

# BEAUFORTIA

SERIES OF MISCELLANEOUS PUBLICATIONS  
INSTITUTE OF TAXONOMIC ZOOLOGY (ZOOLOGICAL MUSEUM)  
UNIVERSITY OF AMSTERDAM

No. 282

Volume 21

December 28, 1973

## Cyclopoid copepods (Lichomolgidae) from octocorals at Eniwetok Atoll

ARTHUR G. HUMES

### ABSTRACT

This report of lichomolgid copepods found for the first time associated with octocorals in the Pacific Ocean includes six species, two of them new. *Paramoligus eniwetokensis* n. sp. and *Paramoligus ostentus* n. sp. are associated with *Lobophytum pauciflorum* (Ehrenberg). New host records include *Acanthomoligus fissisetiger* (Humes & Ho, 1968a) from *Pachyclavularia violacea* (Quoy & Gaimard), *Anisomoligus insolens* (Humes & Ho, 1968b) from *Lobophytum pauciflorum*, *Metaxymoligus aculeatus* (Humes & Ho, 1968a) from *Nephthea chabrolii* Audouin, and *Paradoridicola adelphus* (Humes & Ho, 1968b) from *Lobophytum pauciflorum*.

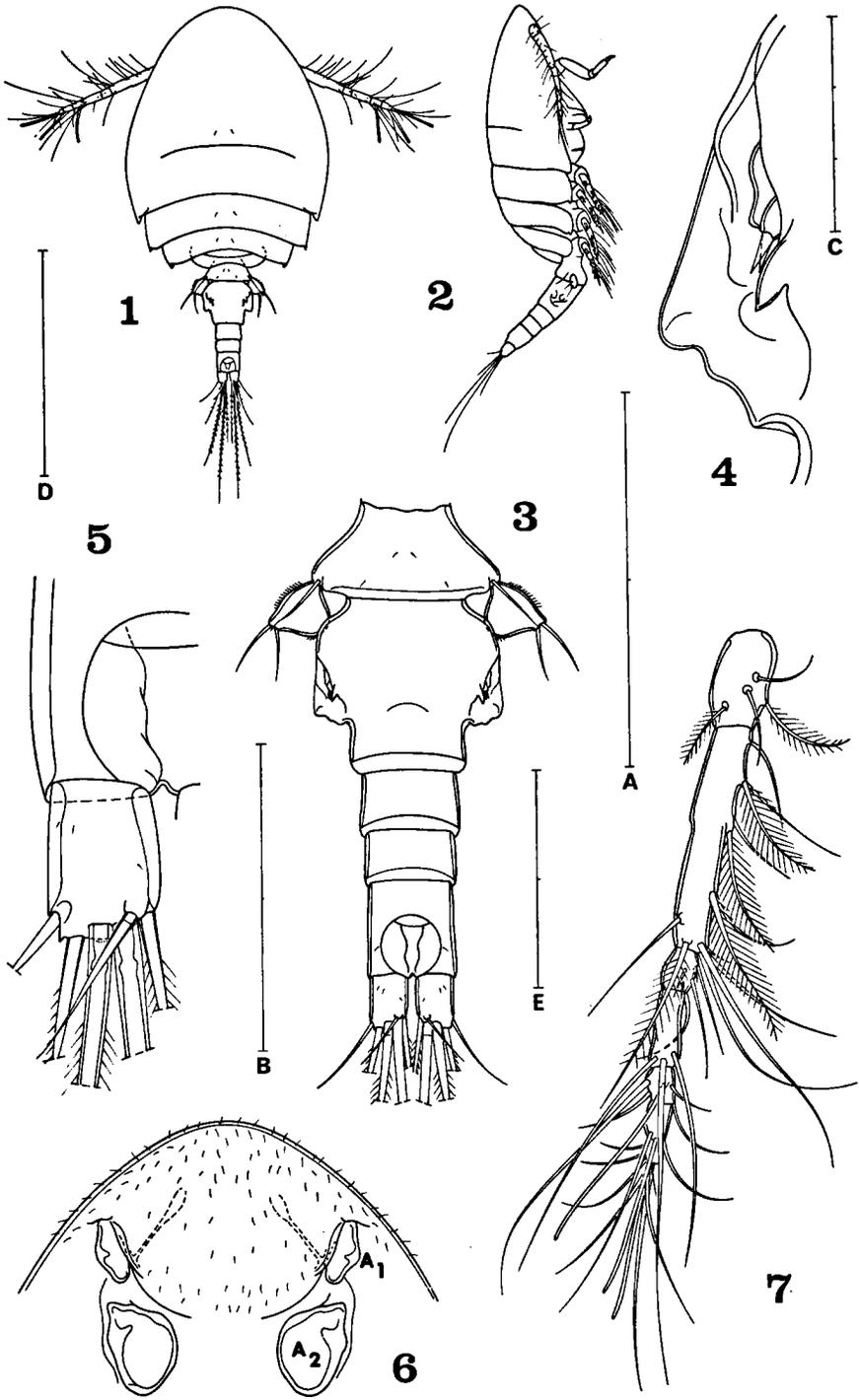
### INTRODUCTION

Although there are many records of lichomolgid copepods associated with octocorals in the Indian Ocean (mostly in Madagascar), there are no reports of such copepods from identified octocorals in the Pacific Ocean (Humes & Stock, 1973). This is in spite of the fact that in shallow tropical Pacific waters octocorals are extremely common. The six species of Lichomolgidae reported here from Stolonifera and Alcyonacea thus constitute the first records from octocorallian hosts in the Pacific Ocean.

The observations and measurements have been made in all cases on specimens cleared in lactic acid. The dimensions of the body are based on ten specimens and the body length does not include the setae on the caudal rami. 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.

Received : September 17, 1973.

[135]



ACKNOWLEDGEMENTS

The specimens were collected by the author and Mr. Charles T. Krebs in June and July 1969, during fieldwork made possible by the support and facilities of the Eniwetok Marine Biological Laboratory at Eniwetok Atoll, Marshall Islands. The subsequent study of the material has been supported by a grant (GB-8381) from the National Science Foundation.

I thank Dr. J. Verseveldt, Zwolle, the Netherlands, for the identification of the host octocorals.

Lichomolgidae Kossmann, 1877  
*Paramoligus* Humes & Stock, 1972  
***Paramoligus eniwetokensis* n. sp.**  
Figs. 1—29

*Type material.* — 43 ♀♀, 10 ♂♂ from one colony of *Lobophytum pauciflorum* (Ehrenberg), in 5 m, west of Eniwetok I., Eniwetok Atoll, 16 July 1969. Holotype ♀, allotype, and 50 paratypes (42 ♀♀, 8 ♂♂) deposited in the Zoölogisch Museum, Amsterdam; one dissected male paratype is in the collection of the author.

*Other specimens* (all from *Lobophytum pauciflorum*). — 3 ♀♀ from one colony, in 2 m, western end of Bogen I., 22 June; 14 ♀♀, 1 ♂ from 2 colonies, in 2 m, western end of Bogen Island, 23 June; 1 ♀ from one colony, in 2 m, western side of the reef at the northern end of Muti I., 29 June; 7 ♀♀, 2 ♂♂ from one colony, in 2 m, Rigili I., 3 July; 6 ♀♀, 1 ♂ from one colony, in 2 m, Rigili I., 3 July; 10 ♀♀, 3 ♂♂ from one colony, in 2 m, on a coral head south of Parry I., 5 July; 4 ♂♂ from one colony, in 3 m, on a coral head north of Sand I., near Eniwetok I., 8 July; 10 ♀♀, 5 ♂♂ from 2 colonies, in 2 m, on a coral head south of Parry I., 9 July.

*Female.* — The body (figs. 1 and 2) has a broad prosome flattened dorso-ventrally. The length is 0.99 mm (0.88—1.13 mm) and the greatest width is 0.52 mm (0.47—0.62 mm). The segment of leg 1 is incompletely separated from the head. The epimeral areas of the segments of legs 1—3 are pointed posteriorly. The segment of leg 4 is much narrower than the preceding segments and without produced epimera. The ratio of the length to the width of the prosome is 1.25:1. The ratio of the length of the prosome to that of the urosome is 2.13:1.

The segment of leg 5 (fig. 3) is  $65 \times 125 \mu$ . Between this segment and the genital segment there is no ventral intersegmental sclerite. The genital segment,  $104 \times 121 \mu$ , in dorsal view is expanded with subparallel lateral

FIGS. 1—7. *Paramoligus eniwetokensis* n. sp., female. 1, dorsal (A); 2, lateral (A); 3, urosome, dorsal (B); 4, genital area, dorsal (C); 5, caudal ramus, dorsal (D); 6, rostrum, ventral (E); 7, first antenna, ventral (B). Scale A = 1.0 mm, B = 0.2 mm, C = 0.03 mm, D = 0.05 mm, and E = 0.2 mm. A<sub>1</sub> = first antenna, A<sub>2</sub> = second antenna.

margins in its anterior three-fourths, but abruptly narrowed in its posterior fourth. The genital areas are situated dorsolaterally at the middle of the segment. Each area (fig. 4) has two small setae about  $6.5 \mu$  and a pointed bladeli-like process. The three postgenital segments from anterior to posterior are  $39 \times 62 \mu$ ,  $32 \times 57 \mu$ , and  $60 \times 57 \mu$ . The posteroventral border of the anal segment is smooth.

The caudal ramus (fig. 5) is short,  $34 \times 24 \mu$ , the ratio of the length to the width being 1.42:1. The outer lateral seta is  $47 \mu$  and the dorsal seta  $40 \mu$ , both naked. The distal three-fourths of the dorsal seta are hyaline and often broken off. The outermost terminal seta is  $70 \mu$  with outer spinules, the innermost terminal seta  $170 \mu$  with bilateral spinules, and the two long median terminal setae  $227 \mu$  (outer) and  $390 \mu$  (inner), both with bilateral spinules and inserted above a small ventral flange with a few minute marginal spines.

The dorsal surface of the body has a few small hairs (sensilla).

The egg sacs were ruptured in all ovigerous specimens observed. The eggs are numerous, each with a diameter of about  $55 \mu$ .

The rostrum (fig. 6) is weakly developed.

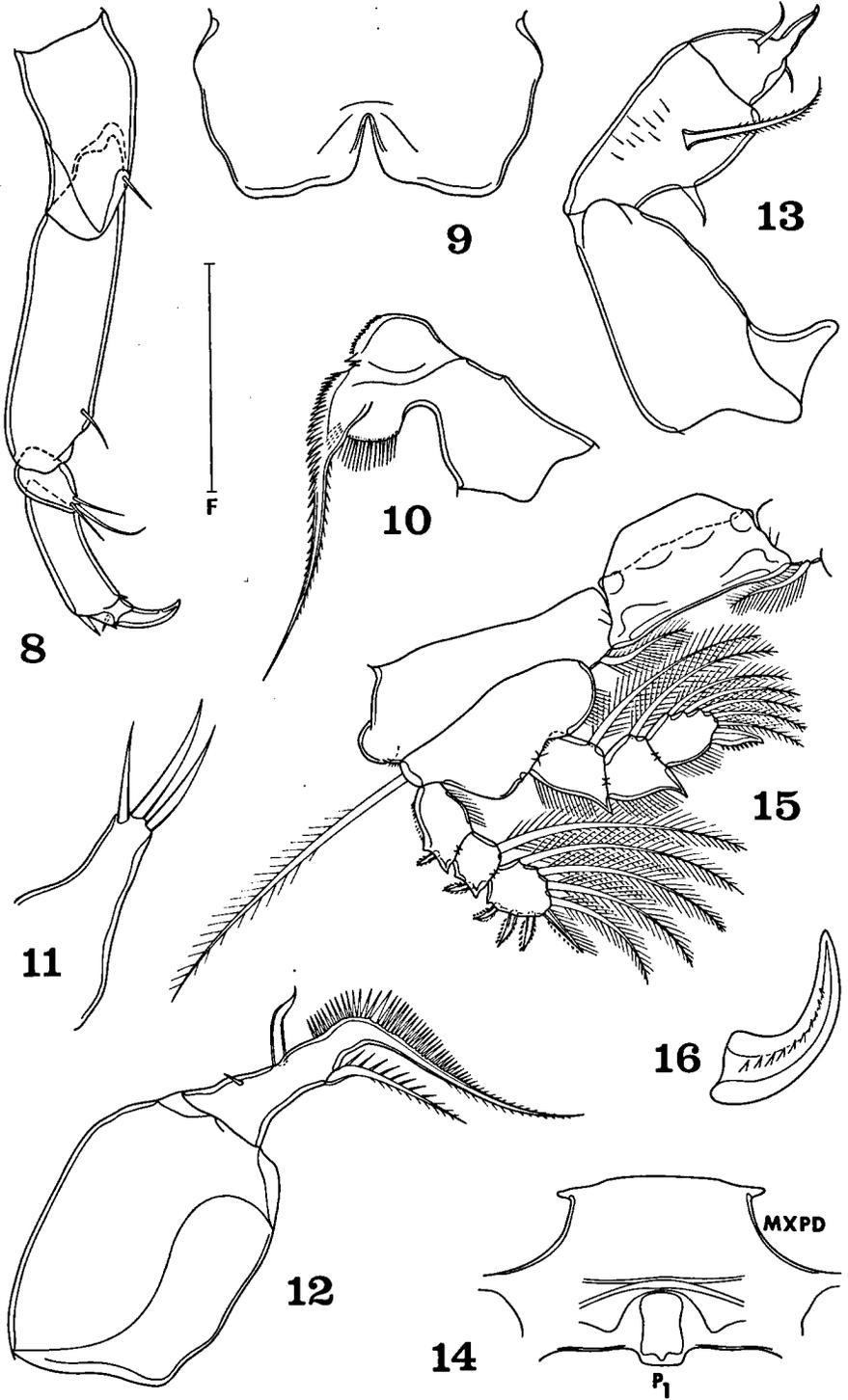
The first antenna (fig. 7) is  $326 \mu$  long. The lengths of the 7 segments (measured along their posterior nonsetiferous margins) are:  $55$  ( $61 \mu$  along the anterior margin),  $135$ ,  $25$ ,  $50$ ,  $21$ ,  $20$  and  $14 \mu$  respectively. The second segment has a small notch near the middle of its posterior margin. The formula for the armature is: 4, 13, 6, 3, 4 + 1 aesthete, 2 + 1 aesthete and 7 + 1 aesthete. Certain setae on segments 1—3 are plumose, the remainder smooth.

The second antenna (fig. 8) is  $260 \mu$  long and 4-segmented, with the formula 1, 1, 3, I. The fourth segment is  $73 \mu$  along the outer side,  $49 \mu$  along the inner side, and  $20 \mu$  wide. The claw is  $31 \mu$  along its axis. On the last segment near the base of the claw there are five very small hyaline setules. All the setae are naked.

The labrum (fig. 9) has two broad truncated posteroventral lobes.

The mandible (fig. 10) has on the convex side of the base a rounded expansion with marginal spinules, the distal few of these spinules more prominent than the others. Otherwise the mandible is similar to other species in the genus. The paragnath is a small lobe with hairs as in *Paramolgus constrictus* (Humes, 1969, fig. 15). The first maxilla (fig. 11) has three naked setae. The second maxilla (fig. 12) has a large unornamented first segment. The second segment is elongated, bearing outwardly (ventrally) a

FIGS. 8—16. *Paramolgus eniwetokensis* n. sp., female. 8, second antenna, postero-inner (F); 9, labrum, ventral (D); 10, mandible, posterior (D); 11, first maxilla, posterior (C); 12, second maxilla, antero-outer (D); 13, maxilliped, antero-inner (D); 14, area between maxillipeds and first pair of legs, ventral (B); 15, leg 1 and intercoxal plate, anterior (F); 16, spine on third segment of endopod of leg 1, ventral (C). Scale F = 0.1 mm. MXP<sub>D</sub> = maxilliped, P<sub>1</sub> = leg 1.



small proximal seta and more distally a naked seta with a hyaline sinuous tip, and having inwardly (dorsally) a long seta strongly barbed along its distal edge and weakly barbed along its proximal edge. This segment is produced to form a long lash bearing on its outer side a row of graduated slender spines, one of these spines (approximately the fifteenth from the proximal end of the row) larger than any of the others. The maxilliped (fig. 13) has an unarmed first segment. The second segment bears two very unequal setae, the smaller one naked, the larger one finely barbed. A few slender spinules are located on the antero-inner surface of the segment. The third segment bears two small naked setae and terminates in a slender pointed process.

The ventral area between the maxillipeds and the first pair of legs (fig. 14) is slightly protuberant.

Legs 1—4 (figs. 15, 17, 18 and 19) are segmented and armed as in *P. constrictus*. Leg 1 is notable in having an outer lobe on the coxa, an unusually long (175  $\mu$ ) outer seta on the basis, and a strongly recurved spine on the third segment of the endopod (fig. 16). In leg 2 the outer seta on the basis is short (35  $\mu$ ). In leg 3 this seta is moderately long (110  $\mu$ ). Leg 4 has a minute inner naked coxal seta 6.5  $\mu$ , instead of a plumose seta as in the preceding legs. The outer seta on the basis is 90  $\mu$ . The exopod is 81  $\mu$ . The first segment of the endopod is 27.5  $\mu$  (31  $\mu$  including the distal outer spiniform process)  $\times$  13  $\mu$  and its inner plumose seta is 47  $\mu$ . The second segment is 43  $\mu$  (50  $\mu$  with the terminal spiniform process)  $\times$  14.5  $\mu$ . The two barbed spines are nearly equal, the outer 26  $\mu$ , the inner 27  $\mu$ .

Leg 5 (fig. 20) has a broad free segment 39  $\times$  30  $\mu$  expanded inwardly. The two naked terminal setae are 42  $\mu$  and 40  $\mu$ . The dorsal seta near the insertion of the free segment is 44  $\mu$  and delicately plumose. Both outer and inner sides of the free segment are ornamented with a row of spinules.

Leg 6 is probably represented by the two small setae on the genital area.

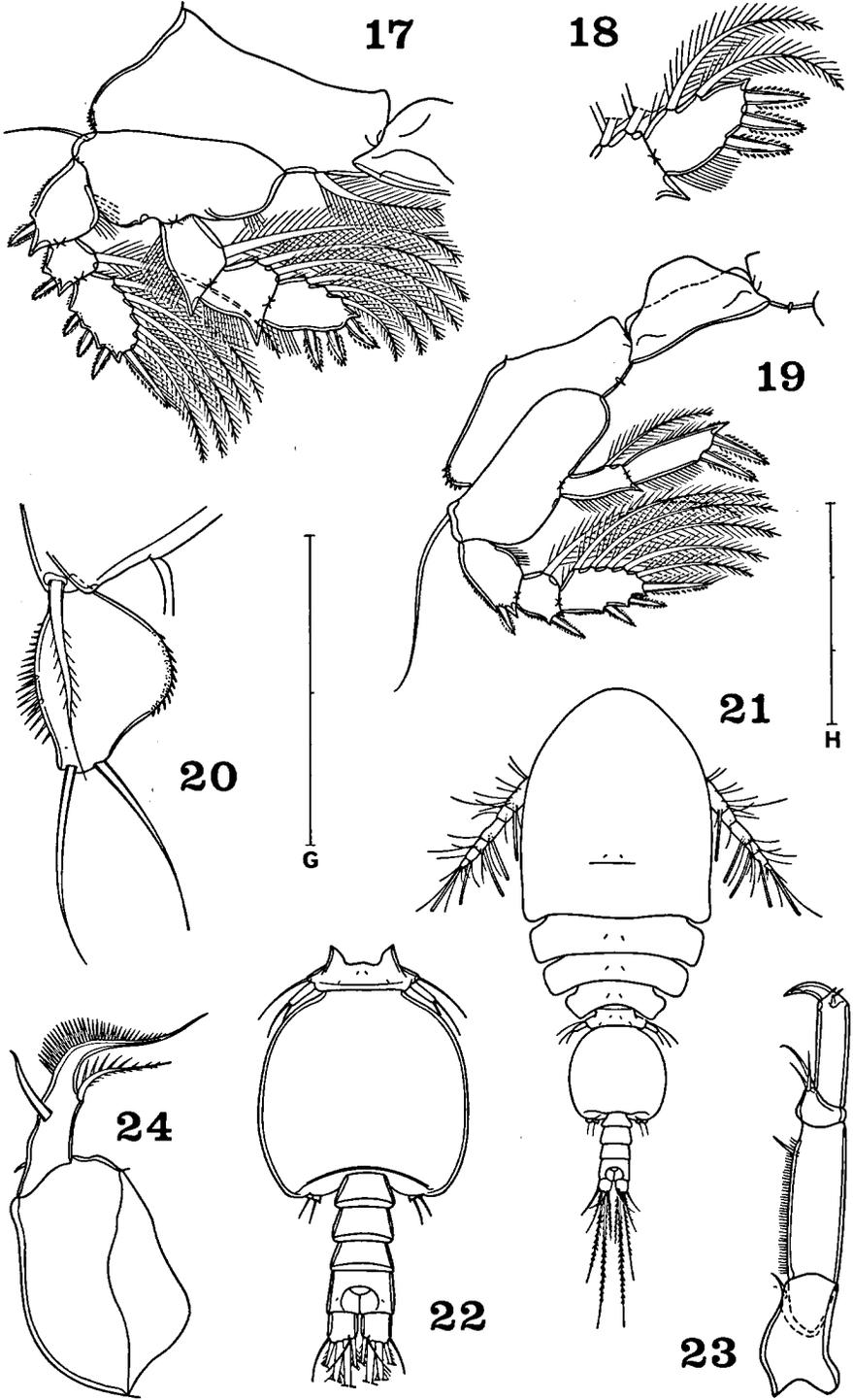
Living specimens in transmitted light were opaque, the prosome slightly amber, the eye red, the eggs gray.

*Male*. — The body (fig. 21) has the prosome less expanded than in the female. The length is 0.63 mm (0.59—0.68 mm) and the greatest width is 0.23 mm (0.22—0.26 mm). The epimera of the segment of leg 1 are rounded posteriorly, those of the segments of legs 2—4 truncated. The ratio of the length to the width of the prosome is 1.65:1. The ratio of the length of the prosome to that of the urosome is 1.76:1.

The segment of leg 5 (fig. 22) is 22  $\times$  70  $\mu$ . There is no ventral intersegmental sclerite. The genital segment is 130  $\times$  123  $\mu$ . The four post-

FIGS. 17—20. *Paramolgus eniwetokensis* n. sp., female. 17, leg 2, anterior (F); 18, third segment of endopod of leg 3, anterior (G); 19, leg 4 and intercoxal plate, anterior (F); 20, leg 5, dorsal (D).

FIGS. 21—24. *Paramolgus eniwetokensis* n. sp., male. 21, dorsal (H); 22, urosome, dorsal (B); 23, second antenna, posterior (F); 24, second maxilla, slightly posterior (D). Scale G = 0.1 mm and H = 0.3 mm.



genital segments from anterior to posterior are  $20 \times 41 \mu$ ,  $23 \times 41 \mu$ ,  $16.5 \times 39 \mu$ , and  $28.5 \times 42 \mu$ .

The caudal ramus (fig. 22) resembles that of the female but is shorter,  $21 \times 17.5 \mu$ , with a ratio of 1.2:1.

The body surface has very few hairs (sensilla).

The rostrum is like that of the female.

The first antenna is segmented and armed as in the female, but three aesthetes are added [as in *P. politus* (Humes & Ho, 1967)], 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.

The second antenna (fig. 23) is similar to that of the female, except for sexual dimorphism in the second segment, where there is a long inner fringe of very slender spinules.

The labrum, mandible, paragnath, and first maxilla are like those of the female. The second maxilla (fig. 24) is similar to that of the female but the slender graduated spines on the lash are nearly equal, with none being perceptibly larger than the others. The maxilliped (fig. 25) is elongated, slender, and 4-segmented (assuming that the proximal part of the claw represents a fourth segment). The first segment is unarmed except for a small distal inner spiniform process. The second segment bears two naked setae and two unequal rows of spinules. The third segment is very small and unarmed. The claw is  $118 \mu$  along its axis, has a narrow terminal lamella, and bears proximally two naked unequal setae.

The ventral area between the maxillipeds and the first pair of legs is like that of the female.

Legs 1—4 are segmented and armed as in the female, except for the last segment of the endopod of leg 1 (fig. 26) where the formula is I, I, 4 instead of I, 5 as in the female. Legs 2 and 3 are like those of the female. Leg 4 is similar to that of the female except for the terminal armature of the endopod (fig. 27) where the two spines are very unequal, the outer  $16 \mu$ , the inner  $8 \mu$  and slightly recurved.

Leg 5 (fig. 28) has a small subrectangular free segment  $20 \times 6 \mu$ , ornamented with a few very small spinules on the outer edge.

Leg 6 (fig. 29) consists of a posteroventral flap on the genital segment bearing two naked setae  $18 \mu$  and  $22 \mu$ .

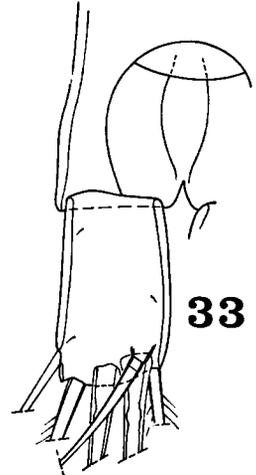
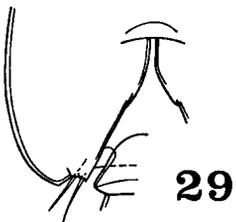
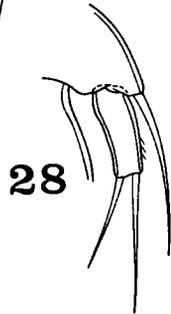
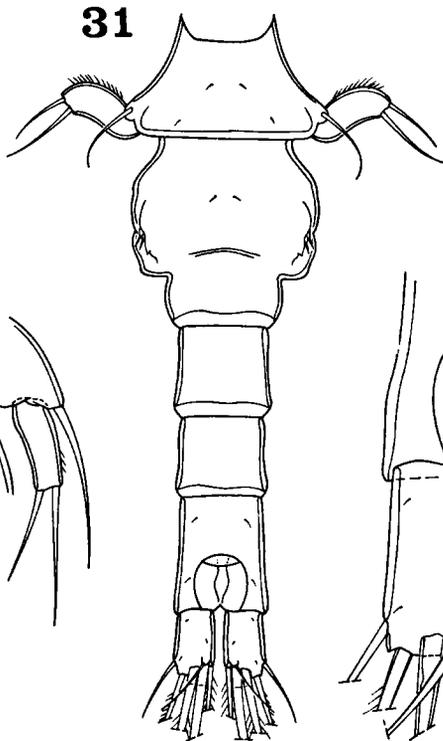
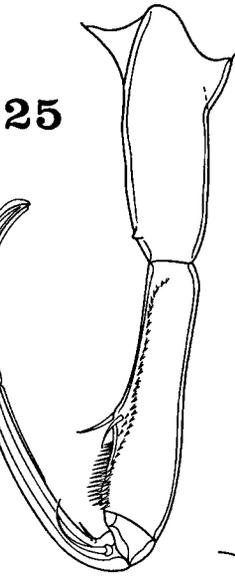
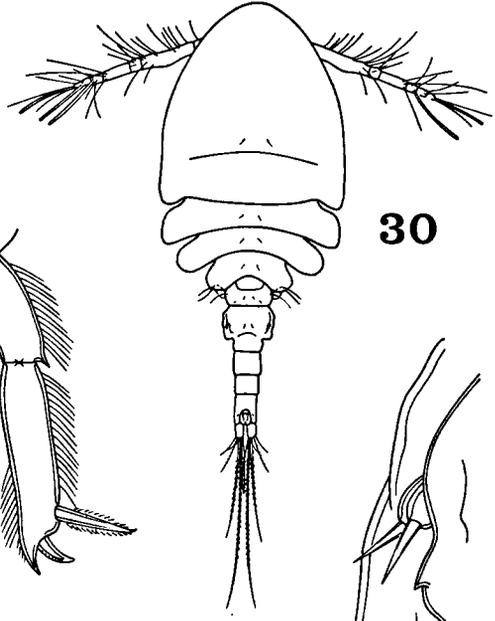
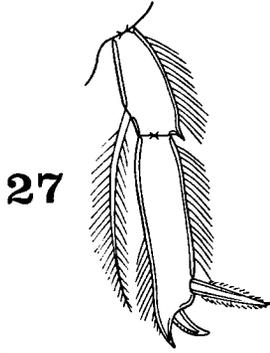
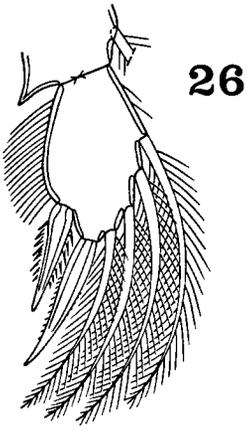
The spermatophore was not observed.

The color in living specimens was similar to that of the female.

*Etymology.* — The specific name *eniwetokensis* refers to the presence of this species at Eniwetok Atoll.

FIGS. 25—29. *Paramolgus eniwetokensis* n. sp., male. 25, maxilliped, inner (G); 26, third segment of endopod of leg 1, anterior (C); 27, endopod of leg 4, anterior (D); 28, leg 5, dorsal (D); 29, leg 6, ventral (F).

FIGS. 30—33. *Paramolgus ostentus* n. sp., female. 30, dorsal (A); 31, urosome, dorsal (B); 32, genital area, dorsal (C); 33, caudal ramus, dorsal (D).



*Comparison with related species.* — As presently conceived the genus *Paramolgus* contains six species and one other species placed within it with reservations (Humes & Stock, 1973). These are *P. politus* (Humes & Ho, 1967), *P. clavatus* (Humes & Ho, 1968c), *P. constrictus* (Humes, 1969), *P. insectus* (Humes, 1969), *P. simulans* (Humes & Ho, 1967), *P. spathophorus* (Humes & Ho, 1968b), and *P. anomalus* (A. Scott, 1909), a species of less definite status in *Paramolgus*. With the exception of *P. anomalus* reported from the Banda Sea and the south coast of Arabia, all species are known only from Madagascar where they are associated with various anthozoans.

*Paramolgus eniwetokensis* may be distinguished from all described species except *P. spathophorus* by the relative length of the outer seta on the basis of legs 1—4, by the shape of the female genital segment, and by the presence of a bladelike process on the female genital area.

The new species resembles *P. spathophorus* more than any other member of the genus. Among easily recognized similarities are the following:

1) In both species the outer seta on the basis in leg 1 is very long, in leg 2 short, and in legs 3 and 4 moderately long. In other species of *Paramolgus* this seta has about the same length on all four legs.

2) The female genital segment in both species is abruptly narrowed posteriorly. In other *Paramolgus* the lateral margins of this segment are entire or deeply constricted or insected.

3) In both species there is a pointed bladelike process on the genital area of the female. Such a process is absent in other species.

Selected features of *P. eniwetokensis* whereby it differs from *P. spathophorus* are:

1) The female caudal ramus is 1.42:1, rather than quadrate.

2) The free segment of leg 5 is short and wide, rather than elongated and slender.

3) The two spines on the second segment of the endopod of leg 4 in the female are nearly equal, rather than very unequal.

4) In the male maxilliped the second segment is long and slender (about 4:1), rather than short and broad (about 2:1).

### ***Paramolgus ostentus* n. sp.**

Figs. 30—47

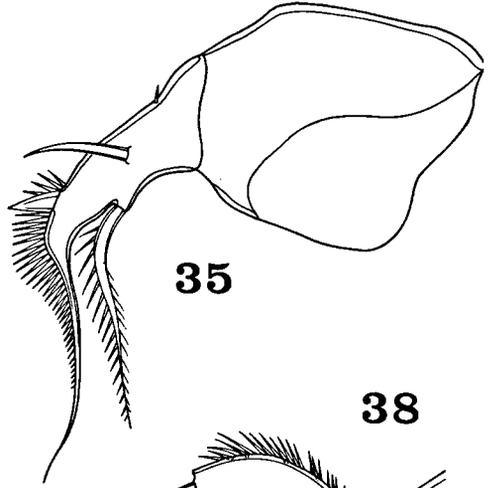
*Type material.* — 6 ♀ ♀, 3 ♂ ♂ from one colony of *Lobophytum pauciflorum* (Ehrenberg), in 2 m, Rigili I., Eniwetok Atoll, 3 July 1969. Holotype ♀, allotype, and 6 paratypes (5 ♀ ♀, 1 ♂) are deposited in the Zoölogisch

FIGS. 34—38. *Paramolgus ostentus* n. sp., female. 34, first antenna, ventral (B); 35, second maxilla, antero-outer (D); 36, maxilliped, antero-inner (D); 37, endopod of leg 4, anterior (G); 38, leg 5, dorsal (D).

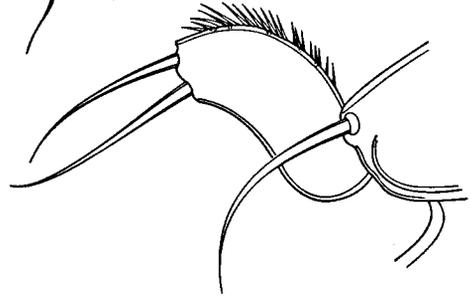
FIGS. 39—40. *Paramolgus ostentus* n. sp., male. 39, dorsal (H); 40, urosome, dorsal (B).



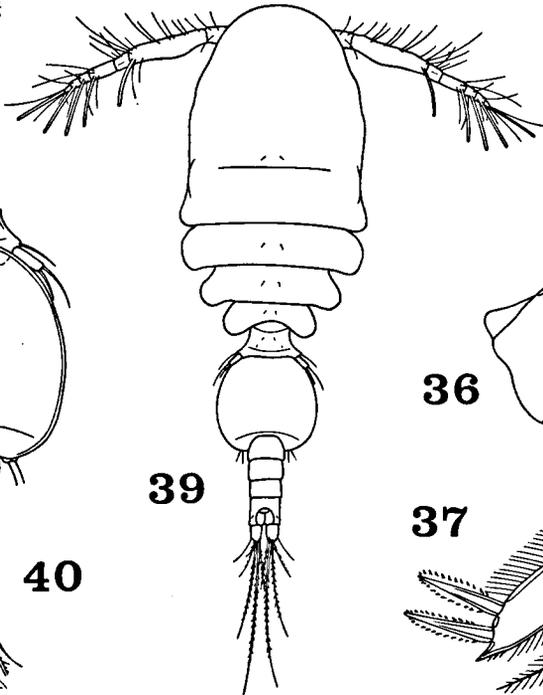
34



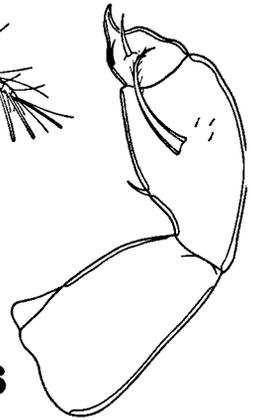
35



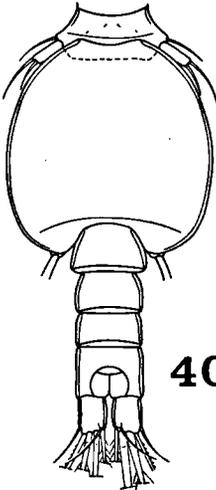
38



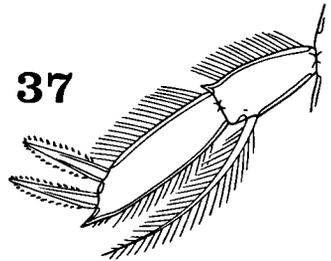
39



36



40



37

Museum, Amsterdam; the remaining paratype (dissected) is in the collection of the author.

*Other specimens* (all from *Lobophytum pauciflorum*). — 2 ♀♀, 5 ♂♂ from one colony, in 2 m, Rigili I., 3 July; 1 ♀ from one colony, in 2 m, on a coral head south of Parry I., 5 July; 3 ♀♀, 2 ♂♂ from 2 colonies, in 2 m, on a coral head south of Parry I., 9 July.

In the description which follows those features not specifically mentioned are to be regarded as similar to *P. eniwetokensis*.

*Female*. — The body (fig. 30) has a less broadened prosome than in *P. eniwetokensis*. The length is 1.02 mm (0.95—1.07 mm) and the greatest width is 0.47 mm (0.41—0.54 mm). The epimeral areas of the segments of legs 1—4 are rounded rather than pointed posteriorly. The ratio of the length to the width of the prosome is 1.45:1. The ratio of the length of the prosome to that of the urosome is 1.68:1.

The segment of leg 5 (fig. 31) is  $75 \times 125 \mu$ . The genital segment is  $116 \times 117 \mu$ , in dorsal view with its lateral margins slightly rounded both in the anterior three-fourths and in the constricted posterior fourth. Each genital area (fig. 32) bears two setae about  $9 \mu$  and a small spiniform process nearby. The three postgenital segments from anterior to posterior are  $57 \times 61 \mu$ ,  $47 \times 53 \mu$ , and  $69 \times 54 \mu$ .

The caudal ramus (fig. 33) is  $40 \times 23 \mu$  with a ratio of 1.74:1. The setae are similar to those in *P. eniwetokensis*.

The egg sac was not observed.

The rostrum resembles that of *P. eniwetokensis*.

The first antenna (fig. 34) is  $355 \mu$  long. The lengths of the seven segments (measured along their posterior nonsetiferous margins) are: 68 ( $70 \mu$  along the anterior margin), 143, 29, 49, 23, 23, and  $18 \mu$  respectively. The second segment has a low bulge on its posterior margin, rather than a notch as in *P. eniwetokensis*. The formula for the armature is like that in *P. eniwetokensis*, with certain setae plumose as in that species.

The second antenna, labrum, mandible, paragnath, and first maxilla are similar to those in *P. eniwetokensis*. The second maxilla (fig. 35) is similar to that in *P. eniwetokensis*, but the enlarged spine on the lash is much larger and nearer the proximal end of the row of spines. The tip of the distal surficial seta is gently recurved and not sinuous as in that species. The maxilliped (fig. 36) is much like that of *P. eniwetokensis*, but the distal prolongation of the third segment is almost clawlike.

The ventral area between the maxillipeds and the first pair of legs resembles that of *P. eniwetokensis*.

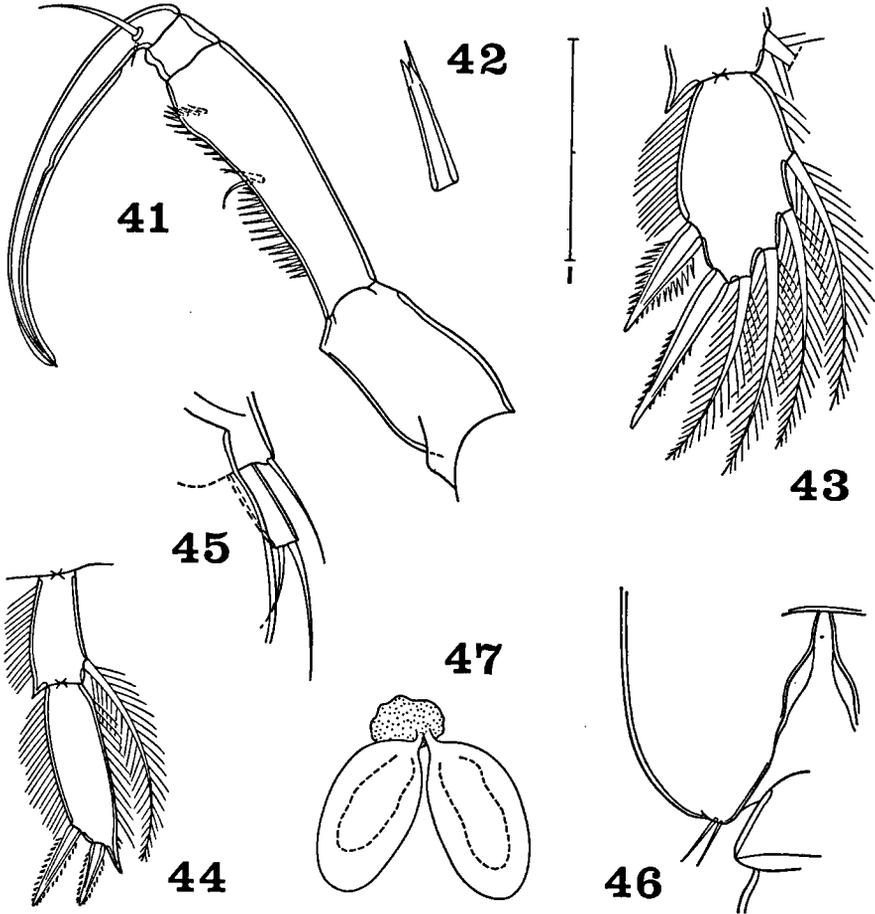
Legs 1—3 are similar to those in *P. eniwetokensis*. Leg 4 is also similar to that species, but shows slight differences in the endopod (fig. 37). The first segment of the endopod is  $33 \mu$  ( $36 \mu$  including the distal outer spiniform process)  $\times 15 \mu$  and its inner plumose seta is  $65 \mu$ . The second segment is  $44 \mu$  ( $55 \mu$  with the terminal spiniform process)  $\times 14 \mu$ . The two barbed spines are equal in length,  $29 \mu$ . The outer seta on the basis of legs

1—4 from anterior to posterior is 130, 40, 90, and 80  $\mu$ .

Leg 5 (fig. 38) has a free segment  $52 \times 21 \mu$ , almost sigmoid in shape and directed outwardly and slightly anteriorly. The two naked terminal setae are 42  $\mu$  and 49  $\mu$ . The dorsal seta near the insertion of the free segment is 47  $\mu$ . The outer (anterior) margin of the free segment has conspicuous spinules.

Living specimens were colored as in *P. eniwetokensis*.

*Male*. — The body (fig. 39) has the prosome more slender than in *P. eniwetokensis*. The length is 0.68 mm (0.65—0.74 mm) and the greatest width is 0.23 mm (0.22—0.26 mm). The epimera of the segments of legs 1—4 are rounded rather than truncated. The ratio of the length to the width



FIGS. 41—47. *Paramolgus ostentus* n. sp., male. 41, maxilliped, inner (G); 42, seta on second segment of maxilliped, outer (I); 43, third segment of endopod of leg 1, anterior (C); 44, endopod of leg 4, anterior (D); 45, leg 5, dorsal (D); 46, leg 6, ventral (G); 47, spermatophores, attached to female, dorsal (E). Scale I = 0.02 mm.

of the prosome is 1.67:1. The ratio of the length of the prosome to that of the urosome is 1.45:1.

The segment of leg 5 (fig. 40) is  $26 \times 68 \mu$ . The genital segment is  $130 \times 127 \mu$ . The four postgenital segments from anterior to posterior are  $26 \times 49 \mu$ ,  $26 \times 44 \mu$ ,  $21 \times 42 \mu$ , and  $32 \times 42 \mu$ .

The caudal ramus (fig. 40) is  $24 \times 18 \mu$ , with a ratio of 1.33:1.

The rostrum is like that in the female.

The first antenna is segmented and armed as in the female, with three aesthetes added as in the male of *P. eniwetokensis*. The second antenna shows sexual dimorphism as in *P. eniwetokensis*.

The labrum, mandible, paragnath, first maxilla, and second maxilla are like those of *P. eniwetokensis*. The maxilliped (fig. 41) resembles that in *P. eniwetokensis*, but the second segment has a slightly different arrangement of spinules and one of the two setae has a minutely trifid tip (fig. 42). The claw is  $114 \mu$  along its axis.

Leg 1 is like that of the female, except for the last segment of the endopod (fig. 43) where the formula is I, I, 4. Legs 2 and 3 are similar to those of the female. Leg 4 resembles that of the female except for the terminal armature of the endopod (fig. 44) where the two spines are moderately unequal, the outer  $17.5 \mu$ , the inner  $14 \mu$ .

Leg 5 (fig. 45) has a small subrectangular free segment  $18.5 \times 6.5 \mu$ , without fine ornamentation.

Leg 6 (fig. 46) consists of a posteroventral flap on the genital segment bearing two naked setae about  $17 \mu$ .

The spermatophore (fig. 47) is oval, approximately  $148 \times 78 \mu$  not including the neck.

The color in living specimens resembled that of *P. eniwetokensis*.

*Etymology.* — The specific name *ostentus*, Latin = held out or displayed, alludes to the unusual position of the free segment of leg 5 in the female.

*Comparison with related species.* — *Paramolgus ostentus* may be distinguished from all other species in the genus by the outwardly and anteriorly projecting leg 5 in the female. The long seta on the coxa of leg 1 in both sexes separates the new species from all others except *P. spathophorus* and *P. eniwetokensis* where this seta is similarly long. *P. spathophorus* may be distinguished from *P. ostentus* by the quadrate caudal ramus in both sexes, by the shape of the female genital segment, and by the long bladelike process on the female genital area.

Although *P. ostentus* and *P. eniwetokensis* show many similarities, there are three easily recognized points of distinction. These are:

1) The contour of the posterior margin of the first antenna in both sexes, bulging in *P. ostentus*, notched in *P. eniwetokensis*.

2) The nature of the free segment of leg 5 in the female, outwardly and anteriorly directed and almost sigmoid in shape in *P. ostentus*, postero-laterally directed and greatly expanded inwardly in *P. eniwetokensis*.

3) The relative lengths of the two spines on the endopod of leg 4 in the male, ratio 1.25:1 in *P. ostentus*, 2:1 in *P. eniwetokensis*.

*Acanthomolgus* Humes & Stock, 1972  
*Acanthomolgus fissisetiger* (Humes & Ho, 1968a)

Specimens from *Pachyclavularia violacea* (Quoy & Gaimard). — 8 ♀ ♀, 5 ♂ ♂ from one colony, in 2 m, western side of the reef at the northern end of Muti I., Eniwetok Atoll, 29 June 1969.

*Remarks.* — The specimens from this stoloniferan host were compared directly with dissections of paratypes from the alcyonacean *Stereonephthya acaulis* Verseveldt in Madagascar. The only apparent difference lies in the lengths of the two terminal claws on the second antenna. They are relatively shorter in females from Eniwetok, 65  $\mu$  and 57  $\mu$ , than in the paratypes where they are 92  $\mu$  and 77  $\mu$ .

The second antenna shows sexual dimorphism in having a few very small spinules on the inner surface of the second segment. These spinules occur also in the paratypic males, although they were not mentioned in the original description.

*Pachyclavularia violacea* is a new host for *A. fissisetiger*. This copepod is known only from Madagascar (Humes & Stock, 1973) where it is associated with the alcyonaceans *Stereonephthya acaulis*, *Lemnalina elegans* (May), and *L. humesi* Verseveldt.

*Anisomolgus* Humes & Stock, 1972  
*Anisomolgus insolens* (Humes & Ho, 1968b)

Specimens from *Lobophytum pauciflorum* (Ehrenberg). — 17 ♀ ♀, 10 ♂ ♂ from one colony, in 2 m, western end of Bogen I., 22 June 1969; 46 ♀ ♀, 49 ♂ ♂, and 12 copepodids from three colonies, in 3 m, western end of Bogen I., 23 June; 16 ♀ ♀, 16 ♂ ♂, and 1 copepodid from one colony, in 2 m, western side of the reef at the northern end of Muti I., 29 June; 86 ♀ ♀, 55 ♂ ♂, and 31 copepodids from one colony, in 2 m, Rigili I., 3 July; 14 ♀ ♀, 10 ♂ ♂, and 26 copepodids from one colony, in 2 m, Rigili I., 3 July; 31 ♀ ♀, 25 ♂ ♂, and 14 copepodids from one colony, in 2 m, on a coral head south of Parry I., 5 July; 18 ♀ ♀, 39 ♂ ♂, and 16 copepodids from one colony, in 3 m, on a coral head north of Eniwetok I., 8 July; 29 ♀ ♀, 26 ♂ ♂, and 17 copepodids, from two colonies, in 2 m, south of Parry I., 9 July; 32 ♀ ♀, 44 ♂ ♂, and 27 copepodids from one colony, in 4 m, west of Eniwetok I., 16 July. The numbers of copepodids listed may include a few copepodids of *Paramolgus eniwetokensis* n. sp., since in ten instances both species of copepods were recovered from the same host colony.

*Remarks.* — The New Caledonian specimens have been compared with paratypes from *Lobophytum crassum* Marenzeller in Madagascar. The specimens from the two geographical regions and two host species show only a few differences. For the New Caledonian females the length is 0.83 mm (0.76—0.94 mm) and the greatest width is 0.40 mm (0.37—0.44 mm) and for the males the length is 0.71 mm (0.68—0.77 mm) and the greatest width is 0.27 mm (0.25—0.30 mm). These dimensions are slightly smaller

than in the Madagascan specimens. The fourth segment of the second antenna has somewhat different proportions, being  $55 \mu$  along its outer edge,  $41 \mu$  along its inner edge, and  $18 \mu$  wide, with its claw  $29 \mu$  along its axis. The caudal ramus of the female is  $35 \times 21 \mu$ , slightly smaller and shorter than in the Madagascan specimens. In other respects the New Caledonian and Madagascan copepods are apparently identical. The New Caledonian material is therefore regarded as *Anisomolgus insolens*. The three slight differences just mentioned may be an expression of the geographical and host separation of the two populations.

*Lobophytum pauciflorum* is a new host for *A. insolens*, which thus far is known only from Madagascar (Humes & Ho, 1968b), where it is associated with the alcyonacean *Lobophytum crassum* Marenzeller.

*Metaxymolgus* Humes & Stock, 1972

***Metaxymolgus aculeatus* (Humes & Ho, 1968a)**

Specimens from *Nephthea chabrolii* Audouin. — 11 ♀♀, 23 ♂♂, and 1 copepodid from one colony, in 5 m, west of Eniwetok I., Eniwetok Atoll, 16 July 1969.

*Remarks.* — The specimens from Eniwetok conform to paratypes of *M. aculeatus* from *Nephthea aberrans* Verseveldt in Madagascar. The only significant difference concerns the lengths of the two claws on the second antenna. These claws are  $104 \mu$  and  $88 \mu$  along their axes, shorter and slightly more unequal in length than in the paratypes.

*Nephthea chabrolii* is a new host for this species which previously has been known only from *Nephthea aberrans*, *N. sphaerophora* Kükenthal, *N. crassa* Kükenthal, *N. tixierae* Verseveldt, *N. bumasta* Verseveldt, *N. filamentosa* Verseveldt, *N. galbuloides* Verseveldt, *N. lanternaria* Verseveldt, *Stereonephthya nosybearia* Verseveldt, *S. scaphis* Verseveldt, and *Litophyton arboreum* Forskål, all in Madagascar.

*Paradoridicola* Humes & Stock, 1972

***Paradoridicola adelphus* (Humes & Ho, 1968b)**

Specimens from *Sinularia polydactyla* (Ehrenberg). — 2 ♀♀ from one colony, in 2 m, on a coral head south of Parry I., Eniwetok Atoll, 9 July 1969.

*Remarks.* — The two females show no important differences from paratypes of *P. adelphus* from *Sinularia whiteleggei* Lüttschwager in Madagascar. Until now this species has been known only from *Sinularia whiteleggei*, *S. pedunculata* Tixier-Durivault, and *S. polydactyla* (Ehrenberg) in Madagascar.

REFERENCES

- HUMES, A. G.  
1969 Cyclopoid copepods associated with antipatharian coelenterates in Madagascar. — *Zool. Med.*, **44** (1): 1—30.
- HUMES, A. G. & J.-S. Ho  
1967 Two new species of *Lichomolgus* (Copepoda, Cyclopoida) from an actinarian in Madagascar. — *Cah. ORSTOM, sér. Océanogr.*, **5** (1): 3—21.  
1968a. Cyclopoid copepods of the genus *Lichomolgus* associated with octocorals of the family Nephtheidae in Madagascar. — *Proc. U.S. Nat. Mus.*, **125** (3661): 1—41.  
1968b. Cyclopoid copepods of the genus *Lichomolgus* associated with octocorals of the family Alcyoniidae in Madagascar. — *Proc. Biol. Soc. Wash.*, **81**: 635—692.  
1968c. Cyclopoid copepods of the genus *Lichomolgus* associated with octocorals of the families Xeniidae, Nidaliidae, and Telestidae in Madagascar. — *Proc. Biol. Soc. Wash.*, **81**: 693—750.
- HUMES, A. G. & J. H. STOCK  
1972 Preliminary notes on a revision of the Lichomolgidae, cyclopoid copepods mainly associated with marine invertebrates. — *Bull. Zool. Mus., Univ. Amsterdam*, **2** (12): 121—133.  
1973 A revision of the family Lichomolgidae Kossmann, 1877, cyclopoid copepods mainly associated with marine invertebrates. — *Smithsonian Contr. Zool.*, no. 127: i—v, 1—368.
- SCOTT, A.  
1909 The Copepoda of the Siboga Expedition. Part I. Free-swimming, littoral and semi-parasitic Copepoda. — *Siboga Exped.*, **29a**: 1—323.

Dr. A. G. HUMES  
Boston University Marine Program  
Marine Biological Laboratory  
Woods Hole, Massachusetts, 02543 — U.S.A.