THE SYSTEMATICS AND DISTRIBUTION OF CUMACEA

FROM DEPTHS EXCEEDING 200 METERS

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CONTENTS

I. INTRODUCTION

Previous knowledge

Papers and reports on the deep sea cumacean fauna have been rather scanty. Except for a number of papers and books by G. O. SARS from 1865 onwards, culminating in his volume on Cumacea in "The Crustacea of Norway" published in 1900, by CALMAN from 1905, NORMAN (1902), STEBBING (1912), ZIMMER from 1908, FORSMAN (1938) and LOMAKINA (1955 and 1958), mostly concerned with the fauna of the north-east Atlantic or Arctic Oceans and some with the results of short cruises, previous information on species from below the continental shelf has come from the results of a few expeditions and voyages. The most important of these were the Challenger Expedition (SARS 1887), the Lightning, Porcupine and Valorous Expeditions (NORMAN 1879), the voyage of the *Caudan* (BONNIER 1896), the Plankton-Expedition and the Danish Ingolf Expedition (HANSEN 1895 and 1920), the German Deep Sea Expedition and the German and Swedish South Polar Expeditions (ZIMMER 1907, 1908 and 1913), the Siboga Expedition (CALMAN 1905b), the voyages of Prince Albert I of Monaco (FAGE 1929), and most recently the cruises of the "Vema" (BACESCU 1961a & b, 1962).

Few of these works deal in any way with bathymetrical distribution, an exception being HANSEN (1920). Even ZIMMER (1941), in Bronns Tierreich, makes little mention of depth distribution although in this and in some of his earlier works he pays a good deal of attention to geographical distribution. LOMAKINA (1958) includes a summary of vertical distribution of the cumacean fauna of waters adjacent to the U.S.S.R.

In the present work the opportunity has been taken to compile a list (in Table 1) of all species described up to the end of 1967 which in my opinion are valid according to existing information. It is hoped that this may prove useful.

Material and methods

For methods of collection and preservation see BRUUN (1959) and WOLFF (1962). A total of 30 species of Cumacea belonging to 15 genera were obtained by the *Galathea* from depths exceeding 200 m. One, *Epileucon galatheae* N.S. Jones, has already been described (JONES 1956). There were 66 specimens altogether of which three were too badly damaged for identification. 26 species were new. Of these 25 were found in only one sample each and 21 are represented by a single specimen. Unfortunately several of the unique specimens are incomplete but I have thought it worth while to describe each one, although in a few cases there remains doubt as to the systematic position. Because of the paucity of material it has not proved possible to investigate the biology or ecology of the species represented.

Measurements of body length were made from the tip of the pseudorostrum to the hind end of the telsonic somite or telson when present. Illustrations are from camera lucida drawings and are original except for Fig. 6i, which is from a sketch by Mr. R. W. INGLE, and Fig. 21a, which is slightly modified from the original by Mr. POUL H. WINTHER.

Keys to the species are given for some genera where this was thought necessary. In the case of the very large genera *Cyclaspis,* with 77 species, *Campylaspis,* with 65, and *Diastylis,* with 68, it has not been found possible to give keys in this work, but for *Cyclaspis* and *Campylaspis* keys to the majority of species may be found in the papers by HALE (1944b, 1945a).

For keys and diagnoses of the families see JONES (1963). Keys to the genera are included except for those in the family Pseudocumatidae which is not represented in the *Galathea* collections and for which a key may be found in LOMAKINA (1958). Useful keys may also be found in STEBBING (1913) – some of STEBBING's genera are not generally recognised and few workers have accepted his classification into families but the work is still invaluable – in FAGE (1951), JONES (1958) and LOMAKINA (1958) for genera found in the eastern North Atlantic and Mediterranean and in the seas adjacent to the U.S.S.R. respectively; in JONES (1963) for the fauna of New Zealand and in HALE (1944a & b, 1945a & b, 1946a & b) for the Australian fauna.

Terminology

The morphological terms where applicable and those used for bathymetrical zones are as used by WOLFF (1962) except that I prefer the term segment rather than joint. The term pereon in this work refers to the five somites which normally carry the pereopods. I have not adopted the terminology used by LEDOYER (1965) for the thoracic appendages of pereopods 1-8, including the maxillipeds. This brings the Cumacea into line with the Isopoda and Tanaïdacea but would, in my opinion, cause more

confusion than its advantages would warrant. I therefore retain the terminology of maxillipeds 1-3 and pereopods 1-5.

Acknowledgments

I am most grateful to Dr. TORBEN WOLFF for placing this material at my disposal and for information about bottom temperatures and other matters. Dr. CHARLOTTE HOLMQUIST kindly tried to find for me the type specimens of *Makrokylindrus josephinae* and *M. longipes* (G.O. SARS 1871) and Mr. R.W. INGLE provided sketches of young specimens of *Ceratocuma horrida* (CALMAN 1905).

List by station of *Galathea* Cumacea from depths exceeding 200 meters

Abbreviations of gear used (see BRUUN 1959, p. 22 and WOLFF 1964, p. 198): HOT: herring otter trawl; SOT: shrimp otter trawl; ST 300 and ST 600: sledge (Agassiz, Sigsbee) trawl, 3 m and 6 m wide; D80: rectangular dredge, 80 × 30 cm; PG 0.2 or PGI 0.2: Petersen grab (bottom sampler) covering 0.2 sq.m.

Stations:

46. Off Ghana (5°36′N, 0°48′E), 220 m, *c.* 13°C, 26.11.1950, PG 0.2.
Epileucon galatheae N.S. Jones; 4 ♂♂, 16 ♀♀.

179. Cape Town – Durban (35°44′S, 34°16′E), 3800 m, *c.* 2°C, 24.1.1951, ST 300.
Bathylamprops natalensis n.sp.; 1 ♀.

190. Off Durban (29°42′S, 33°19′E), 2720 m, *c.* 2.4°C, 3.2.1951, ST 300.
Bathylamprops calmani Zimmer; 2 ♂♂.

192. Off Durban (32°00′S, 32°41′E), 3530 m. 1.2°C, 5.2.1951, SOT.
Bathylamprops calmani Zimmer; 1 ♀.

239. Off Kenya (3°59′S, 42°03′E), 3290 m, *c.* 2.3°C, 14.3.1951, PG 0.2.
Cyclaspis subgrandis n.sp.; 1 ♂.

241. Off Kenya (4°00′S, 41°27′E), 1510 m, *c.* 4.3°C, 15.3.1951, HOT.
Leptostylis azaniensis n.sp.; 1 ♀.

282. Seychelles – Ceylon (5°32′N, 78°41′E), 4040 m, 1.4°C, 11.4.1951, HOT.
Bathycuma magna n.sp.; 1 ♀.

466. Java Trench (10°21′S, 110°12′E), 7160 m, 1.5°C, 6.9.1951, HOT.
Makrokylindrus hadalis n.sp.; 4 ♂♂.

477. S of Bali (9°01′S, 114°48′E), 780 m, *c.* 6°C, 11.9.1951, PG 0.2.
Makrokylindrus balinensis n.sp.; 1 ♂.
Makrokylindrus cinctus n.sp.; 1 ♀.

500. Arafura Sea (7°34′S, 132°44′E), 390 m, *c.* 9.2°C, 25.9.1951, D80.
Paralamprops arafurensis n.sp.; 1 ♀.

554. Great Australian Bight (37°28′S, 138°55′E), 1320-1340 m, *c.* 3.5°C, 5.12.1951, ST300.
Hemilamprops pellucida Zimmer; 1 ♀.
Diastylis gibbera n.sp.; 1 ♀.
Diastylis exilicauda n.sp.; 1 ♀.

607. Tasman Sea (44°18′S, 166°46′E), 3580 m, *c.* 1.3°C, 17.1.1952, HOT.
Gaussicuma scabra n.sp.; 1 ♂.
Makrokylindrus neptunius n.sp.; 3 ♂♂, 4 ♀♀, 1 juv.
?*Makrokylindrus mersus* n.sp.; 1 ♂
Leptostylis profunda n.sp.; 1 ♂.

626. Tasman Sea (42°10′S, 170°10′E), 610 m, *c.* 7.6°C, 20.1.1952, HOT.
Cyclaspis tasmanica n.sp.; 1 ♂.
Campylaspis inornata n.sp.; 1 ♀.
Diastylis delicata n.sp.; 1 ♀.
?*Paradiastylis bathyalis* n.sp.; 1 ♂, 1 ♀.

663. Kermadec Trench (36°31′S, 178°38′W), 4410 m, 1.2°C, 24.2.1952, HOT.
Leptostyloides calcar n.gen., n.sp.; 1 ♀.

664. Kermadec Trench (36°34′S, 178°57′W), 4540 m, 1.1°C, 24.2.1952, HOT.
Gaussicuma kermadecensis n.sp.; 1 ♂.
Leptostyloides calcar n.gen., n.sp.; 1 ♀.

665. Kermadec Trench (36°38′S, 178°21′E), 2470 m, 2.1°C, 25.2.1952, HOT.
Makrokylindrus prolatus n.sp.; 1 ♂.

716. Acapulco – Panama (9°23′N, 89°32′W), 3570 m, *c.* 1.9°C, 6.5.1952, HOT.
?*Diastylis tenebricosa* n.sp.; 1 ♀.

734. Gulf of Panama (7°20′N, 79°38′W), 520 m, *c.* 7.7°C, 15.5.1952, PGI 0.2.
Leucon panamensis n.sp.; 1 ♂.

745. Gulf of Panama (7°15′N, 79°25′W), 915 m, c. 5°C, 16.5.1952, ST 600.
Epileucon pacifica n.sp.; 1 ♀.

758. Puerto Rico Trench (18°45′N, 66°27′W), 2840 m, 3-4°C, 30.5.1952, ST 600.
Ceratocuma amoena n.sp.; 1 ♂.

771. Gulf of Biscay (47°48′N, 8°26′W), 1920 m, *c.* 4°C, 18.6.1952, PGI 0.2.
Makrokylindrus costatus (Bonnier); 1 ♂.
Makrokylindrus josephinae (G.O. Sars); 1 ♀.

Unidentifiable specimens of Cumacea were collected at Stations 24, 93 and 664.

II. SYSTEMATIC PART

Introductory remarks

No major revisions have become necessary from the perusal of the *Galathea* cumacean material. Only one new genus has been erected. The remaining species, though in some cases tentatively because of missing parts in the specimens, present no great difficulties in allocating them to existing genera. Perhaps the most notable find was a second species in the family Ceratocumatidae, but this differs from the first described species in only minor characters.

FAMILY BODOTRIIDAE

Key to the genera

1. Only the first pair of pereopods with exopods in either sex (sub-family Bodotriinae) 2
1. More than one pair of pereopods with exopods, some of which may be rudimentary (sub-family Vaunthompsoniinae) 9
2. Five pereon somites free 3
2. At most four pereon somites free 5
3. Without distinct pseudorostral lobes; endopod of uropod one-segmented ..... *Stephanomma* G.O.Sars, 1871
3. Pseudorostral lobes well formed; endopod of uropod two-segmented 4
4. With two separated branchial siphons ..... *Zygosiphon* Calman, 1907
4. With a single branchial siphon ..... *Iphinoe* Bate, 1856
5. Only two free pereon somites ..... *Cyclaspoides* Bonnier, 1896
5. Three or four free pereon somites 6
6. Pereopod 2 with seven segments ..... *Cyclaspis* G.O.Sars, 1865
6. Pereopod 2 with only six segments (basis and ischium fused) 7
7. Peduncle of the uropod longer than the rami ..... *Bodotria* Goodsir, 1843
7. Peduncle of the uropod shorter than the rami 8
8. Endopod of the uropod one-segmented; basis of pereopod 1 produced; carapace usually with lateral horns ..... *Eocuma* Marcusen, 1894
8. Endopod of uropod two-segmented; basis of pereopod 1 not produced; carapace without lateral horns ..... *Upselaspis* N.S.Jones, 1955
9. Basis of maxilliped 3 greatly expanded; pereopod 1 with its segments curiously expanded 10
9. Basis of maxilliped 3 not greatly expanded; pereopod 1 not modified 12
10. Pleon unusually short, never more than two-thirds as long as the cephalothorax; antenna 1 strongly geniculate, with segments of peduncle globose ..... *Gephyrocuma* Hale, 1936
10. Pleon not unusually short, at least as long as the cephalothorax; antenna 1 not strongly geniculate and segments not globose 11
11. Telsonic somite subtruncate, little produced; basis of maxilliped 3 with large inner distal lobe and basis of pereopod 1 with no distal lobe ..... *Zenocuma* Hale, 1944
11. Telsonic somite well produced posteriorly; basis of maxilliped 3 without inner distal lobe and basis of pereopod 1 with distal lobe ..... *Pomacuma* Hale, 1944
12. ♂ with only two pairs of pleopods ..... *Mancocuma* Zimmer, 1943
12. ♂ with five pairs of pleopods 13
13. Exopods present on pereopods 1 and 2 only 14
13. Exopods on pereopods 1-3 and sometimes 4 15
14. Eyelobe linguiform; distal process of basis of pereopod 1 reaches beyond end of merus ..... *Pseudosympodomma* Kurian, 1956
14. Eyelobe not linguiform; distal process of basis of pereopod 1 does not reach end of merus ..... *Gigacuma* Kurian, 1951
15. Pereopod 2 with distal brush of setae on propodus and dactylus but no spines; ♀ pereopod 4 with small exopod ..... *Leptocuma* G.O.Sars, 1873

15. Pereopod 2 without brushes of setae on the distal segments but with spines on at least the dactylus; ♀ pereopod 4 without exopod 16
16. Telsonic somite not produced posteriorly; exopods of pereopods 2 and 3 rudimentary 17
16. Telsonic somite produced posteriorly between the uropods; exopods of pereopods 2 and 3 well developed 18
17. Telsonic somite truncate posteriorly; carpus of maxilliped 3 not widened ..... *Cumopsis* G.O.Sars, 1878
17. Telsonic somite excavated postero-dorsally; carpus of maxilliped 3 distally widened ..... *Heterocuma* Miers, 1879
18. Maxilliped 3 with basis little produced distally and with ischium much wider than long ..... *Vaunthompsonia* Bate, 1858
18. Maxilliped 3 with basis prominently produced distally and with ischium at least as long as wide 19
19. Eye present; pseudorostral lobes not reaching beyond ocular lobe 20
19. Eye absent; pseudorostral lobes reaching forwards beyond ocular lobe 21
20. Pereopod 4 of ♂ with exopod ..... *Glyphocuma* Hale, 1944
20. Pereopod 4 of ♂ without exopod ..... *Sympodomma* Stebbing, 1912
21. Pseudorostral lobes meeting in front of ocular lobe; produced portion of telsonic somite much shorter than rest of somite ..... *Bathycuma* Hansen, 1895
21. Pseudorostral lobes not meeting in front of ocular lobe; produced portion of telsonic somite as long as rest of somite ..... *Gaussicuma* Zimmer, 1907

Sub-Family **Vaunthompsoniinae**

Genus ***Bathycuma*** Hansen, 1895

Diagnosis: General form elongate. Pseudorostral lobes meeting in the front. Pereonite 1 short but well exposed. Telsonic somite well produced between the bases of the uropods. Eyes lacking. Maxilliped 3 with lateral apex of second segment distally produced, fourth segment little expanded.

Bathycuma magna n.sp.

(Fig. 1)

Material:

Galathea St. 282, Seychelles-Ceylon (5°32′N, 78°41′E), 4040 m, mud, *c.* 1.4°C, 11.4.1951, HOT – 1 female (holotype).

Description:

Carapace (Fig. 1a) less than twice as long as high, with the pseudorostrum short, little more than 1/10 of its total length; front half carinate with a double row of small spines. Dorsal profile arched from the eyelobe to a point 1/4 of the carapace length from the front. Antero-lateral angle acute and moderately prominent, antennal notch rounded. The carapace is covered with short hairs. On either side to the rear of the frontal lobe is a shallow excavation. A slight ridge across the rear of the carapace and continuing diagonally forward on either side is probably due to damage.

Pleon (1a) long (last somite missing) with two faint lateral ridges on each side; pleonite 5 one-and-a-half as long as 4 and more than half as long as the carapace.

Antenna 1 (1b) slender, with the first segment curved and about one-and-a-half as long as the second, which is about equal in length to the third. Flagellum two-segmented, first segment longer than the second, which bears two aesthetascs and one seta at the end. Accessory flagellum very small, two-segmented.

Antenna 2 (1c) with first segment broad, second with a thick plumose filament and third slender, ending in several setae.

Maxilliped 3 (1d) with basis about two-and-a-half as long as the remaining segments together, its end produced well beyond the end of the merus.

Pereopod 1 (1e) with basis slender; the other segments are missing in the specimen.

Pereopod 2 (1f) with the basis slightly longer than the remaining segments together; ischium short but distinctly jointed; merus and carpus about equal in length with spines at their lower ends; propodus short and dactylus four times as long as the propodus and longer than the carpus, ending in a long slender spine.

Pereopod 3 (1g) with basis nearly twice as long as remaining segments together.

Pereopod 4 (1h) with basis about as long as remaining segments together.

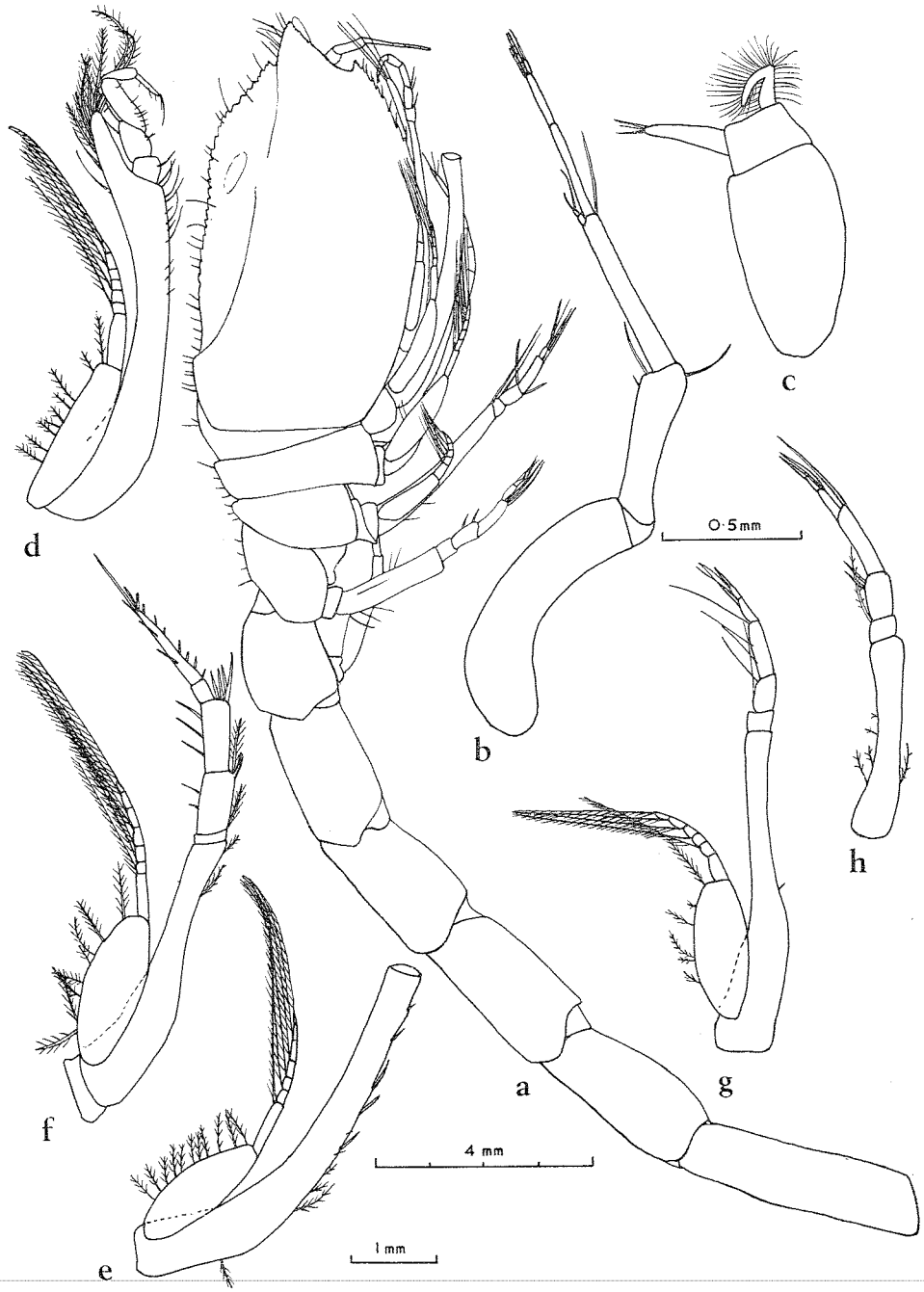

Fig. 1. *Bathycuma magna* n.sp., ♀ holotype; a, lateral view; b, antenna 1; c, antenna 2; d, maxilliped 3; e, pereopod 1; f, pereopod 2; g, pereopod 3; h, pereopod 4.

Uropods missing in specimen.

Size: Length of ♀ holotype estimated to be about 32 mm overall (excluding appendages). The species is therefore among the largest known in the Cumacea.

Remarks:

This species is generally similar to *B. longicaudata* Calman, 1912, and differs from the other species of the genus in having lateral carinae on the pleon somites. These, however, are fainter and the species is probably much larger than *B. longicaudata.* In the absence of the uropods it is not worth while constructing a key to distinguish *B. magna* from the other species of *Bathycuma.*

Genus ***Gaussicuma*** Zimmer, 1907

Diagnosis: General form slender. Pseudorostral lobes not meeting in front of the apically downbent

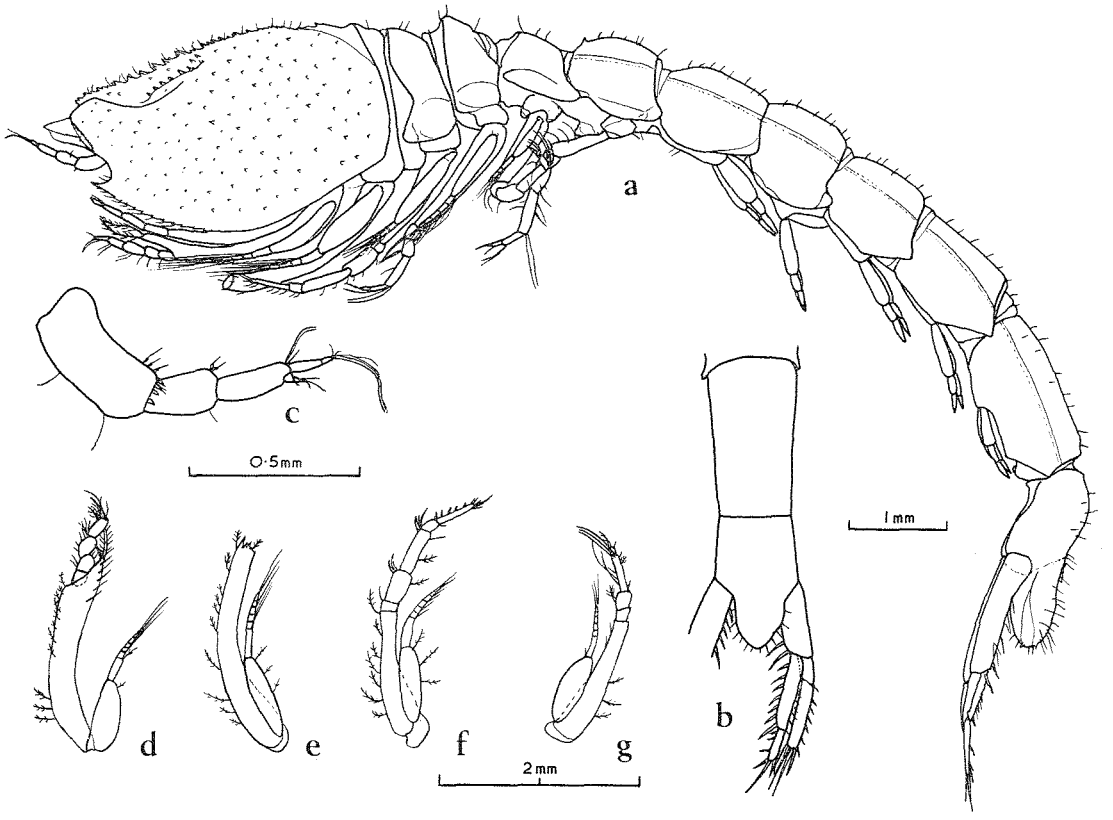

Fig. 2. *Gaussicuma kermadecensis* n.sp., subadult ♂ holotype; a, lateral view; b, pleonites 5-6 and right uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2; g, pereopod 3.

eyeless eyelobe. Telsonic somite strongly produced between the bases of the uropods. Maxilliped 3 with basis long and usually distally produced.

Gaussicuma kermadecensis n.sp.
(Fig.2)

Material:

Galathea St. 664, Kermadec Trench (36°34'S, 178°57'W), 4540 m, brown sandy clay with pumice, 1.1°C, 24.2.1952, HOT – 1 subadult male (holotype).

Description:

Carapace (Fig.2a) a little more than one-and-a-half as long as high, little more than 1/5 of total length. Pseudorostral lobes not meeting in front of the downbent eyelobe. The carapace is carinated, with a double row of denticles along the dorsal ridge; its sides are covered with small denticles and some short scattered hairs and there is a short oblique row of larger teeth on the frontal lobes at each side. The antero-lateral angle has an acute tooth with a rounded antennal notch above it.

Pereon with the first somite visible from the sides and above; a dorso-lateral ridge is present on each side, continued on pleonites 1-5. Pereonites 3-5 have blunt ventral projections on their sternites.

Pleon with scattered hairs dorsally. The telsonic somite (2b) is produced between the uropods almost as far as the end of their peduncles.

Antenna 1 (2c) with first segment of peduncle about as long as the other two together, with a few small spines at its distal end. Flagellum two-segmented, rather more than half as long as the third segment of the peduncle, its second segment about half as long as the first and ending in two aesthetascs. Accessory flagellum two-segmented, about half as long as the first segment of the main flagellum.

Maxilliped 3 (2d) with its basis about two-and-a-half as long as the remaining segments together, its projection reaching beyond the end of the merus.

Pereopod 1 (2e) incomplete on both sides of the specimen but its basis long, with two strong spines at its distal end.

Pereopod 2 (2f) with the basis shorter than the remaining segments together; the ischium short but distinct; the merus shorter than the carpus, with respectively two and three spines at their distal ends;

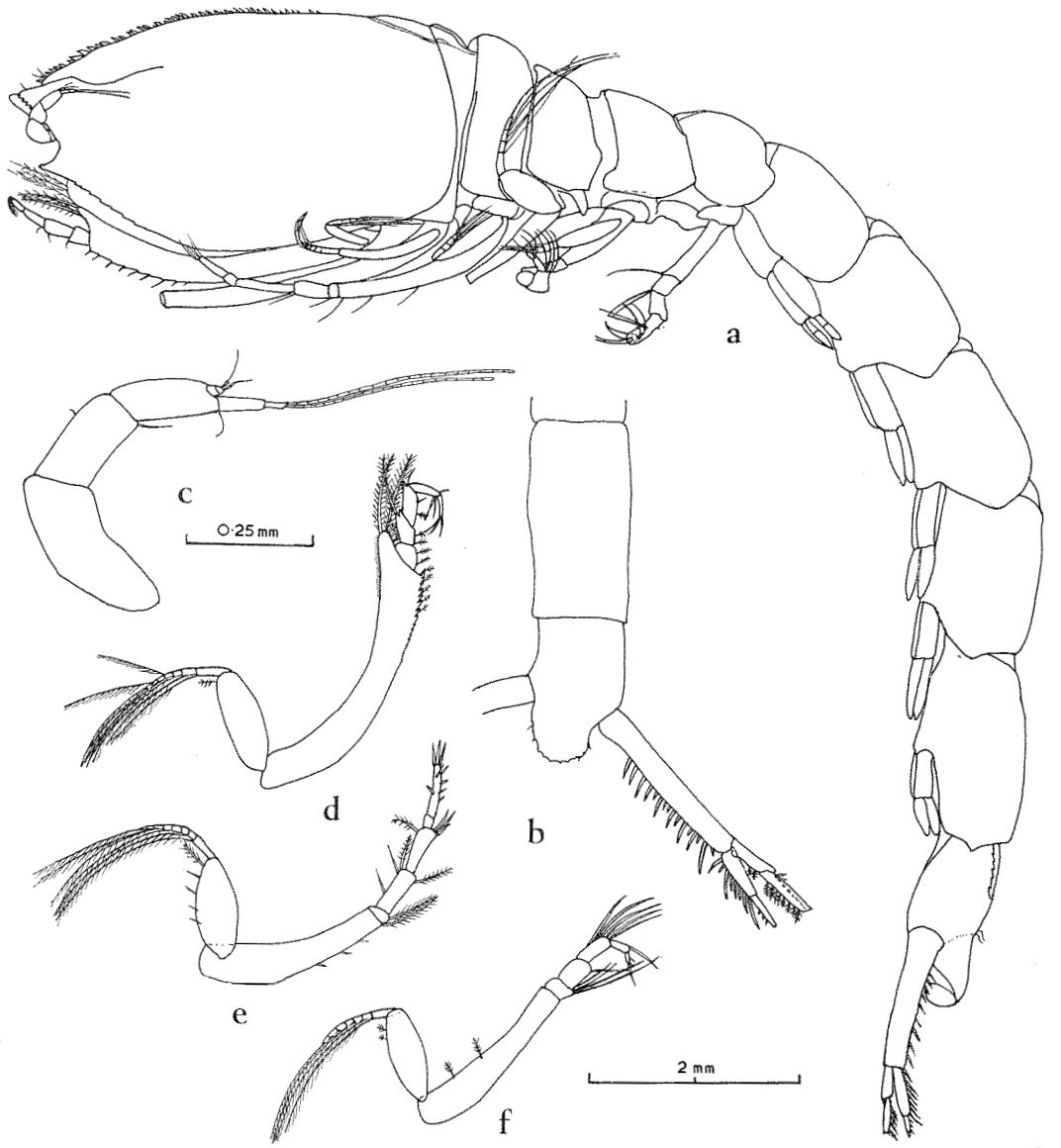

Fig. 3. *Gaussicuma scabra* n.sp., subadult ♂ holotype; a, lateral view; b, pleonites 5-6 and right uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 2; f, pereopod 3.

the dactylus about twice as long as the propodus and a little longer than the merus.

Pereopod 3 (2g) with the basis about one-and-a-half as long as the remaining segments together; the carpus about twice as long as the merus, which is a little longer than the ischium.

Well developed exopods are present on the first four pairs of pereopods.

Five pairs of pleopods are present, not fully developed in this specimen.

Uropods (2b) with the peduncle short, little more than half as long as the last pleonite, with 7 spines on its inner edge, reaching only a little beyond the end of the last somite; the endopod longer than the exopod, its first segment as long as the peduncle and about twice as long as the second segment, with 7 and 4 spines respectively on the inner edges of the two segments and 2 or 3 end spines; a number of more slender spines are present on the outer edge of the proximal segment; the exopod with its distal segment more than twice as long as the proximal, and reaching to nearly half way along the distal segment of the endopod; it has about 7 short spines along its outer edge and a cluster of about 6 fairly long spines round its end.

Size: Length of ♂ holotype 13.5 mm.

Remarks:

The species differs from *Gaussicuma vanhoeffeni* Zimmer, 1907, and *G.scabra* n.sp. in the relative

length of the peduncles of the uropods, which do not project much beyond the end of the telsonic somite and are shorter than the rami. In these respects it resembles *G. gurjanovae* Lomakina, 1952, from which it is easily distinguished by its more slender shape, the denticles on its carapace and the prolongation of the basis of its third maxilliped.

Gaussicuma scabra n. sp.

(Fig. 3)

Material:

Galathea St. 607, Tasman Sea (44°18'S, 166°46'E), 3580 m, clay, *c.* 1.3°C, 17.1.1952, HOT – 1 subadult male (holotype).

Description:

Carapace (Fig. 3a) more than one-and-a-half as long as high, just less than a quarter of the total body length. Pseudorostral lobes acute but not meeting in front of the eyelobe. The carapace is minutely scabrous but without spinules except for a double row on the dorsal crest, and with very few hairs. The antero-lateral angle is acute and well produced and the antennal notch is rounded.

Pereon with all five somites well defined. No ridges or projections on the sternites are visible.

Pleon somites smooth, the last well produced between the peduncles of the uropods (3b).

Antenna 1 (3c) with the first segment of the peduncle distinctly shorter than the other two together. The flagellum two-segmented, much more than half as long as the third segment of the peduncle, its first segment about twice as long as the second, which ends in two long aesthetascs. The accessory flagellum is two-segmented, only about a third as long as the first segment of the main flagellum.

Maxilliped 3 (3d) with its basis a little more than twice as long as the remaining segments together, with a row of spines on its lower distal edge; its distal projection reaches to the middle of the merus.

Pereopod 1 incomplete on either side but the basis is serrated below.

Pereopod 2 (3e) with its basis little longer than the remaining segments together, the ischium short, the merus and carpus about equal in length, the latter with several slender spines distally; the dactylus slightly longer than the carpus and about four times as long as the propodus.

Pereopod 3 (3f) with the basis more than one-and-a-half as long as the remaining segments together; the merus and carpus about equal in length and each about twice as long as the ischium, which bears several long setae; the carpus with 7 slender spines reaching beyond the end of the dactylus; a shorter and more robust spine is present on the propodus and the short dactylus ends in a spine.

Well developed exopods are present on pereopods 1-4.

Pleopods are present on the first five pleonites, without setae in this specimen.

Uropods (3b) with the peduncle long, about one-and-a-quarter as long as the last pleonite, with about 16 unequal spines on its inner edge; both rami are incomplete on one side and missing on the other, but they are both two-segmented and the exopod is longer than the endopod.

Size: Length of ♂ holotype 16 mm.

Remarks:

The species is nearer to *G. vanhoeffeni* than to *G. kermadecensis* or *G. gurjanovae,* but differs from it in the absence of spinules on the sides of the carapace, its more pointed pseudorostral lobes, its smooth sculpturing and lack of carinae on the pereon and pleon, and in the different relative lengths of the peduncles of the uropods.

Key to the species of *Gaussicuma*

1. Peduncle of the uropod about as long as the telsonic somite 2
1. Peduncle of the uropod much shorter than the telsonic somite 3
2. Endopod of the uropod longer than the exopod ..... *vanhoeffeni* Zimmer, 1907
2. Endopod of the uropod shorter than the exopod ..... *scabra* n. sp.
3. Carapace with spinules well developed mid-dorsally and on the sides; basis of maxilliped 3 prolonged ..... *kermadecensis* n. sp.
3. Carapace without denticles; basis of maxilliped 3 not prolonged .... *gurjanovae* Lomakina, 1952

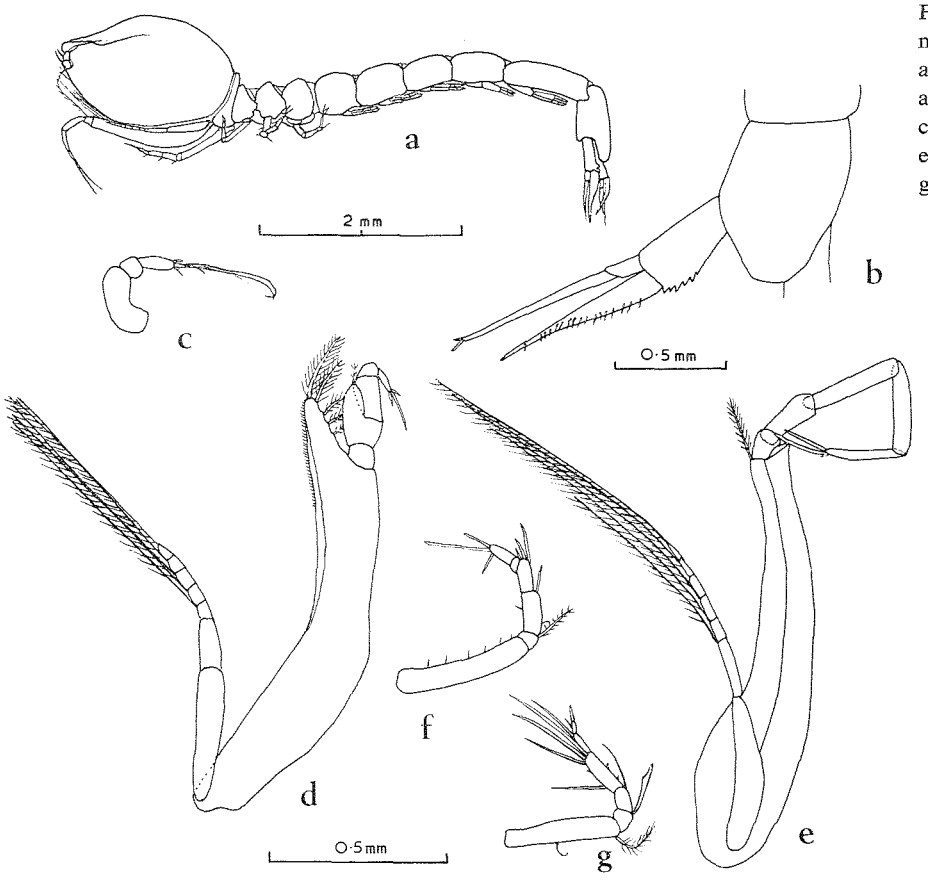

Fig. 4. *Cyclaspis tasmanica* n. sp., subadult ♂ holotype; a, lateral view; b, pleonite 6 and left uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2; g, pereopod 4.

Sub-Family **Bodotriinae**

Genus ***Cyclaspis*** G. O. Sars, 1865

Diagnosis: First pereonite not visible except sometimes in the adult female; the second not longer than the third. Only the first pair of pereopods with exopods in either sex; the second pereopods with the ischium distinct. The endopod of the uropods with only one segment.

Cyclaspis tasmanica n. sp.
(Fig. 4)

Material:

Galathea St. 626, Tasman Sea (42° 10′ S, 170° 10′ E), 610 m, Globigerina ooze, *c.* 7.6° C, 20. 1. 1952, HOT – 1 subadult male (holotype).

Description:

Carapace (Fig. 4a) about one-and-a-half as long as high, somewhat compressed laterally, upper edge domed. A mid-dorsal crest extends along the whole body. Cuticle with minute roughly hexagonal granulations. Eyelobe long, without lenses. Pseudorostrum short. Antero-lateral angle acute and prominent and antennal notch fairly deep.

Pereon with only four somites visible.

Pleon with the fifth somite the longest, but only a little longer than the telsonic somite which is somewhat inflated and well produced between the bases of the uropods (4b).

Antenna 1 (4c) with its first segment elbowed, about one-and-a-half as long as the other two segments of the peduncle together; third segment about twice as long as the second. Flagella two-segmented, the main flagellum with segments of about equal length, together little more than half as long as the third segment of the peduncle. The accessory flagellum about half as long as the proximal segment of the main flagellum.

Maxilliped 3 (4d) with the basis more than three times as long as the remaining segments together, its distal end produced as far as the middle of the carpus; the merus and carpus are broad and the distal outer end of the merus is produced into a lobe.

Pereopod 1 (4e) with the basis less than one-and-a-half as long as the remaining segments together, its distal end a little produced; the merus about twice as long as the ischium and more than half as long as the subequal carpus and propodus; the

dactylus is a little shorter than the propodus and ends in two slender spines.

Pereopod 2 (4f) with the basis a little longer than the remaining segments combined; the ischium distinct and less than half as long as the merus, which is longer than the carpus; the dactylus is about as long as the carpus and more than twice as long as the propodus; the carpus has three spines at its distal end and there are three spines on the dactylus.

Pereopod 4 (4g) with the basis a little shorter than the remaining segments together; the ischium bears a long spine and there is a brush of long spines on the carpus reaching well beyond the end of the dactylus.

Uropods (4b) with the peduncle broad and flat, its inner edge serrated distally, a little more than half as long as the telsonic somite; the rami slender, the exopod a little longer than the endopod and about twice as long as the peduncle; its second segment is more than four times as long as the first and ends in a short spine with an accessory seta; the endopod carries a row of about 17 short spines.

Size: Length of subadult ♂ holotype 6 mm.

Remarks:

This species would run down in HALE's 1944 key to near *C. cottoni* Hale, 1937, but is quite distinct in the relative shape of its uropods. These are unusual in the genus in having the peduncle much shorter than the telsonic somite or the rami. None of the other species which approach it in these characters has a smooth carapace with a domed upper edge.

Cyclaspis subgrandis n. sp.

(Fig. 5)

Material:

Galathea St. 239, off Kenya (3°59'S, 42°03'E), 3290 m, Globigerina ooze, *c.* 2.3°C, 14.3.1951, PG 0.2 – 1 subadult male (holotype).

Description:

Carapace (Fig. 5a) moderately calcified, less than one-and-a-half as long as high, globose in outline with its dorsal edge compressed laterally; a pronounced dorsal crest, slightly serrated at the highest point, runs onto the eyeless eyelobe, which is pointed and longer than broad. The pseudorostrum hardly meets in front of the eyelobe. The carapace is roughened with patches of small scales overlying the normal reticulations. The antero-lateral angle is acute and the antennal notch well excavated.

Pereon with the first somite completely hidden. The dorsal outline is smooth and there is no dorsal crest.

Pleon somites with a mid-dorsal crest, the fifth the longest but only a little longer than the telsonic somite which is not much produced between the bases of the uropods (5b). There are five pairs of pleopods, in the specimen without setae.

Antenna 1 (5c) with the first segment of the peduncle little more than half as long as the other two segments combined and distinctly shorter than the third, which is about one-and-a-half as long as the second. Main flagellum with two segments, the first robust and nearly twice as long as the slender second, which ends in two long aesthetascs; the two segments together are about as long as the second segment of the peduncle. The accessory flagellum is very small.

Maxilliped 3 (5d) with the basis more than three times as long as the remaining segments together, its distal prolongation reaching to the proximal end of the carpus; the merus has a pointed prolongation reaching to the middle of the carpus; the carpus and dactylus are broadened.

Pereopod 1 (5e) with the basis somewhat shorter than the remaining segments together; the propodus is more than twice as long as the dactylus and nearly one-and-a-half as long as the carpus, which is one-and-a-half as long as the ischium and merus together.

Pereopod 2 (5f) long and slender, its basis longer than the remaining segments together; the ischium is distinct, a little less than half as long as the merus, which is a little longer than the carpus; the dactylus is more than twice as long as the propodus and longer than the carpus; the carpus has two spines distally and the dactylus four of unequal lengths.

Pereopod 4 (5g) with the basis much longer than the remaining segments together; the merus longer than each of the other segments distal to the basis, these being about equal in length; the carpus has two slender spines distally, the propodus one, and the dactylus ends in a spine, but none of these are very long.

Uropods (5b) with the peduncle broad, little more than a third as long as the telsonic somite, the endopod very slightly longer than the exopod and nearly as long as the peduncle; the distal segment of the exopod is nearly five times as long as the proximal and has eight short spines on its inner edge.

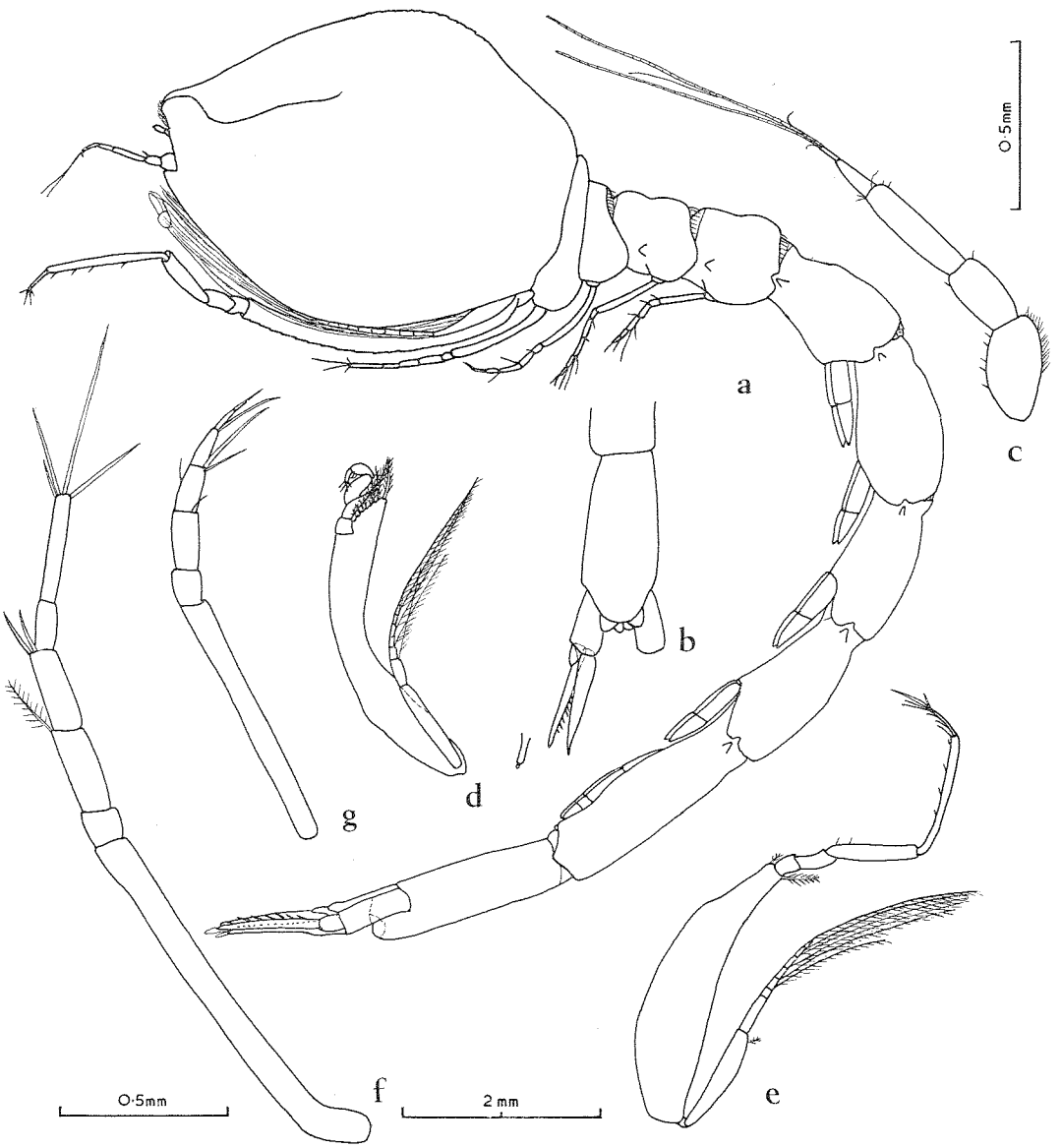

Fig. 5. *Cyclaspis subgrandis* n.sp., subadult ♂ holotype; a, lateral view; b, pleonite 6 and left uropod, with tip of exopod further enlarged, from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2; g, pereopod 4.

Size: Length of subadult ♂ holotype 16.5 mm. This species is among the longest in the genus.

Remarks:

The great majority of the described species of *Cyclaspis,* at least 77, are recorded from comparatively shallow water. Only six others have been obtained from depths of more than 1000 m. *C. subgrandis* resembles *C. gigas* Zimmer, 1907, in its large size but is easily distinguished by the relative proportions of its uropods, which resemble those of *C. tasmanica* n.sp., and by the greater elevation of the dorsal edge of the carapace. From *C. sibogae* Calman, 1905, which also reaches a large size, it is distinguished by the uropods and by the shape and smooth sides of the carapace. It is much larger than *C. tasmanica* and the peduncle of its uropod is even shorter in proportion to the telsonic somite. Its uropods resemble those of *C. spectabilis* Zimmer, 1908, but the latter has a ridge on either side of the carapace, which is not laterally compressed.

FAMILY CERATOCUMATIDAE

Genus *Ceratocuma* Calman, 1905

Diagnosis: Female unknown. Male with small distinct telson, unarmed. Only the first two pairs of pereopods with exopods. The dactylus of the third and fourth pereopods ending in a curved spine.

Five pairs of pleopods present. The uropods with a one-segmented endopod.

Ceratocuma amoena n. sp.
(Fig. 6)

Material:

Galathea St. 758, Puerto Rico Trench (18°45′N, 66°27′W), 2840 m, 3-4°C, 30.5.1952, ST 600 – 1 immature male (holotype).

Description:

Carapace (Fig. 6a, b) flattened dorso-ventrally, with the usual reticulate pattern of hexagonal markings. The pseudorostral lobes meet for some distance in front of the very small eyeless eyelobe. In this (immature) specimen the antero-lateral angle is produced forward as a blunt bifid projection which does not reach as far forward as the pseudorostrum; the lower projection is finely serrated and continues into a lateral ridge running backwards. The antennal notch is well excavated and rounded. Behind the upper projection of the antero-lateral angle is a further blunt projection at about the level of the frontal lobes. Further back two oblique ridges run backwards and downwards on each side of the carapace, ending on blunt projections.

Pereon. Only the first pereonite remains on the specimen, the rest of the pereon and the pleon and their appendages having been lost.

Antenna 1 (6c) with the first segment of the peduncle about one-and-a-half as long as the second and third segments together, the third segment longer than the second. The main flagellum with two segments, the first almost twice as long as the second, together longer than the third segment of the peduncle. The accessory flagellum is very small.

Antenna 2 has three plumose setae on the basal segment. The flagellum is beginning to elongate but segmentation is incomplete.

Mandible with 12 spines.

Maxilliped 1 (6d, e) with only one branchial lobule on the epipod.

Maxilliped 3 (6f) with the basis narrow and more than twice as long as the remaining segments together, not produced distally; the carpus is fairly broad, longer than the ischium and merus together, and about as long as the propodus and dactylus together.

Pereopod 1 (6g, h) with the basis a little shorter than the remaining segments together; the ischium and merus are about equal in length; the carpus is about one-and-a-half as long as the ischium and merus together and more than twice as long as the propodus; the dactylus is about half as long as the propodus. There are two processes on the propodus and one on the carpus, each carrying a tuft of radiating setae, and the last three segments each have laminar crests on the inner edge.

Size: Length of the carapace only of the immature ♂ holotype 2 mm.

Remarks:

In spite of the very incomplete nature of the specimen there is no doubt that it is a member of the genus *Ceratocuma* because of the peculiar first pereopods, which are similar to those described by CALMAN (1905) for *C. horrida*. That it is an immature male is evident from the state of development of the second antennae. The differences in the relative proportions of the appendages between this specimen and *C. horrida* may possibly be ascribed to immaturity, but the sculpturing of the carapace is sufficiently different to make it necessary to erect a new species for it.

I am indebted to Mr. R. W. INGLE of the British Museum (Natural History) for drawing for me the immature male specimen of *C. horrida* described by CALMAN. The processes on the carapace (Fig. 6i) are much less prominent than in the adult but they occupy the same positions and are clearly not equivalent to the more rounded ridges and projections on the carapace of *C. amoena*.

Further specimens will be necessary to complete the description of this species. At present it is only the second member of the genus and of the family to have been described, and no females have yet been found.

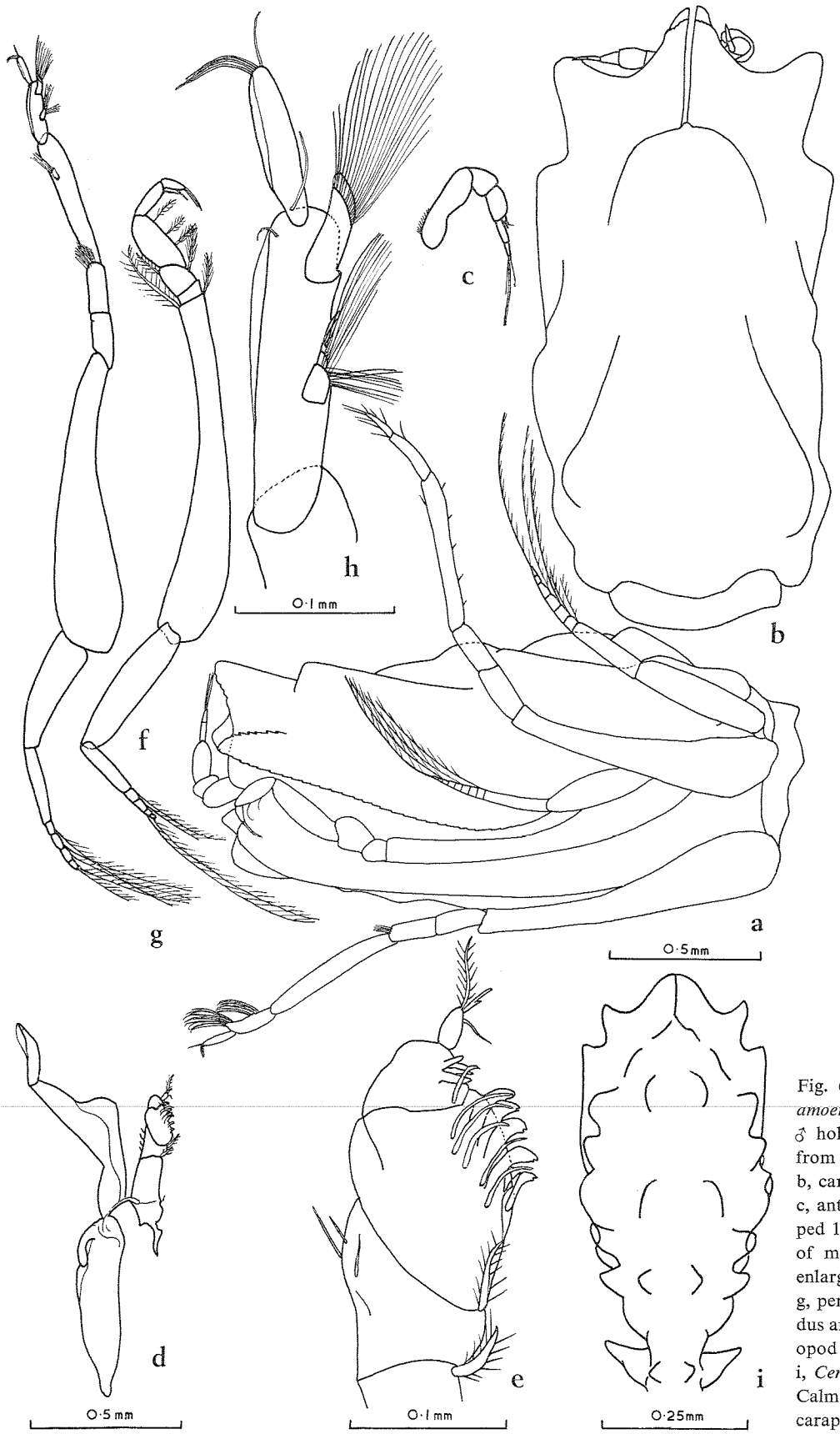

Fig. 6, a-h. *Ceratocuma amoena* n.sp., immature ♂ holotype; a, carapace from left ventral view; b, carapace from above; c, antenna 1; d, maxilliped 1; e, distal segments of maxilliped 1 further enlarged; f, maxilliped 3; g, pereopod 1; h, propodus and dactylus of pereopod 1, further enlarged; i, *Ceratocuma horrida* Calman, immature ♂, carapace from above.

FAMILY LEUCONIDAE

Key to the genera

1. Pseudorostrum distinct and produced forwards, with the efferent orifice at the front 2
1. Carapace truncate anteriorly with the antero-lateral lappets curved backwards; efferent orifice dorsal 7
2. ♂ with two pairs of pleopods 3
2. ♂ with one pair of pleopods or none 5
3. Pseudorostrum obliquely upturned above the carapace; antenna 1 geniculate ..... *Pseudoleucon* Zimmer, 1903
3. Pseudorostrum not obliquely upturned, usually straight; antenna 1 not geniculate 4
4. ♀ with some serrations on the dorsal crest ..... *Leucon* Kröyer, 1846
4. ♀ without serrations on the dorsal crest ..... *Epileucon* N.S. Jones, 1956
5. Pereopods 1 and 2 only with exopods in either sex ..... *Heteroleucon* Calman, 1907
5. Pereopods 1-3 in ♀ and pereopods 1-4 in ♂ with exopods 6
6. One pair of pleopods in ♂ ..... *Paraleucon* Calman, 1907
6. No pleopods in ♂ ..... *Hemileucon* Calman, 1907
7. Antenna 1 geniculate between the second and third segments ..... *Eudorella* Norman, 1867
7. Antenna 1 geniculate between the first and second segments ..... *Eudorellopsis* G.O. Sars, 1883

Genus ***Leucon*** Kröyer, 1846

Diagnosis: Pseudorostrum well developed. Carapace with a serrated dorsal crest in the female, usually smooth in the male. Second antenna of the female with the distal segment well defined.

Leucon panamensis n. sp.
(Fig. 7)

Material:

Galathea St. 734, Gulf of Panama (7°20′N, 79° 38′W), 520 m, green clay, *c.* 7.7°C, 15.5.1952, PGI 0.2 – 1 adult male (holotype).

Description:

Carapace (Fig. 7a, b) a little more than a third of the total length; slightly rounded on dorsal outline, with a single spine at the base of the eyeless eyelobe. The front edge of the well produced pseudorostrum is toothed and there are a number of teeth on the upper part of the shallow antennal notch. The antero-lateral angle is hardly produced so that there is almost no subrostral prominence and the antero-ventral edge is serrated behind it.

Pereon with five somites visible from above. There is a short ventral projection on the fifth sternite inside the bases of the pereopods.

Pleon with the fifth somite one-and-a-half as long as the fourth and twice as long as the telsonic somite (7c), which is well produced backwards between the uropods and has two stout setae projecting from its rounded hind edge.

Antenna 1 (7d) long and slender, the first segment of the peduncle slightly longer than either the second or third which are about equal in length and carry a number of setae. The main flagellum has four segments, together as long as the last segment of the peduncle, its first three segments about equal in length; the fourth short and ending in a long aesthetasc. The accessory flagellum has two very short segments.

Antenna 2 with the flagellum as long as the body.

Maxilliped 1 with 28-30 branchial leaflets.

Maxilliped 3 (7e) with the basis about two-and-a-quarter as long as the remaining segments together; the ischium short; the carpus little longer than the merus and about one-and-a-half as long as the propodus; the dactylus has four slender setae at its end.

Pereopod 1 (7f) with the basis only slightly longer than the remaining segments together, narrowed distally; the ischium fairly short, with a strong spine on its lower edge; the carpus twice as long as the merus and one-and-a-quarter as long as the propodus, which is about twice as long as the dactylus; the dactylus has a row of about six setae at its end.

Pereopod 2 (7g) with the basis a little longer than the remaining segments combined; the ischium very short; the carpus nearly twice as long as the merus and more than three times as long as the propodus, which is only half as long as the dactylus. There is a strong spine at the distal end of the merus and two feathered spines at the end of the carpus; the

Fig. 7. *Leucon panamensis* n.sp., adult ♂ holotype; a, lateral view; b, front of carapace from side; c, pleonite 6 and right uropod from above; d, antenna 1; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, pereopod 3.

dactylus has a number of setae at its distal end, some of which are longer than the segment.

Pereopod 3 (7h) with the basis more than twice as long as the remaining segments together; the ischium is about as long as the merus; the carpus is more than one-and-a-half as long as the merus and nearly twice as long as the propodus; the dactylus is very short and ends in a long slender spine. There is a spine at the distal end of the propodus, a row of five feathered spines at the end of the carpus, and two long flattened spines at the distal end of the ischium, their ends reaching beyond the end of the dactylus.

Well developed exopods are present on the first four pairs of pereopods.

Pleopods are well developed on the first two pleonites.

Uropods (7c) with the peduncle more than one-and-a-half as long as the telsonic somite, with a number of slender spines of varying lengths on its distal inner edge. The endopod slightly longer than the exopod, which is a little longer than the peduncle. The distal segment of the exopod is nearly three times as long as the proximal, and it has a row of slender spines on its outer edge and long plumose setae on its inner edge and at the end. The distal segment of the endopod is a third as long as the proximal; both segments have spines on the inner edge and feathered setae on the outer, with a stronger spine at the distal end of the first segment and two at the end of the second.

Size: Length of adult ♂ holotype 7 mm.

Remarks:

Among the species of *Leucon* which have the endopod of the uropod longer than the exopod, only three, *L. mediterraneus* G.O. Sars, 1879, *L. nasicoides* Liljeborg, 1855, and *L. profundus* Hansen, 1920, have a rudimentary accessory flagellum (less than half as long as the basal segment of the main flagellum) on the first antenna. It is doubtful if any of these have the two backwardly projecting setae on the telsonic somite, but this character needs to be checked. The male of *L. profundus* has not been described but it is likely that it will have a truncate pseudorostrum, as have *L. mediterraneus* and *L. nasicoides,* in contrast to the fairly long pseudorostrum of *L. panamensis.* The armature of the front end of the carapace and the almost complete absence of a subrostral prominence distinguish the latter from any of the species which approach it in other respects.

Genus ***Epileucon*** N.S. Jones, 1956

Diagnosis: Similar to *Leucon,* but the female without a serrated dorsal crest on the carapace.

Epileucon pacifica n. sp.
(Fig. 8)

Material:

Galathea St. 745, Gulf of Panama (7°15'N, 79°25'W), 915 m, green clay, *c.* 5°C, 16.5.1952, ST 600 – 1 ovigerous female (holotype).

Description:

Carapace (Fig. 8a, b) a little more than a quarter of the total length, very slightly convex in dorsal outline, without any trace of serrations on the dorsal crest. Pseudorostrum sloping slightly upwards to its pointed front end and well produced in front of the eyelobe; there are no teeth on its front upper edge but a number of short setae. Three conical teeth are present in the almost straight antennal notch. The antero-lateral angle is hardly produced and the infero-lateral border is coarsely serrated behind it.

Pereon with all five somites visible, the second broad. The marsupium contains 9 embryos.

Pleon with its fifth somite about one-and-a-third as long as the fourth and one-and-a-half as long as the telsonic somite. The fifth somite carries dorsally two pairs of setae reaching backwards beyond the hind end of the telsonic somite (8c), which is well produced between the uropods and has two short backward pointing setae.

Antenna 1 (8d) with the proximal segment of the peduncle stout and a little shorter than the second and third together. The main flagellum is long and robust, about as long as the second and third segments of the peduncle together; its first segment is twice as long as the second and the third is very short. The accessory flagellum has one segment about half as long as the first segment of the main flagellum.

Maxilliped 1 with 9 and one accessory branchial lobules.

Maxilliped 3 (8e) with its basis about one-and-a-third as long as the remaining segments combined; the ischium is short; the carpus is longer than the ischium and merus together but shorter than the propodus and dactylus together; the dactylus is a little shorter than the propodus and ends in five slender spines.

Pereopod 1 (8f) with the basis little more than half as long as the remaining segments together; the

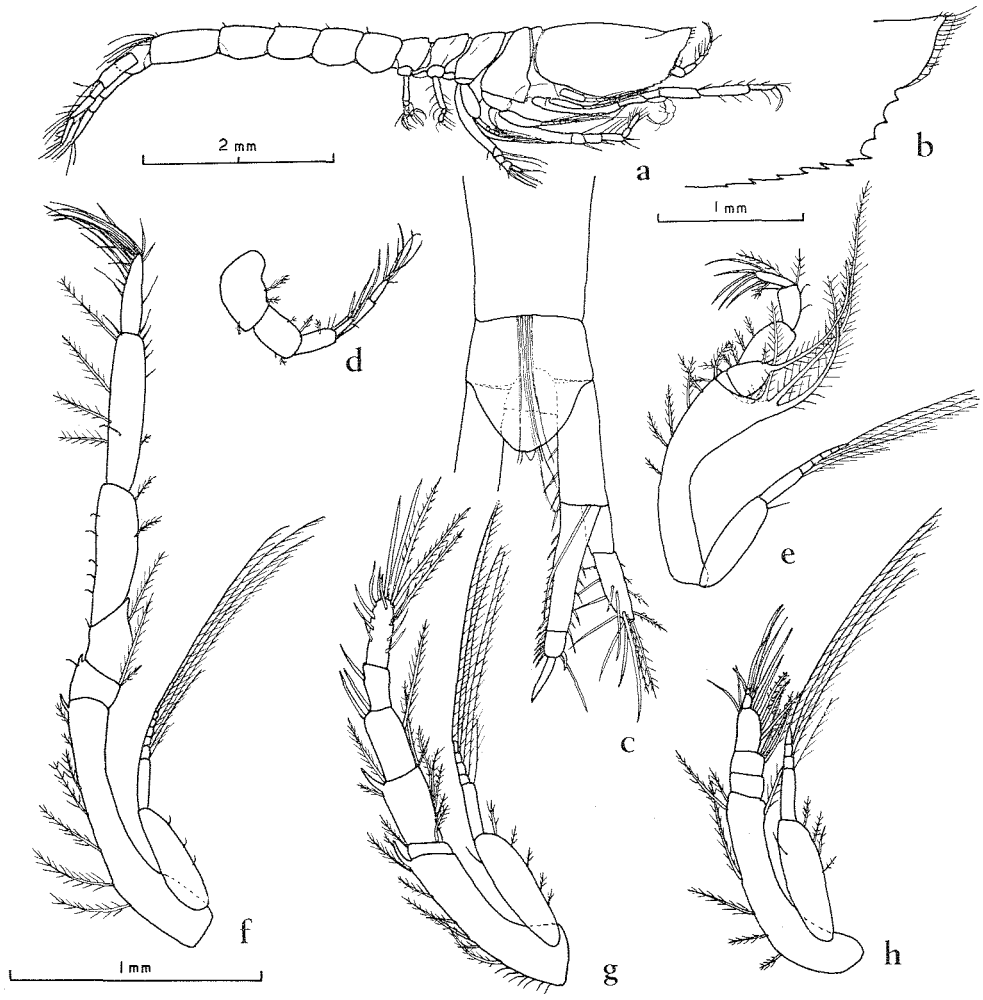

Fig. 8. *Epileucon pacifica* n. sp., adult ♀ holotype; a, lateral view; b, front of carapace from side; c, pleonite 6 and right uropod from above; d, antenna 1; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, pereopod 3.

ischium is about half as long as the merus and about a third as long as the carpus; the propodus is a little longer than the carpus and about twice as long as the dactylus. There is a short spine at the lower distal ends of the basis and ischium and at the upper distal end of the merus; the dactylus ends in a brush of slender setae.

Pereopod 2 (8g) with the basis about three-quarters as long as the remaining segments together; the ischium is short; the merus, carpus and dactylus are about equal in length and each about one-and-a-half as long as the propodus. A single strong spine is present on the distal lower edge of the basis and merus; there are more slender spines at the distal end of the carpus and propodus, while the dactylus ends in several, some of which are feathered.

Pereopod 3 (8h) with the basis about twice as long as the remaining segments together; the ischium and merus are about equal in length and together about equal to the carpus; the propodus is short and narrow and the dactylus very small, ending in a long seta. Long setae are present on the upper edges of the merus, carpus and propodus.

The first three pairs of pereopods have well developed exopods.

Uropods (8c) with the peduncle a little shorter than the telsonic somite; it has a few spines on its inner edge and a long seta at its end, reaching as far as the end of the exopod. The exopod has two equal segments, together about as long as the peduncle; the second segment has a number of long setae on its inner edge and distally, and shorter plumose setae on its outer edge. The proximal segment of the endopod is nearly five times as long as the distal segment and a little longer than the exopod; the two segments have about 15 and 6 slender spines respectively on their inner edges and some setae on their outer edges; the distal segment ends in a strong spine longer than the segment itself.

Size: Length of ovigerous ♀ holotype 6 mm.

Remarks:

From the only other species of *Epileucon* yet described, *E.galatheae* N.S.Jones, 1956, the female differs in the shape of its carapace, which is much longer in proportion to its depth and has a longer and more pointed pseudorostrum. The two pairs of long backwardly projecting setae on pleonite 5 may be a distinguishing character. In *E.galatheae* there is one pair of much shorter setae in this position. In general the shapes of the appendages are rather similar in the two species.

FAMILY NANNASTACIDAE

Key to the genera

1. Pseudorostral lobes widely separated in front and turned upwards and back ..... *Pavlovskeola* Lomakina, 1955
1. Pseudorostral lobes not widely separated nor reflexed 2
2. Exopods present on pereopods 1 and 2 only of ♂; ♂ antenna 2 rudimentary ..... *Almyracuma* Jones & Burbanck, 1959
2. Exopods also present on pereopods 3 and usually 4 of ♂; ♂ antenna 2 with well developed flagellum in adult 3
3. Exopods on pereopods 1-3 of ♂ ..... *Picrocuma* Hale, 1936
3. Exopods on pereopods 1-4 of ♂ 4
4. Molar process of the mandibles thick and truncate 5
4. Molar process of the mandibles styliform 9
5. Carapace more or less overlapping the anterior pereonites 6
5. All the pereonites visible from above 7
6. Carapace very flattened, with prominent edges; gut spirally coiled ..... *Platycuma* Calman, 1905
6. Carapace ovoid and not very flattened; gut not coiled ..... *Cumellopsis* Calman, 1905
7. No eyes or a single median group ..... *Cumella* G.O.Sars, 1865
7. Two ocular groups more or less separated 8
8. Branchial siphons and efferent orifices paired ..... *Schizotrema* Calman, 1911
8. Branchial siphons and efferent orifices united ..... *Nannastacus* Bate, 1865
9. Maxilla 2 rudimentary, without lobes; pereopod 1 with ischium short *Campylaspis* G.O.Sars, 1865
9. Maxilla 2 with one or two lobes; pereopod 1 with ischium elongated 10
10. Maxilla 2 with one lobe; maxilliped 2 with six segments, the carpus armed with teeth and the propodus narrow, with a prolongation extending past the dactylus .... *Campylaspides* Fage, 1929
10. Maxilla 2 with two lobes; maxilliped 2 with seven segments, the carpus unarmed and the propodus broad, without a distal process ..... *Procampylaspis* Bonnier, 1896

Genus *Campylaspis* G.O.Sars, 1865

Diagnosis: All the pereon somites visible from above. Molar process of the mandibles styliform. Second maxillipeds with the basis fused with the ischium, the propodus articulated at right angles with the carpus and terminated by a broad seta, and the dactylus very short, provided with strong diverging distal spines. Pereopod 1 with the ischium not specially elongated.

Campylaspis inornata n.sp.
(Fig.9)

Material:

Galathea St. 626, Tasman Sea (42°10′S, 170°10′E), 610 m, Globigerina ooze, *c.* 7.6°C, 20.1.1952, HOT – 1 ovigerous female (holotype).

Description:

Carapace (Fig.9a) smooth apart from the usual minute reticulate pattern, without distinctive markings, large and vaulted above and behind. The eyeless eyelobe is a little longer than broad. The pseudorostrum is fairly long. The antero-lateral angle is verylittle developed and the antennal notch very shallow.

Pereon with the first two somites visible from above but hidden from the sides by the bulge of the carapace.

Pleon damaged, with the telsonic somite and uropods missing.

Antenna 1 (9b) with the first segment narrowed distally, about three-quarters as long as the other two segments of the peduncle combined; these are

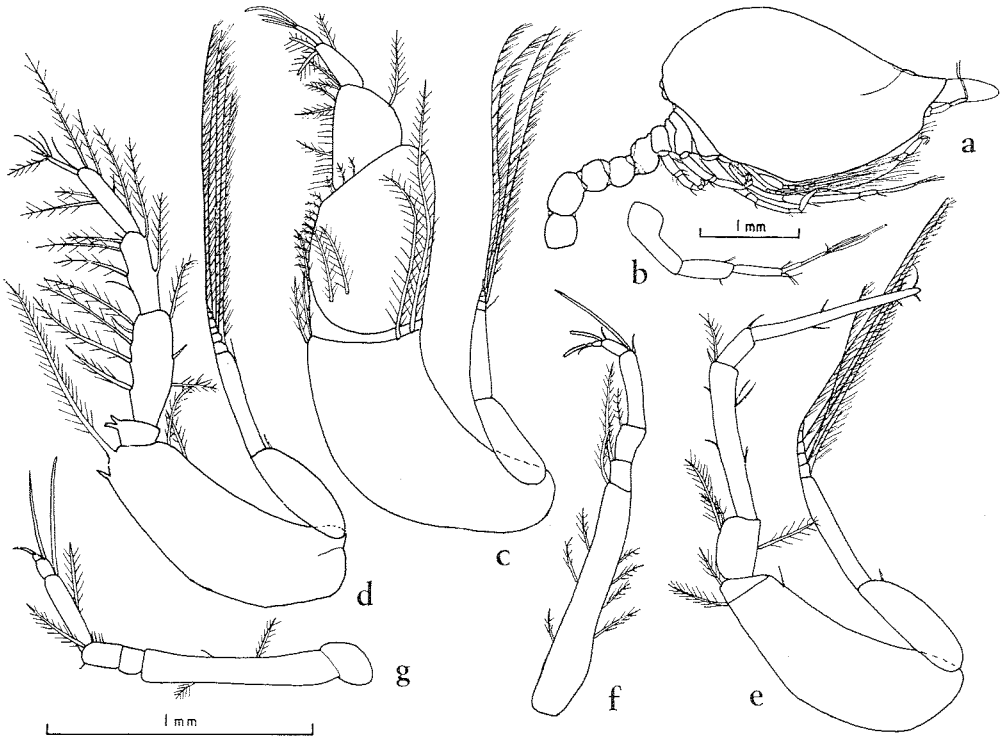

Fig. 9. *Campylaspis inornata* n. sp., adult ♀ holotype; a, lateral view; b, antenna 1; c, maxilliped 3; d, pereopod 1; e, pereopod 2; f, pereopod 3; g, pereopod 4.

about equal in length and fairly slender. The main flagellum has three segments, together about as long as the last segment of the peduncle. The accessory flagellum is very small.

Maxilliped 1 with 18 branchial leaflets.

Maxilliped 3 (9c) with the basis short and broad, shorter than the remaining segments together; the ischium very short but produced distally, the merus nearly twice as long as the carpus, which is a little longer than the propodus and dactylus together. There are no prominent serrations on any segment but two fairly strong distal spines are present on the propodus.

Pereopod 1 (9d) with the basis a little shorter than the remaining segments combined; the ischium is short; the merus is about one-and-a-half as long as the carpus or propodus, which are about equal in length and each about twice as long as the narrow dactylus. There is a single short distal spine on the basis and two on the ischium; plumose setae are present on each segment except the ischium.

Pereopod 2 (9e) with the basis just over half as long as the remaining segments together; the ischium short, the carpus about two-and-a-half as long as the merus, more than three times as long as the propodus and a little shorter than the dactylus.

Pereopod 3 (9f) with the basis about one-and-a-third as long as the remaining segments together; the merus is slightly longer than the ischium and about half as long as the carpus; the propodus is less than half as long as the carpus and twice as long as the small dactylus, which ends in a spine. The carpus and propodus each have a long slender spine distally.

Pereopod 4 (9g) very similar in proportions to pereopod 3.

The first two pairs of pereopods have well developed exopods.

Size: Estimated length of ovigerous ♀ holotype 5 mm.

Remarks:

The general shape of the carapace of this species, with its lack of ornamentation, is very similar to that of *C. glabra* G.O. Sars, 1879, but is rather longer in proportion to its height; it is distinctly more than one-and-a-half as long as high. The basis of the third maxilliped is somewhat broader in proportion to its length than that of *C. glabra* and the merus, carpus and propodus have no serrations. The basis of the first pereopods is similarly rather broader, its length being little more than two-and-a-half its greatest breadth compared with three times in *C. glabra,* while its dactylus is less than half as

long as the propodus (nearly as long in *C. glabra*). *C. inornata* should be distinguishable by the presence of an eyelobe without lenses from other species of similar shape, but the absence of uropods in this specimen does not allow it to be fitted conveniently into a key for identification.

FAMILY LAMPROPIDAE

Key to the genera

1. ♂ with pleopods 2
1. ♂ without pleopods 9
2. ♂ with two pairs of pleopods ..... *Mesolamprops* Given, 1964
2. ♂ with three pairs of pleopods 3
3. The basal segment of the exopod of the uropod little shorter than the distal segment except in *H. mawsoni* Hale, 1937; basis of maxilliped 3 widened at its distal end *Hemilamprops* G.O.Sars, 1883
3. The basal segment of the exopod of the uropod much shorter than the distal segment; basis of maxilliped 3 not widened distally 4
4. Pereopod 5 lacking ..... *Stenotyphlops* Stebbing, 1912
4. Pereopod 5 present 5
5. Pereopods 3 and 4 of the ♀ without exopods ..... *Platysympus* Stebbing, 1912
5. Pereopods 3 and 4 of the ♀ with rudimentary exopods 6
6. Pseudorostrum acutely produced forwards 7
6. Pseudorostrum short and blunt 8
7. Pseudorostrum fairly long; telson little more than half as long as peduncle of uropods ..... *Bathylamprops* Zimmer, 1908
7. Pseudorostrum very long; telson nearly as long as peduncle of uropods ..... *Pseudodiastylis* Calman, 1905
8. Telson short, about a third as long as the peduncle of the uropods *Chalarostylis* Norman, 1879
8. Telson long, at least more than half as long as the peduncle of the uropods ..... *Paralamprops* G.O.Sars, 1887
9. Carapace broad and flattened, without antennal notch; pleon excluding telson about one-and-a-half as long as the carapace and pereon somites together ..... *Platytyphlops* Stebbing, 1912
9. Carapace not specially broad or flattened, with a well marked antennal notch; pleon excluding telson at most little longer than carapace and pereon somites together *Lamprops* G.O.Sars, 1863

Genus ***Hemilamprops*** G.O.Sars, 1878

Diagnosis: Carapace without a distinct antennal notch. Eyes well developed or wanting. Flagellum of male antenna 2 long. First pereopods slender and elongated. Three pairs of well developed pleopods in the male.

Hemilamprops pellucida Zimmer, 1908

Hemilamprops pellucida Zimmer, 1908, p. 171-172, figs. 53-59; Stebbing, 1912, p. 144-145, pl. 52 (4); Jones, 1963, p. 52-53, figs. 192-201.

Material:

Galathea St. 554, Great Australian Bight (37°28′ S, 138°55′E), 1320-1340 m, Globigerina ooze, *c.* 3.5°C, 5.12.1951, ST 300 – 1 adult female.

Remarks:

The occurrence of this species at a depth of about 1330 m in the Great Australian Bight is within the range previously known. Earlier records are from South Africa at 564 m, off New Zealand at 129 and 290 m, and at 65°30′S, 85°56′E at a depth of 2725 m.

Genus ***Bathylamprops*** Zimmer, 1908

Diagnosis: Pseudorostral lobes acute and much produced. Telson well developed. Eye wanting. Antenna 1 long. Antenna 2 of female with terminal segment elongated. Maxilliped 1 with few branchial leaflets. Male with three pairs of pleopods.

Bathylamprops calmani Zimmer, 1908

Bathylamprops calmani ZIMMER, 1908, p. 173, figs. 60-70.

Material:

Galathea St. 190, off Durban (29°42'S, 33°19'E), 2720 m, Globigerina ooze, *c.* 2.4°C, 3.2.1951, ST 300 – 2 subadult males.

Galathea St. 192, off Durban (32°00'S, 32°41'E), 3530 m, Globigerina ooze, 1.2°C, 5.2.1951, SOT – 1 adult female.

Remarks:

The original record for this species was from the region of Dar-es-Salaam (6°12'S, 41°17'E) at 2959 m. The *Galathea* specimens were collected at localities much further south, but still off the east coast of Africa.

The presence of pleopods in the males places the genus nearer to *Hemilamprops* than to *Lamprops,* contrary to the opinion of STEBBING (1913). The length of the adult ♀ was 16 mm.

Bathylamprops natalensis n. sp.

(Fig. 10)

Material:

Galathea St. 179, Cape Town-Durban (35°44'S, 34°16'E), 3800 m, *c.* 2°C, 24.1.1951, ST 300 – 1 female with marsupium (holotype).

Description:

Carapace (Fig. 10a) a little more than a third of the total length, about two-and-a-half as long as high. The surface of the carapace and of the rest of the body and appendages is minutely scabrous. There are scattered short hairs on the front half of the carapace. The branchial regions are obscurely patterned with slightly raised, more or less circular ridges, giving a faint honeycomb appearance. There is no eyelobe. A dorsal crest is present at least as far back as the branchial region. The pseudorostral lobes are long and acute and slightly upraised, rather more than a fifth of the total carapace length. The antennal notch is quite unexcavated but there is a slight antero-lateral projection which has a few serrations.

Pereon with five somites clearly visible from the side, all fairly short.

Pleon with fifth somite a little more than one-and-a-half as long as the fourth and slightly more than one-and-a-half as long as the telsonic somite. The telson (10b) is linguiform, nearly twice as long as the telsonic somite, its edges serrated, and with about 10 or 11 short spines on each side distally and three end spines.

Antenna 1 (10c) with the first segment of the peduncle longer than the second and third combined; its upper and lower edges are strongly serrated and there is a row of small spinules on its outer side; the upper edge carries a row of long plumose setae and the lower edge a row of shorter ones; the second segment is short and fairly stout, about half as long as the slender third segment. The main flagellum is more than half as long as the distal segment of the peduncle and has five segments. The accessory flagellum is short, with two segments.

Maxilliped 3 (10d) with the basis about two-and-a-quarter as long as the remaining segments together, not produced distally; the ischium is very short, the merus a little shorter than the carpus, both the latter segments having their lower edges serrated; the propodus is about as long as the merus and nearly twice as long as the dactylus; the carpus is broad but not specially so.

Pereopod 1 (10e) with the basis somewhat shorter than the remaining segments together, with a distal spine on the lower edge; the basis, ischium and merus are serrated on their lower edges; the ischium is short, the merus about a third as long as the carpus, which is subequal to the propodus and more than one-and-a-half as long as the slender dactylus.

The first two pairs of pereopods have well developed exopods and rudimentary two-segmented exopods are present on the third and fourth pairs.

Uropods (10b) with the peduncle less than one-and-a-half as long as the telson and about one-and-a-half as long as the exopod, which is a little longer than the endopod. The peduncle has a row of about 14 short spines on its inner edge and is serrated on both edges. The exopod has its second segment slightly shorter than the third, these together being about as long as the first segment; there are about four spines on the inner edge of the first segment, one distally on the second and three short end spines on the third. The endopod has two segments, the first a little shorter than the second and both serrated on the inner edge; the first segment has a distal spine and the second about six spines on the inner edge, a few on the outer edge, and several longer end spines.

Size: Length of adult ♀ holotype 18 mm.

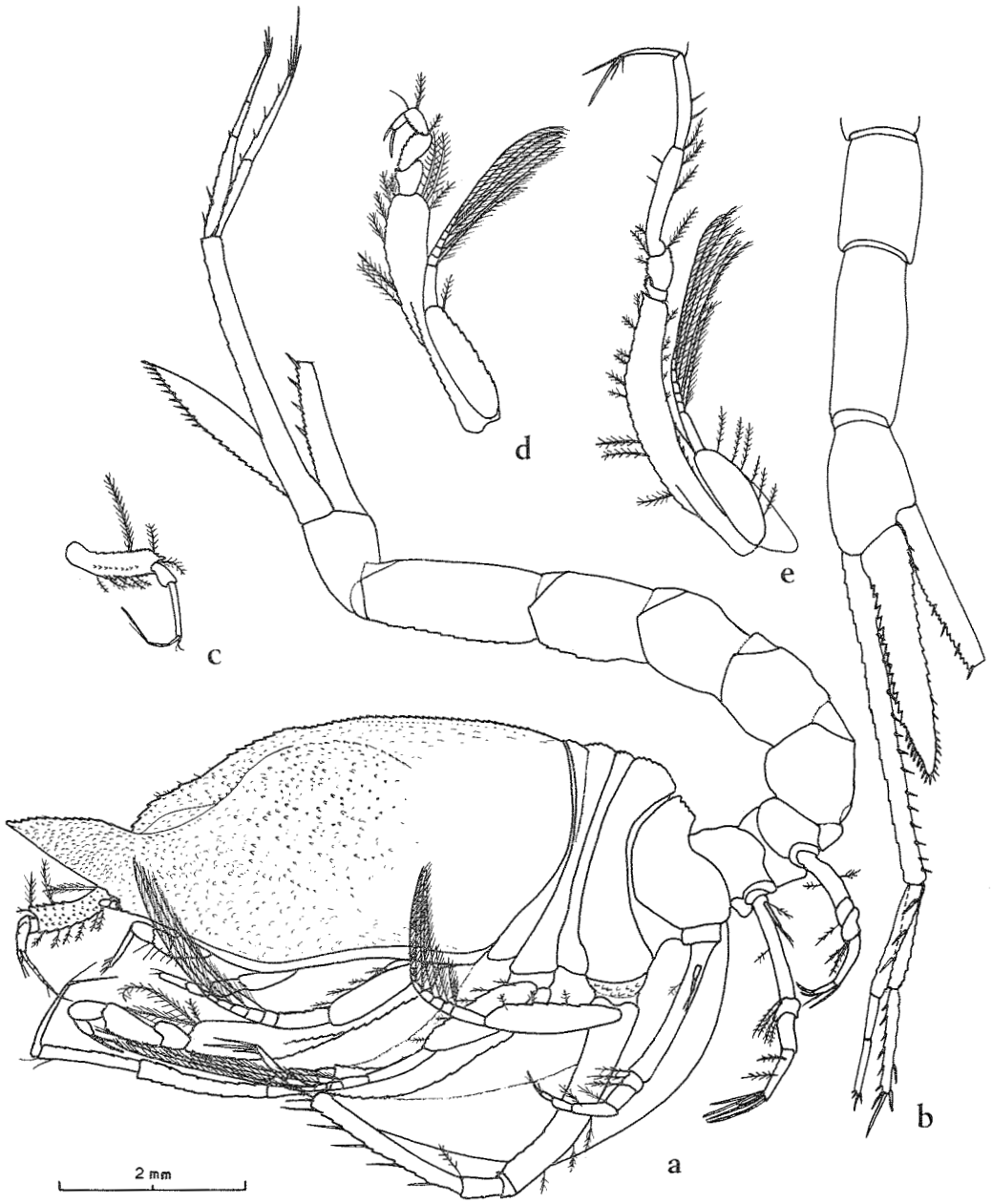

Fig. 10. *Bathylamprops natalensis* n.sp., adult ♀ holotype; a, lateral view; b, pleonites 4-6, telson and left uropod, obliquely from above; c, antenna 1; d, maxilliped 3; e, pereopod 1.

Remarks:

A male and female of a species of parasitic isopod were present in the marsupium, which was devoid of eggs.

The shape of the carapace is very similar to that of *B. calmani,* the only other species in the genus, but it is easily distinguished by the lack of ridges or swellings which are found on the carapace and pleon of *B. calmani.* In *B. natalensis* the telson is not narrowed distally except in its last quarter, the carpus of the third maxillipeds is not specially widened, and the uropods are less slender.

Genus ***Paralamprops*** G.O. Sars, 1887

Diagnosis: Carapace broad, depressed, without antero-lateral angles. Pleon long and slender. Telson with three apical spines. Male second antenna as long as the body. Fifth pereopod normal. Male with three pairs of pleopods.

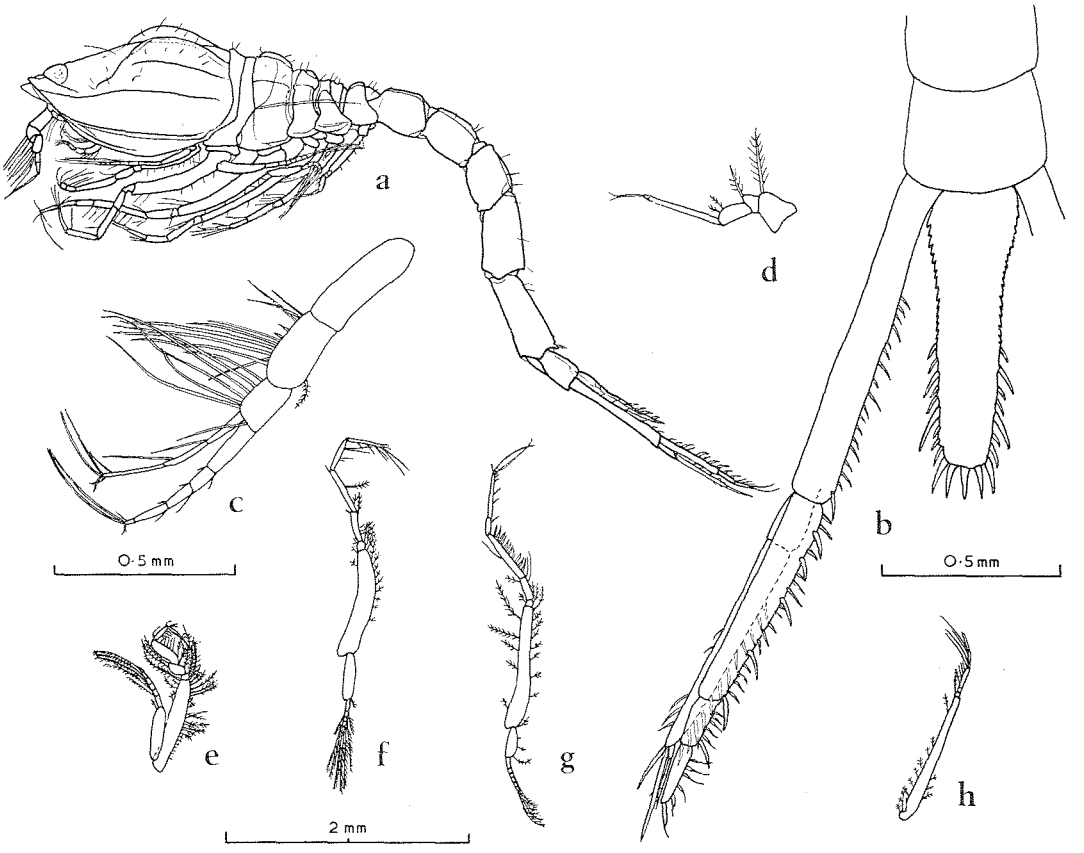

Fig. 11. *Paralamprops arafurensis* n. sp., adult ♀ holotype; a, lateral view; b, pleonite 6, telson and left uropod from above; c, antenna 1; d, antenna 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, pereopod 3.

Paralamprops arafurensis n. sp.
(Fig. 11)

Material:

Galathea St. 500, Arafura Sea (7°34′S, 132°44′ E), 390 m, coralline sand and stones, *c.* 9.2°C, 25.9.1951, D80 – 1 ovigerous female (holotype).

Description:

Carapace (Fig. 11a) one-and-two-thirds as long as high, about a quarter of the total length to the end of the telson, rather compressed dorso-ventrally, with nine carinae which do not appear serrate, a median one on the anterior half, an arcuate submedian pair on the posterior half, a shorter pair below these, a long subdorsal pair and a lateral pair almost encircling the carapace. Some scattered hairs are present dorsally and on the pereon and pleon. The eyelobe is large and prominent and the eye appears to contain lenses. The pseudorostrum is fairly short, meeting for a short distance in front of the eyelobe. There is no distinct antero-lateral angle and the antennal notch is hardly excavated.

Pereon with five somites distinct from above, the second the longest. The submedian pair of carinae is continued on pereonites 2 and 3 and the pair next below on pereonites 2-5. The infero-lateral angles of pereonites 2-5 are produced forwards and sideways.

Pleon with the fifth somite a little longer than the fourth and more than twice as long as the sixth. The two pairs of ridges on the pereon somites are also present but much less prominent on the pleon. The telson (11b) is more than two-and-a-half as long as the last somite and a little shorter than the peduncle of the uropods; it is widened near the base and fairly broad at the end; its sides are serrated at the base and have 8 and 10 robust spines of varying lengths respectively on their distal halves; there are three strong apical spines.

Antenna 1 (11c) with the first segment about as long as the second and third together, the second one-and-a-half as long as the third; there are a number of long setae on the second and third segments. The main flagellum is nearly two-thirds as long as the peduncle and has five segments. The accessory flagellum is nearly as long and has three segments.

Antenna 2 (11 d) with four segments, the last long and slender.

Maxilliped 3 (11 e) with the basis about as long as the remaining segments together, its distal end not at all produced; the ischium short; the carpus nearly twice as long as the merus, not specially widened, and about one-and-a-half as long as the propodus, which is about one-and-a-half as long as the dactylus.

Pereopod 1 (11 f) with the basis only two-thirds as long as the remaining segments together; the ischium is fairly short and about a third as long as the merus, which is about equal in length to the propodus and dactylus separately and about two-thirds as long as the carpus.

Pereopod 2 (11 g) with the basis about five-sixths as long as the remaining segments together; the ischium is short; the carpus is two-and-a-half as long as the merus and has a row of slender spines on the lower edge; there is a long distal spine on the merus; the propodus is less than a third as long as the carpus and about a third as long as the slender dactylus, which ends in two long setae.

Pereopod 3 (11 h) with the basis about twice as long as the other segments combined; the merus is longer than the carpus; merus and carpus have a few long setae distally which reach beyond the end of the dactylus.

Pereopods 1 and 2 have well developed exopods and rudimentary two-segmented exopods are present on pereopods 3 and 4.

Uropods (11 b) with the peduncle more than three times as long as the last somite, with about 18 slender spines on its inner distal edge and a more robust spine at its distal end. The endopod is about as long as the peduncle and distinctly longer than the exopod; its third segment is a little longer than the second and together they are half as long as the first; the segments have about 20, 6 and 6 unequal spines respectively on the inner edges of the first, second and third. The smeecond segnt of the exopod is more than four times as long as the first; the second segment has about 12 slender spines on its inner edge, a number on its outer edge and three long apical spines.

Size: Length of ovigerous ♀ holotype 6.5 mm.

Remarks:

P. arafurensis is perhaps nearest to *P. aspera* Zimmer, 1907, which it resembles in general form and in the number of longitudinal carinae on the carapace. It differs, however, in the absence of serrations on the median carina as it does from *P. serratocostata* (G. O. Sars, 1878), and from these and the remaining three species in the shape of its telson, which is much broader in its distal half. It is also much smaller than any of the other species.

Key to the species of *Paralamprops*

1. Telson reaching to the end of the peduncle of the uropod ..... *aspera* Zimmer, 1907
1. Telson not reaching end of peduncle of uropod 2
2. Proximal part of distal third of telson much more than half as broad as base .. *arafurensis* n. sp.
2. Proximal part of distal third of telson not more than half as broad as base 3
3. Telson with at least 8 pairs of lateral spines 4
3. Telson with at most 4 pairs of lateral spines 5
4. Carapace with a pair of serrated dorsal carinae on its hinder half, commencing on either side of the hind end of the mid-dorsal carina ..... *serratocostata* (G. O. Sars, 1878)
4. This pair of carinae not present ..... *semiornata* Fage, 1929
5. Carapace with mid-dorsal carina serrate ..... *orbicularis* (Calman, 1905)
5. Carapace with mid-dorsal carina smooth ..... *grimaldii* Fage, 1929

FAMILY DIASTYLIDAE

Key to the genera

1. ♂ with pleopods 2
1. ♂ without pleopods 15
2. Mandibles broad at base ..... *Diastyloides* G.O.Sars, 1900
2. Mandibles narrow at base 3
3. ♂ with basis of pereopods 1-4 not greatly expanded 4
3. ♂ with basis of pereopods 1-4 greatly expanded 11
4. Telson comparatively long, longer than the last somite 5
4. Telson comparatively short, shorter than the last somite 9
5. Post-anal portion of the telson short, with not more than four pairs of lateral spines, or absent ..... *Makrokylindrus* Stebbing, 1912
5. Post-anal portion of telson long and narrowed 6
6. Telson without apical spines ..... *Oxyurostylis* Calman, 1912
6. Telson with apical spines 7
7. Pereopods 2 and 3 of ♀ not widely separated ..... *Diastylis* Say, 1818
7. Pereopods 2 and 3 of ♀ widely separated 8
8. Pseudorostrum of ♀ strongly upturned and pereopods 3 and 4 without exopods ..... *Brachydiastylis* Stebbing, 1912
8. Pseudorostrum not strongly upturned and pereopods 3 and 4 of ♀ with rudimentary exopods ..... *Diastylopsis* S.I.Smith, 1880
9. Lateral spines of telson numerous; ♂ antenna 2 as long as the body *Ekleptostylis* Stebbing, 1912
9. Lateral spines of telson few 10
10. Exopod of the uropods shorter than the endopod; ♂ antenna 2 much shorter than the body ..... *Leptostylis* G.O.Sars, 1869
10. Exopod of the uropods longer than the endopod ..... *Leptostyloides* n.gen.
11. Maxilliped 3 of ♀ without an exopod ..... *Paradiastylis* Calman, 1904
11. Maxilliped 3 with an exopod in either sex 12
12. ♀ with no exopods on pereopods 3 and 4 ..... *Dimorphostylis* Zimmer, 1921
12. ♀ with rudimentary exopods on pereopods 3 and 4. 13
13. Pleopods with only one ramus, with modified non-plumose setae ..... *Anchistylis* Hale, 1945
13. Pleopods with two rami, with plumose setae 14
14. Endopod of uropod with two segments ..... *Colurostylis* Calman, 1911
14. Endopod of uropod with three segments ..... *Anchicolurus* Stebbing, 1912
15. Maxilliped 3 with ischium greatly expanded and with exopod present in ♀ .. *Dic* Stebbing, 1910
15. Maxilliped 3 with ischium not greatly expanded and without an exopod in the ♀ 16
16. ♀ with exopods on at least pereopods 1 and 2; ♂ (where known) with terminal telsonic spines absent or similar to those of ♀ 17
16. ♀ with no thoracic exopods; ♂ with terminal telsonic spines long and bristle-like 19
17. Antenna 1 unusually large; first segment of peduncle dilated distally, second expanded proximally ..... *Sheardia* Hale, 1946
17. Antenna 1 small or of moderate size; proximal segments of peduncle not at all expanded 18
18. ♀ with exopods on pereopods 1 and 2 only; pereopod 1 with propodus at most barely more than half length of basis ..... *Gynodiastylis* Calman, 1911
18. ♀ with exopods on pereopods 1-4; pereopod 1 with propodus at least little shorter than basis ..... *Dicoides* Hale, 1946
19. Antenna 1 with third segment of peduncle longer than the combined lengths of the dilated first and second segments; dactylus of pereopod 1 without brush of long setae .. *Allodiastylis* Hale, 1936
19. Antenna 1 normal, third segment of peduncle much less than combined lengths of first and second segments; dactylus of pereopod 1 with a brush of very long setae ..... *Zimmeriana* Hale, 1946

Pachystylis Hansen, 1895, would run out in this key with *Dimorphostylis*. Further description and probably the collection of more specimens will be necessary for its satisfactory inclusion.

Genus ***Diastylis*** Say, 1818

Diagnosis: Carapace with antero-lateral angles usually little produced. Pseudorostrum of female not strongly upturned. Third and fourth pereonites with their pleural plates not much produced backwards. Telson long, post-anal part narrowed, with several pairs of lateral spines. Second antenna as long as the body. Third maxilliped with an exopod in either sex. Pereopods 1-4 of the male with the basis not greatly expanded. Rudimentary exopods are sometimes present on pereopods 3 and 4 of the female. Male with two pairs of pleopods. The endopod of the uropod usually with three segments.

Diastylis gibbera n.sp.

(Fig. 12)

Material:

Galathea St. 554, Great Australian Bight (37°28′ S, 138°55′E), 1320-1340 m. Globigerina ooze, *c.* 3.5°C, 5.12.1951, ST 300) – 1 female with developing oostegites (holotype).

Description:

Carapace (Fig. 12a) very slightly more than twice as long as high, more than a third of the total body length, strongly domed anteriorly in dorsal outline. Epidermis smooth but with a few short hairs, especially on the pseudorostrum, and with three small teeth in a triangle on either side behind the small eyelobe, which is about as broad as long. The pseudorostrum is fairly long and acute. The antennal notch is very shallow and there is no projecting antero-lateral angle. The infero-lateral edges are serrated.

Pereon with a mid-ventral spine on each of the fourth and fifth sternites. The postero-lateral corners of the fifth somite end in a small spine on either side.

Pleon with the fifth somite about one-and-a-third as long as the sixth. Pleonites 1-4 each have a mid-dorsal spine. Pleonite 6 (12b) has two strong postero-lateral spines on each side and a row of a few spines below and forward of these. The telson (12c) with its spines is slightly longer than pleonite 5 and 6 combined and longer than the peduncle of the uropods; without its end spines the telson is a little shorter than the peduncles; the pre-anal portion is a little longer than the post-anal, which is narrow and almost parallel-sided with four spines on either side and two longer apical spines.

Antenna 1 (12d) with the first segment of the peduncle nearly one-and-a-half as long as the second and third segments together, with a tooth near its distal end and a row of about 8 plumose setae. The main flagellum is three-segmented and longer than the third segment of the peduncle, its first segment as long as the other two combined. The one-segmented accessory flagellum is about half as long as the first segment of the main flagellum.

Maxilliped 3 (12e) with the basis about one-and-three-quarters as long as the remaining segments combined, its distal end little produced; the ischium is nearly as long as the merus and together they are a little longer than the carpus, which is about as long as the dactylus and a little shorter than the propodus.

Pereopod 1 (12f) with the basis long and slender, having two strong spines distally; the remaining segments are missing in the specimen.

Pereopod 2 (12g) with the basis only a little longer than the remaining segments together, with about four strong spines distally; the ischium is very short; the merus is about as long as each of the propodus and dactylus and slightly less than half as long as the carpus.

Rudimentary exopods are present on pereopods 3 and 4.

Uropods (12b, h) with the peduncle slender, a little longer than pereonites 5 and 6 combined and about one-and-a-half as long as the exopod; it has a row of 12-14 short spines on its inner edge. The exopod is a little longer than the endopod without its apical spine, its second segment about twice as long as the first, with about 8 small spines on its outer edge and two apical spines. The first and third segments of the endopod are about equal in length and each nearly twice as long as the second segment; they have respectively four, three and three spines on their inner edges and a strong apical spine on the distal segment almost as long as the three segments together.

Size: Length of ♀ holotype 8 mm.

Remarks:

The difficulties of constructing a workable key for the identification of the species of this large genus are great. Since STEBBING's (1913) key to 31 species (and several more which he placed in other

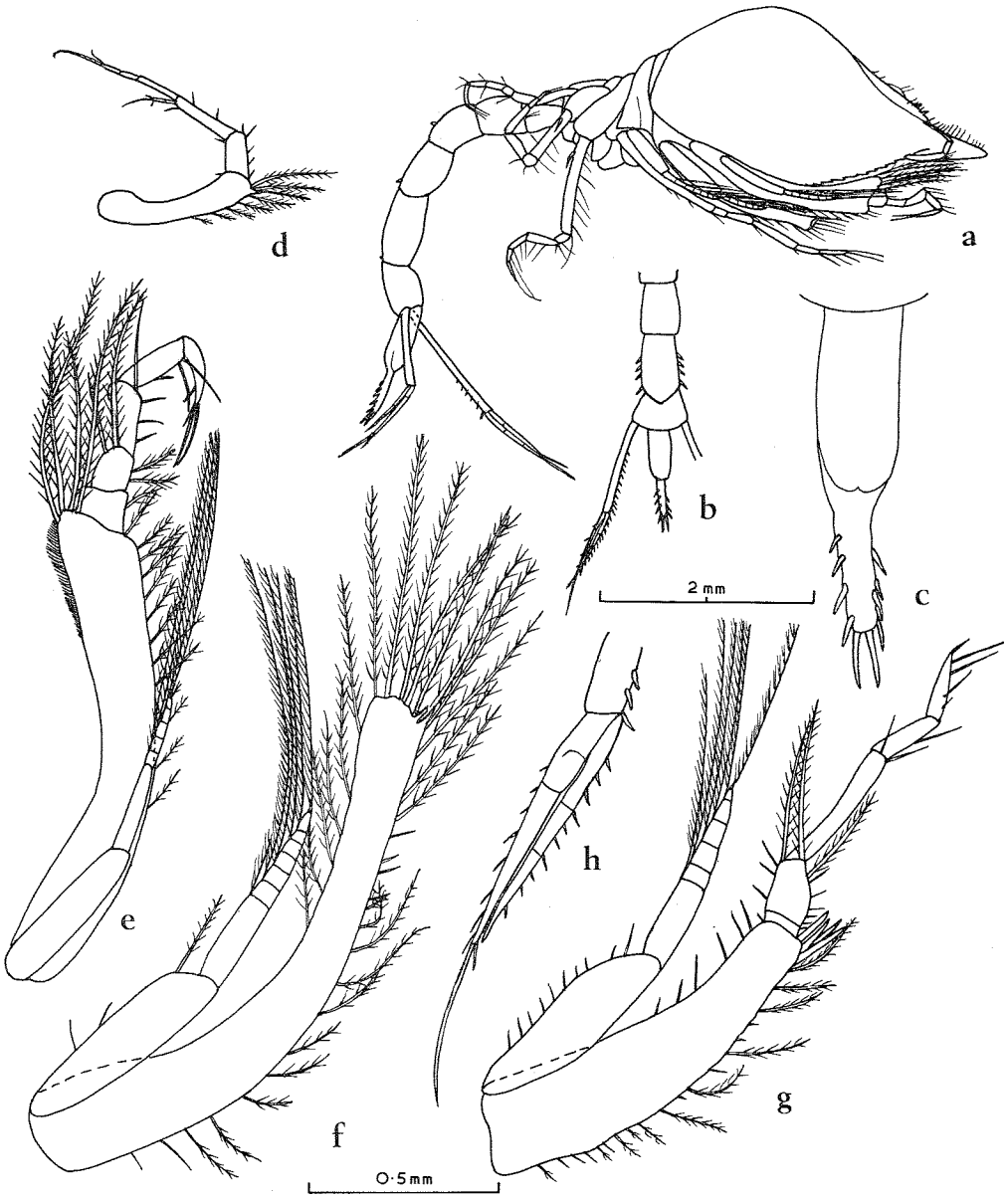

Fig. 12. *Diastylis gibbera* n.sp., adult ♀ holotype; a, lateral view; b, pleonites 4-6, telson and left uropod from above; c, telson from above; d, antenna 1; e, maxilliped 3; f, basis of pereopod 1; g, pereopod 2; h, distal part of left uropod.

genera) only ZIMMER (1930) has attempted to produce a key and this was for the males of some 28 species only. The often large differences between the adults of the two sexes make the task more difficult. There are now 68 described species in the genus, which has become rather a repository for species which can not be placed satisfactorily elsewhere. In this work I shall only indicate the major differences from the nearest species.

D.gibbera, in common with 11 other species in the genus, has rudimentary exopodites on pereopods 3 and 4 in the female. From all of these it may at once be distinguished by the absence of any spines or ridges on its carapace, apart from the few small teeth behind its eyelobe. As well as in the absence of ridges it differs from *D.delicata* n.sp. in the shape of the telson (Figs. 12c and 14b).

Diastylis exilicauda n.sp.

(Fig. 13)

Material:

Galathea St. 554, Great Australian Bight (37°28′ S, 138°55′E), 1320-1340 m, Globigerina ooze, *c.* 3.5°C, 5.12.1951, ST 300 – 1 female with empty marsupium (holotype).

Fig. 13. *Diastylis exilicauda* n. sp., adult ♀ holotype; a, lateral view; b, pleonites 4-6, telson and parts of uropods from above; c, telson obliquely from above; d, antenna 1; e, maxilliped 3; f, pereopod 1; g, pereopod 2.

Description:

Carapace (Fig. 13a) very slightly less than twice as long as high, and less than a third of the total body length (including telson), with its dorsum not strongly arched. The front of the carapace has numerous small curved spines at its sides, low blunt tubercles in the frontal regions, and some short hairs, more numerous on the pseudorosturm. The eyelobe is of normal shape, about as broad at the base as long, without lenses. The pseudorostrum is short, little more than a seventh of the total carapace length. There is a shallow antennal notch but the antero-lateral angle is very obtuse; the infero-lateral edges are finely toothed behind.

Pereon with the first and second pereopods well separated. Pereonites 3 and 4 are fused dorsally. Dorso-lateral teeth are present on pereonites 4 and 5. The postero-lateral corners of the fifth somite are rounded.

Pleon with the fifth somite the longest but only about one-and-a-quarter as long as the fourth and sixth. Pleonites 1 and 2 have each a pair of dorso-lateral spines. The last somite is broadened. The telson (13c) is about as long as the last three somites together and distinctly shorter than the peduncle of the uropod; its post-anal part is about two-thirds as long as the pre-anal and is much narrowed, with four pairs of lateral and two slightly stronger apical spines; there are about 7 short setae on either side of the pre-anal portion.

Antenna 1 (13d) with the first segment of the peduncle nearly twice as long as the second and about one-and-a-half as long as the third; it has a long and robust plumose seta at its distal end and a row of short setae on its distal upper edge; the second and third segments are much more slender than the first. The main flagellum has three segments, the first short, and is a little shorter than the third segment of the peduncle. The accessory flagellum is three-segmented and is about half as long as the main flagellum.

Maxilliped 3 (13e) with the basis curved, about one-and-a-half as long as the other segments combined, its distal end little produced; the merus is a little longer than the ischium and about half as long as the carpus, which is about as long as the dactylus and a little shorter than the propodus.

Pereopod 1 (13f) with the basis curved, about three-fifths as long as the remaining segments together; the merus is about one-and-a-half as long as long as the ischium and less than half as long as the carpus; the carpus, propodus and dactylus are about equal in length.

Pereopod 2 (13g) with the basis only a little shorter than the remaining segments together; the merus and ischium are about equal; the carpus is about two-and-a-half as long as the merus, about three times as long as the propodus and about one-and-a-half as long as the dactylus.

There are no exopods on pereopods 3 and 4.

Uropods (13b) incomplete. The peduncle is slender and nearly as long as the last four pleon somites together; there are about 14 short spines on its inner edge and about 15 setae on its outer edge. The exopod is missing; the endopod has three subequal segments, together less than a third as long as the peduncle, each with one short internal and one external spine distally; there is a longer and more robust apica, spine on the distal segment.

Size: Length of ♀ holotype 8 mm.

Remarks:

Diastylis exilicauda differs from most of the species of the genus which do not have rudimentary exopods on pereopods 3 and 4 of the female by the absence of ridges or folds or prominent spines on its carapace. No other species has a combination of blunt tubercles and small spines at the front of the carapace. The majority of species of *Diastylis* have more lateral spines on the telson and few have the post-anal part so abruptly narrowed.

Diastylis delicata n. sp.

(Fig. 14)

Material:

Galathea St. 626, Tasman Sea (42° 10′ S, 170° 10′ E), 610 m, Globigerina ooze, *c.* 7.6° C, 20. 1. 1952, HOT – 1 adult female (holotype).

Description:

Carapace (Fig. 14a) about one-and-a-half as long as high, about a third of the total body length (including telson), not very strongly arched dorsally, sides coarsely pitted, with a faint oblique ridge on each side meeting on the centre line about half way back, and a nearly vertical ridge running upwards on each side from the hind end of the frontal lobe; a few short hairs are visible. The eyelobe is small, as broad as long, with indistinct lenses. The pseudorostrum is fairly pointed with a very shallow antennal notch below. The lower edges are finely serrated.

Pereon with its first somite visible from above.

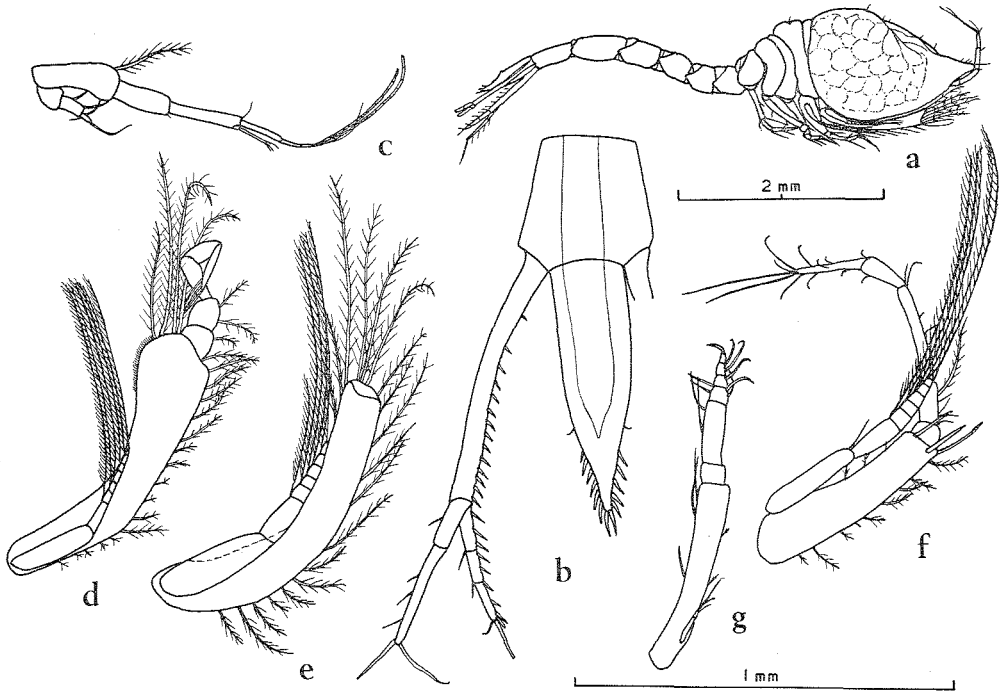

Fig. 14. *Diastylis delicata* n. sp., adult ♀ holotype; a, lateral view; b, pleonite 6, telson and left uropod from above; c, antenna 1; d, maxilliped 3; e, basis of pereopod 1; f, pereopod 2; g, pereopod 3.

There is a blunt ventral projection on the third sternite.

Pleon with the fifth somite about one-and-a-half as long as the fourth or sixth. The telson (without its apical spines) (14b) is less than twice as long as the last pleonite and about as long as the peduncle of the uropods; the pre-anal part is broad and much longer than the post-anal portion, which is only gradually narrowed behind and has a pair of setae proximally and five or six spines on each side distally, with two stronger end spines.

Antenna 1 (14c) with the first segment of the peduncle about one-and-a-half as long as the second and one-and-a-quarter as long as the third, which is much more slender. The three-segmented main flagellum is about as long as the third segment of the peduncle and the two-segmented accessory flagellum is a little shorter than the first segment of the main flagellum.

Antenna 2 (14c) shorter than the first segment of the peduncle of antenna 1, its second segment a little shorter than the first and about twice as long as the much narrower third, which ends in a long seta.

Maxilliped 3 (14d) with the basis more than one-and-a-half as long as the remaining segments together, its distal end broad and somewhat produced; the merus is little longer than the ischium and about two-thirds as long as the carpus, which is about as long as the dactylus and very little longer than the propodus.

Pereopod 1 (14e) incomplete on either side, only the coxa and basis remaining; the basis is curved, with a row of long plumose setae.

Pereopod 2 (14f) with the basis about three-quarters as long as the remaining segments together; it has several long spines distally; the merus is about twice as long as the ischium and about as long as the propodus; the carpus is more than twice as long as the merus and nearly one-and-a-half as long as the dactylus.

Pereopod 3 (14g) with the basis nearly straight, about one-and-a-half as long as the remaining segments combined; the merus is about three times as long as the ischium and more than four times as long as the subequal carpus, propodus or dactylus.

Pereopods 3 and 4 each have a rudimentary two-segmented exopod on the basis.

Uropods (14b) with the peduncle narrow, about twice as long as the last pleonite and with about 14 spines on its inner edge. The exopod is about three-fifths as long as the peduncle and one-and-a-third as long as the endopod (excluding spines). The second segment of the endopod is a little shorter than either the first or third and they have respectively 3:3:2 spines on their inner edges, each a single

distal seta on their outer edges, and the last segment ends in a fairly long distal spine. The second segment of the exopod is about twice as long as the first; each has a few setae on its outer edge and there are two long terminal spines on the second segment.

Size: Length of adult ♀ holotype 5 mm.

Remarks:

D. delicata has rudimentary exopods on the third and fourth pereopods of the female. The coarse pitting and absence of strong ridges on the sides of the carapace, the shape of the telson and its length in proportion to the peduncle of the uropods distinguish it from the other species with these rudimentary exopods. It is also rather small compared with most species of *Diastylis*.

?*Diastylis tenebricosa* n. sp.
(Fig. 15)

Material:

Galathea St. 716, Acapulco-Panama (9°23′N, 89°32′W), 3570 m, muddish clay, *c.* 1.9°C, 6.5.1952, HOT – 1 female without pleon (holotype).

Photograph in WOLFF (1961), p. 144.

Description:

Carapace (Fig. 15a, b) dorso-ventrally flattened, moderately arched dorsally, a little less than half as high but nearly as broad as long. A pattern of ridges crowned with a series of blunt broad spines is present on the carapace and there are a few scattered hairs on its sides. A ridge leads backwards from the front edge of each frontal lobe, connected a little way back by a short transverse ridge, approaching each other behind this transverse ridge and then curving away and running obliquely forwards to the side of the pseudorostrum. Four pairs of ridges run from this upper pair obliquely downwards and backwards, the anterior pair reaching the lower edges of the carapace, the others not quite as far. The eyelobe is about as long as broad, without lenses. The pseudorostrum is about a sixth of the total carapace length, fairly acute, excavated below to form a shallow antennal notch bounded by an obtuse antero-lateral angle. The lower edge of the carapace is serrated from the antennal notch backwards to the first oblique backwards running ridge.

Pereon much damaged dorsally, but with traces of a pair of dorso-lateral ridges with large blunt spines on some of the somites. The fifth somite has a prominent acute mid-ventral tooth on its sternite.

Pleon missing except for a portion of its first somite.

Antenna 1 (15c) with its first segment long and narrow, about one-and-a-half as long as the second or third. The main flagellum is long, with four segments, together longer than the last segment of the peduncle. The accessory flagellum is three-segmented and a little longer than the first segment of the main flagellum.

Antenna 2 (15d) with three segments, the first much the longest, the third narrowed, the first and second each with a long and the third with two rather shorter plumose setae.

Maxilliped 3 (15e) with the basis a little curved near the base, about twice as long as the other segments combined, its distal end hardly produced; the merus and ischium are about equal in length, and about half as long as the carpus or propodus, which are each about one-and-a-half as long as the dactylus.

Pereopod 1 (15f) with the basis about four-fifths as long as the remaining segments together; the merus is about one-and-a-half as long as the ischium and about a third as long as the subequal carpus or propodus; the dactylus is very slender and a little shorter than the propodus.

Pereopod 2 (15g) with the basis about three-quarters as long as the remaining segments together; its distal upper edge has a row of teeth and its lower edge is serrated; the merus is about twice as long as the ischium and more than a third as long as the carpus, which is four times as long as the propodus and not qu.te three times as long as the dactylus.

Pereopod 3 (15h) with the basis a little longer than the remaining segments together; the merus is more than twice as long as the ischium and about as long as the carpus, which is a little longer than the subequal dactylus and propodus together; the dactylus is tipped with a spine more than twice its length and long setae, one on the propodus and two on the carpus, reach as far as the end of this spine.

There is no trace of exopods on pereopods 3 and 4.

Uropods missing.

Size: Length of carapace and pereon of holotype ♀ about 7 mm.

Remarks:

The absence of the pleon makes it impossible to assign this species with certainty to a genus and it is referred only tentatively to *Diastylis*. However, it does not obviously fit elsewhere. No other de-

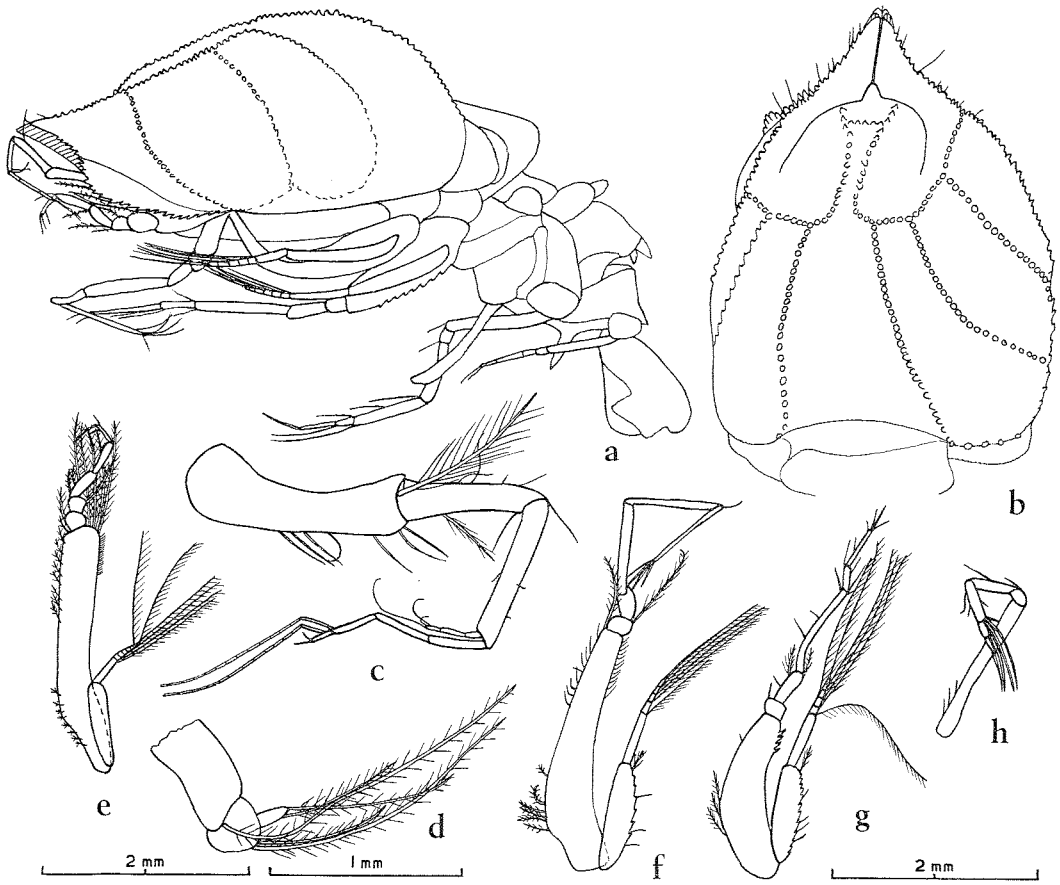

Fig. 15. ?*Diastylis tenebricosa* n. sp., ♀ holotype; a, carapace and pereon in lateral view; b, carapace obliquely from above; c, antenna 1; d, antenna 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, pereopod 3.

scribed species in the order has similar markings on the carapace and further specimens should be recognized without difficulty when they become available.

Genus ***Makrokylindrus*** Stebbing, 1912

Diagnosis: Near to *Diastylis* but with the telson more developed, especially in its cylindrical proximal part which is much longer than the post-anal part. The post-anal part may have some lateral spines but there are seldom more than four pairs.

Makrokylindrus costatus (Bonnier, 1896)
(Fig. 16)

Diastylis costata Bonnier, 1896, p. 553, t. 30, figs. 1, 1a-m, o.
Adiastylis costatus, Stebbing, 1913, p. 116.

Material:

Galathea St. 771, Gulf of Biscay (47°48′N, 8°26′W), 1920 m, stiff clay, *c.* 4°C, 18.6.1952, PGI 0.2 – 1 subadult male.

Remarks:

There is no doubt that, as suggested by Fage (1951), this species should be placed within *Makrokylindrus*. The original find was from the same area as that detailed here, from a depth of 1410 m. Bonnier's specimen was a juvenile female only 6 mm in length.

Additional description of subadult male:

Carapace (Fig. 16a, b) with its outline from the side very similar to Bonnier's drawing of the female. The dorsal crest is not well defined and there is no trace of bifurcation at the hind end. There are three pairs of crests running obliquely forwards and downwards in more or less the same positions as shown by Bonnier but the fourth pair run from further forward, from the front edges of the frontal lobes. The antennal notch is shallowly excavated. The spines on the oblique ridges are more pronounced in the two anterior pairs, becoming blunter in the hinder pairs. The integument is faintly pitted, with forwardly pointing small spines between the

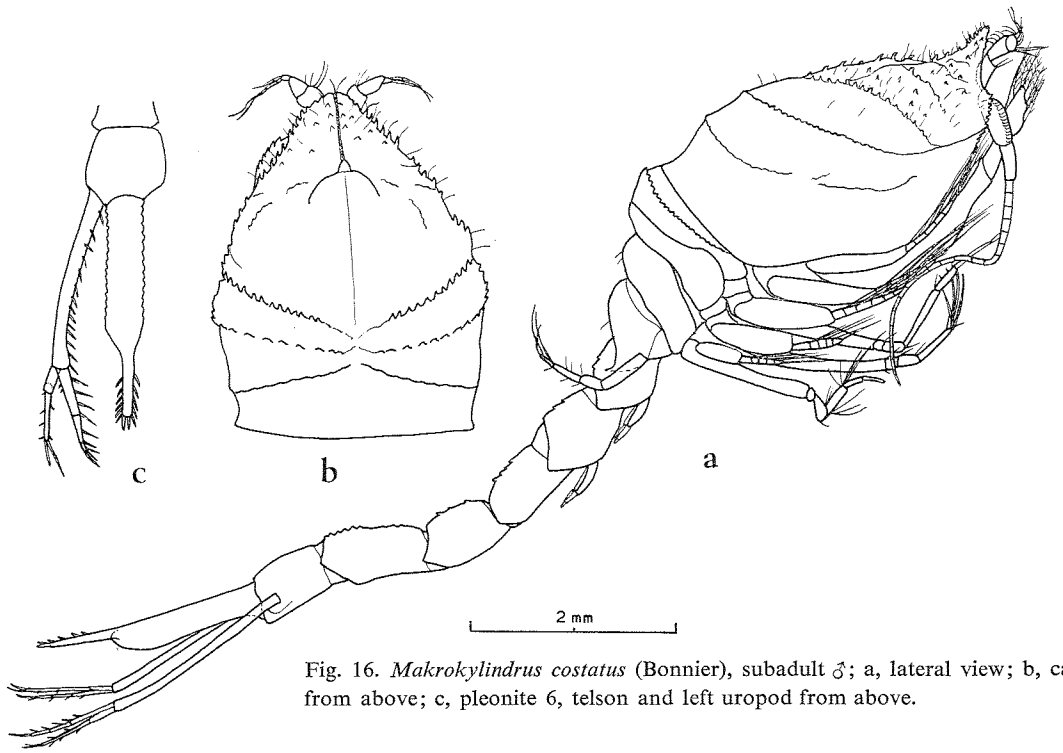

Fig. 16. *Makrokylindrus costatus* (Bonnier), subadult ♂; a, lateral view; b, carapace from above; c, pleonite 6, telson and left uropod from above.

crests on the front part of the carapace, and with scattered hairs.

Pereon somite 5 has a small backward-pointing spine on its postero-lateral corners.

Pleon similar to that of the female. The telson has its post-anal part a little more slender in proportion to the pre-anal part, the sides of which are bluntly serrated.

Antennae 1 and 2 differing in the usual manner from those of the femaie, though not quite fully developed.

Uropods (16c) with more spines on their inner edges but otherwise similar to those of the female.

Size: Length of subadult ♂ 11.5 mm.

Makrokylindrus josephinae (G. O. Sars, 1871)

Diastylis Josephinae G. O. Sars, 1871, p. 36, t. 15, figs. 72-74.

Diastylopsis (?) *dubia* Bonnier, 1896, p. 559, t. 30, fig. 3a-m.

Makrokylindrus josephinae, Stebbing, 1912, p. 150; 1913, p. 120.

Makrokylindrus josephinae, Fage, 1951, p. 119, figs. 101, 102, 1-2.

Makrokylindrus josephinae, Bacescu, 1962, p. 221.

Makrokylindrus dubius, Bacescu, 1962, p. 222.

Material:

Galathea St. 771, Gulf of Biscay (47°48′N, 8°26′ W), 1920 m, stiff clay, *c.* 4°C, 18.6.1952, PGI 0.2 – 1 adult female.

Remarks:

The specimen from the Galathea Expedition is a well grown female 13 mm in length. In the form and ornamentation of the carapace and in other features it closely resembles G. O. Sars' (1871) figures but the third and fourth pereonites are coalesced dorsally. I can see no reason to suppose that Sars' drawing was correct in this last respect (he shows the pereonites as quite separated) and I therefore do not follow Bacescu (1962) in separating it from Bonnier's *Diastylopsis* (?) *dubia,* which I consider, with Fage (1951), to be synonymous.

Sars' type specimen of this species and of *M. longipes* do not appear to be extant.

The specimen was obtained from within the known geographical and depth range of the species.

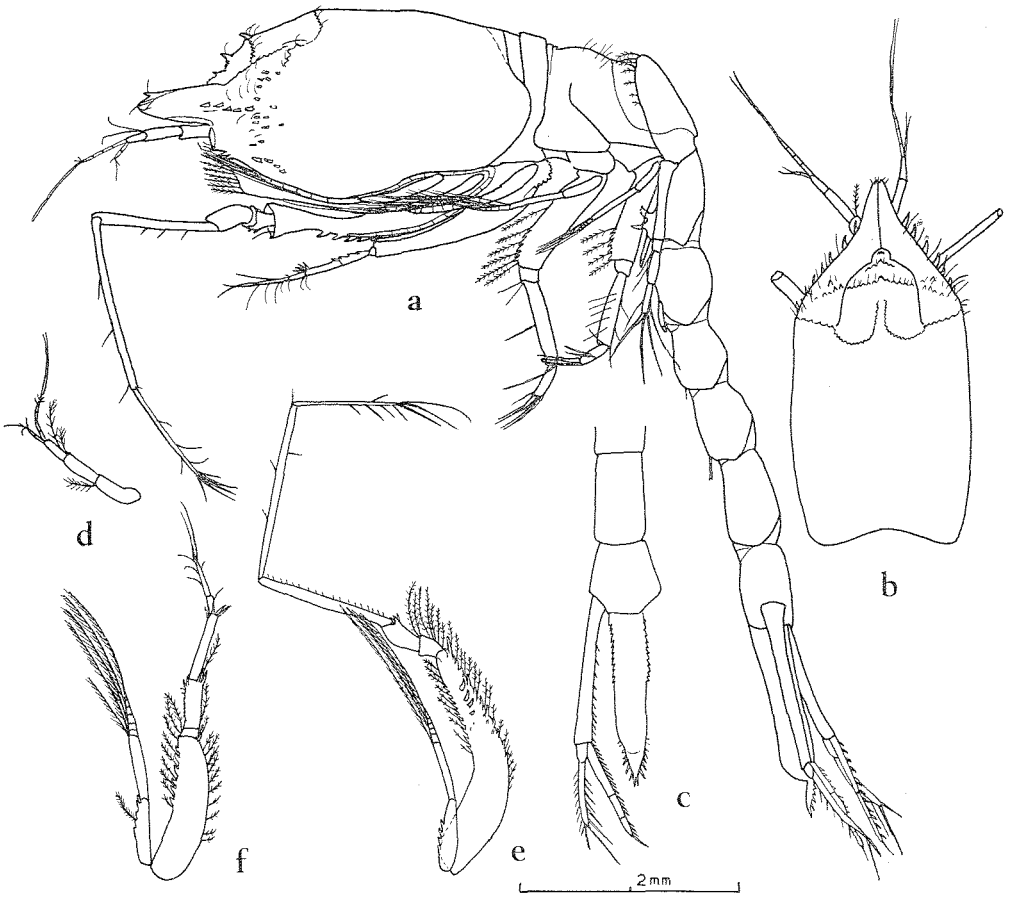

Fig. 17. *Makrokylindrus balinensis* n. sp., subadult ♀ holotype; a, lateral view; b, carapace from above; c, pleonites 5-6, telson and left uropod from above; d, antenna 1; e, pereopod 1; f, pereopod 2.

Makrokylindrus balinensis n. sp.
(Fig. 17)

Material:

Galathea St. 477, south of Bali (9°01'S, 114°48' E), 780 m, sandy clay, *c.* 6°C, 11.9.1951, PG 0.2 – 1 subadult male (holotype).

Description:

Very similar to *Makrokylindrus longipes* (G.O. Sars, 1871), differing only in the following respects: In addition to the spines at the sides of the front part of the carapace (Fig. 17a, b) and on and behind the eyelobe, and the row across the front part of the frontal lobe behind the eyelobe, there is a further row on each side starting near the mid-line at about the middle of the frontal lobe and curving outwards to end as a short row running obliquely forwards. Some scattered hairs are present on the carapace and pereon. The third and fourth pereonites are fused dorsally as in *M. spiniventris* described by HANSEN (1920). The first pleonite has only two ventral processes instead of four or five. There are no spines at the sides of the first two pleon somites. The basal part of the telson (17c) is serrated laterally. There may be some differences in the armature of the appendages of the cephalothorax (17d-f) but those of *M. longipes* have not been described in sufficient detail for exact comparison.

Size: Length of holotype subadult ♂ 11 mm.

Remarks:

FAGE (1929, 1951) considered *Makrokylindrus spiniventris* to be synonymous with *M. longipes*. BACESCU (1962) separated them because of the differences in the articulation of the third and fourth pereonites. As in the case of *M. josephinae* I do not believe that this is a good character and prefer to follow FAGE. *M. balinensis* agrees with *M. spiniventris* in this respect. The characters differentiating it from *M. longipes* are not of great importance and it may turn out to be identical with the North Atlantic species, but for the moment it seems better to separate it in the absence of intermediate specimens.

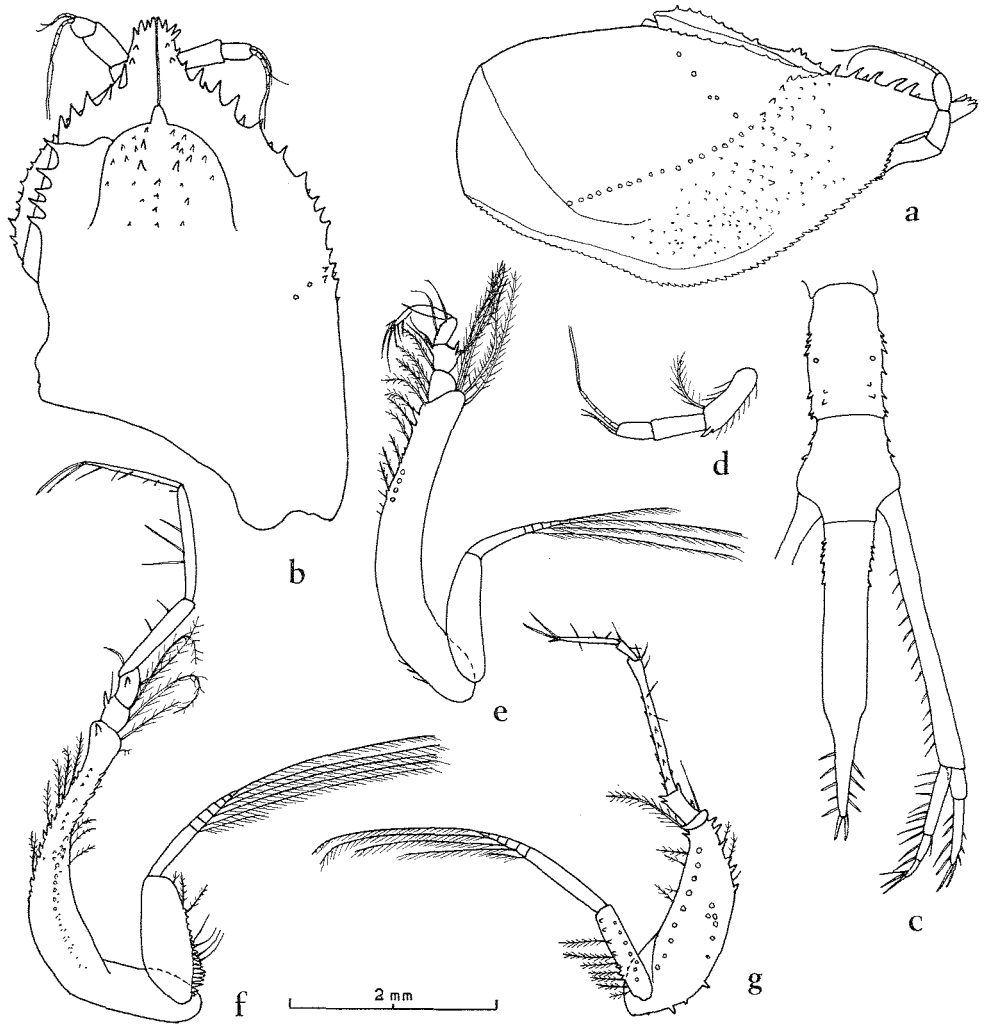

Fig. 18. *Makrokylindrus neptunius* n. sp., subadult ♂ paratype; a, carapace in lateral view; b, carapace from above; c, pleonites 5-6, telson and right uropod from above; d, antenna 1; e, maxilliped 3; f, pereopod 1; g, pereopod 2.

Makrokylindrus neptunius n. sp.
(Fig. 18)

Material:

Galathea St. 607, Tasman Sea (44°18′S, 166°46′ E), 3580 m, clay, *c.* 1.3°C, 17.1.1952, HOT – 3 subadult males, 4 immature females, 1 juvenile.

Description:

Carapace (Fig. 18a, b) of damaged subadult male about twice as long as high and one-and-a-half as broad, finely pitted, with many spinules; in the subadult male the spinules are more robust on the frontal lobe and on a line on each side running from the upper edge of the pseudorostrum obliquely backwards but not quite reaching the posterior lower corners of the carapace; in the immature female the spinules are more scattered over the whole carapace. The eyelobe is longer than broad. The pseudorostrum is fairly prominent and acute when viewed from the side, with a number of spinules on its front edge and at the sides. The antennal notch is very shallow. The lower edges of the carapace are serrated.

Pereon with all five somites separated and with dorso-lateral spine rows, one each side on the first, second and third, three on the fourth somite, and one on the fifth. The fourth and fifth pereonites have small backwardly projecting spines at their postero-lateral corners.

Pleon with several indistinct dorsal and lateral rows of spinules. The telson (18c) is about a third longer than the last two pleonites together and distinctly longer than the peduncles of the uropods (about as long as these, excluding its apical spines, in the immature female); the long pre-anal part has a few lateral serrations near the base; the shorter post-anal part has four or five slender lateral spines on each side and two more robust end spines.

Antenna 1 (18d) of the subadult male with the first segment of the peduncle about one-and-a-half as long as the second, which is about one-and-a-half as long as the third; the basal segment has a strong spine at its upper distal extremity and numerous setae, with one specially long, at its lower distal end; the second and third segments are fairly broad. The main flagellum is about as long as the second segment of the peduncle and has six segments. The four-segmented accessory flagellum is a little less than half as long as the main flagellum. In the female the segments of the peduncle are more slender.

Maxilliped 3 (18e) with the basis about two-and-a-quarter as long as the remaining segments together; the ischium is a little longer than the merus, which is about as long as the carpus; the propodus is about one-and-a-half as long as the carpus and twice as long as the dactylus; there is a row of spines on the inner edge of the basis and two spines distally on the merus.

Pereopod 1 (18f) with the basis strongly curved, a little shorter than the remaining segments together; the merus is a little longer than the ischium; the propodus is nearly three times as long as the merus and a little longer than either the carpus or the dactylus. There are rows of spines distally on the upper and lower edges and on the outer side of the basis; strong spines are present on the distal ends of the basis, ischium and merus. The upper edge of the basal segment of the exopod has a row of spines which are longer towards the base of the segment.

Pereopod 2 (18g) with the basis broad, about three-quarters as long as the remaining segments together; the ischium is very short, about a third as long as the merus; the three distal segments are slender, the carpus about four times as long as the merus, about five times as long as the propodus, and a little more than twice as long as the dactylus. Rows of strong spines are present on the outer and lower edges of the basis, extending over most of its length. The basal segment of the exopod is narrow and has rows of spines on its upper and outer edges. Spines are present on the merus and carpus.

Uropods (18c) of the subadult male with the peduncle longer than the last two pleonites together, with about 13 slender spines on the inner edge. The exopod is about a third as long as the peduncle and about as long as the first two segments of the endopod; its second segment is about twice as long as the first and has about four slender spines internally, three short spines externally, and two more robust terminal spines. The endopod has its first segment about one-and-a-half as long as the two more distal segments together, and the second about one-and-a-half as long as the third; they have respectively 8:2:2 long slender spines on their inner edges and the third segment has a similar terminal spine.

Size: Length of the holotype subadult ♂ about 14 mm.

Remarks:

M. neptunius seems to be quite closely related to *M. vitiasi* Lomakina, 1958, but it has a different distribution of spines on the carapace, the telson is laterally serrated instead of smooth at the base, and the appendages are rather different, especially the basis of the first pereopod.

Makrokylindrus cinctus n. sp.
(Fig. 19)

Material:

Galathea St. 477, south of Bali (9°01′S, 114°48′E) 780 m, sandy clay, *c.* 6°C, 11.9.1951, PG 0.2 – 1 immature female (holotype).

Description:

Carapace (Fig. 19a, b) nearly twice as long as high, about as high as broad, and less than a third of the total body length (including telson). The carapace and the rest of the body are very spiniferous and also have fairly numerous long hairs. The carapace is beset all over with spines but they are especially large at the sides and tip of the pseudorostrum and in two rows, the first a band encircling the carapace in a position about half its length from the tip of the pseudorostrum and the second a pair of bands running upwards from each side about three-quarters of its length from the front, but curving forwards and not quite meeting near the mid-dorsal line. The eyelobe is about as broad as long. The pseudorostrum is fairly acute and the antennal notch very shallow.

Pereon with the second and third appendages fairly well separated. The third and fourth pereonites are coalesced dorsally. The fifth pereonite is much narrower than the third or fourth.

Pleon with spines especially developed ventrally on the four anterior somites; the fifth somite is little longer than the fourth or sixth. The telson (19c) is about as long as the last three pleonites together and distinctly longer than the peduncles of

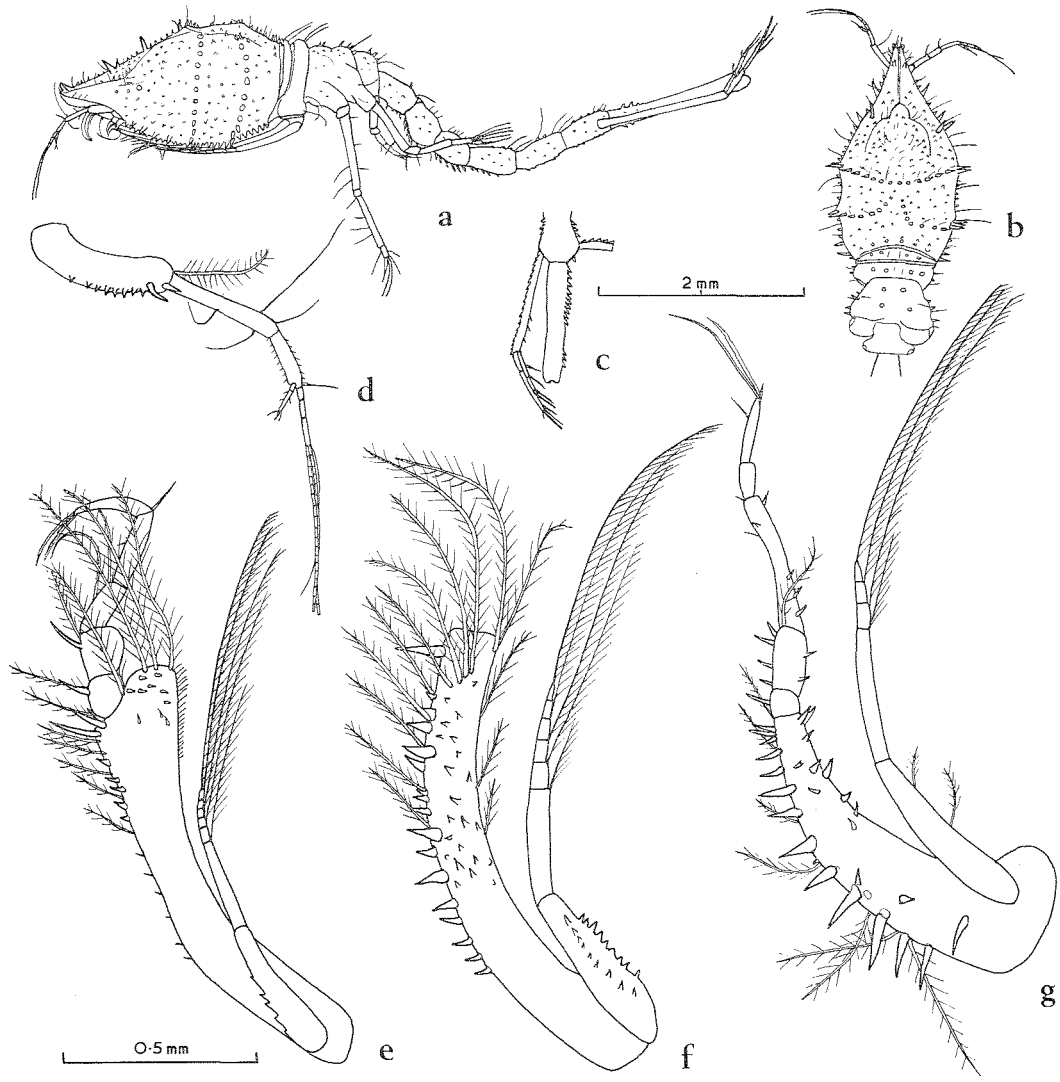

Fig. 19. *Makrokylindrus cinctus* n.sp., immature ♀ holotype; a, lateral view; b, carapace and pereon from above; c, telson and left uropod from above; d, antenna 1; e, maxilliped 3; f, basis of pereopod 1; g, pereopod 2.

the uropods; it is slightly narrowed in the middle but not at its end, which is slightly indentated but unarmed; there is no post-anal part; its sides have a row of spines along the proximal half and a few about the middle of the distal half.

Antenna 1 (19d) with the first segment of the peduncle about one-and-a-quarter as long as the second and slightly more than twice as long as the third; the basal segment has a row of spines on its outer lower edge, with two longer spines and a long plumose seta distally. The main flagellum has four segments and is about as long as the third segment of the peduncle. The accessory flagellum is three-segmented and is about half as long as the main flagellum.

Antenna 2 with three segments, the last minute, each of the second and third carrying a strong seta.

Maxilliped 3 (19e) with the basis nearly one-and-a-half as long as the remaining segments together; the ischium is a little shorter than the merus or carpus; the dactylus and propodus are subequal and about one-and-a-half as long as the carpus. There is a row of spines on the lower edge of the basis, which has a broad prolongation reaching nearly to the end of the ischium; the spines are long at the distal end and there are some shorter spines on the outer edge of the prolongation. The basal segment of the exopod is serrated part way along its lower edge. A single long spine is present distally on the lower edge of the ischium and the merus.

Pereopod 1 (19f) has the segments beyond the basis wanting on either side. The basis is moderately curved and has a row of large but unequal spines along the distal two-thirds of its lower edge and a

number of smaller spines on its outer edge. The basal segment of the exopod has a row of spines on its outer face and along the upper edge.

Pereopod 2 (19g) with the basis moderately curved, broad at the base but narrowed distally, about as long as the remaining segments together; the ischium is short, about a third as long as the merus, which is about half as long as the carpus and about as long as the dactylus; the propodus is a little more than half as long as the dactylus. The basis is beset with large robust spines, especially on its lower edge; there is a single slender spine on the ischium and a number along the merus and carpus.

Uropods (19c) with the peduncle about two-and-a-half as long as the last pleonite, serrated externally and with a few small spines on its distal inner edge. The exopod is about two-thirds as long as the peduncle and about one-and-a-third as long as the endopod; its first segment is about half as long as the second, which has some long spines distally. The first segment of the endopod is longer than the second and third together, with 2:1:1 slender spines respectively on their inner edges and one terminal spine.

Size: Length of holotype immature ♀ 7 mm.

Remarks:

In appearance this species is very similar to *M. cingulatus* (Calman, 1905) from the same region. However, the latter has a rather different pattern of spines on the carapace and a distinct post-anal portion to the telson, although it would be desirable to check the absence of this in further specimens of *M. cinctus*.

?*Makrokylindrus mersus* n. sp.
(Fig. 20)

Material:

Galathea St. 607, Tasman Sea (44°18′S, 166°46′E), 3580 m, clay, *c.* 1.3°C, 17.1.1952, HOT – 1 adult male (holotype).

Description:

Carapace (Fig. 20a) a little more than twice as long as high and more than a third of the total body length; it is very little arched in dorsal outline. The pseudorostrum is less than a fifth of the total carapace length and is slightly downbent. Many minute spinules and short hairs are present on the carapace and larger denticles on the frontal lobes and the pseudorostrum. There is a well excavated antennal notch and the lower front edges of the carapace are serrated.

Pereon with the third and fourth somites completely coalesced dorsally. The postero-lateral corners of the fifth somite are bluntly produced backwards and each has a bundle of long backwardly projecting setae reaching as far as the middle of the second pleonite.

Pleon with the fifth somite the longest, the second to fifth with some denticles dorsally. The telson (20b) has the pre-anal part a little more than two-thirds as long as the peduncles of the uropods, its sides smooth; it appears to be damaged at the distal end and may originally have had a post-anal part.

Antenna 1 (20c) with the first segment of the peduncle not inflated, about one-and-a-quarter as long as the second and twice as long as the third; the basal segment has two rows of a few spines each and there are one or two small spines on the second segment; a dense brush of sensory filaments is present on the distal end of the third segment. Both flagella are fairly long, the main with four segments, together longer than the third segment of the peduncle, and the accessory with three, reaching nearly to the end of the second segment of the main flagellum.

Antenna 2 with the segments of the flagellum long.

Maxilliped 3 (20d) with the basis more than twice as long as the remaining segments together, fairly broad distally and well produced to about the middle of the merus; the merus is a little longer than the ischium, carpus or dactylus, which are all about equal in length and about two-thirds as long as the propodus. The basis has a row of spines on its distal inner edge and there are a few spines on the ischium and merus.

Pereopod 1 (20e) long and slender, the basis little more than half as long as the more distal segments together, its distal end not at all produced; the merus is about three times as long as the short ischium but less than a third as long as the carpus; the propodus is about one-and-a-half as long as the carpus and a little more than three times as long as the dactylus. The basal segment of the exopod is narrow. The basis has several rows of spines distally and there are some spines on the ischium and merus.

Pereopod 2 (20f) with the basis broad and not much curved, about three-quarters as long as the remaining segments together; the ischium is very short; the merus is about as long as the dactylus and about twice as long as the propodus; the carpus is

Fig. 20. ?*Makrokylindrus mersus* n. sp., adult ♂ holotype; a, lateral view; b, pleonite 6, telson and left uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2.

about three-and-a-half as long as the merus and has several recurved spines at its distal end. The basal segment of the exopod is narrow.

Pleopods (20a) are well developed on pleonites 1 and 2.

Uropods (20b) with the peduncles slender, about as long as the last three pleonites together, with about 20 fine spines on their inner edge. The three-segmented endopod is about two-thirds as long as the peduncle, its first segment nearly twice as long as the subequal second and third together; there are about 19:7:6 plumose setae present on the inner edges of the three segments respectively, and one long end spine. The exopod does not quite reach to the end of the first segment of the endopod; its second segment is not quite twice as long as the first and has about five short setae externally and four terminal spines.

Size: Length of holotype adult ♂ 16.5 mm.

Remarks:

I place the species in this genus with considerable doubt. Its appearance is generally more similar to the species of *Diastylopsis* than to most species of *Makrokylindrus*. However, the fourth pereonite is not elongated and is fused to the third, unlike the normal state in *Diastylopsis*. The exact shape and length of the telson are at present unknown, but the pre-anal part is rather longer than is usual in *Diastylopsis*, though not in some species of *Diastylis*. From the other species of *Makrokylindrus* with the third and fourth pereonites coalesced dorsally it is easily distinguished by the rather elongated shape of the carapace and the absence of ridges or spines from its sides, while the pre-anal part of the telson is comparatively short.

Makrokylindrus hadalis n.sp.

(Fig. 21)

Material:

Galathea St. 466, Java Trench (10°21′S, 110°12′ E), 7160 m, clay, 1.5°C, 6.9.1951, HOT – 4 sub-adult males.

Description:

Carapace (Fig. 21a) a little less than twice as long as high and about a quarter of the total body length (including telson), smoothly rounded dorsally and not greatly arched. The pseudorostrum is not much produced, fairly deep, less than a sixth of the total carapace length, with a well excavated antennal notch below. The whole of the carapace is studded with spines, pointing backwards at the rear and especially long and pointing forwards at the front; long scattered hairs are also present on the carapace dorsally and on the pereon.

Pereon with all five somites separate. The fifth has rounded postero-lateral corners. Each somite carries a series of long spines on its back and sides.

Pleon with the fifth somite about one-and-a-half as long as the fourth, which is slightly longer than the sixth. Each pleonite carries numerous short spines. The telson (21b) is only a little longer than the peduncles of the uropods, its long pre-anal part cylindrical and only slightly tapering, with many spinules set all round on the proximal two-thirds; the post-anal part is only about a seventh of the whole, tapering rapidly to a point surmounted by two small terminal spines. These spines are missing in three out of four specimens, probably as a result of damage.

Antenna 1 (21c) rather long, with the peduncle segments narrow; the basal segment is nearly twice as long as the second and a little longer than the third; each carries several rows of slender spines. The main flagellum has five or six segments and is as long as the second and third peduncular segments together. The accessory flagellum has four segments, together a little longer than the first three segments of the main flagellum.

Antenna 2 only partially developed, the segments of the flagellum not very long.

Maxilliped 3 (21d) with the basis nearly twice as long as the remaining segments together, narrowed distally and not at all produced; the merus is twice as long as the ischium and about as long as the dactylus; the carpus and propodus are nearly equal in length and about one-and-a-half as long as the merus. Basis, ischium, merus and carpus each have a number of spine rows.

Pereopod 1 (21e) very long and slender, with each segment except the dactylus set with rows of spines; the basis narrowed soon after its base, less than two-thirds as long as the remaining segments together; the ischium short, the merus about twice as long and as long as the dactylus; the carpus and propodus are nearly equal and each more than six times as long as the merus.

Pereopod 2 (21f) with the basis fairly broad, narrowed only near the distal end, about two-fifths as long as the remaining segments together. The basal segment of the exopod is narrow and beset with

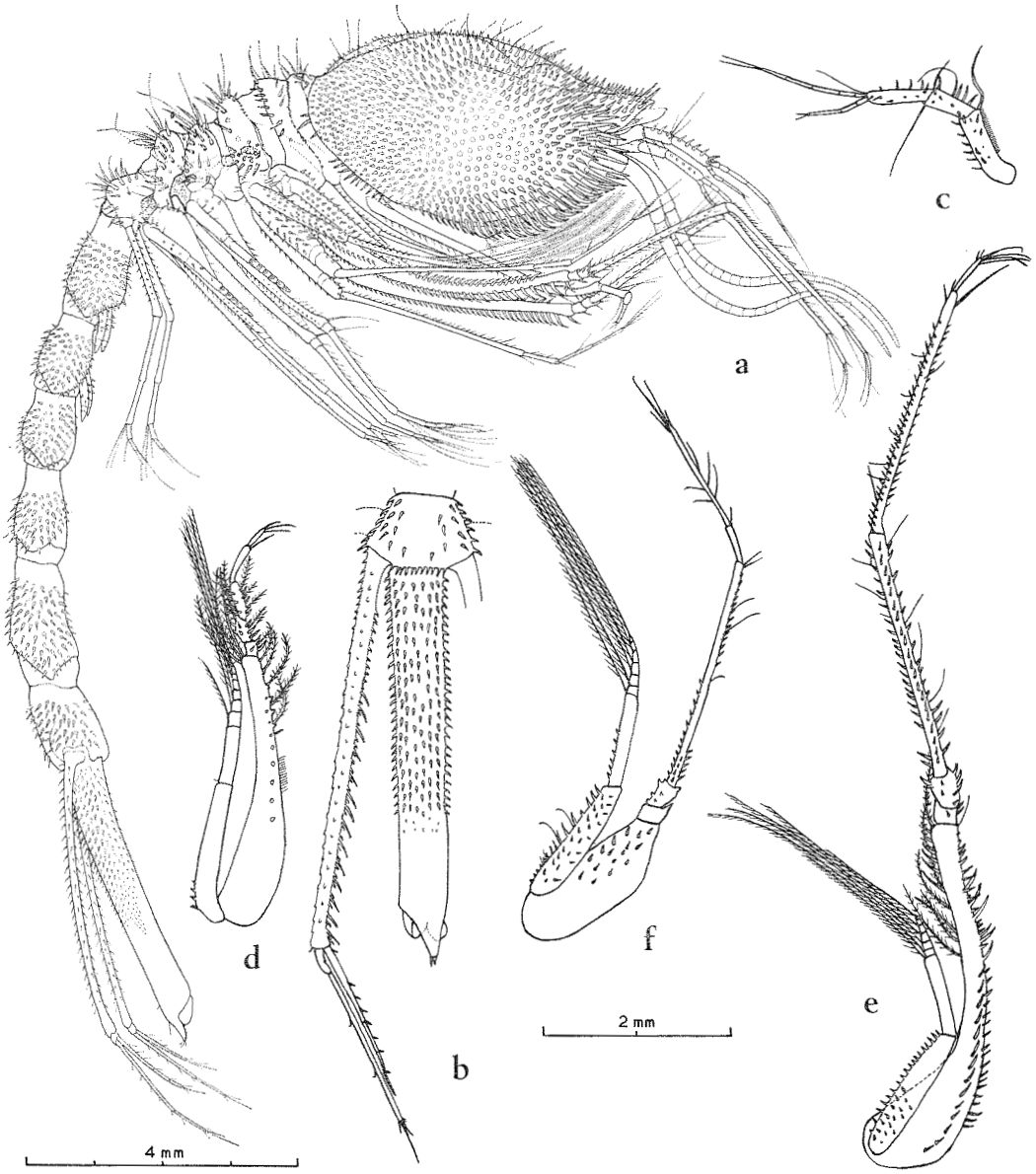

Fig. 21. *Makrokylindrus hadalis* n. sp., subadult ♂ holotype; a, lateral view; b, pleonite 6, telson and left uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2.

spines. Spines are present on the basis, ischium, merus and carpus. The merus is about one-and-a-half as long as the short ischium; carpus, propodus and dactylus are very slender, the carpus about five-and-a-half as long as the propodus and twice as long as the dactylus.

Uropods (21 b) with the peduncle long and slender, about as long as the last three pleonites together, with internal and external rows of spines which are of differing lengths. The exopod, without its terminal spines, is nearly half as long as the peduncle; its second segment is more than five times as long as the first, and has a few external setae. The endopod is little more than two-thirds as long as the exopod, its first segment about two-and-a-half as long as the second, which is again nearly twice as long as the third; they have respectively 4:2:1 short internal spinules and a longer terminal spine.

Size: Length of holotype subadult ♂ 20 mm.

Remarks:

This species has already been figured in BRUUN *et al.* (1955) and included in his key to the genus *Makrokylindrus* by BACESCU (1962). It is in general very similar to *M. tubulicauda* (Calman, 1905), especially in the spinulation of the carapace and appendages. In *M. hadalis* however, the pereopods, especially the first pair, are longer and more slender,

while the telson is shorter in proportion to the uropods.

M. hadalis is the deepest occurring cumacean so far collected and described, although some others have been reported from still greater depths. The ornamentation of the body and fragility and length of the pereopods are probably peculiar to deep water species, although in these respects the species is not very different from *M. tubulicauda,* which has been found in lesser but still considerable depths.

Makrokylindrus prolatus n. sp.
(Fig. 22)

Material:

Galathea St. 665, Kermadec Trench (36°38′S, 178°21′E), 2470 m, clay, 2.1°C, 25.2.1952, HOT – 1 subadult male (holotype).

Description:

Carapace (Fig. 22a) more than twice as long as high and two-sevenths of the total body length (including telson). The pseudorostrum is much produced, nearly straight, with the branchial siphons projecting forwards rather more again than the length of the pseudorostrum, which may be broken off short in the single specimen available. The dorsal part of the carapace is little elevated. Its sides are somewhat inflated, with swellings at each side of the frontal lobes, the base of the pseudorostrum, the lower central part and the upper part towards the hind end. Shallow grooves or hollows are situated between the swellings and just in front of the hind edge of the carapace. The dorsal part carried a number of spines, some of them long and robust and some broken short, together with scattered hairs. The antennal notch is very little excavated and the lower edges are serrated.

Pereon somites each with a small rounded dorso-lateral tubercle on each side and most with a long spine dorsally and several smaller dorso-lateral spines. The postero-lateral corners of the fifth pereonite are rounded.

Pleon with the fifth somite one-and-a-half as long as the fourth and nearly twice as long as the sixth. The first pleonite has a strong ventral spine just in front of the first pair of pleopods, with a pair of shorter spines just in front of it and abreast of each other. Each somite has a dorsal row of short spines, the number increasing from two on pleonites 1 and 2 to about eight on pleonite 5. The telson (22b) is considerably longer than the peduncle of the uropods, with a long pre-anal part reaching about as far as the ends of the peduncles, having a few spines or serrations on each side extending about half way along it, about seven fairly strong spines dorsally and about four small spines ventrally near its base. The post-anal part is short and tapered, its end having the appearance of a single large terminal spine broken off short.

Antenna 1 (22c) with the three segments of the peduncle much inflated, the first more than one-and-a-half as long as the second, which is a little shorter than the third. The main flagellum has six segments and is nearly as long as the peduncle. The accessory flagellum has four segments and is about as long as the first three segments of the main flagellum.

Maxilliped 3 (22d) with the basis about twice as long as the remaining segments together, its distal part narrowed and not much produced at the end. The usual complement of plumose setae is present but no strong spines.

Pereopod 1 (22e) with the basis curved, narrowed at the end, slightly shorter than the remaining segments together. It has a row of spines along the upper and lower edges and a very strong spine distally; the merus is nearly twice as long as the ischium and has one spine on the upper edge; the carpus is more than two-and-a-half as long as the merus and a little longer than the subequal propodus or dactylus, the latter having a group of slender spines or setae distally.

Pereopod 2 (22f) with the basis about four-fifths as long as the remaining segments together; it has a row of short spines along its upper edge; the ischium is fairly short and has several strong spines on the lower edge; the merus is slightly more than twice as long, with a strong spine on the upper edge distally; the carpus is more slender and nearly twice as long as the merus; it is nearly three times as long as the dactylus, which is one-and-a-half as long as the propodus. The dactylus has at least one long rather flattened seta at its end, set at an angle to its axis.

The first four pairs of pereopods have well developed exopods.

Two pairs of not fully developed pleopods are present.

Uropods (22a, b) with the peduncle very slender, about as long as the last two pleonites together. The three-segmented endopod is a little shorter than the two-segmented exopod and a little more than a third as long as the peduncle; its first segment is about as long as the second and third together and

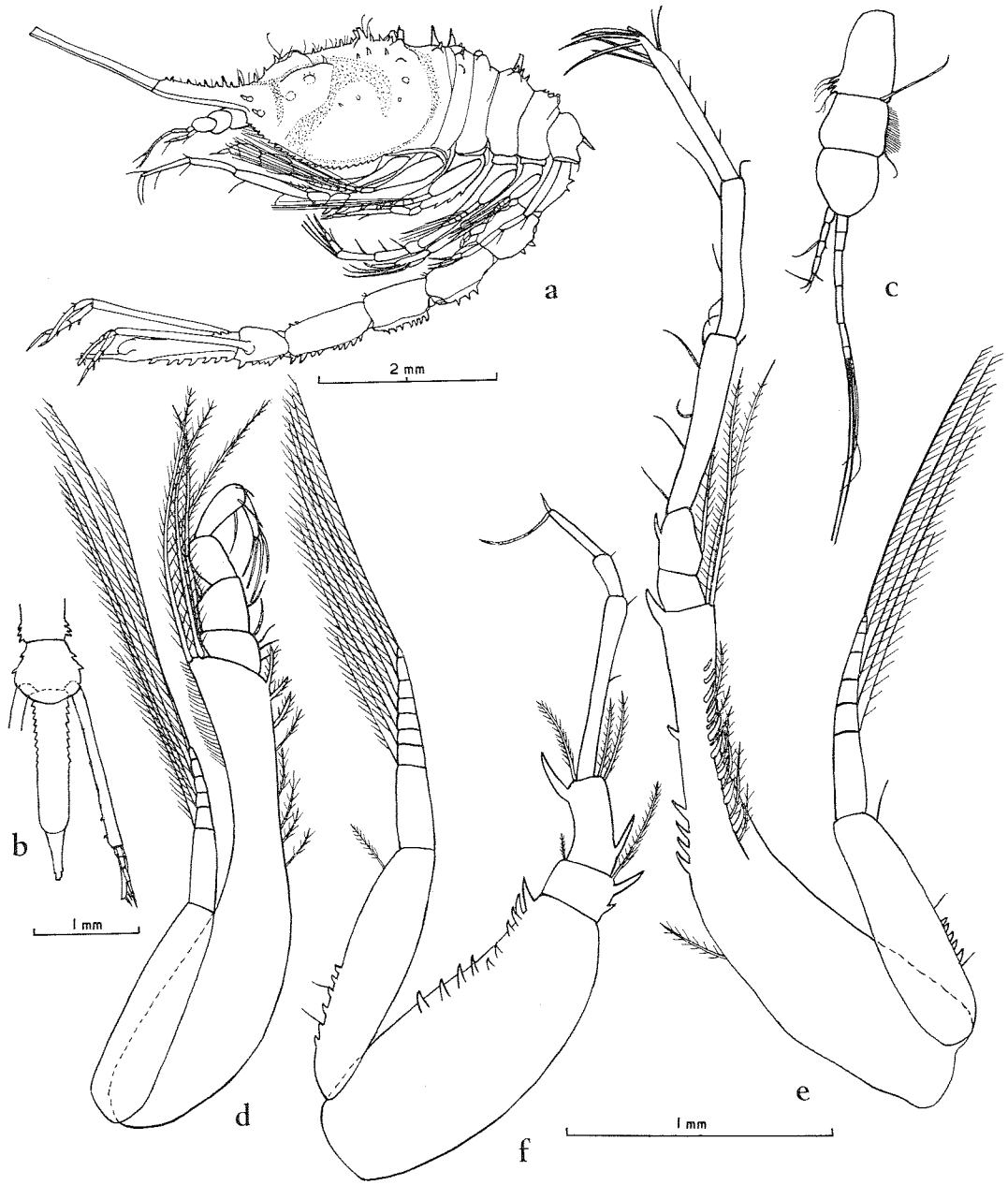

Fig. 22. *Makrokylindrus prolatus* n.sp., subadult ♂ holotype; a, lateral view; b, pleonite 6, telson and right uropod from above; c, antenna 1; d, maxilliped 3; e, pereopod 1; f, pereopod 2.

it has a few short internal spines and a long terminal spine. The second segment of the exopod is about twice as long as the first and has a few small external spines and a short terminal spine.

Size: Length of holotype subadult ♂ 12.5 mm.

Remarks:

This species clearly belongs to the subgenus *Vemakylindrus* based on two species described in 1961. Although their telsons are generally similar to those of *Makrokylindrus,* the shape of the carapace with its long pseudorostrum may be worth generic difference. *M. prolatus* seems closest to *M. costaricanus* Bacescu, 1961, but has a shorter pseudorostrum, although the siphonal tube is about equally long. Possibly the pseudorostrum is broken off in the specimen. However, there are some differences in the spinulation, especially of the pereon and pleon somites. The shape of the telson in *M. costaricanus* is not known.

Key to the species of *Makrokylindrus*

1. Pseudorostrum very long, nearly as long as or longer than the rest of the carapace ..... sub-genus *Vemakylindrus* Bacescu, 1961 2
1. Pseudorostrum short, seldom more than a quarter of the length of the carapace 4
2. Tergites of pereonites 3-5 with prominent spines 3
2. Tergites of pereonites 3-5 without prominent spines ..... *gladiger* Bacescu, 1961
3. Pleonites 3-6 with a dorsal row of spines ..... *prolatus* n. sp.
3. Pleonites 3-6 without dorsal spines ..... *costaricanus* Bacescu, 1961
4. All the pereonites free ..... sub-genus *Makrokylindrus* Stebbing, 1912 5
4. Pereonites 3 and 4 coalesced dorsally ..... sub-genus *Coalescuma* Bacescu, 1962 23
5. Carapace with two antero-lateral horns ..... *insignis* (G. O. Sars, 1871)
5. Carapace oval, without antero-lateral horns 6
6. Telson longer than the last three pleonites 7
6. Telson shorter than the last three pleonites 9
7. All the pereopods extremely slender; the carapace covered with long spines ..... *hadalis* n. sp.
7. Only the first pereopod a little elongated; the carapace with only short spines 8
8. The post-anal part of the telson very short (1/7 to 1/9 of its total length) and reaching only a little beyond the anal valves ..... *fagei* Bacescu, 1962
8. The post-anal part of the telson longer (1/4 to 1/5 of its total length) and reaching well beyond the anal valves ..... *americanus* Bacescu, 1962
9. Telson longer than the peduncle of the uropods 10
9. Telson shorter than the peduncle of the uropods or barely as long 22
10. Sides of carapace covered with numerous long spines 11
10. Sides of carapace with only short spines or none 12
11. Telson with many spines on its basal part ..... *tubulicauda* (Calman, 1905)
11. Telson with its basal part unarmed ..... *erinaceus* (G. O. Sars, 1887)
12. The inner ramus of the uropod shorter than the outer ramus 13
12. The inner ramus of the uropod longer than the outer ramus 15
13. The inner ramus of the uropod with two segments 14
13. The inner ramus of the uropod with three segments ..... *armatus* (Norman, 1876)
14. Proximal segment of the inner ramus of the uropod twice as long as the distal segment ..... *lomakinae* Bacescu, 1962
14. Proximal segment of the inner ramus of the uropod about as long as the distal segment ..... *mystacinus* (G. O. Sars, 1887)
15. Telson covered with fine setae ..... *serricauda* (T. Scott, 1912)
15. Telson without fine setae 16
16. Telson with a narrowed collar behind the anus, with its end rounded .. *abyssi* Lomakina, 1955
16. Telson without a collar behind the anus 17
17. The post-anal part of the telson with only two strong apical spines 18
17. The post-anal part of the telson with lateral spines as well as two apical spines 19
18. Carapace smooth ..... *inermis* Fage, 1929
18. Carapace roughened with small tubercles ..... *wolffi* Bacescu, 1962
19. Post-anal part of the telson with a single pair of lateral spines ..... *gibraltarensis* Bacescu, 1961
19. Post-anal part of telson with several pairs of lateral spines 20
20. Carapace with several pairs of curved serrate ridges running obliquely forwards from the mid-line ..... *costatus* (Bonnier, 1896)
20. Carapace without these ridges 21
21. Proximal part of telson serrated at sides ..... *neptunius* n. sp.
21. Proximal part of telson smooth ..... *vitiasi* Lomakina, 1958
22. Pereon and pleon somites with only small denticles ..... *longicaudatus* (Bonnier, 1896)
22. Pereon and pleon somites with strong spines ..... *anomalus* (Bonnier, 1896)

23. Carapace with short vertical ridges or folds carrying strong spines 24
23. Carapace without these vertical ridges or folds 25
24. Carapace with two vertical rows of spines on its posterior half; base of telson coarsely serrated at sides ..... *cinctus* n. sp.
24. Carapace with a single vertical fold about the middle; base of telson only finely serrated ..... *cingulatus* (Calman, 1905)
25. Telson without a post-anal part and reaching well beyond the ends of the uropods; carapace with longitudinal striations ..... *fistularis* (Calman, 1911)
25. Telson not reaching the ends of the uropods; carapace without longitudinal striations 26
26. Pre-anal part of the telson much shorter than the peduncle of the uropods ..... *mersus* n. sp.
26. Pre-anal part of the telson at least as long as the peduncle of the uropods 27
27. Post-anal part of the telson with at most one pair of lateral spines 28
27. Post-anal part of the telson with at least three pairs of lateral spines 30
28. Carapace with a fold on each side curving forward from the mid-line to meet a dentate carina extending back from the tip of the pseudorostrum ..... *fragilis* Stebbing, 1912
28. Carapace without folds or ridges 29
29. Carapace with numerous spinules and with some longer spines in longitudinal rows on its dorsal part, which is little raised in profile ..... *josephinae* (G. O. Sars, 1871)
29. Carapace with spinules only and no longer spines; on profile the dorsal edge is abruptly raised behind the eyelobe ..... *menziesi* Bacescu, 1962
30. Telson with lateral serrations at its base ..... *balinensis* n. sp.
30. Telson without lateral serrations ..... *longipes* (G. O. Sars, 1871)

To the above key should be appended *Makrokylindrus jedsi* Harada, 1962, of which the only specimen was too badly damaged to be included.

Remarks:

This key is based partly on that constructed by BACESCU (1961a, 1962) but with numerous additions and alterations. For reasons already given I have deleted *spiniventris* Hansen, 1920, and *dubius* (Bonnier, 1896) and placed *longipes* and *josephinae* in the sub-genus *Coalescuma,* which I retain for convenience although I am not convinced of its validity. On the other hand I think that *Vemakylindrus* might well be raised to generic rank. I have omitted BACESCU's *Makrokylindrus acanthodes* (Stebbing, 1912) as I can see no reason for removing this species from *Diastylis*. The distinction between *Makrokylindrus* and *Diastylis* is by no means sharp and the allocation of certain species to one or the other genus is open to debate.

Genus ***Leptostylis*** G. O. Sars, 1869

Diagnosis: Near to *Diastylis* but having a shorter telson with lateral spines few or none. Male antenna 1 with the peduncle dilated and provided with a brush of setae in its distal segment. Antenna 2 of the male shorter than the body. Pereopods 3 and 4 t
of the female wi h rudimentary exopods. Exopods of the uropods not longer than the endopods.

Leptostylis profunda n. sp.
(Fig. 23)

Material:

Galathea St. 607, Tasman Sea (44°18′S, 166°46′E), 3580 m, clay, *c.* 1.3°C, 17.1.1952, HOT – 1 subadult male (holotype).

Description:

Carapace (Fig. 23a) about one-and-a-half as long as high, a little less than a third of the total length, dorsally rounded and moderately elevated; its sides are inflated. The integument is smooth except for some fairly long scattered hairs dorsally. The pseudorostrum is short with a small antennal notch below. The front lower edges of the carapace are strongly serrated.

Pereon with the first somite hidden from above. There are a few dorsal hairs.

Pleon with the fifth somite about one-and-a-half as long as the fourth and twice as long as the sixth. Pleonites 3-6 have many dorsal hairs. The telson (23b) is about a third as long as the peduncles of the uropods; its post-anal part is about half as long as the pre-anal and ends in a pair of short spines; a single pair of smaller lateral spines is present.

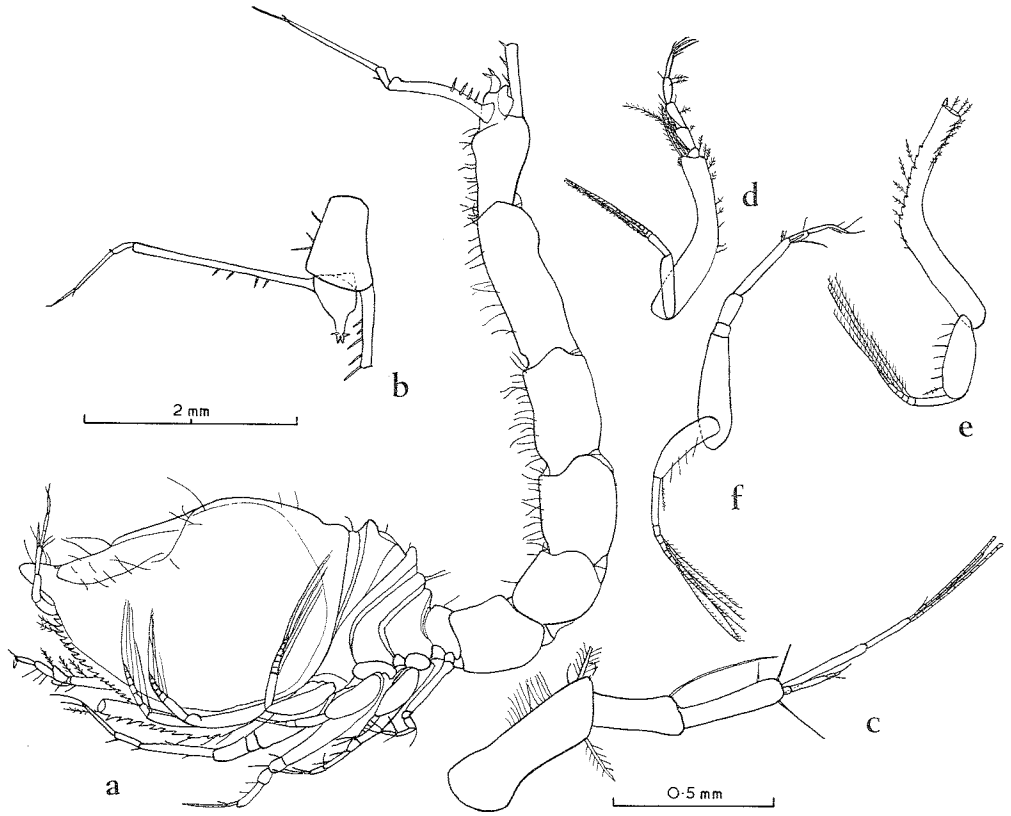

Fig. 23. *Leptostylis profunda* n.sp., subadult ♂ holotype; a, lateral view; b, pleonite 6, telson and parts of uropods from above; c, antenna 1; d, maxilliped 3; e, basis of pereopod 1; f, pereopod 2.

Antenna 1 (23c) with the first segment of the peduncle fairly robust, about as long as the second and third together; the third slender and a little longer than the second; there is no sign of a brush of setae in this specimen. The main flagellum is long, about one-and-a-half as long as the third segment of the peduncle, with three segments, the first nearly twice as long as the second, the third very short. The accessory flagellum has three segments, the first and third very short, together a little more than half as long as the first segment of the main flagellum.

Maxilliped 3 (23d) with the basis strongly curved, about one-and-two-thirds as long as the remaining segments together; its distal end is not much produced; the ischium is short, the merus more than twice as long, with its distal end moderately expanded; the carpus, propodus and dactylus are each about as long as the merus.

Pereopod 1 (23e) damaged on either side, only the basis remaining. This is strongly curved and its lower edge is serrated distally.

Pereopod 2 (23f) with the basis about two-thirds as long as the remaining segments together; the ischium is a little less than half as long as the merus; the carpus is about twice as long as the merus and about three times as long as either the propodus or dactylus. The carpus has two and the propodus a single distal spine.

The first four pairs of pereopods have well developed exopods.

Uropods (23b) with the peduncle slender, about twice as long as the last pleonite, with some internal spines. Only the exopod remains in the specimen, about two-fifths as long as the peduncle and with the second segment a little more than twice as long as the first.

Size: Length of holotype subadult ♂ 10 mm.

Remarks:

The carapace and pereon and pleon are much stouter in this species than in *L. azaniensis* described below, and in most of the other described species of *Leptostylis*. The telson is very short in comparison with the length of the uropod peduncle and its postanal part is much more narrowed than usual compared with the broad basal part. It is not as long as the sixth pleonite and differs in this respect from *L. crassicauda* Zimmer, 1907, which has almost as stout a pleon.

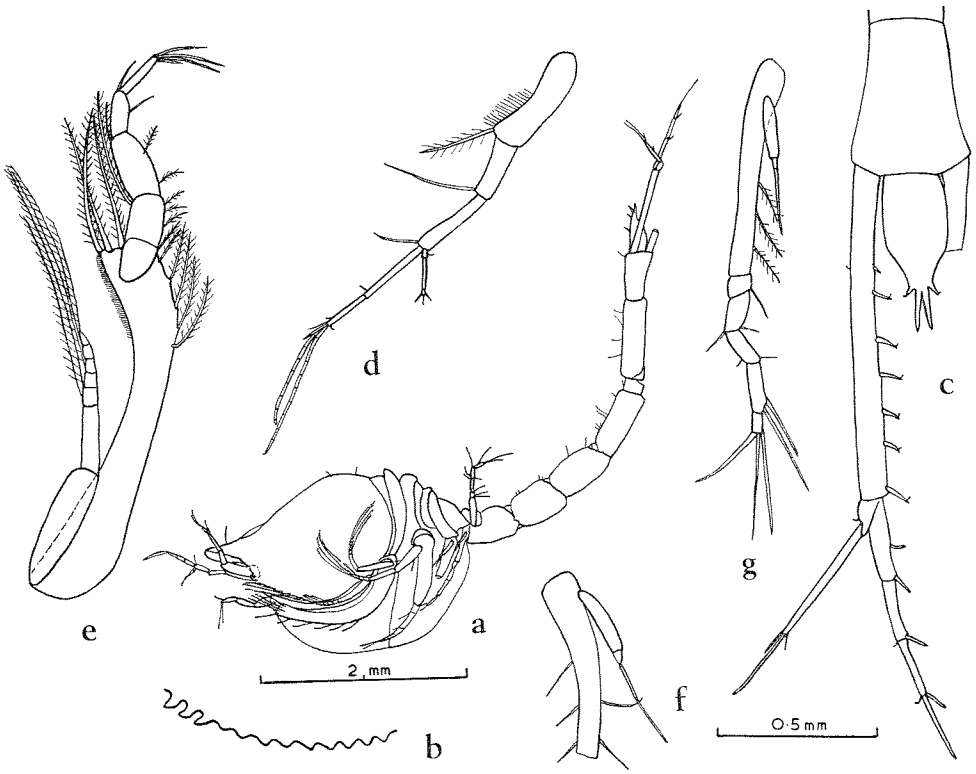

Fig. 24. *Leptostylis azaniensis* n.sp., adult ♀ holotype; a, lateral view; b, left lower front margin of carapace; c, pleonite 6, telson and left uropod from above; d, antenna 1; e, maxilliped 3; f, basis of pereopod 3; g, pereopod 4.

Leptostylis azaniensis n.sp.
(Fig. 24)

Material:

Galathea St. 241, off Kenya (4°00′S, 41°27′E), 1510 m, pure Globigerina, *c.* 4.3°C, 15.3.1951, HOT–1 female with empty marsupium (holotype).

Description:

Carapace (Fig. 24a) about one-and-a-half as long as high, about two-sevenths of the total length, its dorsum fairly well elevated behind and somewhat inflated at the sides. The integument is smooth with only a few short hairs dorsally. The pseudorostrum is fairly short and acute, the antennal notch little excavated, and the lower front edges are finely serrated in front and scalloped behind (24b).

Pereon with the somites successively decreasing in height, the fifth with its postero-lateral corners rounded.

Pleon long and slender, the fifth somite a little longer than the fourth and nearly twice as long as the sixth. The telson (24c) (including spines) a little less than half as long as the peduncles of the uropods, its post-anal part short and not much narrowed, with two short lateral spines and two longer terminal spines.

Antenna 1 (24d) with the peduncle slender, its first segment nearly twice as long as the second and about one-and-a-half as long as the third. The main flagellum is three-segmented, about as long as the last two segments of the peduncle; its first segment is about one-and-a-half as long as the second, the third short. The three-segmented accessory flagellum is more than half as long as the first segment of the main flagellum; its first and third segments are short.

Maxilliped 3 (24e) with the basis moderately curved, about one-and-a-half as long as the other segments combined, its distal end produced as far as the end of the ischium; this is a little shorter than the merus, which is about as long as the propodus or dactylus and about two-thirds as long as the carpus.

Pereopods 1 and 2 are damaged on either side, with only the basis remaining of the first pair.

Well developed exopods are present on the first two pairs and rudimentary but fairly large two-segmented exopods on pereopods 3 and 4 (24f, g).

Uropods (24c) with the peduncle slender, a little longer than the fifth pleonite, with about seven spines internally. The endopod is about three-fifths as long as the peduncle, its first segment a little longer than the second, which is subequal to the third;

they have respectively 2:1:1 spines internally and a long terminal spine. The exopod reaches a little further than the end of the second segment of the endopod, its second segment about four times as long as the first, with several spines at its end, one of them fairly long.

Size: Length of holotype adult ♀ 6.8 mm.

Remarks:

L. azaniensis is similar in general appearance to *L. zimmeri* Fage, 1929, but the latter has its carapace covered with small spines and the uropods are much shorter in proportion to the telson, which reaches to two-thirds of the length of the peduncles compared with less than half in *L. azaniensis* and most other species in the genus. From *L. recalvastra* Hale, 1945, to which it also has some general resemblance, *L. azaniensis* differs in the pattern of the serrations on the lower front edges of the carapace and in the much greater relative size of the rudimentary exopods on the third and fourth pereopods of the female.

Key to the species of *Leptostylis*

1. Exopod of the uropod as long as the endopod 2
1. Exopod of the uropod shorter than the endopod 3
2. Base of the uropod with 3 internal spines; telson with one pair of lateral spines ..... *manca* G.O. Sars, 1873
2. Base of the uropod with 9 internal spines; telson with two pairs of lateral spines ..... *mancoides* Bacescu-Mester, 1967
3. Carapace covered with spinules 4
3. Carapace smooth or with hairs only 5
4. Telson two-thirds as long as the peduncle of the uropod ..... *zimmeri* Fage, 1929
4. Telson less than half as long as the peduncle of the uropod ..... *vercoi* Hale, 1928
5. Telson about as long as or longer than pleonite 6 6
5. Telson distinctly shorter than pleonite 6 13
6. Carpus of pereopod 1 nearly as long as the propodus ..... *crassicauda* Zimmer, 1907
6. Carpus of pereopod 1 much shorter than the propodus 7
7. Lower front edges of carapace with flat-topped teeth 8
7. Lower front edges of carapace with triangular teeth 10
8. Carapace smooth, with a curved crenated ridge on either side 9
8. Carapace hairy, without these ridges ..... *vemae* Bacescu-Mester, 1967
9. Ridges on carapace dorso-lateral, surrounding the frontal area only ..... ♂ *menziesi* Bacescu-Mester, 1967
9. Ridges on carapace ventro-lateral, extending backwards onto the hinder part ..... ♂ *macruroides* Stebbing, 1912
10. Exopod of the uropod not longer than the first segment of the endopod *producta* Norman, 1879
10. Exopod of the uropod much longer than the first segment of the endopod 11
11. Telson with two pairs of lateral spines ..... *grandis* Hansen, 1920
11. Telson with one pair of lateral spines 12
12. Carapace with scattered hairs ..... ♂ *recalvastra* Hale, 1945
12. Carapace smooth ..... ♂ *chileana* Bacescu-Mester, 1967
13. Telson with post-anal part much narrowed, about a quarter as broad as the pre-anal part ..... ♂ *profunda* n.sp.
13. Telson with post-anal part not much narrowed, not much less than half as broad as the pre-anal part 14
14. Rudimentary exopods of ♀ pereopods 3 and 4 more than a quarter as long as the basis 15
14. Rudimentary exopods of ♀ pereopods 3 and 4 not more than a sixth as long as the basis 17
15. Carapace with a pair of ridges running obliquely upwards and backwards from the pseudorostral lobes ..... *antipa* Zimmer, 1907
15. Carapace without ridges 16

16. Basal segment of the endopod of the uropod nearly as long as the second and third segments together ..... ♀ *chileana* Bacescu-Mester, 1967
16. Basal segment of the endopod of the uropod little more than half as long as the second and third segments together ..... ♀ *azaniensis* n. sp.
17. Lower front edges of carapace with flat-topped teeth ..... *villosa* G. O. Sars, 1869
17. Lower front edges of carapace with triangular teeth 18
18. Pereopod 1 with the basis very little longer than the carpus ..... *longimana* (G. O. Sars, 1865)
18. Pereopod 1 with the basis much longer than the carpus 19
19. Pereopod 1 with the propodus longer than the merus and carpus combined 20
19. Pereopod 1 with the propodus not longer than the merus and carpus combined 21
20. Distal segment of the endopod of the uropod longer than its basal segment ..... *macrura* G. O. Sars, 1869
20. Distal segment of the endopod of the uropod shorter than its basal segment ..... ♀ *recalvastra* Hale, 1945
21. Peduncle of the uropod not much longer than its endopod; basis of pereopod 1 about as long as the carpus, propodus and dactylus combined ..... *ampullacea* (Lilljeborg, 1855)
21. Peduncle of the uropod much longer than its endopod; basis of pereopod 1 much shorter than the carpus, propodus and dactylus combined ..... *gorbunovi* Zimmer, 1946

Genus ***Leptostyloides*** n. gen.

Diagnosis: Similar to *Leptostylis* but with the exopods of the uropods longer than the endopods.

Leptostyloides calcar n. sp.
(Fig. 25)

Material:

Galathea St. 663, Kermadec Trench (36°31′S, 178°38′W), 4410 m, sandy clay with pumice, 1.2°C, 24.2.1952, HOT – 1 female (badly damaged).

Galathea St. 664, Kermadec Trench (36°34′S, 178°57′W), 4540 m, sandy clay with pumice, 1.1°C, 24.2.1952, HOT – 1 female (holotype).

Description:

Carapace (Fig. 25a, b) rather flattened dorso-ventrally, about one-and-three-quarters as long as high and a little longer than broad, less than a quarter of the total body length; its front half slopes obliquely downwards. The integument is minutely scabrous but without other markings except for a faint ridge on each side running forwards from below the middle of the hind edge of the carapace to a little behind the pseudorostrum. The frontal lobe is a little raised and the eyelobe narrow and small. The pseudorostrum is short, about an eighth of the carapace length, and the antennal notch very shallow. There is a slightly produced antero-lateral angle and the lower edge of the carapace is serrated behind it.

Pereon with the anterior somites narrowed and raised dorsally, forming transverse ridges. The postero-lateral corners of the fifth pereonite are rounded.

Pleon long and slender. The fifth somite is specially long, nearly twice as long as the fourth and more than one-and-a-half as long as the sixth and it has a curious excrescence or spur placed almost in the middle of the dorsal side (25a, d). This spur has a number of irregular projections set round it in the antero-posterior plane. A similar structure is unknown in any other cumacean but it is present in both specimens and is evidently therefore not an individual variation. The telson (25c, d) is short, not quite half as long as the peduncles of the uropods; its post-anal part is only a little shorter than the pre-anal and is not much narrowed, having two pairs of short setae proximally, a single pair of lateral spines distally and a pair of longer terminal spines. Dorso- and ventro-lateral rows of small spines are visible on each of the pleonites.

Antenna 1 (25e) with the peduncle long, the first segment about one-and-a-half as long as the second and somewhat longer than the third. The main flagellum has three segments, together about as long as the third segment of the peduncle. The accessory flagellum is short and has three segments.

Antenna 2 (25f) apparently with three segments, the first two each with a long plumose seta and the third with several.

Mandibles normal, with 9 spines.

Maxilla 1 with the palp bearing two filaments.

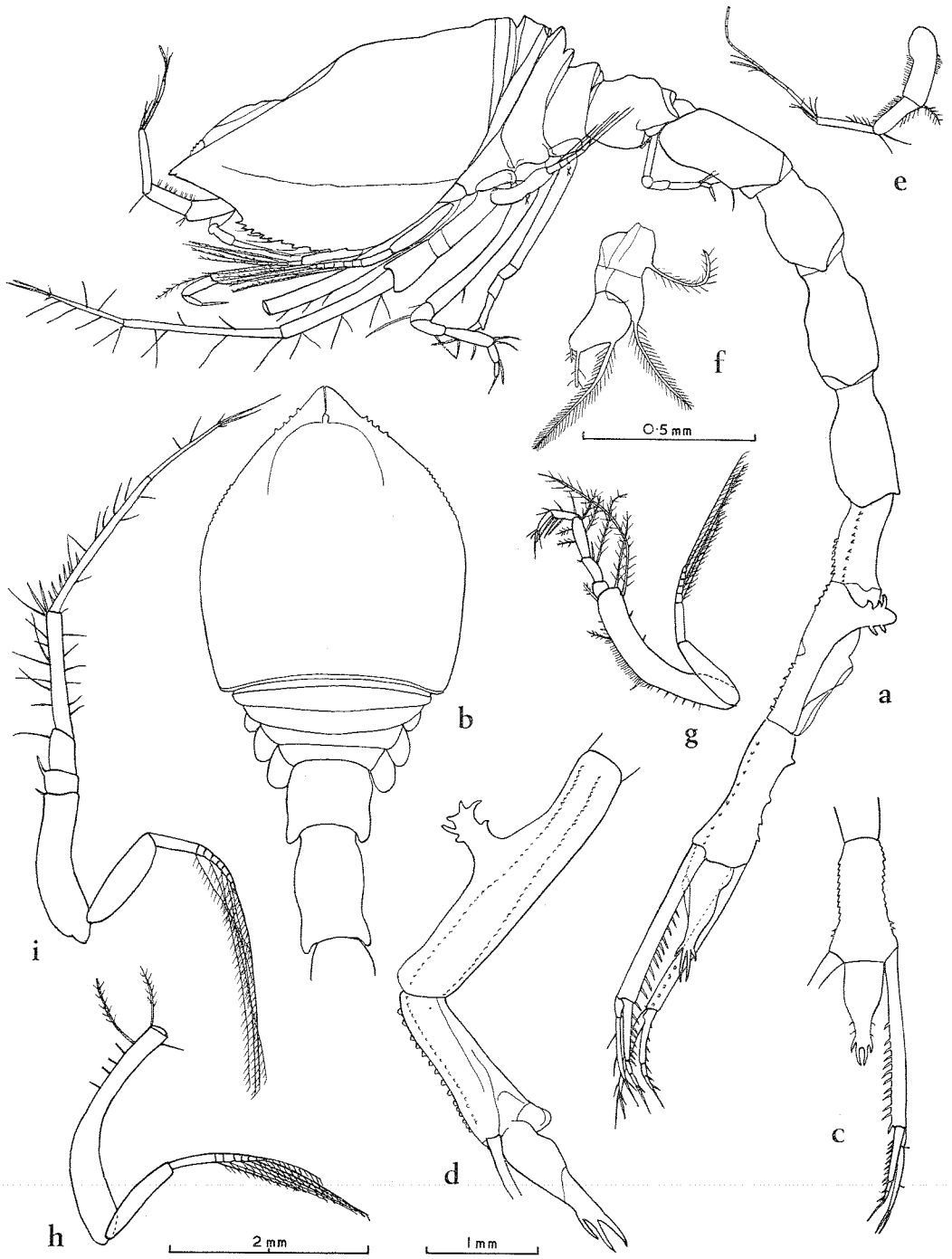

Fig. 25. *Leptostyloides calcar* n. gen., n. sp.; a-c and e-h, adult ♀ holotype, d, ♀ paratype; a, lateral view; b, carapace and pereon from above; c, pleonite 6, telson and right uropod from above; d, pleonites 5-6 and telson from the side; e, antenna 1; f, antenna 2; g, maxilliped 3; h, basis of pereopod 1; i, pereopod 2.

Maxilliped 3 (25g) with the basis moderately curved, nearly one-and-a-half as long as the remaining segments together. A well developed exopod is present.

Pereopod 1 (25h) with the basis moderately curved, narrowed distally. The remaining segments are missing in both specimens.

Pereopod 2 (25i) with the basis short, slightly curved, about a third as long as the remaining segments together; there is a short spine on the lower distal end; the ischium is not very short, with a strong distal spine; the merus is about twice as long as the ischium; the carpus is about three times as long as the merus and one-and-a-half as long as the

dactylus but only four-fifths as long as the propodus, an unusual feature in this appendage. There are two slender spines at the distal end of the carpus and a series of shorter spines along the proximal lower edge of the propodus.

Well developed exopods are present on pereopods 1 and 2 and very small rudimentary exopods on pereopods 3 and 4.

Uropods (25c) with the peduncle about one-and-a-half as long as the last somite, with a series of about 12 slender spines on its inner edge; the outer edge is finely dentate. The exopod is about half as long as the peduncle, its first segment less than a third as long as the second, which has two terminal spines. The endopod is distinctly shorter than the exopod; its first segment is about three times as long as the subequal second and third combined; they have 9:1:1 short spines on their inner edges respectively and a single terminal spine.

Size: Length of holotype ♀ 14.5 mm.

Remarks:

The rather peculiar shape of the carapace in profile, although this is not very unlike that of *Leptostylis zimmeri* Fage, 1929, the long second pereopods and the proportionate lengths of the rami of the uropods separate this species from those in *Leptostylis,* but in other respects, especially in the shape of the telson, it is closely related to them. The species is easily distinguished from any other known at present by the curious dorsal projection on the pleon.

Genus ***Paradiastylis*** Calman, 1904

Diagnosis: Telson usually rather short, with few lateral spines or none. Third maxilliped with an exopod present only in the male. Third and fourth pereopods of the female without exopods. Pereopods 1-4 of the male with the basis expanded.

?***Paradiastylis bathyalis*** n. sp.
(Fig. 26)

Material:

Galathea St. 626, Tasman Sea (42° 10′ S, 170° 10′ E), 610 m, Globigerina ooze, *c.* 7.6° C, 20. 1. 1952, HOT – 1 subadult male, 1 female (holotype).

Description:

Carapace (Fig. 26a) of female about two-and-a quarter as long as high, about twice as long as broad and less than a third of the total body length, its dorsal outline smoothly rounded and moderately elevated towards the rear, where there is a shallow excavation in the mid-line. The integument is smooth except for a few small spines, mainly on the pseudorostrum. There are a number of fairly long hairs scattered over the whole dorsal area of the body. The pseudorostrum is fairly long and acutely pointed, with no antennal notch below. There are some long fragile teeth on the lower front edges of the carapace.

Pereon with the first somite narrow, its dorsum a little raised. The postero-lateral corners of the fifth somite are rounded.

Pleon slender, the fifth somite not much longer than the fourth or sixth. The telson (26c) is rather long, more than three-quarters as long as the peduncles of the uropods, its post-anal part about a quarter of its whole length; there are a few pairs of fine setae at the sides of the cylindrical pre-anal part; the post-anal part has a few pairs of setae proximally, followed by three pairs of lateral spines and two stronger terminal spines.

Antenna 1 (26d) of female with the first segment of the peduncle about five-sixths as long as the second and third together, with a strong plumose seta distally; the second and third segments are subequal. The three-segmented main flagellum is about three-quarters as long as the third segment of the peduncle, its distal segment short. The accessory flagellum has three segments, the first and third short, the whole about two-thirds as long as the proximal segment of the main flagellum.

Maxilliped 3 (26e) of the female without an exopod, although this is present in the male; the basis is moderately curved, about one-and-a-half as long as the remaining segments together, its distal end not much produced; ischium and merus are about equal in length and each is a little more than half as long as the carpus, propodus or dactylus.

Pereopod 1 (26f) with the basis straight, not much more than half as long as the remaining segments together; it has several long plumose setae distally; the merus is a little longer than the ischium and less than a third as long as the carpus; the propodus and dactylus are long and slender, the latter about as long as the carpus and the former a little longer.

Pereopod 2 (26g) with the basis about four-fifths as long as the remaining segments together; the ischium is short and has three spines on its lower edge, two of them long; the merus is about three times as long and has a number of long plumose

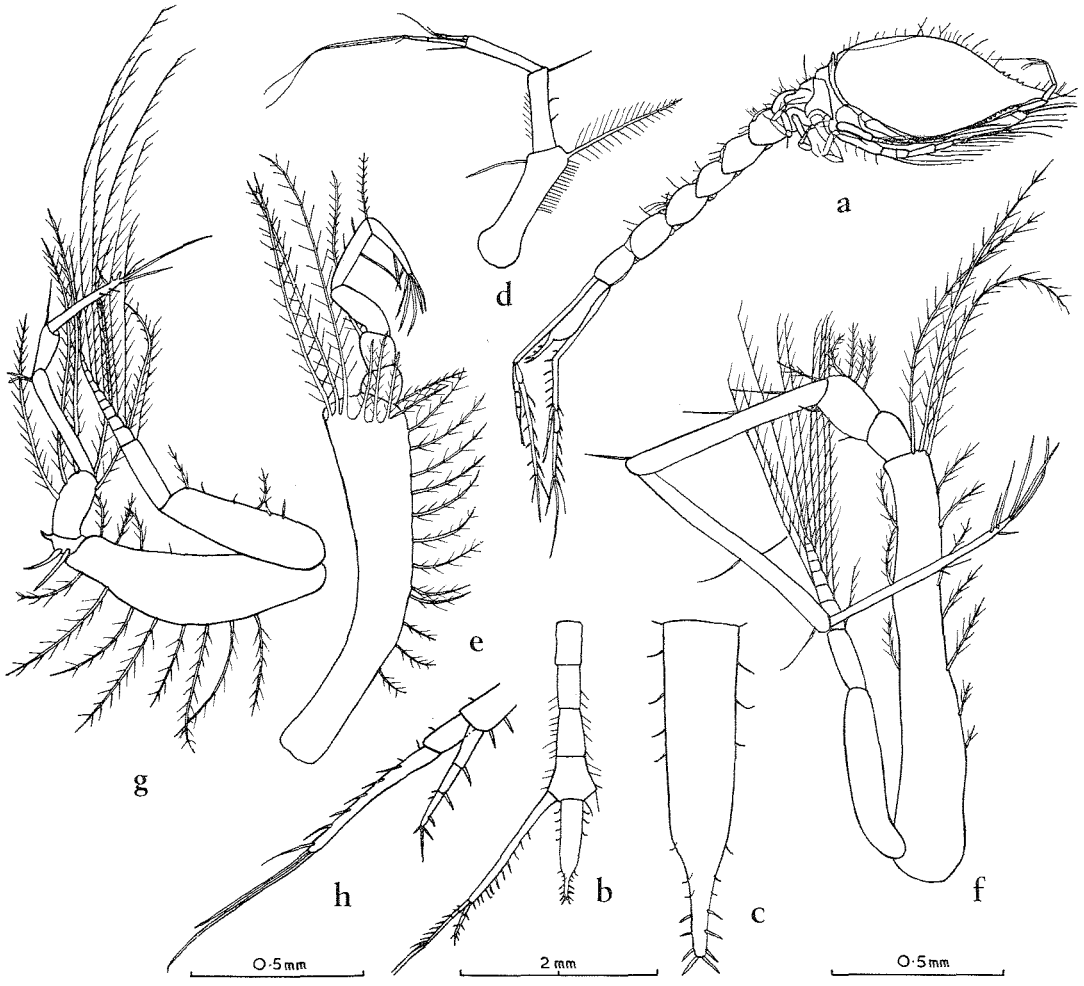

Fig. 26. ?*Paradiastylis bathyalis* n. sp., ♀ holotype; a, lateral view; b, pleonites 3-6, telson and left uropod from above; c, telson from above; d, antenna 1; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, distal segments of left uropod.

setae; the carpus is more than one-and-a-half as long as the merus and two-and-a-half as long as the propodus, which is somewhat widened distally the more slender dactylus is twice as long as the propodus.

The first two pairs of pereopods in the female have well developed exopods. No trace of exopods is present on the third and fourth pairs.

The immature male has two pairs of developing pleopods.

Uropods (26b, h) with the peduncle as long as the last three pleonites together, with about 11 spines on the inner edge. The exopod is a little less than half as long as the peduncle, its second segment more than three times as long as the first, with a few proximal setae, about six external spines, and two very long terminal setae. The endopod is only about two-thirds as long as the exopod, its second segment shorter than the first or third, with 1:1:2 spines internally and two terminal spines.

Size: Length of holotype ♀ 6.5 mm.

Remarks:

This species differs from the others described in the genus, a key to which is given by HALE (1945b), in the absence of folds on the carapace and the comparative length of the telson, and I place it in *Paradiastylis* with some hesitation. However, the third maxilliped of the female does not have an exopod.

The other species have been found only in very shallow water.

III. GENERAL PART

A. Correlation between size and depth

The correlation between increased size and either high latitude or bathyal-abyssal distribution in the Isopoda and Tanaidacea has been discussed by WOLFF (1956 a & b, 1962). There are very few genera of Cumacea with more than three species found below 200 m, and in most little or no correlation between size and depth of occurrence is to be seen. Figs. 27 to 35 show the relation between body length and depth of occurrence, omitting species in which only obviously immature specimens have been found, for all cumacean genera with at least 10 species of which at least 4 are bathyal-abyssal. The occurrence of all species with a vertical range exceeding 200 m has been indicated by a vertical line in the diagrams. Species with a restricted depth range which extend into the Arctic or Antarctic have been indicated by +, those with wider depth range by ⊥.

Little correlation between increasing size and depth is to be seen for *Cyclaspis, Campylaspis* and *Cumella* or in *Leucon* and *Eudorella* but in the last two genera the largest species have been found in the Arctic or Antarctic. In *Hemilamprops* and *Leptostylis* there is a somewhat better correlation. In *Diastylis* the correlation is not good but there is a pronounced tendency towards increased size in high latitudes. *Makrokylindrus* is the only essentially deep-sea genus with a large number of species, and here there is a good correlation between size and depth. It is not possible to place too much reliance on these figures since records of many of the species are extremely scanty and undoubtedly in some cases larger specimens will be found, but there is evidently a tendency towards increased size with depth, which reinforces but does nothing to explain the data discussed by WOLFF (1962). There is little evidence of increase in length of appendages with increased depth, but possibly species such as *Makrokylindrus tubulicauda* and *M. hadalis*, with a greatly ornamented and fragile exoskeleton, are confined to deep and still water.

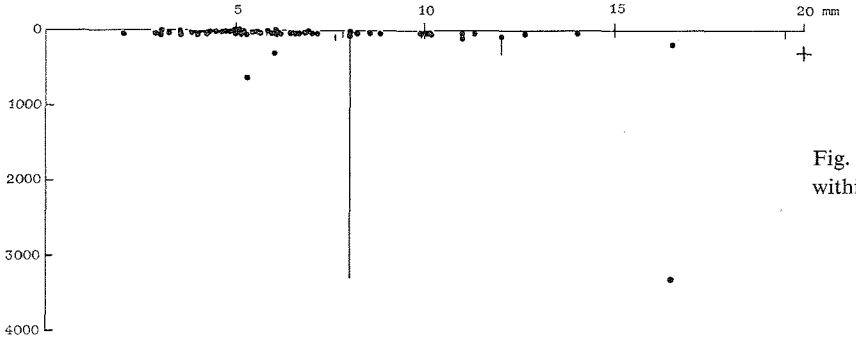

Fig. 27. Relation between size and depth within *Cyclaspis*.

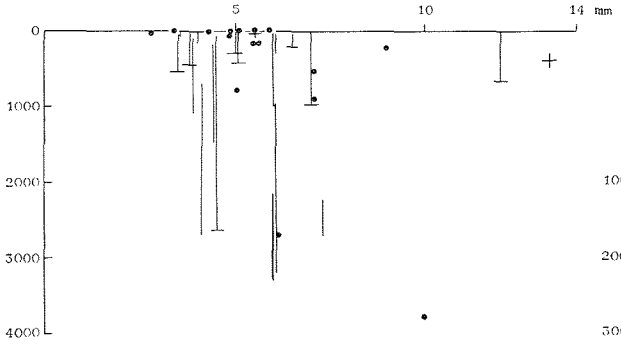

Fig. 28. Relation between size and depth within *Leucon*.

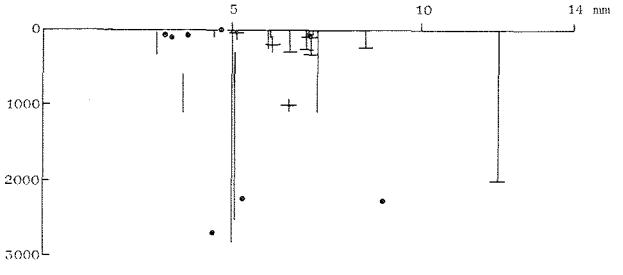

Fig. 29. Relation between size and depth within *Eudorella*.

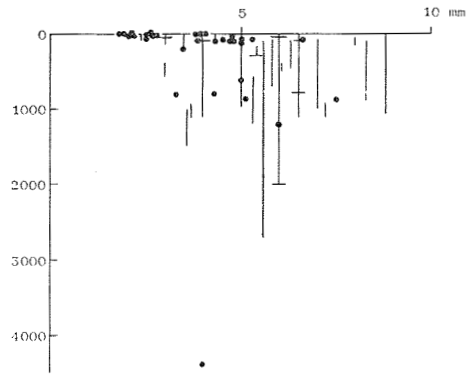

Fig. 30. Relation between size and depth within *Campylaspis*.

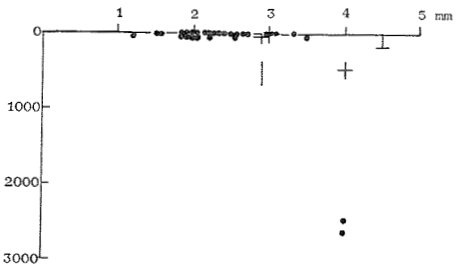

Fig. 31. Relation between size and depth within *Cumella*.

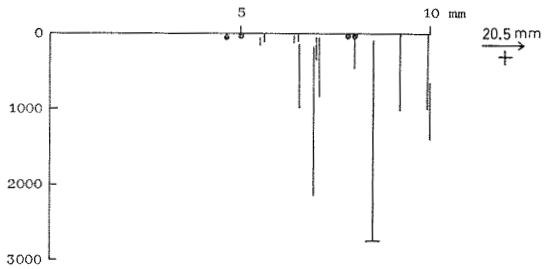

Fig. 32. Relation between size and depth within *Hemilamprops*.

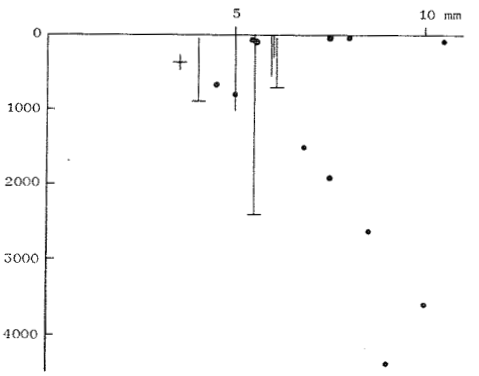

Fig. 33. Relation between size and depth within *Leptostylis*.

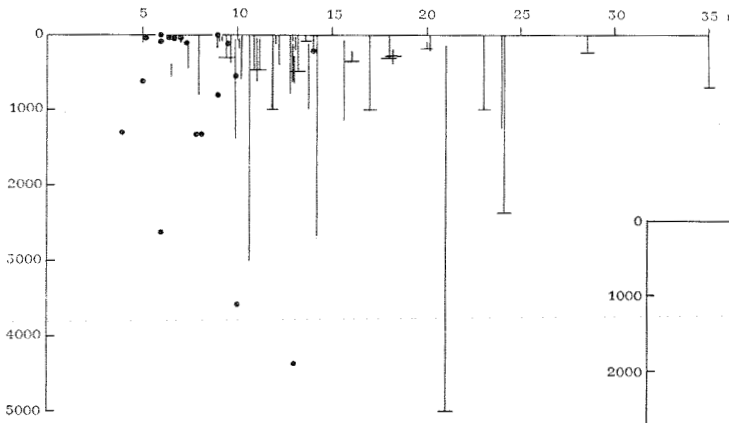

Fig. 34. Relation between size and depth within *Diastylis*.

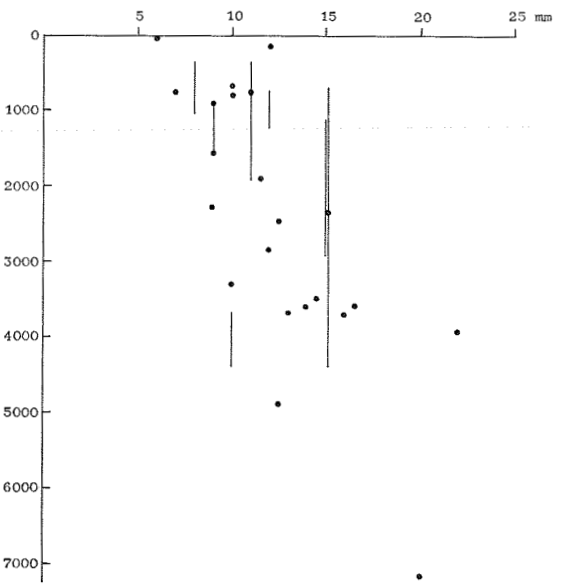

Fig. 35. Relation between size and depth within *Makrokylindrus*.

B. Distribution

Table 1 gives details of the bathymetrical and regional distribution of all species of Cumacea known to me of which descriptions have been published up to the end of 1967, but including those in the present work. It is drawn up on similar lines to Table 18 of WOLFF (1962) for the marine Isopoda Asellota, with the following differences:

Subspecies are ignored, but it is quite possible that species may be combined or split in future taxonomic revisions. No distinction is made between the depth zones 0-200 and 4-200 m, 0-2000 and 4-2000 m, and 0-6000 and 4-6000 m. Records of temperature have not been included as these have seldom been given except for species collected on organised expeditions and I have not thought it worth while in the present state of knowledge to extract temperature ranges from the literature. Instead of the number of localities in which specimens have been collected the number of specimens is given and the following terms are used when the actual number is not stated: *few* includes the range from 3 to 6 specimens inclusive; *several* the range from 7 to 20 inclusive; *many*, more than 20 specimens. In a few cases some details of distribution have not been ascertained.

I have not included in the list of references all the works in which the first descriptions of species were published as these can be found in ZIMMER (1941) and JONES (1963), but only those not listed in either.

Table 1. Regional and bathymetrical distribution, length of body, and number of specimens of all species of Cumacea, arranged according to depth limits. Species marked * should probably be placed in a different depth zone.

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
A. 0-4 METRES				
Gephyrocuma pala Hale, 1936	S. Australia	Shore	2.3	Many
Cumopsis longipes (Dohrn, 1869)	British Is. – Mediterranean	Shore	6	Many
Cumopsis elongata, N. S. Jones, 1956	Ghana	Shore	4.3	Many
Cumopsis fagei Bacescu, 1956	W. France – Morocco	Shore	7.8	Many
Eocuma dollfusi Calman, 1907	W. France – Morocco	Shore	6.5	Many
Iphinoe truncata Hale, 1953	S. Africa	Shore	3.6	Several
Almyracuma proximoculi Jones & Burbanck, 1959	Cape Cod	Brackish water	4.3	Many
?*Pseudocuma lagunae* Baker, 1912	California	Shore	>1.5	1
Allodiastylis johnstoni Hale, 1946	New South Wales	Shore	2.7	Few
Allodiastylis cretata Hale, 1936	S. Australia	Shore	2.5?	Few
B. 0-200 METRES				
Vaunthompsonia cristata Bate, 1958	British Is. – Mediterranean, Annam, S. Africa, Japan	Surface – 36	6	Many
Vaunthompsonia inermis Zimmer, 1909	S. Georgia	24-52	6.5	1
Vaunthompsonia arabica Calman, 1907	Suez, Aden, Andaman Is.	Shallow water	3.4	Few
Vaunthompsonia minor Zimmer, 1944	W. Indies	Surface – 5	4	Many
Vaunthompsonia pacifica Zimmer, 1943	Alaska	Surface – 96	7	Many ♂♂
Vaunthompsonia nana Hale, 1944	S. Australia, W. Australia	Surface	3.4	Several ♂♂
Vaunthompsonia dawydoffi Zimmer, 1952	Annam	Surface	3	24 ♂♂
Vaunthompsonia media Zimmer, 1952	Annam	Surface	3	24 ♂♂
Vaunthompsonia serratifrons Gamô, 1964	Japan	60	4.5	1 ♂
**Bathycuma capensis* Zimmer, 1920	S. Africa	126	9	1 ♂
Gaussicuma gurjanovae Lomakina, 1952	Sea of Okhotsk	42-105	9.5	Several
Leptocuma kinbergi G. O. Sars, 1873	Western S. Atlantic	94	22.5	Few ♀♀

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Leptocuma minor Calman, 1912	N. W. Atlantic	15	7.5	Many
Leptocuma pulleini Hale, 1928	New S. Wales, S. Australia, Queensland	Surface – 3	24	Few
Leptocuma nichollsi Hale, 1949	W. Australia	5	4.3	2
Leotocuma vicaria Hale, 1944	New S. Wales	Surface – 50	17.5	Several
Leptocuma obstipa Hale, 1944	New S. Wales	45-70	7.5	Several
Leptocuma serrifera Hale, 1944	New S. Wales	3	4.4	Several
Leptocuma sheardi Hale, 1936	S. Australia	Surface – 13	7	Many
Leptocuma intermedia Hale, 1944	New S. Wales	3	6.6	Few
Leptocuma forsmani Zimmer, 1943	Lower California	10	12	3 ♀♀
Zenocuma rugosa Hale, 1944	New S. Wales, Tasmania	30-75	14.5	Several
Pomacuma australiae (Zimmer, 1921)	N. W. & E. Australia, New Zealand	Surface – 75	9	Several
Pomacuma cognata Hale, 1944	New S. Wales	50	8	1 ♀
Gephyrocuma repanda Hale, 1944	New S. Wales, W. Australia	3-75	3.5	Several
Gephyrocuma similis Hale, 1949	W. Australia	5	3.1	Several
Glyphocuma bakeri (Hale, 1936)	S. Australia, W. Australia	3-7	12	Many
Glyphocuma dentata Hale, 1944	New S. Wales	45-100	7.1	Many
Glyphocuma inaequalis Hale, 1944	New S. Wales, Tasmania	0-100	13.5	Many
Glyphocuma serventyi Hale, 1944	New S. Wales, Tasmania, W. Australia	0-65	8.5	Several
Sympodomma diomediae (Calman, 1912)	Japan	20-128	14.3	1 ♀
Sympodomma whitleyi Hale, 1949	W. Australia	4	7.2	Few ♂♂
? *Sympodomma incerta* Hale, 1949	S. Australia	?	?	Few
Sympodomma australiensis Foxon, 1932	Queensland	22-200	8	Few
Pseudosympodomma indica Kurian, 1954	S. India	0-180	12.7	Several
Heterocuma sarsi Miers, 1879	Korea, Japan, S. India, Persian Gulf	5-174	18	Many
Heterocuma africana Zimmer, 1921	W. & S. Africa, Andaman Is.	0-82	27	Many
Heterocuma andamani Kurian, 1954	Andaman Is.	4-18	7.9	Several
Heterocuma armata Kurian, 1954	S. India	8-9	4.7	Few
Cumopsis goodsiri (v. Beneden, 1861)	British Is., Mediterranean, Annam	Shore – 32	6	Many
Cumopsis wafri N. S. Jones, 1956	W. Africa	10	5.7	Many
Mancocuma stellifera Zimmer, 1943	E. Canada	Shore – ?	4	Several
Mancocuma altera Zimmer, 1943	N. E. America	?	2.8	Many
Gigacuma halei Kurian, 1951	S. India	8-27	20	Many
Bodotria pulchella (G. O. Sars, 1878)	British Is. – Mediterranean, Senegal	9-50	3.2	Many
Bodotria sublevis Calman, 1907	S. India – Annam	9-28	2.6	Few
Bodotria scorpioides (Montagu, 1804)	Norway – Mediterranean, China?	3-120	7	Many
Bodotria gibba (G. O. Sars, 1878)	Mediterranean	4-9	4.7	Several
Bodotria montagui Stebbing, 1912	S. Africa	75	4.5	1 ♀
Bodotria australis Stebbing, 1912	S. Africa	75	3.3	1 ♀
Bodotria pulex (Zimmer, 1903)	Japan	1-22	3.7	Many
Bodotria arenosa Goodsir, 1843	Norway – Mediterranean	0-120	7	Many
Bodotria similis Calman, 1907	Annam, Japan, S. India	Surface – 28	3.8	Many
Bodotria siamensis Calman, 1907	Annam	Surface – 18	2.8	Many
Bodotria parva Calman, 1907	Annam	Surface – 9	1.5	Few
Bodotria africana Zimmer, 1920	W. Africa	Surface – 18	4.2	Many
Bodotria magna Zimmer, 1920	S. W. Africa	?	6.5	1 ♀

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Bodotria capensis Zimmer, 1920	S. Africa	?	4.5	2 ♂♂
Bodotria maculosa Hale, 1944	S. & W. Australia	Surface – 7	4.2	Many
Bodotria choprai Kurian, 1951	S. India	25-30	1.9	Many
Bodotria glabra N. S. Jones, 1955	S. W. Africa	0-100	4.5	Few
Bodotria lata N. S. Jones, 1956	Senegal	0-8	3.7	Many
Bodotria elevata N. S. Jones, 1960	S. Africa	17-37	5.4	Several
Bodotria prionura Zimmer, 1952	Annam	Surface	4	Few ♀♀
Bodotria chinensis Lomakina, 1960	China	Surface – ?	3.5	Few
Bodotria minuta Kurian, 1961	S. India	?	2.2	Many
Bodotria rugosa Gamô, 1963	Japan	1	3.8	Several
Bodotria biplicata Gamô, 1964	Japan	Surface	2.7	Many
Bodotria carinata Gamô, 1964	Japan	30	6.9	1 ♀
Bodotria ovalis Gamô, 1965	Japan	Surface – 13	4.8	Several
Bodotria serrulata Gamô, 1965	Japan	Surface – 12	4.1	2
Cyclaspis pusilla G. O. Sars, 1887	N. Australia	13	3.5	Few
Cyclaspis exsculpta G. O. Sars, 1887	New Guinea, Queensland	13	8	Several
Cyclaspis picta Calman, 1904	Ceylon	13	4.3	Several
Cyclaspis hornelli Calman, 1904	Ceylon	13-17	5.3	Several
Cyclaspis herdmani Calman, 1904	Ceylon, Andaman Is., Annam	6-16	4.7	Many
Cyclaspis levis Thomson, 1892	New Zealand, Andaman Is.?	Surface – 57	8	Many
Cyclaspis varians Calman, 1912	N. E. Atlantic	Surface	4.3	Many
Cyclaspis longipes Calman, 1907	W. Indies	?	3.3	2
Cyclaspis persculpta Calman, 1905	New Guinea	32	11.3	1 ♀
Cyclaspis similis Calman, 1907	New Zealand, Queensland?	Surface – 75	5.8	Many
Cyclaspis elegans Calman, 1907	New Zealand	1-30	6.5	Several
Cyclaspis uniplicata Calman, 1907	Gulf of Siam, Annam, Ceylon, Andaman Is.	Surface – 18	6.5	Many
Cyclaspis unicornis Calman, 1907	W. Indies	?	3.2	1 ♀
Cyclaspis argus Zimmer, 1902	New Zealand	Surface – 31	6	Many
Cyclaspis cingulata Calman, 1907	Gulf of Siam, S. India	0-18	4.9	Several
Cyclaspis thomsoni Calman, 1907	New Zealand	Surface – 15	6.8	Many
Cyclaspis australis G. O. Sars, 1887	New S. Wales, Tasmania	0-100	10	Many
Cyclaspis quadrituberculata Zimmer, 1907	S. Georgia	75	12	1 ♂
Cyclaspis costata Calman, 1904	Ceylon, S. India	15-23	3.9	Many
Cyclaspis triplicata Calman, 1907	New Zealand	2-31	4	Several
Cyclaspis formosa Zimmer, 1920	Formosa	?	4	Several
Cyclaspis bicornis Zimmer, 1920	N. E. Australia	42	3.5	2
Cyclaspis supersculpta Zimmer, 1921	N. W. Australia	23	>10	1 ♀
Cyclaspis candida Zimmer, 1921	N. W. Australia, Queensland, New S. Wales	0-23	12.6	Many
Cyclaspis mjobergi Zimmer, 1921	N. W. Australia, S. Australia	Surface – 24	10	Many
Cyclaspis coelebs Calman, 1917	New Zealand, Andaman Is.?	Surface – 20	5.6	Several ♂♂
Cyclaspis caprella Hale, 1936	S. Australia, Tasmania	Surface – 5	5	Many
Cyclaspis gibba Hale, 1944	New S. Wales	57	3	Few ♀♀
Cyclaspis lucida Hale, 1944	New S. Wales	3	5	1 ♀
Cyclaspis mollis Hale, 1944	New S. Wales, W. Australia, Queensland	Surface – 3	6.8	Several
Cyclaspis fulgida Hale, 1944	New S. Wales, W. Australia, Queensland	Surface – 3	4.4	2

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Cyclaspis sheardi Hale, 1944	New S. Wales, Tasmania, S. & W. Australia	Surface – 40	5.2	Many
Cyclaspis cretata Hale, 1944	New S. Wales, S. & W. Australia, Queensland Andaman Is.	0-25	6	Many
Cyclaspis granulosa Hale, 1944	S. Australia	7	6.5	Several ♂♂
Cyclaspis concinna Hale, 1944	New S. Wales	3	5	Several ♂♂
Cyclaspis globosa Hale, 1944	New S. Wales, S. Australia	Surface – 50	7	Few
Cyclaspis clarki Hale, 1944	New S. Wales, Tasmania	78-102	7.6	Few
Cyclaspis pinguis Hale, 1944	New S. Wales	?	7	Few
Cyclaspis pura Hale, 1936	S. Australia, W. Australia	Surface – 78?	7.8	Many
Cyclaspis nitida Hale, 1944	New S. Wales, W. Australia	Surface – 58	4	Many
Cyclaspis cottoni Hale, 1937	S. Australia	Surface – 4	4	Several ♂♂
Cyclaspis tribulis Hale, 1928	New S. Wales, Tasmania, S. Australia	0-70	15	Many
Cyclaspis bovis Hale, 1928	New S. Wales, S. Australia	?-98	>19.5	Few
Cyclaspis mawsonae Hale, 1944	S. Australia	Surface	10	Many
Cyclaspis aspera Hale, 1944	New S. Wales	50-100	9.5	Several
Cyclaspis simula Hale, 1944	S. Australia	17	>3.9	1 ♂
Cyclaspis cana Hale, 1944	New S. Wales	100	11	Several
Cyclaspis munda Hale, 1944	New S. Wales, Andaman Is.?	6-35	8.8	Few ♂♂
Cyclaspis pruinosa Hale, 1944	Queensland	25	8	1 ♂
Cyclaspis sabulosa Hale, 1944	New S. Wales	40-50	7	Several
Cyclaspis spilotes Hale, 1928	S. & W. Australia	Surface – 10	11	Many
Cyclaspis nubila Zimmer, 1936	California	13	6	1 ♀
Cyclaspis juxta Hale, 1948	W. Australia	Surface	5.5	Many
Cyclaspis sublevis Hale, 1948	W. Australia	3-6	3	Several
Cyclaspis strumosa Hale, 1948	W. Australia, Queensland, Japan, Andaman Is.	Surface – 18	5	Several
Cyclaspis rudis Hale, 1948	W. Australia	Surface – 6	5	Several ♂♂
Cyclaspis brevipes Hale, 1948	W. Australia	6	4	Few ♂♂
Cyclaspis quadruplicata Kurian, 1951	S. India	23	3.2	2 ♀♀
Cyclaspis platymerus Zimmer, 1944	Gulf of Mexico	Surface	5	1 ♂
Cyclaspis dentifrons Zimmer, 1944	Brazil	Surface	5.5	Several ♂♂
Cyclaspis dolera Zimmer, 1944	Colombia	1	14	Few
Cyclaspis pustulata Zimmer, 1943	Chesapeake Bay	18	>2	Few
Cylaspis testudinum Zimmer, 1943	Colombia, Galapagos Is.	12-49	8	Few ♀♀
Cyclaspis peruana Zimmer, 1943	Peru	12	8.5	Many
Cyclaspis cheveyi Fage, 1945	Annam	Surface	6	Several ♂♂
Cyclaspis bengalensis Kurian, 1956	Andaman Is.	4-18	4.6	1 ♂
Cyclaspis bidens Gamô, 1962	Japan	Surface	>4.2	Few
Cyclaspis amaniebsis Gamô, 1963	Japan	0-1	3.9	Few
Cyclaspis purpurascens Gamô, 1964	Japan	23	2.9	Few
Upselaspis caparti (Fage, 1951)	S. W. Africa	0-100?	4.5	Many
Eocuma taprobanica Calman, 1904	S. India, Ceylon, Andaman Is.	4-28	11	Many
Eocuma longicornis Calman, 1907	Suez, S. India, Penang	?-27	7.7	Several
Eocuma hilgendorfi Marcusen, 1894	Japan, S. India	6-45	10	Few
Eocuma stellifera Calman, 1907	Gulf of Siam	15-28	>5.6	Few ♀♀

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Eocuma lata Calman, 1907	S. India, Andaman Is., Annam, Japan	Surface – 23	13.5	Many
Eocuma sarsi (Kossmann, 1880)	Mediterranean, Red Sea, Ceylon, S. Africa	27-75	9	Several
Eocuma ferox (Fischer, 1872)	Bay of Biscay, Mediterranean, W. Africa, Annam	Surface – 32	7.6	Many
Eocuma affinis Calman, 1904	Ceylon	13	6.7	2 ♂♂
Eocuma agrion Zimmer, 1914	New S. Wales W. Australia	3	8	Several
Eocuma dimorpha Fage, 1928	Morocco, W. Africa	0-50	9	Many
Eocuma calmani Fage, 1928	N. W. & S. W. Africa	80-108	8.6	Few
Eocuma cadenati Fage, 1950	Senegal, W. Africa	0-32	10	Many ♂♂
Eocuma tranvancoricum Kurian, 1951	S. India	0-28	6.4	Several
Eocuma kempi Kurian, 1956	S. India	Shallow water	14.2	1 ♀
Eocuma amakuensis Gamô, 1967	Japan	Shallow water	11.9	Few ♂♂
Stephanomma goesi G. O. Sars, 1871	W. Indies	?	11	1 ♀
Zygosiphon mortenseni Calman, 1907	S. India, Ceylon, Gulf of Siam	9-23	3.1	Few
Iphinoe crassipes Hansen, 1895	E. Mediterranean, W. Africa, S. Africa, S. India, Ceylon, Andaman Is.	8-75	8	Many
Iphinoe brevipes Hansen, 1895	Senegal, W. Africa, S. India	8-28	8.6	Many
Iphinoe africana Zimmer, 1908	S. W. Africa	Surface – 100	15	Many
Iphinoe stebbingi N. S. Jones, 1956	S. Africa	20-28	18	Several
Iphinoe trispinosa (Goodsir, 1843)	N. W. Atlantic, Mediterranean, Madeira	0-147	10	Many
Iphinoe serrata (Norman, 1867)	British Is. – Mediterranean	31-230	12	Many
Iphinoe tenella G. O. Sars, 1878	Mediterranean, Senegal, W. Africa, S. India	0-74	10	Many
Iphinoe robusta Hansen, 1895	W. Africa	Shallow water	6.2	1 ♂
Iphinoe inermis G. O. Sars, 1878	Mediterranean	Few m?	9.5	Many
Iphinoe maeotica (Sowinsky, 1894)	Black Sea	0-10	5.2	Many
Iphinoe sanguinea Kemp, 1916	Chilka Lake, India	Shallow water?	?	?
Iphinoe pellucida Hale, 1944	S. Australia, Tasmania	0-75	4.7	Many
Iphinoe elisae Bacescu, 1950	Black Sea	30-70	7.5	Many
Iphinoe brevidactyla Hale, 1953	S. Africa	1-3	3.4	Few
Iphinoe calmani Fage, 1945	Annam, Andaman Is.	Surface – 10	7	Many
Iphinoe ischnura Zimmer, 1952	Annam	Surface – ?	8	Many
Iphinoe fagei N. S. Jones, 1955	S. W. Africa	Surface – 100	8	Many
Iphinoe senegalensis N. S. Jones, 1956	Senegal, S. Africa	0-1	7	Many
Iphinoe dayi N. S. Jones, 1959	S. Africa	20-58	9.2	Many
Iphinoe sagamiensis Gamô, 1958	Japan	20	9	Several
Iphinoe tenera Lomakina, 1960	China	6-21	7	Few
Iphinoe gurjanovae Lomakina, 1960	China	1	4	Few
Iphinoe pigmenta Kurian, 1961	S. India	Shallow water	2.3	1 ♀
Iphinoe douniae Ledoyer, 1965	Mediterranean	Shallow water	8.6	Many
Iphinoe maculata Ledoyer, 1965	Mediterranean	1-19	10	Several
Iphinoe acutirostris Ledoyer, 1965	Mediterranean	35	15.5	Several
Iphinoe armata Ledoyer, 1965	Mediterranean	5-16	8	Several
Iphinoe rhodaniensis Ledoyer, 1965	Mediterranean	Shallow water	8	Several
?*Iphinoe zimmeri* Stebbing, 1910	S. Africa	75	9	Few
Leucon fulvus G. O. Sars, 1865	Arctic, N. Norway, Iceland	11-90	5.5	Many

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Leucon septemdentatus Zimmer, 1902	Tierra del Fuego, Falkland Is.	1-8	5	Few
?*Leucon heterostylis* Calman, 1907	New Zealand	11	3.4	1 ♀
Leucon kerguelensis Zimmer, 1908	Kerguelen	Shallow water	>5	1 ♂
Leucon vanhöffeni Zimmer, 1907	Kerguelen	Shallow water	>5	1 ♀
Leucon ocularis Hale, 1945	S. Australia	17-35	2.8	Few
Leucon americanus Zimmer, 1943	Chesapeake Bay, Woods Hole	Shallow water	5.5	Many
?*Leucon latispina* N. S. Jones, 1962	New Zealand	90-123	4.8	Few ♀♀
Leucon simanensis Gamô, 1962	Japan	6	5.9	1 ♀
Leucon varians Gamô, 1962	Japan	Surface	4.3	Many
Leucon subnasica Given, 1961	California	6-175	4	Many
Leucon armatus Given, 1961	California	185	5.5	Several
Leucon magnadentata Given, 1961	California	188	5.5	Few
Eudorella monodon Calman, 1912	Louisiana	Beach	4.7	2 ♀♀
Eudorella pusilla G. O. Sars, 1871	N. E. America	2-100	4.5	Many
Eudorella splendida Zimmer, 1902	S. Georgia	0-183	6	Few
Eudorella arctica Hansen, 1920	E. Greenland	17-21	5.1	2 ♀♀
Eudorella spitzbergensis Zimmer, 1926	Spitzbergen, Kara Sea	20-101	7	2 ♀♀
Eudorella rochfordi Hale, 1945	New S. Wales	87	3.4	1 ♀
Eudorella difficilis Blake, 1929	Maine	9-20	5	Many
Eudorella minor Lomakina, 1952	Arctic	33-190	7	Many
Eudorella gottliebi Bacescu, 1961	E. Mediterranean	49-64	3.8	Few
Eudorella hurleyi N. S. Jones, 1962	New Zealand	40	3.2	1 ♀
Eudorellopsis resima Calman, 1907	New Zealand	Shallow water	1.8	1 ♀
Eudorellopsis longirostris Given, 1961	California	40-175	4	Many
Pseudoleucon sorex Zimmer, 1903	Japan	6-23	4.5	Few
Pseudoleucon japonicus Gamô, 1964	Japan	Surface	2.2	1 ♀
Paraleucon suteri Calman, 1907	New Zealand	2-11	2.9	Several
Hemileucon uniplicatus Calman, 1907	New Zealand	2-11	2.6	Few
Hemileucon comes Calman, 1907	New Zealand	2-9	2.8	Few
Hemileucon laevis Hale, 1945	New S. Wales	75-100	3.5	Several
Hemileucon hinumensis, Gamô, 1967	Japan	Shallow water	5.5	Several
Hemileucon enoshimensis Gamô, 1967	Japan	Surface	2.4	Several
Heteroleucon akaroensis Calman, 1907	New Zealand	2-11	2.8	Several
Schizotrema bifrons Calman, 1911	S. India	2-9	1.7	1 ♀
Schizotrema sordidum Calman, 1911	Gulf of Siam	Surface – 2	1.5	Many
Schizotrema depressum Calman, 1911	Gulf of Siam	2	1.5	Several
Schizotrema aculeata Hale, 1936	S. & W. Australia, Queensland	Surface	1.7	Many
Schizotrema leopardina Hale, 1949	W. Australia	Surface – 6	1.9	Many
Schizotrema resima Hale, 1949	W. Australia	6	1.2	1 ♀
Schizotrema macrodactylus Fage, 1945	Annam	Surface	1.5	Many
Schizotrema bidens Fage, 1945	Annam	Surface	1.4	1 ♂
Schizotrema sakaii Gamô, 1964	S. Japan	Surface	1.1	Several ♀♀
Nannastacus reptans Calman, 1911	Gulf of Siam	2	1.5	1 ♀
Nannastacus tardus Calman, 1911	Gulf of Siam	9-28	1.6	Several ♀♀
Nannastacus agnatus Calman, 1911	Gulf of Siam	9-28	1.3	Several ♀♀
Nannastacus zimmeri Calman, 1911	Ceylon, Annam	Surface	2.5	Many
Nannastacus suhmi G. O. Sars, 1887	Philippine Is., New Britain, Annam	Surface	2.6	Few
Nannastacus gibbosus Calman, 1911	Madagascar, Annam, Gulf of Siam, Palau, Ifaluk	Surface – 9	3	Many
Nannastacus minor Calman, 1911	Gulf of Siam, Annam	Surface – 2	2	Many
Nannastacus lepturus Calman, 1911	Suez	?	2	1 ♂
Nannastacus longirostris G. O. Sars, 1879	Mediterranean	Surface	3	Many
Nannastacus brachydactylus Calman, 1905	Sunda Sea	Surface	1.6	1 ♂
Nannastacus ossiani Stebbing, 1900	New Britain	Surface	2	1 ♂

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Nannastacus hanseni Calman, 1905	Sunda Sea	Surface	1.5	Few ♂♂
Nannastacus georgi Stebbing, 1900	New Britain	Surface	2.5	1 ♂
Nannastacus pardus Calman, 1905	Sunda Sea	Surface	1.7	1 ♂
Nannastacus hirsutus Hansen, 1895	Bermuda	Shallow water	1.7	1 ♀
Nannastacus unguiculatus (Bate, 1859)	British Is. – Mediterranean, Annam	Surface – 40	2	Many
Nannastacus brevicaudatus Calman, 1905	S.W. Ireland	Shallow water	2	Several
Nannastacus stebbingi Calman, 1904	Ceylon, Annam	Surface – 4	1.5	Many
Nannastacus erinaceus Zimmer, 1913	S. Africa	Shallow water	1.8	1 ♀
Nannastacus nasutus Zimmer, 1914	S. & W. Australia, Queensland	Surface – 16	2.5	Many
Nannastacus sauteri Zimmer, 1920	Formosa, Philippines	Shallow water	1.3	Many
Nannastacus mystacinus Zimmer, 1920	Ralum	4-10	1.7	Several
Nannastacus gurneyi Calman, 1927	Suez Canal	?	?	1 ♀
Nannastacus inconstans Hale, 1945	S. & W. Australia	Surface – 17	1.4	Many
Nannastacus clavatus Hale, 1945	S. Australia	17	1.9	1 ♂
Nannastacus asper Hale, 1945	S. & W. Australia, Tasmania	Surface – 6	2.3	Many ♂♂
Nannastacus sheardi Hale, 1945	S. Australia	0-4	1.6	Several
Nannastacus inflatus Hale, 1945	S. & W. Australia, Queensland, S. India	Surface – 7	2.5	Many
Nannastacus subinflatus Hale, 1945	S. & W. Australia	Surface – 6	1.7	Many
Nannastacus lima (Hale, 1936)	S. Australia, Tasmania	Shallow water	1.4	Several
Nannastacus johnstoni Hale, 1945	New S. Wales, Queensland, S. India, Andaman Is.	Surface – 18	2.6	Many
Nannastacus nichollsi Hale, 1949	W. Australia	6	1.5	Several
Nannastacus vietus Hale, 1949	W. Australia	6-7	1.7	Several
Nannastacus stephenseni Fage, 1945	Annam	Surface	2	Many ♂♂
Nannastacus euxinicus Bacescu, 1951	Black Sea	Shallow water	2	Several
Nannastacus pilgrimi N.S. Jones, 1962	New Zealand	Shallow water	1.8	Few ♂♂
Nannastacus japonicus Gamô, 1962	Japan	Shallow water	2.3	Many ♂♂
Nannastacus pruinosus Gamô, 1962	Japan	Shallow water	2	Many ♂♂
Nannastacus goniatus Gamô, 1962	Japan	Shallow water	1.7	Several ♀♀
Nannastacus nyctagineus Gamô, 1962	Japan	Shallow water	1.6	Few ♀♀
Nannastacus pectinatus Gamô, 1962	Japan	Shallow water	1.6	Many ♂♂
Nannastacus spinulosus Gamô, 1962	Japan	Shallow water	1.6	Many ♂♂
Nannastacus spinosus Gamô, 1962	Japan	Shallow water	1.4	3 ♀♀
Nannastacus umbellifer Gamô, 1963	Japan	1	1.4	Few
Cumellopsis australiensis Hale, 1949	New S. Wales	80	>3	1 ♀
Cumella forficula Calman, 1911	Gulf of Siam, Annam	Surface – 19	1.9	Many
Cumella clavicauda Calman, 1911	W. Indies, Gulf of Mexico	Surface	1.9	Many ♂♂
Cumella leptopus Calman, 1911	W. Indies	Shallow water	2.2	Few ♂♂
Cumella hispida Calman, 1911	Gulf of Siam, Annam, S. Australia	Surface – 9	2.7	Many
Cumella serrata Calman, 1911	W. Indies	Surface	2.3	Many
Cumella laevis Calman, 1911	Gulf of Siam	2-15	1.2	1 ♀
Cumella pygmaea G.O. Sars, 1865	Norway – Mediterranean	4-124	3	Many
Cumella limicola G.O. Sars, 1879	Mediterranean, Morocco	1-20	3.5	Many
Cumella carinata (Hansen, 1887)	W. Greenland, Arctic, Bering Sea	4-163	4.5	Many
Cumella australis Calman, 1907	Antarctic	25	2.9	Few
Cumella michaelseni Zimmer, 1914	S.W. Australia	2-9	2.5	Few
Cumella gibba Zimmer, 1914	S.W. Australia	2-9	>1.5	1 ♂
Cumella cyclaspoides Zimmer, 1914	S.W. Australia	3	1.5	1 ♀
Cumella tarda Hansen, 1920	S. of Faroes	Surface	3.3	Several ♂♂

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Cumella vulgaris Hart, 1930	Vancouver, Alaska	Shore	2.5	Many
Cumella cana Hale, 1945	S. & W. Australia	Shore – 8	1.9	Several
Cumella turgidula Hale, 1945	S. Australia	2-6	2.9	Few ♂♂
Cumella vicina Zimmer, 1944	W. Indies, Gulf of Mexico	Surface	2?	Many ♂♂
Cumella micruropus Zimmer, 1943	E. Florida	Shallow water	2	1 ♀
Cumella similis Fage, 1945	Annam, W. Australia, Queensland	Surface	2.3	Many
Cumella sp. affin. serrata Zimmer, 1944	Gulf of Mexico	Surface	2.4	1 ♂
Cumella hastata Fage, 1945	Annam	Surface	2	1 ♂
Cumella indosinica Zimmer, 1952	Annam	Surface	3	Many ♂♂
Cumella siamensis Zimmer, 1952	Annam	Surface	2.2	Several ♂♂
Cumella dentata Lomakina, 1952	Arctic	25-65	3	Few ♀♀
Cumella gurwitchi Lomakina, 1952	Arctic	Shore	2.7	Few ♀♀
Cumella glaberata Gamô, 1962	Japan	Shallow water	2.5	Many ♂♂
Cumella scabera Gamô, 1962	Japan	Shallow water	1.9	Few ♂♂
Cumella arguta Gamô, 1962	Japan	Shallow water	1.8	Several ♀♀
Cumella rigida Gamô, 1963	Japan	Shallow water	1.8	Many
Cumella quadrispinosa Gamô, 1965	Japan	1-3	1.8	Many
Cumella alveata Gamô, 1964	Japan	Shallow water	2.2	1 ♂
Cumella sadoensis Gamô, 1967	Japan	Surface	>1.9	1 ♀
Procampylaspis sordida Hale, 1945	New S. Wales	60-100	5.5	Few
Campylaspis platyuropus Calman, 1911	Gulf of Siam	9-19	>1.8	1 ♀
Campylaspis pacifica G. O. Sars, 1887	Philippine Is.	Shallow water	3	1 ♀
Campylaspis orientalis Calman, 1911	Korea, Okhotsk Sea	66-140	8	Several
Campylaspis macrophthalma G. O. Sars, 1879	Mediterranean	38-200	5	Several
Campylaspis maculata Zimmer, 1907	S. Georgia, Andaman Is.?	75 (6-8?)	5	Several
Campylaspis frigida Hansen, 1908	Antarctic	?	6	1 ♀
Campylaspis canaliculata Zimmer, 1936	California	7-15	4	2 ♀♀
Campylaspis legendrei Fage, 1951	British Is. – Mediterranean	Shore – 60	4	Many
Campylaspis rufa Hart, 1930	Vancouver	200	3.5	1 ♀
Campylaspis johnstoni Hale, 1937	Antarctic	193	6.5	1 ♂
Campylaspis thomsoni Hale, 1945	New S. Wales, Tasmania	80	4.5	Few
Campylaspis similis Hale, 1945	Tasmania	?	3.8	1 ♂
Campylaspis unisulcata Hale, 1945	S. & W. Australia, Tasmania	Surface – 8	3.9	Few
Campylaspis uniplicata Hale, 1945	New S. Wales	80-100	4.8	2 ♀♀
Campylaspis rupta Hale, 1945	S. Australia	2-4	4	2 ♂♂
Campylaspis latidactyla Hale, 1945	Queensland	Surface	>2.6	2 ♀♀
Campylaspis minor Hale, 1945	N. W. Australia, Queensland	Shallow water	1.9	Several
Campylaspis triplicata Hale, 1945	Queensland	Surface	2.4	Several ♂♂
Campylaspis roscida Hale, 1945	New S. Wales, Tasmania	70-100	4.3	Few ♀♀
Campylaspis echinata Hale, 1945	New S. Wales	70-87	5.3	Few
Campylaspis pustulosa Hale, 1945	New S. Wales	70	4.8	1 ♂
Campylaspis aspera Hale, 1945	New S. Wales	70-100	>3.9	Few
Campylaspis thetidis Hale, 1945	New S. Wales	78-97	6.6	1 ♀
Campylaspis pileus Foxon, 1932	Queensland	22-200	3.5	Few ♀♀
Campylaspis tubulata Fage, 1945	Annam	Surface	2.8	Many
Campylaspis crispa Lomakina, 1955	Arctic	65-200	4	Few ♀♀
Campylaspis umbensis Gurwitch, 1939	Arctic	22	3	Few ♀♀
Campylaspis aperta Lomakina, 1958	Okhotsk Sea	140	6.5	Few ♀♀
Campylaspis kiiensis Gamô, 1960	Japan	Shallow water	>2.6	1 ♂
Campylaspis granulata Gamô, 1960	Japan	Surface	>2.7	Few ♀♀
Campylaspis pumila Gamô, 1960	Japan	Shallow water	2	Few

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Campylaspis reticulata Gamô, 1960	Japan	Shallow water	>2.1	1 ♂
Campylaspis fusiformis Gamô, 1960	Japan	Surface – Shallow water	2.6	Several
Campylaspis striata Gamô, 1960	Japan	Surface	2.1	Few
Campylaspis sinuosa Gamô, 1960	Japan	Shallow – 70	2.4	Several
Campylaspis angularis Gamô, 1960	Japan	Shallow water	4.8	Several
Campylaspis amblyoda Gamô, 1960	Japan	Shallow – 70	4.3	Several
Picrocuma poecilota Hale, 1936	S. Australia, Tasmania, Queensland	Shallow water	1.9	Several
Pavlovskeola campylaspoides Lomakina, 1955	Okhotsk Sea	150-185	2.8	Few ♀♀
Chalarostylis elegans Norman, 1879	N.E. Atlantic	199	>8	1 ♂
Hemilamprops ultimae-spei Zimmer, 1921	Tierra del Fuego	12-18	5	Few ♀♀
Hemilamprops gracilis Hart, 1930	Vancouver	120-200	6.5	Few
Hemilamprops lata Hale, 1946	New S. Wales, Tasmania	45-120	6.4	Several
Hemilamprops diversa Hale, 1946	New S. Wales, Tasmania	50-150	5.5	Several
Hemilamprops californica Zimmer, 1936	California, Japan	14	8	Many
Hemilamprops izuana Harada, 1959	Japan	50	4.6	Few
Hemilamprops japonica (Harada, 1959)	Japan	Shallow water	7.8	Many
Hemilamprops pacifica (Harada, 1959)	Japan	Shallow water – 90	5.6	Many
Mesolamprops bispinosa Given, 1964	California	30-100	4	Many
Lamprops fasciata G.O. Sars, 1863	Barents Sea – British Is., Pribilofs	0-71	9	Many
Lamprops fuscata G.O. Sars, 1865	Arctic, Bering Sea, Greenland, N. Pacific, N.E. America	4-121	6	Many
Lamprops quadriplicata S.I. Smith, 1879	N.E. Atlantic, Okhotsk Sea, Vancouver	0-104	9	Many
Lamprops beringi Calman, 1912	Kamchatka, Okhotsk & Bering Seas	0-129	17	Many
Lamprops korroensis Derzhavin, 1923	Kamchatka, Okhotsk & Bering Seas	Shallow water	5	Many
Lamprops sarsi Derzhavin, 1926	Kamchatka, Alaska, Okhotsk Sea	1-120	5	Many
Lamprops serrata Hart, 1930	Vancouver, Okhotsk Sea	20-95	4.5	Several ♀♀
Lamprops carinata Hart, 1930	Vancouver, Arctic, Alaska	18-120	9	Many
Lamprops multifasciata Zimmer, 1937	Okhotsk & Bering Seas	14-92	12	Many
Lamprops pumilio Zimmer, 1937	Okhotsk Sea	20-25	4	Several
Lamprops affinis Lomakina, 1958	Kamchatka, Okhotsk Sea	8-90	8.5	Several ♀♀
Lamprops flava Harada, 1959	Japan	Shallow water	3.1	Many
Pseudocuma longicornis (Bate, 1858)	Norway – Mediterranean, Annam, S. Africa	Surface – 130	4	Many
Pseudocuma ciliata G.O. Sars, 1879	Mediterranean, Black Sea	Surface – 10	3.5	Many
Pseudocuma cercarioides G.O. Sars, 1894	Black Sea, Caspian, Volga	0-9	4.5	Many
Pseudocuma laevis G.O. Sars, 1914	Caspian	1-9	4	Many
Pseudocuma chevreuxi Fage, 1928	Senegal	Shallow water	2.5	Many
Schizorhynchus scabriusculus (G.O. Sars, 1894)	Black Sea, Caspian, Danube	1-21	6	Many
**Schizorhynchus eudorelloides* (G.O. Sars, 1894)	Black Sea, Caspian	2-264	7	Many
Schizorhynchus bilamellatus (G.O. Sars, 1894).	Caspian, Volga	2-31	10	Many
Caspiocuma campylaspoides (G.O. Sars, 1879).	Caspian, Volga	1-31	5	Many

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Pterocuma pectinata (Sowinsky, 1893)	Black Sea, Caspian, Volga	1-20	8	Many
Pterocuma rostrata (G.O.Sars, 1894)	Black Sea, Caspian, Volga	1-21	8	Many
Pterocuma sowinskyi (G.O.Sars, 1894)	Black Sea, Caspian, Volga	1-20	12	Many
Pterocuma grandis G.O.Sars, 1914	Caspian	110	17	Few ♀♀
Stenocuma diastyloides (G.O.Sars, 1879).....	Caspian	19-170	12	Many
Stenocuma tenuicauda (G.O.Sars, 1894).....	Caspian, Volga	1-48	4	Many
Stenocuma gracilis (G.O.Sars, 1894)	Caspian, Volga	1-20	10	Many
Stenocuma gracilioides (G.O.Sars, 1894)	Black Sea, Caspian, Volga	0-48	6	Many
Chasarocuma knipowitchi Derzhavin, 1912 ...	Caspian	1-3	4	Many
Hyrcanocuma sarsi Derzhavin, 1912	Caspian	16	3	Few ♀♀
Volgacuma telmatophora Derzhavin, 1912	Black Sea, Caspian, Volga	5	1.7	Many
Diastylis planifrons Calman, 1912	S. America Straits of Magellan	91-112	14	Few ♀♀
Diastylis alaskensis Calman, 1912.....	Alaska, Okhotsk Sea, Japan	Surface – 196	14	Many
Diastylis hammoniae Zimmer, 1902.....	S. Atlantic	50-151	20	Few ♀♀
Diastylis koreana Calman, 1911	Korea, Okhotsk Sea	34-196	13	Several
Diastylis algoae Zimmer, 1908	S. Africa	1-82	9	Many
Diastylis sulcata Calman, 1912	Arctic, Barents & Bering Seas, Alaska	5-89	13.5	Many
Diastylis scorpioides (Lepechin, 1780).....	Arctic, W. Greenland, Novya Zemlya	5-198	20	Many
Diastylis rugosa G.O.Sars, 1865	Norway – Mediterranean	Surface – 90	9	Many
Diastylis neapolitana G.O.Sars, 1879	Mediterranean	?-94	5	Few ♀♀
Diastylis tricincta (Zimmer, 1903).....	Japan, China	Shallow water	7	Many
Diastylis doryphora Fage, 1940	Mediterranean	63	>4	1 ♂
Diastylis gayi (Nicolet, 1849).....	Chile	Shallow water	6.5	1 ♀
Diastylis granulata Zimmer, 1921	Argentina	94	>6	1 ♂
Diastylis dollfusi Fage, 1928	Morocco	38-55	5	Many
Diastylis pellucida Hart, 1930	Vancouver	50-120	9	Several
Diastylis californica Zimmer, 1936	California	18-125	12	Few
Diastylis rufescens N.S.Jones, 1955	S.W. Africa	0-50	10	Several
Diastylis argentata Calman, 1912	Chile	112	9.5	Many
Diastylis abbreviata G.O.Sars, 1871.....	N.E. America	31-71	7	Several
Diastylis fimbriata G.O.Sars, 1873	S. Atlantic	?	6	Few
Diastylis neozealanica Thomson, 1892	New Zealand	0-29	9	Many
Diastylis denticulata N.S.Jones, 1956	S.W. Africa	100	7.4	Few
Diastylis cornuifer Blake, 1929.....	Maine	22	>6	Few
Diastylis lazarevi Lomakina, 1955.....	Okhotsk Sea, Japan	Shallow water	6.5	Several
Diastylis ornata Lomakina, 1952	Okhotsk Sea	83-188	10	Many
Diastylis inornata Hale, 1937	S. of Kerguelen	150	7	2 ♀♀
Makrokylindrus serricauda (T.Scott, 1912) ...	N.E. Atlantic	140	12	1 ♀
Makrokylindrus fistularis (Calman, 1911).....	Gulf of Siam	19-58	>6	Few ♂♂
Diastylopsis elongata Calman, 1911	New Zealand	2-67	9.2	Many
Diastylopsis crassior Calman, 1911	New Zealand	2-46	9.3	Many
Diastylopsis annulata (Zimmer, 1902).....	S. Georgia	0-15	>6	Few ♀♀
Diastylopsis robusta (Zimmer, 1902).....	Magellan Straits	4	8	Few
Diastylopsis thileniusi (Zimmer, 1902)	New Zealand	0-43	6	Many
Diastylopsis dentifrons (Zimmer, 1903)	Kerguelen	19	11	Few
Diastylopsis tenuis Zimmer, 1936	California	4-37	9	Many
Paradiastylis brachyura Calman, 1904	Ceylon	13	>3.2	Several
Paradiastylis longipes Calman, 1905	S. India, Gulf of Siam, Sulu Sea, New S. Wales	Surface – 31	3.5	Many

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Paradiastylis culicoides Kemp, 1916	Chilka Lake, S. India	2-29	4	Many
Paradiastylis mollis Hale, 1945	N. W. Australia, Queensland	Surface	2.6	Many
Paradiastylis whitleyi Hale, 1951	W. Australia	3-6	4	Several ♂♂
Paradiastylis belone Fage, 1945	Annam, S. India	Surface – 29	3.5	Several ♂♂
Leptostylis manca G. O. Sars, 1873	Brazil	98	10.5	Few ♀♀
Leptostylis vercoi Hale, 1928	W. Australia	29-31	8	1 ♀
Leptostylis recalvastra Hale, 1945	New S. Wales, New Zealand	70-80	5.4	Several
Leptostylis mancoides Bacescu-Mester, 1967	Brazil	Shallow water	>7.5	1 ♀
Leptostylis vemae Bacescu-Mester, 1967	S. W. Atlantic	70-107	5.5	Many
Ekleptostylis walkeri (Calman, 1907)	Bay of Biscay	100	6.5	Few
Colurostylis pseudocuma Calman, 1911	New Zealand	2-11	2.7	Several
Colurostylis lemurum Calman, 1917	New Zealand	Surface – 20	4.2	Many
Colurostylis longicaudata N. S. Jones, 1962	New Zealand	22-25	4.3	Several
Anchicolurus occidentalis (Calman, 1912)	Oregon, California	16-64	12	Several
Pachystylis rotundata Hansen, 1895	Brazil	Shallow water	2.3	Few
Oxyurostylis smithi Calman, 1912	N. E. America	Surface – 2	7.3	Many
Oxyurostylis pacifica Zimmer, 1936	California	14-29	9	Many
Oxyurostylis tertia Zimmer, 1943	California	10	9	Few
Oxyurostylis salinoi Brum, 1966	Brazil	1-20	7.7	Many
Dimorphostylis asiatica Zimmer, 1920	Japan, Kuriles,, Formosa, Annam	0-92	4.5	Many
Dimorphostylis australis Foxon, 1932	Queensland, W. Australia	Surface	5	Many
Dimorphostylis cottoni Hale, 1936	S. & W. Australia, New S. Wales, Tasmania	Shallow water	7.1	Many
Dimorphostylis vieta (Hale, 1936)	S. & W. Australia	Surface	3.3	Several
Dimorphostylis subaculeata Hale, 1945	New S. Wales, Tasmania	2-68	12.1	Several
Dimorphostylis inauspicata Hale, 1945	New S. Wales	88	>5.7	Few
Dimorphostylis tasmanica Hale, 1945	Tasmania	?	>5.5	Few
Dimorphostylis colefaxi Hale, 1945	New S. Wales	Shallow water	>4.2	1 ♀
Dimorphostylis tribulis Hale, 1945	S. Australia	Surface – 14	5	Few ♀♀
Dimorphostylis manazuruensis Gamô, 1960	Japan	20	5.2	Few
Dimorphostylis elegans Gamô, 1960	Japan	40	5.1	Several
Dimorphostylis coronata Gamô, 1960	Japan	20	6.2	Several
Dimorphostylis quadriplicata Gamô, 1960	Japan	30-60	6.3	Many
Dimorphostylis hirsuta Gamô, 1960	Japan	Shallow water	6	Many
Dimorphostylis horai Kurian, 1956	S. India, Andaman Is.	4-18	5.1	Few
Dimorphostylis longicauda Gamô, 1962	Japan	Surface	>2.6	2 ♀♀
Dimorphostylis echinata Gamô, 1962	Japan	Surface – 1	>2.5	Few
Dimorphostylis valida Harada, 1960	Japan	60	4.8	Many
Dimorphostylis acroplicata Harada, 1960	Japan	Shallow water	4.6	Several
Dimorphostylis gibbosa Harada, 1960	Japan	Shallow water	5.8	Several
Dimorphostylis cornigera Harada, 1960	Japan	Shallow water	>5	Several
Dimorphostylis longitelson Kurian, 1965	S. India	197	6.5	Few
Dimorphostylis brevicaudata (Zimmer, 1903)	Japan	6-8	9	1 ♂
Anchistylis watei (Hale, 1928)	S. & W. Australia	Surface	4	Many
Anchistylis similis Hale, 1945	New S. Wales, S. Australia, Tasmania	2-10	4.5	Many
Anchistylis longipes Hale, 1945	S. Australia	6	>3.2	1 ♀
Dic calmani Stebbing, 1910	S. Africa	18-75	5	Few
Sheardia antennata Hale, 1946	New S. Wales	87	4.1	1 ♀
Gynodiastylis laevis Calman, 1911	New Zealand	2-9	4.1	Few
Gynodiastylis carinata Calman, 1911	New Zealand	2-9	4	Few
Gynodiastylis costata Calman, 1911	Gulf of Siam, Japan	9-37	2.4	Several
Gynodiastylis bicristata Calman, 1911	Japan, Gulf of Siam, N. W. Australia	9-73	1.9	Several

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Gynodiastylis hartmeyeri Zimmer, 1914	W. Australia	6-13	2.3	Few ♀♀
Gynodiastylis similis Zimmer, 1914	W. Australia	7-8	>2	1 ♀
Gynodiastylis rochfordi Hale, 1946	New S. Wales	87	>4	1 ♂
Gynodiastylis lata Hale, 1946	W. Australia, Queensland	Surface	2.2	Several ♂♂
Gynodiastylis robusta Hale, 1946	Tasmania	0-50	4.4	Few ♀♀
Gynodiastylis dilatata Hale, 1946	New S. Wales	30-87	3	Few ♂♂
Gynodiastylis ampla Hale, 1946	New S. Wales	75	>9.3	Few
Gynodiastylis subtilis Hale, 1946	New S. Wales	75	>4.4	1 ♀
Gynodiastylis carinirostris Hale, 1946	New S. Wales	6	4.7	Several ♀♀
Gynodiastylis truncatifrons Hale, 1928	New S. Wales, S. Australia	0-70	7.3	Several
Gynodiastylis polita Hale, 1946	New S. Wales	60-120	4.7	Several ♀♀
Gynodiastylis ambigua Hale, 1946	New S. Wales	70-87	3.8	Several
Gynodiastylis attenuata Hale, 1946	Queensland	Surface	2.5	Few
Gynodiastylis echinata Hale, 1946	New S. Wales	70	3.3	1 ♀
Gynodiastylis roscida Hale, 1946	Tasmania	20-33	>3	1 ♀
Gynodiastylis mutabilis Hale, 1946	New S. Wales	87-120	3	Few
Gynodiastylis ornata Hale, 1946	New S. Wales, Tasmania	0-87	4	Few
Gynodiastylis strumosa Hale, 1946	Tasmania	0-50	4.1	1 ♀
Gynodiastylis margarita Hale, 1946	New S. Wales	60-97	>6	Several
Gynodiastylis quadricristata Hale, 1946	Queensland	Surface	>1.4	1 ♀
Gynodiastylis brevipes Hale, 1946	New S. Wales	70-87	3.1	Few ♀♀
Gynodiastylis concava Hale, 1946	New S. Wales, Tasmania	0-70	3.3	Few ♀♀
Gynodiastylis tumida (Hale, 1937)	New S. Wales, S. Australia, Tasmania	Surface – 6	2.8	Several
Gynodiastylis turgida Hale, 1928	S. & W. Australia	Surface – 6	2.7	1 ♀
Gynodiastylis munda Hale, 1951	W. Australia	4	>2.5	1 ♀
Gynodiastylis vicaria Hale, 1951	W. Australia	Surface	1.8	1 ♂
Gynodiastylis inepta Hale, 1951	W. Australia	6	2.9	Few ♂♂
Gynodiastylis milleri N. S. Jones, 1962	New Zealand	6	4	1 ♀
Gynodiastylis platycarpus Gamô, 1961	Japan	20-30	3.9	Several
Gynodiastylis rotundicaudatus Gamô, 1961	Japan	20	4.4	1 ♀
Gynodiastylis nitida Harada, 1962	Japan	10-30	4.4	Few
Gynodiastylis tubicola Harada, 1962	Japan	30	3.7	Several
Gynodiastylis anguicephala Harada, 1962	Japan	10-20	2	Several
Dicoides areolata Hale, 1946	New S. Wales	70-87	3.5	Several
Dicoides brevidactyla (Hale, 1937)	New S. Wales, S. Australia	70	2.7	Several
Dicoides fletti Hale, 1946	New S. Wales, Tasmania	Surface – 80	5.3	Several
Dicoides occidentalis Hale, 1951	W. Australia	Surface	2.2	1 ♂
Allodiastylis hirtipes Hale, 1946	New S. Wales	70-87	3.2	Few ♀♀
Allodiastylis tenuipes Hale, 1946	New S. Wales	87	2.5	Few ♀♀
Zimmeriana spinicauda (Hale, 1937)	S. Australia	Shallow water	3	Several
Zimmeriana longirostris Hale, 1946	S. Australia	1-18	2.6	Several
Zimmeriana lasiodactyla (Zimmer, 1914)	W. Australia, Tasmania	3-14	2.3	Few

C. 0-2000 METRES

Vaunthompsonia meridionalis G. O. Sars, 1887	Kerguelen, S. Georgia	5-310	12	Many
Cyclaspis gigas Zimmer, 1907	Antarctic	193-640	20	Several
Cyclaspis spectabilis Zimmer, 1908	Agulhas Bank, S. Atlantic	126-565	12	Several
Leucon siphonatus Calman, 1905	Iceland – Mediterranean	100-1100	3.9	Several

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Leucon nasicoides Lilljeborg, 1855	Arctic, N. Atlantic	19-1000	6	Many
Leucon nasica (Kröyer, 1841)	Arctic, N.E. & N.W. Atlantic	4-659	12	Many
Leucon nathorsti Ohlin, 1900	Arctic, N. Atlantic	20-960	7	Many
Leucon mediterraneus G.O. Sars, 1879	Mediterranean	25-300	6	Many
Leucon acutirostris G.O. Sars, 1865	Arctic, Norway	56-584	3.5	Many
Leucon assimilis G.O. Sars, 1887	Kerguelen	150-232	9	Few
Leucon sagitta Zimmer, 1907	Antarctic, S. Georgia	12-310	5	Few
Leucon laticauda Lomakina, 1952	Arctic	33-216	6.5	Several
Leucon kobjacovae Lomakina, 1955	Arctic	48-430	5	Several
Leucon minor Lomakina, 1955	Arctic	45-447	3.8	Several
Eudorella emarginata (Kröyer, 1846)	Arctic, N.E. Atlantic	13-2000	12	Many
Eudorella gracilior Zimmer, 1907	Antarctic, S. Georgia	75-310	7	Few
Eudorella fallax Zimmer, 1909	Antarctic, S. Georgia	64-310	6.5	Few
Eudorella nana G.O. Sars, 1879	Mediterranean	38-300	3	Many
Eudorella hispida G.O. Sars, 1871	N. Atlantic	2-1096	7.2	Few
Eudorella sordida Zimmer, 1907	Antarctic, S. Georgia	12-250	7	Few
Eudorella pacifica Hart, 1930	N.E. Pacific	20-240	6	Few
Eudorella dentata Lomakina, 1955	Arctic	45-240	8.5	Few
**Eudorellopsis deformis* Kröyer, 1846	N. Atlantic, N. Pacific	0-271	5	Many
Eudorellopsis integra (S.I. Smith, 1879)	Arctic, N.W. Atlantic, N. Pacific	28-791	5.5	Many
Eudorellopsis biplicata Calman, 1912	N.W. Atlantic	20-1514	5.5	Few
Eudorellopsis ushakovi Lomakina, 1955	N. Pacific	85-412	4	Few
Campylaspis rubicunda (Lilljeborg, 1855)	N. Atlantic, Arctic, N. Pacific	22-1977	6	Many
Campylaspis glabra G.O. Sars, 1879	Norway – Mediterranean, Annam	33-1100	4	Many
Campylaspis costata G.O. Sars, 1865	N.E. Atlantic, Arctic, N. Pacific	38-780	6.5	Many
Campylaspis undata G.O. Sars, 1864	Norway	188-377	7	Few
Campylaspis sulcata G.O. Sars, 1870	Norway – Mediterranean	130-639	5	Few
Campylaspis horrida G.O. Sars, 1870	Norway	188-970	7	Few
Campylaspis verrucosa G.O. Sars, 1866	Norway – Mediterranean	113-1100	6.5	Few
Campylaspis nodulosa G.O. Sars, 1887	Kerguelen, Antarctic	150-437	5	Few
Campylaspis intermedia Hansen, 1920	N. Atlantic	185-699	5.8	Several
Campylaspis papillata Lomakina, 1952	N. Pacific	143-440	6.3	Few
Campylaspis clavata Lomakina, 1952	N.W. Pacific	98-880	8.3	Few
Campylaspis sagamiensis Gamô, 1967	Japan	0-1107	>8.8	1 ♂
Hemilamprops rosea (Norman, 1863)	Norway – British Is.	38-364	7	Many
Hemilamprops assimilis G.O. Sars, 1883	N. Atlantic	113-970	6.5	Many
Hemilamprops uniplicata (G.O. Sars, 1872)	N. Atlantic	110-834	7	Few
Hemilamprops pectinata Lomakina, 1955	N. Pacific	31-440	8	Few
Hemilamprops tanseiana Gamô, 1967	Japan	0-1000	>9.2	Few ♀♀
Hemilamprops miyakei Gamô, 1967	Japan	0-1000	10	1 ♀
Petalosarsia declivis (G.O. Sars, 1865)	Arctic, N. Atlantic	18-430	5	Many
Pseudocuma similis G.O. Sars, 1900	Norway – Mediterranean	11-358	5.5	Many
Diastyloides serrata (G.O. Sars, 1865)	Norway – Mediterranean	7-1691	7	Many
Diastylis edwardsi (Kröyer, 1841)	Arctic, N. Atlantic	3-500	13	Many
Diastylis bidentata Calman, 1912	N. Pacific, Arctic	9-1000	12	Many
Diastylis anderssoni Zimmer, 1907	Antarctic, S. Georgia	64-310	17	Few
Diastylis spinulosa Heller, 1875	Arctic, N. Norway	9-1011	23	Few
Diastylis rathkei (Kröyer, 1841)	N. Atlantic	9-1222	24	Many
Diastylis bradyi Norman, 1879	British Is. – Bay of Biscay	0-376	12	Many

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Diastylis goodsiri (Bell, 1855)	Arctic, N. Atlantic	2-700	35	Many
Diastylis lucifera (Kröyer, 1841)	N. Atlantic	15-791	8	Many
Diastylis tumida (Lilljeborg, 1855)	Norway – Azores	37-1384	10	Many
**Diastylis glabra* Zimmer, 1926	Labrador, Greenland, Alaska	5-237	28.5	Many
Diastylis echinata Bate, 1865	Norway – British Is.	183-1096	11	Many
Diastylis helleri Zimmer, 1907	S. Georgia, Antarctic	12-581	13	Several
Diastylis aspera Calman, 1912	N. Pacific	95-1150	15.6	Few
Diastylis nucella Calman, 1912	Arctic	5-280	9.5	Several
Diastylis lepechini Zimmer, 1926	Arctic, N. Norway	9-446	11	Many
Diastylis paraspinulosa Zimmer, 1926	Arctic, N. Pacific	53-440	11	Several
Diastylis oxyrhyncha Zimmer, 1926	Arctic, N. Atlantic	9-1024	17	Many
Diastylis sculpta (G. O. Sars, 1871)	N. E. America	0-347	10	Many
Diastylis polita (S. I. Smith, 1879)	N. E. America	0-347	14	Many
Diastylis insularum (Calman, 1908)	New Zealand	2-585	10	Many
Diastylis bispinosa (Stimpson, 1853)	N. E. America	4-373	11	Few
Diastylis horrida G. O. Sars, 1887	Kerguelen	150-239	14	Few
Diastylis loricata Lomakina, 1955	N. Pacific	120-955	14	Few
Diastylis tetradon Lomakina, 1955	N. Pacific	142-440	7.5	Few
Diastylis hirsuta Lomakina, 1955	N. Pacific	34-780	13	Few
Brachydiastylis resima (Kröyer, 1846)	Arctic, N. E. Atlantic	6-352	6	Many
Brachydiastylis nimia Hansen, 1920	Arctic, N. Atlantic	42-446	4	Several
Brachydiastylis hexaceros Lomakina, 1952	N. Pacific	82-228	6	Few
Diastylopsis dawsoni S. I. Smith, 1880	N. Pacific	3-1960	14.5	Many
Leptostylis antipus Zimmer, 1907	Antarctic, S. Georgia	12-310	6	Few
Leptostylis ampullacea (Lilljeborg, 1855)	N. Atlantic	15-549	6	Many
Leptostylis villosa G. O. Sars, 1869	N. E. Atlantic, Arctic, N. Pacific	73-887	4	Many
Leptostylis macrura G. O. Sars, 1869	N. Atlantic	75-1000	5	Many
Leptostylis gorbunowi Zimmer, 1946	Arctic	49-698	6	Few

D. 0-6000 METRES

Cyclaspis longicaudata G. O. Sars, 1865	Norway – Mediterranean	120-3285	8	Many
Leucon pallidus G. O. Sars, 1865	Arctic, N. Atlantic	75-2636	4.5	Few
Eudorella truncatula (Bate, 1856)	Norway – Mediterranean	11-2826	5	Many
Hemilamprops pellucida Zimmer, 1908	Antarctic, S. Africa, New Zealand	126-2725	8.5	Several
Hemilamprops cristata (G. O. Sars, 1870)	N. Atlantic	150-2151	7	Several
Diastyloides biplicata G. O. Sars, 1865	Norway – British Is.	71-2980	8	Many
Diastylis cornuta (Boeck, 1864)	Norway – France	27-2700	14	Many
Diastylis laevis Norman, 1869	Norway – France	9-2980	11	Many
Diastylis dalli Calman, 1912	Arctic, N. Pacific	24-2350	24	Few
Leptostylis longimana (G. O. Sars, 1865)	Arctic, N. Atlantic	6-2378	5.5	Many

E. 200-2000 METRES

Bathycuma longicaudata Calman, 1912	California	1174-1218	>18.5	1
Bathycuma brevirostris (Norman, 1879)	N. Atlantic, Mediterranean	205-1710	10	Several
Bathycuma longirostris Calman, 1905	Malaya	1158	>12	1
Bathycuma natalense Stebbing, 1912	S. E. Africa	805	>11	1
Sympodomma africanus Stebbing, 1912	S. Africa	over 800?	18	1 ♂
Sympodomma weberi (Calman, 1905)	Malaya	1158	28.6	1
Sympodomma anomalus (G. O. Sars, 1871)	W. Indies	377-565	>8	1

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Cyclaspis sibogae Calman, 1905	Philippine Sea	411	16.5	1
Cyclaspis carinata Zimmer, 1920	E. Africa	693	>5.3	1
Cyclaspis tasmanica n. sp.	Tasman Sea	610	6	1
Cyclaspoides sarsi Bonnier, 1896	N.E.Atlantic, Malaya?	698-1788	5	Few
Ceratocuma horrida Calman, 1905	N. Atlantic, S. Africa	699-805	4	Few
Leucon kalluropus Stebbing, 1912	S. Africa	805	5	1
Leucon antarctica Zimmer, 1907	Antarctic	385	13.3	Several
Leucon tener Hansen, 1920	N. Atlantic	384-1505	4.4	Few
Leucon spiniventris Hansen, 1920	Iceland	912	7	2
Leucon panamensis n. sp.	Gulf of Panama	520	7	1
Epileucon galatheae N. S. Jones, 1956	W. Africa	202	6.3	Many
Epileucon pacifica n. sp.	Gulf of Panama	915	6	1
Eudorella gracilis G. O. Sars, 1871	Spitzbergen	1017	6.5	1
Eudorella parvula Hansen, 1920	Davis Strait	599-1096	3.7	Many
Eudorella groenlandica Zimmer, 1926	Greenland	216	6	Few
Eudorellopsis derzhavini Lomakina, 1952	N. Pacific	235-390	5	Few
?*Schizotrema calmani* Stebbing, 1912	S. Africa	805	2.5	1
Cumellopsis helgae Calman, 1905	W. Ireland	699-890	5.8	Few
Cumellopsis puritani Calman, 1906	Mediterranean	950-1100	3.6	2
Cumella gracillima Calman, 1905	W. Ireland	364-699	2.8	Few
Cumella molossa Zimmer, 1907	Antarctic	385	4	1
Procampylaspis bonnieri Calman, 1906	Mediterranean	950-1200	2.3	Few
Procampylaspis compressa Zimmer, 1907	Antarctic	385	4	1
Procampylaspis tridentata Stebbing, 1912	S. Africa	805	4.5	1
Procampylaspis bituberculata Hansen, 1920	S. W. Faroes	840-918	5.7	Few
Procampylaspis macronyx Hansen, 1920	N. Atlantic	840-1450	7.5	2
Procampylaspis bacescoi Reyss & Soyer, 1966.	Mediterranean	1040-1180	6	1
Campylaspides grandis Fage, 1929	Azores	1482	11	1
Campylaspis nitens Bonnier, 1896	N. E. Atlantic	570-950	5	Few
Campylaspis paeneglabra Stebbing, 1912	S. Africa	805	4.3	1
Campylaspis pulchella G. O. Sars, 1871	W. Indies	377-565	3	1
Campylaspis spinosa Calman, 1906	Mediterranean	950-1100	3.7	Few
Campylaspis vitrea Calman, 1906	Mediterranean	950-1100	7.2	Few
Campylaspis ovalis Stebbing, 1912	S. Africa	805	3.3	Few
Campylaspis rostrata Calman, 1905	W. Ireland, off Sudan?	570-1205	5.3	Few
Campylaspis affinis G. O. Sars, 1870	Norway	377-471	6	Few
Campylaspis antarctica Calman, 1907	Antarctic	385-505	5.4	Few
Campylaspis horridoides Stephensen, 1915	Mediterranean	1227	6	Few
Campylaspis alba Hansen, 1920	S. W. Faroes	840-918	5.1	Many
Campylaspis laticarpa Hansen, 1920	S. W. Faroes	840-918	7.5	Many
Campylaspis serratipes Hansen, 1920	W. Iceland	1030-1450	3.6	Several
Campylaspis inornata n. sp.	Tasman Sea	610	5	1
Hemilamprops normani Bonnier, 1896	Bay of Biscay, Azores	630-1384	10	Few
Hemilamprops mawsoni Hale, 1937	Antarctic	300	20.5	1 ♀
Paralamprops serratocostata (G. O. Sars, 1885)	Kerguelen	232	12	Several
Paralamprops orbicularis (Calman, 1905)	N. Atlantic	600-1000	16	Few
Paralamprops grimaldii Fage, 1929	Azores	1850	17	1
Paralamprops arafurensis n. sp.	Arafura Sea	390	6.5	1
Platysympus typicus (G. O. Sars, 1870)	Norway – Mediterranean	226-1691	6	Few
Platysympus tricarinatus Hansen, 1920	N. Atlantic	219-957	5.7	Few
Platytyphlops peringueyi Stebbing, 1912	S. Africa	over 200?	>10	Few
Stenotyphlops spinulosa Stebbing, 1912	S. Africa	over 200?	12	1
Pseudodiastylis ferox Calman, 1905	Malaya	1158	14	1
Diastyloides bacescoi Fage, 1940	Mediterranean	230-300	7	Few
Diastyloides scabra Hansen, 1920	S. W. Faroes	815	5.1	1
Diastylis antillensis G. O. Sars, 1871	W. Indies	377-565	6.5	Few
Diastylis samurai Zimmer, 1943	Sea of Japan	320-639	13	1
Diastylis hexaceros (Zimmer, 1908)	S. Africa	565	10	1

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Diastylis mawsoni Calman, 1918	Antarctic	581	18	3 ♀♀
Diastylis acanthodes (Stebbing, 1912)	S. Africa	805	9	1
Diastylis corniculata Hale, 1937	Antarctic	218-350	16	Few
Diastylis vemae Bacescu, 1961	Mediterranean	1239	4	1
Diastylis gibbera n. sp.	Great Australian Bight	1320-1340	8	1
Diastylis exilicauda n. sp.	Great Australian Bight	1320-1340	8	1
Diastylis delicata n. sp.	Tasman Sea	610	5	1
Makrokylindrus fragilis Stebbing, 1912	S. Africa	805	10	Few
Makrokylindrus josephinae (G. O. Sars, 1871)	N. E. Atlantic	364-1920	11	Many
Makrokylindrus longipes (G. O. Sars, 1871)	N. Atlantic	750-1227	12	Few
Makrokylindrus inermis Fage, 1929	Azores	1550	9	Few
Makrokylindrus costatus (Bonnier, 1896)	Bay of Biscay	1920	11.5	Few
Makrokylindrus longicaudatus (Bonnier, 1896)	Bay of Biscay	650	10	1
Makrokylindrus insignis (G. O. Sars, 1871)	N. Atlantic	360-1036	8	Several
Makrokylindrus anomalus (Bonnier, 1896)	Bay of Biscay, Azores	950-1550	9	Few
Makrokylindrus gladiger Bacescu, 1961	Off Colombia	912	9	2
Makrokylindrus gibraltariensis Bacescu, 1961	Mediterranean	1293	>3.6	1
Makrokylindrus americanus Bacescu, 1962	N. W. America	1748	>6.3	1
Makrokylindrus balinensis n. sp.	S. of Bali	780	11	1
Makrokylindrus cinctus n. sp.	S. of Bali	780	7	1
Diastylopsis diaphanes Zimmer, 1907	Antarctic	385	>2.5	1
?*Paradiastylis bathyalis* n. sp.	Tasman Sea	610	6.5	2
Leptostylis crassicauda Zimmer, 1907	Antarctic	385	>3.5	1
Leptostylis macruroides Stebbing, 1912	S. Africa	805	5	1
Leptostylis producta Norman, 1879	N. Atlantic	838	?	1
Leptostylis azaniensis n. sp.	Off Kenya	1510	6.8	1
Leptostylis menziesi Bacescu-Mester, 1967	W. of Panama	1892	7.5	1 ♂
Leptostylis chileana Bacescu-Mester, 1967	S. of Chile	642	4.5	2

F. 200-6000 METRES

Leucon longirostris G. O. Sars, 1871	N. Atlantic, Mediterranean	950-3200	6	Several
Leucon spinulosa Hansen, 1920	Davis Strait	698-2702	4.1	Few
Eudorella hirsuta (G. O. Sars, 1869)	Norway, Rockall	282-2524	5	Few
Platycuma holti Calman, 1905	N. Atlantic	699-4380	4.1	Few
Procampylaspis armata Bonnier, 1896	N. Atlantic, Mediterranean	200-3465	5	Several
Campylaspis globosa Hansen, 1920	Davis Strait	219-2702	5.6	1
Diastylis polaris G. O. Sars, 1871	Arctic, N. E. America	267-4986	21	Many
Makrokylindrus cingulatus (Calman, 1905)	Malaya	1158-2798	15	Few
Makrokylindrus tubulicauda (Calman, 1905)	N. Atlantic	699-4380	15	Several

G. 2000-6000 METRES

Bathycuma elongata Hansen, 1895	N. Atlantic	4980	12.5	1
Bathycuma magna n. sp.	Seychelles-Ceylon	4040	32	1
Gaussicuma vanhöffeni Zimmer, 1907	Antarctic	3423	12	1
Gaussicuma kermadecensis n. sp.	Kermadec Trench	4540	13.5	1
Gaussicuma scabra n. sp.	Tasman Sea	3580	16	1
Cyclaspis subgrandis n. sp.	off Kenya	3290	16.5	1
Ceratocuma amoena n. sp.	Puerto Rico Trench	2840	>5	1
Leucon tenuirostris G. O. Sars, 1887	N. Pacific	3570	>10	1
Leucon serratus Norman, 1876	N. Atlantic	2160-3293	6	Few
Leucon profundus Hansen, 1920	Davis Strait	2258-2702	7.3	Few

Name	Locality	Depth (in m)	Body length (in mm)	No. of specimens
Leucon robustus Hansen, 1920	Davis Strait	2702	>6.1	Few
Eudorella abyssi G.O.Sars, 1887	N.Atlantic	2268	9	1
Eudorella intermedia Hansen, 1920	Davis Strait	2258	>5.3	Few
Eudorella aequiremis Hansen, 1920	Davis Strait	2702	>4.5	Several
Platycuma marginalis Zimmer, 1943	off N.E. America	2795	>3.5	1
Cumella abyssicola (Norman, 1879)	W.Ireland	2487	4	1
Cumella egregia Hansen, 1920	Davis Strait	2630	4	2
Campylaspis squamifera Fage, 1929	Mediterranean	4380	4	1
?*Lamprops comata* Zimmer, 1907	Antarctic	3423	>7	1
Paralamprops aspera Zimmer, 1907	Antarctic	3423	>9	2
Paralamprops semiornata Fage, 1929	W.Portugal	3789	9	1
Platysympus brachyurus (Zimmer, 1907)	Antarctic	3423	5	1
Bathylamprops calmani Zimmer, 1908	E.Africa	2720-3530	>13	Few
Bathylamprops natalensis n.sp.	E.Africa	3800	18	1
Diastylis hastata Hansen, 1920	Davis Strait	2628	>6	Many
Diastylis richardi Fage, 1929	Mediterranean	4380	>13	3
?*Diastylis tenebricosa* n.sp.	Acapulco-Panama	3570	10	1
Makrokylindrus armatus (Norman, 1876)	Davis Strait	3295	>10	Few
Makrokylindrus erinaceus (G.O.Sars, 1887)	N.Atlantic	3700	13	1
Makrokylindrus mystacinus (G.O.Sars, 1887)	N.Atlantic	3700-4380	10	Few
Makrokylindrus abyssi Lomakina, 1955	Bering Sea	3934	22	1
Makrokylindrus vitiasi Lomakina, 1958	Kamchatka	2840	12	Few
Makrokylindrus costaricanus Bacescu, 1961	off Costa Rica	3718	16	1
Makrokylindrus wolffi Bacescu, 1962	S.E.Africa	4885	12.5	1
Makrokylindrus lomakinae Bacescu, 1962	S.E.Africa	4893	>6	1
Makrokylindrus menziesi Bacescu, 1962	Galapagos Is.	3469-3493	14.5	1
Makrokylindrus fagei Bacescu, 1962	S.E.Madagascar	2275	9	1
Makrokylindrus jedsi Harada, 1962	Japan	2350	15	1
Makrokylindrus neptunius n.sp.	Tasman Sea	3580	14	Several
?*Makrokylindrus mersus* n.sp.	Tasman Sea	3580	16.5	1
Makrokylindrus prolatus n.sp.	Kermadec Trench	2470	12.5	1
Leptostylis grandis Hansen, 1920	Davis Strait	2628	8.5	2
Leptostylis zimmeri Fage, 1929	Mediterranean	4380	9	2
Leptostylis profunda n.sp.	Tasman Sea	3580	10	1
Leptostyloides calcar n.sp.	Kermadec Trench	4410-4540	14.5	2
H. 6000-11000 METRES				
Makrokylindrus hadalis n.sp.	S. of Java	7160	20	Few

There can be little doubt that many species remain to be discovered, especially in the Pacific, the South Atlantic, and in any depth below 200 m. Table 2 shows the numbers of species known at various dates from those listed in STEBBING (1913) onwards.

Table 2.

Date	No. of Genera	No. of Species
1913	59	309
1929	60	545
1959	78	645
1962	80	680
1968	82	770

Of the 770 species included in Table 1, 257 are known each from a single record and 169 of these from a single specimen. It is therefore necessary to be cautious in drawing conclusions from the data available.

1. BATHYMETRICAL DISTRIBUTION

Table 3, compiled from Table 1, shows the distribution of the species in each genus of Cumacea arranged according to their occurrence in different depth zones.

Table 3.

FAMILY BODOTRIIDAE

Sub-family Vaunthompsoniinae

Depth zone	0-4	0-200	0-2000	0-6000	200-2000	200-6000	2000-6000	6000-11000	Total
Vaunthompsonia	–	9	1	–	–	–	–	–	10
Bathycuma	–	1	–	–	4	–	2	–	7
Gaussicuma	–	1	–	–	–	–	3	–	4
Leptocuma	–	10	–	–	–	–	–	–	10
Zenocuma	–	1	–	–	–	–	–	–	1
Pomacuma	–	2	–	–	–	–	–	–	2
Gephyrocuma.....	1	2	–	–	–	–	–	–	3
Glyphocuma	–	4	–	–	–	–	–	–	4
Sympodomma	–	4	–	–	3	–	–	–	7
Pseudosympodomma.	–	1	–	–	–	–	–	–	1
Heterocuma.....	–	4	–	–	–	–	–	–	4
Cumopsis	3	2	–	–	–	–	–	–	5
Mancocuma.....	–	2	–	–	–	–	–	–	2
Gigacuma	–	1	–	–	–	–	–	–	1
Total 14	4	44	1	–	7	–	5	–	61

Sub-Family Bodotriinae

Bodotria	–	27	–	–	–	–	–	–	27
Cyclaspis	–	70	2	1	3	–	1	–	77
Upselaspis	–	1	–	–	–	–	–	–	1
Cyclaspoides	–	–	–	–	1	–	–	–	1
Eocuma	1	15	–	–	–	–	–	–	16
Stephanomma	–	1	–	–	–	–	–	–	1
Zygpsiphon	–	1	–	–	–	–	–	–	1
Iphinoe	1	29	–	–	–	–	–	–	30
Total 8	2	144	2	1	4	–	1	–	154
Bodotridae: 22	6	188	3	1	11	–	6	–	215

FAMILY CERATOCUMATIDAE

Ceratocuma	–	–	–	–	1	–	1	–	2
Total 1	–	–	–	–	1	–	1	–	2

FAMILY LEUCONIDAE

Leucon	–	13	11	1	5	2	4	–	36
Epileucon	–	–	–	–	2	–	–	–	2
Eudorella	–	10	8	1	3	1	3	–	26
Eudorellopsis	–	2	4	–	1	–	–	–	7
Pseudoleucon	–	2	–	–	–	–	–	–	2
Paraleucon.....	–	1	–	–	–	–	–	–	1
Hemileucon	–	5	–	–	–	–	–	–	5
Heteroleucon	–	1	–	–	–	–	–	–	1
Total 8	–	34	23	2	11	3	7	–	80

FAMILY NANNASTACIDAE

Depth zone	0-4	0-200	0-2000	0-6000	200-2000	200-6000	2000-6000	6000-11000	Total
Schizotrema	–	9	–	–	1?	–	–	–	10
Nannastacus	–	44	–	–	–	–	–	–	44
Platycuma	–	–	–	–	–	1	1	–	2
Cumellopsis	–	1	–	–	2	–	–	–	3
Cumella	–	33	–	–	2	–	2	–	37
Procampylaspis	–	1	–	–	6	1	–	–	8
Campylaspides.....	–	–	–	–	1	–	–	–	1
Campylaspis	–	37	12	–	14	1	1	–	65
Picrocuma	–	1	–	–	–	–	–	–	1
Pavlovskeola	–	1	–	–	–	–	–	–	1
Almyracuma	1	–	–	–	–	–	–	–	1
Total 11	1	127	12	–	26	3	4	–	173

FAMILY LAMPROPIDAE

Chalarostylis	–	1	–	–	–	–	–	–	1
Hemilamprops.....	–	8	6	2	2	–	–	–	18
Mesolamprops.....	–	1	–	–	–	–	–	–	1
Lamprops.....	–	12	–	–	–	–	1?	–	13
Paralamprops	–	–	–	–	4	–	2	–	6
Platysympus.....	–	–	–	–	2	–	1	–	3
Stenotyphlops	–	–	–	–	1	–	–	–	1
Platytyphlops	–	–	–	–	1	–	–	–	1
Bathylamprops.....	–	–	–	–	–	–	2	–	2
Pseudodiastylis	–	–	–	–	1	–	–	–	1
Total 10	–	22	6	2	11	–	6	–	47

FAMILY PSEUDOCUMATIDAE

Petalosarsia	–	–	1	1
Pseudocuma.....	1	5	1	7
Schizorhynchus	–	3	–	3
Caspiocuma	–	1	–	1
Pterocuma	–	4	–	4
Stenocuma	–	4	–	4
Chasarocuma	–	1	–	1
Hyrcanocuma	–	1	–	1
Volgacuma	–	1	–	1
Total 9	1	20	2	23

It may be seen that most of the genera are confined to the continental shelf. In only 6 out of the 22 genera of the family Bodotriidae have species been found as yet below 200 m depth, and these species comprise only 21 out of 215. Only *Bathycuma* and *Gaussicuma* have a majority of deep sea species.

The two species of the single genus in the family Ceratocumatidae are bathyal and abyssal.

The family Leuconidae has 4 out of 8 genera with deep water representatives, including 46 of the 80 species, and apart from 4 small genera found in shallow water in the Pacific is predominantly bathyal-abyssal.

In the family Nannastacidae 3 genera with single species have been found only in the littoral and sublittoral, while the large genus *Nannastacus* and probably also *Schizotrema* are similarly confined. *Cumella* has only 4 out of 37 species in deep water, but *Campylaspis* 28 out of 65. The remaining 4 genera are mainly bathyal-abyssal. In all 45 out of 173 species occur at least sometimes in deep water.

Only 2 out of 10 genera in the family Lampropi-

FAMILY DIASTYLIDAE

Depth zone	0-4	0-200	0-2000	0-6000	200-2000	200-6000	2000-6000	6000-11000	Total
Diastyloides	–	–	1	1	2	–	–	–	4
Diastylis.....	–	26	25	3	10	1	3	–	68
Makrokylindrus	–	2	–	–	13	2	14	1	32
Brachydiastylis	–	–	3	–	–	–	–	–	3
Diastylopsis.....	–	7	1	–	1	–	–	–	9
Paradiastylis	–	6	–	–	1	–	–	–	7
Leptostylis.....	–	5	5	1	6	–	3	–	20
Ekleptostylis	–	1	–	–	–	–	–	–	1
Leptostyloides	–	–	–	–	–	–	1	–	1
Colurostylis.....	–	3	–	–	–	–	–	–	3
Anchicolurus	–	1	–	–	–	–	–	–	1
Pachystylis	–	1	–	–	–	–	–	–	1
Oxyurostylis	–	4	–	–	–	–	–	–	4
Dimorphostylis	–	23	–	–	–	–	–	–	23
Anchistylis.....	–	3	–	–	–	–	–	–	3
Dic.....	–	1	–	–	–	–	–	–	1
Gynodiastylis.....	–	37	–	–	–	–	–	–	37
Sheardia	–	1	–	–	–	–	–	–	1
Dicoides.....	–	4	–	–	–	–	–	–	4
Allodiastylis	2	2	–	–	–	–	–	–	4
Zimmeriana	–	3	–	–	–	–	–	–	3
Total 21	2	130	35	5	33	3	21	1	230
Cumacea 82	10	523	76	10	96	9	45	1	770
%	1.3	68	9.9	1.3	12.4	1.2	5.8	0.1	

dae are confined to the sublittoral and each has at present only one species, although *Lamprops* is probably also confined to shallow water. The remaining 7 genera are represented in or are found only in the bathyal-abyssal fauna, and 25 out of 47 species occur there.

In the Pseudocumatidae only *Petalosarsia,* with a single species, and *Pseudocuma* have been found below the sublittoral, but 7 out of the 9 genera in the family occur only in water of reduced salinity in the Black Sea or the Caspian and the rivers running into them.

No species in 13 of the 21 genera of the Diastylidae has yet been collected below 200 m. *Diastylopsis* and *Paradiastylis* are predominantly shallow water genera, the large genus *Diastylis* has rather more species found below than above 200 m, while *Diastyloides, Brachydiastylis* and *Leptostylis* are mainly bathyal-abyssal in their distribution. *Makrokylindrus* is probably the most widespread genus of Cumacea in the deep sea and it contains the only species to have been described so far from hadal depths, although BELYAEV (1966) reports that Lomakina has recorded 8 species collected by the "Vityaz" at depths greater than 6000 m, a species of *Bathycuma* having been found at possibly 7657 m and a *Leucon* species at 7246 m. In all 96 out of 230 species in the family occur below the sublittoral zone.

The apparent scarcity of Cumacea compared with Isopoda and some other groups in very deep water may be due to several causes – lack of collecting with the right gear, differences in subsequent sorting techniques, different habits or real scarcity. There seems to be no obvious reason why the gear used on the Galathea Expedition should not have captured almost as many cumaceans as isopods if they had been present in equal numbers because they were sorted as carefully as the other crustacean groups. Although cumaceans burrow they do so only shallowly and they usually remain close to the bottom when not buried. It is therefore reasonable to assume that there are in fact very few hadal species. SANDERS, HESSLER and HAMPSON (1965) report that Cumacea were found only occasionally in infaunal samples along a deep transect from Gay Head to Bermuda. Amphipoda, Isopoda and Tanaidacea made up 97 % of the crustacean macrofauna encountered. In contrast to the scarcity of Cumacea, BELYAEV (1966) reported 59 species of Isopoda which penetrate to or are confined to the hadal zone. HANSEN (1920) commented on the scarcity of Cumacea in deeper or colder water compared with

Table 4. The regional distribution according to depth zones of species found in one ocean only.

Depth in m	Arctic	Atlantic								Indian Ocean	Indo-Malayan	Pacific							Antarctic	Total	Total 1 record	Total < 4 records
		North	Central	North + Centr.	South	North + South	Mediterranean	Med. + Atlantic	Total			Northwest	Northeast	Tropical	Southwest	Southeast	Widely distr.	Total				
0-4	–	3	1	–	–	–	–	1	**5**	**1**	–	–	1	–	3	–	–	**4**	–	**10**	3	–
0-200	**12**	19	17	1	32	3	33	9	**114**	**42**	**39**	75	26	8	162	2	1	**274**	**7**	**488**	154	126
0-2000	**6**	17	–	–	1	–	2	5	**25**	–	–	11	5	–	1	–	–	**17**	**5**	**53**	2	25
0-6000	–	4	–	–	–	–	–	2	**6**	–	–	–	–	–	–	–	–	–	–	**6**	–	2
200-2000	**2**	28	5	–	10	1	9	2	**55**	**6**	**6**	2	2	3	7	–	–	**14**	**13**	**96**	58	35
200-6000	–	5	–	–	–	–	–	2	**7**	–	**1**	–	–	–	–	–	–	–	–	**8**	1	5
2000-6000	–	16	2	–	–	–	3	–	**21**	**7**	–	3	1	2	7	–	–	**13**	**4**	**45**	40	5
6000-11000	–	–	–	–	–	–	–	–	–	–	**1**	–	–	–	–	–	–	–	–	**1**	1	–
Total	**20**	92	25	1	43	4	47	21	**233**	**56**	**47**	91	35	13	180	2	1	**322**	**29**	**707**	259	198

the numbers of Tanaidacea and Isopoda. On the other hand, a large collection of Cumacea from deep water recently sent to me by Dr. SANDERS contains many species, some in large numbers, from deep water. From a single station at 2886 m there are about 33 species, at present only briefly examined, and there are several hundred individuals of some. These were taken by an epibenthic trawl so the earlier apparent scarcity of cumaceans may well have been due to the unsuitable collecting gear in use.

2. REGIONAL DISTRIBUTION

The regional divisions used correspond to those in WOLFF (1962). In some cases I have had to use my own judgement as to where a species should be placed but any error arising from this is most unlikely to affect the overall picture.

a. Species

1. Occurring in one ocean only.

707 species (92 %) have been found in one ocean only. Table 4 shows the horizontal distribution at various depth intervals of the species found only in one ocean. Of these 707 species, 37 % are known from one find only and a further 28 % from less than four finds, leaving only 35 % from more than four finds.

Shelf species. A total of 496 species (70 % of those restricted to one ocean) occur exclusively on the continental shelf. This is a much higher proportion than the 30 % of asellote isopods restricted to the shelf according to WOLFF (1962). The large number occurring in the south-west Pacific is a reflection of the amount of collecting in Australian waters over the last 40 years but they probably give a false impression of the relative numbers of shelf species because of the lack of collecting below 200 m; a fair proportion of the species will probably be found to penetrate occasionally beyond the shelf. Otherwise there is a good representation in tropical and subtropical waters and it is likely that the species will eventually be found to be most numerous in shallow tropical seas. There seem to be few truly eulittoral species.

Slope species. The much larger number of species found in the Atlantic Ocean is almost certainly due to the concentration of collecting in this region. 53 species have been found on the lower parts of the shelf and on the slope. There are about 100 typical slope species and 59 % of them have been found in the Atlantic Ocean.

Abyssal species. The preponderance of species (53 %) found in the Atlantic Ocean is not as great as among the bathyal species. 15 % of the species occurring below 2000 m have been found in the Indian Ocean. This contrasts with the findings for the Isopoda Asellota of which WOLFF (1962) reported only 4 % in the Indian Ocean. Very few of either the bathyal or abyssal species have been found on more than three occasions and the great majority of the abyssal species only once, but where species have been collected four or more times they have usually been found to have a great depth range. From the data at present available the most obvious conclusion to be drawn is that they are inadequate, but the fact that almost every haul in deep water except in the north-east Atlantic

produces a new species indicates that the cumacean fauna is largely composed of species with a rather restricted range, considering the fairly uniform environment. WOLFF (1962, p. 302) suggested a pronounced endemism among the deep water Cumacea.

2. Occurring in two oceans.

Of the remaining 63 species of Cumacea, 49 have been recorded from two oceans (6.4 % of all species found). 32 of them are shelf species, 12 from the shelf and slope, and 5 from the slope and abyssal depths.

The Arctic and Atlantic Oceans: 15 species are found in these two oceans, all of them from the Arctic and North Atlantic only. Two, *Leucon fulvus* and *Lamprops fasciata,* are shelf species, 10, *Leucon nathorsti, Petalosarsia declivis, Diastylis rathkei, D. edwardsi, D. oxyrhyncha, D. goodsiri, D. lepechini, D. spinulosa, D. echinata* and *Brachydiastylis nimia,* from the shelf and slope, and three, *Leucon pallidus, Diastylis polaris* and *Leptostylis longimana,* from the slope and abyssal depths.

The Arctic and Pacific Oceans: Two shelf species, *Lamprops carinata* and *Diastylis alaskensis,* one, *Diastylis bidentata,* from the shelf and slope, and one, *Diastylis dalli,* from the shelf and abyssal depths, have so far been found in these two oceans.

The Atlantic and Indian Oceans: 8 species, *Cumopsis goodsiri, Eocuma sarsi, E. ferox, Iphinoe crassipes, I. brevipes, I. tenella, Nannastacus unguiculatus* and *Pseudocuma longicornis,* all from the shelf, have been reported from these two oceans.

The Atlantic and Pacific Oceans: A single shelf species, *Lamprops quadriplicata,* one, *Eudorellopsis deformis,* from the shelf and slope, and one, *Campylaspis glabra,* extending from the shelf to abyssal depths, have been found in these two oceans.

The Indian and Pacific Oceans: 19 shelf species are common to both oceans, *Heterocuma sarsi, Bodotria similis, Cyclaspis candida, C. mjobergi, C. cretata, C. strumosa, Eocuma hilgendorfi, E. lata, Nannastacus suhmi, N. gibbosus, N. sheardi, N. johnstoni, Cumella hispida, C. similis, Campylaspis minor, Paradiastylis longipes, Dimorphostylis asiatica, Gynodiastylis costata* and *G. bicristata.*

3. A wide distribution.

In this category are 14 species, 11 of which including *Lamprops fuscata* from the shelf, and *Leucon nasica, L. nasicoides, L. acutirostris, Eudorella emarginata, Eudorellopsis integra, Campylaspis rubicunda, C. costata, Diastylis glabra, Brachydiastylis resima* and *Leptostylis villosa* from the shelf and slope, are found in the northern parts of the Atlantic and Pacific Oceans and extend across the Arctic. The comparatively large number of species with this type of distribution is similar to the situation in other some other groups, including the Isopoda. It is also a reflection of the greater collecting effort in these areas. Several of the species have separate subspecies at either end of this range. Very widely distributed are the shelf species *Vaunthompsonia cristata* (from the Atlantic, Indian and Pacific Oceans) and *Hemilamprops pellucida* (found in the Antarctic, South Indian and South Pacific Oceans) and *Campylaspis glabra* (from the Atlantic, Indian and Pacific Oceans), the two latter occurring from the shelf down to abyssal depths.

b. Genera

1. Known from one ocean only.

Of the 82 known genera, 42 (51 %) are restricted to one ocean; 27 of these are monotypic and none has more than 4 species.

The Atlantic Ocean, including the Black Sea and Caspian, has 19 endemic genera, but *Mancocuma* and *Almyracuma* occur in brackish water on the north-east American coast, while *Schizorhynchus, Caspiocuma, Pterocuma, Stenocuma, Chasarocuma, Hyrcanocuma* and *Volgacuma* are confined to the Black Sea or the Caspian and their rivers.

Campylaspides, Platycuma, Chalarostylis, Diastyloides and *Ekleptostylis* have been found only in the North Atlantic, *Upselaspis* and *Stephanomma* in the Central Atlantic, *Pachystylis* in the South Atlantic, while *Ceratocuma* has a wider distribution.

The Indian Ocean has 8 endomic genera, *Pseudosympodomma, Gigacuma* and *Zygosiphon* from the Indian coasts, *Dic* from South Africa, *Stenotyphlops, Platytyphlops* and *Bathylamprops* from deeper water off the East African coast and *Pseudodiastylis* from deep water in the Malayan region. It may well be found that the range of some of these genera is extended by future collections.

The Pacific Ocean contains 16 genera which have so far not been found outside it. These include *Zenocuma, Paraleucon, Hemileucon, Heteroleucon, Picrocuma, Colurostylis, Anchistylis, Sheardia, Dicoides, Allodiastylis* and *Zimmeriana* from shallow water in the Australian-New Zealand region, *Pavlovskeola* and *Pseudoleucon* from the north-west Pacific, *Mesolamprops* and *Anchicolurus*

from the north-east, and *Leptostyloides* from deep water.

2. Known from two oceans.

There are 16 genera (19.5 %) in this group, of which only two are monotypic and another 7 have less than 4 species. On the other hand 4 genera have 10 or more species.

Arctic-Atlantic: *Petalosarsia* with one species.

Atlantic-Indian Ocean: *Cyclaspoides* with one species.

Atlantic-Pacific: 5 genera, *Leptocuma, Epileucon, Eudorellopsis, Cumellopsis* and *Oxyurostylis.*

Indian Ocean-Pacific: 7 genera, *Pomacuma, Gephyrocuma, Glyphocuma, Schizotrema, Paradiastylis, Dimorphostylis* and *Gynodiastylis.* All occur in the Indian and only in the western part of the Pacific Ocean, as far as is known at present, but the central and south-east Pacific have been very little investigated. All are shelf genera with the possible exception of *Schizotrema* and *Paradiastylis,* each of which may have one representative from deeper water. *Dimorphostylis* has 23 species and *Gynodiastylis* 37.

Atlantic-Antarctic: *Platysympus.*

Pacific-Antarctic: *Gaussicuma.*

3. Known from three oceans.

This group contains 14 genera (17 % of the total). No genus contains less than three species and four genera are large.

Arctic-Atlantic-Pacific: *Brachydiastylis.*

Atlantic-Indian Ocean-Pacific: 10 genera are found in all three temperate and tropical oceans, including the littoral *Heterocuma, Cumopsis, Bodotria, Eocuma, Iphinoe, Nannastacus* and *Pseudocuma,* the littoral-bathyal *Sympodomma,* the bathyal-abyssal *Bathycuma* and the bathyal-abyssal-hadal *Makrokylindrus.*

Atlantic-Pacific-Antarctic: *Hemilamprops* and *Diastylopsis.*

Atlantic-Indian Ocean-Antarctic: *Paralamprops.*

4. Known from four oceans.

There are 6 genera (7.5 %) in this group. None has less than 8 species and one is the largest genus in the order.

Arctic-Atlantic-Pacific-Antarctic: *Eudorella* with 26 species extends from littoral to abyssal depths, but *Lamprops,* with 13 species, is probably confined to the shelf although one doubtful species has been recorded from abyssal depths.

Atlantic-Indian Ocean-Pacific-Antarctic: *Cyclaspis,* with 77 species, *Procampylaspis* with 8 and *Leptostylis* with 20 all extend from the littoral into the abyssal zones, but *Vaunthompsonia,* with 10 species, is almost confined at present to the shelf.

5. Known from all five oceans.

Four genera (5 % of the total), *Leucon,* with 36 species, *Cumella,* with 37 species, *Campylaspis* with 65 and *Diastylis* with 68 are distributed throughout all the oceans. All four have a wide vertical as well as horizontal distribution, although none has yet been found in hadal depths and *Cumella* has only a few species from below 200 m.

c. Families

One family, the Ceratocumatidae, has only one genus with at present two species and is so far confined to bathyal and abyssal depths in the Atlantic. The Bodotriidae do not appear to extend into the Arctic and the Pseudocumatidae do not penetrate into the Antarctic. The remaining four families, Leuconidae, Nannastacidae, Lampropidae and Diastylidae have very wide distributions.

ZIMMER (1941) discussed the geographical distribution of the Cumacea. He regarded the Leuconidae, Lampropidae and Diastylidae as positively amphipolar and the Bodotriidae and Nannastacidae as negatively amphipolar. The distribution of the species discovered since that time does not significantly alter this classification.

IV. SUMMARY

1. A short summary of earlier work on the deep sea Cumacea is given.

2. During the Galathea Expedition a total of 30 species of Cumacea (15 genera) were collected from depths below 200 metres. A total of 26 species were new and one was referred to a new genus. The species are described and differences from closely related species are discussed. Keys are given to the genera in each family and for some genera keys to the known species are included.

3. Some correlation between size and depth and/or latitude was found to exist in some of the genera with a large number of species in the deep sea, especially *Makrokylindrus,* but not generally throughout the order.

4. Table 1 sets out the regional and bathymetrical distributions, maximum size, and numbers of specimens of all the 770 species of Cumacea. Table 3 shows the distribution of the species in each genus in different depth zones.

5. Only about 6 % of the species have been recorded from abyssal depths (2000-6000 m) and another 13 % from the slope (200-2000 m). From hadal depths (below 6000 m) only a single described species is known. In contrast to the Isopoda it seems probable that the Cumacea do not penetrate to hadal depths in any numbers. Altogether 259 species have been recorded only once and 169 are known by single specimens, while a further 199 have been recorded on less than four occasions. It is certain that the distribution in depth zones will be considerably modified by later work as many species will be found to have much greater depth ranges than appears from the present data. Only three out of the 7 families, the Ceratocumatidae, Leuconidae and Diastylidae, are predominantly bathyal-abyssal in distribution. Of the genera *Makrokylindrus,* with 30 out of the 32 species occurring below 200 m, has by far the greatest proportion of deep-sea species.

6. Of the species, 92 % are known from one ocean only and of these 70 % are restricted to the continental shelf. Of about 100 typical slope species 59 % have been found in the Atlantic Ocean, almost certainly because of the comparative lack of collecting in other oceans. Very few of the 45 abyssal species confined to one ocean have been found more than once but what evidence exists points to a restricted distribution for most species of deep water Cumacea.

About 6 % of the species have been found in two oceans and only 2 % from three. Most of the latter, 11 out of 14 species, are circumpolar.

Of the 82 genera, 42 are restricted to one ocean. Of the latter, 27 are monotypic, and none has more than four species. Sixteen genera are restricted to two oceans, only two being monotypic but four having more than ten species. Fourteen genera, none with less than five species, occur in three oceans, six, none with less than eight species, in four, and four, all with at least 36 species, in five oceans.

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