Metaxymolgus praelongipes, a species whose large size is noteworthy, may be distinguished from all other members of the genus by a combination of three characters: (1) the elongated female genital segment with small anteriorly located expansions in dorsal view, (2) the long free segment of the female leg 5 (more than twice as long as any other previously described species) reaching to the first postgenital segment (in all other species it is clearly shorter than the genital segment), and (3) the very unequal claws on the second antenna in both sexes.

Sexual dimorphism in the first maxilla, evident in the new species, does not occur in other species of *Metaxymolgus* as far as known; however, the first maxilla in both sexes has not been described in several species.

Metaxymolgus comparatus, new species

FIGURES 6e-l, 7, 8a-g

TYPE MATERIAL.—14 ♀♀, 18 ♂♂ from 6 colonies of *Xenia membranacea* Schenk, in 15 cm, on the reef 5 km south of Yaté, southeastern New Caledonia, 22°11'00"S, 166°59'00"E, 23 June 1971. (These are the same colonies from which *Notoxynus mundus* and *Metaxymolgus praelongipes* were recovered.) Holotype ♀, allotype, and 25 paratypes (10 ♀♀, 15 ♂♂) deposited in the National Museum of Natural History (under USNM numbers), Washington; the remaining paratypes (dissected) in the collection of the author.

Features not mentioned in the description below may be assumed to be similar to those in the preceding species.

FEMALE.—Body (Figure 6e) resembling that of *M. praelongipes*. Length 2.06 mm (1.95–2.24 mm) and the greatest width 0.74 mm (0.70–0.78 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.60:1. Ratio of the length of the prosome to that of the urosome 1.32:1.

Segment of leg 5 (Figure 6f) 130 × 330. Between this segment and the genital segment no ventral sclerite. Genital segment in dorsal view elongated, 286 long, 242 in greatest width far anteriorly and 180 wide posteriorly; in lateral view shaped as in Figure 6g. Ratio of the length to the average width 1.35:1. Each genital area (Figure 6h) with two small naked setae 16 and 10 and a spiniform process. Three postgenital segments from anterior to posterior 156 × 161, 83 × 146, and 143 × 154.

Caudal ramus (Figure 6i) moderately elongated, 148 in greatest dorsal length, 156 in greatest ventral length, and 70 wide. Ratio of the length (based on the dorsal length) to the width 2.11:1. Outer lateral seta 143 and naked. Dorsal seta 33 and naked. Outermost terminal seta 179, innermost terminal seta 268, and the two median terminal setae 415 (outer) and 670 (inner), both inserted between dorsal (smooth) and ventral (with prominent marginal denticles) flanges. All four terminal setae plumose.

Egg sac (Figure 6e) elongated, 179 × 81, containing approximately 22 eggs about 138 in diameter.

Rostrum (Figure 6j) broadly rounded in ventral view with clusters of minute refractile points.

First antenna (Figure 6k) 670 long. Lengths of the seven segments: 55 (117 along the anterior margin), 177, 47, 130, 101, 68, and 39 respectively. Armature as in *M. praelongipes*.

Second antenna (Figure 6l) 418 long. Fourth segment 97 along the outer side, 55 along the inner side, and 39 wide. Two terminal claws subequal, 43 and 51 along their axes. One of the five sub-terminal setules large.

Labrum and paragnaths as in Figure 7a. Mandible and second maxilla identical to those in *M. praelongipes*. First maxilla (Figure 7b) with the finely barbed element more slender than in that species. Maxilliped (Figure 7c) resembling that of *M. praelongipes* but without spinules on the first segment, the two setae on the second segment much more unequal in length, and the distal marginal knob on the third segment larger.

Area between the maxillipeds and the first pair of legs as in *M. praelongipes*.

Legs 1–4 resembling those in *M. praelongipes* but the third segment of the endopods of legs 1–3 a little shorter (Figure 7d–f). Leg 4 (Figure 7g) with the inner coxal seta 35 and naked. Exopod 253 long. First segment of the endopod 73 without

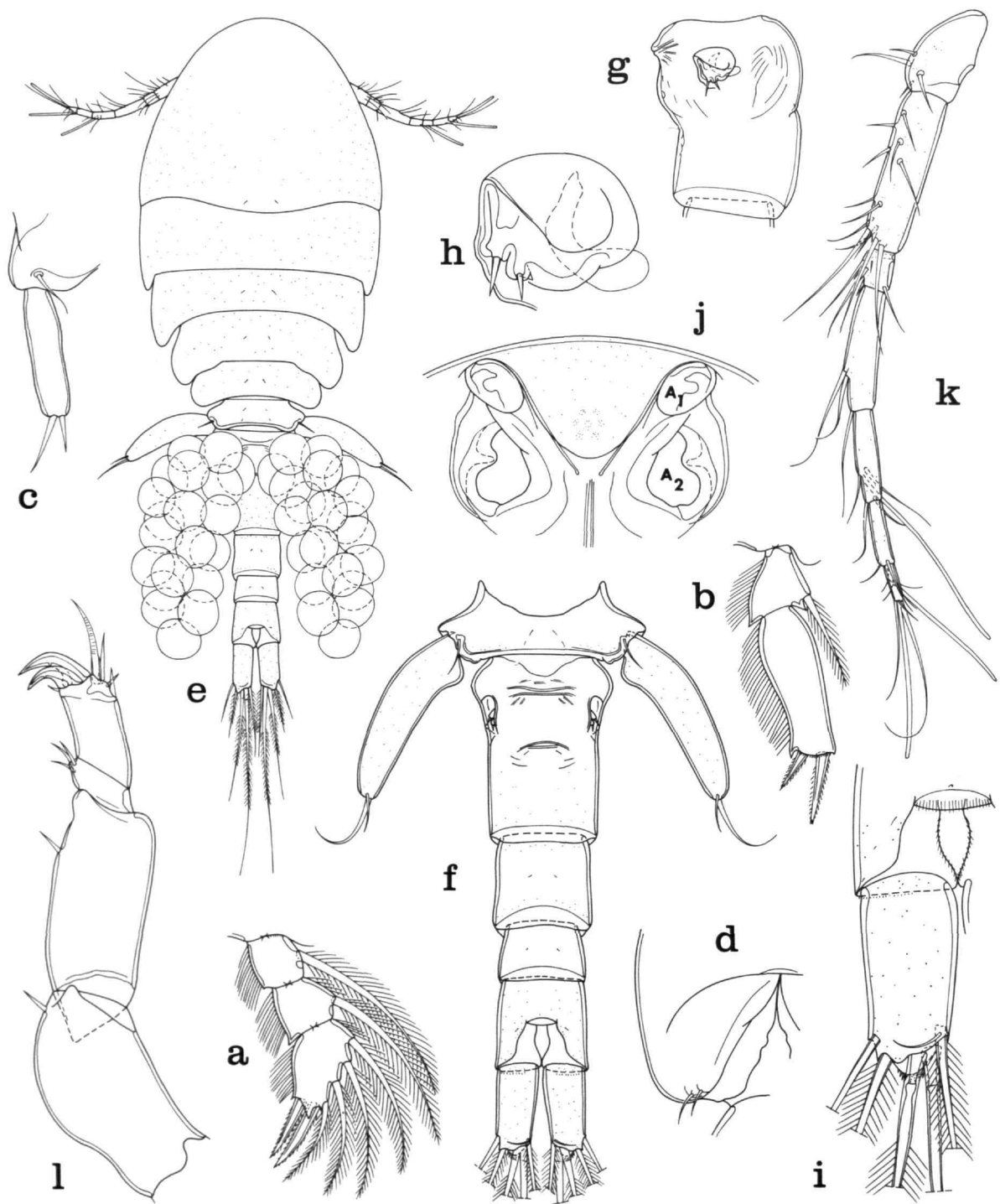


FIGURE 6.—*Metaxymolgus praelongipes*, new species, male: *a*, endopod of leg 1, anterior (D); *b*, endopod of leg 4, anterior (D); *c*, leg 5, dorsal (E); *d*, leg 6, ventral (G). *Metaxymolgus comparatus*, new species, female: *e*, dorsal (A); *f*, urosome, dorsal (B); *g*, genital segment, lateral (B); *h*, genital area, lateral (C); *i*, caudal ramus, dorsal (D); *j*, rostrum, ventral (G); *k*, first antenna, dorsal (G); *l*, second antenna, posterior (D).

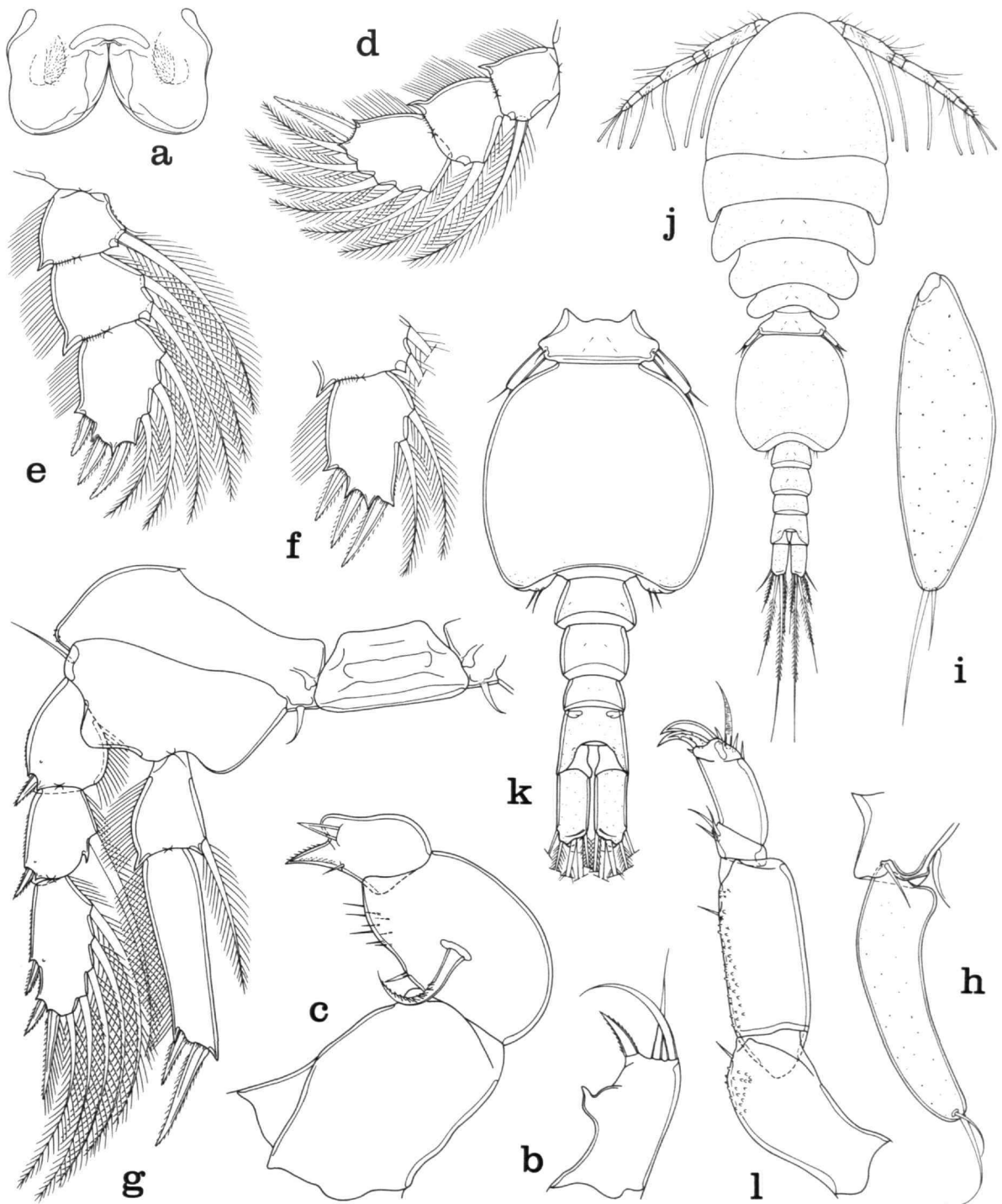


FIGURE 7.—*Metaxymolgus comparatus*, new species. Female: *a*, labrum, with paragnaths indicated by broken lines, ventral (D); *b*, first maxilla, posterior (E); *c*, second maxilla, postero-inner (E); *d*, endopod of leg 1, anterior (D); *e*, endopod of leg 2, anterior (D); *f*, third segment of endopod of leg 3, anterior (D); *g*, leg 4 and intercoxal plate, anterior (D); *h*, leg 5, dorsal (G); *i*, free segment of leg 5, flat ventral view (G). Male: *j*, dorsal (A); *k*, urosome, dorsal (B); *l*, second antenna, posterior (D).

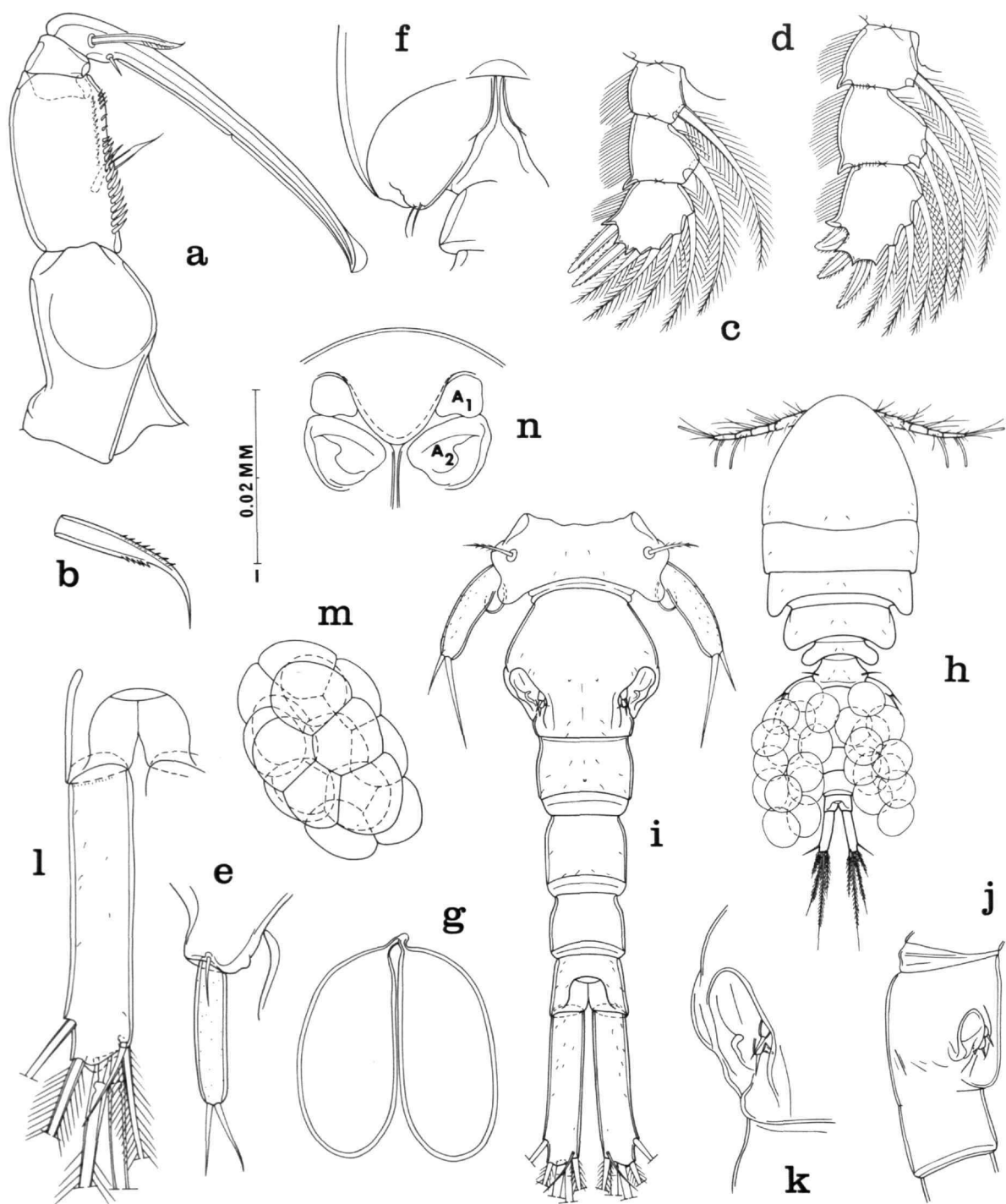


FIGURE 8.—*Metaxymolgus comparatus*, new species, male: *a*, maxilliped, inner (D); *b*, seta on outer surface of second segment of maxilliped, outer (I); *c*, endopod of leg 1, anterior (D); *d*, endopod of leg 2, anterior (D); *e*, leg 5, dorsal (E); *f*, leg 6, ventral (G); *g*, pair of spermatophores, attached to female, dorsal (B). *Metaxymolgus cincinnatus*, new species, female: *h*, dorsal (A); *i*, urosome, dorsal (G); *j*, genital segment, lateral (G); *k*, genital area, dorsal (E); *l*, caudal ramus, dorsal (E); *m*, egg sac, dorsal (B); *n*, rostrum, ventral (G).

the spiniform processes and 55 wide, its distal inner plumose seta 115. Second endopod segment 164 including the processes, 44 in greatest width, 31 in least width. Outer terminal spine 44, inner spine 73.

Leg 5 (Figure 7h) slightly arcuate in dorsal view, the free segment 297 long and 78 wide at the small proximal inner expansion. In a flat ventral view the free segment 352×110 and shaped as in Figure 7i. Two naked terminal setae 153 and 75.

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

Living specimens with the same color as in *M. praelongipes*.

MALE.—Body (Figure 7j) shaped as in *M. praelongipes*. Length 1.75 mm (1.66–1.82 mm) and the greatest width 0.55 mm (0.51–0.58 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.63:1. Ratio of the length of the prosome to that of the urosome 1.13:1.

Segment of leg 5 (Figure 7k) 75×200 . No ventral intersegmental sclerite. Genital segment 374×374 . Four postgenital segments from anterior to posterior 72×127 , 83×109 , 49×101 , and 104×120 .

Caudal ramus similar to that of the female, but smaller, 109 in dorsal length, 117 in ventral length, and 58 wide.

Rostrum as in the female. First antenna like that of the female but three long aesthetes added (Figure 7j), two on segment 2 and one on segment 4. Second antenna (Figure 7l) like that of the female except for small inner spines on the first two segments.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of the female. Maxilliped (Figure 8a) with the claw 200 along its axis. Larger of the two elements on the base of the claw shorter

than in *M. praelongipes* but similarly striated. Seta on the outer surface of the second segment barbed as in Figure 8b.

Legs 1–4 as in the female except for sexual dimorphism in the third endopod segment of legs 1 and 2. Formula for the third endopod segment of leg 1 (Figure 8c) 1,1,4. Three spines on the third endopod segment of leg 2 (Figure 8d) shorter than in the female (female 39, 44, and 55; male 26, 34, and 44 from outer to inner).

Leg 5 (Figure 8e) with a slender free segment 75×18 . Two naked terminal setae 36 and 39.

Leg 6 (Figure 8f) with the two naked setae about 30.

Spermatophore (Figure 8g) attached to the female in pairs, 340×160 , not including the neck.

Color as in the female.

ETYMOLOGY.—The specific name *comparatus* from Latin (= matched or paired) refers to the many similarities between this species and *M. praelongipes*.

COMPARISON WITH RELATED SPECIES.—*Metaxymolgus comparatus*, along with *M. praelongipes*, is larger than any other species in the genus. *M. comparatus* may be distinguished from all other species except *M. praelongipes* by the following features: (1) the elongated female genital segment with small anteriorly located lateral expansions in dorsal view, and (2) the long free segment of the female leg 5 (more than half again as long as in other species).

Several points of distinction between *M. comparatus* and *M. praelongipes* are shown in Table 2.

Aside from the differences which establish the separate identities of the two new species of *Metaxymolgus* from *Xenia*, there are several striking similarities. The two species are, in fact, more like each other in many ways than they are like other species in the genus and may be regarded as paired species.

TABLE 2.—Chief points of distinction between *Metaxymolgus praelongipes* and *Metaxymolgus comparatus*

Characters	<i>M. praelongipes</i>	<i>M. comparatus</i>
Caudal ramus of ♀	177 x 65, ratio 2.72:1	148 x 70, ratio 2.11:1
Claws on second antenna	extremely unequal	subequal
First maxilla	sexually dimorphic	same in both sexes
Spines on third segment of endopod of leg 2	similar in both sexes	sexually dimorphic
Length of free segment of leg 5 in ♀	424 (reaching to first postgenital segment)	297 (not reaching to first postgenital segment)

In the female, *M. praelongipes* and *M. comparatus* have in common: (1) an elongated genital segment with small anteriorly located lateral expansions in dorsal view; (2) a similar mandible; (3) the first maxilla with three terminal elements, one broader than the other two, and a subterminal fingerlike process; (4) a similar second maxilla; (5) a small marginal knob on the third segment of the maxilliped; (6) the inner coxal seta of leg 4 relatively long and naked; and (7) the free segment of leg 5 relatively long, approaching or reaching the first postgenital segment and at least one half again as long as other species in the genus. In the male the two species have: (1) similar sexual dimorphism in the second antenna, and (2) an obliquely striated seta on the proximal part of the claw of the maxilliped.

Metaxymolgus cincinnatus, new species

FIGURES 8*h-n*, 9, 10, 11*a-i*

TYPE MATERIAL.—94 ♀♀, 139 ♂♂ from one colony of the alcyonacean *Cladiella pachyclados* (Klunzinger), in 0.5 m, Isle aux Serpents, near Noumea, New Caledonia, 26°16'52"S, 166°25'12"E, 19 July 1971. Holotype ♀, allotype, and 225 paratypes (90 ♀♀, 135 ♂♂) deposited in the National Museum of Natural History (under USNM numbers), Washington; the remaining paratypes (dissected) in the collection of the author.

OTHER SPECIMENS (all from *Cladiella pachyclados*).—3 ♀♀, 2 ♂♂, from one colony, in 2 m, north of Rocher à la Voile, Noumea, 22°18'24"S, 166°25'50"E, 28 June 1971; 19 ♀♀, 17 ♂♂, from one colony and 4 ♂♂ from another colony, in 1 m, west of Isle To N'du, near Noumea, 22°10'42"S, 166°16'30"E, 29 June; 10 ♀♀, 37 ♂♂ from one colony, in 2 m, west of Isle Ngou, near Noumea, 22°13'44"S, 166°23'01"E, 29 July.

FEMALE.—Body (Figure 8*h*) rather slender, with the prosome not unusually thickened dorsoventrally. Length 1.46 mm (1.34–1.63 mm) and the greatest width 0.49 mm (0.47–0.54 mm), based on 10 specimens. Segment of leg 1 separated from the head by a dorsal transverse furrow. Epimera of the segments of legs 1–4 variously rounded posteriorly. Ratio of the length to the width of the prosome 1.70:1. Ratio of the length of the prosome to that of the urosome 1.23:1.

Segment of leg 5 (Figure 8*i*) 100 × 180, with a rounded lobe overhanging the proximal inner part of the free segment of leg 5. Between this segment and the genital segment no ventral sclerite. Genital segment elongated, in dorsal view 234 long, 166 wide in the expanded anterior two-thirds and 105 wide posterior to the transverse sclerotization. This dorsal subdivision of the segment not evident laterally or ventrally (Figure 8*j*). Genital areas located dorsolaterally in the posterior half of the expanded anterior part of the segment. Each area (Figure 8*k*) bearing two small naked setae, 8 and 11, with an adjacent minute spiniform process. Three postgenital segments from anterior to posterior 91 × 91, 65 × 83, and 65 × 83. Posteroventral border of the anal segment with a row of minute spinules on both sides.

Caudal ramus (Figure 8*l*) elongated, 169 × 35, with the ratio of length to width 4.83:1. Outer lateral seta 86 and naked. Dorsal seta 55 and naked. Outermost terminal seta 120, innermost terminal seta 164, and the two median terminal setae 265 (outer) and 375 (inner), both inserted between dorsal (smooth) and ventral (with minute marginal spinules) flanges. All four terminal setae plumose.

Body surface with a few small hairs (sensilla).

Egg sac with approximately 15 eggs arranged loosely as in Figure 8*h* (size of right sac 506 × 220) or more compactly as in Figure 8*m* (size 385 × 253). Egg diameter about 117.

Rostrum (Figure 8*n*) broadly rounded in ventral view; in lateral view (Figure 9*a*) slightly projected.

First antenna (Figure 9*b*) 427 long. Lengths of the seven segments: 35 (67 along the anterior margin), 118, 31, 68, 65, 47, 31 respectively. Armature as in *M. praelongipes*. All setae naked.

Second antenna (Figure 9*c*) 4-segmented and 265 long, with the formula 1,1,3, and II + 5. Fourth segment 88 along the outer side, 57 along the inner side and 31 wide. Two terminal claws very unequal, larger claw 55 along its axis, smaller claw 13. All setae naked.

Labrum (Figure 9*d*) with two rounded posteroventral lobes with hyaline margins. Mandible (Figure 9*e*) with its convex margin having a scalelike area with 5–6 dentiform spines followed by a serrated fringe; with its concave margin beyond the indentation bearing a row of slender spinules. Lash long and barbed. Paragnath (Figure 9*d*) a small lobe with slender spinules. First maxilla (Figure

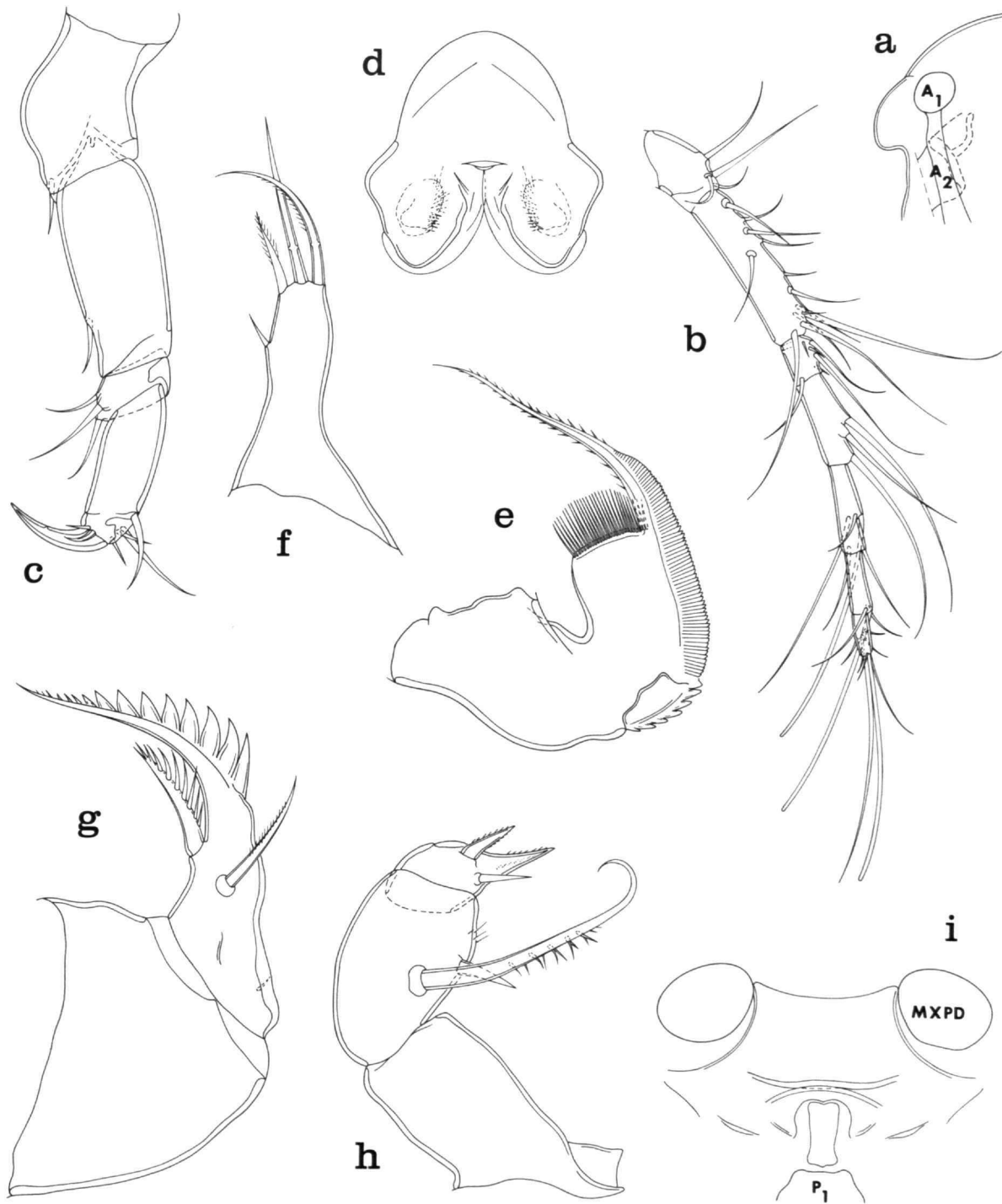


FIGURE 9.—*Metaxymolgus cincinnatus*, new species, female: *a*, rostrum, lateral (G); *b*, first antenna, dorsal (D); *c*, second antenna, posterior (E); *d*, labrum, with paragnaths indicated by broken lines, ventral (E); *e*, mandible (F); *f*, first maxilla, anterior (F); *g*, second maxilla, posterior (F); *h*, maxilliped, posterior (C); *i*, area between maxillipeds and first pair of legs, ventral (D).

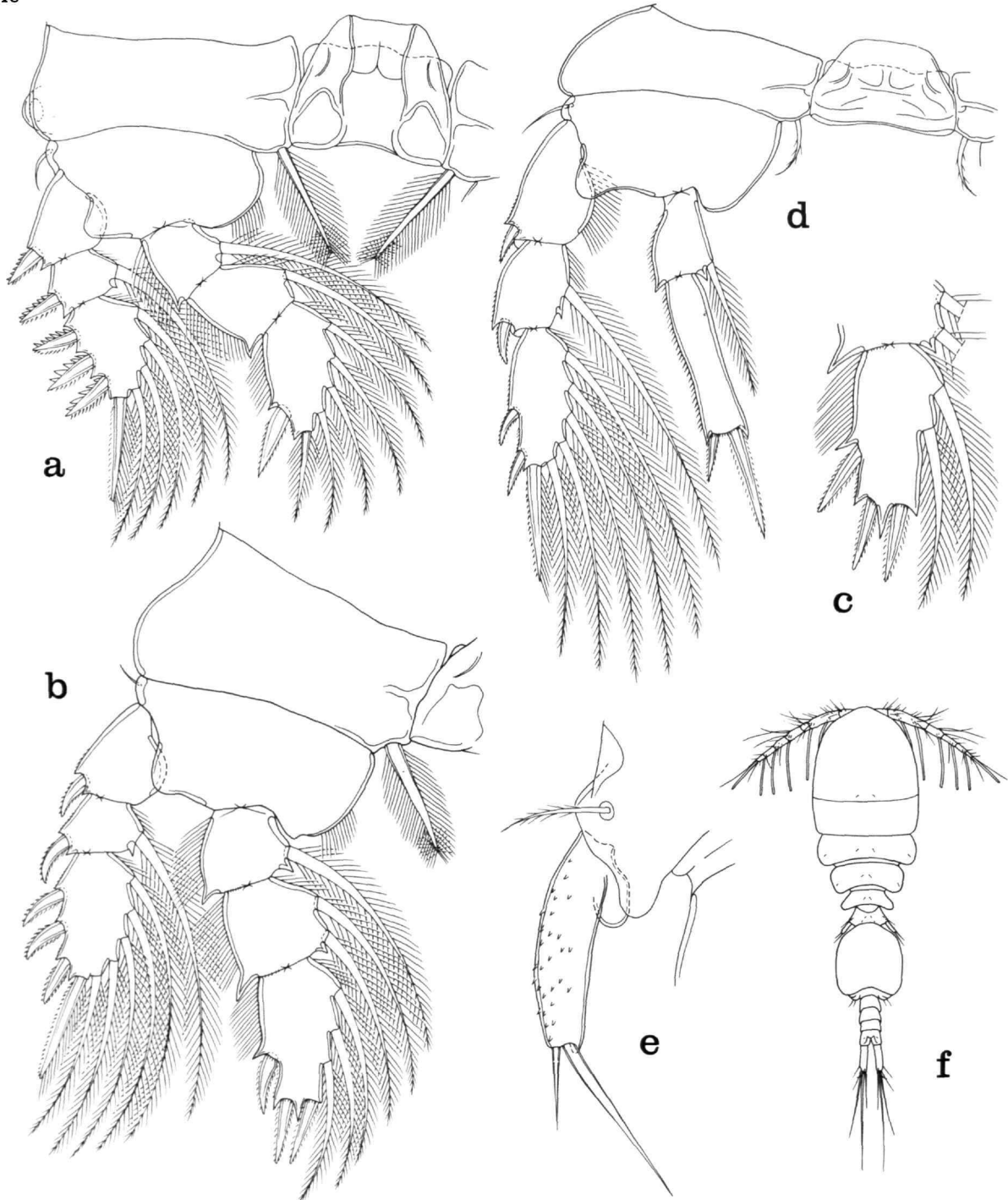


FIGURE 10.—*Metaxymolgus cincinnatus*, new species, female: *a*, leg 1 and intercoxal plate, anterior (E); *b*, leg 2, anterior (E); *c*, third segment of endopod of leg 3, anterior (E); *d*, leg 4 and intercoxal plate, anterior (E); *e*, leg 5, dorsal (E). *Metaxymolgus cincinnatus*, new species, male: *f*, dorsal (A).

9f) with four elements. Second maxilla (Figure 9g) 2-segmented. First segment unornamented. Second segment armed with a small setule on its proximal outer (ventral) surface, a surficial posterior seta finely barbed along one edge, and an inner (dorsal) distal spine with a row of conspicuous spinules unilaterally. This segment produced to form a lash with graded marginal teeth along one side. Maxilliped (Figure 9h) 3-segmented. First segment unornamented. Second segment with a group of small slender spinules and two very unequal setae, the larger seta with two short rows of spinules. Third segment with a smooth seta, a finely barbed spine, and a terminal barbed spiniform process.

Area between the maxillipeds and the first pair of legs (Figure 9i) only slightly protuberant.

Legs 1-4 (Figure 10a-d) segmented and armed as in other species in the genus. Coxa of leg 1 with an outer prominence on its posterior surface (Figure 10a). Inner coxal seta in legs 1-3 with its tip strongly curled posteriorly. Leg 4 (Figure 10d) with the inner coxal seta 30, lightly plumose, and not curled posteriorly as in the preceding legs. Inner margin of the basis smooth. Exopod 180 long. First segment of the endopod 44 long, not including the spiniform processes and 31 wide, its distal inner plumose seta 75. Second endopod segment 85 long without the processes, 22 in greatest width, 19 in least width; outer terminal spine 29, inner spine 60, both barbed. In another female these spines 31 and 69. Outer margins of both endopod segments with a row of short spinules instead of long hairlike spinules as in legs 1-3.

Leg 5 (Figure 10e) scarcely reaching to the genital areas. Free segment 117×44 , the width taken at the rounded proximal inner expansion. Two smooth terminal elements 30 and 101. Dorsal seta on the body near the insertion of the free segment 52 and lightly feathered. Free segment ornamented dorsally and outwardly with small spines.

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

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

MALE.—Body (Figure 10f) slender. Length 1.25 mm (1.18-1.34 mm) and the greatest width 0.35 mm (0.33-0.37 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.88:1.

Ratio of the length of the prosome to that of the urosome 1.20:1.

Segment of leg 5 (Figure 11a) 52×107 . No ventral intersegmental sclerite. Genital segment elongated 265×216 . Four postgenital segments from anterior to posterior 44×75 , 49×70 , 36×65 , and 40×65 .

Caudal ramus resembling that of the female, but smaller, 114×30 .

Body surface sparsely ornamented as in the female.

Rostrum as in the female. First antenna resembling that of the female but three long aesthetes added (Figure 10f), two on segment 2 and one on segment 4. Second antenna (Figure 11b) with the first and second segments bearing inwardly two rows of short stout spines and a pectinate seta; otherwise this appendage similar to that in the female.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those in the female. Maxilliped (Figure 11c) with the first and third segments unarmed. Second segment bearing two setae, one of them smooth, the other pectinate along one side, and two rows of spines. Claw 228 along its axis including the terminal lamella, weakly divided about midway, and bearing proximally two very unequal setae. Larger of these two setae 62 with a slightly expanded and bilaterally spinulose distal portion, the ratio of its length to the length of the claw 1:3.66.

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

Legs 1-4 segmented as in the female and similarly armed except for the third segment of the endopod of leg 1 (Figure 11d-e) where the formula is I,1,4 instead of I,5 as in the female. Sexual dimorphism also evident in the third segment of the endopod of leg 2 (Figure 11f) where, although the formula is the same as in the female, the terminal spiniform processes and the fine ornamentation are distinctive. Leg 3 without sexual dimorphism. Dimensions of the endopod of leg 4 (Figure 11g): first segment 34 long, not including the spiniform processes, and 25 wide, with the distal inner seta 82; second segment 60 without the processes, 19 in greatest width, 14 in least width, with the outer terminal spine 33, the inner spine 69. In other respects legs 1-4 resembling those of the female.

Leg 5 (Figure 11h) with the free segment $44 \times$

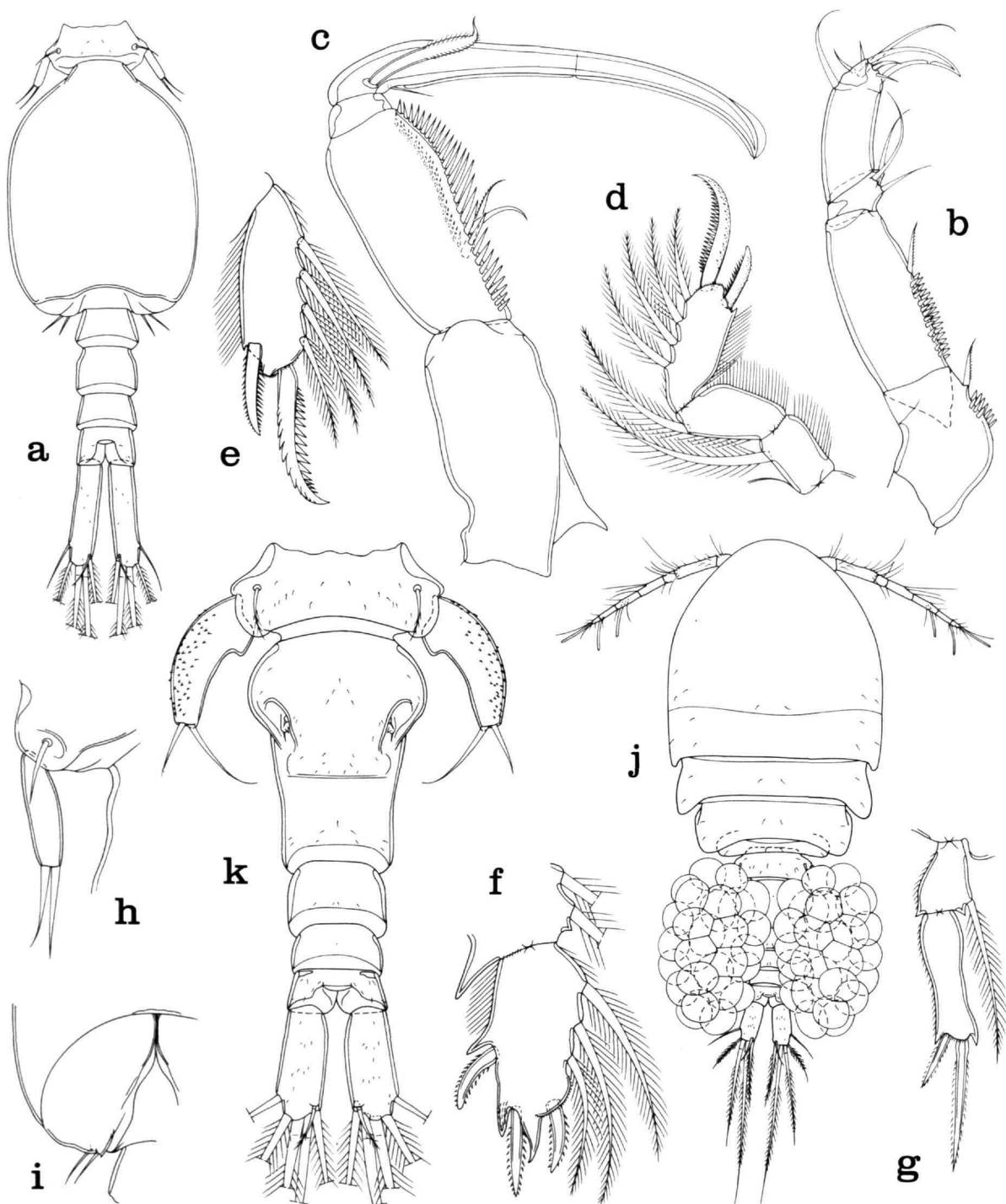


FIGURE 11.—*Metaxymolgus cincinnatus*, new species, male: *a*, urosome, dorsal (G); *b*, second antenna, posterior (E); *c*, maxilliped, outer (E); *d*, endopod of leg 1, anterior (E); *e*, third segment of endopod of leg 1, posterior (C); *f*, third segment of endopod of leg 2, anterior (C); *g*, endopod of leg 5, anterior (E); *h*, leg 5, dorsal (C); *i*, leg 6, ventral (D). *Metaxymolgus mimicus*, new species, female: *j*, dorsal (A); *k*, urosome, dorsal (G).

12, without fine ornamentation; the two terminal setae 35 and 41.

Leg 6 (Figure 11i) the usual posteroventral flap on the genital segment, bearing two naked setae 34 and 29.

Spermatophore not observed.

Color in living specimens like that of the female.

ETYMOLOGY.—The specific name *cincinnatus* from Latin (= having curled hair) alludes to the curled inner coxal setae on legs 1–3.

COMPARISON WITH RELATED SPECIES.—*Metaxymolgus cincinnatus* may be separated from other species in the genus by two easily recognizable features. The caudal ramus in the female is relatively longer (ratio 4.83:1) than in any other species except *M. micropus* Humes, 1973a (ratio 4.84:1), an associate of the basket star *Astroboa nuda* (Lyman) in Madagascar. The minute leg 5 of *M. micropus* (11 × 11) distinguishes it immediately, however, from the new species.

The extremely unequal claws on the second antenna in both sexes distinguish the new species from all others in the genus except *M. echinasteris* Humes, in press, associated with the sea star *Echinaster luzonicus* (Gray) in New Caledonia, and *M. praelongipes* Humes, described above. In contrast to *M. cincinnatus*, however, these two species have in the female an undivided genital segment of a different configuration.

Although the exact nature of the inner coxal seta in legs 1–3 is not known in several species, the curled tip of this seta seen in *M. cincinnatus* seems distinctive.

Metaxymolgus mimicus, new species

FIGURES 11j–k, 12, 13

TYPE MATERIAL.—15 ♀♀, 12 ♂♂ from one colony of *Cladiella pachyclados* (Klunzinger), in 0.5 m, Isle aux Serpents, near Noumea, New Caledonia, 22°16'52"S, 166°25'12"E, 19 July 1971. (This is the same colony from which *Metaxymolgus cincinnatus* was recovered.) Holotype ♀, allotype, and 19 paratypes (11 ♀♀, 8 ♂♂) deposited in the National Museum of Natural History (under USNM numbers), Washington; the remaining paratypes (dissected) in the collection of the author.

OTHER SPECIMENS (all from *Cladiella pachyclados*).—2 ♂♂, 1 copepodid from one colony, in 2 m,

north of Rocher à la Voile, Noumea, 22°18'24"S, 166°25'50"E, 28 June 1971; 2 ♀♀, 2 ♂♂ from one colony, in 1 m, Isle aux Serpents, west of Pte. Denouel, near Noumea, 22°16'52"S, 166°25'12"E, 19 July; 2 ♀♀, 8 ♂♂ from one colony and 5 ♀♀, 14 ♂♂ from another colony, in 1 m, west of Isle To N'du, near Noumea, 22°10'42"S, 166°16'30"E, 29 June; 4 ♀♀, 52 ♂♂ from one colony, in 2 m, west of Isle Ngou, near Noumea, 22°13'44"S, 166°23'01"E, 29 July.

FEMALE.—Body (Figure 11j) with a slightly broader prosome than in *M. cincinnatus*. Length 1.59 mm (1.50–1.73 mm) and the greatest width 0.61 mm (0.58–0.64 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 5 (Figure 11k) 104 × 238, with a broad lobe overhanging the base of the free segment of leg 5. Between this segment and the genital segment no ventral sclerite. Genital segment elongated, in dorsal view 252 long, 200 wide in the expanded anterior third and 125 wide posterior to the transverse sclerotization. This dorsal subdivision of the segment absent laterally and ventrally. Genital areas located dorsolaterally just posterior to the widest part of the segment. Each area (Figure 12a) with two small naked seta about 11 and a minute spiniform process. Three postgenital segments from anterior to posterior 73 × 114, 44 × 105, and 44 × 117. Posteroventral border of the anal segment with a row of very small spinules on both sides.

Caudal ramus (Figure 12b) 130 × 55, with the ratio of length to width 2.36:1. Outer lateral seta 122 and naked. Dorsal seta 55 and sparsely feathered. Outermost terminal seta 170, innermost terminal seta 225, and the two median terminal setae 390 (outer) and 550 (inner), both inserted between dorsal (smooth) and ventral (with small marginal spinules) flanges. All four terminal setae plumose.

Body surface with small hairs (sensilla) as in Figure 11j.

Egg sac (Figure 11j) elongated oval, 572 × 341, reaching nearly to the ends of the caudal rami and containing about 47 eggs approximately 105 in diameter.

Rostrum (Figure 12c) rounded posteroventrally.

First antenna 507 long and having the same armature as in *M. cincinnatus*. Lengths of the seven

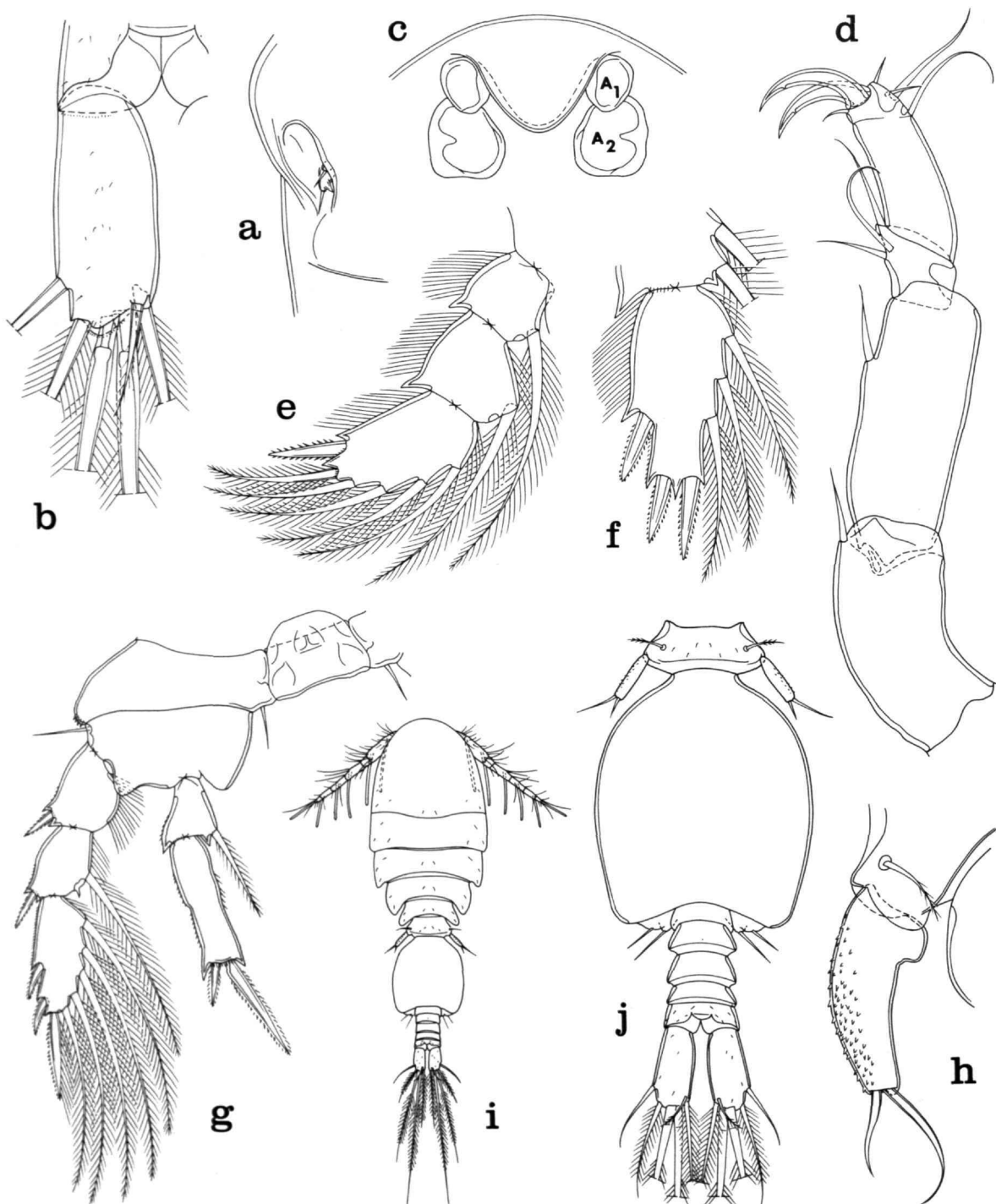


FIGURE 12.—*Metaxymolgus mimicus*, new species, female: a, genital area, dorsal (E); b, caudal ramus, dorsal (E); c, rostrum, ventral (G); d, second antenna, posterior (E); e, endopod of leg 1, anterior (E); f, third segment of endopod of leg 2, anterior (E); g, leg 4 and intercoxal plate, anterior (D); h, leg 5, dorsal (D). *Metaxymolgus mimicus*, new species, male: i, dorsal (A); j, urosome, dorsal (G).

segments: 36 (83 along the anterior margin, 135, 35, 75, 81, 66, and 32 respectively).

Second antenna (Figure 12d) generally similar to that of *M. cincinnatus*, but the two terminal claws unequal, both 54 along their axes. Fourth segment 99 along the outer side, 63 along the inner side, and 31 wide.

Labrum, mandible, paragnath, first maxilla, second maxilla, maxilliped, and the ventral area between the maxillipeds and the first pair of legs resembling those in *M. cincinnatus*.

Legs 1-4 similar to those of *M. cincinnatus* except that the inner coxal seta of legs 1-3 has a straight tip, not curled posteriorly and the exopod spines of legs 1-3 have less strongly developed spinous fringes. Endopod of leg 1 (Figure 12e) with the outer terminal seta on the third segment slightly stronger than the other four setae (as in *M. cincinnatus*). Third segment of the endopod of leg 2 as in Figure 12f. Leg 4 (Figure 12g) with a naked inner coxal seta 35. Exopod 208 long. First endopod segment 44, not including the spiniform processes, and 39 wide, with its inner distal plumose seta 73. Second endopod segment 99 long without the processes, 34 in greatest width, and 25 in least width; outer terminal spine 34, inner spine 82, both barbed. Outer margins of both endopod segments with minute spinules as in *M. cincinnatus*. Second endopod segment having a few inner hairs and, in some specimens, a small outer marginal notch.

Leg 5 (Figure 12h) with the free segment 161 long and 70 wide at the basal inner expansion. Two naked terminal setae 60 and 94. Dorsal seta on the body near the insertion of the free segment about 50 and lightly feathered. Free segment ornamented dorsally and outwardly with small spines.

Leg 6 represented by the two setae on the genital area (Figure 12a).

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

MALE.—Body (Figure 12i) slender. Length 1.14 mm (1.08-1.22 mm) and the greatest width 0.37 mm (0.34-0.39 mm), based on 10 specimens. Ratio of the length to the width of the prosome 1.73:1. Ratio of the length of the prosome to that of the urosome 1.30:1.

Segment of leg 5 (Figure 12j) 55 × 130. No ventral intersegmental sclerite. Genital segment longer than wide, 286 × 242. Four postgenital segments

from anterior to posterior 36 × 78, 34 × 78, 21 × 75, and 26 × 83.

Caudal ramus resembling that of the female, but smaller, 91 × 43.

Body surface ornamented as in the female.

Rostrum as in the female. First antenna like that of the female but three long aesthetes added (Figure 12i) as in the male of *M. cincinnatus*. Second antenna (Figure 13a) showing sexual dimorphism similar to that in *M. cincinnatus*.

Labrum, mandible, paragnath, first maxilla, and second maxilla like those of the female. Maxilliped (Figure 13b) similar to that of *M. cincinnatus*, but the larger of the two setae on the proximal part of the claw relatively longer, 91, the ratio of its length to the length of the claw 1:2.62. Length of the claw 234.

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

Legs 1-4 segmented and armed as in the female except for the third segment of the endopod of leg 1 (Figure 13c) where the formula is I,1,4 instead of 1,5 as in the female. A spiniform process between the two spines. Sexual dimorphism in the third endopod segment of leg 2 (Figure 13d), the process between the two terminal spines with a peculiar digitiform extension. Leg 3 lacking sexual dimorphism. Dimensions of the endopod of leg 4 (Figure 13e): first segment 32 long, not including the spiniform processes, with the distal inner seta 55; second segment 64 without the processes, 22 in greatest width, 17 in least width, with the outer terminal spine 27, the inner spine 66. Second segment lacking an outer marginal notch.

Leg 5 (Figure 13f) with the free segment 57 × 15, with small outer spinules; the two terminal naked setae 57 and 20 and the sparsely plumose dorsal seta near the insertion of the segment about 40.

Leg 6 (Figure 13g) the usual posteroventral flap on the genital segment, bearing two naked setae 36 and 52.

Spermatophore not observed.

Color in living specimens like that of the female.

ETYMOLOGY.—The specific name *mimicus* from Latin (= imitative) refers to the many similarities of this species to *M. cincinnatus*.

COMPARISON WITH OTHER SPECIES.—The elongated dorsally divided female genital segment distinguishes *Metaxymolgus mimicus* from all other

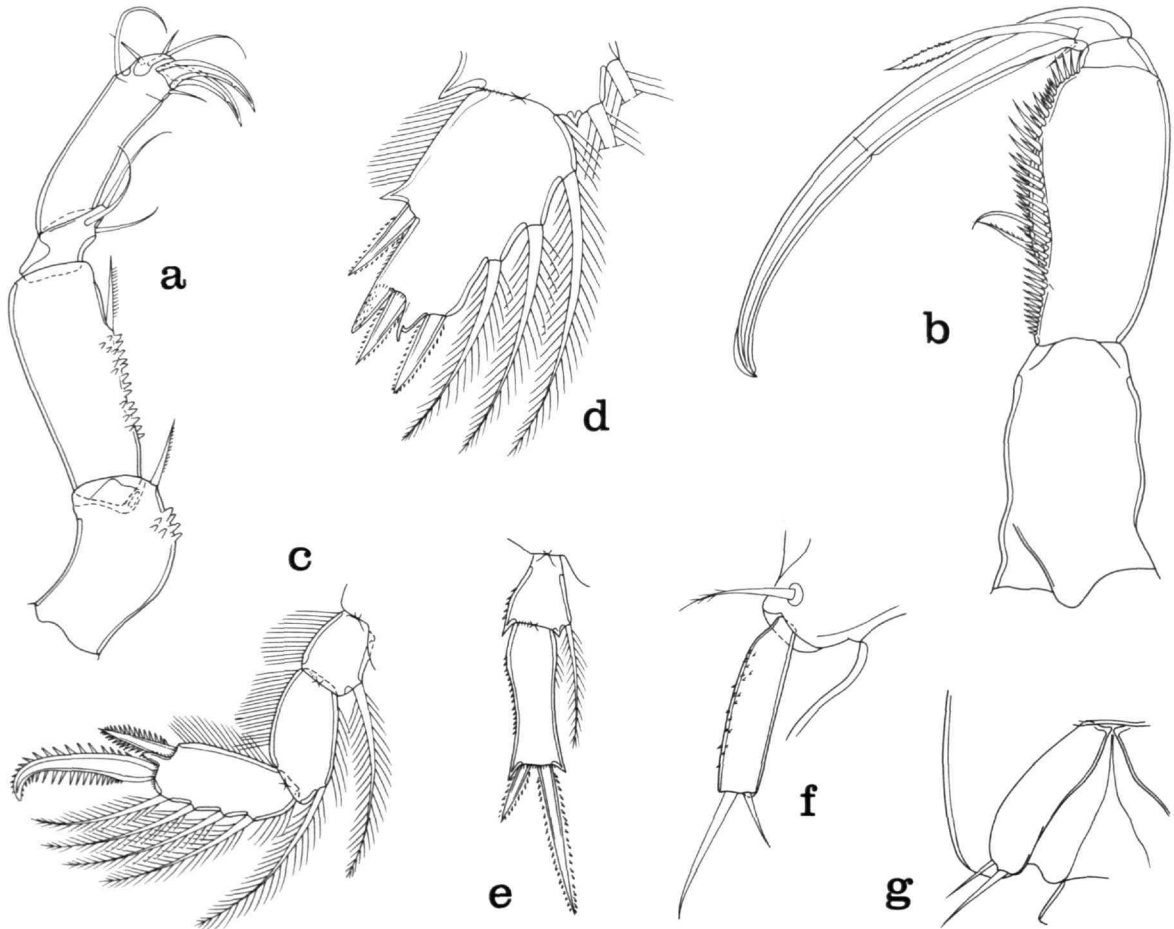


FIGURE 13.—*Metaxymolgus mimicus*, new species, male: a, second antenna, posterior (E); b, maxilliped, inner (E); c, endopod of leg 1, anterior (E); d, third segment of endopod of leg 2, anterior (C); e, endopod of leg 4, anterior (E); f, leg 5, dorsal (C); g, leg 6, ventral (D).

species in the genus except *M. hirsutipes* (T. Scott, 1893) and *M. cincinnatus*. The new species may be separated from *M. hirsutipes* chiefly by details of the mandible, maxilliped, and leg 5, and from *M. cincinnatus* by the features indicated in Table 3.

Although the two species are clearly distinct, there are many similarities between them. Conspicuous among these are the elongated female genital segment with a dorsal subdivision, the form of the mouthparts, the outer terminal seta on the third segment of the endopod of leg 1 being slightly stronger than the other, the outer margins of the two segments of the endopod of leg 4 having short

spinules instead of long hairlike spinules, the free segment of leg 5 in the female having a prominent inner proximal expansion, the sexual dimorphism in the second antenna of the male, the nature of the large proximal seta on the claw of the maxilliped, and the sexual dimorphism in the endopod of leg 1.

Metaxymolgus mimicus and *M. cincinnatus* resemble each other more closely than they do other species in the genus, and represent a pair of species associated with a single host species.

PAIRED SPECIES ASSOCIATED WITH A SINGLE HOST SPECIES.—Several instances are known where pairs

TABLE 3.—Comparison of certain features of *Metaxymolgus mimicus* and *M. cincinnatus*

Characters	<i>M. mimicus</i>	<i>M. cincinnatus</i>
Caudal ramus	♀ = 2.36:1 ♂ = 2.12:1	♀ = 4.83:1 ♂ = 3.80:1
Claws on second antenna	equal size	very unequal size
Inner coxal seta on legs 1-3	tip straight	tip curled posteriorly
Ratio of length of larger proximal seta on ♂ maxilliped claw to length of claw	1:2.62	1:3.66
Process between two terminal spines on third segment of ♂ leg 2 endopod	with a digitiform process	smoothly attenuated

of species of lichomolgid copepods are associated with one host genus. *Paramolgus constrictus* (Humes, 1969) and *Paramolgus insectus* (Humes, 1969) occur on the antipatharian genus *Antipathes*. *Paramolgus politus* (Humes and Ho, 1967b) and *Paramolgus simulans* (Humes and Ho, 1967b) live with the actiniarian *Rhodactis rhodostoma* (Ehrenberg). *Plesiomolgus organicus* (Humes and Ho, 1967a) and *Plesiomolgus conjunctus* (Humes and Ho, 1967a) are associated with the stoloniferan *Tubipora musica* (Linnaeus). *Metaxymolgus praelongipes* and *Metaxymolgus comparatus*, both described above, occur with the alcyonacean *Xenia membranacea* Schenk.

The explanation for such pairing of species would seem to lie in the evolutionary history of the association between the copepods and the hosts. Presumably in each of these pairs of copepods an ancestral copepod associate, confronted by some kind of barrier inhibiting free genetic exchange throughout the population, evolved into two forms now sufficiently distinct to be recognized as separate species but retaining a number of characteristics in common. Such an evolution is suggested by the interpretation by Bocquet, Stock, and Louise (1963) of speciation in *Asterocheres* on regular echinoids in the Mediterranean Sea and on the Atlantic coast of Europe.

New Records and Hosts

(New hosts are preceded by an asterisk)

Acanthomolgus varirostratus (Humes and Ho, 1968b)

Acanthomolgus exilipes (Humes and Ho, 1968b)

Acanthomolgus gentilis (Humes and Ho, 1968b)

From *Dendronephthya mucronata* (Pütter): many specimens from one colony, in 1.5 m, Rocher à la Voile, Noumea, 22°18'24"S, 166°25'50"E, 13 June 1971; many specimens from 5 colonies, in 4 m, Ricaudy Reef, 22°19'05"S, 166°26'28"E, 28 July.

These three species have been previously known only from Madagascar (Humes and Stock, 1973).

Anisomolgus insolens (Humes and Ho, 1968a)

From *Lobophytum crassum* Von Marenzeller: 1 ♀, 3 ♂♂ from one colony, intertidal, on reef 5 km south of Yaté, southeastern New Caledonia, 22°11'00"S, 166°59'00"E, 23 June 1971.

This species has been recorded from both Madagascar (Humes and Stock, 1973) and Eniwetok Atoll (Humes, 1973b).

Anisomolgus protentus (Humes and Frost, 1964)

From **Sarcophyton elegans* Moser: many specimens from one colony, in 2 m, west of Isle Mando, near Noumea, 22°18'59"S, 166°09'30"E, 1 July 1971.

This species has until now been reported only from Madagascar (Humes and Stock, 1973).

Colobomolgus dentipes (Thompson and A. Scott, 1903)

From **Sinularia polydactyla* (Ehrenberg): many specimens including copepodids from one colony, in 2 m, west of Isle Mando, near Noumea, 22°18'59"S, 166°09'30"E, 1 July 1971.

This species has previously been reported from

Ceylon (Thompson and A. Scott, 1903) and Madagascar (Humes and Stock, 1973).

Metaxymolgus aculeatus (Humes and Ho, 1968b)

From **Stereonephthya inordinata* (Tixier-Durivault): 36 ♀♀, 47 ♂♂, from one colony in 30 m, outside Récif Mtere, west of Noumea, 22°20'40"S, 166°13'55"E, 23 July 1971.

This species is known from both Madagascar (Humes and Stock, 1973) and Eniwetok Atoll (Humes, 1973b).

Metaxymolgus spinulifer (Humes and Frost, 1964)

From *Paralemnalia thyrsoidea* (Ehrenberg): 4 ♀♀, 1 ♂ from one colony, in 3 m, eastern side of Isle Maître, near Noumea, 22°20'35"S, 166°25'10"E, 8 June 1971.

From *Lemnalia elegans* (May): 17 ♀♀, 10 ♂♂ from one colony, in 3 m, north of Isle Maître, 22°19'30"S, 166°24'35"E, 13 July 1971.

This species has been previously known only from Madagascar (Humes and Stock, 1973).

Paradoridicola sinulariae Humes and Stock, 1973

From **Sinularia flexibilis* (Quoy and Gaimard): 198 ♀♀, 304 ♂♂, 134 copepodids from one colony, in 3 m, west of Isle Mando, near Noumea, 22°18'59"S, 166°09'30"E, 15 July 1971.

This species has been previously known only from Madagascar (Humes and Stock, 1973).

Paradoridicola squamiger (Humes and Frost, 1964)

Paradoridicola adelphus (Humes and Ho, 1968a)

From *Sinularia polydactyla* (Ehrenberg): many specimens from one colony, in 0.5 m, Ricaudy Reef, 22°19'05"S, 166°26'28"E, 5 June 1971; many specimens from one colony, in 2 m, western side of Isle Maître, near Noumea, 22°20'05"S, 166°24'05"E, 11 June; few specimens from one colony, in 2 m, eastern side of Ricaudy Reef, Noumea, 22°19'00"S, 166°27'18"E, 18 June; many specimens from one colony, in 0.5 m, Isle To N'du near Noumea, 22°10'42"S, 166°16'30"E, 29 June; many specimens from one colony, in 1 m, west of Isle Mando, near

Noumea, 22°18'59"S, 166°09'30"E, 1 July; few adults, more than 400 copepodids from one colony, in 1 m, east of Isle To N'du, near Noumea, 22°10'49"S, 166°17'12"E, 12 July; many specimens from one colony, in 1 m, west of Isle Mando, 22°18'59"S, 166°09'30"E, 12 July; many specimens from one colony, in 0.5 m, west of Paita, northwest of Noumea, 22°07'10"S, 166°12'00"E, 22 July; many specimens from one colony, in 20 cm, intertidal, eastern end of Isle Maître, 22°20'35"S, 166°25'10"E, 31 July.

Paradoridicola squamiger has been known only from Madagascar, but *P. adelphus* has been reported from both Madagascar (Humes and Stock, 1973) and Eniwetok Atoll (Humes, 1973b).

Paramolgus clavatus (Humes and Ho, 1968c)

From **Stereonephthya inordinata* (Tixier-Durivault): 1 ♀ from the above-mentioned colony with which *Metaxymolgus aculeatus* was associated.

This species has previously been known only from Madagascar (Humes and Stock, 1973).

Paramolgus eniwetokensis Humes, 1973b

From **Lobophytum crassum* Von Marenzeller: 1 ♀ from the above-mentioned colony with which *Anisomolgus insolens* was associated.

This species has been reported only from Eniwetok Atoll (Humes, 1973b).

Paramolgus spathophorus (Humes and Ho, 1968a)

Paramolgus eniwetokensis Humes, 1973b

Anisomolgus insolens (Humes and Ho, 1968a)

From **Lobophytum crebriplacatum* Von Marenzeller: many specimens from one colony, in 2 m, north of Rocher à la Voile, Noumea, 22°18'24"S, 166°25'50"E, 28 June 1971; many specimens from one colony in 2 m, Rocher à la Voile, 19 June; many specimens (not including *A. insolens*) from one colony in 3 m, eastern side of Isle Maître, near Noumea, 22°20'35"S, 166°25'45"E, 8 June.

Paramolgus eniwetokensis has been reported from Eniwetok Atoll (Humes, 1973b), *P. spathophorus*

from Madagascar (Humes and Stock, 1973) and *A. insolens* from both Madagascar (Humes and Stock, 1973) and Eniwetok Atoll (Humes, 1973b).

Paredromoligus decorus (Humes and Frost, 1964)

From **Cladiella pachyclados* (Klunzinger): 22 ♀ ♀, 15 ♂ ♂ from one colony, in 0.5 m, Isle aux Serpents, west of Pointe Denouel, near Noumea, 22°16'52"S, 166°25'12"E, 19 July 1971; 11 ♀ ♀,

9 ♂ ♂ from one colony, in 2 m, north of Rocher à la Voile, Noumea, 22°18'24"S, 166°25'50"E, 28 June; 32 ♀ ♀, 26 ♂ ♂ from one colony, in 1 m, Isle aux Serpents, west of Pointe Denouel, near Noumea, 22°16'52"S, 166°25'12"E, 19 July; 4 ♀ ♀ from one colony and 50 ♀ ♀, 30 ♂ ♂ from a second colony in 1 m, west of Isle To N'du, near Noumea, 22°10'42"S, 166°16'30"E, 29 June.

This species until now has been reported only from Madagascar (Humes and Stock, 1973).

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