

DEEP-SEA AMPHIPODA (CRUSTA-
CEA) COLLECTED BY THE R/V
"VEMA" IN THE EASTERN
PACIFIC OCEAN AND THE
CARIBBEAN AND MED-
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J. LAURENS BARNARD

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J. LAURENS BARNARD

Beaudette Foundation for Biological Research
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INTRODUCTION

DURING THE FIFTEENTH CRUISE of the R/V "Vema" of the Lamont Geological Observatory of Columbia University, trawling with the Menzies deep-sea open trawl was extended from the south Atlantic Ocean (Menzies, 1962; J. L. Barnard, 1962b) into the Mediterranean Sea, the eastern Pacific Ocean, and, more extensively than before, into the Caribbean Sea (Menzies, 1956a, 1956b). Identifiable amphipods were recovered in 15 of the samples (see table 1). The stations listed throughout the present paper are those of the R/V "Vema," fourteenth and fifteenth cruises. New species account for 20 entries, five of them requiring the erection of new genera, and 14 previously described species are recorded, some with enormous extensions of range. All the material described herein is deposited in the Department of Living Invertebrates of the American Museum of Natural History.

Those discoveries of the greatest interest to carcinologists and ecologists are the following: (1) the addition of still another new cyphocarid genus (see J. L. Barnard, 1961) in the series of 12; (2) a fourth species of *Byblisoides* (see J. L. Barnard, 1961), which extends this antiboreal genus into the Caribbean Sea; (3) the extension of range of the benthic bathyal species *Phoxocephalus ker-*

gueleni from the subantarctic to Pacific Panama; (4) a remarkable new western Atlantic genus of the Pardaliscidae having a short entire telson; (5) a further realignment of *Austrosyrrhoe* and *Syrrhoites* in the Tironidae; (6) the description of a new genus in the recently discovered, heretofore monotypic, family Vitjazianidae; and (7) a realignment of *Bonnierella*, with its assignment to the Ischyroceridae.

Except where references are listed, the concept of genera follows Stebbing (1906). References to species not otherwise identified can be found in J. L. Barnard's (1958) index.

ACKNOWLEDGMENTS

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TABLE 1
LOCALITIES OF SAMPLES

Station	Date	Latitude	Longitude	Depth in Meters	General Area
V-14-46-II	July 3, 1958	32° 28' N.	29° 46' E.	1938	East Mediterranean
V-15-10	Nov. 7, 1958	14° 05' N.	75° 25' W.	4077	Caribbean Sea
V-15-12	Nov. 8, 1958	11° 30' N.	75° 50' W.	2868-2875	Caribbean Sea
V-15-14	Nov. 9, 1958	10° 11' N.	78° 30' W.	1826	Caribbean Sea
V-15-15	Nov. 9, 1958	10° 11' N.	78° 30' W.	1715	Caribbean Sea
V-15-18	Nov. 10, 1958	10° 13' N.	78° 33' W.	1905-1703	Caribbean Sea
V-15-20	Nov. 10, 1958	9° 46.3' N.	79° 37.5' W.	850	Caribbean Sea
V-15-22	Nov. 10, 1958	9° 46.3' N.	79° 37.5' W.	975	Caribbean Sea
V-15-36	Nov. 14, 1958	7° 30' N.	79° 21' W.	1746-1609	Gulf of Panama
V-15-37	Nov. 14, 1958	7° 25' N.	79° 23' W.	1749	Gulf of Panama
V-15-54	Nov. 24, 1958	9° 22.5' N.	89° 33' W.	3517-3503	Guatemala Basin
V-15-63	Dec. 4, 1958	3° 15' S.	82° 30' W.	2864-2861	Off Gulf of Guayaquil
V-15-69	Dec. 9, 1958	10° 13' S.	80° 05' W.	6324-6328	Off Peru
V-15-147	June 4, 1959	21° 18.7' N.	65° 13.4' W.	5451-5419	N. of Puerto Rico Trench
V-15-150	June 11, 1959	20° 21.3' N.	66° 24' W.	5481-5497	N. of Puerto Rico Trench

SYSTEMATIC ACCOUNTS

FAMILY LYSIANASSIDAE

GENUS *ARISTIOPSIS* J. L. BARNARD

Aristiopsis tacitus J. L. Barnard

Figure 1

Aristiopsis tacitus J. L. BARNARD, 1961, p. 31, fig. 2.

MATERIAL: Station V-15-36, three specimens.

RECORD: Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 30' N., longitude 79° 21' W., November 14, 1958, 1746–1609 meters.

REMARKS: One specimen at hand differs from the type of this species from the Tasman Sea only in the slightly less produced dorsal fourth pleonal process. The other two specimens have pleonal segment 4 similar to that of the type. The smallest specimen lacks the projecting epistomal process, so that variation of the species is to be expected when one is identifying it from the other areas. All three specimens have a seemingly larger claw of gnathopod 2. These slight differences do not seem to warrant specific separation but may permit subspecific distinction in the future.

Peraeopod 5 is redrawn, since it was partially missing on the type from the Tasman Sea.

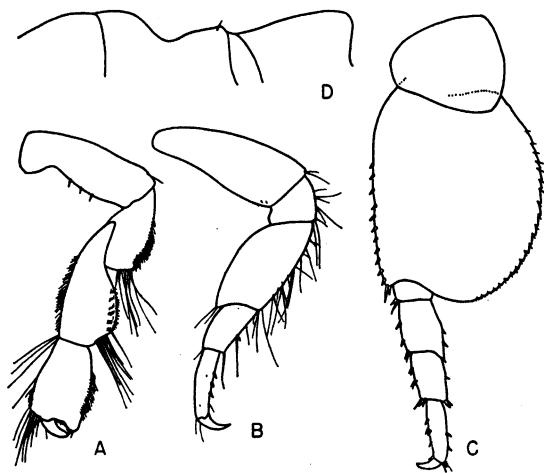


FIG. 1. *Aristiopsis tacitus* J. L. Barnard, female, 6.5 mm., Station V-15-36. A. Gnathopod 2. B. Peraeopod 1. C. Peraeopod 5. D. Dorsal view of pleonal segments 3, 4, 5, and 6, from left to right.

That *A. tacitus* may be Pacific-pandemic seems apparent, for the species now has been caught in the southwest and eastern Pacific. Probably it is pelagic or demersal.

CEBOCARIS, NEW GENUS

DIAGNOSIS: Head dorsoventrally elongated and deformed; flagella of first antennae reduced to two articles, those of second antennae very small, each accessory flagellum reduced to a microscopic, barrel-shaped article; mouth parts not conically produced below head; mandible with distinct, untoothed cutting edge, lacking molar, palp short, triarticulate; first maxilla with biarticulate palp; lobes of second maxilla normal; maxilliped with four-articulate palp; first gnathopod simple; first and second coxae much smaller than third coxa, second coxa partially hidden by third coxa; peraeopods subchelate; inner ramus of third uropod shorter than outer; telson entire.

TYPE SPECIES: *Cebocaris grutesca*, new species.

RELATIONSHIP: Differing from *Mesocyphocaris* Birstein and Vinogradov (1960) by the uncleft telson and by the following minor features, mostly of specific value: the further reduced accessory flagellum; the shorter third uropod, with its inner ramus shortened, yet longer than the peduncle of the third uropod (in *Mesocyphocaris* it is shorter than the peduncle and the outer ramus is immensely elongated); the smaller flagellum of the second antenna; and the stouter first gnathopod with a longer finger. The fifth articles of peraeopods 1 and 2 are as long as the fourth, in contrast to those of *Mesocyphocaris*.

Both *Mesocyphocaris* and *Cebocaris* have shortened coxae, and the first two are not obscured as are those of other cyphocarid genera.

Cebocaris grutesca, new species

Figure 2

DIAGNOSIS: With the characters of the genus.

DESCRIPTION: The distal segments of the last two peraeopods are missing from the unique specimen, and the tips of some rami

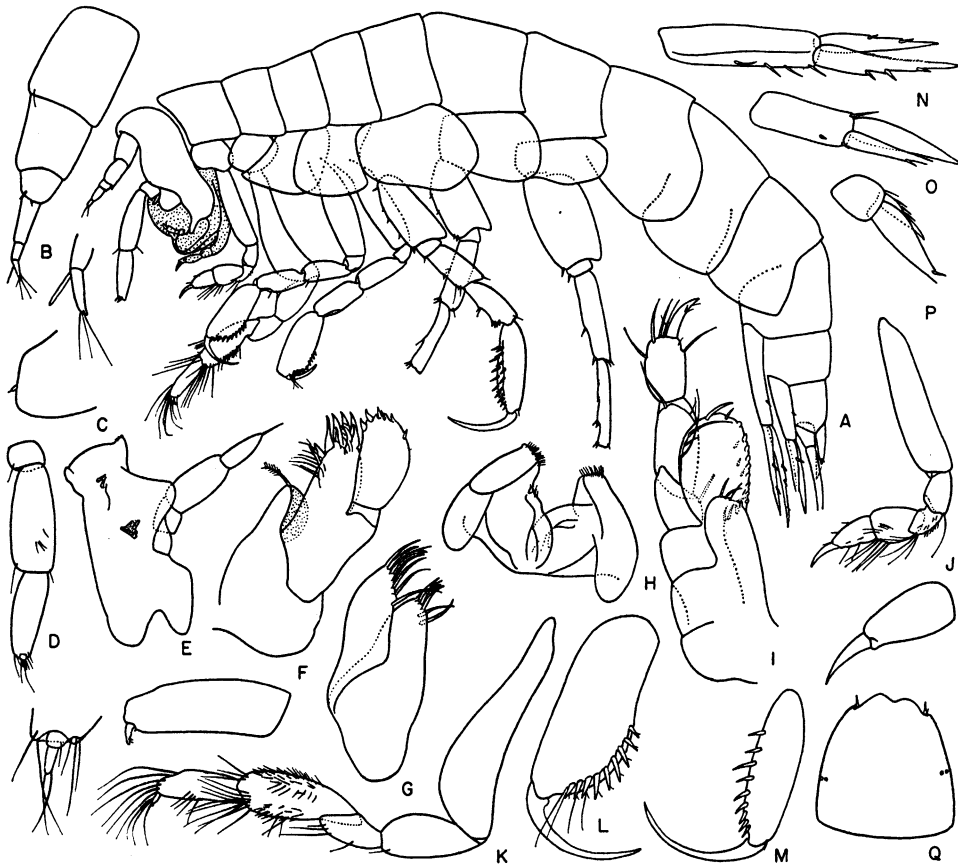


FIG. 2. *Cebocaris grutesca*, new genus and new species, holotype, male, 7.0 mm., Station V-15-147. A. Lateral view. B. Antenna 1. C. End of peduncular article 3 of antenna 1, showing the tiny accessory flagellum. D. Antenna 2. E. Mandible. F, G. Maxillae 1, 2. H. Lower lip. I. Maxilliped. J, K. Gnathopods 1, 2. L. Last two articles of pereopod 1. M. Last two articles of pereopod 3. N, O, P. Uropods 1, 2, 3, the last two with broken rami. Q. Telson.

of the uropods have been broken and cannot be described.

HOLOTYPE: A.M.N.H. No. 12310, male, 7 mm. Unique.

TYPE LOCALITY: Station V-15-147, north of Puerto Rico Trench, latitude 21° 18.7' N., longitude 65° 13.4' W., June 4, 1959, 5451–5419 meters.

GENUS *HIPPOMEDON* BOECK

Hippomedon Boeck, GURJANOVA, 1962, p. 93.

REMARKS: Gurjanova fuses the genus *Paratryphosites* Stebbing to this genus, describes six new species, transfers *Tryphosa coeca* Holmes to *Hippomedon*, and writes an extensive key. In later pages I point out that the

genus *Paracentromedon* Chevreux and Fage probably should be fused to *Hippomedon* as there are now, with Gurjanova's conception, no differences between *Paracentromedon* and *Hippomedon* in terms of first gnathopods. The mandibular palp can be shown to have numerous intergrades represented by species with palp article 3 longer than article 2 varying to species with palp article 3 about half as long as article 2. The genus *Elimedon* J. L. Barnard (1962a) combines first gnathopods of typical *Hippomedon* with the mandibular palp of *Paracentromedon*, so forms linkage between the two. For the time being, I am retaining *Paracentromedon* (see following pages) with its junior synonym *Elimedon*,

since I have not examined the type species of *Paracentromedon*. A simplified key to *Hippomedon* is presented below:

KEY TO *Hippomedon* AND *Paracentromedon*

Figures 3 and 4

1. Third pleonal epimeron bidentate (fig. 3T) *H. bidentatus*
Third pleonal epimeron not bidentate 2
2. Coxae 1-3 with conspicuous posterodistal teeth *H. multidentatus*
Coxae 1-3 lacking conspicuous posterodistal teeth 3
3. Pleonal segment 4 with dorsal angular process (fig. 3N) 4
Pleonal segment 4 rounded above or lacking angular process (fig. 3M) 9

4. Eyes bearing distinct crystalline lens (fig. 3A) *H. holbollii*
Eyes absent 5
5. Mandibular palp article 3 half as long, or less, as article 2 (fig. 3J) 6
Mandibular palp article 3 more than five-eighths as long as article 2 (fig. 3I) 7
6. Article 5 of gnathopod 1 much longer than article 6 *P. cristatus*
Articles 5 and 6 of gnathopod 1 subequal *P. carabicus*, new species
7. Article 1 of antenna 1 with a distal process (as shown in fig. 3E) *H. longimanus*
Article 1 of antenna 1 lacking a distal process (fig. 3D) 8
8. Article 5 of gnathopod 1 longer than article 6 *H. antitemplado*



FIG. 3. Variation in *Hippomedon* Boeck and *Paracentromedon* Chevreux and Fage. A-C. Head. A. *H. holbollii*. B. *H. denticulatus*. C. *P. crenulatus*. D-H. Antenna 1. D. *H. holbollii*. E. *H. denticulatus*. F. *H. nasutus*. G. *H. minusculus*. H. *H. propinquus*. I-K. Mandible. I. *H. denticulatus*. J. *P. crenulatus*. K. *P. cristatus* (= *Elimedon*). L. Pleonal epimera 1-2, *H. oculus*. M, N. Urosomal segment 2. M. *H. propinquus*. N. *H. holbollii*. O-X. Pleonal epimeron 3. O. *H. angustimanus*. P. *H. striolatus*. Q. *H. abyssi*. R. *H. denticulatus*. S. *H. holbollii*. T. *H. bidentatus*. U. *H. bandae*. V. *H. propinquus*. W. *P. crenulatus*. X. *H. robustus*.

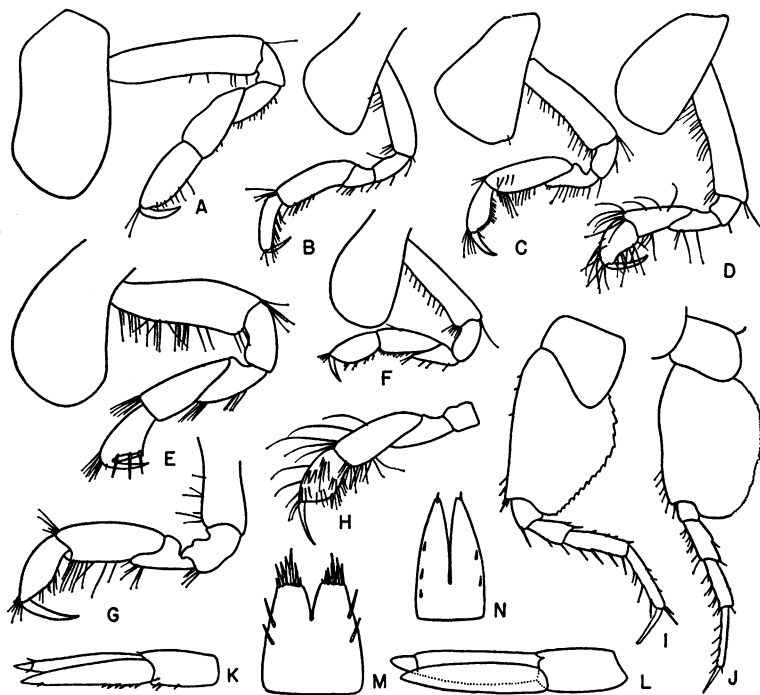


FIG. 4. Variation in *Hippomedon* Boeck and *Paracentromedon* Chevreux and Fage. A-H. Gnathopod 1. A. *P. crenulatus*. B. *H. serratus*. C. *H. denticulatus*. D. *H. bandae*. E. *H. punctatus*. F. *H. granulatus*. G. *H. rylovi*. H. *H. tasmanicus*. I, J. Peraeopod 5. I. *H. pacificus*. J. *H. denticulatus*. K, L. Uropod 3. K. *H. denticulatus*. L. *H. frigidus*. M, N. Telson. M. *H. abyssii*. N. *H. proquinqus*.

- | | | | |
|--|----------------------|--|-----------------------------|
| Articles 5 and 6 of gnathopod 1 equal in length | <i>H. concolor</i> | base of the tooth (fig. 3R) | 16 |
| 9. Outer ramus of uropod 3 uniarticulate | <i>H. ambiguus</i> | Third pleonal epimeron lacking a notch at the base of the tooth | 17 |
| Outer ramus of uropod 3 biarticulate | 10 | 16. Article 6 of gnathopod 1 60 per cent as long as article 5 | <i>H. mercatoris</i> |
| 10. Posterior tooth of third pleonal epimeron situated medially on hind edge (fig. 3P) | <i>H. striolatus</i> | Article 6 of gnathopod 1 as long as article 5 | <i>H. incisus</i> (in part) |
| Posterior tooth of third pleonal epimeron situated at lower posterior corner | 11 | 17. Pleonal segment 4 with bulbous dorsal process, dactyl of gnathopod 1 strongly overlapping palm (fig. 4G) | <i>H. rylovi</i> |
| 11. Telson short, cleft halfway, apices truncate and multispinose (fig. 4M) | <i>H. abyssii</i> | Pleonal segment 4 scarcely bulbous, dactyl of gnathopod 1 not overlapping palm (as shown in fig. 4H) | <i>H. gorbunovi</i> |
| Telson intermediate, cleft more than five-eighths, apices generally with three or fewer spines, except <i>H. kurilicus</i> | 12 | 18. Third pleonal epimeron with a notch at the base of the tooth (fig. 3R) | 19 |
| 12. Eyes present | 13 | Third pleonal epimeron lacking a notch at the base of the tooth | 20 |
| Eyes absent | 24 | 19. Article 6 of gnathopod 1 60 per cent as long as article 5 | <i>H. denticulatus</i> |
| 13. Eyes bearing distinct ommatidia (fig. 3B) | 14 | Articles 5 and 6 of gnathopod 1 equal in length | <i>H. incisus</i> |
| Eyes lacking ommatidia | 18 | 20. Gnathopod 1 simple, lacking palm (fig. 4B) | <i>H. serratus</i> |
| 14. Anterior corner of first pleonal epimeron and posterior corner of second pleonal epimeron each with a long acute tooth (fig. 3L) | <i>H. oculatus</i> | Gnathopod 1 with distinct palm | 21 |
| Both of these conditions not present | 15 | 21. Article 2 of peraeopod 5 distinctly constricted | |
| 15. Third pleonal epimeron with a notch at the | | | |

- distally (fig. 4I) *H. pacificus*
 Article 2 of peraeopod 5 not constricted distally (fig. 4J) 22
22. Third pleonal epimeron of broad-tooth type (fig. 3X) *H. robustus*
 Third pleonal epimeron of narrow-tooth type (fig. 3V) 23
23. Article 1 of first antennal flagellum as long as rest of flagellum (as shown in fig. 3D) *H. propinquus*
 Article 1 of first antennal flagellum scarcely longer than next few articles (fig. 3G) *H. minusculus*
24. Second pleonal epimeron with a very long, acute posterior tooth (as shown in fig. 3L) *H. similis*
 Second pleonal epimeron quadrate or rounded behind 25
25. Tooth of third pleonal epimeron very small (fig. 3U) 26
 Tooth of third pleonal epimeron large 29
26. Article 6 of gnathopod 1 linear (as shown in fig. 4G) *H. angustimanus*
 Article 6 of gnathopod 1 stout (fig. 4E) 27
27. Palm of gnathopod 1 not distinct from hind margin of article 6 (fig. 4D) *H. bandae*
 Palm of gnathopod 1 distinct from hind margin of article 6 28
28. Differences unknown *H. coecus*
 Differences unknown *H. tasmanicus*
29. Article 1 of antenna 1 with a large nasiform process (fig. 3F) *H. nasutus*
 Article 1 of antenna 1 lacking a large nasiform process, but often apically produced 30
30. Article 6 of gnathopod 1 as long as article 5 31
 Article 6 of gnathopod 1 shorter than article 5 32
31. Palm of gnathopod 1 distinct; article 3 of mandibular palp four-fifths as long as article 2 *H. geelongi*
 Palm of gnathopod 1 indistinct; article 3 of mandibular palp two-thirds as long as article 2 *H. crenulatus*
 Palm of gnathopod 1 distinct; article 3 of mandibular palp longer than article 2 *H. wirketis*
32. Tooth of third pleonal epimeron evenly tapering (fig. 3W) 33
 Tooth of third pleonal epimeron asymmetrically tapering (fig. 3V) 34
33. Palm of gnathopod 1 very oblique, article 6 very slender, tooth of third pleonal epimeron very long (as shown in fig. 3Q) *H. kergueleni*
 Palm of gnathopod 1 not very oblique, article 6 stouter, tooth of third pleonal epimeron intermediate (as shown in fig. 3S) *H. boreopacificus*
34. Article 2 of peraeopod 5 distally narrowing asymmetrically (fig. 4I) 38
 Article 2 of peraeopod 5 symmetrical, not distally narrowing (fig. 4J) 35
35. Palm of gnathopod 1 not distinct from hind margin of article 6, second pleonal epimeron with a small but distinct tooth *H. squamosus*
 Palm of gnathopod 1 distinct, second pleonal epimeron quadrate 36
36. Uropod 2 armed with short spines 37
 Uropod 2 armed with long setae *H. kurilicus*
37. Palm of gnathopod 1 shorter than hind margin of article 6 (fig. 4F), body chitin granular *H. granulatus*
 Palm of gnathopod 1 longer than hind margin of article 6, body chitin punctate *H. strages*, new species
38. Third pleonal epimeron with a poorly developed sinus at base of tooth *H. reticulatus*
 Third pleonal epimeron lacking a sinus 39
39. First flagellar article of antenna 1 with a large distal spine 40
 First flagellar article of antenna 1 lacking a large distal spine 42
40. Teeth of article 2 on peraeopod 5 coarse, third uropodal rami very stout *H. serratipes*
 Teeth of article 2 on peraeopod 5 very fine, third uropodal rami slender 41
41. Palm of gnathopod 1 shorter than hind margin of article 6 *H. tunisiacus*
 Palm of gnathopod 1 longer than hind margin of article 6 *H. strages*, new species
42. Article 6 of gnathopod 1 expanding distally, palm distinct *H. punctatus*
 Article 6 of gnathopod 1 with parallel sides, palm indistinct *H. frigidus*

Hippomedon strages, new species

Figure 5

DIAGNOSIS: Third pleonal epimeron with straight posterior edge, lower corner with an intermediate-sized tooth tapering asymmetrically, acute, not reflexed; second pleonal epimeron rounded at lower corner; fourth pleonal segment slightly rounded above; outer ramus of third uropod biarticulate; telson intermediate in length, apices tapering, armed with two spines; eyes absent; sixth article of gnathopod 1 shorter than fifth, palm very oblique, occupying most of article 6, hind margin of article 6 short but distinct; article 2 of fifth peraeopod slightly asymmetrical distally but not distinctly constricted, serrations small; uropod 2 armed

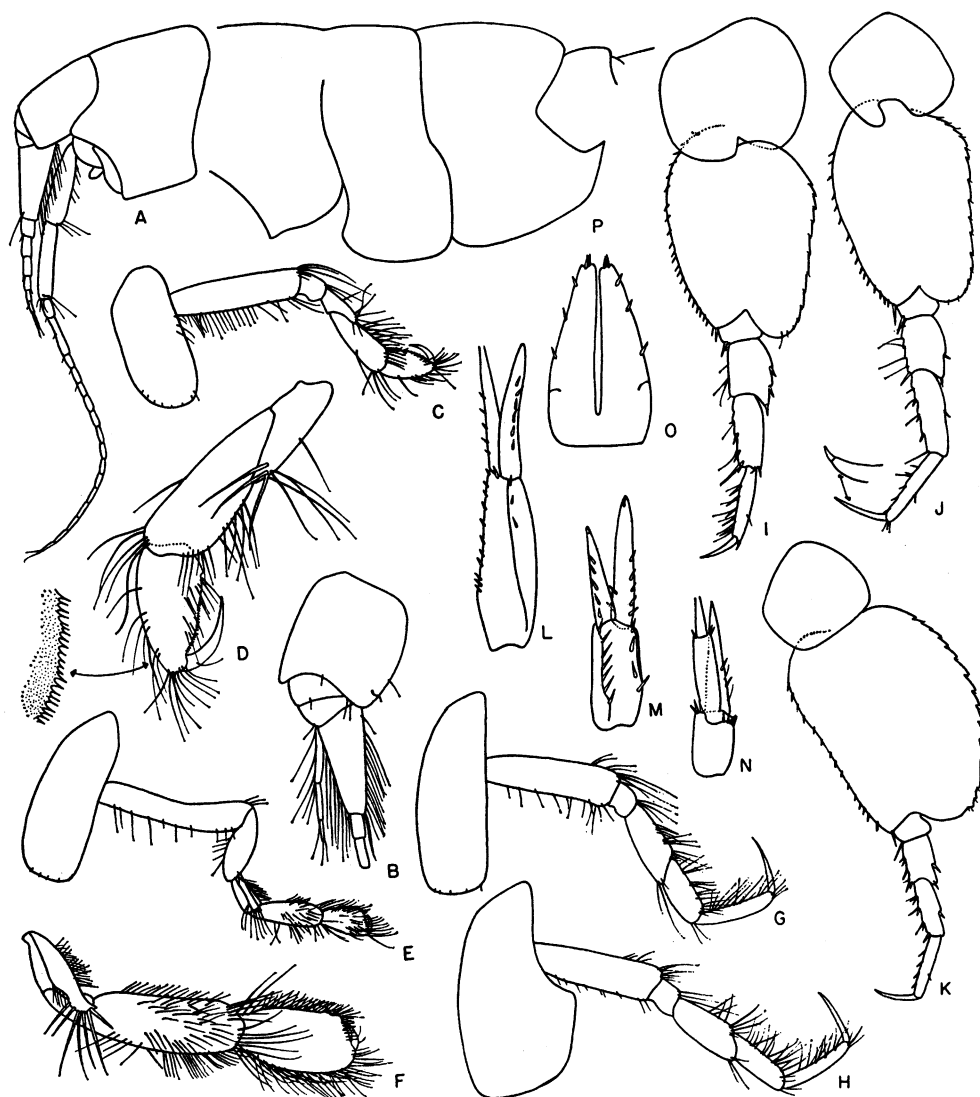


FIG. 5. *Hippomedon strages*, new species, holotype, female, 6.5 mm., Station V-15-63. A. Head. B. Antenna 1. C, D. Gnathopod 1. E, F. Gnathopod 2. G, H, I, J, K. Peraeopods 1, 2, 3, 4, 5. L, M, N. Uropods 1, 2, 3, some rami broken. O. Telson. P. Pleonal segments 1-3 (complete), 4-6 (dorsal).

with short spines; first flagellar article of antenna 1 elongated, armed distally with a slender spine, first peduncular article poorly produced distally; lateral lobes of head short; third article of mandibular palp about three-fourths as long as article 2.

HOLOTYPE: A.M.N.H. No. 12311, female, 6.5 mm. Unique.

TYPE LOCALITY: Station V-15-63, off the Gulf of Guayaquil, Ecuador, latitude $3^{\circ} 15'$

S., longitude $82^{\circ} 30' W.$, 2864-2861 meters, December 4, 1958.

RELATIONSHIP: According to the key of *Hippomedon* by Gurjanova (1962) and the foregoing key, *H. strages* and the following species are closely related: *H. squamosus* Stebbing, *H. granulatus* Bulycheva, *H. kurilicus* Gurjanova, *H. punctatus* Gurjanova, *H. frigidus* Stephensen, *H. serratipes* Stephensen, and *H. tunisiacus* Stephensen. The first

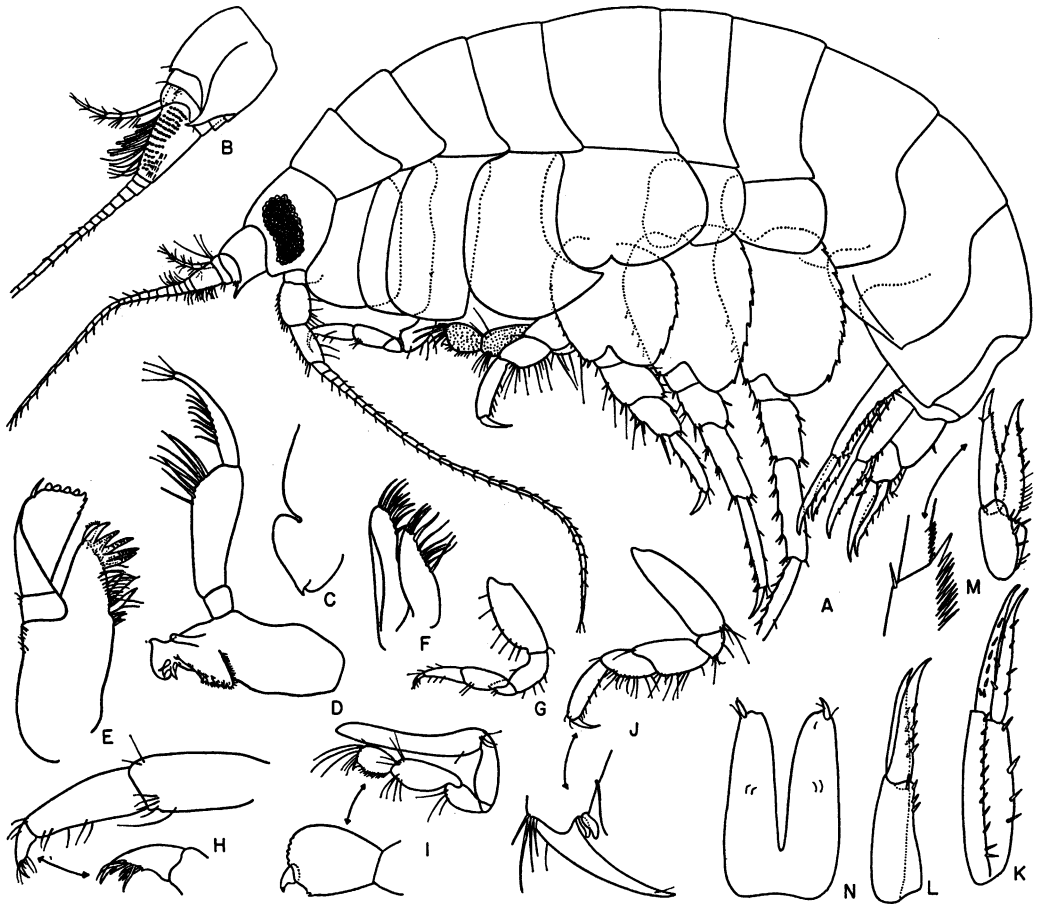


FIG. 6. *Ichnopus pelagicus* Schellenberg, female, 6.2 mm., Station V-15-54. A. Lateral view. B. Antenna 1. C. Epistome and upper lip, lateral. D. Mandible. E, F. Maxillae 1, 2. G, H. Gnathopod 1. I. Gnathopod 2. J. Peraeopod 2. K, L, M. Uropods 1, 2, 3. N. Telson.

three species are characterized by a symmetrical second article of peraeopod 5, while the remainder have it constricted distally. This character is very difficult to make a value judgment upon, and in *H. strages* it is simply a matter of opinion as to which alternative fits. Of the above species, *H. strages*, *H. serratipes*, and *H. tunisiacus* have a distal spine on the first flagellar article of antenna 1. Gurjanova (1962) placed *H. serratipes* in a couplet that indicated its lack of a spine, but the original figures show it to be present. Perhaps it is present on many other species but not recognized because it is hidden by the tufts of aesthetascs. I did not observe it on *H. strages* until after making a special search for it; it is very inconspicuous. Its value presently is dubious until all species of

Hippomedon have been reexamined especially for its presence. The palmar condition of the first gnathopod remains as a variable for distinguishing the several species. Unfortunately it is also a character of dubious value, since the palmar condition of such a poorly developed appendage can be changed by the observational aspect of the appendage when mounted on the glass slide. The palm of *H. strages*, however, is clearly distinct from that of other species because it continues along most of the hind portion of article 6 but remains discrete from the very short hind margin.

The value of eyes as a major systematic distinction is also questionable. More and more species of amphipods are being shown to support eyeless populations at the deeper

extremes of their ranges, even those having distinct crystalline lenses or ommatidia. Many species of *Hippomedon* (see couplets 4, 12, 13, and 18) have pigmentary eyes lacking distinct ommatidia; these often fade in alcohol. In keying out species, one should use alternative couplets for ocular specimens when the specimen at hand lacks eyes.

GENUS *ICHNOPUS* COSTA

Ichnopus pelagicus Schellenberg

Figure 6

Ichnopus pelagicus SCHELLENBERG, 1926, p. 218; 1929, p. 196.

?*Socarnes longicornis* BIRSTEIN AND VINOGRADOV, 1960, pp. 185-187, fig. 7.

MATERIAL: Station V-15-54, one female, 6.2 mm.

RECORD: West of Costa Rica and south of Guatemala Trench, latitude 9° 22.5' N., longitude 89° 33' W., November 24, 1958, 3517-3503 meters.

DISTRIBUTION: Eastern Pacific from near Guatemala Trench (latitude 9° N.) to off South America at latitude 20° S.; western Pacific in the New Hebrides Trench, Mellish Rise of the Coral Sea, and the Phoenix Islands. Probably a pan-Pacific pelagic species dwelling in the upper 150 meters.

REMARKS: Although the upper lip is not figured and the seventh article of gnathopod 1 is not enlarged sufficiently to show the spines and setae characteristic of *Ichnopus*, I believe that *S. longicornis* represents a synonym of *I. pelagicus*. The clues lie in the mandibular palp, which is that of *Ichnopus* (compare Sars, 1895, pl. 15 and pl. 16, fig. 2, to see the differences in the palps of *Ichnopus* and *Socarnes*). The broad palp of maxilla 1 and the shortened inner plate of maxilla 2 also are indicative. All other figures shown by Birstein and Vinogradov correspond well with the specimen at hand.

GENUS *PARACENTROMEDON* CHEVREUX
AND FAGE

Paracentromedon CHEVREUX AND FAGE, 1925, p. 57.

?*Elimedon* J. L. BARNARD, 1962a, p. 24.

REMARKS: I instituted the genus *Elimedon* as a relative of *Hippomedon* having a shortened third mandibular palp article. Gurjanova's (1962) key to the Lysianassidae calls

my attention to *Paracentromedon*, which also differs from *Hippomedon* mainly by this criterion. I did not relate *Elimedon* to *Paracentromedon* because of the condition of the first gnathopods. In *Paracentromedon* articles 5 and 6 are equal, and article 6 is sublinear and poorly palmate. Most species of *Hippomedon* and *Elimedon* have a distinctive first gnathopod, in which article 5 is very elongated, inflated slightly medially, and tapered distally, with article 6 short, the palm inflated but poorly defined. But many exceptions to this condition of gnathopod 1 in the genus *Hippomedon* are known (Gurjanova, 1962). Thus, *Elimedon* represents simply a *Paracentromedon* with "typical" first gnathopods. *Paracentromedon* probably is not sufficiently distinctive, on the basis of the shortening of its third mandibular palp article, because it is connected to typical *Hippomedon* by the following intergrading species: *Hippomedon antitemplado* J. L. Barnard (1961) and *H. concolor* J. L. Barnard (1961).

A judgment must be made on the condition of coxa 1 in *Paracentromedon*, as it seems to bridge the very broad expanded coxa of *Hippomedon* with the rectangular, slightly narrowed condition of *Tryphosa*.

Paracentromedon carabicus, new species

Figure 7

DIAGNOSIS: Tooth of the third pleonal epimeron short, ventral edge minutely serrate; carina of pleonal segment 4 sharp, overriding segment 5; rami of uropods 1 and 2 naked; flagellar articles of first antenna elongated; claws of pereopods 1 and 2 as long as sixth articles.

HOLOTYPE: A.M.N.H. No. 12313, male, 3 mm. Unique.

TYPE LOCALITY: Station V-15-15, north of Caribbean Panama, latitude 10° 11' N., longitude 78° 30' W., November 9, 1958, 1715 meters.

RELATIONSHIP: The criteria of the diagnosis distinguish this species from *Elimedon cristatus* J. L. Barnard (1962b). Because the present species has a long second antenna, the shortness of antenna 2 no longer is a valid generic character of *Elimedon*. The shapes of gnathopod 1 and the telson also differentiate the two species, and the inner ramus of uropod 3 is shorter in *E. carabicus*.

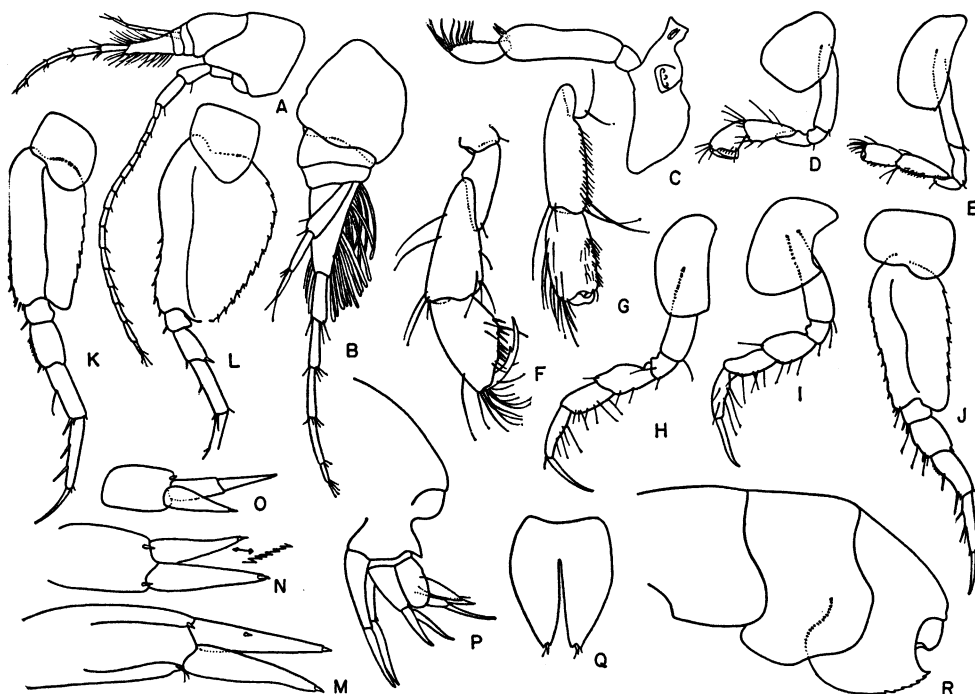


FIG. 7. *Paracentromedon carabicus*, new species, holotype, male, 3.0 mm., Station V-15-15. A. Head. B. Antenna 1. C. Mandible. D, F. Gnathopod 1. E, G. Gnathopod 2. H, I, J, K, L. Peraeopods 1, 2, 3, 4, 5. M, N, O. Uropods 1, 2, 3. P. Urosome. Q. Telson. R. Metasome.

Externally these two species of *Elimedon* (= *Paracentromedon*) bear close resemblance to *Hippomedon antitemplado* and *H. concolor*, both erected by J. L. Barnard (1961) because of the presence of keels on pleonal segment 4. Indeed, both species show intergradation of the mandibular palps with those of *Paracentromedon* (= *Elimedon*) to such an extent that I suggest a reduction of *Paracentromedon* to subgeneric status under *Hippomedon*.

The type species of *Paracentromedon* lacks a sharp dorsal keel on pleonal segment 4.

GENUS URISTES DANA

Uristes (?) *lepidus*, new species

Figure 8

DIAGNOSIS: Article 1 of antenna 1 enlarged and forming a dorsal crest slightly overhanging articles 2 and 3; first urosomal segment smooth dorsally; third pleonal epimeron straight behind, with very small tooth at lower corner; sixth article of gnathopod 1

scarcely longer than article 6, article 7 not overlapping palm; posterior edges of second articles on peraeopods 3 to 5 evenly serrate.

HOLOTYPE: A.M.N.H. No. 12314, female, 4.0 mm.

TYPE LOCALITY: Station V-15-150, north of Puerto Rico Trench, latitude 20° 21.3' N., longitude 66° 24' W., June 11, 1959, 5481–5497 meters.

ADDITIONAL MATERIAL: Station V-15-417, male, 3.0 mm.

RELATIONSHIP: This is the only species of *Uristes* known to have a dorsally crested first article of antenna 1. Probably a new subgenus or genus should be erected for it on that basis, to follow normal procedure in this family, although genera such as *Hippomedon* have both crested and non-crested species.

The lateral lobes of the head are so extended ventrally that the bases of the second antennae are hidden behind them, and this fact may also form a character of generic usefulness.

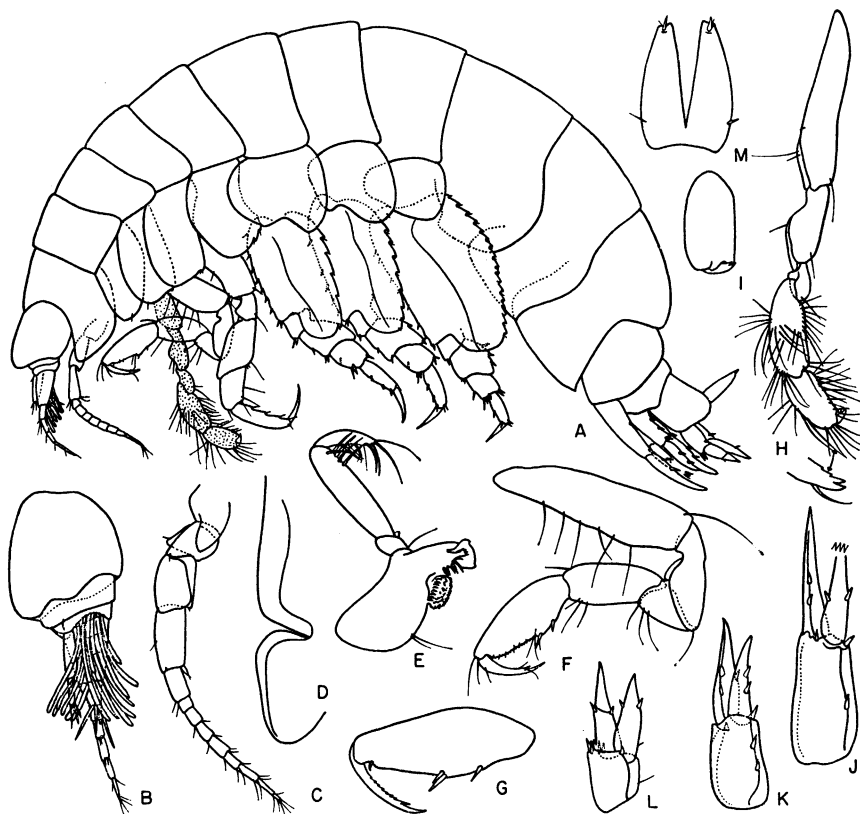


FIG. 8. *Uristes* (?) *lepidus*, new species, holotype, female, 4.0 mm., Station V-15-150. A. Lateral view. B, C. Antennae 1, 2. D. Epistome and upper lip. E. Mandible. F, G. Gnathopod 1. H, I. Gnathopod 2. J, K, L. Uropods 1, 2, 3. M. Telson.

FAMILY STEGOCEPHALIDAE

GENUS ANDANIEIXIS STEBBING

Andaniexis australis K. H. Barnard

Figure 9

Andaniexis australis K. H. BARNARD, 1932, pp. 76-77, fig. 34. J. L. BARNARD, 1962b, pp. 38-40, figs. 24, 25.

MATERIAL: Station V-15-69, two specimens.

RECORD: Off Peru, latitude 10° 13' S., longitude 80° 05' W., December 9, 1958, 6324-6328 meters.

REMARKS: Again I figure this species for comparison with material from the south Atlantic Ocean shown in Barnard (1962b).

KEY TO *Andaniexis*

1. Lobe of article 2 of pereopod 5 not projecting

- below end of article 3 *A. subabyssi*
 Lobe of article 2 of pereopod 5 projecting below article 3 2
 2. Head telescoped by thoracic segment 1, telson with apical notch *A. spongicola*
 Head not telescoped by thoracic segment 1, telson apically entire 3
 3. Article 6 of gnathopod 2 as stout as article 5 and bearing a large distal spine
 *A. australis*
 Article 6 of gnathopod 2 more slender than article 5 and lacking a large distal spine
 *A. abyssi*

GENUS STEGOCEPHALOIDES SARS

Stegocephaloides christianiensis (Boeck)

Figure 10

Stegocephaloides christianiensis (Boeck) STEBBING, 1906, p. 92. CHEVREUX, 1911a, pp. 177-179, fig. 5, pl. 8, figs. 15-28. CHEVREUX AND FAGE,

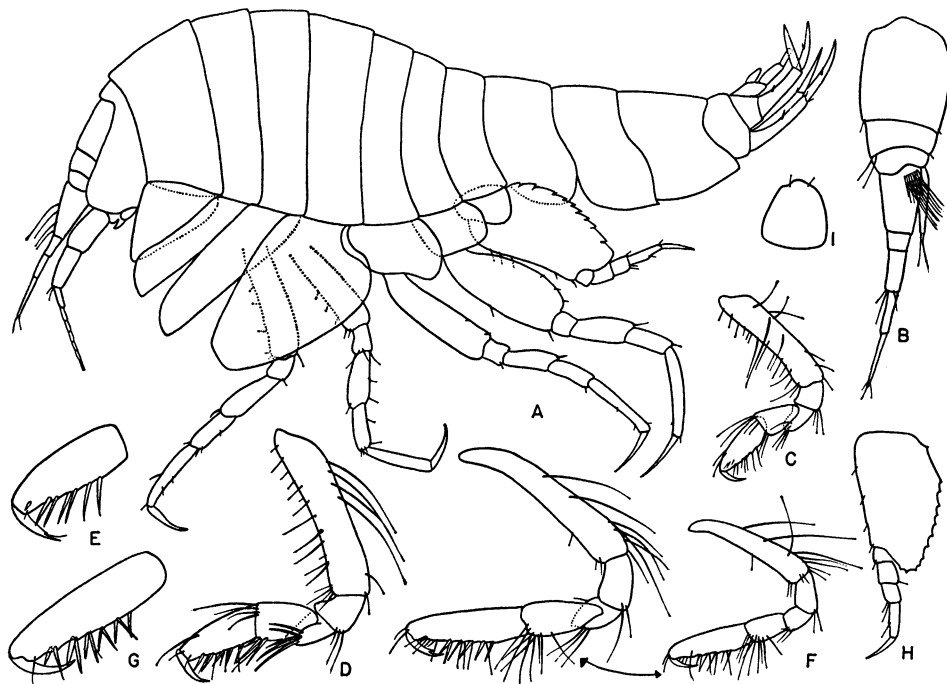


FIG. 9. *Andaniexis australis* K. H. Barnard, female, 2.6 mm., Station V-15-69. A. Lateral view. B. Antenna 1. C-E. Gnathopod 1. F, G. Gnathopod 2. H. Peraeopod 5. I. Telson.

1925, pp. 74-75, figs. 64, 65. STEPHENSEN, 1935, pp. 116-117. GURJANOVA, 1951, pp. 300-301, fig. 165.

MATERIAL: Station V-14-46-II, female, 3.0 mm.

RECORD: East Mediterranean Sea, latitude

32° 28' N., longitude 29° 46' E., July 3, 1958, 1938 meters.

REMARKS: The specimen at hand has slight discrepancies from the figures of Sars (1895) and Chevreux and Fage (1925). The lateral lobes of the head are not sharp; the telson has

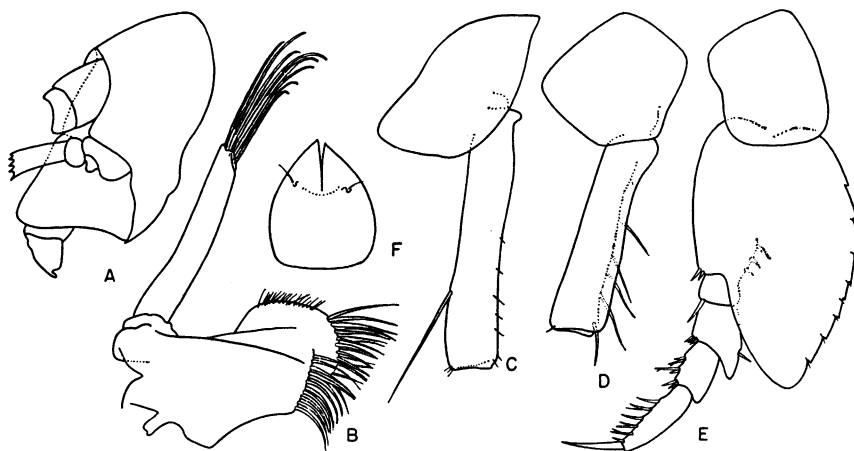


FIG. 10. *Stegocephaloides christianiensis* (Boeck), female, 3.0 mm., Station V-14-46-II. A. Head. B. Maxilla 2. C, D, E. Peraeopods 3 (part), 4 (part), 5. F. Telson.

a slightly different shape (Sars); the second maxilla has a somewhat more slender outer plate; the coxae of pereopods 3 and 4 differ; and the basal article of the primary flagellum of antenna 1 apparently is split into two articles, and the accessory flagellum therefore appears relatively longer. Nevertheless, they probably represent distinctions of no specific value and in some measure may reflect differences in dissection and mounting techniques.

STELEUTHERA, NEW GENUS

DIAGNOSIS: Mandible bearing toothed primary cutting edge; palp of first maxilla short, uniarticulate; outer plate of second maxilla narrow, but not geniculate nor attached to a diverging basal process; article 4 of maxillipedal palp rather well developed; flagella of antennae with only two or three articles, spiniform; sixth articles of gnathopods longer

than and as broad as fifth articles, not tapering strongly; accessory flagellum biarticulate; telson poorly cleft; article 2 of pereopod 4 linear, narrow.

TYPE SPECIES: *Steleuthera maremboca*, new species.

RELATIONSHIP: Differing from *Stegocephaloides* Sars by the non-geniculate outer plate of maxilla 2, the biarticulate accessory flagellum, the short cleft of the telson, and the larger fourth palp article of the maxilliped. Mouth parts of *Stegocephaloides* have not been figured, and reliance thereon is based on Sars's (1895) statement that the mouth parts are like those of *Stegocephalus*.

Steleuthera maremboca, new species

Figure 11

DIAGNOSIS: With the characters of the genus. Eyes absent.



FIG. 11. *Steleuthera maremboca*, new genus and new species, holotype, male, 2.4 mm., Station V-15-69. A. Lateral view. B. Antenna 1. C. Part of antenna 1, showing accessory flagellum. D. Upper lip. E. Mandible. F, G. Maxilla 1. H. Maxilla 2. I. Maxilliped. J, K. Gnathopods 1, 2. L. Pereopod 5. M, N, O. Uropods 1, 2, 3. P. Telson.

HOLOTYPE: A.M.N.H. No. 12318, male, 2.4 mm.

TYPE LOCALITY: Station V-15-69, off Peru, latitude 10° 13' S., longitude 80° 05' W., December 9, 1958, 6324–6328 meters.

MATERIAL: Three specimens from the type locality.

FAMILY AMPELISCIDAE

GENUS BYBLISOIDES K. H. BARNARD

Byblisoides K. H. BARNARD, 1932, pp. 86–87.

J. L. BARNARD, 1961, pp. 64–66 (description of *B. arcillis* and *B. esferis*).

KEY TO *Byblisoides*

1. Anterior edge of article 5 on pereopod 5 bearing four long plumose setae *B. juxtacornis*
- Anterior edge of article 5 on pereopod 5 lacking long plumose setae 2
2. Pleonal segment 4 not acutely produced from lateral view and not bilobate dorsally *B. esferis*



FIG. 12. *Byblisoides blasensis*, new species, holotype, female, 10.0 mm., Station V-15-15. A. Head. B. Last article of antenna 1. C. Flagellum of antenna 2. D. Mandibular palp. E, F. Maxillae 1, 2. G. Gnathopod 2. H. Gnathopod 1. I, J, K, L, M. Pereopods 1, 2, 3, 4, 5. N, O, P. Uropods 1, 2, 3. Q. Telson. R. Pleonal segments 1–6 (5 and 6 fused), with offset showing dorsum of pleonal segment 4.

- Pleonal segment 4 acutely produced from lateral view and bilobate dorsally . . . 3
 3. Coxa 1 evenly rounded below, inner ramus of uropod 2 spinose
 *B. blasensis*, new species
 Coxa 1 asymmetrically rounded below, inner ramus of uropod 2 naked *B. arcillis*

***Byblisoides blasensis*, new species**

Figure 12

DIAGNOSIS: Lower edge of the lobe on the second article of pereopod 5 evenly rounded, anterior edge of fifth article lacking long plumose setae; lower anterior corners of articles 4 and 5 each bearing a short spine; article 7 shorter than article 6; antenna 2 about twice as long as head; distal end of coxa 1 evenly rounded; dorsal process of pleonal segment 4 acute from lateral view, composed of a single rounded lobe from dorsal view; both rami of second uropod spinose.

OTHER FEATURES: Finger of gnathopod 1 with large inner tooth, presumably not present in other species of the genus; third mandibular palp article two-thirds as long as article 2, strongly setose along inner edge.

HOLOTYPE: A.M.N.H. No. 12320, female, 10 mm. Unique.

TYPE LOCALITY: Station V-15-15, north of Caribbean Panama, latitude 10° 11' N., longitude 78° 30' W., November 9, 1958, 1715 meters.

RELATIONSHIP: The key provides the relationship among the four known species of the genus. As stated by J. L. Barnard (1961), the differences among species in this genus are minor, but the places in which they have been collected are so widely scattered that the minor differences presently can be used on a specific basis. In the future, when intermediate localities are occupied and perhaps

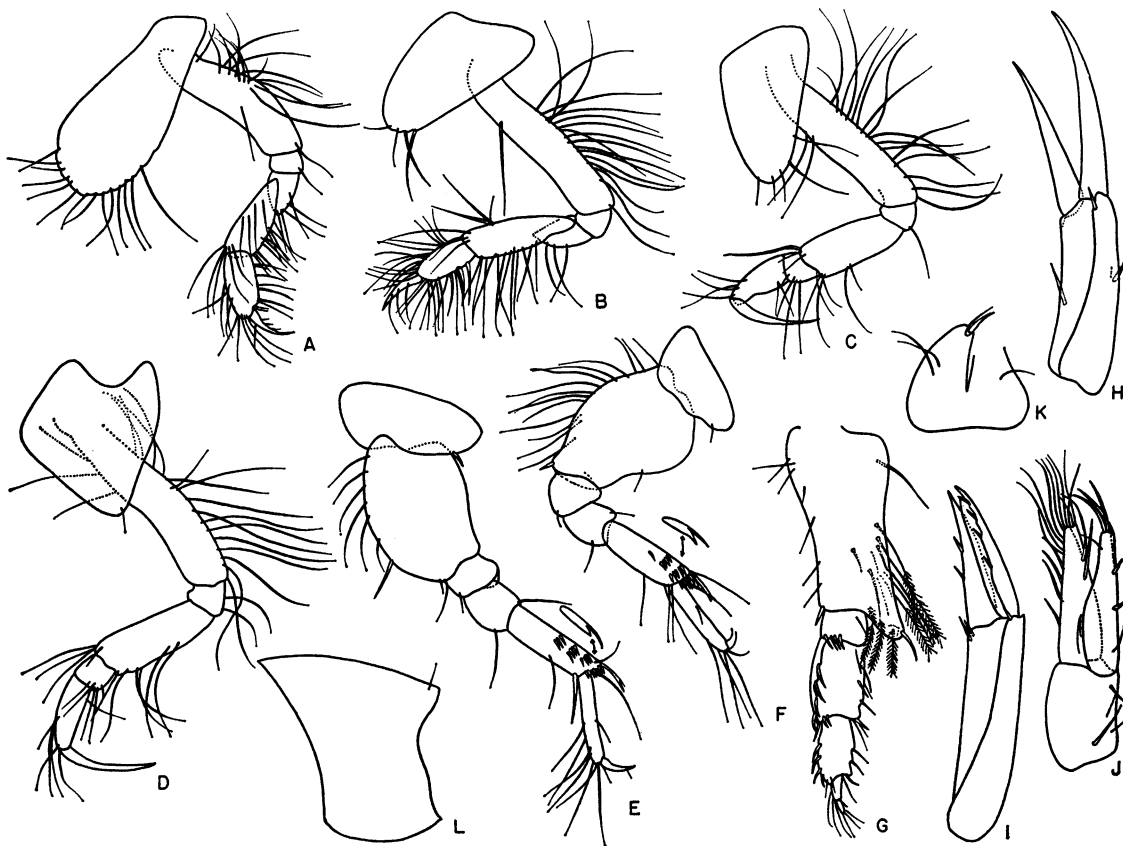


FIG. 13. *Haploops lodo* J. L. Barnard, female, 5.8 mm., Station V-15-37. A, B. Gnathopods 1, 2. C, D, E, F, G. Pereopods 1, 2, 3, 4, 5. H, I, J. Uropods 1, 2, 3. K. Telson, left dorsum broken. L. Left third pleonal epimeron.

intermediate specimens are collected, the differences may denote only subspeciation. Probably the members of this genus represent the infraspeciation of a formerly ubiquitous abyssal species that has been displaced into bathyal depths by changes in the abyss (Madsen, 1961). A displacement to bathyal depths would result in discontinuity of widely separated populations.

GENUS **HAPLOOPS** LILJEBORG

Haploops lodo J. L. Barnard

Figure 13

Haploops lodo J. L. BARNARD, 1961, pp. 67–69, fig. 38.

MATERIAL: Station V-15-37, female, 5.8 mm.

RECORD: Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 25' N., longitude 79° 23' W., November 14, 1958, 1749 meters.

REMARKS: The third pleonal epimeron and peraeopod 5 have different shapes from those originally described, the third pleonal epimeron having a distinctly quadrate, very slightly produced lower corner and the second article of peraeopod 5 being somewhat thinner.

FAMILY **PHOXOCEPHALIDAE**

GENUS **HARPINIA** BOECK

Harpinia abyssalis Pirlot

Harpinia abyssalis PIRLOT, 1932, pp. 69–74, figs. 16–18. J. L. BARNARD, 1960, p. 347; 1961, p. 69.

MATERIAL: Station V-15-69, one specimen.

RECORD: Off Peru, latitude 10° 13' S., 80° 05' W., December 9, 1958, 6324–6328 meters.

DISTRIBUTION: Flores Sea, Makassar Strait, northern Indian Ocean, eastern Pacific Ocean, 780–6328 meters.

Harpinia abyssalis productus, new subspecies

Figure 14

DIAGNOSIS: Like the nominate subspecies, but the tooth of the third pleonal epimeron is about twice as long.

HOLOTYPE: A.M.N.H. No. 12323, female, 6.0 mm.

TYPE LOCALITY: Station V-15-54, Guatemala Basin, latitude 9° 22.5' N., longitude 89° 33' W., November 24, 1958, 3517–3503 meters.

MATERIAL: Ten specimens from the type locality; Station V-15-37, two specimens.

Harpinia ayutlanta, new species

Figure 15

DIAGNOSIS: Third pleonal epimeron bearing a medium-sized posterior tooth, lower edge convex, lacking setae; second pleonal epimeron bearing two setae on lower edge; article 2 of peraeopod 5 with narrow posterior lobe, not expanded distally, posterior edge with three small serrations, rounded lower edge with minute serrations; head with a large slender tooth at lower antennal corner; rami of uropods 1 and 2 strongly spinose; article 2 of second antenna lacking a projecting gland cone.

HOLOTYPE: A.M.N.H. No. 12326, female, 7 mm. Unique.

TYPE LOCALITY: Station V-15-36, Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 30' N., longitude 79° 21' W., November 14, 1958, 1746–1609 meters.

RELATIONSHIP: This specimen is clearly distinct from its close relative, *H. abyssalis productus*, new subspecies, also from the eastern Pacific Ocean. It differs by the lack of a gland-cone process on article 2 of antenna 2, by the shorter tooth of the third pleonal epimeron, and by the unexpanded narrower lobe of article 2 on peraeopod 5. The third pleonal epimeron is more like that of the nominate subspecies, *H. abyssalis abyssalis*, from the Flores Sea bathyal area, but again, the lack of a gland cone is distinctive.

The new species is related to *H. similis* Stephensen (1925), but differs by the multi-spinose rami of uropods 1 and 2, also characteristic of *H. abyssalis* and its subspecies.

Harpinia excavata Chevreux, new synonymy

Figure 16

Harpinia excavata CHEVREUX, 1887, pp. 3–5; 1900, pp. 37–38, pl. 6, fig. 1. STEBBING, 1906, pp. 142–143; 1908, pp. 73–74; 1910, p. 452. K. H. BARNARD, 1925, pp. 340–341. CHEVREUX, 1927, p. 73; 1935, p. 74. SCHELLENBERG, 1955, p. 193. J. L. BARNARD, 1962b, pp. 47–50, figs. 37, 38.

Harpiniopsis sanpedroensis J. L. BARNARD, 1960, pp. 328–330, pls. 64, 65.

DIAGNOSIS OF NEW MATERIAL: Third pleonal epimeron bearing a long, slightly up-turned, slender tooth; peraeopod 5 with

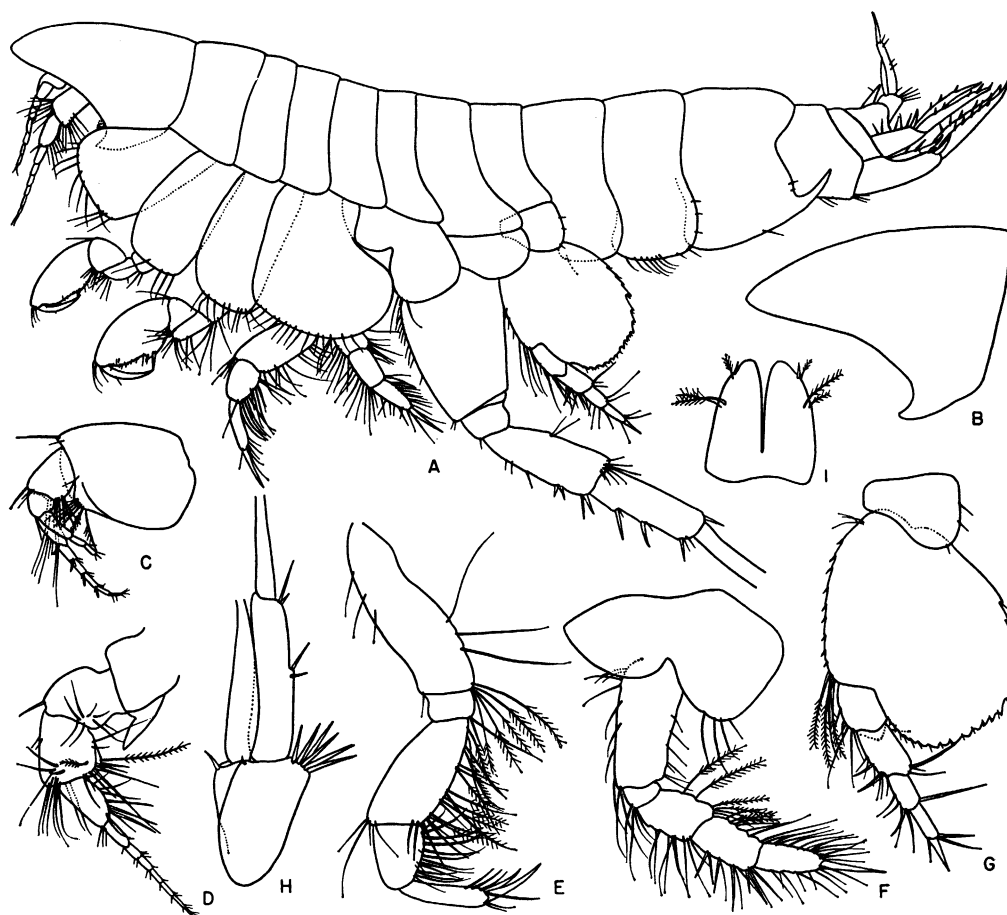


FIG. 14. *Harpinia abyssalis productus*, new subspecies, female, 6.0 mm., Station V-15-54. A. Lateral view. B. Head. C, D. Antennae 1, 2. E, F, G. Peraeopods 1, 3, 5. H. Uropod 3, rami broken. I. Telson.

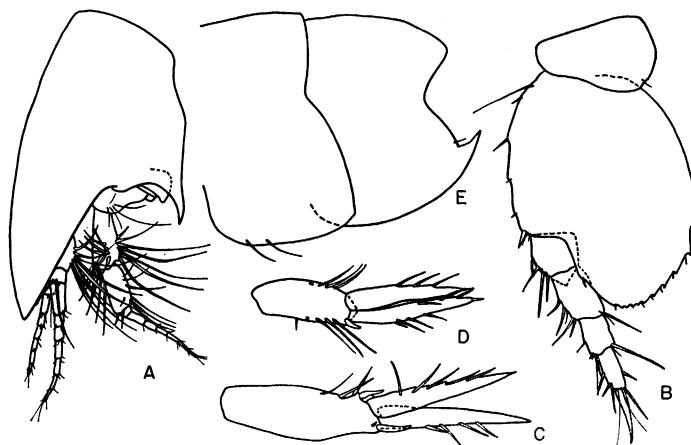


FIG. 15. *Harpinia ayutlanta*, new species, holotype, female, 7.0 mm., Station V-15-36. A. Head. B. Peraeopod 5. C, D. Uropods 1, 2. E. Pleonal segments 2, 3.

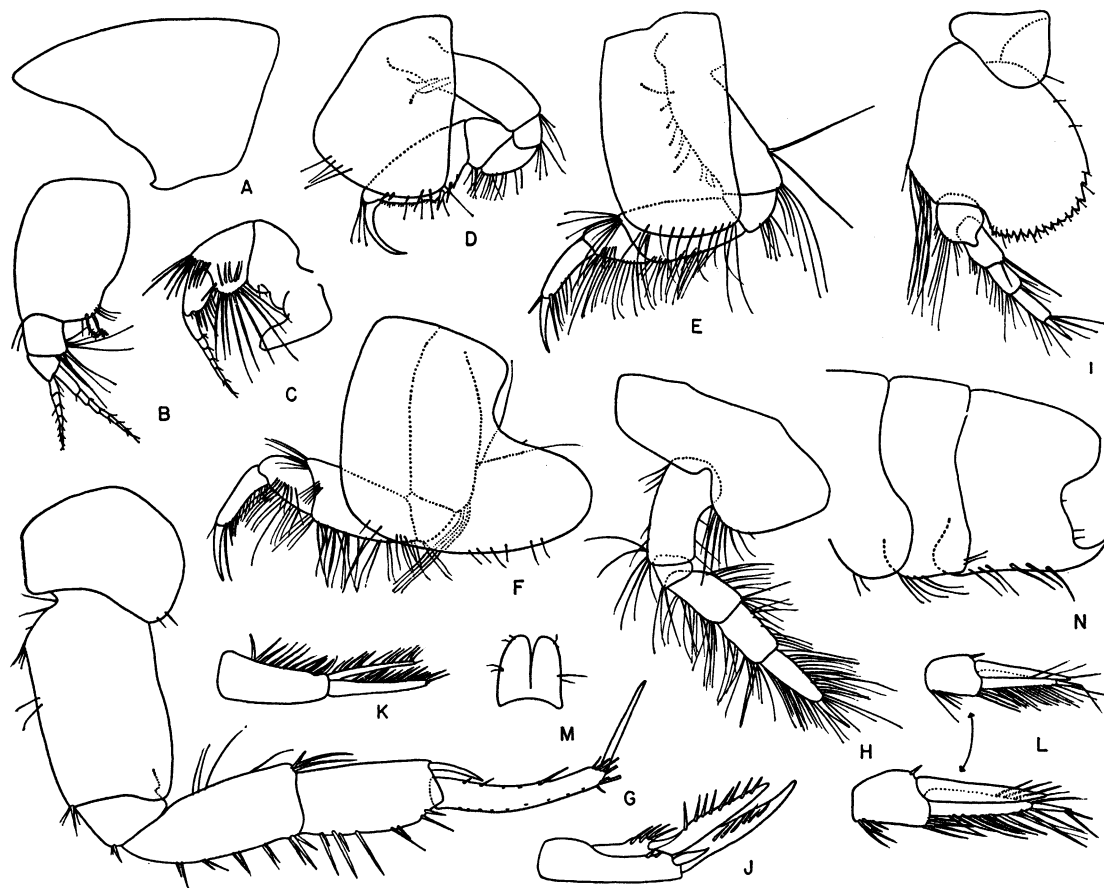


FIG. 16. *Harpinia excavata* Chevreux, female, 7.6 mm., Station V-15-22. A. Head. B, C. Antennae 1, 2. D. Gnathopod 1. E, F, G, H, I. Peraeopods 1, 2, 3, 4, 5. J, K, L. Uropods 1, 2, 3. M. Telson. N, Metasome.

article 2 smooth behind, lower edge of expansion bearing numerous small, sharp teeth, lower anterior edge bearing a row of eight or nine long setae; head with small tooth at lower antennal corner; antenna 2 with a large, blunt, gland cone; uropods 1 and 2 with strongly setose peduncles and rami; lobes of telson blunt apically.

MATERIAL: Station V-15-22, female, 7.6 mm., figured; Station V-15-37, two specimens like *H. sanpedroensis*.

RECORDS: Off Nombre de Dios, Caribbean Panama, latitude 9° 46.3' N., longitude 79° 37.5' W., November 10, 1958, 975 meters; Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 25' N., longitude 79° 23' W., November 14, 1958, 1749 meters (*H. sanpedroensis*).

REMARKS: J. L. Barnard (1961) discussed

the possibility that *H. sanpedroensis* and *H. excavata* represent subspecies or varieties of the same stem. This new material shows that the above synonymy represents a widely distributed, pan-oceanic, stem species with subspecific localization. The stem species as represented by Chevreux (1900) and by J. L. Barnard (1962b) has pereopod 5 with an oblique and serrate lower edge of article 2 combined with a short tooth on the third pleonal epimeron. The stem species is known from the north and south Atlantic oceans. J. L. Barnard (1962b) described a form from the abyssal south Atlantic having an elongated third pleonal tooth. J. L. Barnard (1960) described *H. sanpedroensis* from California also as having a long third pleonal epimeral tooth, but article 2 of pereopod 5 as having fewer, more ragged serrations on the

lower and posterior edges, and uropods 1 and 2 as having fewer setae. The present material has the long third epimeral tooth and the dense setae of uropods 1 and 2, but the second article of pereopod 5 is distinctly defined into lower and posterior edges, bearing numerous teeth only on the lower edge. The writer proposes that these various forms represent subspecies but postpones naming them until more samples can be collected in intermediate localities.

GENUS *PHOXOCEPHALUS* STEBBING

Phoxocephalus kergueleni (Stebbing)

Figure 17

Phoxus kergueleni STEBBING, 1888, pp. 816-819, pl. 55.

Phoxocephalus kergueleni, STEBBING, 1906, p. 135. J. L. BARNARD, 1960, p. 300.

MATERIAL: Station V-15-37, one female, 4.0 mm.

RECORD: Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 25' N., longitude 79° 23' W., November 14, 1958, 1749 meters.

REMARKS: This remarkable find of subantarctic *P. kergueleni* in the deep bathyal zone of Pacific Panama supports the view that bathyal faunas are cosmopolitan.

The specimen at hand differs in no major respect from the fine illustrations of Stebbing, but eventually may require subspecific designation, although such will come from study of specimens at intermediate localities. The eyes are less perfectly developed, but this is

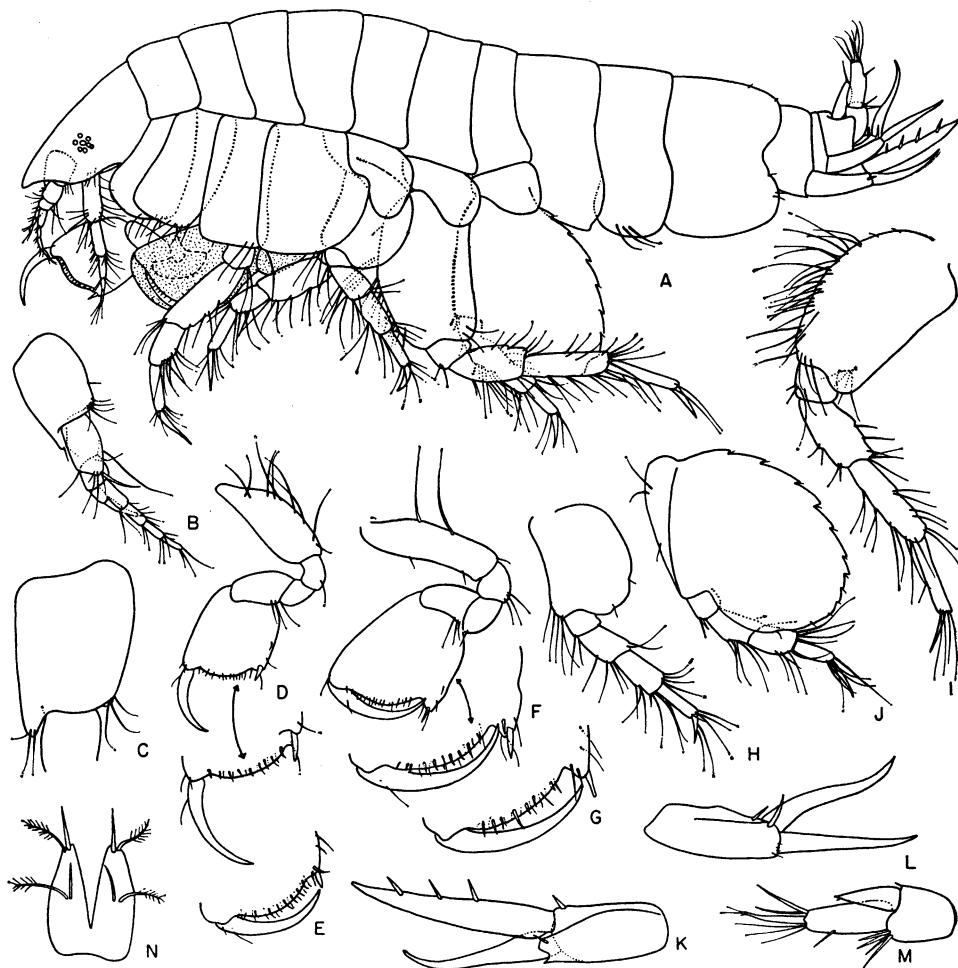


FIG. 17. *Phoxocephalus kergueleni* (Stebbing), female, 4.0 mm., Station V-15-37. A. Lateral view. B. Antenna 1. C. Article 1 of antenna 1. D, E. Gnathopod 1. F, G. Gnathopod 2. H, I, J. Pereopods 3, 4, 5. K, L, M. Uropods 1, 2, 3. N. Telson.

typical of other phoxocephalid species descending into greater depth. The hind lobe of article 2 on pereopod 3 is slightly less produced downward, the same lobe on pereopod 4 is more slender, and the hands of the gnathopods are stouter, but all these criteria are quantitative in nature and may indeed be found to be characteristic of some Kerguelen specimens when sufficient numbers are studied.

This species differs from *P. tenuipes* Stephensen (1925) by the short fourth pereopod,

the very long posterior lobe of article 2 on pereopod 5, the short fifth articles of the gnathopods, the presence of poorly developed eyes, and the short outer ramus of uropod 1.

FAMILY PARDALISCIDAE

GENUS *HALICE* BOECK (=SYNOPIOIDES STEBBING)

Halice Boeck, BIRSTEIN AND VINOGRADOV, 1955, pp. 242-243; 1962, p. 252 (with key).

I concur with Birstein and Vinogradov (1962) that J. L. Barnard's (1959) resurrection of *Synopioides* Stebbing and transfer of



FIG. 18. *Halice cocalito*, new species, holotype, male, 3.5 mm., Station V-15-37. A. Head. B, C. Antennae 1, 2. D, E. Gnathopod 1. F, G. Gnathopod 2. H, I, J, K, L. Pereopods 1, 2, 3, 4, 5. M, N, O. Uropods 1, 2, 3. P. Telson. Q. Pleon.

some species of *Pardaliscella* to that genus were errors.

***Halice cocalito*, new species**

Figure 18

DIAGNOSIS: Palp article 3 of mandible nearly as long as article 2, not apically expanded; urosomal segment 1 with a medium-sized dorsal tooth, segment 2 with a long tooth nearly reaching the base of the telson; rostrum of head small, not swollen, lateral lobes extending strongly ventrally; peduncle and rami of uropod 1 subequal in length; third pleonal epimeron bearing a posteroventral tooth; rami of uropod 2 subequal in length, rami of uropod 3 very long and slender; accessory flagellum slightly longer than the inflated portion of primary flagellum, basal article of accessory flagellum lobately produced apically; article 4 of pereopods 1 and 2 longer than article 5; inner plate of maxilla 1 with one seta.

HOLOTYPE: A.M.N.H. No. 12330, male, 3.5 mm. Unique.

TYPE LOCALITY: Station V-15-37, Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 25' N., longitude 79° 23' W., November 14, 1958, 1749 meters.

RELATIONSHIP: So many distinctive characters are combined in this species that it is not related particularly to any other. Its relationship as detected in the key to the genus published by Birstein and Vinogradov (1962) approaches *H. secunda* (Stebbing), and *H. tenella* Birstein and Vinogradov "sp. n. in press" (see Birstein and Vinogradov, 1962, p. 253). Indeed it may be conspecific with the latter, according to the key, but until that species is described no decision can be made. From *H. secunda*, it differs by the produced third pleonal epimeron and the equality of the rami and peduncle of uropod 3.

PARPANO, NEW GENUS

DIAGNOSIS: Antenna 1 bearing accessory flagellum, palp article 3 of mandible much longer than article 1, article 2 of antenna 1 not longer than article 1, basal part of flagellum segmented and slender in female, unsegmented in male; outer plates of maxillipeds broad; upper lip symmetrically lobed; gnathopods with fifth article very short, sixth

article elongated, simple, not subchelate, article 7 long, curved; telson entire; uropod 3 considerably reduced in size.

TYPE SPECIES: *Parpano cebus*, new species.

RELATIONSHIP: This is the first genus of the Pardaliscidae to be described that has an uncleft telson and radically reduced third uropods. It cannot be assigned to the Stilipedidae, in which the telsonic lobes are nearly fused, because it bears a large accessory flagellum. It is also remarkable in the obsolescence of the fifth articles of the gnathopods.

The two species to be described raise the question as to whether urosomal ornamentation is a mark of sexual difference in other pardaliscid genera, such as *Halice*, for *Parpano* is composed of two species from the same geographic area, one based on a male having urosomal ornamentation, the other on a female lacking it.

***Parpano cebus*, new species**

Figure 19

DIAGNOSIS: Urosome lacking dorsal teeth; primary and accessory flagella of antenna 1 basally segmented.

DESCRIPTIVE FEATURES: One of the mandibles bears what appears to be a spine-like molar process in addition to the normal two spines of the spine row; perhaps it represents the lacinia mobilis. Its significance is unclear, but it does not qualify the species to be assigned to families with well-developed triturating mandibles. The inner lobes of the lower lip were damaged on dissection but appear to be fused, as in the genus *Nicippe*. Eyes are absent. The outer rami of the uropods are shortened; the smallness of the third uropod may be seen in figure 19, in which it is drawn first in relationship to uropods 1 and 2. The second antenna is considerably reduced in length for a pardaliscid.

HOLOTYPE: A.M.N.H. No. 12331, female, 3.8 mm. Unique.

TYPE LOCALITY: Station V-15-12, northwest of Barranquilla, Caribbean Colombia, latitude 11° 30' N., longitude 75° 50' W., November 8, 1958, 2868–2875 meters.

POSSIBLE IDENTIFICATION: Station V-12-3, south Atlantic Ocean, latitude 28° 25' S., longitude 8° 28' E., May 2, 1957, 4986 meters, one female, badly damaged.

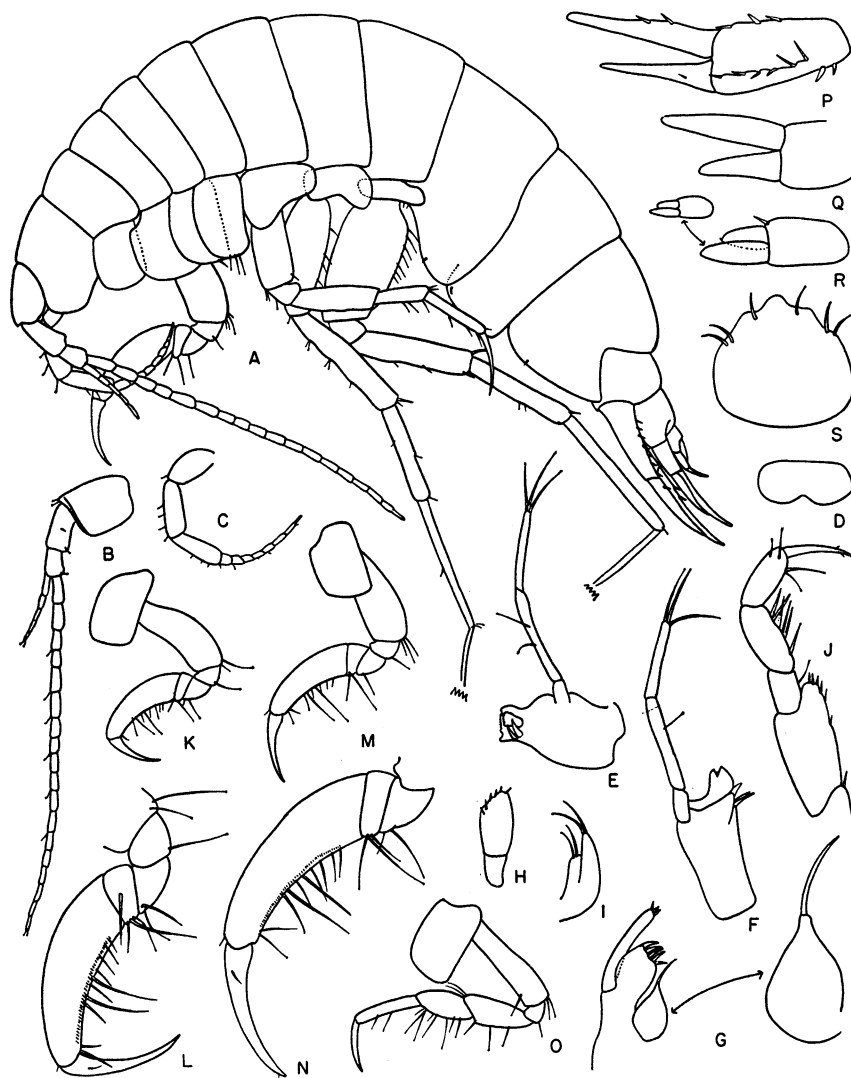


FIG. 19. *Parpano cebus*, new genus and new species, holotype, female, 3.8 mm., Station V-15-12. A. Lateral view. B, C. Antennae 1, 2. D. Upper lip. E, F. Mandibles. G. Maxilla 1. H. Palp of maxilla 1. I, Maxilla 2. J. Maxilliped. K, L. Gnathopod 1. M, N. Gnathopod 2. O. Peraeopod 1. P, Q, R. Uropods 1, 2, 3. S. Telson.

***Parpano composturus*, new species**

Figure 20

DIAGNOSIS: Urosome segments 1 and 2 each with a long dorsal tooth; primary and accessory flagella of antenna 1 long and basally unsegmented.

HOLOTYPE: A.M.N.H. No. 12332, male 3.9 mm. Unique.

TYPE LOCALITY: Station V-15-147, north of Puerto Rico Trench, latitude $21^{\circ} 18.7' N.$,

longitude $65^{\circ} 13.4' W.$, June 4, 1959, 5451–5419 meters.

REMARKS: Although the genus *Halice* has been composed of species similar to these in the presence or absence of dorsal urosomal ornamentation, and at least one species, *H. abyss* Boeck (see Sars, 1895, pl. 145, fig. 2), has ornamentation in both sexes, the question arises as to whether *P. cebus* and *P. composturus* are the opposite sexes of one species.

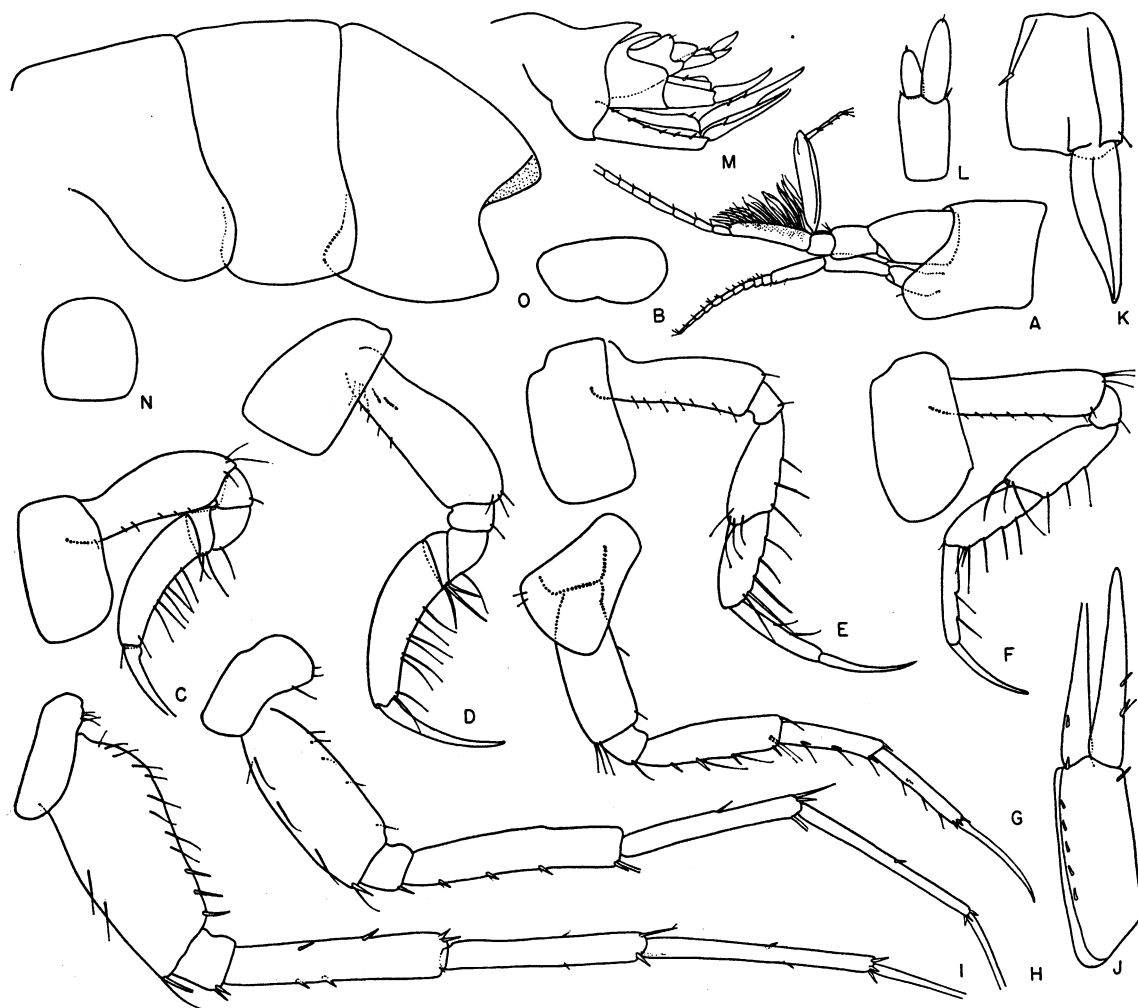


FIG. 20. *Parpano composturus*, new species, holotype, male, 3.9 mm., Station V-15-147. A. Head. B. Upper lip. C, D. Gnathopods 1, 2. E, F, G, H, I. Peraeopods 1, 2, 3, 4, 5. J, K, L. Uropods 1, 2, 3, inner ramus of uropod 2 missing. M. Urosome. N. Telson. O. Metasome.

FAMILY SYNOPIIDAE (=TIRONIDAE)

Except for its inflated fourth and fifth articles of peraeopods 1 and 2, the genus *Synopia* Dana is not distinct from members of the Tironidae. J. L. Barnard's (1962a) *Pardisynopia* in the Pardaliscidae also has these inflated peraeopods, a fact that demonstrates the independent evolution of such a feature and its uselessness as a familial character. Hence, I am fusing the Tironidae with the Synopiidae.

KEY TO THE SYNOPIIDAE

- | | |
|---|--------------------------------|
| 1. Telson entire | 2 |
| Telson slightly, or fully, cleft | 3 |
| 2. Coxa 3 not conspicuously larger than coxa 4, not excavate behind | <i>Bruzelia</i> |
| Coxa 3 much larger than coxa 4, excavate above and behind | <i>Bruzeliopsis</i> |
| 3. Articles 4 and 5 of peraeopods 1 and 2 inflated | <i>Synopia</i> |
| Articles 4 and 5 of peraeopods 1 and 2 not inflated | 4 |
| 4. Gnathopods distinctly subchelate, palms transverse | 5 |
| Gnathopods simple or imperfectly subchelate, palms oblique | 6 |
| 5. Coxa 4 much shorter and narrower than coxa 3 | <i>Syrrhoe</i> |
| Coxa 4 as long as and slightly broader than coxa 3 | <i>Garosyrrhoe</i> , new genus |

6. Mandibular molar immense, smooth, completely dominating the mandible, lacking both a spine row and teeth on the cutting edge 7
Mandibular molar small or intermediate in size, either strongly ridged or nearly smooth, one or both mandibles with cutting edge having two or more teeth or spines occupying the normal spine row position 8
7. Coxa 3 immensely broader and longer than coxa 4, produced anteriorly and posteriorly *Jeddo*
Coxa 4 as large as or increasingly smaller than coxa 3, but the latter not excavate behind nor strongly produced *Syrrhoites*
8. Gnathopod 1 slender, article 6 linear 9
Gnathopod 1 moderately stout, article 6 bulbous *Austrosyrrhoe*
9. Coxa 4 much shorter and narrower than the posteriorly excavate third coxa
Coxa 4 about as long and as broad as the non-excavate third coxa *Tiron*

GENUS *AUSTROSYRRHOE* K. H. BARNARD

Austrosyrrhoe K. H. BARNARD, 1925, p. 354.

REMARKS: Although this genus remains problematical (see J. L. Barnard, 1962b), further light can be shed on it and on the genus *Syrrhoites*. Probably J. L. Barnard's *Syrrhoites torpens* represents K. H. Barnard's *Austrosyrrhoe crassipes*, as he indicated in its erection, and most certainly it is now apparent, from my examination of the new species to follow, that *Syrrhoites torpens* cannot be assigned to *Syrrhoites*, which indicates that *Austrosyrrhoe* is a valid genus, distinct from *Syrrhoites*. This was apparent when Stephensen (1931) assigned his *A. septentrionalis* to *Austrosyrrhoe*, since the mandibular molar of that species is like that of *Syrrhoe*, not of *Syrrhoites*. K. H. Barnard described the mandible of *Austrosyrrhoe* as similar to *Syrrhoe*, and I find in the literature that *Syrrhoites fimbriatus* (Stebbing and Robertson, 1891) also conforms more to the *Syrrhoe* kind of mandible. The significance of mandibles has been elusive, because of the difficulty in mounting them in proper positions and in their often sketchy rendering in the literature. One may compare Sars's (1895) excellent figures of *Syrrhoites* and *Syrrhoe* to see the differences, noting the immense molar, small palp, and lack of spines, teeth, or

lacinia mobili on the primary plate of the mandible of *Syrrhoites*.

Species assignable presently to *Austrosyrrhoe* have coxae 3 and 4 somewhat intermediate in condition between the clearly tironid and syrrhoid conditions, since coxa 3 is slightly larger than 4 and scarcely to fully excavate behind. Apparently I confused coxae 3 and 4 of *Syrrhoites torpens*, and coxa 3 is the larger. In my key to the Tironidae in the "Vema" report (J. L. Barnard, 1962b), I tried to bypass the coxal problems of *Syrrhoites* and *Austrosyrrhoe* by using gnathopodal differences earlier in the key.

The species presently to be assigned to *Austrosyrrhoe* show characters, although intergrading, of generic significance. The excavation or non-excavation of coxa 3, the size of coxa 4, the long and short, deeply or poorly cleft telsons, the subchelation or simplicity of gnathopod 2 all might be used for generic segregation, were not the extremes intergraded among the several species.

KEY TO *Austrosyrrhoe*

1. Urosomal segment 2 with a long horizontal tooth, other segments not toothed
A. *crassipes* and A. *torpens*
These characters not combined 2
2. Coxa 3 excavate behind
A. *ilergetes*, new species
Coxa 3 not excavate behind 3
3. Gnathopod 2 subchelate A. *septentrionalis*
Gnathopod 2 simple A. *fimbriatus*

REVISION OF *Austrosyrrhoe*,
Syrrhoites, AND *Kindia*

- Austrosyrrhoe* K. H. Barnard, 1925
crassipes K. H. Barnard, 1925
fimbriatus (Stebbing and Robertson); Stebbing, 1906; Gurjanova, 1951; was *Syrrhoites*
ilergetes, new species
septentrionalis Stephensen, 1931
torpens (J. L. Barnard, 1962b), was *Syrrhoites*, probably synonym of A. *crassipes*
Garosyrrhoe, new genus
bigarra (J. L. Barnard, 1962a), was *Syrrhoites*
Kindia J. L. Barnard, 1962b → *Syrrhoites*
Syrrhoites Sars; Stebbing, 1906
anaticauda K. H. Barnard, 1930, 1932
lorida (J. L. Barnard, 1962b), was *Kindia*
pusillus Enequist, 1950
serratus Sars; Stebbing, 1906; Gurjanova, 1951
sorpresa (J. L. Barnard, 1962b), was *Kindia*
tenellus K. H. Barnard, 1925

walkeri Bonnier; Stebbing, 1906
(levis) (Boeck); Stebbing, 1906
bigarra J. L. Barnard, 1962a → *Garosyrrhoë*

***Austrosyrrhoë ilergetes*, new species**

Figure 21

DIAGNOSIS: Peraeon segment 7 and pleon segments 1 to 5 each produced posterodorsally to a small tooth; coxa 3 large, excavate behind, coxa 4 half as long as and narrower than coxa 3 but excavate behind; third

pleonal epimeron with a notch at lower posterior corner; both gnathopods distinctly but imperfectly subchelate; telson very long, cleft for about an eighth of its length.

HOLOTYPE: A.M.N.H. No. 12333, sex?, 2.7 mm. Unique.

TYPE LOCALITY: Station V-14-46-II, east Mediterranean Sea, latitude 32° 28' N., longitude 29° 46' E., July 3, 1958, 1938 meters.

RELATIONSHIP: This species differs from *A.*

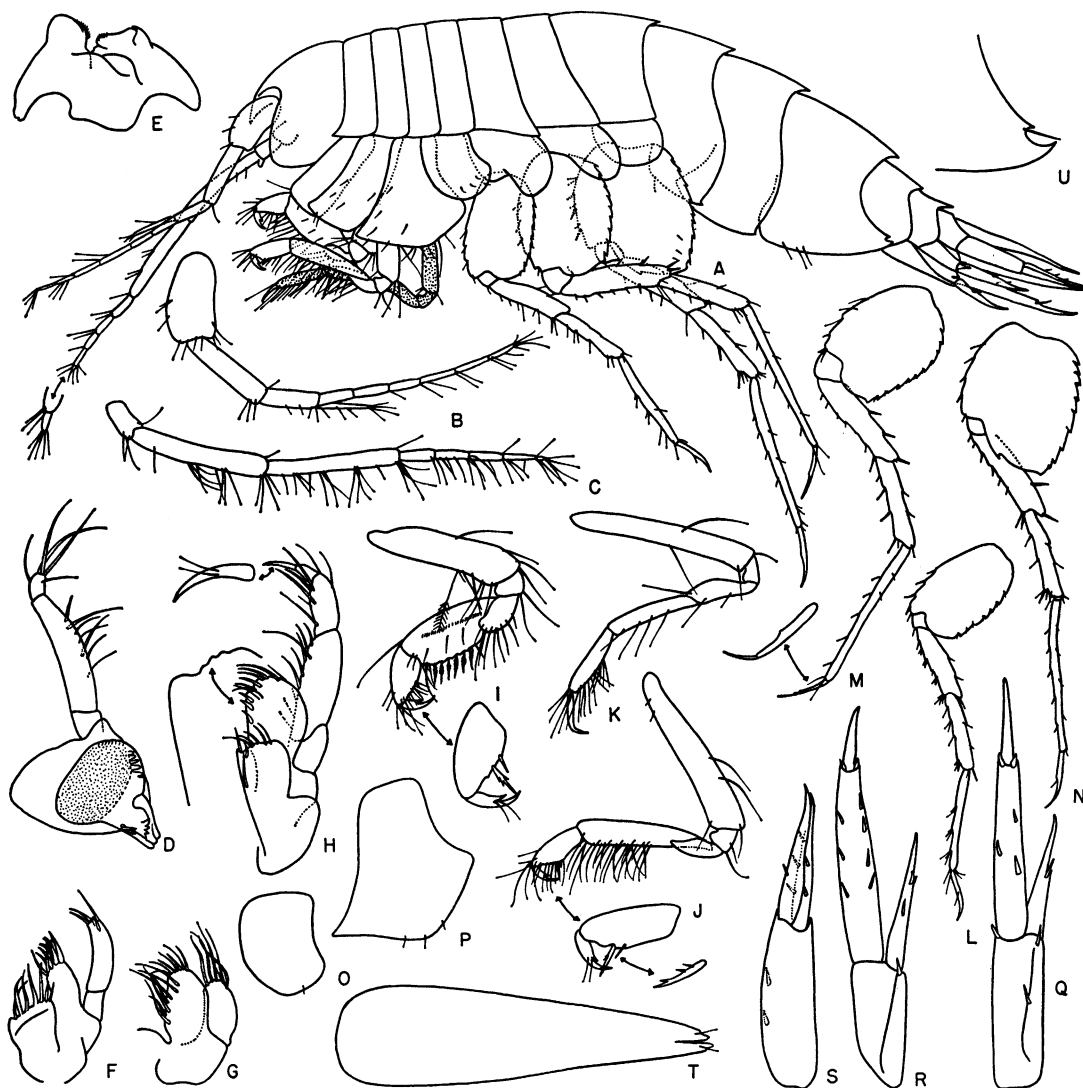


FIG. 21. *Austrosyrrhoë ilergetes*, new species, ?sex, 2.7 mm., Station V-14-46-II. A. Lateral view. B, C. Antennae 1, 2. D. Mandible. E. Lower lip. F, G. Maxillae 1, 2. H. Maxilliped. I, J. Gnathopods 1, 2. K, L, M, N. Peraeopods 1, 3, 4, 5. O. Coxa 4. P. Coxa 3. Q, R, S. Uropods 1, 2, 3. T. Telson. U. Lower posterior corner of third pleonal epimeron.

crassipes and *A. torpens* by the lack of urosomal teeth and from *A. septentrionalis* and *A. fimbriatus* by the posterior excavation of coxa 3.

Austrosyrrhoe ?torpens (J. L. Barnard)

Figure 22

Syrrhoites torpens J. L. BARNARD, 1962b, p. 61, figs. 52, 53.

MATERIAL: Station V-15-147, male, 2.6 mm.

RECORD: North of Puerto Rico Trench,

latitude 21° 18.7' N., longitude 65° 13.4' W., June 4, 1959, 5451–5419 meters.

REMARKS: In reconstructing *S. torpens*, J. L. Barnard confused coxae 3 and 4 and reversed them. They should appear as shown herein, coxa 3 forming a large, quadrate, posteriorly excavate plate, coxa 4 forming a small nasiform plate. Probably *S. torpens* is a synonym of *Austrosyrrhoe crassipes* K. H. Barnard (1925), as was written by J. L. Barnard (1962b). The type specimen of *A. crassipes* is no longer in condition for a re-

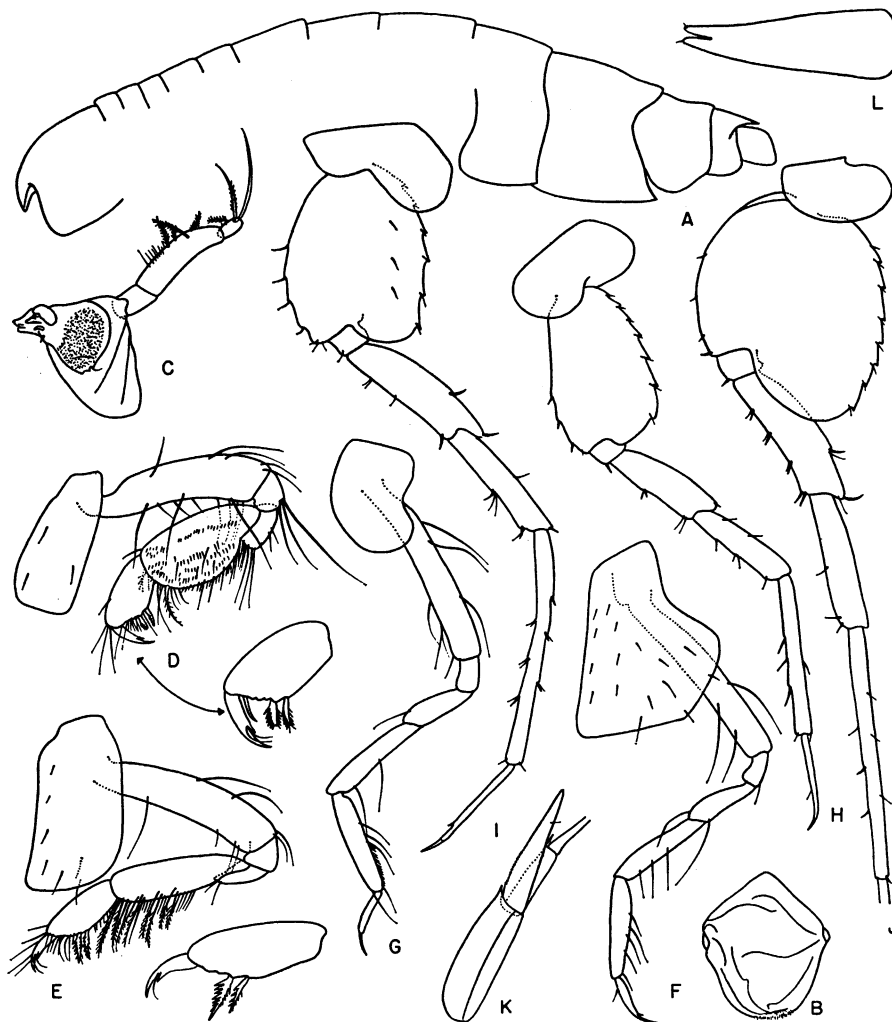


FIG. 22. *Austrosyrrhoe ?torpens* (J. L. Barnard), male, 2.6 mm., Station V-15-147. A. Lateral outline of head, dorsum of body, and pleonal epimera. B. Upper lip. C. Mandible. D, E. Gnathopods 1, 2. F, G, H, I, J. Peraeopods 1, 2, 3, 4, 5. K. Uropod 3. L. Telson.

analysis of coxa 4 and urosomal segments 1 to 3, and, therefore, we must wait until sufficient materials have been collected in the south Atlantic Ocean for the detection of the species by a process of elimination.

The present specimen is in poor condition and not so well developed as that figured by J. L. Barnard. The dorsal tooth of urosomal segment 2 is not so fully developed nor so elevated above the following segment. The slight dorsal projections of the posterior body segments are difficult to detect because of damage.

DISTRIBUTION: Previously known from Cape Basin, south Atlantic Ocean, 2972–3045 meters.

GENUS BRUZELIA BOECK

***Bruzelia typica* Boeck**

Bruzelia typica Boeck, Sars, 1895, pp. 395–397, pl. 138, pl. 139, fig. 1. GURJANOVA, 1951, pp. 588–589, fig. 394.

MATERIAL: Station V-14-46-II, female, 3.2 mm.

DISTRIBUTION: Northeastern Atlantic Ocean, 160–600 meters; eastern Mediterranean Sea, 1938 meters.

GENUS BRUZELIOPSIS CHEVREUX

***Bruzeliopsis turba*, new species**

Figure 23

DIAGNOSIS: Dorsum of body lacking any cusps, keels, or teeth; tooth of third pleonal epimeron short; telson with minute apical notch.

HOLOTYPE: A.M.N.H. No. 12336, female, 6 mm. Unique.

TYPE LOCALITY: Station V-15-22, north of Caribbean Panama, latitude 9° 46.3' N., longitude 79° 37.5' W., November 10, 1958, 975 meters.

RELATIONSHIP: The species differs from *Bruzeliopsis alberti* Chevreux (1911b), the only other species of the genus, by the lack of dorsal segmental teeth and by the very short tooth of the third pleonal epimeron. The telson has a minute apical notch unlike that of *B. alberti*.

The third article of the mandibular palp is quite short, in contrast to that of *B. alberti* and species in the genus *Bruzelia*. J. L. Barnard (1962b) distinguished *Bruzelia* from

Bruzeliopsis by the short third palp article of the mandible, but, in the light of the present new species, a better way is to distinguish *Bruzeliopsis* from *Bruzelia* by its small fourth coxa.

The head of the unique specimen was badly crushed and is drawn in that condition, but it is believed from attempts at restoration that it fits the figure of *B. alberti* Chevreux (1911b, fig. 2).

Except for its cleft telson, *Jeddo* J. L. Barnard (1962b) is very closely related to *Bruzeliopsis* by its mandible, gnathopods, and coxae. If clefting of telsons is proved to be of no generic value, then *Jeddo* would fall to *Bruzeliopsis*. On the other hand, *Jeddo* has an accessory flagellum reduced to a single article, whereas *Bruzeliopsis* has an accessory flagellum composed of one long article tipped with a short one.

GAROSYRRHOE, NEW GENUS

DIAGNOSIS: Telson cleft; articles 4 and 5 of peraeopods 1 and 2 not inflated; gnathopods distinctly subchelate, palms transverse; coxa 4 as long as, and slightly broader than, coxa 3, the latter not excavate behind; mandibular molar intermediate in size, not strongly ridged, cutting edge distinctly but poorly toothed, spines present in spine row.

TYPE SPECIES: *Syrrhoites bigarra* J. L. Barnard (1962a).

RELATIONSHIP: The gnathopods of this species relate it closely to *Syrrhoe* Goës but the third and fourth coxae are distinct. In *Syrrhoe* coxa 3 is very large and posteriorly excavate, while coxa 4 is much shorter and narrower.

From *Austrosyrrhoe* K. H. Barnard (1925), the new genus differs by the distinctly subchelate gnathopods with transverse palms.

GENUS PSEUDOTIRON CHEVREUX

***Pseudotiron bouvieri* Chevreux**

Figure 24

Pseudotiron bouvieri CHEVREUX, 1895, pp. 166–170, 14 figs.

MATERIAL: Station V-14-46-II, female, 4.2 mm.

RECORD: East Mediterranean Sea, latitude 32° 28' N., longitude 29° 46' E., July 3, 1958, 1938 meters.

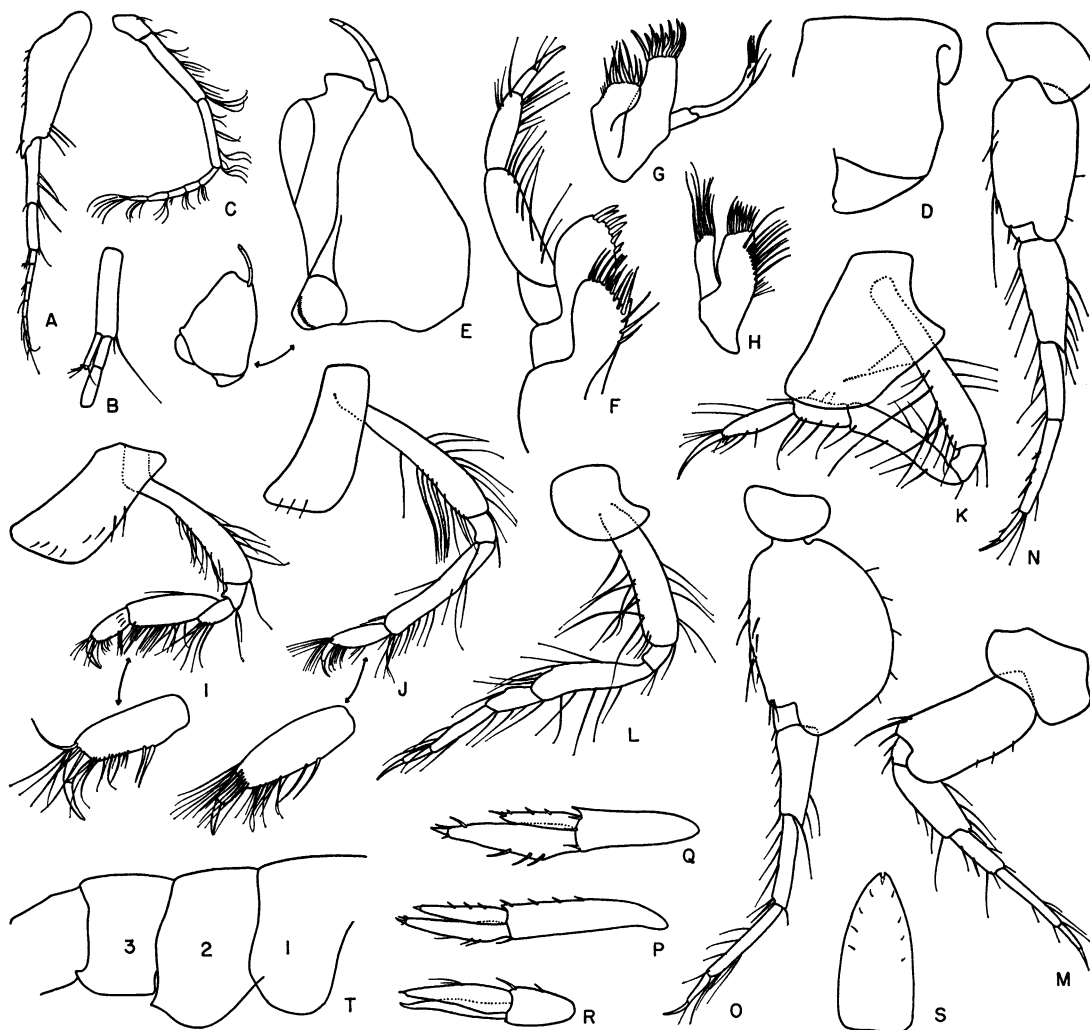


FIG. 23. *Bruzeliopsis turba*, new species, holotype, female, 6.0 mm., Station V-15-22. A. Antenna 1. B. Enlargement of accessory flagellum. C. Antenna 2. D. Right side of head, crushed and partially restored. E. Mandible. F. Maxilliped. G, H. Maxillae 1, 2. I, J. Gnathopods 1, 2. K, L, M, N, O. Peraeopods 1, 2, 3, 4, 5. P, Q, R. Uropods 1, 2, 3. S. Telson. T. Metasome, right side.

REMARKS: The present specimen differs from the original description only in the presence of two, not three, dorsal teeth on pleonal segment 4, seen only in dorsal view. The antennae are missing.

DISTRIBUTION: Mediterranean, recovered by Chevreux from a depth of 170 meters; the present specimen, from a haul at 1938 meters. The stomach and intestine of the specimen are filled with silt particles which indicate its benthic feeding habit.

GENUS *SYRRHOITES* SARS, NEW SYNONYMY

Syrrhoites Sars, STEBBING, 1906, p. 279.

Kindia J. L. BARNARD, 1962b, p. 57.

REMARKS: The type species of *Kindia* differs from the type species of *Syrrhoites* by the simple, not subchelate gnathopods and the larger fourth coxa, which in *Syrrhoites* is shorter and scarcely wider than coxa 3. Stebbing (1906) assigned to *Syrrhoites* the species *Syrrhoe fimbriatus*, bearing nearly simple gnathopods, but I am removing that

species to *Austrosyrrhoe* on the basis of its mandible. *Syrrhoites walkeri* Bonnier (1896), with coxa 4 conspicuously larger than coxa 3, has gnathopods distinctly, though imperfectly, subchelate. The gnathopods of *S. pusillus* Enequist (1950) clearly are simple. The differences in coxae and gnathopods are so slight and intergraded that *Kindia* does not deserve generic status.

KEY TO *Syrrhoites* (= *Kindia*)

1. Dorsum of pleonal segment 3 bidentate *S. serratus*
Dorsum of pleonal segment 3 not bidentate 2
2. Third pleonal epimeron quadrate behind 3
Third pleonal epimeron with a posteroventral tooth 4
3. Third pleonal epimeron not serrate behind, peraeonal segment 5 and pleonal segment 5 lacking dorsal teeth, second pleonal epimeron lacking posteroventral tooth *S. tenellus*
Third pleonal epimeron minutely serrate behind, peraeonal segment 5 and pleonal segment 5 each with a dorsal tooth, second pleonal epimeron with a posteroventral tooth *S. terceris*, new species
4. Dorsal tooth of pleonal segment 3 reverted 5
Dorsal tooth of pleonal segment 3 straight or absent 6
5. Third pleonal epimeron with small reverted tooth posteroventrally *S. pusillus*
Third pleonal epimeron with long, straight, serrate tooth posteroventrally *S. anaticauda*
6. Dorsal carina starting on peraeonal segment 2 *S. lorida*
Dorsal carina starting on peraeonal segment 5 7
7. Peraeonal segments 5 and 6 with large carina, urosomal segment 2 lacking a dorsal tooth *S. sorpresa*
Peraeonal segments 5 and 6 with small carina, urosomal segment 2 with a dorsal tooth *S. walkeri*

Syrrhoites terceris, new species

Figure 25

DIAGNOSIS: Body with small dorsal teeth from peraeonal segment 5 to urosomal segment 3, the tooth on metasomal segment 3 damaged, but possibly obsolescent; third pleonal epimeron with slightly sinuous and

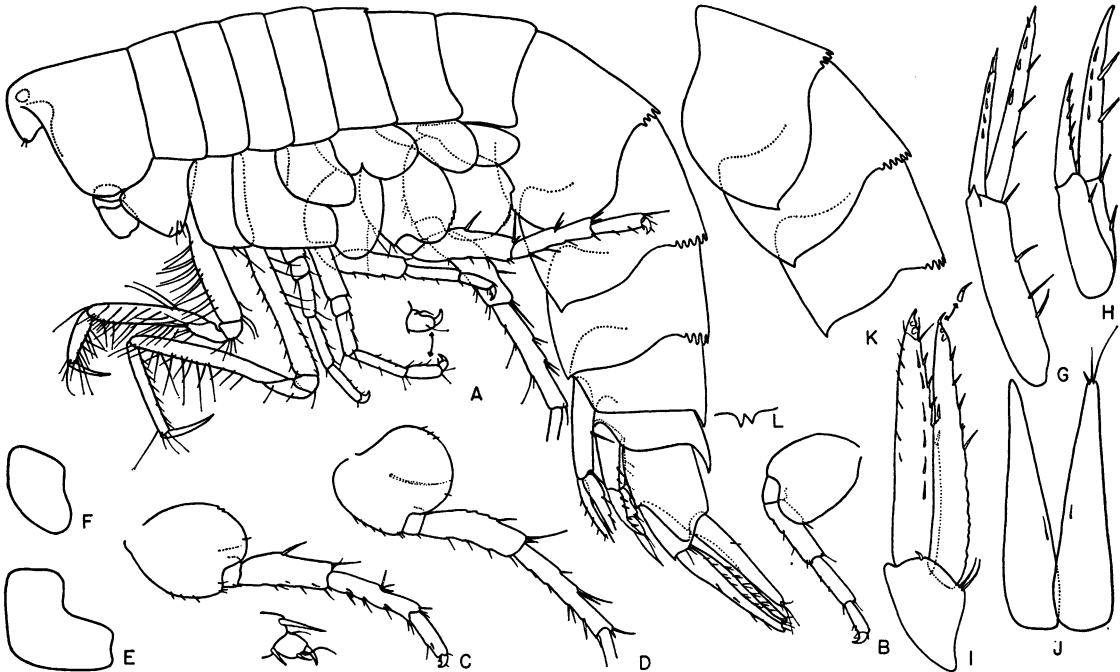


FIG. 24. *Pseudotiron bouvieri* Chevreux, female, 4.2 mm., Station V-14-46-II. A. Lateral view, minus antennae. B, C, D. Peraeopods 3, 4, 5. E, F. Coxae 3, 4. G, H, I. Uropods 1, 2, 3. J. Telson. K. Metasome. L. Dorsum of pleonal segment 4.

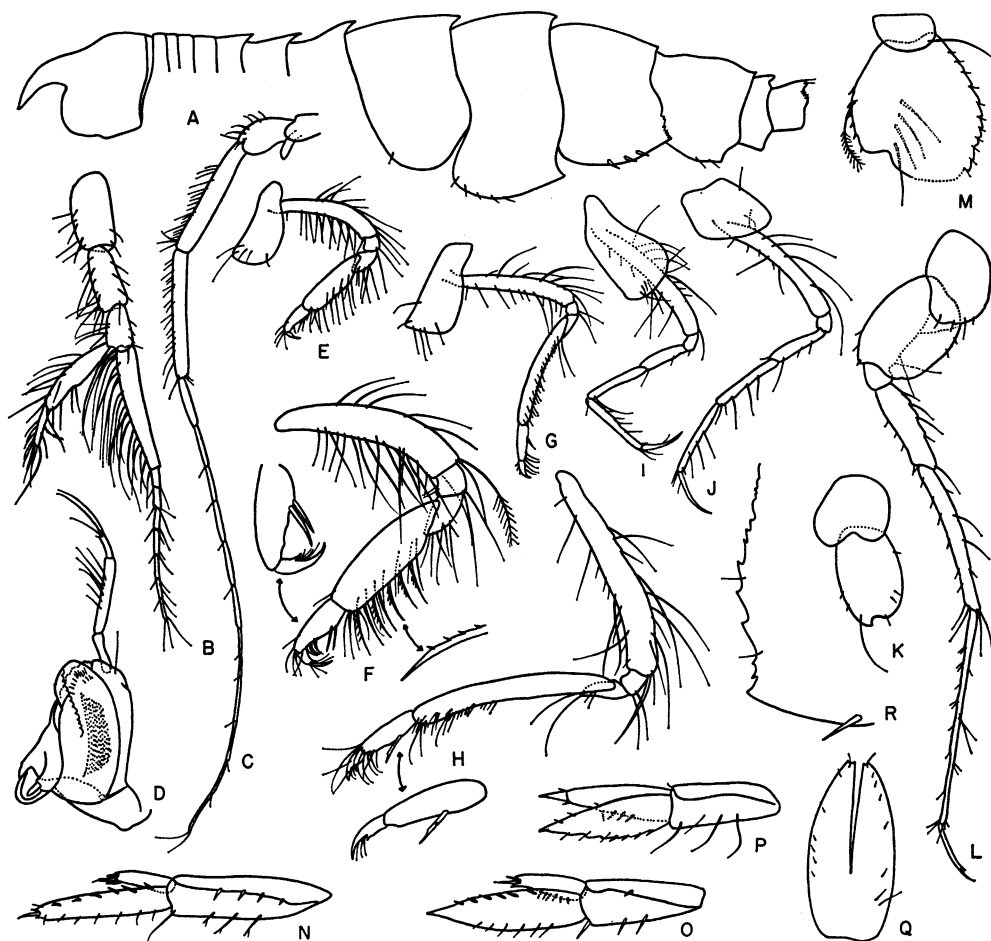


FIG. 25. *Syrrhoites tercensis*, new species, holotype, male, 4.8 mm., Station V-15-36. A. Outline of head, dorsum of body, and pleon. B, C. Antennae 1, 2. D. Mandible. E, F. Gnathopod 1. G, H. Gnathopod 2. I, J, K, L, M. Peraeopods 1, 2, 3, 4, 5. N, O, P. Uropods 1, 2, 3. Q. Telson. R. Right posterior edge of third pleonal epimeron.

minutely crenulate posterior edge, tooth at lower corner poorly developed.

HOLOTYPE: A.M.N.H. No. 12338, male, 4.8 mm. Unique.

TYPE LOCALITY: Station V-15-36, Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 30' N., longitude 79° 21' W., November 14, 1958, 1746–1609 meters.

RELATIONSHIP: Most closely related to *S. tenellus* K. H. Barnard (1925) but differing by characters shown in couplet 3 of the preceding key. Differing from *S. sorpresa* (J. L. Barnard, 1962b) by the smaller dorsal teeth and the obsolescence of the tooth of the third pleonal epimeron. *Syrrhoites lorida* (J. L.

Barnard, 1962b) has dorsal teeth commencing on peraeonal segment 2.

The head is damaged, forcing the rostrum to project anteriorly, whereas it probably is deflected as in the other species. Article 2 of peraeopod 5 apparently has the lower corner of its posterior lobe rounded, in contrast to the angular corner in *S. sorpresa*.

FAMILY OEDICEROTIDAE

GENUS OEDICEROIDES STEBBING

Oediceroides ?*wolffi* J. L. Barnard

Oediceroides wolffi J. L. BARNARD, 1961, pp. 92–93, figs. 60, 61.

MATERIAL: Station V-12-2 (=Biotrawl

No. 14), one anterior end similar to J. L. Barnard's specimen from "Galathea" Station 607 (1961, fig. 61); Station V-14-29 (= Bio-trawl No. 52), one damaged specimen similar to that shown in figure 62 in J. L. Barnard (1961).

RECORDS: Cape Basin, south Atlantic Ocean, 3045–4961 meters (data in J. L. Barnard, 1962b). Previously known from the west Indian Ocean and Tasman Sea, 1510–3580 meters with doubtful records to 4410 meters.

OEDICEROIDES (PATOIDES), NEW SUBGENUS

DIAGNOSIS: Differing from the typical subgenus by the first and second pairs of peraeopods: article 5 apically and ventrally produced, the process blunt; article 6 remaining slender so that article 5 is about three times as wide as article 6.

DESCRIPTION: Gnathopods subchelate, palms oblique, fifth articles with long, erect, posterior lobes; primary plate of mandible projecting strongly and deeply toothed; mandible with triarticulate palp and large triturating molar; body segments not carinate; coxa 4 not produced behind; peraeopods bearing seventh articles; eyes absent; mouth parts like those of *Anoedicerus hansenii* Pirlot (1932), except for maxilla 2, on which the outer plate has a small, simple, distal spine, instead of a bifurcate spine.

Unknown generic criteria are the length of uropod 2 in relation to uropod 3 and the condition of the basal part of the flagellum of antenna 2.

TYPE SPECIES: *Oediceroides (Patoides) synparis*, new species.

RELATIONSHIP: Although the uropods and second antennae are damaged or missing, this subgenus does not appear assignable to *Halicreion* (see key in J. L. Barnard, 1961) because of its peraeopods, or to *Lopiceros* J. L. Barnard (1961), the other subgenus of *Oediceroides*, which was described on the basis of its second antennae.

The structure of the first two peraeopods is remarkable and unlike that of any of the 22 other species of *Oediceroides*.

***Oediceroides (Patoides) synparis*, new species**

Figure 26

DIAGNOSIS: With the characters of the subgenus.

DESCRIPTION: The third and fourth coxae are excavate below; dactyls of peraeopods 1 and 2 slender, tapering, and not inflated as are those in other species of the genus; article 2 of antenna 1 slightly longer than article 1; rostrum evanescent; lateral lobes of head very broad; eyes absent; telson rounded apically; no dorsal tubercles present; second pleonal epimeron with a lateral swath of setae.

RELATIONSHIP: This species resembles *O. antennatus* K. H. Barnard (1937) in its long second peduncular article of antenna 1, but differs by its subgeneric characters, i.e., in the first two peraeopods.

HOLOTYPE: A.M.N.H. No. 12341, male, 13 mm. Unique.

TYPE LOCALITY: Station V-15-20, north of Caribbean Panama, latitude 9° 46.3' N., longitude 79° 37.5' W., November 10, 1958, 850 meters.

FAMILY EUSIRIDAE (INCLUDING PONGOGENEIIDAE)

GENUS EUSIROGENES STEBBING

***Eusirogenes adad*, new species**

Figure 27

DIAGNOSIS: Structure of gnathopod 2 dissimilar to that of gnathopod 1, bearing a shortened fifth article supporting a broad and strongly projecting, setose, hind lobe; article 6 of first gnathopod rather elongated, so that the part fitting the hind edge of article 5 is nearly twice as long as the anterior edge of article 6; proximal portion of article 5 very short, the hind lobe lying near article 4; finger of gnathopod 1 armed with scales along its inner edge; coxa 4 larger than coxa 3 and with a quadroconvex posterior edge; distal edge of article 2 of antenna 1 bearing a conical process, accessory flagellum composed of an intermediate-sized article, not spine-shaped; article 2 of peraeopod 5 linear; telson much shorter than peduncle of uropod 3, leaf-like, cleft for one-third of its length; rostrum of head small, slightly deflected, lateral lobes shallow, slightly downturned.

HOLOTYPE: A.M.N.H. No. 12344, ?sex, 2.9 mm. Unique.

TYPE LOCALITY: Station V-15-18, north of Caribbean Panama, latitude 10° 13' N., longitude 78° 33' W., November 10, 1958, 1905–1703 meters.

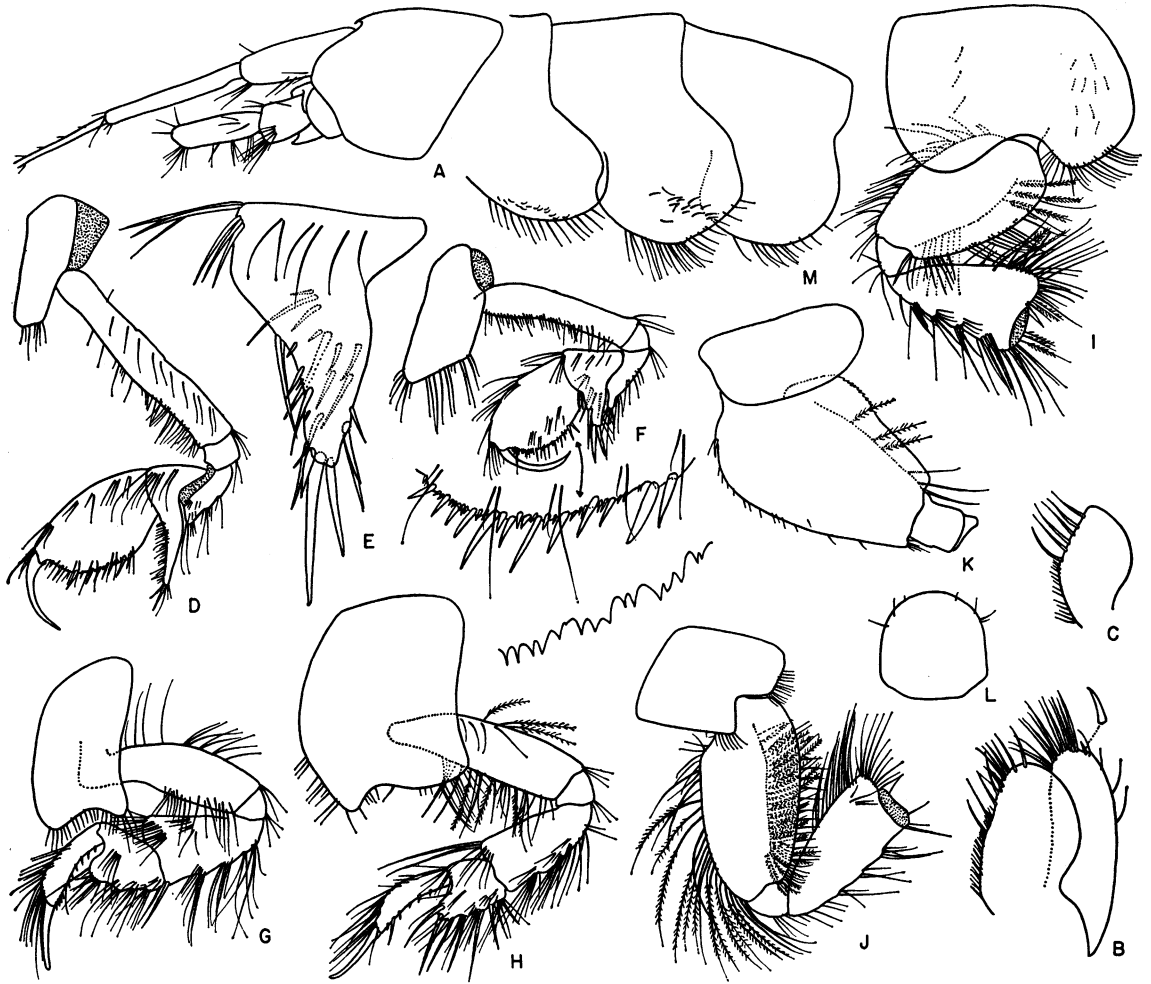


FIG. 26. *Oediceroides (Patoides) synparis*, new species, holotype, male, 13.0 mm., Station V-15-20. A. Head. B. Maxilla 2. C. Inner plate of maxilla 1. D. Gnathopod 2. E. Article 5 of gnathopod 1. F. Gnathopod 1. G, H, I, J, K. Peraeopods 1, 2, 3, 4, 5. L. Telson. M. Metasome.

RELATIONSHIP: This species is so rich in morphological distinctions from its relatives that it may become necessary to erect a genus for it. All known species have been based on single collections, which indicates that more species are likely to be discovered. Hence I do not find it prudent to erect a new genus for the present form, since its distinctiveness is very likely to be intergraded in other species. Its distinctions are: the process of article 2 of antenna 1; the shape of the lobe of article 5 on gnathopod 2; and the linear second article of peraeopod 5.

Since gnathopod 2 differs so from that of other members of the genus there is little relationship shown to them.

GENUS RHACHOTROPIS SMITH

Rhachotropis gubilata, new species

Figure 28

DIAGNOSIS: Pleonal segment 4 lacking any dorsal teeth; pleonal segment 3 bearing a small mediodorsal tooth and a smaller lateral tooth on each side; pleonal segment 2 with a large mediodorsal tooth and two medium-sized lateral teeth; pleonal segment 1 with a small mediodorsal tooth and two medium sized laterals; peraeon lacking dorsal teeth; first and second pleonal epimera each with a medium-sized posterior tooth, third pleonal epimeron with two obsolescent posterior teeth, the posteroventral corner slightly ser-

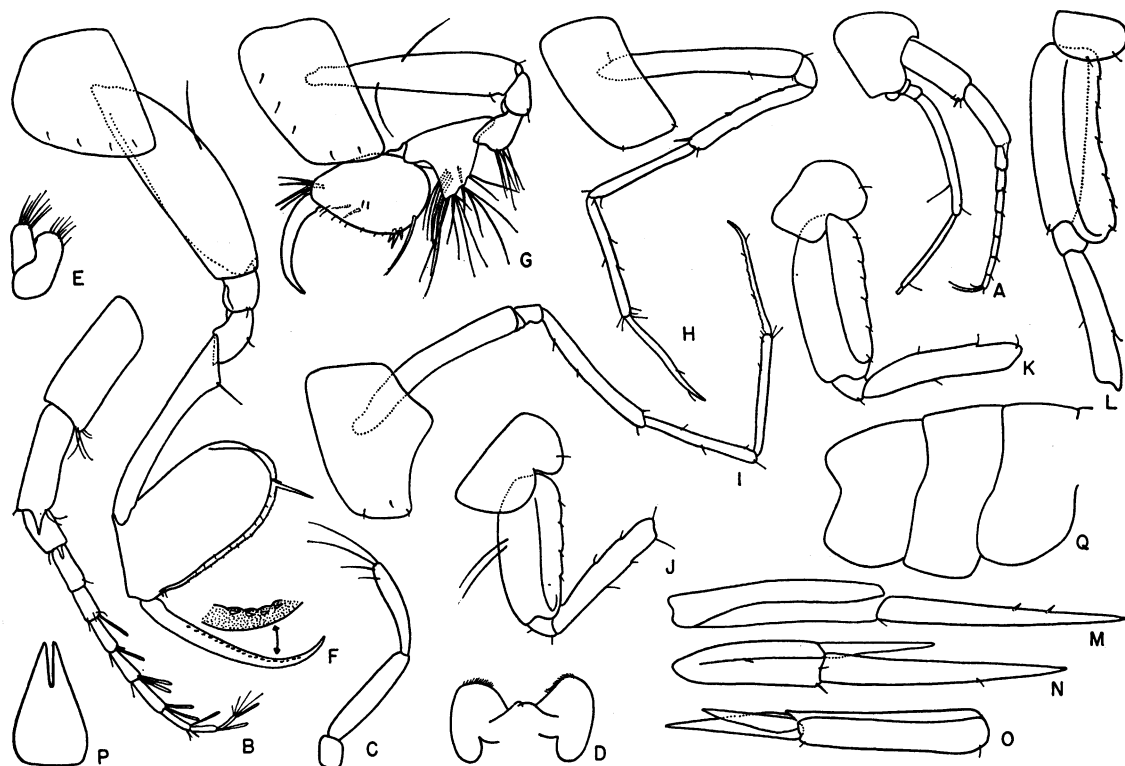


FIG. 27. *Eusirogenes adad*, new species, holotype, ?sex, 2.9 mm., Station V-15-18. A. Head. B. Antenna 1. C. Mandibular palp. D. Lower lip. E. Maxilla 2. F, G. Gnathopods 1, 2. H, I, J, K, L. Peraeopods 1, 2, 3, 4, 5. M, N, O. Uropods 1, 2, 3. P. Telson. Q. Metasome, right side.

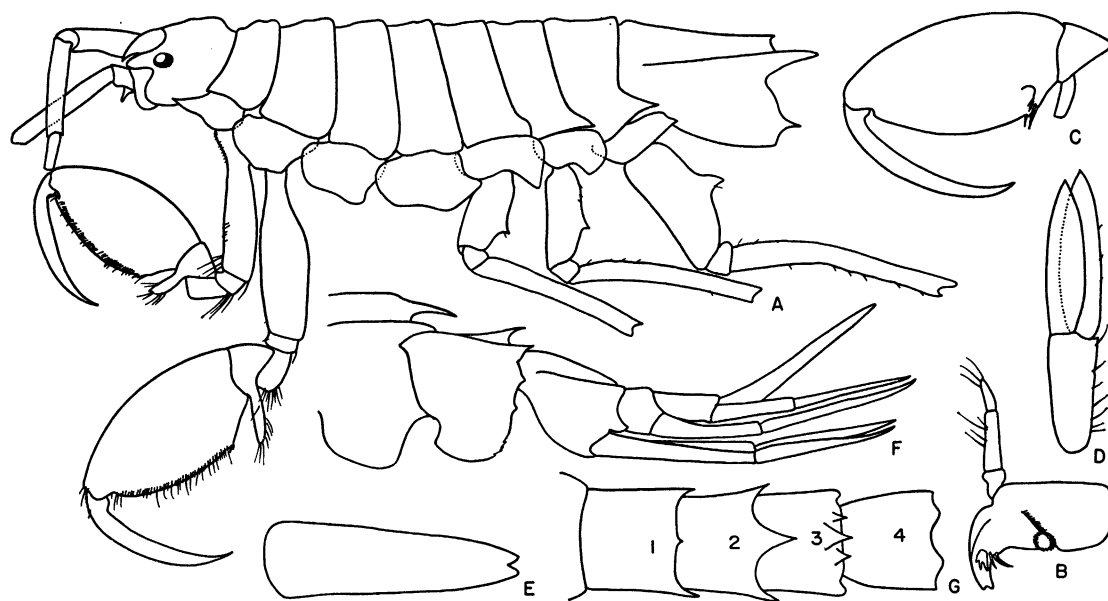


FIG. 28. *Rhachotropis gubilata*, new species, holotype, female, 17.0 mm., Station V-15-36. A, F. Lateral view in two pieces. B. Mandible. C. Medial view of end of gnathopod 1. D. Uropod 3. E. Telson. G. Dorsal view of pleonal segments 1-4.

rate; telson poorly cleft; each second article of pereopods 3 to 5 with a medial posterior cusp; eyes absent, but a small boss present at normal eye position; third palp article of mandible shortened; medial faces of sixth articles on gnathopods 1 and 2 with an accessory lobe proximal to palm.

Pereopods 1 and 2 and distal ends of pereopods 3 to 5 missing. Animal broken into two pieces at junction between pleonal segments 1 and 2.

Except for the mandible, the mouth parts are like Sars's drawings (1895, pl. 150).

HOLOTYPE: A.M.N.H. No. 12345, female, 17 mm. Unique.

TYPE LOCALITY: Station V-15-36, Panama Basin, Gulf of Panama, Pacific Ocean, latitude 7° 30' N., longitude 79° 21' W., November 14, 1958, 1746–1609 meters.

RELATIONSHIP: This species finds its closest relative in *Rhachotropis palporum* Stebbing (1908), as shown by the key to the genus in J. L. Barnard (1957). It differs by the relative shortness of all its lateral pleonal teeth, but especially by the fact that on pleonal segment

2 the medial tooth is longest while the lateral teeth are shortest, which is the reverse case in *R. palporum*; the teeth on the third pleonal epimeron are obsolescent in the new species, whereas they are quite long in *R. palporum*.

Schellenberg (1929) described forma *pacifica* of *R. palporum* as differing from the stem species by the shorter posterolateral teeth of pleonal segments 1 and 2, a condition characteristic of the new species, but the remarkable feature of the new species is the enlarged mediodorsal tooth of pleonal segment 2.

Rhachotropis portoricana, new species

Figure 29

DIAGNOSIS: Each metasome segment with a small, dorsal, posterior tooth; urosomal segments lacking teeth; no lateral carinae present on metasome segments; rostrum intermediate in size, blunt, deflected; cleft of telson very short; article 2 of pereopod 5 lacking a posterior tooth; third pleonal epimeron serrate behind; eyes absent.

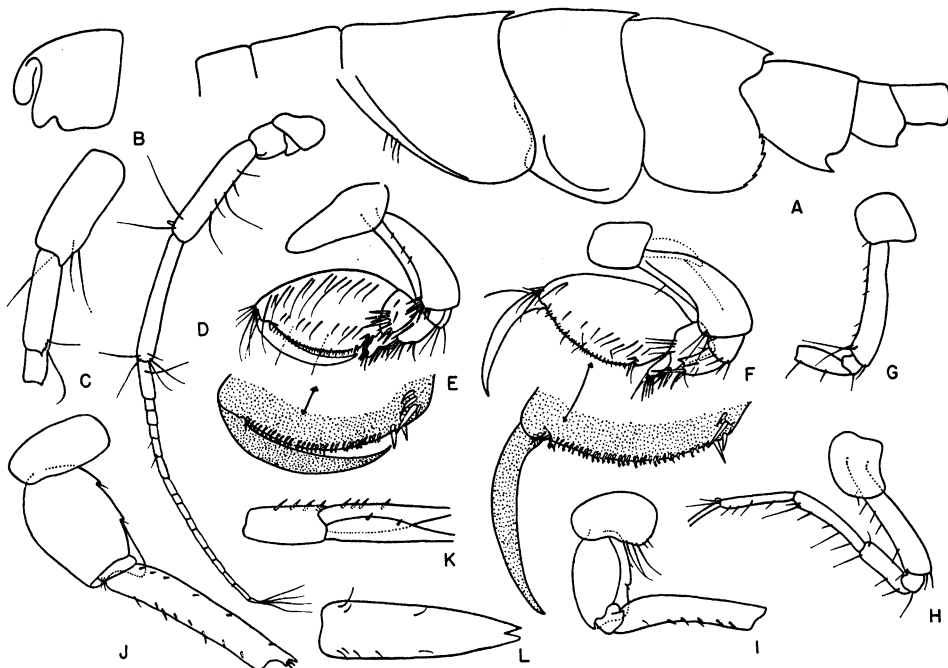


FIG. 29. *Rhachotropis portoricana*, new species, holotype, male, 4.7 mm., Station V-15-150. A. Lateral view of last two segments of pereopod and all segments of pleon. B. Head. C, D. Antenna 1, 2. E, F. Gnathopods 1, 2. G, H, I, J. Pereopods 1, 2, 4, 5. K. Uropod 3. L. Telson.

HOLOTYPE: A.M.N.H. No. 12346, male, 4.7 mm. Unique.

TYPE LOCALITY: Station V-15-150, north of Puerto Rico Trench, latitude $20^{\circ} 21.3' N.$, longitude $66^{\circ} 24' W.$, June 11, 1959, 5481–5497 meters.

RELATIONSHIP: This species is closely related to *Rhachotropis natator* (Holmes, 1908; see J. L. Barnard, 1954), but differs by the longer rostrum and the serrate third pleonal epimeron.

FAMILY VITJAZIANIDAE

DIAGNOSIS: Peduncle of antenna 1 not longer than head, articles quite short (much as in the Lysianassidae); accessory flagellum very slender, composed of two or more long articles; gnathopod 1 simple, article 7 large, claw-like; gnathopod 2 with short third article; telson short, cleft; mandible bearing molar and triarticulate palp; first maxillae symmetrical on both sides, palps not geniculate; coxae not acuminate below; third uropods with lanceolate rami, not uncinat, lacking hooked spines; outer lobes of lower lip unnotched; plates of maxillae and maxilliped well developed; uropods all present, all biramous.

RELATIONSHIP: The family differs from the Hyperiopsideae by the fact that the symmetrical first maxillae have straight, not geniculate, palps. From the Eusiridae, it differs by the small gnathopods, the first pair being simple, and by the shortened peduncle of antenna 1. It differs from the Synopiidae by the long third article of the mandibular palp, which is longer than the first palp article. The Melphidippidae have an elongated peduncle on the first antenna. The Astyridae have a uniarticulate accessory flagellum, gaping lower lip, and feeble mandibular molar.

DISCUSSION: The peculiar amphipod that is described below and assigned to the Vitjazianidae creates a problem of systematics at the family level in the Gammaridea.

Families often are based on quantitative features. Albeit when originally based on a few species, these families seem well enough defined, the persistent discovery of new intergrading animals merges these family concepts until it becomes difficult to keep them separated. Many families of the Amphipoda are,

at best, matters of opinion and matters of practice; they are in a constant state of flux, particularly now that reawakened interest is being taken in the deep sea, where new problems of convergence are arising.

One of the most confused families has been the Tironidae. In 1906 Stebbing listed seven genera in the family. Since that time two have been removed to form types of new families (*Argissa* and *Astyra*), three legitimate tironid genera have been described and four others temporarily assigned, but removed later to other families (*Alexandrella*, *Cacao* [= *Stilipes*], *Dorbanella* [= *Lepechinella*], and *Parargissa*). *Parargissa* forms the key to the present problem. It was described by Chevreux (1908) in the Tironidae, removed to the Argissidae by Pirlot (1934) in a technical move that was left undiscussed, and, finally, removed to the family Hyperiopsideae by Birstein and Vinogradov (1958) where it formed a senior synonym to *Protohyperiopsis* Birstein and Vinogradov (1955).

The family Hyperiopsideae had been monogeneric until this last move, and its single genus had been easily recognized as a gammaridean amphipod with a large bulbous head and diffused eyes similar to those of hyperiid amphipods. Its first and second pereopods have greatly enlarged fourth articles, and the pereopods and uropods are elongated. The coxae are somewhat shortened, but the first four are of uniform size. In contrast, the type species of *Parargissa* presumably has a scarcely bulbous head bearing small lateral lobes, from Chevreux' description. Nevertheless, Birstein and Vinogradov's several species seem to have a head more like that of *Hyperiopsis*. J. L. Barnard's (1961) species has very distinct lateral lobes. If the head, which seems to vary in the genus, be disregarded, the other points of similarity between *Parargissa* and *Hyperiopsis* that are also distinctions from the Tironidae concern the mandibular palp. The palp is quite long, moderately stout, and has a heavily setose third article that is slightly inflated and longer than article 1. In all tironids except *Liouvillea* (which should be removed to the Eusiridae-Pontogeneiidae), the mandibular palp is small and slender, with a very short third article bearing a few terminal setae, the article being somewhat rectangular rather

than bulbous. The first maxillae of hyperiopsids are asymmetrical, one side having the palp quite enlarged and bent. The diversity between *Hyperiopsis* and *Parargissa* in coxae and the variability of appendages and uropods in the known species of *Parargissa* suggest that the diversity in heads is also of no megasystematic concern.

Thus the Hyperiopsideae differ from the Tironidae by the asymmetrical first maxillary palps and the longer, bulbous, and heavily setose third articles of the mandibular palp.

Next comes the question of the Vitjazianidae, recently erected by Birstein and Vinogradov (1955). Here, presumably, the maxillary palps are symmetrical and neither is geniculate, but the general shape of the mandible is similar to that of hyperiopsids, except that the elongated third article of the palp is slender, its setae are sparse and dispersed, and the primary plate is clearly toothed. The coxae of *Vitjaziana* are quite tiny, being greatly shortened, but continuing to be as broad as their respective segments. The fourth articles of pereopods 1 and 2 are not elongated. Only this combination of characters separated *Vitjaziana* from the Hyperiopsideae, plus the apparent fact that the first two pereopods have their claws pointing forward rather than backward, an observation that may be useless. The small coxae relate *Vitjaziana* to the Pardaliscidae, but the mandibular molar is absent in the Pardaliscidae, and the mandibles are flattened and toothed on one member of the pair.

The mandibular palp of the Hyperiopsideae is not unique in amphipods; it is of value only in comparison to the Tironidae. Other characters of the Hyperiopsideae, such as telson, uropods, maxillipeds, accessory flagella, and gnathopods, can be used to separate the Hyperiopsideae from amphipods other than the Tironidae. These need not be discussed, since they are obvious to amphipod systematists.

The new species and genus that are here described are problematical in their relationship to the Hyperiopsideae and Vitjazianidae. They differ from the Vitjazianidae by the larger coxae, and, like the Hyperiopsideae, have a setose, bulbous third article on the

mandibular palp. The first maxillae are symmetrical (except that the palpal spines on one side are much shorter than on the other; fig. 30E, G).

Similarities of the new genus to *Vitjaziana* are: body of mandible and length of its palp articles, lower lip, maxillae, maxilliped, gnathopod 1, shape of thoracic segments, size relationship between abdominal and thoracic segments, telson, and peduncle of antenna 1 (but the flagellum is much longer in *Vitjaziana*).

Contrasts of the new genus to *Vitjaziana* are: shape and setation of the third palp article of mandible; larger coxae; gnathopod 2 unlike gnathopod 1, whereas in *Vitjaziana*, the gnathopods are similar; pereopods 1 and 2 with claws pointing backward, not forward; pereopods 3 to 5 short, not greatly elongated as in *Vitjaziana*; uropods quite shortened; accessory flagellum short but still linear; antenna 2 short (possibly a sexual difference).

The only diagnostic alteration of the Vitjazianidae necessary to admit the new genus would be permissive quantitative differences in size of coxae and differences in setation and stoutness of the third articles of the mandibular palp. These differences are also seen among genera of the Eusiridae. Although these are only quantitative features, one must remember that much of amphipod taxonomy is based on such quantitative features. The new genus finds its closest relationship somewhere between the Hyperiopsideae and the Vitjazianidae and on the basis of the first maxillae the genus should be assigned to the Vitjazianidae. In its larger coxae and mandibular palps the genus shows a link between the two families, but its distinctly subchelate second gnathopod shows independent divergence from that of these families. Such divergence has no familial value taxonomically, however, since mixtures of simple and subchelate gnathopods are seen in species of the Tironidae, but it does have generic value and is the principal generic distinction from *Vitjaziana*, plus its recognizably larger coxae.

VEMANA, NEW GENUS

DIAGNOSIS: Vitjazianid with second gnathopod subchelate; third palp article of

mandible clavate, regularly setose along inner edge; anterior coxae longer than broad.

TYPE SPECIES: *Vemana compressa*, new species.

RELATIONSHIP: *Vitjaziana* Birstein and Vinogradov has a simple, not subchelate, second gnathopod, a straight non-clavate article on the mandibular palp, and shorter coxae.

***Vemana compressa*, new species**

Figure 30

DIAGNOSIS: Third pleonal epimeron rounded behind and at lower corner.

DESCRIPTIVE FEATURES: Eyes absent; rostrum well marked, slender, short; peraeopod 5 shorter than 4, its second article much broader than articles of peraeopods 3 and 4, uropods short, first not reaching end of

second, its outer ramus shortened; outer ramus of uropod 3 biarticulate; first urosomal segment with a dorsal hump, lateral edges of segment with a ridge; urosome quite broad and greatly depressed, although not appearing so from lateral view; uropod 1 attached broadly to ventral surface of its segment; pleopods biramous in the normal manner.

HOLOTYPE: A.M.N.H. No. 12342, male, 5.1 mm. Unique.

TYPE LOCALITY: Station V-15-14, north of Caribbean Panama, latitude 10° 11' N., longitude 78° 30' W., November 9, 1958, 1826 meters.

***Vemana lizata*, new species**

Figure 31

DIAGNOSIS: Third pleonal epimeron produced into a large tooth at lower hind corner.



FIG. 30. *Vemana compressa*, new genus and new species, holotype, male, 5.1 mm., Station V-15-14. A. Lateral view. B. Antenna 1. C. Mandible. D. Mandibular palp. E. Lower lip. F, G. Maxillae 1, 2. H. Maxilliped. I, J. Ends of gnathopods 1, 2. K, L, M. Uropods 1, 2, 3. N. Telson. O. Dorsal view of urosome, hatching showing base of uropod 1 underneath.

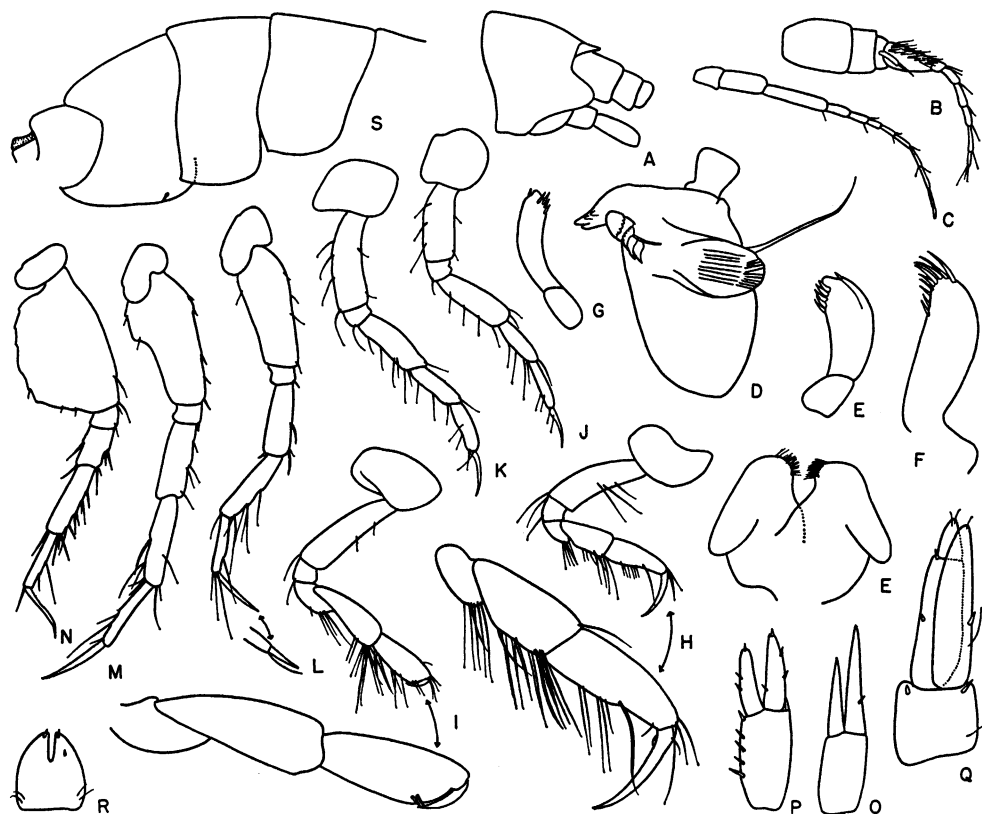


FIG. 31. *Vemana lizata*, new species, holotype, ?sex, 6.0 mm., Station V-15-10. A. Head. B, C. Antennae 1, 2. D. Mandible. E, G. Palps of maxilla 1. F. Outer plate of maxilliped. H, I. Gnathopods 1, 2. J, K, L, M, N. Peraeopods 1, 2, 3, 4, 5. O, P, Q. Uropods 1, 2, 3. R. Telson. S. Right side of pleonal segments 1-5.

DESCRIPTIVE FEATURES: Differing in other minor details from the type species, *V. compressa*, new species, this species has a sharper rostrum and a narrower, and more strongly produced, lateral head lobe. The urosome has been crushed, but it appears that the dorsal bump of urosomal segment 1 is less rounded dorsally and no lateral ridges are present on that segment. The basally unsegmented part of the flagellum on antenna 1 is shorter than that in *V. lizata*, and the second article of the outer ramus of uropod 3 is shorter and stouter than that in *V. compressa*. However, the specimen was about to molt at the time of death, and various parts of the animal seem more inflated on this specimen. For instance, the molar of the mandible is larger and more projecting, partially because of the onset of molting.

HOLOTYPE: A.M.N.H. No. 12343, ?sex, 6.0 mm. Unique.

TYPE LOCALITY: Station V-15-10, Caribbean Basin, latitude 14° 05' N., longitude 75° 25' W., November 7, 1958, 4077 meters.

FAMILY ATYLIDAE

GENUS ATYLUS LEACH

Atylus aberrantis J. L. Barnard

Figure 32

Atylus aberrantis J. L. BARNARD, 1962b, p. 69, figs. 66, 67.

DIAGNOSIS: Urosomal segment 1 with a large, erect, posterior tooth, anterior to which is a deep notch bounded by another smaller, erect tooth; urosomal segments 2 to 3 (fused) with erect dorsal tooth; pleonal segments 1 to 3 with dorsal carinae, successively increasing

in size, each produced into a dorsal posterior tooth; second articles of pereopods 3 to 5 lacking wing-like posterior lobes, not produced downward at lower posterior corners; eyes absent; rostrum moderately stout, acute apically; lateral lobes of head with acute dorsal process; article 2 of antenna 1 slightly longer than article 5 of antenna 2; article 3 of mandibular palp much shorter than article 2, palp slender, poorly setose; coxae short; uropod 3 with long rami; telson with a single apical spine on each lobe.

MATERIAL: Station V-15-147, north of Puerto Rico Trench, latitude $21^{\circ} 18.7' N.$, longitude $65^{\circ} 13.4' W.$, June 4, 1959, 5451–5419 meters, a figured specimen, 5.5 mm.; a specimen 4.3 mm. long; and a fragment of a specimen probably 3.0 mm. long. The 4.3-mm. specimen has a smaller anterior tooth on urosomal segment 1 than the holotype (see fig. 32).

RELATIONSHIP: In Mills's (1961) key to *Atylus* this species is related to *A. homochir* Haswell (see Stebbing, 1888, pl. 74) but dif-

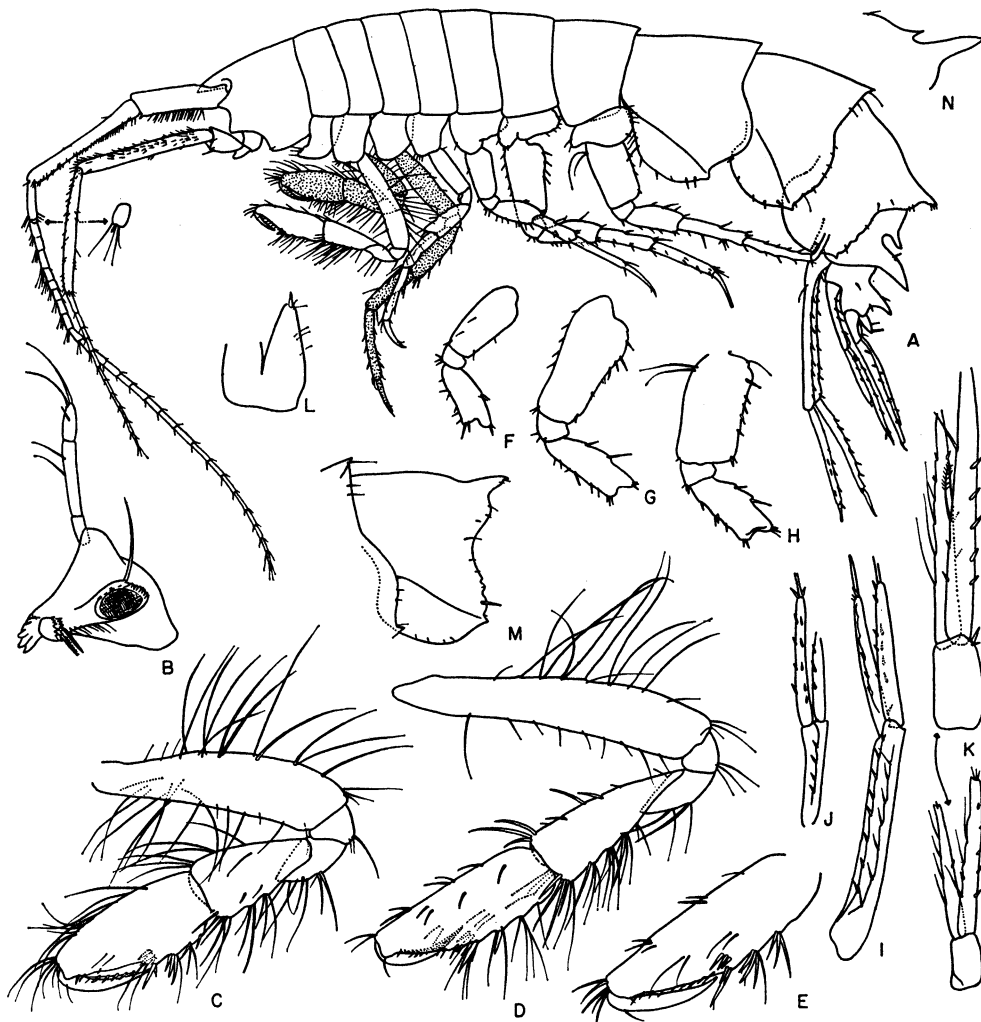


FIG. 32. *Atylus aberrantis* J. L. Barnard, ?male, 5.5 mm., Station V-15-147. A. Lateral view. B. Mandible. C. Gnathopod 1. D, E. Gnathopod 2, lateral and medial views. F, G, H. Pereopods 3, 4, 5. I, J, K. Uropods 1, 2, 3. L. Telson. M. Pleonal segments 2 and 3, left to right. N. Dorsum of pleonal segment 4 of another specimen, 4.3 mm.

fers in numerous ways: the teeth of pleonal segments 4 to 6 are much larger; the lateral lobes of the head bear processes; the eyes are absent; the third palp article of the mandible is short; and the lengths of the antennal articles are different.

The species especially differs from *A. atlassovi* (Gurjanova, 1951) and *A. rylovi* (Bulycheva, 1952) by the absence of a posterodistal lobe on article 2 of pereopod 5.

DISTRIBUTION: Cape Basin, south Atlantic Ocean, 4893 meters; adjacent to Puerto Rico Trench, 5451 meters.

FAMILY ISCHYROCERIDAE

GENUS BONNIERELLA CHEVREUX

REMARKS: I am transferring this genus from the Photidae to the Ischyroceridae on the basis of the fact that the third uropodal rami are shorter than the elongated peduncle. The genus so closely bridges both families that it points to the possibility that they are not sufficiently distinct to be maintained. All species heretofore assigned to *Bonnierella*, except *B. angolae* J. L. Barnard (1962b), and the new species that follows have been described originally in other photid genera, i.e., *B. lapisi* (J. L. Barnard) (1962b), and *B. abyssi* (Chevreux) were described in *Podoceropsis*; *B. abyssorum* was described in *Gammaropsis* (= *Eurystheus*). The following new species shows the definite relationship to the Ischyroceridae by its subuncinate and minutely armatured outer ramus on the third uropod, not heretofore described for the other species, perhaps because of damage to specimens brought up from such great depths.

DIAGNOSIS: Accessory flagellum biarticulate, basal article elongated; article 3 of mandibular palp elongated; article 4 of maxillipedal palp much longer than article 3, claw-like and poorly armed; coxae small, but touching, or slightly overlapping, all of similar length; second articles of pereopods 3 to 5 linear; article 5 of gnathopod 1 shorter than article 6.

RELATIONSHIP: Other deep-sea ischyrocerids are the genera *Bogenfelsia* J. L. Barnard (1962b) and *Bathyphtis* Stephensen (1944). *Bogenfelsia* is characterized by the fact that the minute coxae do not touch each other, and *Bathyphtis* differs from *Bonnierella* by

its oval second articles of pereopods 3 to 5, reduced spines on the outer plate of maxilla 2, its dissimilar coxae, and the short fourth article of the maxillipedal palp. In this respect, *Bonnierella* differs from other ischyrocerids by the greatly elongated, claw-like article of the fourth maxillipedal palp.

KEY TO *Bonnierella*

1. Hind margin of article 6 on gnathopod 2 longer than palm 2
Hind margin of article 6 on gnathopod 2 shorter than palm 3
2. Palm of male gnathopod 2 sharply cusped *B. linearis*, new species
Palm of male gnathopod 2 poorly ornamented *B. abyssorum*
3. Palm of male gnathopod 1 with three sharp cusps *B. abyssi*
Palm of male gnathopod 1 with two or fewer blunt or obsolescent cusps 4
4. Male gnathopod 2 with three sharp palmar cusps *B. lapisi*
Male gnathopod 2 with cusps blunt and obsolescent *B. angolae*

Bonnierella linearis, new species

Figure 33

DIAGNOSIS: Palms on the second gnathopods of both sexes longer than the respective hind margins of the sixth articles; palm of male gnathopod 2 sharply cusped; palm of gnathopod 1 not ornamented.

DESCRIPTION: Eyes absent; lateral lobes of head produced and acute; antennae nearly as long as body; gnathopod 2 in female much larger than gnathopod 1; palm of male second gnathopod armed with three sharp cusps including defining corner, in female with two blunt processes, defining cusp obsolete; palm of gnathopod 1 not defined by a cusp or a specific spine, merging convexly with hind margin of article 6; inner ramus of uropod 1 lacking a marginal spine; telson triangular, the narrow apex blunt; tip of outer ramus on third uropod bearing 5 to 6 minute, fringe-like spinules and a distal setule.

HOLOTYPE: A.M.N.H. No. 12348, male, 4 mm.

TYPE LOCALITY: Station V-15-69, off Peru, latitude 10° 13' S., longitude 80° 05' W., December 9, 1958, 6324 meters.

MATERIAL: Thirty-one specimens from the type locality.

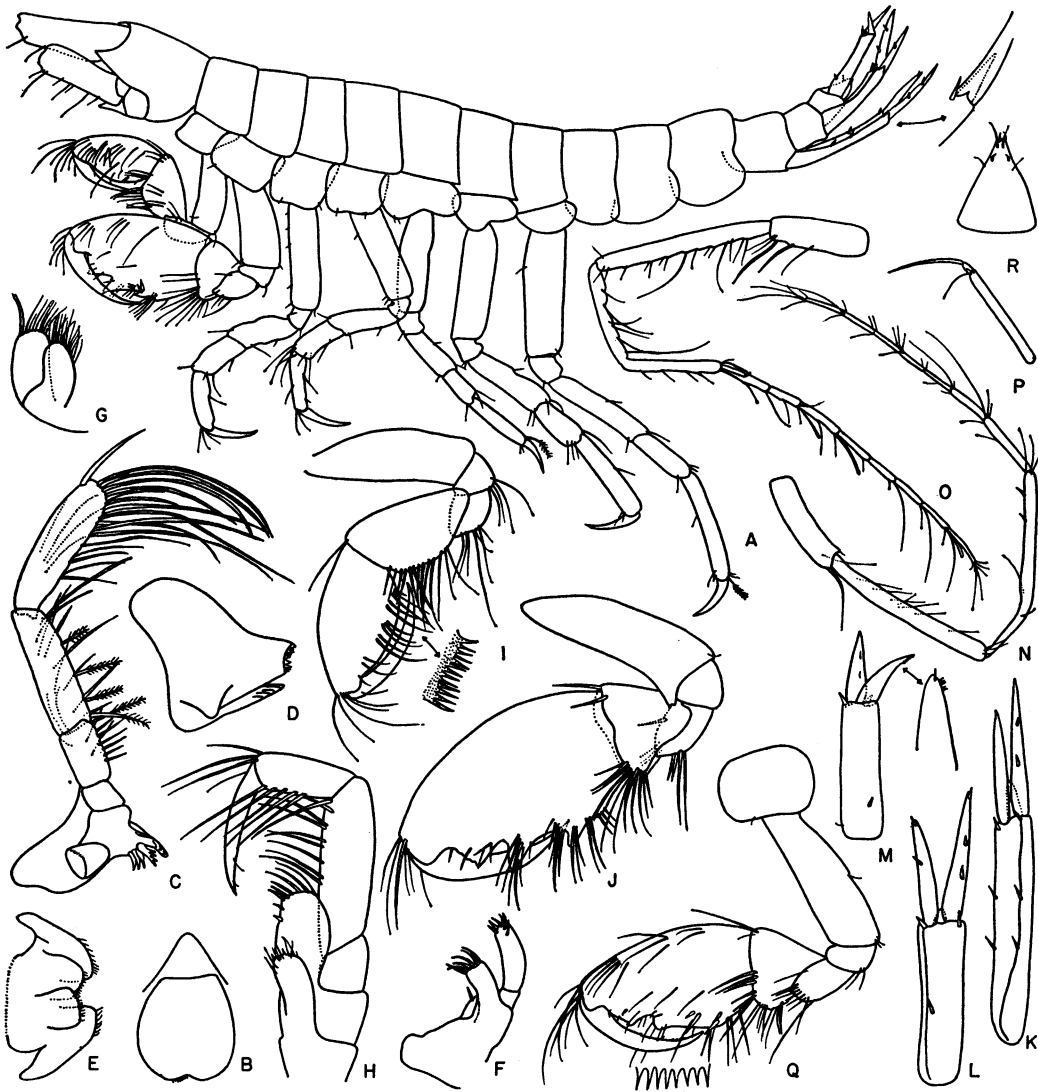


FIG. 33. *Bonnierella linearis*, new species, holotype, male, 4.0 mm., and female, 3.4 mm., Station V-15-69. A-M. Male. A. Lateral view. B. Upper lip. C. Mandible. D. Another view of mandible. E. Lower lip. F, G. Maxillae 1, 2. H. Maxilliped. I, J. Gnathopods 1, 2. K, L, M. Uropods 1, 2, 3. N-R. Female. N. Antenna 2. O. Antenna 1. P. Accessory flagellum. Q. Gnathopod 2. R. Telson.

RELATIONSHIP: This species and *Bonnierella lapisi* J. L. Barnard (1962b) form Pacific and Atlantic partners. *Bonnierella lapisi* differs from *B. linearis* by the fact that the second

gnathopodal palms are shorter than the respective hind margins of the sixth articles, and is further differentiated in the foregoing key.

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