

Antarctic Ostracoda (Myodocopina)

[IN TWO PARTS]

Part 1

LOUIS S. KORNICKER

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 163

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Louis S. Kornicker



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ABSTRACT

Kornicker, Louis S. Antarctic Ostracoda (Myodocopina) [in two parts], *Smithsonian Contributions to Zoology*, number 163, 720 pages, 432 figures, 9 plates, 1975.—Extensive benthic collections of myodocopid ostracodes made principally from the research vessels *Eltanin*, *Anton Bruun*, *Hero*, and *Vema* between Antarctica and 35°S, but including some previously reported collections, contain 35 genera, of which 10 are new, and 122 species, of which 60 were previously undescribed. Diagnostic keys are presented to assist in identification. Faunal resemblances between areas based on the Simpson Index are highest between Antarctica and South America, lowest between Antarctica and southern Africa and intermediate between Antarctica and New Zealand and Antarctica and Australia. Four biofacies are delimited: (1) *Skogsbergiella-Empoulsenia* biofacies, which includes shelf and bathyal depths, has outer limits roughly coinciding with the boundary of the Subantarctic region; (2) *Cypridinodes* biofacies, which includes shelf and upper slope depths, extends south from the Indo-West-Pacific region and includes Australia and New Zealand; (3) Rutidermatidae biofacies, which is restricted to shelf depths, extends southward into the study area along the coast of Chile; (4) *Spinacopia-Metavargula-Azygocypridininae* biofacies, which is restricted mainly to bathyal and abyssal depths, includes all abyssal and lower bathyal regions of the Antarctic and extends northward into other oceans. The relationship of morphology and feeding habit to distribution is investigated; some new data on reproduction are analyzed; and the microstructure of the carapace, the upper lip, and some appendages is examined with the aid of the scanning electron microscope.

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Contents

PART 1

	<i>Page</i>
Introduction	1
Station List with Specimens Collected	7
Species-Locality List	26
Faunal Resemblance	31
Biotic Zonation	34
Vertical Distribution	38
Relationship of Feeding Habits to Distribution	38
Relationship between Eye Development, Water Depth, and Latitude	42
Reproduction	48
Relationship between Size and Vertical Distribution	52
Parasites and Commensals	52
Swimming	74
Subclass Ostracoda	81
Key to Orders	82
Order Myodocopida	82
Key to Suborders	83
Suborder Myodocopina	83
Key to Families	83
Summary of Classification	84
Cypridinidae	84
Key to Subfamilies	85
Cypridininae	85
Key to Genera	86
Microstructures	87
<i>Bathyvargula</i>	89
1. <i>Bathyvargula walfordi</i>	90
<i>Cypridinodes</i>	90
Key to Species	92
2. <i>C. javus</i>	93
3. <i>C. asymmetrica</i>	96
4. <i>C. reticulata</i>	96
5. <i>C. wyvillethomsoni</i>	97
<i>Doloria</i>	98
Key to Species	99
6. <i>D. levis</i>	99
7. <i>D. pectinata</i>	102
8. <i>D. levinsoni</i>	107
9. <i>D. septenaria</i>	114
10. <i>D. isaacsi</i>	118
11. <i>D. mawsoni</i>	122
<i>Doloria</i> Species Indeterminate	125
<i>Hadacypridina</i>	125
12. <i>H. bruuni</i>	126
<i>Metavargula</i>	130
Key to Species	131
13. <i>M. adinothrix</i>	131
14. <i>M. iota</i>	138
<i>Metavargula</i> Species Indeterminate	141
<i>Paradoloria</i>	141

	<i>Page</i>
15. <i>P. australis</i>	142
<i>Pterocypridina</i>	142
16. <i>P. excreta</i>	142
<i>Siphonostira</i>	142
Key to Species	143
17. <i>S. hallex</i>	143
<i>Vargula</i>	154
Key to Species	154
18. <i>V. antarctica</i>	155
19. <i>V. puppis</i>	156
20. <i>V. tubulata</i>	158
21. <i>V. hamata</i>	158
22. <i>V. sutura</i>	167
23. <i>V. subantarctica</i>	171
24. <i>V.?</i> <i>danae</i>	180
25. <i>V. dentata</i>	183
26. <i>V. lusca</i>	190
27. <i>V. stathme</i>	193
<i>Vargula</i> Species Indeterminate	197
<i>Rugosidoloria</i>	197
28. <i>R. serrata</i>	197
Cypridininae Genus Indeterminate	204
Azygocypridininae	204
Key to Genera	205
Microstructures	206
<i>Azygocypridina</i>	206
Key to Species	206
29. <i>A. imperator</i>	206
30. <i>A. africanus</i>	207
<i>Isocypridina</i>	207
31. <i>I. quatuorsetae</i>	208
<i>Isocypridina</i> Species Indeterminate	222
Philomedidae	222
Key to Subfamilies	223
Pseudophilomedinae	223
Key to Genera	223
Philomedinae	224
Key to Genera	224
Microstructures	225
<i>Philomedes</i>	228
Key to Species	229
32. <i>P. assimilis</i>	229
33. <i>P. charcoti</i>	236
34. <i>P. eugeniae</i>	238
35. <i>P. orbicularis</i>	240
36. <i>P. rotunda</i>	245
37. <i>P. heptathrix</i>	248
38. <i>P. tetrathrix</i>	255
39. <i>P. subantarctica</i>	262
40. <i>P. minys</i>	272
41. <i>P. ramus</i>	277
42. <i>P. lofthousae</i>	281
43. <i>P. cubitum</i>	289
<i>Philomedes</i> Species Indeterminate	293
<i>Euphilomedes</i>	293
Key to Species	294
44. <i>E. ferox</i>	294
45. <i>E. agilis</i>	294

	<i>Page</i>
<i>Scleroconcha</i>	306
Key to Species	306
46. <i>S. appelloefi</i>	307
47. <i>S. arcuata</i>	307
48. <i>S. flexilis</i>	315
49. <i>S. gallardoi</i>	321
50. <i>S. sculpta</i>	325
51. <i>S. frons</i>	329
52. <i>S. wolffi</i>	335
<i>Scleroconcha</i> Species Indeterminate	340
<i>Anarthron</i>	340
Key to Species	340
53. <i>A. reticulata</i>	341
54. <i>A. chilensis</i>	350
55. <i>A. dithrix</i>	354
56. <i>A. pholion</i>	361
57. <i>A. evexum</i>	362
<i>Anarthron</i> Species Indeterminate	367
<i>Igene</i>	367
58. <i>I. walleni</i>	368

PART 2

	<i>Page</i>
Cylindroleberididae	375
Key to Subfamilies	375
Cylindroleberidinae	376
Key to Genera	377
Microstructure	378
<i>Archasterope</i>	382
Key to Species	382
59. <i>A. dentata</i>	383
60. <i>A. bulla</i>	384
<i>Archasterope</i> Species Indeterminate	388
<i>Diasterope</i>	388
Key to Species	389
61. <i>D. grisea</i>	389
62. <i>D. schmitti</i>	395
<i>Diasterope</i> Species Indeterminate	399
<i>Dolasterope</i>	400
63. <i>D. johanseni</i>	401
<i>Parasterope</i>	401
Key to Species	401
64. <i>P. ohlini</i>	402
65. <i>P. longiseta</i>	405
66. <i>P. quadrata</i>	409
67. <i>P. quadrata?</i>	412
68. <i>P. pseudoquadrata</i>	415
69. <i>P. micrommata</i>	419
70. <i>P. crinita</i>	421
71. <i>P. anommata</i>	427
72. <i>P. styx</i>	432
73. <i>P. proluxa</i>	436
<i>Parasterope</i> Species Indeterminate	440
<i>Synasterope</i>	440
Key to Species	441
74. <i>S. dimorpha</i>	441
75. <i>S. bassana</i>	447

	<i>Page</i>
76. <i>S. empoulseni</i>	447
77. <i>S. duplex</i>	448
78. <i>S. polythrix</i>	454
79. <i>S. mystax</i>	456
80. <i>S. brachythrix</i>	461
81. <i>S. arnaudi</i>	463
<i>Synasterope</i> Species Indeterminate	465
<i>Skogsbergiella</i>	465
Key to Species	467
82. <i>S. spinifera</i>	467
83. <i>S. skogsbergi</i>	471
84. <i>S. scotti</i>	471
85. <i>S. macrothrix</i>	477
86. <i>S. plocus</i>	489
87. <i>S. pax</i>	495
<i>Skogsbergiella</i> Species Indeterminate	498
<i>Empoulsenia</i>	499
Key to Species	499
88. <i>E. quinquasetae</i>	501
89. <i>E. pentathrix</i>	502
90. <i>E. antarctica</i>	509
91. <i>E. weddellensis</i>	514
<i>Empoulsenia</i> Species Indeterminate	524
<i>Homasterope</i>	524
Key to Species	525
92. <i>H. curta</i>	525
93. <i>H. glacialis</i>	526
94. <i>H. maccaini</i>	526
95. <i>H. micra</i>	534
<i>Bathyleberis</i>	538
Key to Species	539
96. <i>B. grossmani</i>	539
97. <i>B. monothrix</i>	545
98. <i>B. oculata</i>	551
Cylindroleberidinae Genus Indeterminate	555
Cyclasteropinae	555
Key to Genera	556
<i>Asteropella</i>	557
Key to Species	558
99. <i>A. rotundicostata</i>	559
100. <i>Asteropella</i> species A	559
<i>Asteropteron</i>	561
Key to Species	561
101. <i>A. magnum</i>	562
102. <i>A. hulingsi</i>	562
<i>Cycloleberis</i>	567
103. <i>C. bradyi</i>	568
104. <i>C. poulseni</i>	568
105. <i>C. ovulum</i>	569
106. <i>C. zealandica</i>	569
<i>Cycloleberis</i> Species Indeterminate	570
Sarsiellidae	570
Key to Genera	571
<i>Sarsiella</i>	571
Key to Species	573
107. <i>S. magna</i>	573
108. <i>S. lunata</i>	573
<i>Spinacopia</i>	582

	<i>Page</i>
Key to Species	584
109. <i>S. menziesi</i>	585
110. <i>S. antarctica</i>	589
111. <i>S. variabilis</i>	591
112. <i>S. bisetula</i>	592
113. <i>S. ooto</i>	592
114. <i>S. mastix</i>	598
<i>Spinacopia</i> Species Indeterminate	607
<i>Anscottiella</i>	607
Key to Species	608
<i>Cymbicopia</i>	608
Key to Species	609
115. <i>C. zealandica</i>	609
116. <i>C. hanseni</i>	610
117. <i>C. hispida</i>	622
118. <i>C. brevicosta</i>	633
<i>Adelta</i>	640
119. <i>A. theta</i>	641
Rutidermatidae	645
Key to Genera	646
<i>Rutiderma</i>	646
Key to Species	647
120. <i>R. gerdhartmanni</i>	648
121. <i>R. ovata</i>	657
122. <i>Rutiderma</i> species A	673
123. <i>Rutiderma</i> species B	675
<i>Scleraner</i>	678
124. <i>S. chacaoi</i>	678
Indeterminate Taxa	682
125. <i>Cypridina glacialis</i>	682
126. <i>Cypridina thielei</i>	682
127. <i>Philomedes laevipes</i>	683
128. <i>Cypris violacea</i>	683
129. <i>Cypris bimaculata</i>	683
130. <i>Asterope oculata</i>	683
The γ -sclerite	684
Postadult Molting	687
Literature Cited	688
Plates	695
Index	705

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Part 1

Louis S. Kornicker

Introduction

This work represents the study of extensive benthic collections of myodocopid ostracodes made principally from the research vessels *Eltanin*, *Anton Bruun*, *Hero*, and *Vema* in an area extending from Antarctica to 35°S (Figures 1, 2), and it is also the restudy of previously reported collections (Figure 3).

In addition to studying the taxonomy and distribution of the species encountered, the relationship of morphology and feeding habit to horizontal and vertical distribution was investigated, some new data on reproduction were analyzed, and the scanning electron microscope (SEM) was used to discern the microstructure of the carapace, the upper lip, and appendages.

A northern limit of 35°S was chosen because many "Antarctic" samples collected on the RV *Eltanin* were taken as far north as that latitude, and polar projection maps available for plotting distributional data stop at 35°S, making it a convenient place to delimit the study.

Geographic names used are based on *Gazetteer No. 14: Antarctica*, 3rd Edition, Geographic Names Division, U.S. Army Topographic Command, Washington D.C. 20315, June 1969. Major submarine topography and the names of islands and

submarine features are given in Figure 4, which is adapted from Kott (1969:196-197).

Station localities are placed in seas and oceans according to the "Chart of Limits of Seas and Oceans," published by the Aeronautical Chart and Information Center, Air Photographic and Charting Service (MATS), United States Air Force, Saint Louis, Missouri (1953, revised 1958). I have transposed that map to polar azimuthal equal-area projection in order to locate stations more easily (Figure 5). Note that, according to this chart, the South Shetland Islands are in the Weddell Sea.

Station localities have been related to the biogeographic zones proposed by Hedgepeth (1969, 1970, 1971) (Figure 6). The term "Antarctic" is used to signify stations south of the Antarctic Convergence, "Subantarctic" to signify stations between the Antarctic Convergence and the line on the map lettered "Subantarctic Boundary," and "Subantarctic-to-35°S" to signify stations between the Subantarctic Boundary and the latitude of 35°S.

The term "shelf" is used for depths between 0 m and 200 m, "bathyal" for depths between 200 m and 2000 m, and "abyssal" for depths between 2000 m and 6000 m. The Antarctic shelf has an outer edge at a depth of 400-500 m (Knox, 1970: 83), so that the term shelf used here, when referred to the Antarctic continent, should be considered the upper part of the shelf, and the term bathyal includes the lower part.

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mens used in this study. I am grateful to all the individuals and institutions for the opportunity to work on the specimens, and also to the scientists, officers, and crews of the research vessels from which the ostracodes were collected.

The material collected aboard the RV *Vema* by

the Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York, was obtained with the support of the Office of Naval Research, ONR (N00014-67-A-0108-0004), and the National Science Foundation, NSF-GA-29460. The latter organization also supplied photographs

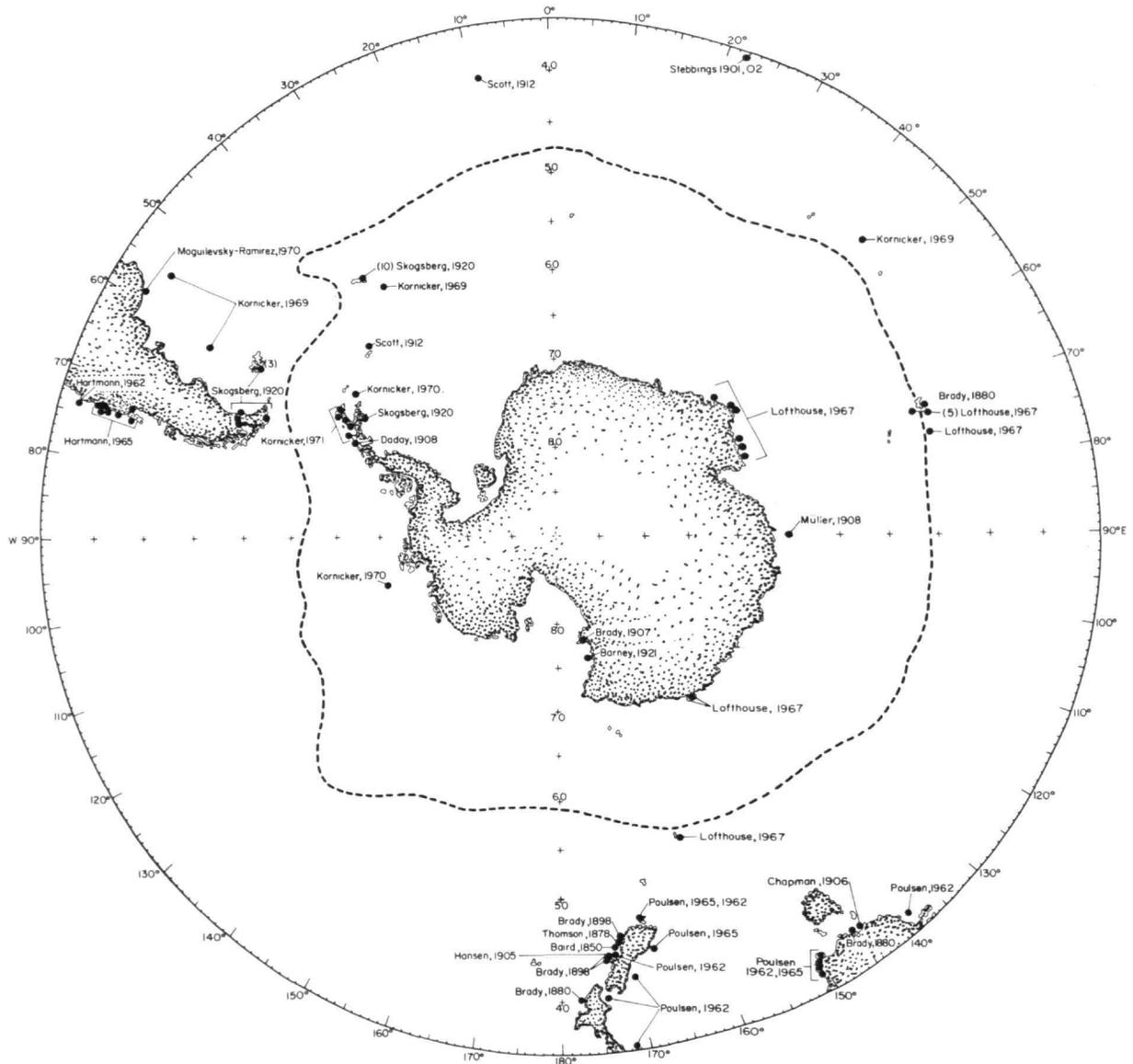


FIGURE 3.—Map showing station localities in the study area from which Ostracoda of the sub-order Myodocopina have been previously described. The author and date of publication is indicated next to each locality.

of the bottom and supported cost of some of the illustrations herein through a grant from Dr. George A. Llano, Antarctic Research Program, administered at the Smithsonian Institution by Dr. I. E. Wallen, as well as the cost of many collections made aboard the *Eltanin*, *Anton Bruun*, *Hero* and other research ships and boats.

All the shaded rendering of ostracode carapaces were made by Mrs. Caroline Bartlett Gast, who also prepared Figures 74, 88, 89, 101, 115, 116, 212, 318, 319, 322, 323, 372-374, 376, 390*l-q*, 390, 399, 412, 413, 419, 428 from my camera lucida drawings. The remaining figures were prepared by Mr. Jack R. Schroeder from my camera lucida drawings



FIGURE 4.—Geographic localities. (Map adapted from Kott, 1969.)

and also preliminary diagrams, graphs, and maps. I also thank Miss Kathryn Schroeder who ably assisted in final preparation of the plates and figures and in assembling the bibliography and index. The assistance of Mr. Walter R. Brown, who

operated the Scanning Electron Microscope, is acknowledged. Freeze-drying of the specimens for photography was done in the laboratory of Mr. Rolland Hower.

I also wish to thank Dr. Janet Bradford for re-

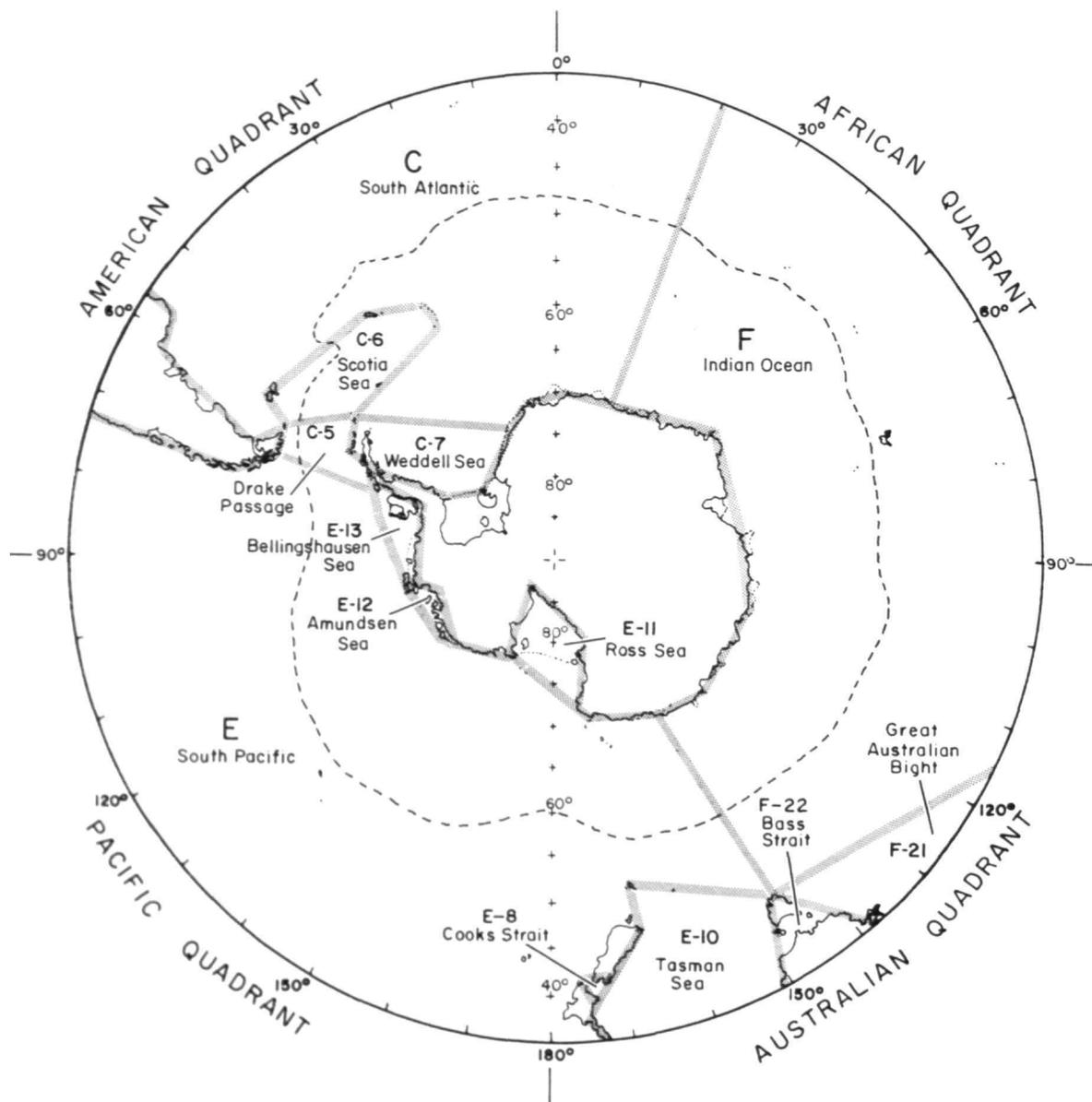


FIGURE 5.—Map showing boundaries of seas and oceans. Map adapted from "Chart of Limits of Seas and Oceans" published by the Aeronautical Chart and Information Center, Air Photographic Service (MATS), United States Air Force, St. Louis, Missouri (1953, revised 1958).

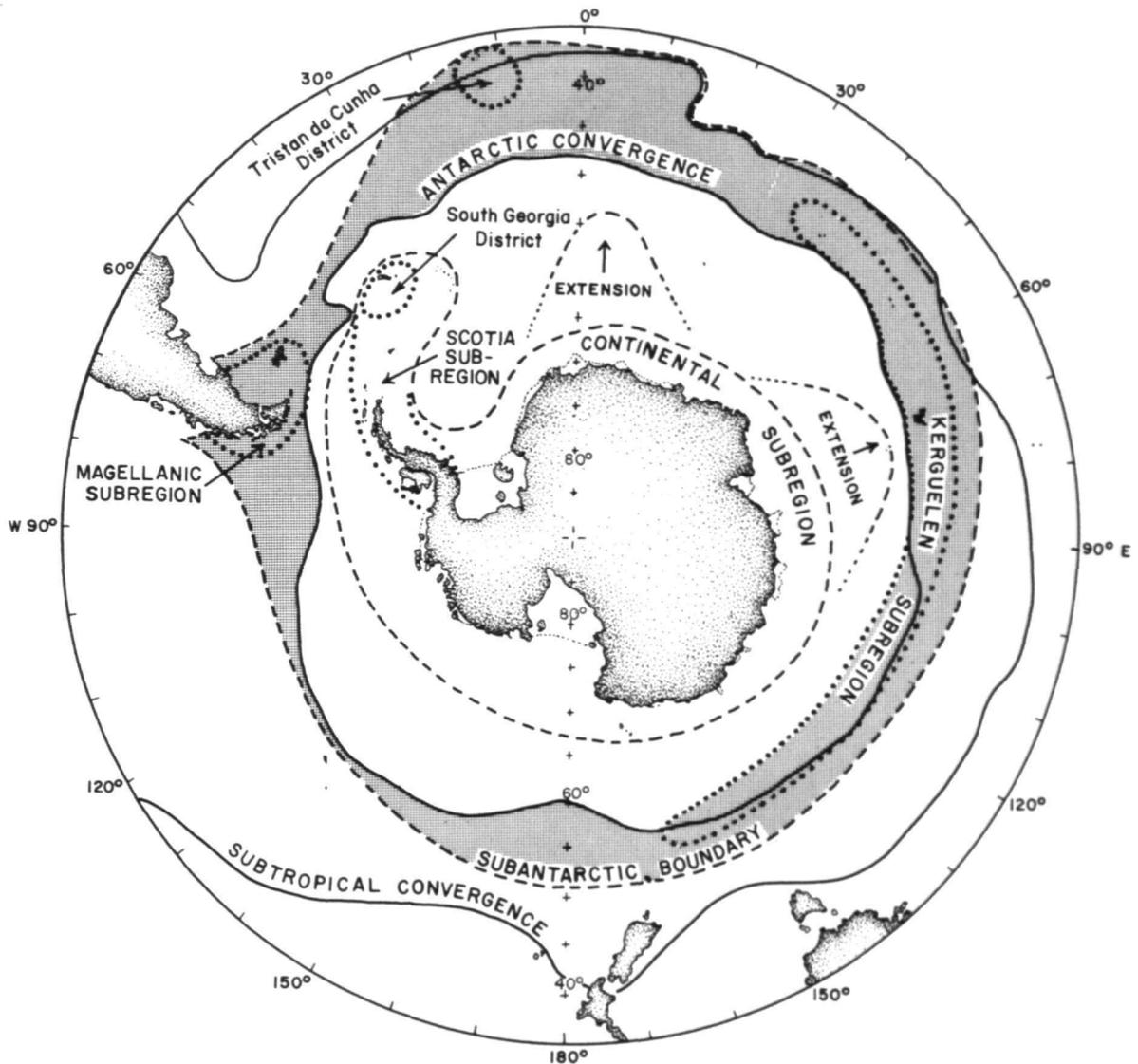


FIGURE 6.—Biogeographic zones. (Adapted from Hedgpeth, 1969.)

viewing the manuscript, and Dr. Thomas E. Bowman, Dr. Fenner A. Chace, and Dr. I. Gregory Sohn for reviewing certain parts. The bottom photographs were supplied by Mr. Keith L. Simmons, from the collection at the Smithsonian Oceanographic Sorting Center. I thank Dr. H. D. Roth for assistance in statistical evaluations and Dr. Waldo L. Schmidt for several suggestions.

Station List with Specimens Collected

Cruise ships are arranged in alphabetical order; samples collected on small unnamed boats follow the listing of samples collected on the cruise ships. The biogeographic region is given only for those stations considered to be in the Antarctic or Subantarctic regions.

(Abbreviations: SBT = small bottom trawl, ISMWT = Isaac Kidd Midwater Trawl.)

USS *Atka*

Deep Freeze III, January 1958; collected by L. W. Wilson.

Sta. 24; January 1958; 66°15'24"S, 110°28'40"E; 45.7 meters; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; near Wilkes Station; between Budd and Knox Coasts; bottom water temperature -1.28°C.

Philomedes assimilis: 1 N-1 male.

Sta. 28; 27 January 1958; 65°55'48"S, 110°28'E; 58.5 meters; triangular dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; near Wilkes Station; Vincennes Bay.

Scleroconcha gallardoi: 1 juvenile female.

S.Y. *Aurora*

Australasian Antarctic Expedition 1911-1914.

Sta. 1741; 67°S, 140°E; ?shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; off Adelie Coast.

Philomedes assimilis: 5 specimens.

Sta. 1783; residue 68; 67°S, 142°E; 27.4-36.6 meters; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; off Adelie Coast.

Philomedes assimilis: 2 juveniles.

Sta. 1784; 67°S, 142°E; ?shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; off Adelie Coast.

Philomedes assimilis: 2 juveniles.

USS *Burton Island*

Deep Freeze III, January 1958.

Sta. 5; 29 January 1958; 66°32'56"S, 93°00'54"E; 80 meters; trawl; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilhelm Coast; Davis Sea at Russian Station Mirny; bottom of hard rock and gravel; bottom water temperature -1.53°C.

Philomedes assimilis: 1 gravid female, 2 juveniles.

RRS *Discovery*

British, Australian, and New Zealand Antarctic Research Expedition (BANZARE); November 1929 to March 1930.

Cruise 1.

Sta. 15; residue 166; 23 November 1929; 49°27'20"S, 70°01'40"E; 55 meters; small dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; in channel between northwestern end of Hog Island and southwestern portion of Blakeney Island, Gulf of Morbihan, Kerguelen Islands.

Philomedes lofthousae: 1 gravid female [in collection of British Museum (Natural History)].

Philomedes lofthousae: 3 specimens including 1 adult female, and 2 juveniles (in collection of South Australian Museum).

Sta. 39; 17 January 1930; 66°12'S, 49°41'E; 300 meters; Monegasque trawl; bathyl; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off Enderbyland.

Vargula antarctica: 1 adult male.

Doloria isaacsi: 3 gravid females, 2 juveniles, 4 specimens.

Skogsbergiella species indet.: 1 gravid female identified by Lofthouse (1967) as *Philippiella spinifera*.

Sta. 41; 24-25 January 1930; 65°48'S, 53°16'E; 209-180 meters; shelf; Otter trawl; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off Enderbyland.

Doloria isaacsi: 1 gravid female.

Sta. 41; 24-25 January 1930; 65°48'S, 53°16'E; 193 meters; Monegasque trawl; shelf; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off Enderbyland.

Vargula antarctica: 1 gravid female, 1 specimen.

Doloria isaacsi: 1 gravid female.

Sta. 58; 22 February 1930; 49°30'S, 70°04'E; 50 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; in Hydrography Channel; a short distance southeasterly from Green Island; Kerguelen.

Philomedes lofthousae: 8 gravid females, 1 adult female without eggs, 9 juveniles.

Sta. 58; residue 199; 22 February 1930; 49°30'S, 70°04'E; 50 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; in Hydrography Channel; a short distance southeasterly from Green Island; Kerguelen.

Philomedes lofthousae: 1 N-1 male.

Sta. 64; 2 March 1930; 49°28'S, 70°33'E; 270 meters; Otter trawl; bathyl; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; off the entrance to Royal Sound; Kerguelen.

Skogsbergiella species indet.: 1 adult female (identified as *Philippiella spinifera* by Lofthouse, 1967).

Sta. 317; residue 155; 21 November 1929; 46°S, 52°E; shallow; hand dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; Crozet Island; American Bay (Possession Island) Swamp. (I could find no record of this station in published station list.)

Skogsbergiella species indet.: 1 mature female.

Diasterope species indet.: 1 N-1 male.

Cylindroleberidinae genus indet.: 2 juveniles.

Sta. 42; 26 January 1930; 65°50'S, 54°23'E; 220 meters; Monegasque trawl; bathyl; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off Enderbyland.

Doloria isaacsi: 1 adult male [in collection of British Museum (Natural History)].

Doloria isaacsi: 1 specimen without eggs (in collection of South Australian Museum).

Vargula antarctica: 1 female (South Australian Museum)

Sta. 47; 7 February 1930; 49°50'S, 69°33'E; 150 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean;

Subantarctic; Kerguelen subregion; just south of Kerguelen.

Empoulsenia species indet.: 1 gravid female identified as *Philippiella quinquesetae* by Lofthouse (1967).

Sta. 51; residue 92; 12 February 1930; 49°31'S, 69°48'45"E; 40–50 meters; small dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; specimens from "roots" of common globular silicious sponge from Supply Bay, about 2 miles NNW of Port Jeanne d'Arc.

Cylindroleberidinae genus indet.: 1 specimen identified by Lofthouse (1967) as *Parasterope ohlini*.

Sta. 53; residue 197; 14 February 1930; 49°35'30"S, 70°03'E; 20–30 meters; small dredge; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; near mouth of Peace River, Bras Bolinder.

Philomedes lofthouseae: 1 gravid female, 1 juvenile.

Cylindroleberidinae genus indet.: 1 specimen identified as *P. ohlini* by Lofthouse (1967).

BANZARE Cruise 2; December 1930 to February 1931.

Sta. 83; 5 December 1930; 54°42'30"S, 158°54'30"E; 69 meters; rectangular dredge; shelf; Australian Quadrant; South Pacific; Subantarctic; Kerguelen subregion; off Lusitania Bay; Macquarie Island.

Doloria mawsoni: 1 adult female, 1 juvenile female.

Sta. 105; residue 196; 13 February 1931; 67°46'S, 67°03'E; 163 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean; Antarctic; Continental subregion; adjacent to Murray Monolith and glacier; MacRobertson Land.

Philomedes assimilis: 1 juvenile female.

Sta. 105; residue 192; 13 February 1931; 67°46'S, 67°03'E; 163 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean; Antarctic; Continental subregion; adjacent to Murray Monolith and glacier; MacRobertson Land.

Philomedes assimilis: 1 gravid female, 1 adult female, 2 adult males, 13 specimens (mostly juvenile) [in collection of British Museum (Natural History)].

Philomedes assimilis: 19 specimens, including at least 1 adult male (in collection of South Australian Museum).

Sta. 105; residue 231; 13 February 1931; 67°46'S, 67°03'E; 163 meters; rectangular dredge; shelf; African Quadrant; Indian Ocean; Antarctic; Continental subregion; adjacent to Murray Monolith and glacier; MacRobertson Land.

Philomedes assimilis: 1 adult male.

Sta. 106; residue 140; 13 February 1931; 67°38'S, 64°52'E; 210 to 17 meters; rectangular dredge; bathyal; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off MacRobertson Land.

Philomedes assimilis: 1 gravid female.

Sta. 107; 16 February 1931; 66°45'S, 62°03'E; 219 meters; Otter trawl; bathyal; African Quadrant; Indian Ocean; Antarctic; Continental subregion; off MacRobertson Land.

Skogsbergiella species indet.: 1 specimen identified as *Philippiella spinifera* by Lofthouse (1967).

Doloria isaacsi: 1 gravid female, 1 specimen.

USCGC *Eastwind*

January 1966; collections made by D. F. Squires and D. L. Pawson.

Sta. 004; 24 January 1966; 67°53'S, 69°10'30"W; 302 meters; Menzies trawl; bathyal; American Quadrant; South Pacific; Antarctic; Scotia subregion; Continental subregion; Marguerite Bay; bottom of dark gray mud.

Doloria levis: 1 gravid female.

Scleroconcha gallardoi: 2 adults, 9 juveniles.

Philomedes orbicularis: 3 adult females, 20 juveniles.

Empoulsenia pentathrix: 1 gravid female, 1 stage III male.

USS *Edisto*

United States Navy Antarctic Expedition (Operation Windmill) 1947–1948; January–February 1948, collection made by Cmdr. David C. Nutt, USNR.

Sta. 95; 29 January 1948; (95 and 104 same station and sample) 77°33'S, 166°09'E; 106.1 meters; dredge; shelf; Australian Quadrant; Ross Sea; Antarctic; Continental subregion; off Cape Royds; Ross Island.

Philomedes assimilis: 5 adult specimens.

Sta. 104, 29 January 1948; 77°33'S, 166°09'E; 106.1 meters; dredge; shelf; Australian Quadrant; Antarctic; Ross Sea; Continental subregion; off Cape Royds; Ross Island.

Philomedes assimilis: 1 gravid female, 41 specimens.

Sta. 234; 22 February 1948; 68°30'S, 68°30'W; 73.2 meters; dredge; shelf; American Quadrant; Bellingshausen Sea; Antarctic; Scotia subregion; Continental subregion; from near a group of small islands in center of Margerite Bay, between Alexander and Adelaide Islands.

Philomedes assimilis: 1 juvenile male (N-1).

Deep Freeze I, February 1956.

Stations 5, 6, 8. Unfortunately when the author received a jar containing these samples, the labels, which had been applied to the outside of several vials, were loose on the bottom of the jar; all samples are from the same general area in or near the Ross Sea.

Sta. 5; 9 February 1956; 71°30'S, 169°20'E; 400 meters; dredge; bathyal; Australian Quadrant; South Pacific; Antarctic; Continental subregion; near Cape Adare; Ross Sea.

Sta. 6; 12 February 1956; 73°19'S, 169°15'E; 100.6 meters; dredge; shelf; Australian Quadrant; Antarctic; Ross Sea; Continental subregion.

Sta. 8, 18 February 1956; 77°27'S, 166°30'E; 321 meters; dredge; bathyal; Australian Quadrant; Antarctic; Ross Sea; Continental subregion.

Philomedes assimilis: 9 gravid females, 6 adult females, 1 adult male, 9 juveniles.

Philomedes orbicularis: 3 gravid females, 267 adult females and juveniles, 8 adult males.

Philomedes heptathrix: 1 gravid female, 1 adult female, 1 adult male, 1 juvenile.

Philomedes species indet.: 3 juveniles.

Scleroconcha gallardoii: 1 juvenile female.

Diasterope schmitti: 1 gravid female, 36 adults and juveniles.

Deep Freeze IV, January-February 1959.

Sta. Ed. 14, sample TD-2; 18 January 1959; 71°50'S, 15°50'W; 1006-1097 meters; triangular dredge; bathyal; American Quadrant; South Atlantic; Antarctic; Continental subregion; near Weddell Sea.

Empoulsenia pentathrix: 1 juvenile male (instar ?IV).

Sta. Ed. 23, sample TR-9, 10, 11; 1 February 1959; 77°40'S, 40°50'W; 805 meters; Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes assimilis: 1 adult female.

USNS *Eltanin**

Cruise 3, June 1962.

Sta. 75-19; 24 June 1962; 31°10'S, 71°56'W to 31°14'S, 71°58'W; 1834 meters; Phleger corer; bathyal; American Quadrant; South Pacific; west of Chile. Aliquot: whole.

Rutiderma ovata: 1 N-1 male.

Sta. 71-26; 24 June 1962; 31°05'S, 71°44'W to 31°06'S, 71°47'W; 192-176 meters; Menzies trawl; shelf; American Quadrant; South Pacific; west of Chile.

Rutiderma ovata: Over 1000 specimens including gravid females, adult males, and juveniles.

Cruise 4, July-August 1962.

Sta. 102; 17 July 1962; 55°45'S, 61°11'W to 55°45'S, 61°07'W; 4141 meters; Petersen grab; abyssal; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion.

Synasterope species indet.: 1 N-1 male.

Sta. 112; 20 July 1962; 56°02'S, 61°56'W to 56°01'S, 61°55'W; 4004-4031 meters; Menzies trawl; abyssal; American Quadrant; Drake Passage; Antarctic. Aliquot: whole.

Synasterope polythrix: 2 adult females.

Sta. 127; 1 August 1962; 61°45'S, 61°14'W; 4758 meters; Menzies trawl; abyssal; American Quadrant; Drake Passage; Antarctic; Continental subregion. Aliquot: whole.

Spinacopia octo: 1 gravid female, 1 juvenile.

Sta. 129; 2 August 1962; 61°46'S, 61°35'W to 61°48'S, 61°25'W; 3678-3816 meters; Menzies trawl; abyssal; American Quadrant; Drake Passage; Antarctic; Continental subregion. Aliquot: whole.

Bathyleberis grossmani: 2 gravid females, 1 adult.

Spinacopia octo: 1 gravid female, 1 juvenile.

Sta. 162; 20 August 1962; 55°42'S, 70°35'W to 55°42'S, 70°32'W; 174 meters; Petersen grab; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile. Aliquot: whole.

Doloria pectinata: 1 N-1 male.

* *Eltanin* station numbers in this list are those of the University of Southern California except stations of Cruises 20 and 21, which were run by the Smithsonian Oceanographic Sorting Center (SOSC).

Cruise 5, September-November 1962.

Sta. 208; 11 September 1962; 37°29'S, 73°55'W to 37°30'S, 73°55'W; 957 meters; Cambell grab; bathyal; American Quadrant; South Pacific; west of Chile.

Scleroconcha frons: 2 N-1 males.

Sta. 216; 16 September 1962; 52°53'S, 75°36'W to 52°55'S, 75°36'W; 1190-1263 meters; Menzies trawl; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile. Aliquot: whole.

Scleroconcha frons: 1 N-1 male.

Philomedes tetrathrix: 1 juvenile female, 1 N-1 male, 13 juveniles.

Sta. 219; 23 September 1962; 55°47'S, 66°17'W to 55°52'S, 66°24'W; 115 meters; Petersen grab; shelf; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion. Aliquot: whole.

Doloria pectinata: 1 gravid female (appendages obscured by debris).

Sta. 322; 7 November 1962; 56°04'S, 71°13'W to 56°05'S, 71°09'W; 1806-2013 meters; Menzies trawl; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile. Aliquot: whole.

Spinacopia species indet.: 1 female (N-1 or adult).

Cruise 6, December 1962-January 1963.

Sta. 340; 3 December 1962; 53°08'S, 59°23'W to 53°07'S, 59°21'W; 578-567 meters; Menzies trawl; bathyal; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion. Aliquot: whole.

Vargula hamata: 1 gravid female, 4 adult females without eggs, 2 adult males, 7 juveniles.

Vargula subantarctica: 3 gravid females, 1 adult male, 2 juveniles (one with 1 female choniostomatid copepod and 12 copepodites.)

Vargula dentata: 2 adult males, 1 juvenile instar II.

Vargula species indet.: 1 juvenile without carapace (probably *V. hamata*).

Doloria levinsoni: 1 adult male.

Philomedes subantarctica: 1 gravid female, 1 adult female, 2 adult males, 7 juveniles.

Skogsbergiella macrothrix: 1 gravid female with 2 eggs and 1 female choniostomatid copepod, 2 N-1 males, 1 N-2 female.

Sta. 344; 4 December 1962; 54°04'S, 58°46'W to 54°04'S, 58°45'W; 119 meters; Menzies trawl; shelf; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion, Burdwood Bank.

Vargula subantarctica: 1 adult male.

Anarthron dithrix: 1 N-1 male, 1 juvenile.

Skogsbergiella spinifera: 3 juveniles.

Sta. 350; 4 December 1962; 55°03'S, 58°57'W to 55°00'S, 58°51'W; 2452 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion. Aliquot: whole.

Metavargula adinothrix: 1 adult female with 1 female choniostomatid copepod, 1 juvenile with 1 isopod

- parasite, 1 instar stage III, 15 specimens (mostly juveniles). Total, 18 specimens.
- Doloria levinsoni*: 1 instar stage III.
- Sta. 345; 5 December 1962; 55°22'S, 58°51'W to 55°44'S, 58°53'W; fishing depth: 1812-2145 meters; bottom depth: 3880-4118; IKMWT; bathyal; American Quadrant; Scotia Sea; Subantarctic. Aliquot: whole. Station not used in distributional maps. Trawl probably hit bottom.
- Vargula dentata*: 1 gravid female.
- Philomedes subantarctica*: 1 adult female, 1 juvenile.
- Archasterope bulla*: 1 N-1 male.
- Sta. 363; 7 December 1962; 57°09'S, 58°58'W to 58°00'S, 58°50'W; 3590-3825 meters; Phleger corer; abyssal; American Quadrant; Scotia Sea. Aliquot: one-quarter.
- Vargula* species indet.: 3 juveniles.
- Anarthron dithrix*: 1 N-1 male, 9 juveniles.
- Skogsbergiella macrothrix*: 1 adult female with 1 female chionistomatid copepod and 8 ovisacs, 4 adult females, 2 juveniles. (Because it is unlikely that so many specimens of Ostracoda could be collected in a Phleger core, the remaining animals collected in the sample were checked and found to be shallower water forms. Therefore, this sample is excluded from charts and tables.)
- Sta. 394; 29 December 1962; 59°04'S, 56°04'W to 58°55'S, 56°02'W; 3724-3825 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.
- Metavargula adinothrix*: 2 juveniles.
- Sta. 410; 31 December 1962; 61°18'S, 56°09'W to 61°20'S, 56°10'W; 220-240 meters; 5' Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; South Shetland Islands.
- Skogsbergiella spinifera*: 1 gravid female.
- Empoulsenia antarctica*: 1 gravid female.
- Empoulsenia* species indet.: 1 juvenile male.
- Sta. 412; 1 January 1963; 62°06'S, 56°00'W to 62°06'S, 55°59'W; 1180 meters; Menzies trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Bransfield Strait. Aliquot: whole.
- Scleroconcha gallardoi*: 2 juvenile females (N-1), 3 juveniles (One of the N-1 juveniles contained 1 female chionistomatid copepod and 9 ovisacs, the other contained 1 female chionistomatid copepod and 2 copepodites.)
- Empoulsenia* species indet.: 3 juveniles.
- Sta. 416; 2 January 1963; 62°40'S, 56°13'W to 62°39'S, 56°13'W; 494-507 meters; Menzies trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Bransfield Strait.
- Skogsbergiella spinifera*: 1 gravid female, 1 adult female.
- Sta. 418; 2 January 1963; 62°39'S, 56°10'W to 62°40'S, 56°08'W; 426-311 meters; 5' Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Bransfield Strait.
- Parasterope ohlini*: 1 gravid female, 1 juvenile.
- Skogsbergiella spinifera*: 1 female.
- Cylindroleberidinae genus indet.: 1 juvenile.
- Sta. 453; 21 January 1963; 54°27'S, 66°12'W to 54°24'S, 66°17'W; 31 meters; Petersen grab; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.
- Philomedes minys*: 1 gravid female.
- Parasterope* species indet.: 1 juvenile female.
- Cruise 7, February-March 1963.
- Sta. 475; 14 February 1963; 57°11'S, 44°53'W to 57°14'S, 44°47'W; 3382 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.
- Isocypridina* species indet.: 1 juvenile.
- Philomedes tetrathrix*: 1 adult female without eggs.
- Spinacopia menziesi*: 1 adult female with large unextruded eggs.
- Sta. 480; 15 February 1963; 58°06'S, 44°56'W to 58°10'S, 44°47'W; 2800-2837 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.
- Metavargula adinothrix*: 1 adult female with 2 isopod parasites.
- Philomedes tetrathrix*: 1 gravid female, 1 juvenile female, 31 juveniles.
- Doloria levinsoni*: 1 adult female, 2 juveniles.
- Spinacopia menziesi*: 3 N-1 juvenile females.
- Sta. 499; 20 February 1963; 62°06'S, 45°08'W to 62°06'S, 45°10'W; 485 meters; Rock dredge; bathyal; American Quadrant; South Atlantic; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.
- Philomedes assimilis*: 2 specimens including 1 gravid female.
- Sta. 542; 7 March 1963; 60°01'S, 49°04'W to 60°02'S, 49°09'W; 2906-2946 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.
- Philomedes tetrathrix*: 11 adult females without eggs, 15 juveniles.
- Doloria* species indet.: 1 N-1 male, 1 juvenile, both probably *D. levinsoni*.
- Sta. 557; 14 March 1963; 51°56'S, 56°39'W to 51°57'S, 56°38'W; 866-847 meters; Menzies trawl; bathyal; American Quadrant; South Atlantic; Subantarctic; northeast of Falkland Islands. Aliquot: whole.
- Vargula hamata*: 6 gravid females, 6 adult females without eggs, 12 juveniles.
- Vargula dentata*: 1 juvenile instar III.
- Vargula* species indet.: 2 juveniles.
- Doloria levinsoni*: 1 juvenile instar II.
- Spinacopia variabilis*: 1 adult female, 1 N-1 male.
- Sta. 558; 14 March 1963; 51°58'S, 56°38'W to 52°01'S, 56°38'W; 845-646 meters; 5' Blake trawl; bathyal; Ameri-

can Quadrant; South Atlantic; Subantarctic; northeast of Falkland Islands. Aliquot: whole.

Vargula hamata: 1 gravid adult female; 1 juvenile.

Vargula species indet.: 2 juveniles (probably *V. subantarctica*).

Spinacopia variabilis: 2 adult females.

Cruise, 9 August–September 1963.

Sta. 661; 11 August 1963; 50°32'S, 43°32'W to 50°35'S, 43°35'W; 1821–1272 meters; Menzies trawl; bathyal; American Quadrant; South Atlantic; Antarctic; northwest of South Georgia. Aliquot: whole.

Isocypridina quatuorseta: 3 specimens.

Sta. 690; 27 August 1963; 56°18'S, 37°04'W to 56°23'S, 36°57'W; 3446–3413 meters; 5' Blake trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion; South Georgia District. Aliquot: whole.

Gigantocypris species: 1 specimen.

Sta. 707; 1 September 1963; 59°11'S, 37°13'W to 59°09'S, 37°04'W; 2827–2818 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.

Isocypridina quatuorseta: 3 specimens.

Sta. 715; 6 September 1963; 56°51'S, 34°25'W to 56°50'S, 34°09'W; 3197–3144 meters; Menzies trawl; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion; South Georgia District. Aliquot: whole.

Isocypridina quatuorseta: 1 gravid female, 6 specimens.

Sta. 740; 18 September 1963; 56°06'S, 66°19'W to 56°07'S, 66°30'W; 384–494 meters; 5' Blake trawl; bathyal; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion. Aliquot: whole.

Vargula hamata: 1 gravid female, 2 adult females without eggs, 1 adult male, 7 juveniles.

Vargula species indet.: 1 female with small unextruded eggs.

Doloria septenaria: 1 female adult with unextruded eggs.

Doloria pectinata: 2 gravid females, 1 juvenile female, 8 juveniles.

Doloria species indet.: 2 juvenile females.

Parasterope species indet.: 1 juvenile female, 1 juvenile male.

Cruise 11, January 1963–February 1964.

Sta. 939; 22 January 1964; 70°20'S, 99°10'W to 70°13'S, 98°57'W; 3848–3980 meters; 5' Blake trawl; abyssal; Pacific Quadrant; Antarctic; South Pacific; Continental subregion; Southeast Pacific Basin. Aliquot: whole.

Synasterope species indet.: 1 juvenile female.

Sta. 951; 29 January 1964; 65°11'S, 86°52'W to 64°59'S, 86°27'W; 4529–4548 meters; 5' Blake trawl; abyssal; American Quadrant; South Pacific; Antarctic; Continental subregion; Southeast Pacific Basin. Aliquot: whole.

Gigantocypris species: 1 specimen, USNM 127519 (many halocyprids, no strictly benthic forms suggesting that the specimens were picked up in the water column, possibly trawl did not reach bottom).

Sta. 958; 5 February 1964; 52°56'S, 75°00'W to 52°56'S, 75°00'W; 92–101 meters; 5' Blake trawl; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile. Aliquot: whole.

Doloria pectinata: 14 gravid females, 6 adult females without eggs, 1 adult male with 1 male and 1 female chonistomatid copepod, 27 juveniles (possible some adults included).

Parasterope longiseta: 2 gravid females.

Rutiderma species B: 1 adult male.

Cruise 12, March–April 1964.

Sta. 993; 13 March 1964; 61°25'S, 56°30'W to 61°25'S, 56°32'W; 300 meters; 10' Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.

Doloria species indet.: 1 juvenile female.

Sta. 997; 14 March 1964; 61°44'S, 55°56'W to 61°46'S, 55°54'W; 769 meters; 10' Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Bransfield Strait. Aliquot: whole.

Cylindroleberidinae genus indet.: 1 juvenile.

Sta. 1003; 15 March 1964; 62°41'S, 54°43'W; 210–220 meters; 10' Blake trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Bransfield Strait. Aliquot: whole.

Philomedes assimilis: 16 specimens including 2 gravid females.

Parasterope ohlini: 8 specimens including 5 gravid females.

Skogsbergiella species indet.: 1 juvenile.

Spinacopia antarctica: 4 gravid females, 4 juveniles. (Reported by Kornicker, 1970.)

Sta. 1078; 12 April 1964; 61°27'S, 41°55'W to 61°26'S, 41°55'W; 613–604 meters; 5' Blake trawl; bathyal; American Quadrant; Scotia Sea; Antarctic; Continental subregion. Aliquot: whole.

Skogsbergiella spinifera: 1 juvenile male (N-1?).

Sta. 1082; 14 April 1964; 60°50'S, 42°55'W to 60°52'S, 42°56'W; 298–302 meters; 5' Blake trawl; bathyal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion. Aliquot: whole.

Doloria levis: 1 gravid female with 10 eggs and 5 Cyproniscus larvae.

Empoulsenia pentathrix: 1 gravid female.

Skogsbergiella scotti: 1 gravid female.

Cruise 14, August 1964.

Sta. 1209; 11 August 1964; 58°18'S, 160°03'W to 58°19'S, 160°03'W; 3587–3817 meters; Menzies trawl; abyssal; Pacific Quadrant; South Pacific; Antarctic; Albatross Cordillera. Aliquot: whole.

Igene walleni: 1 adult female.

Philomedes species indet.: 1 juvenile.

Sta. 1248; 25 August 1964; 59°57'S, 136°37'W to 59°57'S, 136°40'W; 3386–3477 meters; Menzies trawl; abyssal; Pacific Quadrant; South Pacific; Antarctic; Albatross Cordillera. Aliquot: whole.

Vargula sutura: 1 adult female, 5 juveniles.

Igene walleni: 1 gravid female, 1 adult female with isopod parasite, 1 juvenile male (N-1).

Bathyleberis grossmani: 3 juvenile females.

Skogsbergiella species indet.: 1 juvenile female.

Cruise 16, February 1965.

Sta. 1418; 10 February 1965; 54°32'S, 159°02'E to 54°32'S, 159°02'E; 86–101 meters; 10' Blake trawl; shelf; Australian Quadrant; Tasman Sea; Subantarctic; near Macquarie Island. Aliquot: whole.

Parasterope micrommata: 6 gravid females, 1 adult female without eggs, 6 juveniles.

Cylindroleberidinae genus indet.: 1 juvenile female.

Sta. 1429; 21 February 1965; 49°15'S, 172°14'E to 49°12'S, 172°14'E; 320–361 meters; 40' Otter trawl; bathyal; Australian Quadrant; South Pacific; east of South Island, New Zealand. Aliquot: whole.

Gigantocypris species: 1 specimen.

Sta. 1431; 23 February 1965; 43°37'S, 170°58'E to 45°35'S, 170°59'E; 51 meters; 40' Otter trawl; shelf; Australian Quadrant; South Pacific; east of South Island, New Zealand. Aliquot: whole.

Parasterope crinita: 1 gravid female, 1 juvenile.

Cruise 19, July 1965.

Sta. 1474; 25 July 1965; 59°01'S, 110°04'W to 59°01'S, 110°02'W; 4795 meters; Menzies trawl; abyssal; Pacific Quadrant; South Pacific; Antarctic; Southeast Pacific Basin. Aliquot: whole.

Cylindroleberidinae genus indet.: 1 juvenile (*Parasterope?* not *ohlini*).

Cruise 20, September 1965.

Sta. 91; 12 September 1965; 36°51'S, 174°45'E; depth intertidal; hand collected; Australian Quadrant; Tasman Sea; North Island; New Zealand. Aliquot: whole.

Scleroconcha species indet.: 1 adult female.

Euphilomedes agilis: 1 N-1 male, 1 adult male.

Parasterope species indet.: 1 adult female.

Cruise 21, November 1965.

Sta. 194; 23 November 1965; 33°03'S, 71°47'W; 141–147 meters; Petersen grab; shelf; American Quadrant; South Pacific; west of Chile. Aliquot: whole.

Anarthron reticulata: 1 gravid female, 1 juvenile male.

Cruise 22, February-March 1966.

Sta. 1535; 7 February 1966; 53°51'S, 37°38'W to 53°52'S, 37°36'W; 97–101 meters; 5' Blake trawl; shelf; American Quadrant; Scotia Sea; Antarctic; Continental subregion;

Scotia subregion; South Georgia District. Aliquot: whole.

Doloria levis: 6 gravid females, 12 juveniles.

Sta. 1536; 8 February 1966; 54°29'S, 39°22'W to 54°31'S, 39°19'W; 659 meters; 5' Blake trawl; bathyal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion; South Georgia District. Aliquot: whole.

Vargula hamata: 1 juvenile.

Sta. 1594; 14 March 1966; 54°41'S, 56°59'W to 54°41'S, 57°03'W; 128 meters (from ship's log); 40' Otter trawl; shelf; American Quadrant; Scotia Sea; Subantarctic; Burdwood Bank. Aliquot: whole.

Doloria pectinata: 3 gravid females, 1 adult male.

Sta. 1596; 14 March 1966; 54°39'S, 57°09'W to 54°39'S, 57°12'W; 124 meters; 10' Blake trawl; shelf; American Quadrant; Scotia Sea; Subantarctic; Burdwood Bank. Aliquot: whole.

Vargula subantarctica: 1 juvenile.

Doloria pectinata: 1 gravid female.

Cruise 25, November 1966.

Sta. 366; 15 November 1966; 49°21'S, 172°16'W to 49°25'S, 172°20'W; 5340 meters; 5' Blake trawl with Menzies trawl attached; abyssal; Pacific Quadrant; South Pacific; west of New Zealand; Southwest Pacific Basin. Aliquot: whole.

Hadacypridina bruuni: 1 juvenile male.

Cruise 27, January-February 1967.

Sta. 1870; 14 January 1967; 71°17'S, 171°33'E to 71°16'S, 171°29'E; 741–659 meters; 5' Blake trawl; bathyal; Australian Quadrant; South Pacific; Antarctic; Continental subregion; near Cape Adare, Ross Sea. Aliquot: whole.

Sta. 1896; 18 January 1967; 76°10'S, 168°17'E to 76°10'S, 168°17'E; 81–70 meters; 10' Blake trawl; shelf; Australian Quadrant; Ross Sea; Antarctic; Continental subregion. Aliquot: one-tenth.

Doloria levis: 1 gravid female, 1 juvenile female.

Philomedes assimilis: 11 adult males, 27 females, 298 adult females and juveniles.

Philomedes orbicularis: 5 adult females (no eggs), 22 juveniles.

Diasterope schmitti: 1 juvenile female.

Philomedes assimilis: 1 adult female.

Sta. 1974; 15 February 1967; 54°30'S, 158°59'E to 54°34'S, 158°59'E; 112–124 meters; 5' Blake trawl; bathyal; Australian Quadrant; South Pacific; Subantarctic; near Macquarie Island. Aliquot: whole.

Parasterope micrommata: 31 gravid females, 5 adult females without eggs, 18 juveniles.

Sta. 1980; 23 February 1967; 48°09'S, 148°17'E to 48°10'S, 148°15'E; 1790–1803 meters; 5' Blake trawl; bathyal; Australian Quadrant; South Pacific; south of Tasmania; Tasman Plateau. Aliquot: whole.

Metavargula adinothrix: 1 juvenile.

Sta. 1981; 24 February 1967; 47°21'S, 147°52'E to 47°18'S, 147°51'E; 910–915 meters; 10' Blake trawl; bathyal; Aus-

tralian Quadrant; South Pacific; south of Tasmania; Tasman Plateau. Aliquot: whole.

Vargula lusca: 1 gravid female.

Cruise 32, January 1968.

Sta. 1996; 10 January 1968; 72°05'S, 172°08'E to 72°05'S, 172°09'E; 344-351 meters; 5' Blake trawl; Australian Quadrant; Ross Sea; Antarctic; Continental subregion. Aliquot: whole.

Empoulsenia pentathrix: 1 gravid female.

Sta. 2035; 18 January 1968; 74°32'S, 168°17'E; 876 meters; camera grab; bathyal; Australian Quadrant; Ross Sea; Antarctic; Continental subregion.

Philomedes assimilis: 1 adult female without eggs.

Cruise 47, February 1971.

Sta. 5056; 15 February 1971; 50°13'42"S, 74°36'18"E. 615 meters; bottom dredge; bathyal; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion; Kerguelen-Gaussberg Ridge.

?*Scleroconcha* species indet.: 1 N-1 male. (Dry specimens treated with Aerosol OT, rod-shaped organ not observed.)

USS *Glacier*

Deep Freeze II, October 1956 to February 1957; collected by W. L. Tressler.

Sta. 1; 28 October 1956; 77°30'S, 166°04'E; 402.3 meters; bottom sampler; bathyal; Australian Quadrant; Ross Sea; Antarctic; Continental subregion.

Philomedes assimilis: 2 gravid females, 2 adult females.

Sta. 19; 4 February 1957; 66°15'57"S, 110°32'35"E; 45.7 meters; orange peel; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes assimilis: 1 gravid female, 1 adult female.

Philomedes species indet.: 1 male instar III, 2 juveniles.

Scleroconcha gallardoi: 1 gravid female.

Sta. 20; 4 February 1957; 66°15'57"S, 110°32'35"E; 64 meters; orange peel; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes assimilis: 1 juvenile female.

Sta. 22; 11 February 1957; 66°15'57"S, 110°33'11"E; 65.8 meters; from grapnel dragging bottom; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes species indet.: 1 juvenile.

Philomedes assimilis: 1 juvenile.

Deep Freeze III, February 1958; collected by W. H. Littlewood.

Sta. B1-8j; 4 February 1958; 77°50'48"S, 166°34'E; 125 meters; trawl; shelf; Australian Quadrant; Antarctic; Ross Sea; Continental subregion; one and one-half miles off Hut Point, Cape Armitage, Ross Island, McMurdo Sound; bot-

tom covered with very heavy matting of siliceous sponges and other fauna; bottom water temperature -1.5°C.

Philomedes species indet.: 1 juvenile instar III.

Sta. B1-12; 5 February 1958; 77°50'48"S, 166°34'E; 125 meters; trawl; shelf; Australian Quadrant; Ross Sea; Antarctic; Continental subregion; one and one-half miles off Hut Point, Cape Armitage, Ross Island, McMurdo Sound; bottom with heavy matting of siliceous sponges and other fauna; bottom temperature -1.5°C.

Philomedes assimilis: 23 specimens including 1 adult male, several gravid females and many juveniles.

Sta. B1-13; 5 February 1958; 77°50'48"S, 166°34'E; 125 meters; trawl; shelf; Australian Quadrant; Ross Sea; Antarctic; Continental subregion; one and one-half miles off Hut Point, Cape Armitage, Ross Island, McMurdo Sound; bottom of shelly ooze with mat of siliceous sponges and other fauna; bottom temperature about -1.5°C.

Philomedes assimilis: 2 gravid females, 5 juveniles.

USCGC *Glacier*

International Weddell Sea Oceanographic Expedition (IWSOE) Cruise 1, February 1968; collected by J. S. Rankin, Jr., K. Clark, B. Found.

Sta. 0001; 6 February 1968; 74°07'S, 39°38'W; 650 meters; epibenthic sled; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Empoulsenia weddellensis: 1 adult male, 26 juveniles.

Vargula antarctica: 1 juvenile.

Sta. 0001; 6 February 1968; 74°06'S, 39°38'W; 650 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Empoulsenia weddellensis: 60 juveniles.

International Weddell Sea Oceanographic Expedition (IWSOE), Cruise 2, February-March 1969; collected by J. S. Rankin, Jr., K. Clark, C. Biernbaum.

Sta. 0002; 25 February 1969, 75°31'30"S, 30°08'18"W; 378 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes heptathrix: 1 adult female, 3 juveniles.

Scleroconcha species indet.: 2 juveniles.

Empoulsenia species indet.: 1 juvenile male (probably *E. antarctica*).

Sta. 0004; 26 February 1969; 77°05'24"S, 35°02'36"W; 803 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes assimilis: 1 gravid female.

Sta. 0006; 28 February 1969; 76°50'12"S, 40°44'24"W; 513 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes species indet.: 1 juvenile.

Scleroconcha species indet.: 1 juvenile.

Sta. 0007; 1 March 1969; 77°16'S, 42°38'18"W; 500 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes heptathrix: 1 adult female.

Sta. 0008; 2 March 1969; 77°38'30"S, 42°27'48"W; 570 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Empoulsenia species indet.: 1 juvenile.

Philomedes heptathrix: 1 adult female, 1 adult male, 1 juvenile.

Sta. 0009; 3 March 1969; 77°54'12"S, 45°13'18"W; 250 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Empoulsenia species indet.: 1 juvenile male (probably *E. antarctica*).

Philomedes heptathrix: 57 adult females, 50 adult males, 482 juveniles.

Scleroconcha gallardoi: 1 juvenile female, 6 juveniles.

Sta. 0010; 4 March 1969; 77°50'S, 42°05'12"W; 657 meters; anchor dredge; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Philomedes species indet.: 1 N-1 male, 1 juvenile.

Sta. 0022; 14 March 1969; 73°29'S, 30°24'6"W; 3035 meters; epibenthic sled; abyssal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Synasterope duplex: 1 specimen.

Spinacopia mastix: 15 gravid females, 19 adult females, 3 adult males, 55 juveniles.

Skogsbergiella species indet.: 1 juvenile male.

Sta. 0022; 14 March 1969; 73°29'S, 30°24'6"W; 3035 meters; anchor dredge; abyssal; American Quadrant; Weddell Sea; Antarctic; Continental subregion.

Spinacopia mastix: 1 adult male.

Sta. 0023; 14-15 March 1969; 72°47'30"S, 30°28'18"W; 3658 meters; epibenthic sled; abyssal; American Quadrant; Weddell Sea, Antarctic; Continental subregion.

Metavargula species indet.: 1 female with eggs within body, 5 juveniles (2 specimens with lateral eyes, 5 without).

RV Hero

Cruise 69-1, February 1969; Stations 2-12B collected by J. W. Hedgpeth, J. C. McCain, W. E. Stout; Stations 22-27 collected by J. C. McCain.

Sta. 3; 1 February 1969; 64°49'18"S, 63°29'6"W; 15-46 meters; 5' Blake trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Port Lockroy, Wiencke Island; mud bottom.

Philomedes orbicularis: 3 gravid females, 3 adult females, 8 juveniles.

Sta. 5; 1 February 1969; 64°49'18"S, 63°30'18"W; 18-37 meters; 5' Blake trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; trawl leaving Port Lockroy; much algae.

Philomedes orbicularis: 1 adult female.

Sta. 6; 2 February 1969; 64°49'15"S, 63°29'15"W; 15 meters; Petersen grab; shelf; American Quadrant; Weddell

Sea; Antarctic; Continental subregion; Scotia subregion; Port Lockroy at overnight anchorage.

Scleroconcha gallardoi: 3 gravid females, 1 adult female, 28 juveniles.

Philomedes orbicularis: 1 gravid female, 11 adult females, 1 adult male, 32 juveniles.

Philomedes charcoti: 6 adult females, 5 juveniles.

Sta. 7; 2 February 1969; 64°49'12"S, 63°29'25"W; 37 meters; Petersen grab; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Port Lockroy; mud bottom; bottom temperature +0.3°C; bottom salinity 33.93 parts per thousand.

Philomedes orbicularis: 7 adult females, 1 adult male, 1 juvenile.

Philomedes charcoti: 1 adult female.

Sta. 9; 2 February 1969; 64°29'S, 63°05'W; 113 meters; Petersen grab; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Fournier Bay, Anvers Island, off Thompson Peninsula; small rocks on mud bottom; bottom salinity 34.32 parts per thousand.

Parasterope ohlini: 1 gravid female (specimen fragmented).

Sta. 12B; 3 February 1969; 64°19'56"S, 62°56'20"W; 55 meters; Petersen grab; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Port Andersen, Eta Island; sandy bottom; bottom salinity 33.91 parts per thousand; glass sponges abundant in bay.

Scleroconcha species indet.: 1 juvenile.

Philomedes orbicularis: 1 juvenile.

Philomedes charcoti: 2 juveniles.

Sta. 22; 8 February 1969; 64°49'15"S, 63°29'15"W; 15 meters; Petersen grab; shelf; American Quadrant; Weddell Sea; Antarctic; Scotia subregion; Continental subregion; north of Palmer Peninsula; Port Lockroy, Wiencke Harbor, at anchorage; bottom salinity 33.68 parts per thousand.

Philomedes orbicularis: 727 specimens including gravid females, adult females, and juveniles.

Sta. 23; 9 February 1969; 64°12'6"S, 62°39'36"W to 64°11'18"S, 62°40'W; 93-95 meters; try net; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; off coast of Brabant Island between Astrolab Needle and Driencourt Point.

Philomedes orbicularis: 2 adult females.

Sta. 27; 10 February 1969; 63°24'S, 62°14'W to 63°24'S, 62°12'W; 91-95 meters; 5' Blake trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; off south coast of Low Island.

Philomedes charcoti: 1 adult female.

Cruise 69-5, October 1969; collected by R. L. Kaisler.

Sta. 45, Kaisler no. 10; 19 October 1969; 53°45'S, 71°06'40"W; 20 meters; Petersen grab; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; Saint Nicholas Bay, Strait of Magellan.

- Philomedes eugeniae*: 1 gravid female, 66 adult females without eggs and juveniles.
- Parasterope proluxa*: 1 adult male, 1 adult female without eggs, 1 juvenile.
- Sta. 48, Kaisler no. 5; 20 October 1969; 53°41'40"S, 72°0'45"W; 21.3 meters; epibenthic dredge; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; Fortesque Bay, Strait of Magellan; bottom coarse with much red algae.
- Doloria pectinata*: 1 juvenile male with female chonionostomatid copepod, 1 juvenile female, 116 juveniles.
- Philomedes cubitum*: 2 adult females, 1 juvenile female, 1 N-1 male, 20 juveniles.
- Philomedes* species indet.: 235 juveniles (similar to *P. tetrathrix*).
- Anarthron* species indet.: 3 juveniles.
- Parasterope proluxa*: 3 gravid females, 2 adult females without eggs, 17 juveniles.
- Scleraner chacaoi*: 1 N-1 male, 1 juvenile female, 7 juveniles.
- Sta. 49, Kaisler no. 11; 20 October 1969; 53°41'40"S, 72°0'45"W; 30-50 meters; epibenthic dredge; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; outer edge of Fortesque Bay, Strait of Magellan; bottom of fine shell fragments, with less algae than at station 48.
- Doloria pectinata*: 4 juveniles.
- Philomedes* species indet. (2 species): 9 juveniles.
- Parasterope proluxa*: 1 juvenile male.
- Sta. 50, Kaisler no. 4; 20 October 1969; 53°32'S, 72°29'W; 28 meters; Petersen grab; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; Bahia Borja, Strait of Magellan; bottom of fine to coarse shell fragments with little algae.
- Philomedes cubitum*: 1 N-1 male, 4 juveniles.
- Sta. 53, Kaisler no. 3; 21 October 1969; 52°50'S, 73°55'W; 530.3 meters; epibenthic dredge; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; Strait of Magellan; bottom of fine tan mud.
- Philomedes* species indet.: 1 juvenile.
- Sta. 57, Kaisler no. 8; 23 October 1969; 52°0'50"S, 74°14'10"W; 214 meters; epibenthic dredge; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; in channel off Puerto Bheno (Canal Sarmiento), Strait of Magellan; bottom of fine tan mud.
- Anarthron* species indet.: 3 juveniles.
- ?*Archasterope* species indet.: 2 juvenile males, 1 juvenile.
- Synasterope brachythrix*: 20 specimens including adult females without eggs and juveniles.
- Synasterope* species indet.: 1 juvenile male.
- Sta. 201, Kaisler no. 1; 25 October 1969; 50°9'55"S, 74°43'25"W; 390-460 meters; epibenthic dredge; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile; Conception Canal-Passo Caffin, about same position as *Challenger* #308, which was in 175 fm of water.
- Synasterope brachythrix*: 1 adult female.
- Sta. 206; 26 October 1969; 50°16'42"S, 74°48'28"W; 30 meters; Petersen grab (0.1 square meter); shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile, at anchor in Esto Henderson; bottom of pea gravel with mud.
- Scleraner chacaoi*: 3 juveniles.
- Sta. 207; Kaisler no. 12; 27 October 1969; 50°20'S, 75°20'W; 1-2 meters; Benson-Kaisler Bolatype dredge; shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile; Seno Contreras, a few miles north of the quarry on Isla Quorello; bottom of fine to medium sand, much attached algae in places; small stream flowed in nearby, so water may have been slightly brackish.
- Rutiderma* species B: 1 adult male.
- Sta. 210, Kaisler no. 14; 28 October 1969; 50°21'17"S, 75°17'25"W; 78 meters; Petersen grab (0.1 square meter); shelf; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile; Bahia Corbetta Papudo; limestone mountains surrounding area; bottom of fine, yellow-brown mud.
- Synasterope brachythrix*: 1 adult female without eggs, 2 specimens.
- Sta. 213, Kaisler no. 17; 30 October 1969; 51°27'30"S, 74°03'W; 640-786 meters; epibenthic dredge; bathyal; American Quadrant; South Pacific; Subantarctic; Magellanic subregion; west of Chile; off Punto Don Pedro, southern tip of Vancouver Island, dredged flat depression believed to be channel coming from Paso Childers—south-southwest; bottom of mud.
- Archasterope* species indet.: 1 juvenile male, 8 juveniles.
- Cruise 70-2, March-April 1970; collected by USARP.
- Sta. 448; 16 March 1970; 64°49'17"S, 63°30'10"W to 64°49'17"S, 63°30'32"W; 18-27 meters; Blake trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Scotia subregion; Continental subregion; Port Lockroy area, Palmer Archipelago.
- Philomedes eugeniae*: 1 gravid female.
- Sta. 488; 29 April 1970; 53°49'18"S, 70°25'W; 13-29 meters; Blake trawl; shelf; American Quadrant; Subantarctic; Magellanic subregion; Strait of Magellan.
- Scleroconcha gallardoi*: 3 specimens.
- Philomedes orbicularis*: 11 specimens.
- Homasterope maccaini*: 1 gravid female, 1 adult female, 1 specimen (undissected).
- Cruise 71-2, May 1971; collected by E. G. Menez, SOSC.
- Sta. 665; 11 May 1971; 54°44'51"S, 63°52'54"W; 44 meters; Petersen grab; shelf; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion; Staten Island.
- Philomedes* species indet.: 1 juvenile.
- Chilean Antarctic Expedition, Cruise XXIII, January-March 1969; collected by J. Castillo et al.

Sta. 69-2 (2); 5 March 1969; 62°59'36"S, 60°33'30"W; 110 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Deception Island, South Shetland Islands.

Scleroconcha gallardoi: 1 juvenile female.

Sta. 69-22; 25 January 1969; 63°0'24"S, 60°31'36"W; 112 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Deception Island, South Shetland Islands.

Philomedes charcoti: 6 adult females without eggs.

Sta. 69-24; 28 January 1969; 62°26'30"S, 59°39'W; 338 meters; Rastra trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes assimilis: 1 adult female without eggs, 1 juvenile.

Parasterope ohlini: 1 gravid female, 2 adult females without eggs, 3 juveniles.

Sta. 69-26; 11 February 1969; 62°27'S, 59°37'W; 220 meters; Rastra trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 adult female without eggs.

Sta. 69-28; 11 February 1969; 62°27'48"S, 59°39'30"W; 201 meters; Rastra trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 adult female without eggs.

Sta. 69-30; 11 February 1969; 62°28'30"S, 59°41'8"W; 119 meters; Rastra trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 1 gravid female, 2 juveniles.

Sta. 69-33; 11 February 1969; 62°29'S, 59°41'W; 69 meters; Rastra trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 2 gravid females, 2 adult females without eggs.

Sta. 69-35; 11 February 1969; 62°28'30"S, 59°38'24"W; 91 meters; Rastra trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 1 gravid female, 3 adult females, 1 juvenile.

Sta. 69-37; 11 February 1969; 62°29'42"S, 59°40'21"W; 40 meters; Rastra trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 1 gravid female, 1 juvenile.

Philomedes assimilis: 1 gravid female, 1 adult female without eggs.

Empoulsenia pentathrix: 1 adult female without eggs.

Sta. 69-40; 28 January 1969; 62°21'30"S, 59°36'W; 405 meters; Petersen dredge (0.2 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 13 adult females (including 4 with eggs), 41 juveniles.

Scleroconcha gallardoi: 1 N-1 male, 4 juveniles.

Empoulsenia pentathrix: 1 gravid female, 4 adult females without eggs.

Sta. 69-42; 28 January 1969; 62°24'S, 59°39'W; 130 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 adult female without eggs, 1 juvenile.

Empoulsenia pentathrix: 4 gravid females, 3 adult females.

Sta. 69-45; 28 January 1969; 62°27'30"S, 59°40'W; 283 meters; Petersen dredge (0.2 square meter); American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands. (The depth does not fit the map position and may be an average.)

Philomedes orbicularis: 2 adult females without eggs.

Sta. 69-46; 28 January 1969; 62°26'30"S, 59°44'W; 225 meters; Petersen dredge (0.2 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 gravid female, 9 adult females without eggs; 6 juveniles.

Scleroconcha gallardoi: 1 juvenile.

Sta. 69-47; 28 January 1969; 62°26'S, 59°43'W; 220 meters; Petersen dredge (0.2 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 2 gravid females, 10 juveniles.

Empoulsenia pentathrix: 1 gravid female, 1 juvenile.

Sta. 69-48; 28 January 1969; 62°26'30"S, 59°42'W; 288 meters; Petersen dredge (0.2 square meter); American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 4 juveniles.

USCGC *Northwind*

Deep Freeze IV, January 1959; collection made by L. W. Wilson.

Sta. 8; 12 January 1959; 72°16'40"S, 170°18'E; 135 meters; triangular dredge; shelf; Australian Quadrant; Antarctic; Ross Sea; Continental subregion.

Cypridininae genus indet.: 2 juveniles.

Philomedes assimilis: 9 gravid females, 6 adult females, 7 juveniles.

Diasterope schmitti: 4 juveniles.

RV *Octans*

December 1961 to February 1962; collected by personnel of the Virginia Institute of Marine Science.

Sta. AG; 11 December 1961; 66°17'42"S, 110°32'03"E to 66°17'52"S, 110°32'42"E; 101 meters; dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes assimilis: 3 adult females.

Sta. AH; 11 December 1961; 66°15'56"S, 110°31'09"E to 66°15'57"S, 110°31'47"E; 55-91 meters; dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes assimilis: 1 adult female with 1 female chonistomatid copepod and 4 chonistomatid ovisacs, 3 adult females, 5 specimens including females and juveniles (no females with eggs).

Sta. AM; 13 December 1961; 66°21'54"S, 110°29'50"E to 66°22'01"S, 110°32'02"E; 293-329 meters; dredge; bathyal; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes species indet.: 1 adult male.

Sta. TAT; 28 December 1961; 66°13'18"S, 110°37'50"E to 66°13'47"S, 110°38'18"E; 36 meters; trawl; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes assimilis: 1 adult female with 1 female chonistomatid copepod and 7 chonistomatid ovisacs, 2 gravid females, 18 adult females, 12 juveniles.

Sta. AZ; 12 February 1961; 66°16'38"S, 110°30'48"E to 66°16'20"S, 110°31'24"E; 128-146 meters; trawl; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station; mud-rock bottom.

Doloria levis: 3 gravid females, 1 adult male, 1 N-1 male.

Philomedes assimilis: 1 adult female with chonistomatid copepod, 6 specimens.

Skogsbergiella species indet.: 1 gravid female (badly crystallized; cf. *S. macrothrix*).

USS *Staten Island*

Deep Freeze II, December 1956; collection made by W. H. Littlewood.

Sta. S.I. 17; (Bio. S.I. 3); 27 December 1956; 71°18'S, 13°32'W; 237.7 meters; orange peel; bathyal; American Quadrant; South Atlantic; Antarctic; Continental subregion; near Weddell Sea.

Empoulsenia pentathrix: juvenile N-1 stage female.

Deep Freeze IV, January-February 1959; collection made by Robert Starr.

Sta. S.I. 2; 23 January 1959; 71°21'30"S, 170°05'E; 128 meters; *Challenger*-type trawl; shelf; Australian Quadrant; South Pacific; Antarctic; Continental subregion; near Cape Adare; Ross Sea.

Philomedes species indet.: 1 juvenile.

Sta. S.I. 4; 2 February 1959; 66°15'33"S, 110°32'05"E; 54 meters; trawl; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Wilkes Station.

Philomedes orbicularis: 1 adult female, 2 juveniles.

Diasterope schmitti: 1 adult female, 2 juveniles.

Oceanographic Cruise 1962-1963; biological investigations; Antarctic Peninsula, December 1963; collections made by Waldo L. Schmitt with assistance of ship's personnel and survey team.

Sta. 37/63, Antarctic Peninsula, Danco Coast, Wilhelmina Bay, Foyen Harbor; 8 February 1963; 64°34'00"S, 62°00'00"W; 45.7 or 49.4 m; dredged; gravel and sand bottom; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion. (Kornicker, 1971, listed station but not specimen.)

Philomedes species indet.: 1 juvenile.

RV *Vema*

Cruise 14, January-March 1958.

Sta. V-14-2; 31 January 1958; 41°49'S, 64°20'W; 129 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina.

Philomedes subantarctica: 2 gravid females, 2 adult females, 4 juveniles.

Doloria pectinata: 5 juveniles.

Skogsbergiella macrothrix: 1 gravid female, 2 juveniles.

Sta. V-14-5; 3 February 1958; 45°51'S, 61°52'W; 107 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina.

Anarthron dithrix: 5 gravid females, 38 adult females, and juveniles, 5 adult males.

Skogsbergiella macrothrix: 1 adult male.

Sta. V-14-6; 4 February 1958; 46°47'42"S, 62°47'W; 105 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom of yellow sand.

Anarthron dithrix: 1 gravid female, 1 juvenile.

Skogsbergiella macrothrix: 2 gravid females, 1 adult female, 1 adult male, 9 juveniles.

Sta. V-14-14; 19 February 1958; 54°23'S, 65°35'W; 75 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina; coarse sand and angular and round basalt pebbles in trawl.

Doloria pectinata: 1 juvenile.

Parasterope longiseta: 1 gravid female.

Skogsbergiella species indet.: 1 N-1 male (either *S. spinifera* or *S. macrothrix*) with female chonistomatid copepod.

Sta. V-14-16; 2 February 1958; 52°22'S, 65°45'W; 116 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina; sand and pebbles in trawl.

Anarthron dithrix: 1 adult female with unextruded eggs.

Sta. V-14-19; 22 February 1958; 52°41'S, 59°09'W; 108 meters; SBT; shelf; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion.

Doloria pectinata: 1 gravid female, 7 juveniles.

Sta. V-14-21; 5 March 1958; 54°18'S, 39°23'W; 237 meters; SBT; bathyal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion; South Georgia District.

Scleroconcha appelloefi: 2 gravid females, 1 adult female without eggs; 84 juveniles.

Philomedes rotunda: 4 gravid females, 2 juveniles

Empoulsenia quinquesetae: 1 gravid female, 1 juvenile.

Sta. V-14-25 (LGO 49); 9 March 1958; 56°43'S, 27°41'W; 2747 meters; SBT; abyssal; American Quadrant; Scotia Sea; Antarctic; Continental subregion; Scotia subregion; bottom with some volcanic sand.

Philomedes tetrathrix: 1 adult female, 2 juveniles

Synasterope mystax: 1 adult female.

Synasterope species indet.: 1 female (possibly adult) (not *S. mystax*).

Sta. V-14-32 (LGO 54); 6 April 1958 34°35'S, 17°31'W; 1861 meters; SBT; bathyal; African Quadrant, South Atlantic; south of Africa.

Philomedes species indet.: 1 juvenile (probably new species).

Archasterope species indet.: 1 juvenile (nematode in body).

Cypridininae genus indet.: 1 early instar.

Sta. V-14-34 (LGO 56); 6 April 1958; 34°05'30"S, 18°06'W; 179 meters; SBT; shelf; African Quadrant; South Atlantic; south of Africa.

Sarsiella lunata: 1 female, 1 adult male, 1 N-1 male, 1 juvenile.

Cypridininae genus indet.: 1 juvenile (carapace fragmented).

Cruise 15, February-April 1959.

Sta. V-15-91 19 February 1959; 51°01'S, 68°32'30"W; 82 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Skogsbergiella species indet.: 1 female (either *S. spinifera* or *S. macrothrix*).

Sta. V-15-93; 20 February 1959; 50°17'S, 66°50'W; 82 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Anarthron pholion: 1 gravid female.

Parasterope longiseta: 3 gravid females.

Sta. V-15-102; 5 March 1959; 52°53'18"S, 65°35'W; 108 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Doloria pectinata: 3 gravid females, 4 adult females without eggs, 39 juveniles (may include adult males).

Philomedes minys: 1 gravid female, 1 adult female.

Anarthron dithrix: 1 adult female.

Skogsbergiella macrothrix: 1 adult male.

Parasterope longiseta: 1 gravid female, 2 juveniles, 1 specimen without shell.

Sta. V-15-106; 6 March 1959; 54°10'12"S, 65°44'W; 79 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Anarthron evexum: 1 adult female, 1 carapace (Hulings #210).

Sta. V-15-107; 6 March 1959; 54°10'12"S, 65°57'30"W; 101 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Doloria species indet.: 1 stage III instar, 1 juvenile.

Parasterope longiseta: 8 gravid females, 4 juveniles.

Sta. V-15-110; 7 March 1959; 54°10'S, 63°20'12"W; 284 meters; SBT; bathyal; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion.

Anarthron pholion: 1 adult female.

Anarthron evexum: 2 adult females.

Sta. V-15-131; 3 April 1959; 40°146'S, 55°24'42"W; 1475 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina.

Anarthron species indet.: 1 juvenile male.

Skogsbergiella pax: 1 gravid female, 1 adult female, 1 N-1 male, 2 juvenile females, 2 juveniles.

Parasterope species indet.: 1 instar III female with 1 female choniostomatid copepod.

Spinacopia variabilis: 5 specimens including 2 gravid females. (Kornicker, 1969a, reported 77 additional specimens from this station.)

Sta. V-15-132; 3 April 1959; 39°57'30"S, 54°49'30"W; 1912 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina.

Doloria species indet.: 1 juvenile female, 1 specimen (appendages only).

Cruise 16, January-May 1960.

Sta. V-16-15; 8 January 1960; 45°00'S, 45°46'E; 1622 meters; SBT; bathyal; African Quadrant; Indian Ocean; Subantarctic.

Cypridininae genus indet.: 1 juvenile.

Sta. V-16-37; 16 May 1960; 51°52'S, 67°01'W; 101-101 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Anarthron pholion: 2 gravid females, 1 adult female without eggs, 4 juveniles.

Skogsbergiella species indet.: 1 juvenile male and 4 juveniles.

Sta. V-16-39; 19 May 1960; 50°53'S, 62°35'W; 157-157 meters; SBT; shelf; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina.

Anarthron pholion: 1 juvenile.

Skogsbergiella species indet.: 1 juvenile (*S. spinifera* or *S. macrothrix*).

Cruise 17, March-June 1961.

Sta. V-17-6; 21 March 1961; 37°57'S, 75°08'W; 4303 meters;

SBT; abyssal; American Quadrant; South Pacific; west of Chile; on crest of west rise of trench off Chilean coast; trawl with little sediment composed mostly of fecal pellets.

Igene walleni: 9 gravid females, 30 adults without eggs and juveniles.

Bathyleberis grossmani: 1 juvenile male, 2 juvenile females.

Parasterope styx: 1 gravid female.

Sta. V-17-8; 23 March 1961; 43°14'S, 75°27'W; 3219 meters; SBT; abyssal; American Quadrant; South Pacific; west of Chile; steep hills and deep valleys off Boca del Guaro; trawl with medium-to-coarse sand and small pebbles.

Macrocypridina castanea: 1 instar I, 1 instar II.

Philomedes ramus: 1 adult female without eggs.

Psilomedes tetrathrix: 1 N-1 male, 1 N-2 male.

Sta. V-17-10; 23 March 1961; 43°24'S, 75°08'W; 397-501 meters; SBT; bathyal; American Quadrant; South Pacific; west of Chile; on shelf off Boca del Guaro; trawl with soft and hard lumps of clay with worm tubes.

Isoocypridina quatuorsetae: 1 gravid female, 2 adult males, 4 juveniles.

Sta. V-17-12; 23 March 1961; 43°30'S, 74°55'W; 112 meters; SBT; shelf; American Quadrant; South Pacific; west of Chile; off Golfo de Penas.

Anarthron chilensis: 1 gravid female, 1 adult female without eggs, 3 adult males.

Synasterope dimorpha: 2 gravid females, 1 adult female, 1 adult male, 1 N-1 male.

Homasterope micra: 2 gravid females, 4 adult females (1 with chonistomatid copepodite).

Skogsbergiella plocus: 1 gravid female, 2 adult females without eggs, 2 adult males.

Sta. V-17-13; 24 March 1961; 46°59'S, 75°34'W; 2657-2470 meters; SBT; abyssal; American Quadrant; South Pacific; west of Chile; off Golfo de Penas.

Synasterope ?dimorpha: 1 juvenile male with 1 chonistomatid copepod.

Sta. V-17-14; 24 March 1961; 47°01'S, 75°44'W; 1201-1146 meters; SBT; bathyal; American Quadrant; South Pacific, west of Chile.

Anarthron dithrix: 11 adult females without eggs, 6 adult males, 46 juveniles.

Skogsbergiella macrothrix: 1 gravid female, 1 adult female with 1 female chonistomatid copepod and 6 chonistomatid ovisacs, 7 adult females without eggs, 7 adult males, 21 juveniles.

Sta. V-17-18; 28 March 1961; 53°55'30"S, 71°16'48"W; 248-262 meters; SBT; bathyal; American Quadrant; Subantarctic; Magellanic subregion; Tierra del Fuego; Strait of Magellan; bottom of coarse sand and small round pebbles.

Metavargula species indet.: 1 juvenile.

Cylindroleberidinae genus indet.: 1 juvenile male.

Sta. V-17-21B; 29 March 1961; 53°23'S, 70°54'36"W; 150 meters; SBT; shelf; American Quadrant; Subantarctic; Magellanic subregion; Tierra del Fuego; Strait of Magellan

off Fresh Water Bay; bottom of medium to very coarse sand and pebbles.

Skogsbergiella macrothrix: 1 gravid female, 1 juvenile.

Sta. V-17-22; 29 March 1961; 53°38'S, 70°50'30"W; 249-392 meters; SBT; bathyal; American Quadrant; Subantarctic; Magellanic subregion; Tierra del Fuego; Strait of Magellan off Santa Ana Coast.

Doloria pectinata: 1 adult male.

Sta. V-17-23; 29 March 1961; 53°47'S, 70°17'30"W; 280-278 meters; SBT; bathyal; American Quadrant; Subantarctic; Magellanic subregion; Tierra del Fuego; Strait of Magellan; bottom of soft medium gray lutite.

Archasterope bulla: 1 gravid female, 1 adult female without eggs, 1 juvenile.

Sta. V-17-25; 29 March 1961; 53°20'30"S, 69°32'48"W; 44 meters; SBT; shelf; American Quadrant; Subantarctic; Magellanic subregion; Tierra del Fuego, Strait of Magellan. Cylindroleberidinae genus indet.: shell only, dissection by Hulings (his number 215).

Sta. V-17-43; 21 April 1961; 62°48-49'S, 62°06'W; 656-670 meters; SBT; bathyal; American Quadrant; Weddell Sea; Drake Passage; Antarctic; Continental subregion; Scotia subregion; bottom of silty green mud, some sand and small pebbles; Boyd Strait, South Shetland Islands.

Skogsbergiella spinifera: 1 gravid female, 1 juvenile.

Sta. V-17-46; 4 May 1961; 54°52'36"S, 67°57'W; 227 meters; SBT; Bathyal; American Quadrant; South Atlantic; Subantarctic; Magellanic subregion; east of Argentina; Beagle Channel off Point Bursham near Lawrence Reef.

Empoulsenia pentathrix: 1 female (adult or late instar).

Sta. V-17-47; 4 May 1961; 55°07'12"S, 66°29'18"W; 71 meters; SBT; shelf; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion; entrance to Beagle Channel.

Doloria pectinata: 1 stage II female.

Anarthron dithrix: 1 juvenile male.

Parasterope longiseta: 1 gravid female, 1 adult female, 4 juveniles.

Skogsbergiella species indet.: 1 N-1 male, 1 juvenile.

Sta. V-17-48; 4 May 1961; 55°10'S, 66°23'W; 42 meters; SBT; shelf; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion.

Doloria pectinata: 1 gravid female, 3 juveniles.

Anarthron species indet.: 1 juvenile.

Sta. V-17-51; 4 May 1961; 55°17'30"S, 66°00'W; 205-207 meters; SBT; bathyal; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion.

Doloria pectinata: 1 juvenile female, 13 juveniles.

Skogsbergiella species indet.: 1 juvenile female (either *S. spinifera* or *S. macrothrix*).

Sta. V-17-52; 4 May 1961; 55°20'S, 65°52'W; 938-947 meters; SBT; bathyal; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion.

Cylindroleberidinae genus indet.: 1 specimen (adult male, valves and gills only). Hulings' number 235.

Sta. V-17-53; 4 May 1961; 55°20'S, 65°50'W; 1185-1240 meters; SBT; bathyal; American Quadrant; Drake Passage; Subantarctic; Magellanic subregion.

Vargula hamata: 1 gravid female, 2 juveniles.

Empoulsenia pentathrix: 1 gravid female, 1 juvenile.

Sta. V-17-56; 6 May 1961; 56°34'31"S, 62°41'40"W; 4006 meters; SBT; abyssal; American Quadrant; Scotia Sea; Drake Passage; Subantarctic; Magellanic subregion.

Synasterope mystax: 1 adult male.

Sta. V-17-59; 10 May 1961; 54°53'30"S, 60°26'30"W; 432-426 meters; SBT; bathyal; American Quadrant; Scotia Sea; Subantarctic; Magellanic subregion; Burdwood Bank; bottom with coarse dark sand and pebbles.

Vargula hamata: 1 gravid female, 1 juvenile male, 5 juveniles.

Vargula dentata: 2 juveniles.

Doloria species indet.: 1 juvenile.

Empoulsenia pentathrix: 1 juvenile female.

Sta. V-17-61; 11 May 1961; 54°44'S, 55°39'W; 1814-1919 meters; SBT; bathyal; American Quadrant; Scotia Sea; Subantarctic; east of Falkland Islands; Burdwood Bank; bottom with angular shale pebbles.

Doloria species indet.: 1 juvenile female.

Sta. V-17-63; 12 May 1961; 54°23'S, 54°22'W; 2155-2154 meters; SBT; abyssal; American Quadrant; Scotia Sea; Subantarctic; east of Falkland Islands; bottom with sand and pebbles.

Metavargula adinothrix: 1 gravid female.

Sta. V-17-66; 15 May 1961; 50°08'S, 54°14'W; 1511 meters; SBT; bathyal; American Quadrant; South Atlantic; Subantarctic; northeast of Falkland Islands; on rising abyssal plain approaching Argentine shelf; bottom with medium sand and small pebbles.

Vargula dentata: 1 gravid female.

Isocypridina species indet.: 2 juveniles.

Empoulsenia pentathrix: 1 adult female.

Sta. V-17-67; 18 May 1961; 41°39'S, 59°53'W; 73 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray medium sand.

Skogsbergiella macrothrix: 2 juvenile females.

Bathyleberis monothrix: 1 juvenile female.

Sta. V-17-68; 18 May 1961 41°16'S, 60°03'W; 70 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray sand with some lutite.

Skogsbergiella macrothrix: 1 gravid female, 1 adult female without eggs, 2 juveniles.

Sta. V-17-69; 18 May 1961; 40°56'S, 60°10'W; 68 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with gray brown sand with some lutite.

Doloria species indet.: 1 juvenile.

Parasterope species indet.: 1 juvenile male, 1 juvenile.

Sta. V-17-70; 18 May 1961; 40°32'S, 60°19'W; 57 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with brown sand with minor lutite.

Asteropella species A: 1 juvenile (carapace only).

Sta. V-17-71; 18 May 1961; 40°11'S, 60°27'W; 44 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray brown sand with 20-40 percent bioclastics.

Rugosidoloria serrata: 3 gravid females, 9 juveniles.

Asteropteron hulingsi: 2 juvenile females (late instars), 17 juveniles.

Asteropella species A: 1 adult female (appendages missing).

Sta. V-17-72; 19 May 1961; 39°21'S, 61°08'W; 15 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina near Bahia Blanca; bottom with fine sand and minor lutite.

Siphonostira hallex: 2 gravid females (1 with chonionostomatid copepod pupa), 1 adult female with female chonionostomatid copepod, 4 adult females, 4 adult males, 6 juveniles. Two labels in vial V-17-52 and V-17-72.

Adelta theta: 1 adult female.

Sta. V-17-74; 23 May 1961; 41°27'S, 59°33'W; 71 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with sand and lutite and few small rounded pebbles.

Anarthron dithrix: 43 gravid females, 8 adult females, 14 juveniles.

Skogsbergiella macrothrix: 2 gravid females, 3 adult females without eggs.

Bathyleberis monothrix: 1 gravid female, 9 adult females without eggs, 4 juveniles.

Sta. V-17-75; 23 May 1961; 41°41'S, 59°19'W; 82 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray sand about 10 percent gray lutite.

Anarthron dithrix: 37 gravid females, 3 adult females without eggs, 1 adult female with chonionostomatid copepod (1 female and 2 ovisacs), 153 juveniles.

Skogsbergiella macrothrix: 4 gravid females, 22 juveniles.

Bathyleberis monothrix: 11 gravid females, 7 adult females without eggs, 28 juveniles.

Sta. V-17-76; 23 May 1961; 41°57'S, 59°03'W; 81 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with medium sand and bioclastics with about 10 percent lutite.

Skogsbergiella macrothrix: 4 gravid females, 4 adult females without eggs, 8 juveniles.

Sta. V-17-77; 24 May 1961; 42°15'S, 58°45'W; 95 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with medium and bioclastics.

Anarthron dithrix: 1 gravid female.

Skogsbergiella species indet.: 1 juvenile female (either *S. spinifera* or *S. macrothrix*).

Sta. V-17-78; 24 May 1961; 42°28'S, 58°31'W; 227-229 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina; near crest of shelf; bottom with medium sand and shells.

- Skogsbergiella* species indet.: 1 juvenile female (either *S. spinifera* or *S. macrothrix*).
- Sta. V-17-86; 11 June 1961; 45°29'S, 60°06'W; 225-227 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina; on rise of shelf, steep uneven slope (about 15°); bottom with medium and fine sands.
Skogsbergiella macrothrix: 1 adult female without eggs, 2 adult males, 4 juveniles.
- Sta. V-17-88; 11 June 1961; 45°11'S, 60°55'W; 110 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with medium to fine dark brown sand and some brown lutite.
Anarthron dithrix: 3 gravid females, 1 adult with chonionostomatid copepods (1 female and 2 pupae), 3 juveniles.
Skogsbergiella macrothrix: 2 gravid females, 2 adult females, 4 juveniles.
- Sta. V-17-89A; 11 June 1961; 45°00'S, 61°18'W; 102 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray brown sand and minor lutite.
Anarthron dithrix: 98 gravid females, 54 adult females without eggs.
Anarthron evexum: 6 gravid females.
Anarthron species indet.: 345 specimens (including adult females without eggs of *A. evexum* and juveniles of that species and *A. dithrix*).
Skogsbergiella macrothrix: 14 gravid females, 7 adult females without eggs, 1 adult male, 25 juveniles.
- Sta. V-17-89; probably same sample as 89A, only latter listed in cruise report.
Anarthron evexum: 1 gravid female.
Anarthron dithrix: 1 gravid female, 1 adult female.
Skogsbergiella macrothrix: 2 gravid females, 2 adult females.
- Sta. V-17-90; 11 June 1961; 44°53'S, 61°43'W; 99 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark gray brown sand and minor brown lutite.
Anarthron dithrix: 45 gravid females, 1 adult female with unextruded eggs, 5 juveniles.
Skogsbergiella macrothrix: 4 gravid females, 3 adult females.
- Sta. V-17-92; 12 June 1961; 44°37'S, 62°40'W; 93 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with dark brown medium sand with 5-10 percent brown lutite.
Anarthron species indet.: 1 juvenile.
- Sta. V-17-97; 13 June 1961; 44°29'S, 60°59'W; 101 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with medium sand.
Anarthron dithrix: 7 gravid females, 2 adult females without eggs, 2 juveniles.
Skogsbergiella spinifera: 1 N-1 male.
Skogsbergiella macrothrix: 1 adult female.
- Sta. V-17-99; 13 June 1961; 44°25'S, 59°54'W; 150-154 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; bottom with medium dark gray sand.
Skogsbergiella macrothrix: 2 gravid females, 3 juveniles.
- Sta. V-17-101; 19 June 1961; 38°13'S, 55°19'W; 454-450 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina; near outer edge of shelf; bottom with green brown lutite and fine sand.
Vargula hamata: 1 gravid female, 3 juveniles.
Skogsbergiella macrothrix: 3 gravid females, 1 adult female, 3 adult males, 13 juveniles.
- Cruise 18, February-July 1962.
- Sta. V-18-9; 4 February 1962; 36°17'S, 53°21'W; 676-547 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina; continental slope; bottom with soft, dark green, silty lutite.
Vargula subantarctica: 1 juvenile.
Bathyleberis monothrix: 1 gravid female.
- Sta. V-18-12; 17 February 1962; 47°09'S, 60°38'W; 424-428 meters; SBT; bathyal; American Quadrant; South Atlantic; east of Argentina; continental slope off Point Descado; bottom with coarse to very coarse dark gray sand and gravel.
Doloria pectinata: 2 gravid females, 4 juveniles (2 of these could be adult males).
Doloria levinsoni: 1 adult female, 1 adult male, 3 juveniles.
Philomedes subantarctica: 1 adult female (with female and male chonionostomatid and 5 chonionostomatid ovisacs), 1 juvenile.
Skogsbergiella macrothrix: 1 adult male, 1 juvenile female, 1 juvenile.
Parasterope anommata: 1 gravid female, 1 ?adult female, 1 juvenile male, 2 juveniles.
Parasterope species indet.: 1 juvenile male.
- Sta. V-18-13; 17 February 1962; 47°10'S, 61°02'W; 135-135 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; seaward edge of shelf off Point Descado; bottom with grayish-brown coarse sand.
Anarthron dithrix: 1 adult female with 1 female chonionostomatid and 5 chonionostomatid ovisacs, 11 adult females without eggs, 1 juvenile.
Skogsbergiella macrothrix: 3 gravid females, 2 adult females without eggs, 1 juvenile.
Spinacopia variabilis: Kornicker (1969a) reported 1 female.
- Sta. V-18-14; 17 February 1962; 47°13'S, 61°30'W; 132-130 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina; off Point Descado; bottom with dark gray, medium-to-coarse-grained sand mixed with gravel.
Skogsbergiella species indet.: 1 juvenile male (either *S. macrothrix* or *S. spinifera*).
- Sta. V-18-15; 18 February 1962; 47°22'S, 62°06'W; 135-137 meters; SBT; shelf; American Quadrant; South Atlantic;

east of Argentina; off Point Descado; bottom with dark gray, fine to medium-grained sand mixed with gravel.

Vargula subantarctica: 1 gravid female, 2 juveniles.

Sta. V-18-16; 18 February 1962; 47°30'S, 62°39'W; 123-123 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina.

Anarthron dithrix: 2 adult females.

Skogsbergiella macrothrix: 2 gravid females.

Sta. V-18-18; 18 February 1962; 47°55'S, 63°41'W; 108-108 meters; SBT; shelf; American Quadrant; South Atlantic; east of Argentina.

Anarthron dithrix: 1 adult female.

Skogsbergiella macrothrix: 1 gravid female, 7 adult females.

Sta. V-18-27; 24 February 1962; 52°41'S, 75°21'W; 470-562 meters; SBT; bathyal; Pacific Quadrant; South Pacific; Subantarctic; continental slope west of Strait of Magellan.

Philomedes tetrathrix: 1 gravid female.

Skogsbergiella macrothrix: 1 gravid female.

Sta. V-18-39; 4 April 1962; 33°49'30"S, 53°09'W; 15 meters; SBT; shelf; American Quadrant; South Atlantic; off Chui, Brazil; bottom with dark gray mixture of sand and shell material.

Adelta theta: 1 gravid female.

Sta. V-18-113; 31 July 1962; 40°33'S, 174°07'E; 117-117 meters; SBT; shelf; Australian Quadrant; Cook Strait; bottom with olive-green lutite sand and shells.

Vargula stathme: 1 gravid female.

Metavargula iota: 1 adult female.

Scleroconcha arcuata: 2 adult females without eggs, 1 adult male, 2 juveniles.

Bathyleberis oculata: 1 gravid female, 1 N-1 female.

AGS *Yelcho*

Chilean Antarctic Expedition, Cruise XXII, January 1968; collected by J. Castillo et al.

Sta. 57; 17 January 1968; 62°26'18"S, 59°37'W; 294 meters; Petersen dredge (0.1 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands; mud substrate.

Scleroconcha gallardoi: 1 adult female.

Empoulsenia pentathrix: 1 N-1 male.

Chilean Antarctic Expedition, Cruise XXIV, December 1969; collected by J. Castillo et al.

Sta. 70-22; 19 December 1969; 63°00'30"S, 60°31'24"W; 32 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Deception Island, South Shetland Islands.

Philomedes charcoti: 6 adult females without eggs.

Sta. 70-25; 11 December 1969; 62°28'18"S, 59°41'18"W; 43

meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 3 gravid females.

Sta. 70-28; 12 December 1969; 62°28'48"S, 59°39'30"W; 85 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Discovery Bay, Greenwich Island, South Shetland Islands.

Philomedes orbicularis: 1 gravid female, 2 juveniles.

Sta. 70-30; 13 December 1969; 62°27'18"S, 59°38'30"W; 200 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 2 gravid females, 1 adult female without eggs, 2 juveniles.

Scleroconcha gallardoi: 1 juvenile.

Sta. 70-32; 19 December 1969; 62°27'S, 59°34'48"W; 400 meters; Petersen dredge (0.2 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 2 gravid females, 8 juveniles.

Sta. 70-35; 14 December 1969; 62°25'36"S, 59°41'18"W; 329 meters; Petersen dredge (0.2 square meter); bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Scleroconcha gallardoi: 1 juvenile.

Sta. 70-39; 16 December 1969; 62°24'S, 59°40'W; 325 meters; Rastra trawl; bathyal; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 7 gravid females, 15 specimens.

Scleroconcha gallardoi: 3 gravid females, 2 adult females, 4 juveniles.

Empoulsenia pentathrix: 2 gravid females.

Sta. 70-42; 16 December 1969; 62°23'12"S, 59°36'54"W; 100 meters; Petersen dredge (0.2 square meter); shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 adult female without eggs.

Sta. 70-44; 16 December 1969; 62°23'18"S, 59°36'30"W; 110 meters; Rastra trawl; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; English Strait, South Shetland Islands.

Philomedes orbicularis: 1 juvenile.

Sta. 70-46; 1969; station data missing (Gallardo, 1971, written communication).

Philomedes orbicularis: 1 adult female without eggs.

French Antarctic Expeditions

XII French Antarctic Expedition to Adélie Land, January–December 1962; collected by P. M. Arnaud.

Sta. TA-1 19; 17 December 1962; 66°39'S, 139°55'E; surface net; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Point Géology Archipelago; Ostracoda washed from sponges *Homainella balfourensis* floating at the surface of the sea.

Philomedes assimilis: 2 gravid females, 1 juvenile.

Sta. TA-D 51; 4 January 1962; 66°39'S, 139°55'E; 10–50 meters; Charcot dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Point Géology Archipelago; between Nunatak and point south of Jean Rostrand Island.

Philomedes assimilis: 1 gravid female.

XV French Antarctic Expedition to Adélie Land, December 1964 to February 1965; collected by P. M. Arnaud.

Sta. TA-D 67; 12 December 1964; 66°39'S, 139°55'E; 40 meters; Charcot dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Point Géology Archipelago; specimens from holdfasts of *Phyllogigas grandifolius*.

Philomedes assimilis: 1 juvenile male, 5 specimens (none gravid).

Sta. TA-D 104; 6 January 1965; 66°39'S, 139°55'E; 60–75 meters; Charcot dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Bernard Island; bottom of sand.

Philomedes assimilis: 1 specimen.

Sta. TA-12-2; 12 February 1965; 66°39'S, 139°55'E; 13 meters; Charcot dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Point Géology Archipelago; between Petrels and Jean Rostrand Islands; specimens washed from holdfasts of *Phyllogigas grandifolius*.

Philomedes assimilis: 1 specimen.

Sta. TA-14-2; 14 February 1965; 66°39'S, 139°55'E; 20 meters; Charcot dredge; shelf; Australian Quadrant; Indian Ocean; Antarctic; Continental subregion; Adélie Coast; Point Géology Archipelago; between Petrels and Jean Rostrand Islands; specimens washed from holdfasts of *Phyllogigas grandifolius*.

Philomedes assimilis: 1 gravid female, 4 juveniles.

French Antarctic Expedition to the Kerguelen Islands; February–March 1970; collected by P. M. Arnaud and J. C. Hureau.

Sta. Ker-D40; 4 February 1966; collected by J. C. Hureau; southwest part of Bay of Morbihan, north of Long Island; 49°31'S, 69°55'E; 130 meters; dredging; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion.

Philomedes lofthousae: 1 juvenile male.

Sta. Ker-D70A; 2 February 1970; collected by P. M.

Arnaud; Bay of Morbihan; in Laboureur Fjord; lat. 49°25'S, long. 69°50'E; from *Macrocystis pyrifera*; dredging; 10–35 meters; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion.

Skogsbergiella scotti: 1 gravid female, 1 adult female, with choniostomatid copepods (1 female plus 3 copepodites).

Sta. Ker-D74; 18 March 1970; collected by P. M. Arnaud; Bay of Morbihan; between Pender, Bryer, and Powell Islands; 49°25'S, 70°10'E; 50 meters; shelf; African Quadrant; Indian Ocean; Subantarctic; Kerguelen subregion.

Philomedes lofthousae: 4 gravid females, 14 juveniles.

Synasterope arnoudi: 1 gravid female, 1 N-1 male, 1 juvenile.

Chile

Pacific coast of Chile; restudy of part of the collections made by Dr. Gerd Hartmann in 1960 (specimens in collection of the Hamburg Zoological Museum).

Sta. 93; 15 March; 39°58'S, 73°44'48"W; 84 meters; shelf; American Quadrant; South Pacific; west of Chile; substrate of fine sand with mud and detritus; temperature at 70 meters, 9.6°C.

Synasterope dimorpha: 1 gravid female—identified as *Cylindrolebris dimorpha* by Hartmann (in Hartmann-Schröder and Hartmann, 1965) [hereinafter in this section referred to as "Hartmann (1965)"].

Note: Hartmann (1965) also referred a specimen to *Cylindrolebris* indet. from this station.

Sta. 94; 15 March; 39°59'S, 73°47'W; 100 meters; shelf; American Quadrant; west coast of Chile; substrate fine sand; temperature at 80 meters, 9.5°C.

Anarthron chilensis: 1 male—identified as *Philomedes (Scleroconcha) chilensis* by Hartmann (1965).

Note: Hartmann (1965) also reported *Cylindrolebris dimorpha* (= *Synasterope dimorpha*) at this station.

Sta. 96; 15 March; 39°59'54"S, 74°01'30"W; 260–235–295 meters; dredge; shelf; American Quadrant; South Pacific; west coast of Chile; substrate of fine sand with a little detritus and rocks; temperature at 150 meters, 9.4°C.

Anarthron reticulata: 4 females—identified by Hartmann (1965) as *Philomedes (Scleroconcha) reticulata*.

Note: Hartmann (1965) also referred a specimen from this station to *Cylindrolebris* cf. *spinifera* (= *Skogsbergiella* cf. *spinifera*).

Sta. 99 (Sta. X1); 42°57'S, 72°57'W; 190 meters; shelf; American Quadrant; South Pacific; Gulf of Corcovado; Canal of Chacao; South Chile; substrate of fine sand with mud, detritus, and rocks; temperature at 170 meters, 11.1°C.

Scleraner chacaoi: 2 specimens—identified by Hartmann (1965) as *Rutiderma (Rutiderma) chacaoi*.

Sta. 106; 17 March; 40°55'24"S, 74°12'30"W; 200–220 meters; dredge; shelf; American Quadrant; South Pacific; west coast of Chile; substrate of mud with fine sand; temperature at 150 meters, 10.4°C.

Anarthron reticulata: 2 females—identified as *Philomedes (Scleroconcha) reticulata* by Hartmann (1965).

Note: Hartmann (1965) also reported from this station 5 specimens of *Cylindroleberis dimorpha* (= *Synasterope dimorpha*).

Sta. 108; 17 March; 40°53'30"S, 73°58'30"W; 136 meters; shelf; substrate of mud with fine sand and detritus; temperature at 100 meters; 9.9°C.

Anarthron reticulata: 3 females, 1 male—identified by Hartmann (1965) as *Philomedes* (*Scleroconcha*) *reticulata*.

Synasterope dimorpha: Several specimens—identified by Hartmann (1965) as *Cylindroleberis dimorpha*.

Sta. 110; 18 March; 42°16'30"S, 74°22'W; 110 meters; shelf; American Quadrant; South Pacific; west coast of Chile; substrate of fine sand with mud and detritus; temperature at 100 meters, 9.4°C.

Anarthron chilensis: 1 adult male, 6 females [identified as *Philomedes* (*Scleroconcha*) *chilensis* by Hartmann (1965)].

Note: Hartmann (1965) also reported *Cylindroleberis dimorpha* (= *Synasterope dimorpha*) from this station.

Sta. Bahia Ingles near Chiloe; 18 March; 41°48'S, 73°53'W; 12 meters; shelf; American Quadrant; South Pacific; west coast of Chile; substrate of mud with sand and rocks.

Parasterope pseudoquadrata: several specimens from Probe 87—identified by Hartmann (1965) as *Cylindroleberis pseudoquadrata*.

Rutiderma gerdhartmanni: 2 gravid females, 1 female, 1 adult male—identified by Hartmann (1965) as *Rutiderma compressa*.

Rutiderma species A: 1 N-1 male plus 2 disarticulated valves—identified by Hartmann (1965) as *Rutiderma compressa*.

Note: Hartmann (1965) also identified from this station *Cycloleberis rotundicostata* (= *Asteropella rotundicostata*) and *Cycloleberis* cf. *orbicularis*.

New Zealand

New Zealand, restudy of Brady material collected in 1897. Lyttelton Harbor; August; 43°30'S, 173°E; 1.8-9.1 meter; dredge; shelf; Australian Quadrant; South Pacific; east coast of South Island.

In collection at Copenhagen Museum.

Scleroconcha flexilis: 2 females identified by E. M. Poulsen (1962), 227 specimens.

Scleroconcha arcuata: 1 gravid female, 1 juvenile.

Parasterope ?quadrata: 1 adult male.

Cymbicopia hispida: 1 adult female, 1 adult male, 1 juvenile male, 3 adult females with chonistomatid copepods, 5 gravid females and 42 females and juveniles.

Cymbicopia hansenii: 2 adult males, 4 adult females without eggs, 15 juveniles.

Cymbicopia brevicosta: 1 adult female without eggs.

In collection of Hancock Museum.

Scleroconcha flexilis: 2 specimens on slide; 1 specimen (received dry but returned in alcohol); 120 specimens

including many gravid females, adult females without eggs, and juveniles.

Parasterope quadrata: 1 adult male, 1 N-1 male, 2 juvenile females (probably N-1 instars), 4 juveniles.

Cymbicopia hispida: 2 adult males, 1 juvenile male, 1 juvenile female, 1 juvenile (lost).

Cymbicopia hansenii: 4 gravid females, 2 adult females without eggs, 1 adult male, 15 juveniles.

Akaroa Harbor; August 1897; 44°S, 173°E; 11 meters; shelf; Australian Quadrant; South Pacific; east coast of South Island.

In collection of Hancock Museum.

Scleroconcha wolffi: (identified by Brady, 1898, as *Philomedes flexilis*), 1 male on slide.

Scleroconcha species indet.: (identified as *Philomedes flexilis* by Brady, 1898), 1 female on slide.

Parasterope ?quadrata: (identified as *Asterope grisea* by Brady, 1898), 9 juveniles.

Diasterope grisea: 310 specimens in alcohol (66 adult females including 32 gravid specimens, 2 adult males and 242 juveniles); 1 adult male and 2 females on slides.

In collection of Copenhagen Museum.

Scleroconcha flexilis: 1 adult male, 1 gravid female, 1 adult female, 3 juveniles.

Scleroconcha wolffi: 1 gravid female, 2 adult females without eggs, plus 36 specimens, mostly juveniles.

Parasterope ?quadrata: 1 ?adult female.

Cymbicopia brevicosta: 1 adult male, 4 gravid females, 2 adult females without eggs (1 with nematodes), 2 empty carapaces.

Cymbicopia hansenii: 1 N-1 male.

Cymbicopia hispida: 1 adult female.

Otago Harbor; no date; 46°S, 171°E; surface net; shelf; Australian Quadrant; South Pacific; east coast of South Island.

In collection of British Museum (Natural History).

Scleroconcha sculpta: 1 male (received dry returned in alcohol).

Palmer Station

Palmer Station, January 1969; collected by John C. McCain, Oregon State University.

Sta. AH4-20; 25 January 1969; 64°46'36"S, 64°03'29"W; 6.1 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Doloria levis: 1 gravid female, 2 juveniles.

Homasterope maccaini: 34 gravid females, 16 adult females without eggs, 3 adult males, 10 juveniles.

Skogsbergiella scottii: 18 gravid females, 7 adult females, 13 juveniles.

Sta. AH4-25; 25 January 1969; 64°46'36"S, 64°03'29"W; 7.6 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia sub-

region; Arthur Harbor; Anvers Island; Palmer Archipelago.

Homasterope maccai: 1 adult male.

Skogsbergiella scotti: 1 gravid female, 1 adult female; 1 juvenile.

Sta. AH4-30; 25 January 1969; 64°46'36"S, 64°03'29"W; 9.1 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Homasterope maccai: 27 gravid females; 11 adult females without eggs, 7 adult males, 18 juveniles.

Skogsbergiella scotti: 1 gravid female, 2 adult females without eggs.

Sta. AH4-45; 25 January 1969; 64°46'36"S, 64°03'29"W; 13.7 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Doloria levis: 1 juvenile female.

Homasterope maccai: 1 adult male.

Sta. AH4-50; 25 January 1969; 64°46'36"S, 64°03'29"W; 15.2 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Doloria levis: 5 gravid females, 2 juveniles.

Homasterope maccai: 1 gravid female, 1 juvenile.

Sta. AH4-60; 26 January 1969; 64°46'36"S, 64°03'29"W; 18.3 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Doloria levis: 1 gravid female.

Sta. AH4-70; 28 January 1969; 64°46'36"S, 64°03'29"W; 21.3 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island, Palmer Archipelago.

Parasterope ohlini: 1 gravid female.

Homasterope maccai: 2 gravid females.

Sta. AH4-80; 26 January 1969; 64°46'36"S, 64°03'29"W; 24.4 meters; collected by hand; shelf; American Quadrant; Weddell Sea; Antarctic; Continental subregion; Scotia subregion; Arthur Harbor; Anvers Island; Palmer Archipelago.

Doloria levis: 9 gravid females, 3 adult females, 1 juvenile male (N-1), 1 juvenile.

Homasterope maccai: 1 gravid female.

Species-Locality List

The following list includes records by other authors and localities adjacent to the study area (new records*; endemic species†):

ANTARCTIC COAST, BAYS, AND SEAS

WEDDELL SEA

species	no. of	
	sta.	depth (m)
<i>Metavargula</i> sp. indet.*	1	650
<i>Vargula antarctica</i> *	1	3658

species	no. of	
	sta.	depth (m)
<i>Philomedes assimilis</i> *	2	803-805
<i>Philomedes heptathrix</i> *†	4	250-570
<i>Philomedes</i> sp. indet.	2	513-657
<i>Scleroconcha gallardoi</i> *	1	250
<i>Scleroconcha</i> sp. indet.	2	378-513
<i>Synasterope duplex</i> *†	1	3035
<i>Spinacopia mastix</i> *†	1	3035
<i>Skogsbergiella</i> sp. indet.*	1	3035
<i>Empoulsenia weddellensis</i> *†	1	650
<i>Empoulsenia</i> sp. indet.	3	250-270

ROSS SEA

<i>Doloria levis</i>	1	81-70
<i>Philomedes assimilis</i>	10	75-876
<i>Philomedes orbicularis</i>	2	75-400
<i>Philomedes heptathrix</i> *†	1	400
<i>Philomedes</i> sp. indet.	2	128-400
<i>Scleroconcha gallardoi</i> *	1	400
<i>Diasterope schmitti</i> *†	3	75-400
<i>Empoulsenia pentathrix</i> *	1	344-351

FOYN HARBOR, WILHELMINA BAY, DANCO COAST

<i>Philomedes</i> sp. indet.*	1	45.7-49.4
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GRAHAM COAST

<i>Philomedes charcoti</i>	1	less than 300
<i>Philomedes</i> sp. indet.	1	less than 300

MARGUERITE BAY, BELLINGSHAUSEN SEA

<i>Doloria levis</i> *	1	302
<i>Philomedes assimilis</i> *	1	73.2
<i>Philomedes orbicularis</i> *	1	302
<i>Scleroconcha gallardoi</i> *	1	302
<i>Empoulsenia pentathrix</i> *	1	302

KING GEORGE V COAST

<i>Philomedes assimilis</i>	1	?
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ADELIE COAST

<i>Philomedes assimilis</i>	6	10-67
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WILHELM II COAST

<i>Vargula antarctica</i>	1	385
<i>Philomedes assimilis</i>	2	80-385
<i>Homasterope glacialis</i> †	1	385

MAC. ROBERTSON LAND

<i>Doloria isaaci</i> *†	2	219
<i>Vargula antarctica</i>	1	219
<i>Philomedes assimilis</i>	2	163-210
<i>Skogsbergiella</i> sp. indet.*	1	219

ENDERBY LAND

<i>Doloria isaaci</i> *†	3	193-300
<i>Vargula antarctica</i>	3	193-300
<i>Skogsbergiella</i> sp. indet.*	1	300

<i>species</i>	<i>no. of sta.</i>	<i>depth (m)</i>	<i>species</i>	<i>no. of sta.</i>	<i>depth (m)</i>
PRINCESS MARTHA COAST			SHELF BETWEEN KING GEORGE AND ELEPHANT ISLANDS		
<i>Empoulsenia pentathrix</i> *	2	238-1051	<i>Skogsbergiella spinifera</i> *	1	220-240
PALMER ARCHIPELAGO			<i>Empoulsenia antarctica</i> *	1	220-240
ARTHUR HARBOR, ANVERS ISLAND			<i>Empoulsenia</i> sp.	1	220-240
<i>Doloria levis</i> *	5	6.1-24.4	ENGLISH STRAIT (between Greenwich and Robert Islands)		
<i>Parasterope ohlini</i> *	2	21.3; 39	<i>Philomedes assimilis</i> *	1	338
<i>Philomedes orbicularis</i> *	4	39	<i>Philomedes orbicularis</i>	22	82-405
<i>Skogsbergiella scotti</i> *	3	6.1-9.1	<i>Scleroconcha gallardoi</i>	6	200-405
<i>Homasterope maccaini</i> *	7	6.1-24.4	<i>Parasterope ohlini</i>	2	90, 338
FOURNIER BAY, ANVERS ISLAND			<i>Empoulsenia pentathrix</i>	5	130-405
<i>Parasterope ohlini</i> *	1	113	<i>Skogsbergiella skogsbergi</i> †	1	274
MELCHIOR HARBOR, GAMMA ISLAND, MELCHIOR ISLANDS			<i>Skogsbergiella spinifera</i>	1	335
<i>Philomedes orbicularis</i> *	1	45.7	KERGUELEN PLATEAU		
PORT LOCKROY, WIENCKE ISLAND			? <i>Scleroconcha</i> sp. indet.*	1	615
<i>Philomedes charcoti</i> *	2	15-37	KERGUELEN ISLANDS		
<i>Philomedes orbicularis</i> *	6	15-37	? <i>Vargula danae</i>	1	219.5
<i>Scleroconcha gallardoi</i> *	2	15-22.5	<i>Philomedes lofthouseae</i> *†	5	25-130
<i>Homasterope maccaini</i> *	1	22.5	<i>Synasterope arnaudi</i> *†	1	50
ANDERSEN HARBOR, ETA ISLAND, MELCHIOR ISLANDS			<i>Skogsbergiella scotti</i> *	1	10-35
<i>Philomedes charcoti</i> *	1	55	<i>Skogsbergiella</i> sp. indet.		270
<i>Philomedes orbicularis</i> *	1	55	<i>Empoulsenia</i> sp. indet.*	1	150
<i>Scleroconcha</i> sp. indet.*	1	55	BRANSFIELD STRAIT		
BRABANT ISLAND			<i>Philomedes assimilis</i> *	1	210-220
<i>Philomedes orbicularis</i> *	1	93-95 m	<i>Scleroconcha gallardoi</i> *	1	1180
SOUTH SHETLAND ISLANDS			<i>Parasterope ohlini</i> *	2	215-368
DISCOVERY BAY, GREENWICH ISLAND			<i>Skogsbergiella spinifera</i> *	2	368-500
<i>Philomedes assimilis</i> *	1	40	<i>Skogsbergiella</i> sp. indet.	1	210-220
<i>Philomedes charcoti</i> *	1	40	<i>Empoulsenia</i> sp. indet.*	1	1180
<i>Philomedes orbicularis</i>	25	33-283	<i>Spinacopia antarctica</i> †	1	210-220
<i>Scleroconcha gallardoi</i>	3	33, 39, 225	SOUTH ORKNEY ISLANDS		
<i>Parasterope ohlini</i>	1	66	<i>Doloria levis</i> *	1	298-302
<i>Empoulsenia pentathrix</i>	2	40, 188	<i>Philomedes assimilis</i>	1	?
LIVINGSTON ISLAND			<i>Skogsbergiella scotti</i> *	2	298-302
<i>Doloria levis</i>	1	31.1	<i>Skogsbergiella spinifera</i> *	1	613-604
BOYD STRAIT (between Snow and Smith Island)			<i>Empoulsenia pentathrix</i> *	1	298-302
<i>Skogsbergiella spinifera</i> *	1	656-670	<i>Homasterope maccaini</i> *	1	?
LOW ISLAND			SOUTHWEST PACIFIC BASIN		
<i>Philomedes charcoti</i> *	1	91-95	<i>Hadacypridina bruuni</i> *	1	5340
DECEPTION ISLAND			<i>Azygocypridina imperator</i> †	1	2012
<i>Philomedes charcoti</i>	3	32, 37, 112	MACQUARIE RIDGE		
<i>Scleroconcha gallardoi</i>	2	99, 110	<i>Parasterope micrommata</i> *	2	86-124
			<i>Skogsbergiella</i> sp. indet.*	1	69
			TASMAN PLATEAU		
			<i>Metavargula adinothrix</i> *	1	1790-1803
			<i>Vargula lusca</i> *†	1	910-915

species	no. of		species	no. of	
	sta.	depth (m)		sta.	depth (m)
ALBATROSS CORDILLERA					
<i>Vargula sutura</i> *	1	3386-3477	<i>Skogsbergiella macrothrix</i> *	1	450-454
<i>Philomedes</i> sp. indet.*	1	3587-3817	<i>Bathyleberis monothrix</i> *	1	546-676
<i>Igene walleni</i> *†	1	3386-3817	<i>Cycloleberis poulsemit</i> †	1	15
<i>Skogsbergiella</i> sp. indet.*	2	3386-3477	<i>Adelta theta</i> *†	1	15
<i>Bathyleberis grossmani</i> *	1	3386-3477	40°-45°S		
KERMADEC TRENCH					
<i>Hadacypridina bruuni</i>	1	6000	<i>Doloria pectinata</i> *	1	129
SCOTIA RIDGE					
<i>Doloria levinsoni</i> *	1	2800-2837	<i>Doloria</i> sp. indet.	1	68
<i>Doloria</i> sp. indet.	1	2906-2946	<i>Rugosidoloria serrata</i> *†	1	44
<i>Metavargula adinothrix</i> *	1	2800-2837	<i>Philomedes subantarctica</i> *	1	129
<i>Isocypridina quatuorsetae</i> *	1	2827-2818	<i>Anarthron dithrix</i> *	6	71-102
<i>Isocypridina</i> sp. indet.	1	3382	<i>Anarthron evexum</i> *†	1	102
<i>Philomedes tetrathrix</i> *	3	2818-3382	<i>Anarthron</i> sp. indet.	3	93-1475
<i>Spinacopia menziesi</i> *	2	2818-3382	<i>Parasterope</i> sp. indet.*	2	68-1475
SOUTH GEORGIA RISE					
<i>Isocypridina quatuorsetae</i> *	1	3197-3144	<i>Skogsbergiella macrothrix</i> *	10	70-152
<i>Spinacopia menziesi</i>	1	3500	<i>Skogsbergiella pax</i> *†	1	1475
SOUTH SANDWICH TRENCH (north edge)					
<i>Philomedes tetrathrix</i> *	1	2747	<i>Skogsbergiella spinifera</i> *	1	101
<i>Synasterope mystax</i> *	1	2747	<i>Skogsbergiella</i> sp. indet.	1	95
<i>Synasterope</i> sp. indet.	1	2747	<i>Bathyleberis monothrix</i> *†	3	71-82
DRAKE PASSAGE					
<i>Metavargula adinothrix</i> *	1	3724-3825	<i>Asteropella species A</i> *	2	44-57
<i>Synasterope polythrix</i> *	1	4004-4031	<i>Asteropteron hulingsi</i> *†	1	44
<i>Bathyleberis grossmani</i> *	1	3678-3816	<i>Spinacopia variabilis</i> †	1	1475
<i>Spinacopia octo</i> *	2	3747-4758	45°-50°S		
ATLANTIC-INDIAN RIDGE					
<i>Spinacopia bisetula</i> †	1	1622	<i>Doloria levinsoni</i> *	1	424-428
SOUTH GEORGIA					
<i>Doloria levis</i> *	1	97-101	<i>Doloria pectinata</i> *	1	424-428
<i>Vargula hamata</i> *	1	659	<i>Vargula subantarctica</i> *	1	135-137
<i>Philomedes rotunda</i> †	7	69-250	<i>Philomedes subantarctica</i> *	1	424-428
<i>Scleroconcha appelloefi</i>	6	75-250	<i>Anarthron dithrix</i> *	6	105-135
<i>Parasterope ohlini</i>	4	22-301	<i>Parasterope anommata</i> *†	1	424-428
<i>Skogsbergiella spinifera</i>	1	252-310	<i>Parasterope</i> sp. indet.	1	424-428
<i>Empoulsenia quinquesetae</i>	2	237-281	<i>Skogsbergiella macrothrix</i> *	8	105-426
<i>Homasterope curta</i> †	4	12-52	<i>Skogsbergiella</i> sp. indet.	2	131-228
ARGENTINA SHELF AND SLOPE (including slope around Staten and Falkland Islands)					
35°-40°S					
<i>Doloria</i> sp. indet.*	1	1912	<i>Spinacopia variabilis</i> †	1	135
<i>Siphonostra hallex</i> *†	1	15	50°-55°S		
<i>Vargula hamata</i> †	1	450-454	<i>Doloria levinsoni</i> *	2	572-857
<i>Vargula subantarctica</i> *	1	547-676	<i>Doloria pectinata</i>	2	75-108
			<i>Doloria</i> sp. indet.	1	101
			<i>Vargula dentata</i> *	3	572-857
			<i>Vargula hamata</i> *	3	572-857
			<i>Vargula subantarctica</i> *	1	572
			<i>Vargula</i> sp. indet.	3	572-857
			<i>Isocypridina</i> sp. indet.*	3	1511
			<i>Philomedes minys</i> †	2	31-108
			<i>Philomedes subantarctica</i> *†	1	572
			<i>Anarthron dithrix</i> *	2	108-116
			<i>Anarthron evexum</i> †	2	79-284
			<i>Anarthron pholion</i> *†	4	82-284
			<i>Parasterope longiseta</i> *	4	75-108
			<i>Parasterope</i> sp. indet.	1	31
			<i>Skogsbergiella macrothrix</i> *	2	108-572
			STATEN ISLAND SHELF		
			<i>Philomedes</i> sp. indet.*	1	44

<i>species</i>	<i>no. of sta.</i>	<i>depth (m)</i>	<i>species</i>	<i>no. of sta.</i>	<i>depth (m)</i>
FALKLAND ISLANDS SHELF					
<i>Doloria pectinata</i>	2	108-197	<i>Anarthron chilensis</i> †	2	112
<i>Parasterope longiseta</i>	4	12-40	<i>Anarthron reticulata</i> *†	3	110-210
ARGENTINE BASIN					
<i>Isocypridina quatuorsetae</i> *	1	1281-1272	<i>Parasterope pseudoquadrata</i> †	1	12
BURDWOOD BANK					
<i>Doloria pectinata</i>	2	137-150	<i>Synasterope dimorpha</i>	4	110-210
<i>Doloria</i> sp. indet.	1	429	<i>Skogsbergiella plocus</i> *†	1	112
<i>Vargula dentata</i> *	1	429	<i>Homasterope micra</i> *†	1	112
<i>Vargula hamata</i> *	1	429	<i>Asteropella rotundicostata</i> †	1	12
<i>Vargula subantarctica</i> *	1	119	<i>Cycloleberis</i> sp. indet.	1	12
<i>Anarthron dithrix</i> *	1	119	<i>Rutiderma gerdhartmanni</i> †	1	12
<i>Empoulsenia pentathrix</i> *	1	429	<i>Rutiderma</i> species A	1	12
<i>Skogsbergiella spinifera</i> *	1	119	<i>Scleraner chacaoi</i> †	2	190-240
FALKLAND TROUGH					
<i>Doloria levinsoni</i> *	1	2453	45°-50°S		
<i>Metavargula adinothrix</i> *	2	2155-2453	<i>Anarthron dithrix</i> *	1	1201-1146
<i>Synasterope mystax</i> *	1	4006	<i>Skogsbergiella macrothrix</i> *	1	1201-1146
<i>Synasterope</i> sp. indet.	1	4006	50°-55°S		
STRAIT OF MAGELLAN					
<i>Doloria pectinata</i>	5	21.3-270	<i>Doloria pectinata</i> *	1	97
<i>Metavargula</i> sp. indet.*	1	255	<i>Philomedes tetrathrix</i> *	2	516-1226
<i>Philomedes cubitum</i> *†	2	21.3-28	<i>Scleroconcha frons</i> *†	1	1190-1263
<i>Philomedes eugeniae</i>	4	7-270	<i>Anarthron</i> sp. indet.*	1	?
<i>Philomedes</i> sp. indet.	3	20-40	<i>Archasterope bulla</i> *	1	214
<i>Anarthron</i> sp. indet.*	2	21.3-214	<i>Archasterope</i> sp. indet.	2	214-703
<i>Skogsbergiella macrothrix</i> *	1	150	<i>Parasterope longiseta</i> *	1	97
<i>Skogsbergiella spinifera</i>	1	70	<i>Synasterope brachythrix</i> *†	3	78-425
<i>Parasterope prolixa</i> *†	3	20-40	<i>Synasterope</i> sp. indet.	1	214
<i>Synasterope brachythrix</i> *†	1	214	<i>Skogsbergiella macrothrix</i> *	1	516
<i>Synasterope</i> sp. indet.	1	214	<i>Rutiderma</i> species B*	2	1-97
<i>Archasterope bulla</i> *	1	279	<i>Scleraner chacaoi</i> *†	1	30
<i>Archasterope</i> sp. indet.	1	214	55°-60°S		
<i>Scleraner chacaoi</i> *†	1	21.3	<i>Doloria pectinata</i>	6	42-439
CHILEAN SHELF AND SLOPE					
30°-35°S					
<i>Anarthron reticulata</i> *†	1	141-147	<i>Doloria septenaria</i> *	1	439
<i>Cycloleberis orbicularis</i> †	1	?	<i>Doloria</i> sp. indet.	1	439
<i>Rutiderma ovata</i> *†	1	176-192	<i>Vargula hamata</i> *	2	439-1212
35°-40°S					
<i>Scleroconcha frons</i> *†	1	957	<i>Vargula</i> sp. indet.	1	439
<i>Anarthron chilensis</i> †	1	100	<i>Anarthron dithrix</i> *	1	71
<i>Anarthron reticulata</i> †	1	235-295	<i>Anarthron</i> sp. indet.	1	42
<i>Synasterope dimorpha</i>	2	84-100	<i>Parasterope longiseta</i> *	1	71
<i>Skogsbergiella macrothrix</i> *	1	235-295	<i>Parasterope</i> sp. indet.	1	439
40°-45°S					
<i>Isocypridina quatuorsetae</i> *	1	397-501	<i>Skogsbergiella</i> sp. indet.*	2	71-206
			<i>Empoulsenia pentathrix</i> *	1	1212
			<i>Spinacopia</i> sp. indet.*	1	1806-2013
			SOUTHEAST PACIFIC BASIN		
			<i>Synasterope</i> sp. indet.*	1	3848-3980
			<i>Spinacopia octo</i>	1	3495
			PERU-CHILE TRENCH		
			<i>Igene walleni</i> *†	1	4303
			<i>Parasterope styx</i> *	1	4303
			<i>Bathyleberis grossmani</i> *	1	4303
			CHILE RISE (south of Peru-Chile Trench)		
			<i>Macrocypridina castanea</i> *	1	3219 (planktonic)
			<i>Philomedes ramus</i> *†	1	3219

<i>species</i>	<i>no. of</i> <i>sta.</i>	<i>depth (m)</i>	<i>species</i>	<i>no. of</i> <i>sta.</i>	<i>depth (m)</i>
<i>Philomedes tetrathrix</i> *	1	3219	<i>Cycloleberis zealandica</i>	?	?
<i>Synasterope dimorpha</i> *	1	2657-2470	(locality in doubt)		
BRAZIL SHELF			West Shelf		
<i>Asteropella agassizii</i>	1	?	<i>Dolasterope johansonii</i> †	1	26
<i>Adelta theta</i> *	1	15	West Slope		
NEW ZEALAND			<i>Bathyvargula walfordi</i> †	1	10-1
THREE KINGS ISLANDS			<i>Cypridinodes reticulata</i> †	1	10-15
<i>Codonocera cruenta</i>	2	planktonic	Stewart Island		
<i>Paracypridina aberrata</i>	1	130	<i>Scleroconcha flexilis</i>	1	
<i>Parasterope pectinata</i>	1	100	<i>Synasterope empoulseni</i>	1	
<i>Synasterope empoulseni</i>	1	110	<i>Cycloleberis ovulum</i>	?	
NORTH ISLAND			<i>Cymbicopia zealandica</i> †	1	
<i>Cycloleberis bradyi</i>	1	15	AUSTRALIA		
<i>Cycloleberis ?bradyi</i>	2	3-20	<i>?Cypridina thielei</i> †	1	
<i>Cypridina inermis</i>	1	planktonic	<i>Cypridinodes asymmetrica</i> †	1	
<i>Euphilomedes agilis</i> *	1	intertidal	<i>Cypridinodes wyvillethomsoni</i> †	1	
<i>Scleroconcha</i> sp. indet.*	1	intertidal	<i>Cypridinodes ?wyvillethomsoni</i>	3	
<i>Parasterope</i> sp. indet.*	1	intertidal	<i>Paradolonia australis</i> †	1	
COOK STRAIT			<i>Vargula puppis</i> †	3	
<i>Scleroconcha arcuata</i>	2	117-146	<i>Vargula tubulata</i> †	1	
SOUTH ISLAND			<i>Azygocypridina</i> sp.	1	
Otago Harbor			<i>Pterocypridina excreta</i> †	1	
<i>Euphilomedes agilis</i> *	?	planktonic	<i>Euphilomedes ferox</i> †	1	
<i>Scleroconcha sculpata</i>	?	planktonic	<i>Archasterope dentata</i> †	1	
<i>Parasterope ?quadrata</i> *	?	planktonic	<i>Synasterope bassana</i> †	1	180
Lyttelton Harbor			<i>?Cyclasterope albomaculata</i> †	1	?
<i>Scleroconcha arcuata</i> *	?	1.8-9.1	<i>Asteropteron magnum</i> †	2	70-100
<i>Scleroconcha flexilis</i>	?	1.8-9.1	<i>Sarsiella magna</i> †	1	70-100
<i>Parasterope ?quadrata</i>	1	1.8-9.1	AFRICA		
<i>Parasterope quadrata</i>	?	1.8-9.1	SOUTH AFRICA		
<i>Cycloleberis ?zealandica</i>	?	3.7-9.1	<i>"Cypridina" nobilis</i>	1	planktonic
<i>Cymbicopia brevicosta</i> *†	1	1.8-9.1	<i>Paradolonia vanhoeffeni</i>	3	20
<i>Cymbicopia hanseni</i> †	?	1.8-9.1	<i>Paradolonia dorsoserrata</i>	1	?
<i>Cymbicopia hispida</i> †	1	1.8-9.1	<i>Paradolonia capensis</i>	3	planktonic
Akaroa Harbor			<i>Skogsbergia caudata</i>	1	planktonic
<i>Scleroconcha wolffi</i> *	?	11	<i>Paravargula arborea</i>	2	20-?
<i>Scleroconcha</i> sp. indet.	?	11	<i>Azygocypridina africanus</i>	3	156-229
<i>Diasterope grisea</i>	?	11	<i>Philomedes</i> sp. indet.*	1	1861
<i>Parasterope quadrata</i>	?	?	<i>Archasterope</i> sp. indet.*	1	1861
<i>Parasterope ?quadrata</i>	1	11	<i>Asteropteron nodulosum</i>	1	20
<i>Cymbicopia brevicosta</i> *†	1	11	<i>Cycloleberis galathea</i>	2	20
<i>Cymbicopia hanseni</i> *†	?	11	<i>Sarsiella lunata</i> *	1	179
<i>Cymbicopia hispida</i> †	?	11	<i>Sarsiella</i> sp.	1	?
Taieri Beach			<i>Rutiderma compressa</i>	1	?
<i>Euphilomedes agilis</i>	?	?	SOUTH-WEST AFRICA		
East Shelf			<i>Paradolonia dorsoserrata</i>	2	?
<i>Parasterope crinita</i> *	1	51	<i>Euphilomedes africana</i>	3	1-?
			<i>Parasterope muelleri</i> ?	7	?
			<i>Cylindroleberis grimaldi</i>	4	?
			<i>Rutiderma compressa</i>	1	1-2

Faunal Resemblance

The faunal resemblance between areas may be shown numerically by use of the Simpson Index (Simpson, 1960; Peters, 1968; King and Kornicker, 1970):

$$\frac{\text{Number of taxa common to both areas} \times 100}{\text{Number of taxa in smaller fauna}}$$

SHELF AND SLOPE (0-2000 m).—Resemblance indices obtained by use of the above formula on shelf and slope species and genera are compared for continents in Table 1. The indices indicate a zero resemblance between assemblages of species from all continents except South America and Antarctica, which have a very low Simpson Index of 9.5.

At the generic level, the indices are highest between Antarctica and South America (SI=75), lowest between Antarctica and southern Africa (SI=15) and intermediate between Antarctica and New Zealand (SI=36), and Antarctica and Australia (SI=18). The faunal resemblance between

Africa and Australia (SI=45) is about the same as for Africa and South America (SI=46) and lower for Africa and New Zealand (SI=17). The faunal resemblance between New Zealand and Antarctica and New Zealand and South America is the same (SI=36) and lower for New Zealand and Australia (SI=27).

The indices for resemblances between local areas at the generic and specific level are given in Table 2. At the generic level, the indices indicate a greater resemblance (SI=65+) between assemblages from Antarctic coast, bays and seas, Palmer Archipelago, South Shetland Islands, Bransfield Strait, South Orkney Islands, South Georgia, Argentine shelf and slope including Staten and Falkland Islands, Chilean shelf and slope than between other areas (SI=less than 60). An exception is the Kerguelen Islands which have a Simpson Index of 80 with both the Chilean shelf and slope and the Antarctic coast, bays and seas.

At the species level, the Simpson Indices relating localities within the Continental subregion (excluding the South Georgia district) have a range of 40 to 80 (average 55.5).

The indices suggest that species assemblages within the Continental subregion (with the exception of Antarctic coasts, bays, and seas) are more closely related to South Georgia than they are to assemblages in the vicinity of Argentina and Chile, and may be more closely related to assemblages in the vicinity of Argentina and Chile than they are to the assemblages in the vicinity of the Kerguelen Islands. Assemblages of New Zealand, Australia, South and South-West Africa are unrelated to those in the Continental subregion.

The assemblage of South Georgia Island is more closely related to assemblages of adjacent localities within the Continental subregion (South Orkney Islands, Bransfield Strait, South Shetland Islands, Palmer Archipelago. The range of Simpson Indices relating South Georgia Island with these localities is 29 to 40) than to the assemblage on the Argentine shelf and slope (SI=25) or Chilean shelf and slope (SI=25), but is less closely related to the assemblage of Antarctic coast, bays and seas (SI=12.5).

The Simpson Indices obtained for genera and species collected at abyssal depths are shown in Table 3. The table includes bathyal localities of species that occurred elsewhere at abyssal depths.

TABLE 1.—Simpson indices between continents

Continents	South and South-West Africa	Australia	New Zealand	South America	Antarctica (including South Shetland and South Orkney Islands and Palmer Archipelago)
	GENERA				
South and South-West Africa	●	45	27	46	15
Australia	0	●	27	36	18
New Zealand	0	0	●	36	36
South America	0	0	0	●	75
Antarctica (including South Shetland and South Orkney Islands and Palmer Archipelago)	0	0	0	9.5	●
SPECIES					

TABLE 2.—Simpson indices between localities

Localities	Antarctic Coast, bays and seas	Palmer Archipelago	South Shetland Islands	Bransfield Strait	South Orkney Islands	South Georgia Islands	Argentine shelf and slope, Staten and Falkland Islands	Chilean shelf and slope	Kerguelen Islands	Australia	New Zealand	South and South-West Africa
		●	83	83	83	100	87.5	45	73	80	18	27
Antarctic coast, bays and seas	57	●	83	67	80	100	67	100	40	0	33	33
Palmer Archipelago	60	71	●	83	80	100	83	100	60	0	33	33
South Shetland Islands	40	40	80	●	60	100	100	83	60	0	33	33
Bransfield Strait	50	50	67	40	●	100	80	80	60	0	0	20
South Orkney Islands	12.5	29	37.5	40	33	●	75	87.5	60	12.5	25	25
South Georgia Island	7	0	20	20	33	25	●	53	60	27	27	23
Argentine shelf and slope, Staten, Falkland Islands	14	0	20	20	33	25	25	●	80	27	27	31
Chilean shelf and slope	0	25	0	0	25	0	0	0	●	20	40	20
Kerguelen Islands	0	0	0	0	0	0	0	0	0	●	27	45
Australia	0	0	0	0	0	0	0	0	0	0	●	27
New Zealand	0	0	0	0	0	0	0	0	0	0	0	●
South and South-West Africa	0	0	0	0	0	0	0	0	0	0	0	●
	SPECIES											

TABLE 3.—Simpson indices between abyssal areas

Abyssal areas	Kermadec Trench	Southwest Pacific Basin	Albatross Cordillera	Chile Rise	Peru-Chile Trench	Southeast Pacific Basin	Weddell Sea	Drake Passage	South Sandwich Trench	South Georgia Rise	Falkland Trough	Scotia Ridge
		●	100	0	0	0	0	0	0	0	0	0
Kermadec Trench	100	●	0	0	0	0	0	0	0	0	0	0
Southwest Pacific Basin	0	0	●	0	67	0	0	33	0	0	0	0
Albatross Cordillera	0	0	0	●	0	0	50	50	100	0	50	50
Chile Rise	0	0	67	0	●	0	0	33	0	0	0	0
Peru-Chile Trench	0	0	0	0	0	●	0	100	0	0	0	0
Southeast Pacific Basin	0	0	0	0	0	0	●	0	100	50	50	50
Weddell Sea	0	0	33	0	33	100	0	●	50	50	67	67
Drake Passage	0	0	0	50	0	0	0	0	●	0	50	100
South Sandwich Trench	0	0	0	0	0	0	0	0	0	●	50	100
South Georgia Rise	0	0	0	0	0	0	0	33	50	0	●	67
Falkland Trough	0	0	0	0	0	0	0	33	50	100	67	●
Scotia Ridge	0	0	0	0	0	0	0	33	50	100	67	●
	SPECIES											

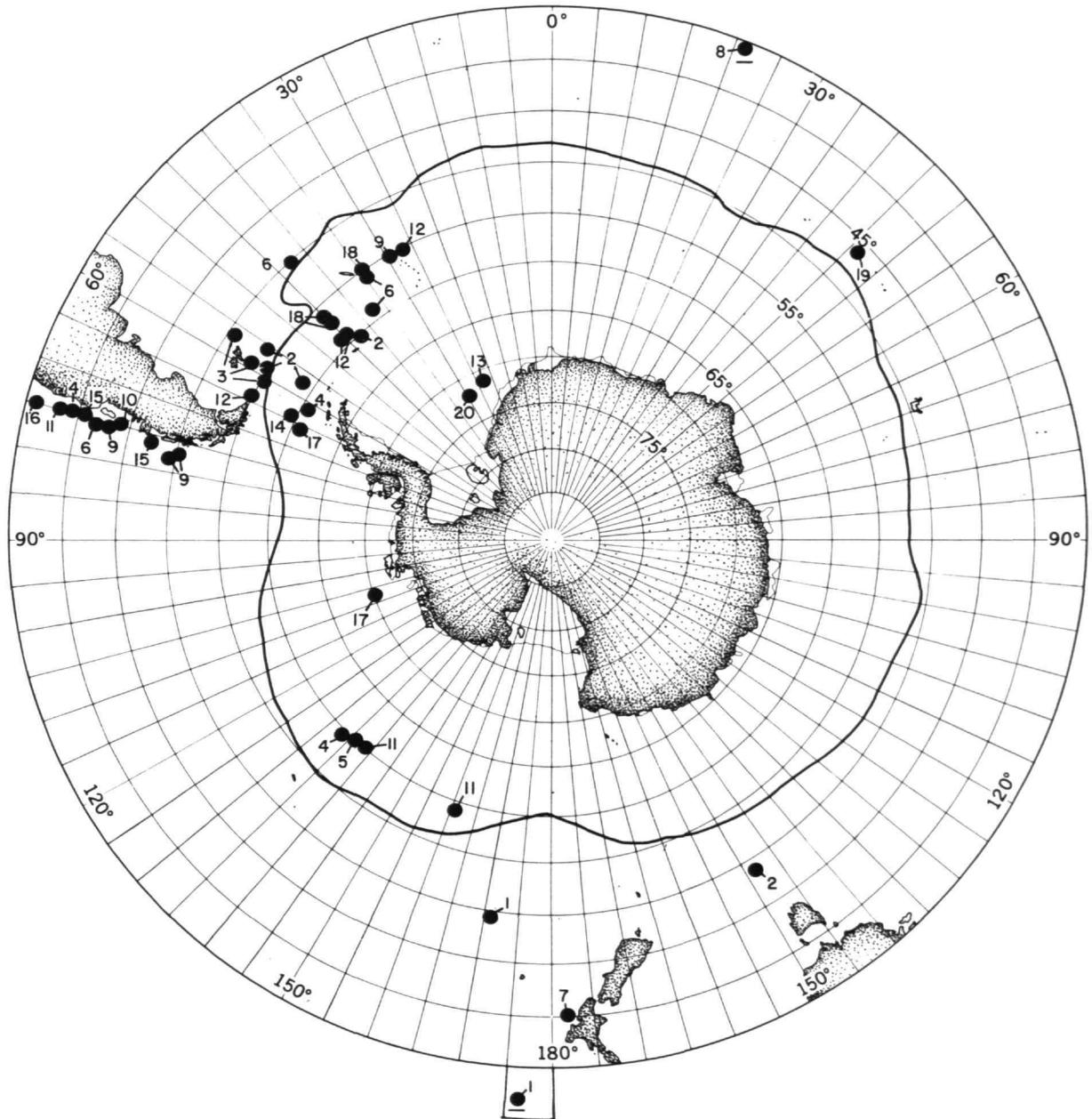


FIGURE 7.—Map showing distribution of abyssal species. Numbers on map refer to species as follows: 1, *Hadacypridina bruuni*; 2, *Metavargula adinothrix*; 3, *Doloria levinsoni*; 4, *Bathyleberis grossmani*; 5, *Vargula sutura*; 6, *Isocypridina quatuorseta*; 7, *Azygocypridina imperator*; 8, *A. africanus*; 9, *Philomedes tetrathrix*; 10, *P. ramus*; 11, *Igene walleni*; 12, *Synasterope mystax*; 13, *S. duplex*; 14, *S. polythrix*; 15, *S. dimorpha*; 16, *Parasterope styx*; 17, *Spinacopia octo*; 18, *S. menziesi*; 19, *S. bisetula*; 20, *S. mastix*. (In all distribution maps, underlined datum point = locality reported by previous author.)

Because of so few samples from abyssal depths in quadrants other than the American Quadrant (Figure 7), the Simpson Indices are of little use in comparing quadrants. Within the American Quadrant the Simpson Indices at the generic level are above 50 for most localities indicating close relationship; at the species level the data are too scattered for meaningful analysis.

Biotic Zonation

Several distinct biofacies occur in the study area:

1. *Skogsbergiella-Empoulsenia* biofacies. This biofacies includes only shelf and bathyal depths (0–2000 m). Species of the genus *Skogsbergiella* or *Empoulsenia* are present in the area encompassed by this biofacies. The biofacies lies mainly within the Antarctic Convergence, but it also extends outside the convergence to include the Kerguelen Islands, the Falkland Islands, the Argentine shelf south of 40°–45°S (Figure 8), and the Chilean shelf and slope south of 40°–45°S (Figure 9). Its extent is shown on the basis of known localities in Figure 10.

Philomedes assimilis subbiofacies. The subbiofacies includes only shelf and upper slope depths (0–1000 m). It lies within the *Skogsbergiella-Empoulsenia* biofacies. The species *Philomedes assimilis* is assumed to live throughout this subbiofacies. It includes the Antarctic coasts, bays and sea,

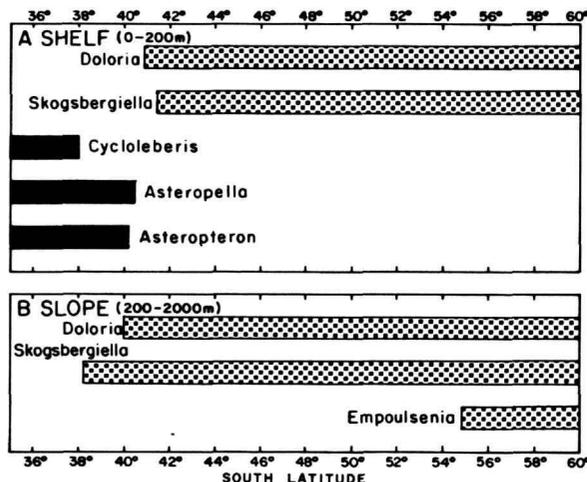


FIGURE 8.—Range of selected genera on the Argentine shelf (A) and slope (B).

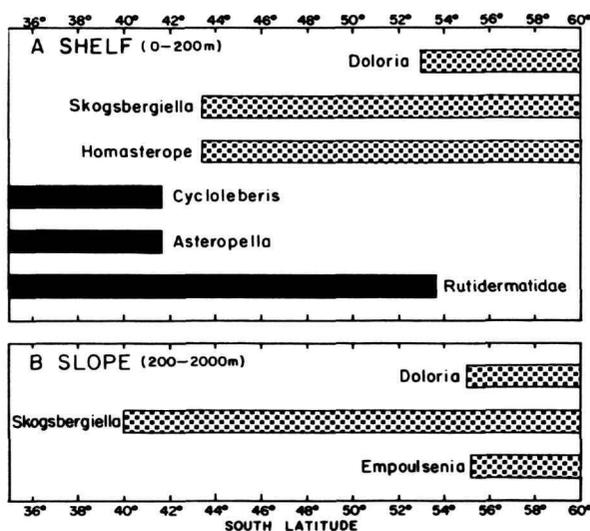


FIGURE 9.—Range of selected genera on the Chilean shelf (A) and slope (B).

the South Shetland Islands, the South Orkney Islands, and also the Palmer Archipelago, although to date *Philomedes assimilis* has not been collected there. The extent of the subbiofacies is shown in Figure 10.

2. *Cypridinodes* biofacies. This biofacies includes only shelf and upper slope depths of 0 to 610 m. Most species in this genus live in the Indo-West-Pacific region. Species of *Cypridinodes* have been collected in the study area only in the vicinity of Australia and New Zealand. The extent of this biofacies is shown in Figure 10.

3. Rutidermatidae biofacies. This biofacies in the study area is restricted to approximately shelf depths (0–240 m). Members of this family have been collected in the study area only along the Chilean coast north of 55°–60°S. This biofacies overlaps the *Skogsbergiella-Empoulsenia* biofacies along the Chilean coast (Figure 10). Outside the study area, the Rutidermatidae biofacies occurs along the western coast of South Africa and elsewhere.

4. *Spinacopia-Metavargula-Azygocypridininae* biofacies. This biofacies is restricted mainly to abyssal and bathyal depths and in some areas overlaps shallower facies. It is likely that this biofacies could be divided into subbiofacies, but an insufficient number of samples has been collected at abyssal depths to do this. This biofacies is considered here to encompass all the abyssal and lower bathyal re-

gions of the Antarctic and extends northward into other oceans. The biofacies is named for some of the taxa generally found at abyssal depths, although representatives of these taxa also live in shallower waters.

In addition to the biofacies designated above many interesting distributional patterns are evident.

The genus *Euphilomedes* which is widespread north of 35°S occurs in the study area only in the vicinity of Australia and New Zealand. The genus *Asteropella* is present only near the northern boundary of the study area along the coasts of Argentina and Chile (Figures 8,9). The genus *Asteropteron* has been collected in the study area only

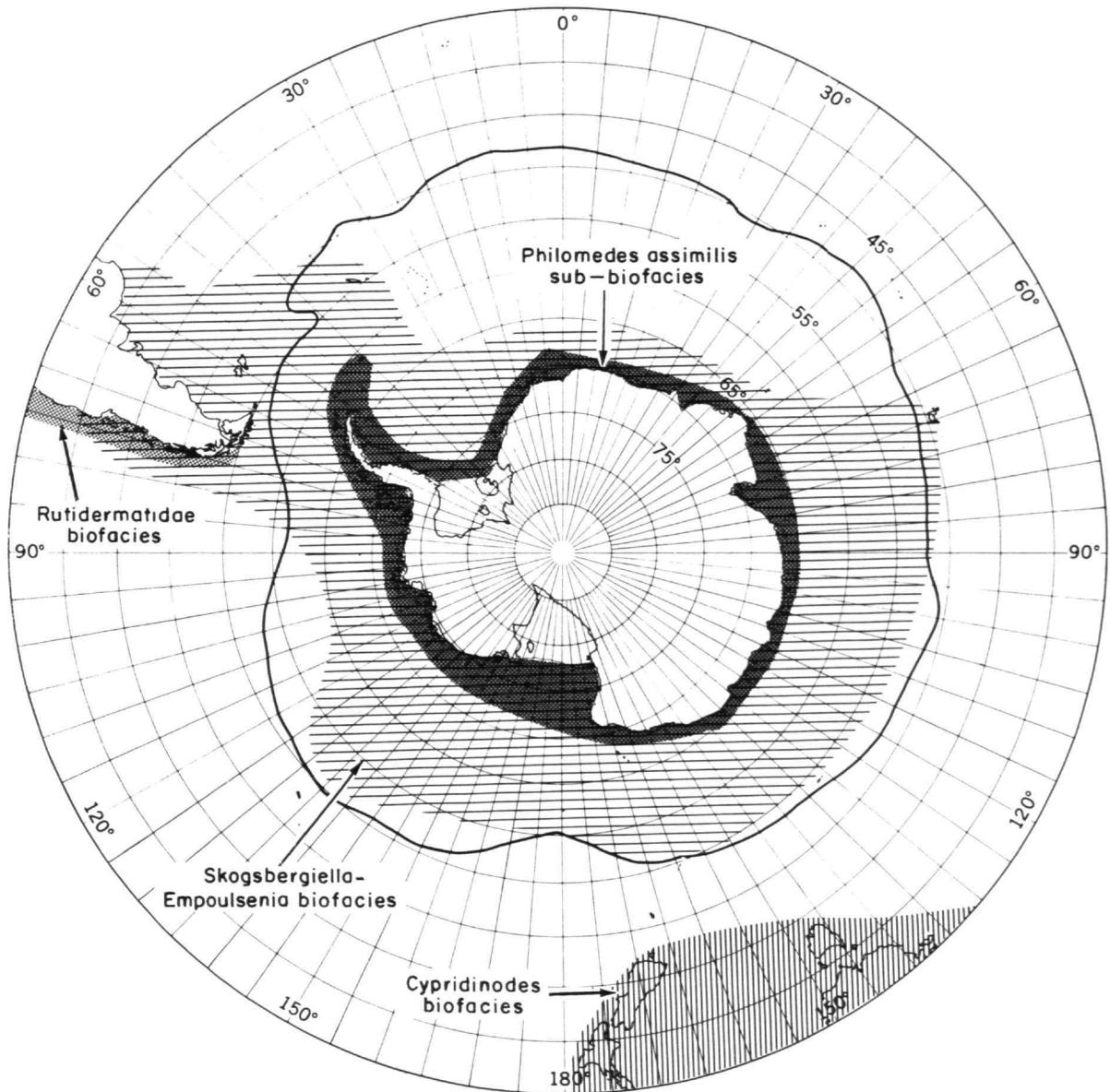


FIGURE 10.—Distribution of biofacies.

in the vicinities of Australia, South Africa, and the Argentine coast. The genus *Cycloleberis* has been collected in the study area only in the vicinities of New Zealand, Australia, South Africa, and the coasts of Chile and Argentina. The genus *Sarsiella* was collected only in the vicinities of Australia and South Africa.

For purposes of locating stations and comparing attributes of the fauna, I have used the biogeographic divisions proposed by Hedgpeth (1969, 1970, 1971) (see Figure 6). The distribution of *Myodocopina* within these divisions is shown in Tables 13–15. The following discussion is for the purpose of pointing out areas where the distribution of *Myodocopina* resembles or varies from the general scheme.

The *Philomedes assimilis* subbiofacies delimited herein encompasses the Antarctic coast, bays and seas, the South Shetland Islands, the Palmer Peninsula and the South Orkney Islands. The species has been collected from depths of 9 to 876 meters. Faunal resemblances at the species level between each of these localities at depths of 0–2000 m is high (Simpson Indices 40–80). The "Continental or High Antarctic subregion" of Hedgpeth encompasses the above areas, but perhaps the subregion should be restricted to depths shallower than 2000 m.

The placement of South Georgia in a particular biogeographical division has been difficult because it has faunal elements related to South America as well as to Antarctica. This matter has been discussed by Hedgpeth (1971) who places South Georgia in the South Georgia district, which together with the Palmer Peninsula, South Shetland Islands, Palmer Archipelago, South Orkney, and South Sandwich Islands comprise the Scotia subregion, which apparently is part of the Continental subregion. South Georgia is not within the *Philomedes assimilis* biofacies. The Simpson Indices between South Georgia and the Palmer Archipelago, South Shetland Islands and South Orkney Islands have a range of 29 to 37.5, whereas, the Simpson Index between South Georgia and Antarctic coasts, bays and seas is only 12.5, and the Simpson Index between South Georgia and the Argentine shelf and slope is 25. Thus, for the *Myodocopina*, the faunal resemblance between South Georgia and the Argentine shelf and slope is closer than between South Georgia and Antarctic coast, bays and seas, and slightly

farther apart than between South Georgia and islands off the Palmer Peninsula. The distribution of *Myodocopina* tends to support the contention that the fauna of South Georgia is intermediate between that of Antarctic and South America and, therefore, should be a subregion separate from the Continental subregion. Similar conclusions (with different terminology) were reached by Knox (1960) and Kussakin (1967), but it is apparent that because South Georgia has a fauna containing Antarctic as well as South American elements in addition to endemic species, determination of its biogeographic position is somewhat subjective.

In the vicinity of Argentina the *Skogsbergiella-Empoulsenia* biofacies extends along the shelf to latitudes of 40°–45°S and along the slope to latitudes of 35°–40°S. These latitudes more or less coincide with those shown for the northern boundary of the Subantarctic region along the Argentine coast drawn by Hedgpeth (1970, fig. 1), but is north of the boundary drawn by Hedgpeth (1969, fig. 10; 1971, fig. 15). Knox (1960) placed the northern end of his Magellanic province along the Argentine coast at 41°–44°S, which is in good agreement with the boundary indicated by the distribution of *Myodocopina*.

The *Skogsbergiella-Empoulsenia* biofacies also encompasses the Kerguelen Islands. The faunal resemblance at the species level between the *Myodocopina* of the Kerguelen Islands and Antarctic coasts, bays and seas, and South Shetland Islands, was null (Simpson Index = 0) but higher for the South Orkney Islands and the Palmer Archipelago (Simpson Index = 25). The data support the contention that the Kerguelen Islands are within the Subantarctic region as shown by Hedgpeth (1969, 1970, 1971). Insufficient collections in the vicinity of the Kerguelen, Marion, and Crozet Islands permit no conclusions concerning whether or not the distribution of the *Myodocopina* supports the concept of a Kerguelen subregion.

The *Skogsbergiella-Empoulsenia* biofacies extends to 40°–45°S along the coast of Chile. Based on the *Myodocopina*, 40°–45°S would seem to be a logical position for the northern boundary of the Subantarctic region along the Chilean coast. These latitudes are somewhat lower than suggested by Hedgpeth (1969, fig. 10; 1971, fig. 15), but similar to the latitudes suggested by Hedgpeth (1970, fig. 1). Knox (1960:614) considered the northern bound-

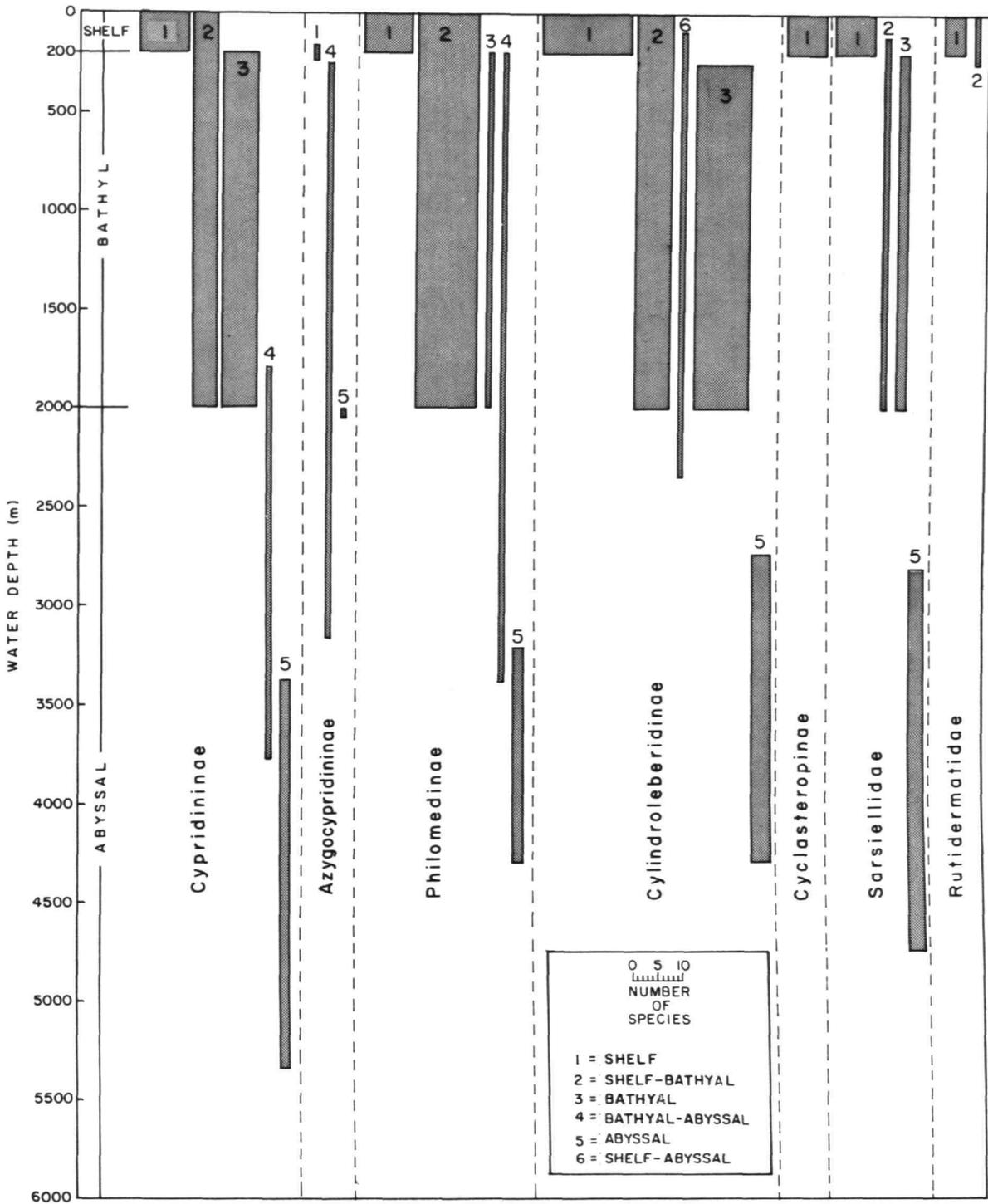


FIGURE 11.—Distribution of species with depth.

ary of Subantarctic South America to be in the vicinity of northern Chloe (42°S). Thus, the distribution of the Myodocopina supports the findings of others working with different taxa in placing the northern boundary of the Subantarctic within the latitudes of 40°–45°S along the Chilean coast.

The *Skogsbergiella-Empoulsenia* biofacies encompasses Macquarie Island. This supports the contention of Hedgpeth (1971) that Macquarie Island is within the Subantarctic region.

Because of the relatively high density of samples from along the Chilean and Argentine coasts, the northern limits of the *Skogsbergiella-Empoulsenia* biofacies are well defined there. The proximity of the northern limit of the biofacies along these two coasts and that of the Subantarctic region (see Figure 6) suggests that the northern limit of the biofacies is essentially that of the Subantarctic region, which has been established on the basis of the distribution of many organisms. In other areas within this study, the sparse distribution of samples does not permit close control of the northern limit of the biofacies, but in no instance does the *Skogsbergiella-Empoulsenia* biofacies extend north of the Subantarctic region (compare Figures 6 and 10).

Vertical Distribution

Depth is known to be an important factor affecting animal distributions because many taxa appear to be adapted to, and are found only between, specific depth ranges (Morkhoven, 1972; Belyaev,

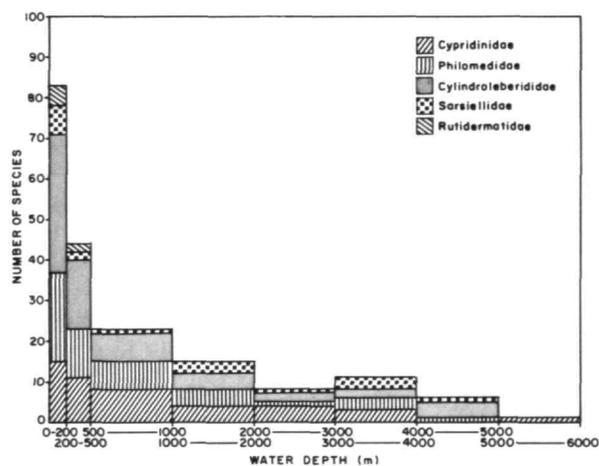


FIGURE 12.—Species abundance with depth.

1972). The effect of depth is reflected in the relatively short depth ranges of most of the species encountered in the study area (Figure 11). Many species have a range restricted to one depth zone, or extending over two adjacent depth zones (shelf-bathyal; bathyal-abyssal), but few have a range including all zones.

The number of species within the study area decreases rapidly with depth (Figure 12), but this is probably the result of most samples having been collected at relatively shallow depths. The absence of members of the family Rutidermatidae at depths below the upper slope results in a decrease in the number of families with depth (Figure 12). The Cypridinidae is the only family collected below 5000 m, but the absence of other families, as well as the absence of Myodocopina below 6000 m, could be the result of the relatively sparse sampling at abyssal depths.

The collections reported upon herein have more than doubled the number of Myodocopina known from abyssal depths (Table 4). Only two genera—*Hadacypridina* (1 species) and *Igene* (1 species)—are restricted to the abyssal zone, each genus is known from only two localities (Figure 7). In this respect, the Myodocopina support the conclusion of Barnard (1962:20) based on Amphipoda that abyssal generic endemism is low.

Relationship of Feeding Habits to Distribution

Because “fundamental nutrient needs of species are determinants of animal dispersion and their spatial and temporal distributions” (Blaxter 1970:6), food requirements of Myodocopina were surveyed to find the relationship, if any, of food habits to distribution in the study area.

Members of the family Cylindroleberididae differ greatly from other myodocopids in that they are filter feeders, filtering particles from a current produced by the ostracode, often while in its burrow (Cannon, 1933). The method of feeding is reflected in the gut contents which are fine-grained and unrecognizable (Table 16); occasionally the gut is found empty (Figure 13*h*). Cylindroleberids were common throughout the present study area, but they were dominant only at two localities within the Antarctic convergence—on a submarine cliff in the vicinity of Arthur Harbor, Anvers Island, Palmer Archipelago (Table 5, Figure 14), and at

Glacier station 0001 at 650 m in the Weddell Sea. On the submarine cliff, cylindroleberids were most abundant near the base of the surf zone, where the water was murky due to surf action.

In the Subantarctic region, cylindroleberids were dominant at the following *Vema* and *Hero* stations:

Station	Total number of specimens	Number of cylindroleberids	Depth (m)	Locality
V-14-6	15	13	105	east of Argentina
V-15-107	14	12	101	east of Argentina
V-17-12	21	16	112	west of Chile
V-17-101	24	20	454-450	east of Argentina
V-18-18	9	8	108-108	east of Argentina
H-57	27	25	214	channel off Puerto Bheno, Chile

Cylindroleberids appear alone, or in greater abundance than other families in other samples (see Station List), but the total number of specimens in the samples is too small to have statistical significance. Clearly, filter feeding myodocopids are seldom dominant in the study area.

The remaining families of Myodocopina are difficult to classify as belonging to a particular feeding type. Their gut contents generally consist of animal matter, and/or minute detritus, which may consist of organic and/or inorganic matter (Table 16, Figures 13a-g).

The gut of benthic Philomedidae generally consists of minute fragments of organisms, whole diatoms and foraminifers, or unidentifiable fine-grained organic or inorganic matter (Table 16, Figure 13g). According to Cannon (1933:755, 756),

TABLE 4.—*Abyssal benthic Myodocopina*

Taxon	Depth range (m)	Abyssal locality
CYPRIDINIDAE		
CYPRIDININAE		
<i>Hadacypridina bruuni</i> Poulsen, 1962	5340-6000	Southwest Pacific Basin, Kermadec Trench
<i>Metavargula ampla</i> Kornicker, 1970a	1927-1997	Peru-Chile Trench
<i>M. adinothrix</i> , n. sp.	1796-3775	Falkland Trough, Scotia Ridge, Drake Passage
<i>Doloria levinsoni</i> , n. sp.	426-2820	Falkland Trough, Scotia Ridge
<i>Vargula sutura</i> , n. sp.	3386-3477	Albatross Cordillera
AZYGOCYPRIDININAE		
<i>Azygocypridina imperator</i> Brady, 1880	2012	Southwest Pacific Basin
<i>A. imperialis</i> Brady and Norman, 1896	2633	Northern edge West European Basin
<i>A. grimaldi</i> Granata, 1919	2320	West European Basin
<i>Isocypridina quatuorsetae</i> , n. sp.	248-3170	Scotia Ridge, South Georgia
PHILOMEDIDAE		
PHILOMEDINAE		
<i>Philomedes tetrathrix</i> , n. sp.	566-3382	Chile Rise, Scotia Ridge, edge South Sandwich Trench
<i>P. ramus</i> , n. sp.	3219	Chile Rise
<i>Igene walleni</i> , n. sp.	3702-4303	Peru-Chile Trench, Albatross Cordillera
CYLINDROLEBERIDIDAE		
CYLINDROLEBERIDINAE		
<i>Parasterope styx</i> , n. sp.	4303	Peru-Chile Trench
<i>Bathyleberis grossmani</i> , n. sp.	3431-4303	Peru-Chile Trench, Drake Passage, Albatross Cordillera
<i>Synasterope dimorpha</i> (Hartmann, 1965)	112-2563	Chile Rise
<i>S. mystax</i> , n. sp.	2747-4006	Falkland Trough, Edge Sandwich Trench
<i>S. polythrix</i> , n. sp.	4004-4031	Drake Passage
<i>S. duplex</i> , n. sp.	3035	Weddell Sea
<i>Synasterope</i> species A Kornicker, 1970a	2504-2414	Peru-Chile Trench
<i>Synasterope</i> species B Kornicker, 1970a	4383-4516	Peru-Chile Trench
<i>Skogsbergiella</i> species indet. (herein)	3035	Weddell Sea, Albatross Cordillera
SARSIELLIDAE		
<i>Spinacopia mastix</i> , n. sp.	3035	
<i>S. menziesi</i> Kornicker, 1969a	2818-3500	Scotia Ridge
<i>S. octo</i> Kornicker, 1969a	3495-4758	Southeast Pacific Basin, Drake Passage
<i>S. torus</i> Kornicker, 1970a	1962-4364	Peru-Chile Trench

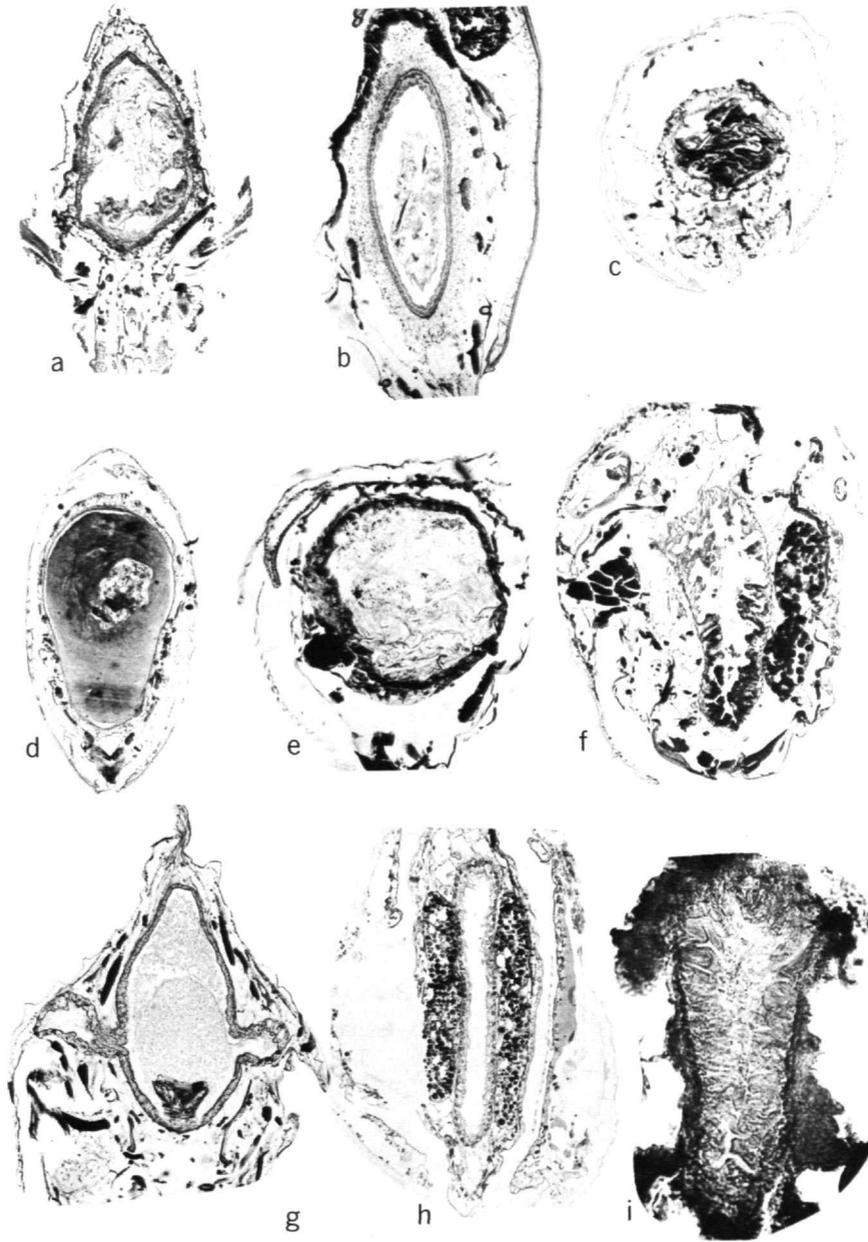


FIGURE 13.—Sections through stomachs: *a*, *Cypridinodes* sp., female (maximum width of stomach in section 0.23 mm), USNM 120516; *b*, *Azgocypridina* sp., female (maximum width of stomach in section 0.9 mm), USNM 120519; *c*, *Codonocera* sp., female (maximum width of stomach in section 0.86 mm), USNM 120511; *d*, *Vargula hilgendorfi* (maximum width of stomach in section about 0.83 mm), USNM 95646; *e*, *Cypridina* sp., female (maximum width of stomach in section 0.30 mm), USNM 141813; *f*, *Pseudophilomedes ferulanus*, female (maximum width of stomach in section 0.04 mm), USNM 120510; *g*, *Euphilomedes* sp., female (maximum width of stomach in section 0.33 mm), USNM 141557; *h*, *Parasterope pollex*, female (maximum width of stomach in section 0.04 mm), USNM 141810a; *i*, *Sarsiella zostericola*, female (maximum width of stomach in section 0.01 mm), USNM 141811.

who studied *Euphilomedes interpuncta* (Baird, 1850), the mandible is used to kick up particles of detritus from the sediment; these are sucked into the shell by a current created by the epipodial appendage on the 5th limb and then pushed into the esophagus by appendages around the mouth. Elofsen (1941, 1969:215) stated that species of *Philomedes* apparently consume silt without filtering out coarse particles. A descriptive name used for this method of feeding is that of "Collector"—collects detritus from the sediment—(Turpaeva, 1957:137; Walker, 1972:83).

The Philomedidae dominate most samples collected in the study area. Some examples from the Antarctic are tabulated below:

Locality	Depth (m)	Number of specimens	Number of philomedids
Discovery Bay,			
Greenwich Island	33-90	51	49
same	146-222	29	28
English Strait	249-355	103	93
Arthur Harbor,			
Anvers Island	39	18	14
Ross Sea (<i>Eltanin</i> sta. 1896)	70-81	366	363

This family is also dominant in samples from the Kerguelen Islands (station Ker-d74), the Argentine shelf (station V-17-75), and the Peru-Chile Trench (*Vema* station V-17-6).

The gut of pelagic members of Cypridinidae contains whole or large fragments of recognizable organisms (Table 16, Figures 13a,c,e). According to Cannon (1933:752, 756; 1940:240) *Gigantocypris* and *Macrocypridina castanea* eat live prey. Benthic members of this family, however, often contain detritus and sediment particles along with animal fragments (Table 16, Figure 13b,d; also see Cannon, 1931:439; 1933:756). The mandible of the Cypridinidae differs from that in the Philomedidae in that the joints permit flexing so that it is capable of passing food it scrapes from sediment back toward the mouth region; the maxilla and 5th limb differ in being better equipped for tearing up food.

Thus, pelagic members of this family could be classified as Predators, but the benthic forms are sufficiently similar to Philomedidae in feeding habit to be classified as Collectors, although capable of being more selective and ingesting less sediment than do the philomedids. Members of Cypridinidae were rarely dominant in the study area. At one station, however (*Vema* station V-15-102), at a

depth of 108 m on the Argentine shelf, the sample contained 46 specimens of a cypridinid and only 9 specimens in other families.

The gut of members of the Sarsiellidae generally contains whole complete exoskeletons of organisms and some sediment (Table 16). Occasional specimens contain in their gut only unrecognizable organic or inorganic debris (Figure 13i). The complete organisms in their gut suggests that sarsiellids are capable of selecting and capturing prey, and are, therefore, classified here as Predators. In Texas bays and lagoons (Kornicker and Wise, 1962) and in the vicinity of the Bimini Islands, Bahamas (Kornicker, 1958) sarsiellids were dominant. They were not, however, collected on the Antarctic shelf, but were present in the deeper slope and abyssal waters, and dominant at only one station in the study area (*Vema* station V-15-131) on the Argentine slope at a depth of 1475 m.

The gut contents of members of the Rutidermatidae are similar to that of the Sarsiellidae (Table 16). Therefore, members of this family are also classified here as Predators. Rutidermatids were not collected in the Antarctic region. Their southernmost range was the tip of South America. Members of the family are generally confined to shelf depths. They were dominant at only one station (*Eltanin* cruise 3, station 71-26) at a depth of 176-196 m on the Chile shelf where they were the only family (over 1000 specimens of 1 species) in the sample.

Valentine (1972:203) concluded that in an unstable environment, "a good strategy is to feed upon the most stable food resource possible, which is

TABLE 5.—Number of specimens of each feeding type on a submarine cliff in the vicinity of Arthur Harbor, Anvers Island, Palmer Archipelago

Sample	Depth (m)	Filter feeder ^a	Collector ^b
AH4-20	6.1	101	3
AH4-25	7.6	4	0
AH4-30	9.1	66	0
AH4-45	13.7	1	1
AH4-50	15.2	2	7
AH4-60	18.3	0	1
AH4-70	21.3	3	0
AH4-80	24.4	1	14

^a*Homasterope maccaini*, *Skogsbergiella scotti*, *Parasterope ohlini*.

^b*Doloria levis*.

commonly detritus. Therefore, in highly fluctuating environments detritus feeders and perhaps scavengers should make up a large proportion of the feeding types, which appears to be the case in the

Arctic and Antarctic." The present study, which indicates that Collectors are usually dominant among ostracodes in the study area, provides further support for Valentine's conclusion.

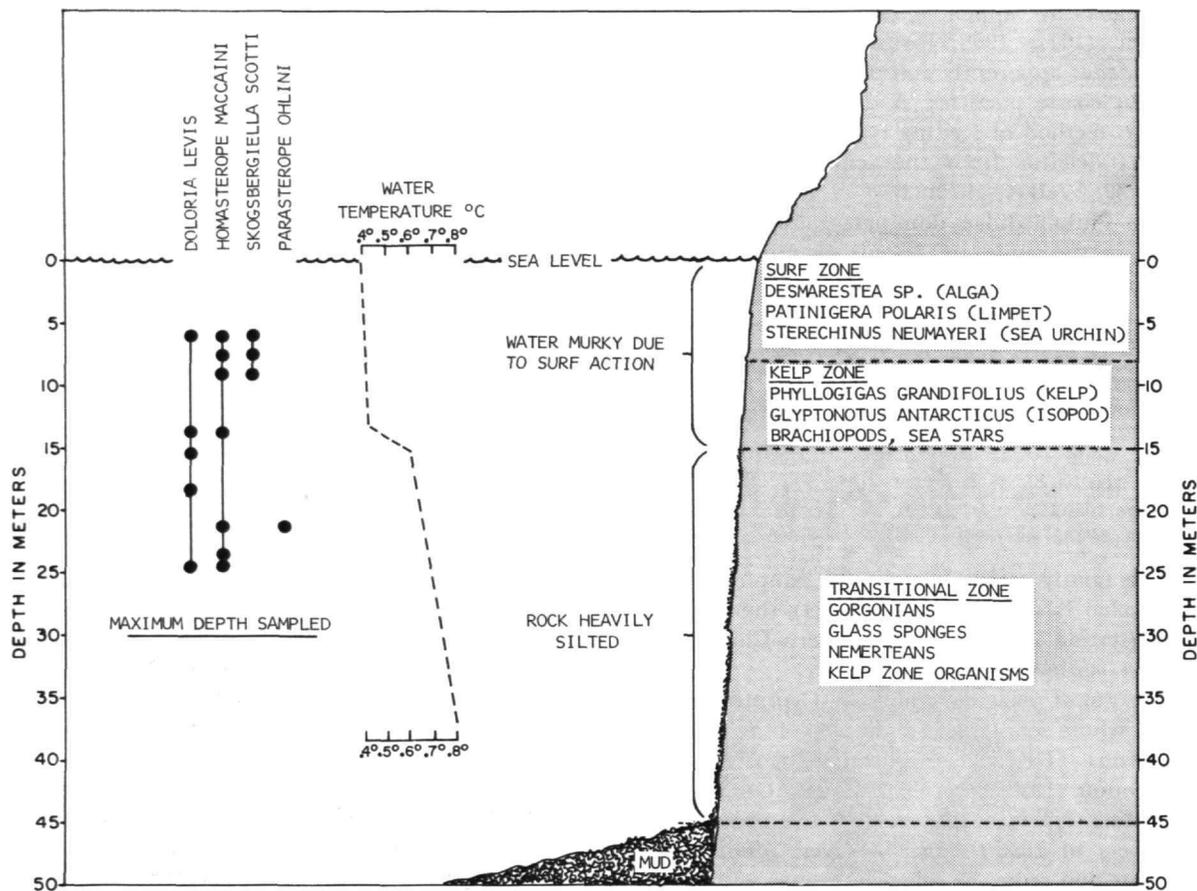


FIGURE 14.—Diagrammatic illustration of rock cliff at Arthur Harbor, Anvers Island, Palmer Archipelago, showing distribution of ostracodes. (Illustration of cliff based on description by McCain and Stout, 1969.)

Relationship between Eye Development, Water Depth, and Latitude

Among Ostracoda, only the Myodocopina have compound lateral eyes; one eye is present on each side of the head. In some species the eye is borne on a short stalk. Each eye contains 2 to 80 ommatidia, which may be large and closely packed forming regular rows, or small and scattered throughout the eye. Some species have completely lost the lateral

eye, and on one species, an eye sac without ommatidia was observed. In the subfamily Azygocypridininae, the lateral eye has lost its visual function and is replaced by a flaplike triangular appendage with hairs (probably sensory).

The lateral eye of the female myodocopid is never better developed than that of the male (Figure 15). In the Philomedidae and Rutidermatidae, the lateral eye of the male is larger and has more ommatidia than that of the female. In the Sarsiel-

lidae and Cypridininae, males and females generally have the same number of ommatidia, but in some species of these families the eye of the male is slightly larger or more deeply pigmented than the eye of the female. In the *Cylindroleberididae*, male

eyes are often larger than those of the females, but may or may not have more ommatidia and deeper pigmentation.

In the *Cylindroleberididae* and *Philomedidae* the ommatidia in juvenile males are smaller and usually fewer than in adult males. Anderson (1964:86) noted that the carapace of the adult podocopid ostracode *Pterygocythereis jonesi* (Baird, 1850a)

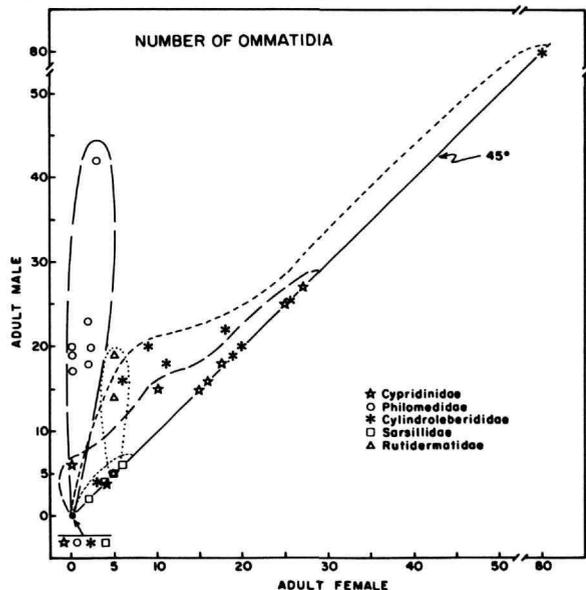


FIGURE 15.—Sexual dimorphism in the number of Ommatidia in lateral eyes (numbers refer to number of species).

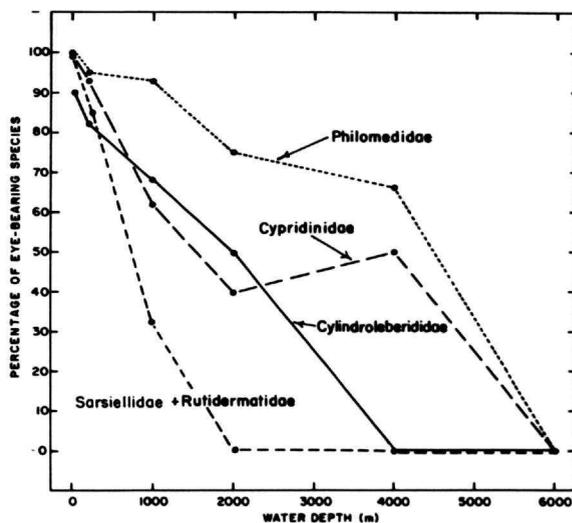


FIGURE 17.—Relation of percentage of eye-bearing species of families of Myodocopina with depth. (Data from Figures 19-22; datum point includes species between it and point at next shallower depth.)

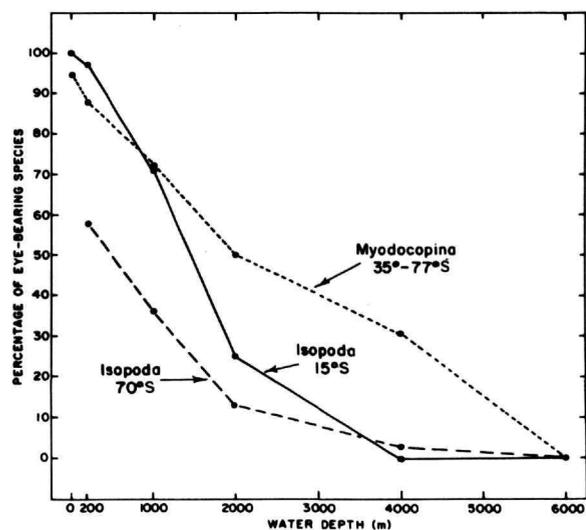


FIGURE 16.—Percentage of eye-bearing species of Isopoda and Myodocopina at different depths. (Data on Isopoda from Menzies et al., 1968; data on Myodocopina from Figures 19-22; datum point includes species between it and point at next shallower depth.)

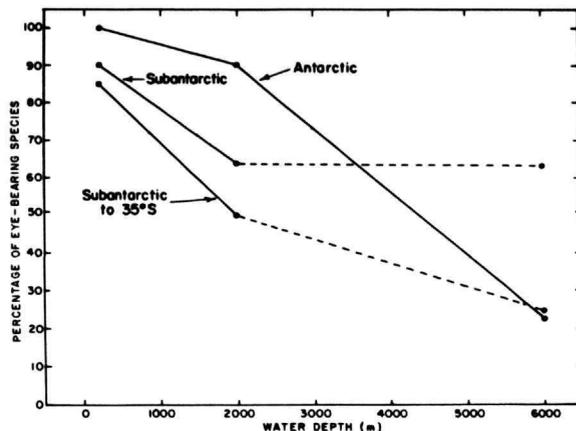


FIGURE 18.—Relation of percentage of eye-bearing Antarctic, Subantarctic, and Subantarctic-to-35°S species at different depths. (Datum point includes species between it and next shallower point; data from Figures 19-22.)

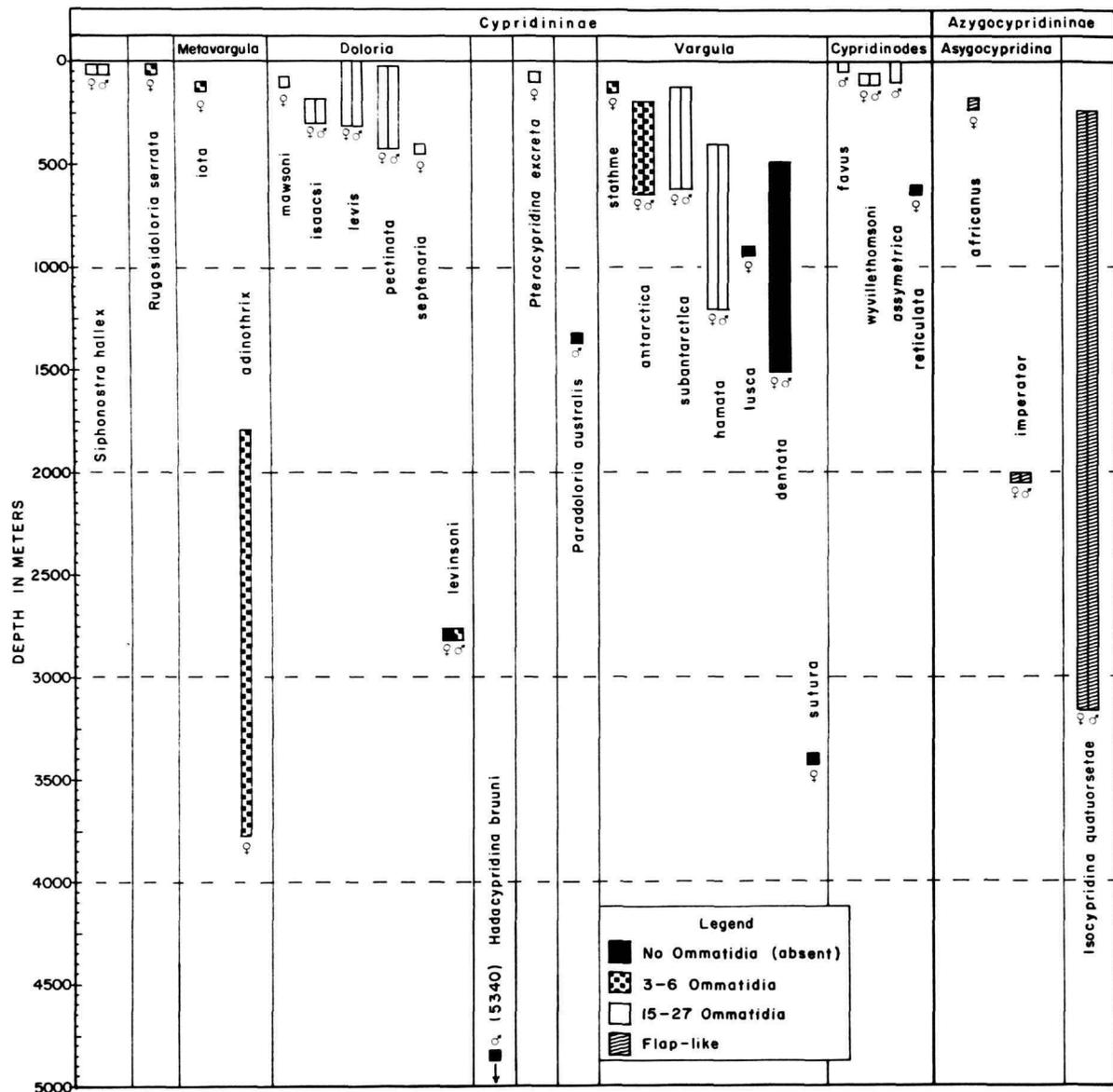


FIGURE 19.—Relationship between depth and number of Ommatidia in lateral eyes of species of Cypridinidae collected south of latitude 35°S.

develops a "large clear hemispherical eye tubercle" not present in juveniles.

The only benthic crustacean group in which the distribution of eye-bearing and blind forms have been systematically studied in relation to water depth and latitude is the Isopoda (Menzies et al., 1968). This permitted comparison of similar data

on the eyes of mydocopids (Table 17) with that of the isopods. The percentage of eye-bearing* mydocopid species decreases with water depth more gradually than in the Isopoda (Figure 16).

* In the present analysis the possible sight function of the medial eye, which lacks lens cells in the Mydocopina (see Elofsson, 1966), has been considered negligible.

At 70°S, the Isopoda have an ocular index (O.I.) of 50 (50% eye-bearing species) between depths of 100 and 500 m, and at 15°S an O.I. of 50 occurs at a depth of about 1300 m. An O.I. of 50 in the

myodocopids within the study area (35°S–77°S) occurs at a depth of about 2000 m. This is below the maximum depth (1300–1400 m) that isopods have an O.I. of 50 at any latitude.

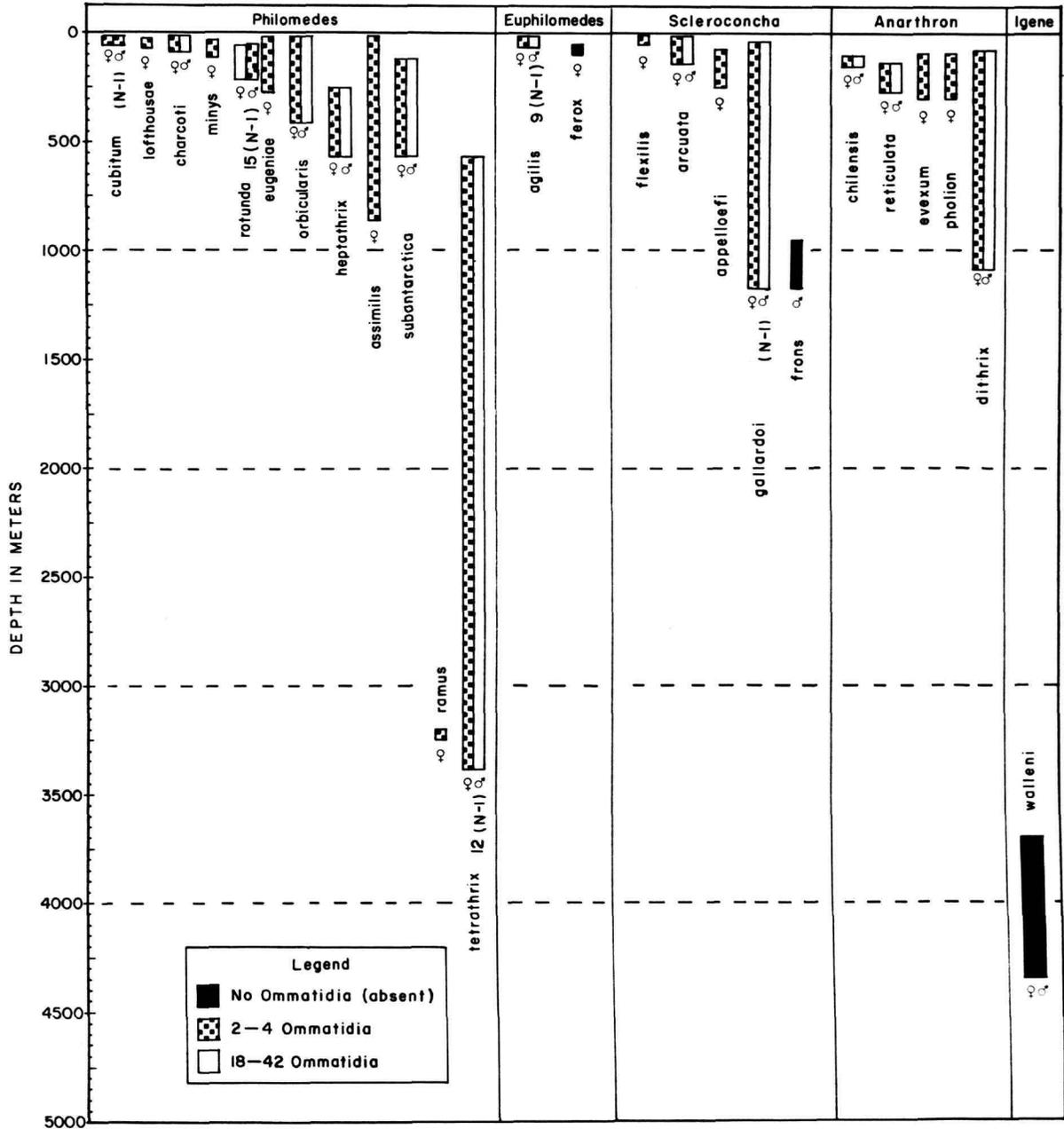


FIGURE 20.—Relationship between depth and number of Ommatidia in lateral eyes of species of Philomedidae collected south of latitude 35°S.

The depth at which an O.I. of 50 is encountered must in part be controlled by the composition of the mydocopid assemblage, because the rate at which the percentage of eye-bearing species decreases with depth varies considerably among the mydocopid families (Figure 17). The approximate depths at which the O.I. of 50 is found for different families (based on species encountered within the study area) are as follows: Sarsiellidae-Rutidermatidae, 800 m; Cypridinidae, 1500 m; Cylindroleberididae, 2000 m; Philomedidae, 4600 m. The Cypridinidae have a second peak at about 4000 m.

An O.I. of 50 for isopods is found deeper at low latitudes than at high latitudes in both the northern and southern hemispheres (Menzies et al., 1968, fig. 2). This relationship is illustrated for 15° and

70°S on Figure 16. An O.I. of 50 is found deeper for mydocopids collected within the Antarctic Convergence than for those collected between the northern limit of the Subantarctic region and 35°S (Figure 18). This apparent reversal of the relationship of eye-bearing species and latitude between mydocopids and isopods may be the result of the difference in the range of latitudes sampled. The isopods were compared at latitudes of 15°S and 70°S, whereas the mydocopids were studied within a narrower range, 35°S–77°S. It is quite possible that if comparisons were made over the same range of latitudes, the number of eye-bearing isopods and mydocopids would be similar.

Some support for this hypothesis is derived from the depth of light penetration, which was considered by Menzies et al. (1968, fig. 2) to be one of

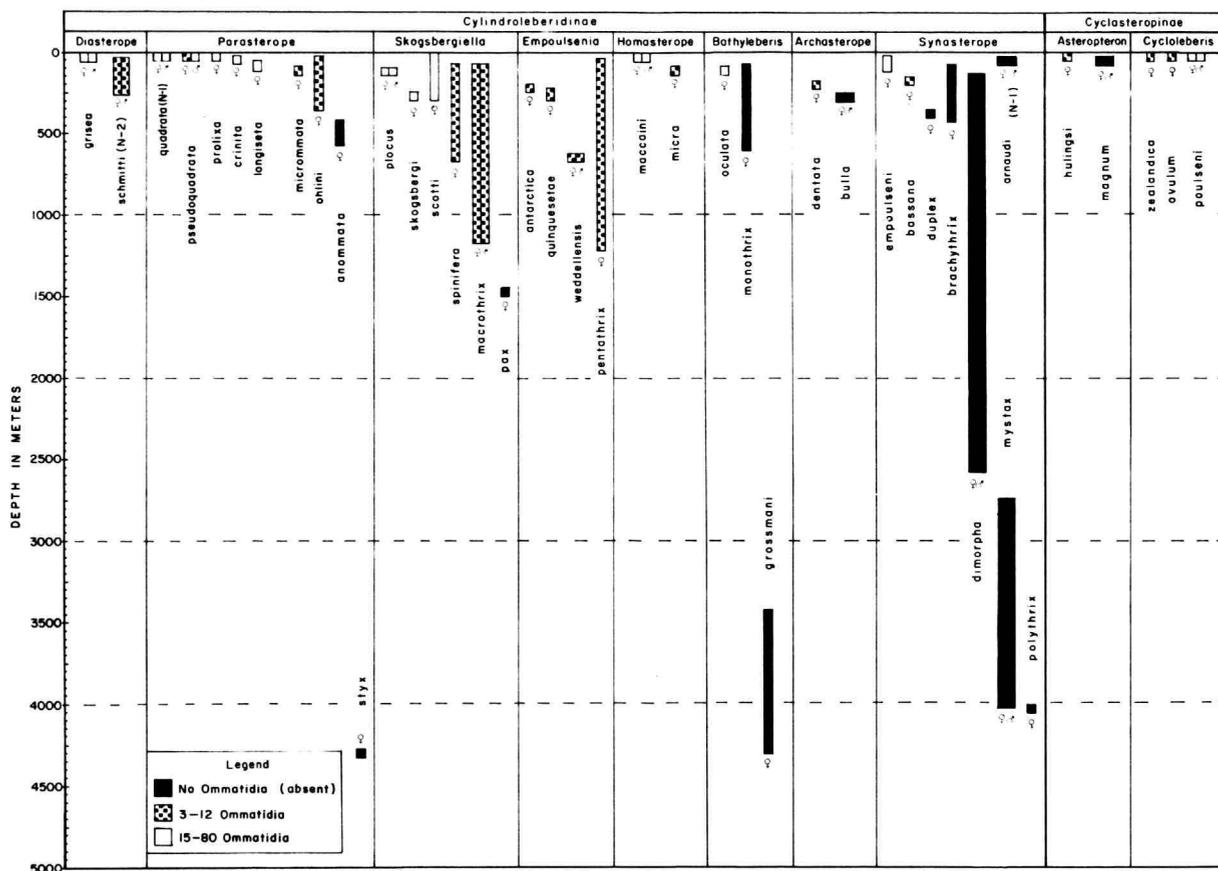


FIGURE 21.—Relationship between water depth and number of Ommatidia in species of Cylindroleberididae collected south of latitude 35°S.

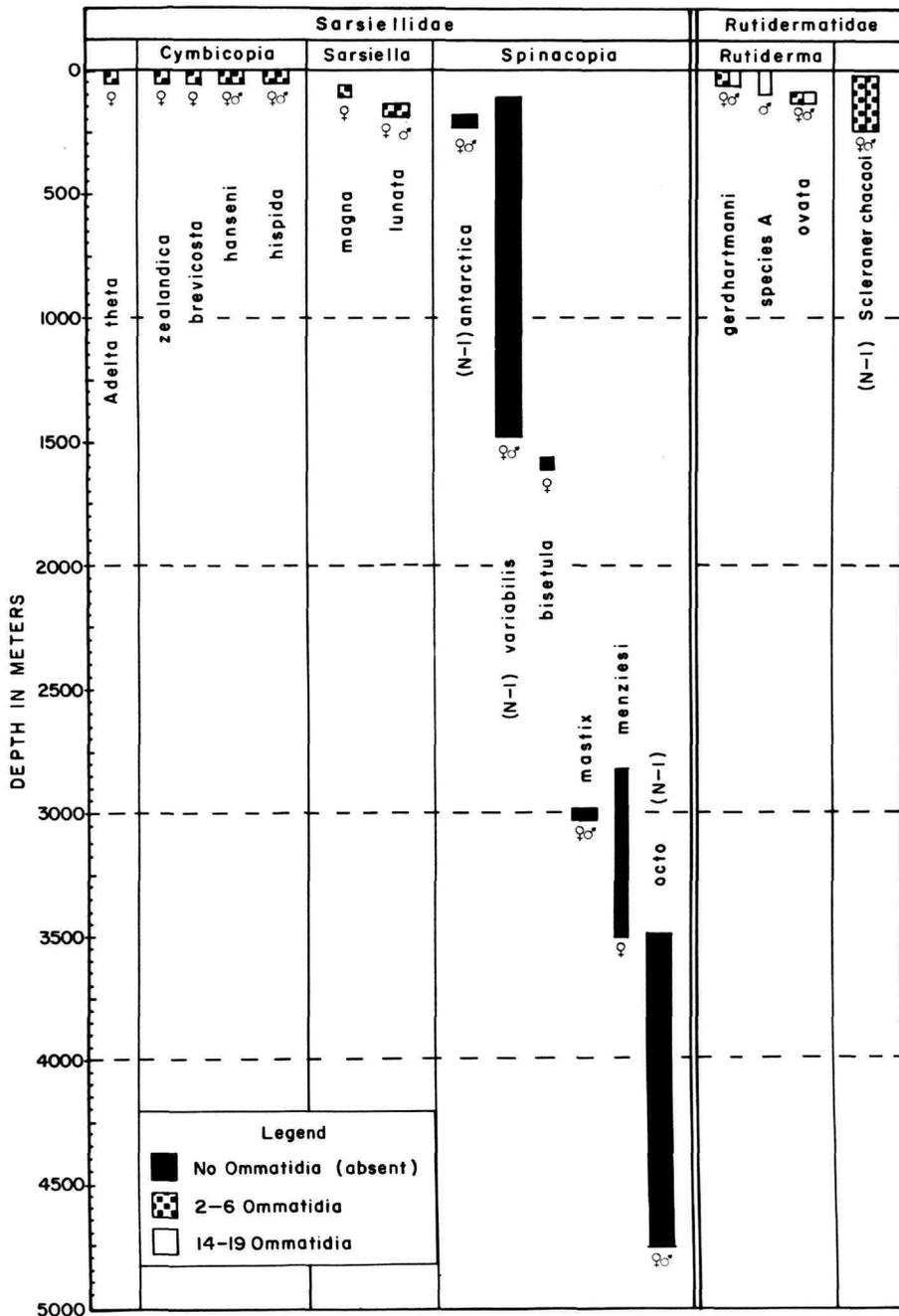


FIGURE 22.—Relationship between water depth and number of Ommatidia in species of Sarsiellidae and Rutidermatidae collected south of latitude 35°S.

the factors that could be associated with the equatorial submergence of isopod assemblage with an O.I. of 50. The depth to which light penetrates is much greater at 15°S than at 70°S, the two latitudes at which the isopods were compared, but is fairly constant between the latitudes (35°S–77°S) within which the mydocopids were compared.

Clarkson (1967) made a survey of eye degeneration and blindness in present-day crustaceans and concluded that, with few exceptions, "almost all the known cases of eye degeneration occur in benthonic species normally living in depths of 600 m or more." A depth of 600 m appears to have little significance in relation to eye development among the mydocopids within the present study area. Of 29 blind species, 12 have been collected shallower than 600 m and 22 deeper than 600 m (Table 17; Figures 19–22).

Menzies et al. (1968) observed that all isopods collected below 4000 m to 6000 m at all latitudes are blind. Because the average upper limit of the abyssal zone is placed at 3600 m by Vinogradova (1962) near the upper depth limit for blind isopods (4000 m), they suggest that Vinogradova's zonation may be more meaningful than zonations proposed by others. Such an inference may be supported by the depth at which all mydocopids are blind (3775 m). It should be pointed out, however, that each mydocopid family seems to have its own depth below which members of the family are blind. These depths are as follows: Cypridinidae (excluding Azygocypridininae), 3775 m; Philomedidae, 3382 m; Cylindroleberididae, 1212 m; Sarsiellidae, 373 m.

Reproduction

The season eggs are deposited in the marsupium of Mydocopina has been shown to differ among species, and for populations of the same species collected at different latitudes. For example, gravid females of *Parasterope pollex* Kornicker (1967e) were absent in Hadley Harbor, Massachusetts, from November 1964 through May 1965, a period of seven months (Hulings, 1969, fig. 3), and gravid females of *Philomedes globosus* (Sars, 1866) were absent from Skagerak, Sweden, during April–July, a period of four months (Elofsen, 1941, 1969:156), but were present for a longer period, possibly year round, in the Arctic (Skogsberg, 1920:357).

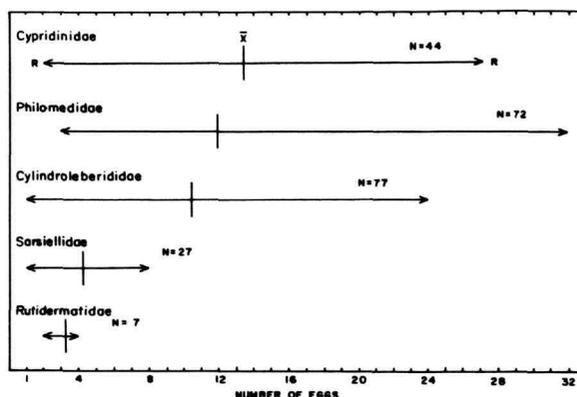


FIGURE 23.—Range and average number of eggs per clutch in families of Mydocopina. (Data include only species reported herein.)

In the study area, only three species were collected in a sufficient number of samples to investigate whether eggs are produced periodically or year round. These are the shelf-slope species *Philomedes assimilis* and *P. orbicularis*, confined to the Antarctic, and *Skogsbergiella macrothrix*, collected both in the Antarctic and Subantarctic regions. With few exceptions, which are attributable to a small number of samples, females with eggs in their marsupium were present in all months in which samples were collected (Table 6). This suggests that these species reproduce year round. Insufficient data prevented determination of whether the number of specimens with eggs peak during certain months.

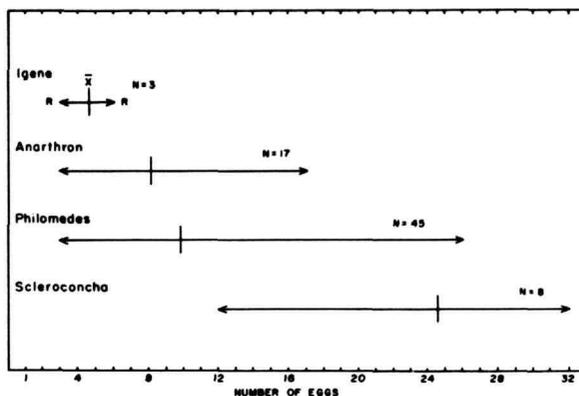


FIGURE 24.—Range and average number of eggs per clutch in genera of Philomedidae. (Data include only species reported herein.)

Little is known concerning the life span and the number of broods raised by myodocopids. The female of *Philomedes globosus* lives 4 years or longer, with 2¾ to 3 years of this time being the duration of larval stages (Elofsen, 1941; 1969:153, 159,165). Small unextruded eggs in addition to a clutch of larger eggs or larvae are commonly found in the same specimen, so that at least 2 clutches may be assumed for most species. An exception might be *Parasterope pollex*, which dies soon after the brooding season (Hulings, 1969:16). The time between larvae leaving the marsupium and the appearance of new well-developed eggs differs among species and may be as little as 15 days or more than 45 days (Müller, 1894:174).

The number of eggs produced within members of the same species vary (Table 18); however, differences in clutch size among taxa are evident (Figure 23). The Rutidermatidae has the smallest clutch size (2-4). The Sarsiellidae is next with a maximum clutch size of 16 (no more than 8 eggs were found in species from within the study area). Benthic members of the Cypridinidae, Philomedidae (possibly excluding the Pseudophilomedinae), and Cylindroleberididae generally have more eggs (maximum 24, 32, and 34, respectively) than the Sarsiellidae and Rutidermatidae.

The data also suggest variation in clutch size between some genera. For example, in the Philomedinae, *Scleroconcha* appears to have larger clutches than *Philomedes* and *Anarthron*, and

these in turn have larger clutches than *Igene* (Figure 24). Differences also appear at the species level; for example, *Philomedes rotunda* and *Philomedes subantarctica* have more eggs than other species of *Philomedes* (Table 18).

The number of eggs produced by a species is in part a measure of the stress the larvae must endure in order for the species to survive. For example, animals that have pelagic larvae generally produce more eggs than animals which have larvae that do not have to exist in the hazardous pelagic environment (Sverdrup, Johnson, and Fleming, 1942:317). Two pelagic species of Cypridinidae have much larger clutch sizes than the benthonic species: *Gigantocypris muelleri* with a clutch size of 20-85 eggs, and *Macrocypridina castanea* with a clutch size of 50-70 eggs (Table 18).

Depth also may be a factor in clutch size. The two abyssal species *Igene walleni* and *Hadacypridina bruuni* both have relatively small clutch sizes.

It was noticed that larger benthic species generally had more eggs per clutch than smaller species within the same family, so this relationship was examined statistically. The correlation coefficient was computed for all benthic species in the family collected within the study area, and then for all species in the family both inside and outside of the study area, but not including genera not collected within the study area. Among the Cypridinidae, the Azygocypridininae tend to have a much longer carapace for a given clutch size than do the

TABLE 6.—Monthly distribution of *Philomedes assimilis*, *P. orbicularis*, and *Skogsbergiella macrothrix* (figures indicate number of samples; zero indicates only samples with species included; dash means no samples collected with species)

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Philomedes assimilis</i>												
Adult males	1	5	0	0	1	-	-	-	-	0	-	0
Gravid females	4	11	1	1	0	-	-	-	-	1	-	2
Samples with species without adult males without gravid females	5	7	0	0	0	-	-	-	-	0	-	3
<i>Philomedes orbicularis</i>												
Adult males	0	4	0	-	1	1	0	-	-	-	-	0
Gravid females	4	8	0	-	0	1	1	-	-	-	-	5
Samples with species without adult males without gravid females	7	6	1	-	0	2	1	-	-	-	-	3
<i>Skogsbergiella macrothrix</i>												
Adult males	0	3	2	-	0	3	-	-	-	-	-	0
Gravid females	1	5	2	-	4	7	-	-	-	-	-	1
Samples with species without adult males without gravid females	0	0	0	-	1	1	-	-	-	-	-	1

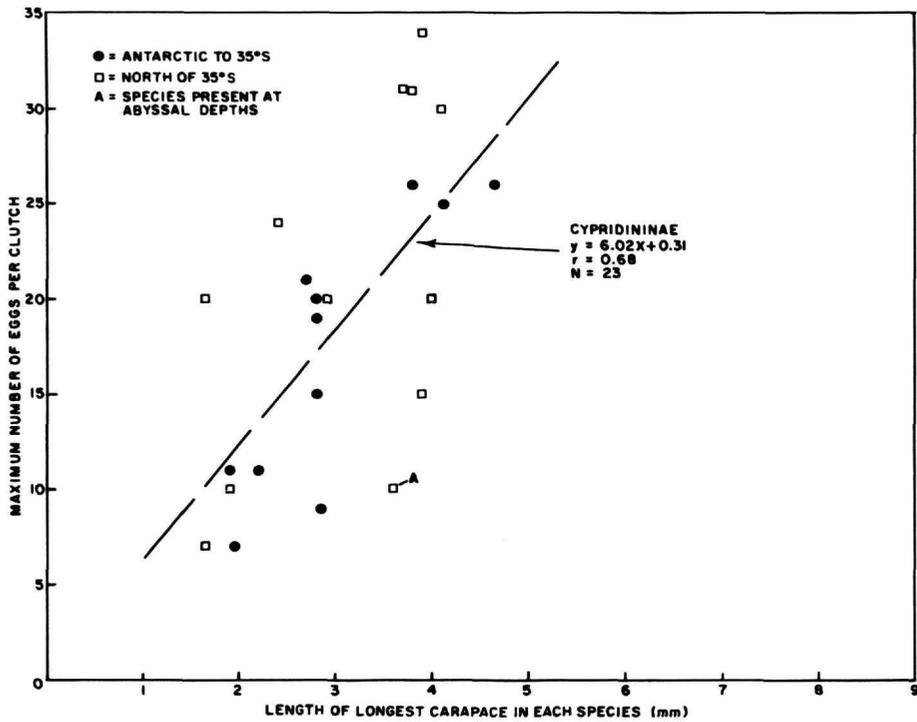


FIGURE 25.—Relation between maximum number of eggs per clutch and maximum length of carapace in subfamily Cypridininae.

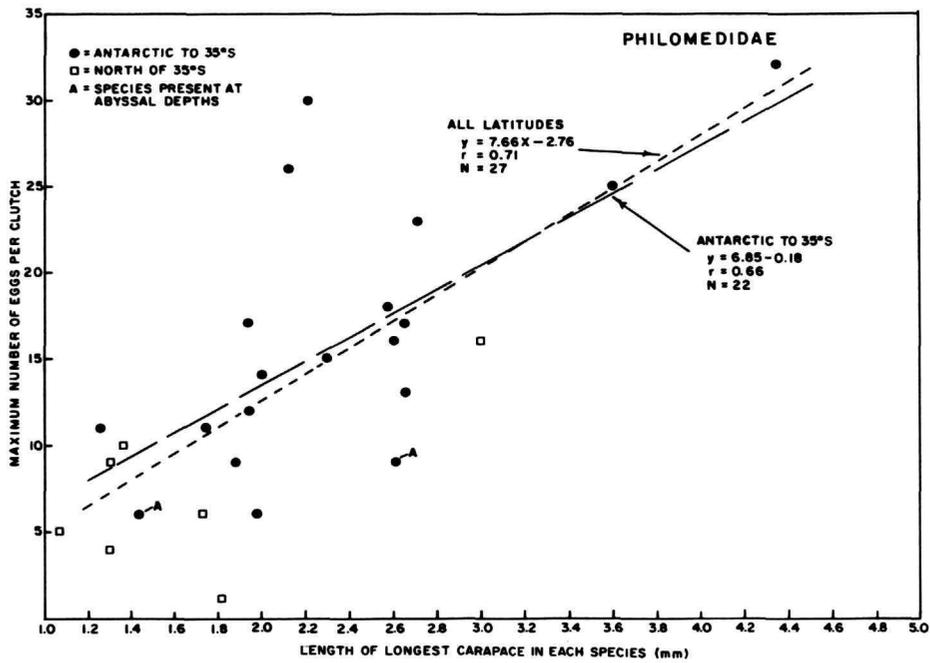


FIGURE 26.—Relations between maximum number of eggs per clutch and maximum length of carapace in the family Philomedidae.

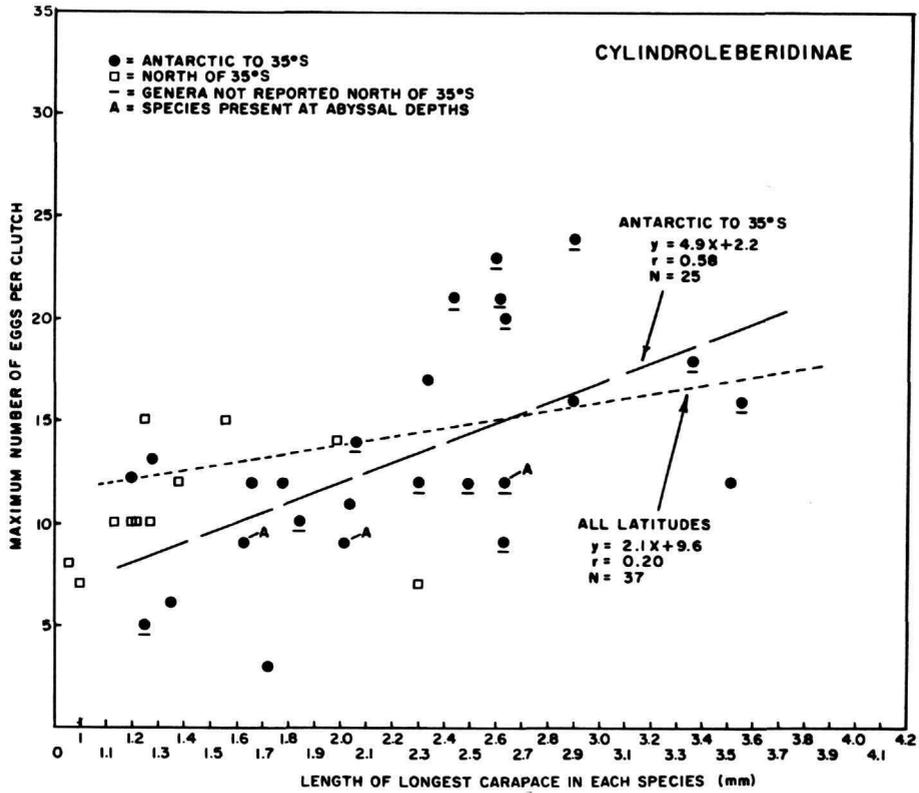


FIGURE 27.—Relation between maximum number of eggs per clutch and maximum length of carapace in subfamily Cylindroleberidinae.

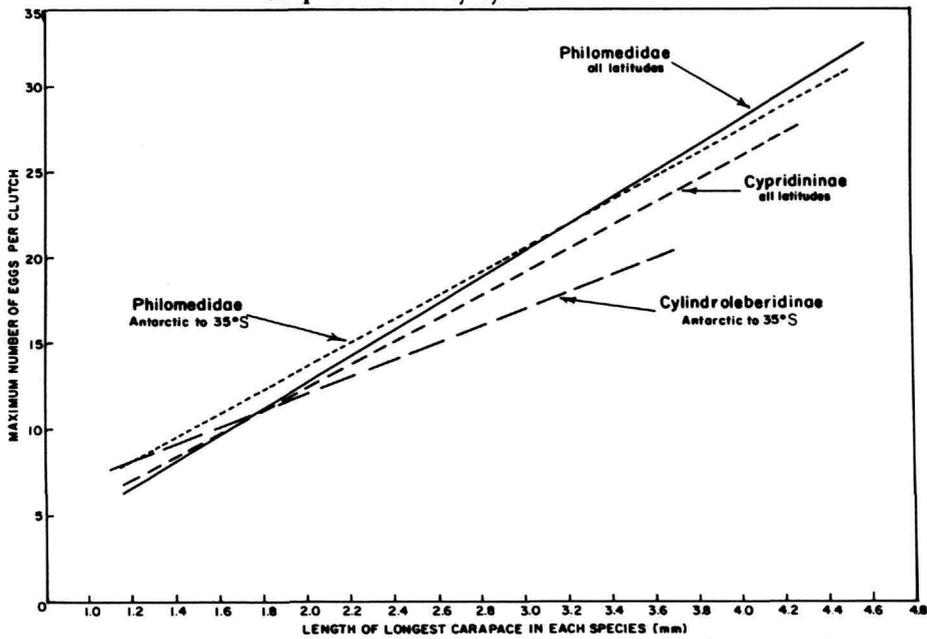


FIGURE 28.—Comparison of relation between the maximum number of eggs per clutch and maximum length of carapace of different taxa.

Cypridininae and were excluded from the calculations. Among the Cyndroleberididae, the subfamily Cyclasteropinae has only one species whose clutch size is known; therefore, that subfamily was excluded from the calculations. Because a relatively small number of eggs in a gravid female of a given species could be the result of not all the eggs having been extruded at the time the ostracode was collected, the maximum number of eggs reported for the species was used in the calculation. The range in carapace lengths is generally small for a given species, so the length of the longest specimen recorded was used in the calculations.

The correlation coefficient between maximum carapace length and maximum clutch size was significant at the 0.01 level for the *Cypridininae* (Figure 25) and *Philomedidae* (Figure 26) for species within the study area and also for the combined species inside and outside the study area. In the Cyndroleberidinae, there was no significant correlation for the combined species, but when those living north of 35°S (which tend to be smaller for a given clutch size) were excluded, the correlation coefficient was significant at the 0.01 level (Figure 27). There was no significant correlation between carapace length and clutch size in the Sarsiellidae and Rutidermatidae.

The similarity of slope and position of the regression line for those families having a significant correlation between carapace length and clutch size (Figure 28) suggests that the unknown cause of the relationship is the same for the families.

Relationship between Size and Vertical Distribution

An increase in size with depth has been noted for many crustacea (Belyaev, 1972:155) and for some genera of podocopid Ostracoda (Morkhoven, 1972). In the study area, an increase in size with depth was observed in the genera *Synasterope* (Figure 29) and *Spinacopia* (Figure 30). A relationship of size with depth is also suggested by the distribution of *Metavargula*, which has 2 species in the study area: *M. iota*, a shelf species about 2.9 mm long, and *M. adinothrix*, a bathyal-abyssal species, over 5 mm long. Also, *Philomedes ramus*, the largest species in its genus, was collected deeper than any other member of that genus. The remaining species, however, do not seem to show any correlation between size and depth. A lack of relationship between size and depth is exemplified by the abyssal genera *Igene* and *Hadacypridina*, whose species are small. Most species of *Cycloleberis* are large, but all are found only at shelf depths. All members of the subfamily Azygocypridininae, which is essentially bathyal-abyssal, are large but no relationship is apparent between size and depth within the subfamily.

Parasites and Commensals

Myodocopid ostracodes from the study area were associated with several kinds of parasites or commensals: choniostomatid copepods (Bradford, in

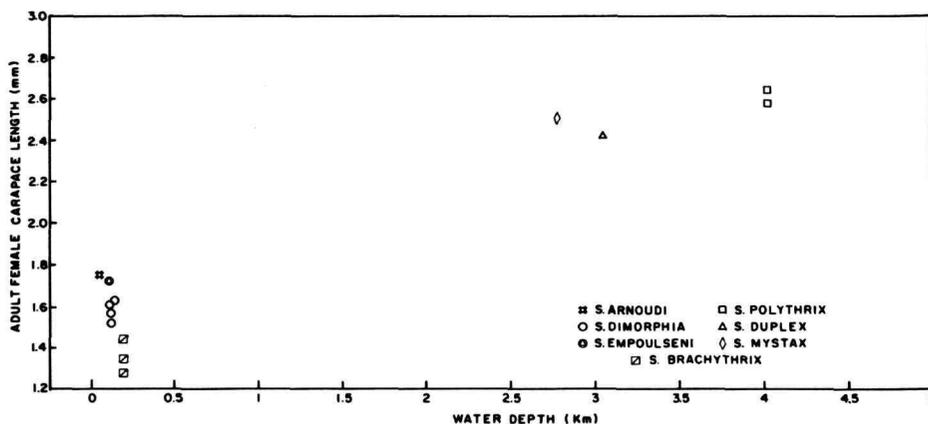


FIGURE 29.—Graph showing relationship of carapace length and water depth of species in the genus *Synasterope*.

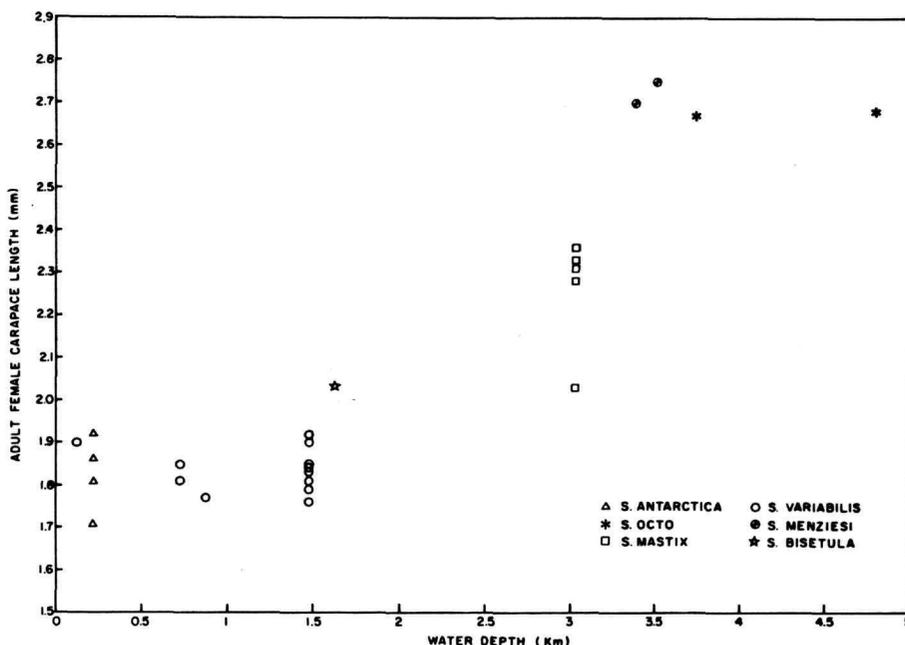


FIGURE 30.—Graph showing the relationship of carapace length and water depth of species in the genus *Spinacopia*.

prep.), cyproniscid isopods (Stromberg, in prep.), nematodes, protists, diatoms.

CRUSTACEA.—Copepoda, Choniostomatidae: Parasitic copepods have not been reported infesting any group of Ostracoda other than the Myodocopina. Choniostomatids have been reported from all families of Cypridinacea except the Rutidermatidae (Table 7). They are now reported from 10 additional genera and 14 additional species including the first record from genera in the subfamily Philomedinae (Table 8). Their southernmost occur-

rence, until now New Zealand, is extended to coastal Antarctica (Figure 31). The deepest occurrence previously reported, 1927–1997 m in the Peru-Chile Trench is extended to 2657–2470 m west of Chile (*Vema* station V-17-13).

Bowman and Kornicker (1967:2), in their discussion of the life history of *Sphaeronellopsis monothrix* Bowman and Kornicker, 1967, concluded that the copepodids normally do not enter immature ostracodes. They found only 1 immature specimen of the host *Parasterope pollex* with para-

TABLE 7.—Previous records of Ostracoda parasitized by choniostomatids

Ostracode species	Locality	References
CYPRIDINIDAE		
<i>Paradoloria vanhoeffeni</i> (Müller, 1908)	Madagascar	Monod (1932)
<i>Metavargula ampla</i> Kornicker, 1970a	Peru-Chile Trench	Kornicker and Bowman (1969)
PHILOMEDIDAE		
<i>Pseudophilomedes ferulanus</i> Kornicker, 1958	North Carolina	Bowman and Kornicker (1968)
CYLINDROLEBERIDAE		
<i>Parasterope pollex</i> Kornicker, 1967f	New England	Bowman and Kornicker (1967), Hulings (1969)
SARSIELLIDAE		
<i>Cymbicopia hispida</i> (Brady, 1898)	New Zealand	Hansen (1905)
<i>Sarsiella disparalis</i> Darby, 1965	Sapelo Island, Georgia	Kornicker (1967e)

sites; whereas, 23 adult females were parasitized. In the present study almost half of the parasitized ostracodes are juveniles, more than might have been expected from the study of Bowman and Kornicker (Table 9).

Whereas Bowman and Kornicker (1967) found only a copepodid in a gravid female, in the present study an adult female copepod was present in a

gravid female of *Skogsbergiella macrothrix* (USNM 128044), and a pupa (an immature parasite beyond the copepodid stage) was present in a gravid female of *Siphonostra hallex* (USNM 137264). No copepod ovisacs were present in the two gravid ostracodes.

Bowman and Kornicker (1967) believed that copepodids did not enter gravid females and the

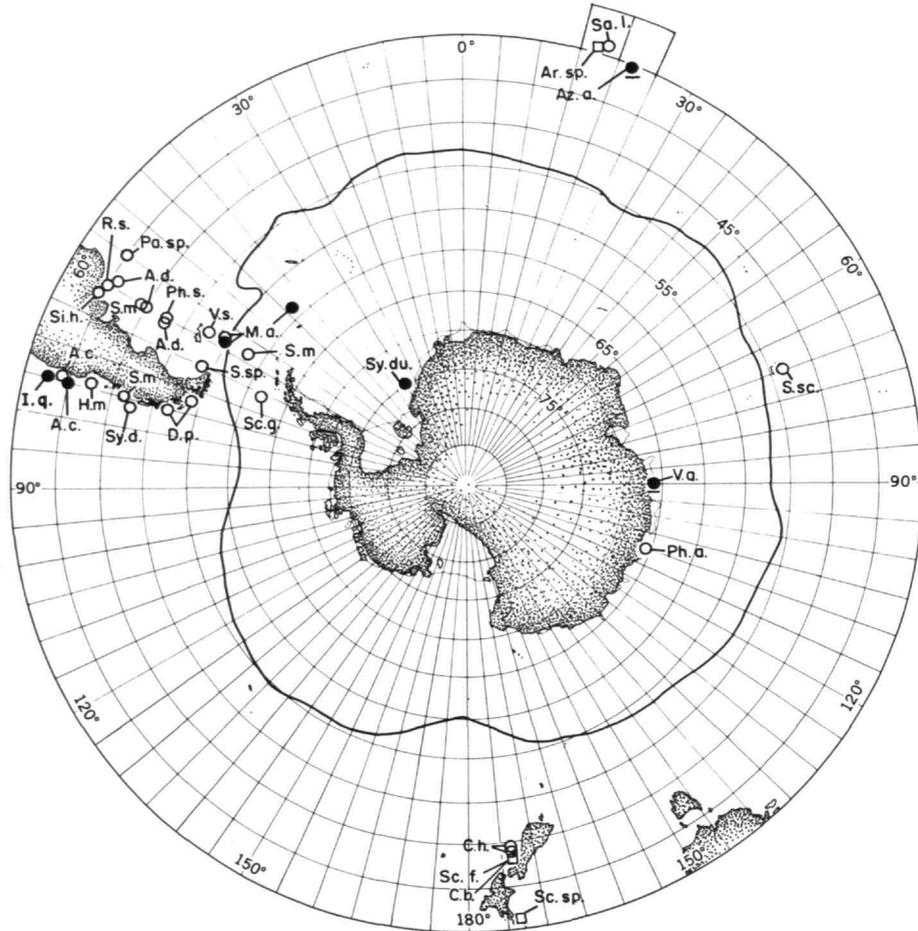


FIGURE 31.—The distribution of parasitized ostracodes. Parasites: Copepoda = open circles; Isopoda = solid circles; Nematoda = squares. Ostracodes: *Doloria pectinata* (= D.p.), *Vargula subantarctica* (= V.s.), *V. antarctica* (= V.a.), *Metavargula adinothrix* (= M.a.), *Rugosidoloria serrata* (= R.s.), *Siphonostra hallex* (= Si. h.), *Isocypridina quatuorsetae* (= I.q.), *Azygocypridina africanus* (= Aza.a.), *Philomedes assimilis* (= Ph.a.), *P. subantarctica* (= Ph.s.), *Scleroconcha gallardoii* (= Sc.g), *S. flexilis* (= Sc.f), *S. species indet.* (= Sc. sp.), *Anarthron chilensis* (= A.c), *A. dithrix* (= A.d.), *Synasterope dimorpha* (= Sy.d.), *S. duplex* (= Sy.du.), *Skogsbergiella scotti* (= S. sc.), *S. macrothrix* (= S.m.), *S. species indet.* (= S. sp.), *Homasterope micra* (= H.m.), *Archasterope species indet.* (= Ar.sp.), *Parasterope species indet.* (= Pa. sp.), *Sarsiella lunata* (= Sa.l), *Cymbicopia hanseni* (= C.h.), *C. brevicosta* (= C.b.).

TABLE 8.—New records: the number of ostracodes parasitized by choniostomatids

Ostracode species	Adults		Juveniles		
	Females	Males	Females	Males	Sex unknown
	Gravid	Nongravid			
CYPRIDINIDAE					
CYPRIDININAE					
<i>Doloria pectinata</i> Skogsberg	1	1	1		
<i>Vargula subantarctica</i> , n. sp.					1
<i>Metavargula adinothrix</i> , n. sp.	1				
<i>Siphonostra hallex</i> , n. sp.	1	1			1
<i>Rugosidoloria serrata</i> , n. sp.					1
PHILOMEDIDAE					
PHILOMEDINAE					
<i>Philomedes assimilis</i> Brady	3				
<i>P. subantarctica</i> , n. sp.	1				
<i>Scleroconcha gallardoi</i> Kornicker			2		
<i>Anarthron chilensis</i> (Hartmann)	Sex and age of host not known				
<i>A. dithrix</i> , n. sp.	3				
CYLINDROLEBERIDIDAE					
CYLINDROLEBERIDINAE					
<i>Synasterope dimorpha?</i> (Hartmann)				1	
<i>Skogsbergiella scotti</i> , n. sp.		1			
<i>S. macrothrix</i> , n. sp.	1	3			
<i>Skogsbergiella</i> species indet.				1	
<i>Homasterope micra</i> , n. sp.		1			
<i>Parasterope</i> species indet.			1		
SARSIELLIDAE					
<i>Sarsiella lunata</i> , n. sp.			1		
Total	2	15	2	4	3

presence of a parasite inhibited ovulation by the host. One of the parasitized gravid females (*Skogsbergiella macrothrix*) in the present study had only 2 eggs in the brood chamber, which is much fewer than found in other gravid females of the species. The other parasitized gravid female (*Siphonostra hallex*) contained 8 eggs, but a second gravid female of the same species, which was not parasitized, contained only a few more eggs (11). A nongravid adult female of *Philomedes subantarctica* (USNM 137383), parasitized by 2 female choniostomatids, had the bristles on the exopodite of the 2nd antennae broken. This usually indicates that the ostracode has laid at least 1 batch of eggs.

The relatively low number of parasitized gravid females (2 of 17) supports the hypothesis of Bowman and Kornicker that the parasites either prefer nongravid females and/or inhibit ovulation, but the occasional occurrence of a parasite in a gravid

female needs explaining. Did the parasite invade the host after oviposition, or in these cases, did the parasite not inhibit either ovulation or oviposition? Additional studies are needed to answer these questions.

TABLE 9.—Comparison of the number of ostracodes (arranged by sex and stage of development parasitized by choniostomatids)

Sex and stage of development	Bowman and Kornicker (1967)	Herein
Adult females without eggs	22	15
Gravid females	1	2
Adult males	2	2
Total adults	25	19
Juvenile females	0	3
Juvenile males	1	3
Juveniles, sex unknown	0	3
Total juveniles	1	9

TABLE 10.—*Adult ostracodes parasitized by choniostomatids*

Ostracode species	Number of specimens		Number parasitized	Percent parasitized
	Female	Male		
<i>Doloria pectinata</i>	36	5	2	5±
<i>Metavargula adinothrix</i>	3	0	1	33
<i>Siphonostira hallex</i>	6	4	2	20
<i>Philomedes assimilis</i>	80+	12	3	3±
<i>P. subantarctica</i>	8	2	1	10
<i>Anarthron dithrix</i>	347	10	3	1
<i>Skogsbergiella scotti</i>	32	0	1	3
<i>S. macrothrix</i>	96	17	4	4
<i>Homasterope micra</i>	6	0	1	17
Totals	614+	50	18	Average 3±

Choniostomatids parasitized 8–13 percent of the adults in collections of *Parasterope pollex* from several localities along the Massachusetts coast (Bowman and Kornicker, 1967; Hulings, 1969). The average percentage of parasitized adults in the present collection is about 3 (Table 10).

Bowman and Kornicker (1967) suggested that the eggs (ovisacs) of the choniostomatids mimic the eggs of the host ostracodes and, because of this, the eggs of the copepod are not removed by the ostracode. They believed that the absence of copepod ovisacs in a few instances of parasitism of the ostracode male is support for the hypothesis. In the present study none of the adult males had copepod ovisacs, but they were present in over half of the parasitized adult females (Table 11). Although the data are few, the observations lend support to the hypothesis concerning egg mimicry. To date, copepod ovisacs have not been reported in the

TABLE 11.—*Parasitized ostracodes having copepod ovisacs*

Sex and stage of development	Number	Number with parasitized copepod ovisacs
Adult females without eggs	14	8
Gravid females	3	0
Adult males	2	0
Juvenile females	3	1
Juvenile males	3	0

carapaces of adult male ostracodes.

Isopoda: Parasitic isopods have not been reported infesting any group of Ostracoda other than the Myodocopina. The parasites all belong to members of the family Cyproniscidae which are found only on Ostracoda (Nielson and Stromberg, 1965). Previously reported parasitized species are as follows.

Ostracode species	Locality	Reference
<i>Azygocypridina africanus</i> (Stebbing, 1902)	South Africa	Stebbing (1902), Müller (1906c)
<i>Azygocypridina rudjakovi</i> Kornicker, 1970a	Peru-Chile Trench	Kornicker (1970a)
" <i>Cypridina</i> " <i>mediterranea</i> Costa, 1845	Gulf of Naples, Italy	Müller (1894)
<i>Vargula antarctica</i> (Müller, 1908)	Gauss Station, Antarctica	Vanhoffen (1914)
<i>Vargula hilgendorfi</i> (Müller, 1890)	Misaki, Japan	Shiino (1942)
<i>Vargula norvegica</i> (Baird, 1860)	Norway	Sars (1883, 1899, 1922), Skogsberg (1920).

According to the list, cyproniscids have been reported only from the Cypridinidae, and their range extends north to Japan and south to Antarctica. These parasites are now reported from 5 additional genera and 5 additional species, including the first

records from the families Philomedidae and Cylindroleberididae (Table 12). The distribution of cyproniscids in the study area is shown in Figure 31.

A specimen of *Synasterope duplex* contained an

TABLE 12.—*New records: the number of ostracodes parasitized by cyproniscids*

Ostracode species	Adult females		Juveniles (sex unknown)
	Gravid	Non-gravid	
CYPRIDINIDAE			
CYPRIDININAE			
<i>Metavargula adinothrix</i>		1	1
AZYGOCYPRIDINAE			
<i>Isocypridina quatuorsetae</i>	1		
PHILOMEDIDAE			
PHILOMEDINAE			
<i>Anarthron chilensis</i>	(sex and age of host not known)		
<i>Igene walleni</i>		1	
CYLINDROLEBERIDIDAE			
CYLINDROLEBERIDINAE			
<i>Synasterope duplex</i>		1	(possibly a juvenile)

adult female and male isopod, and a specimen of *Igene walleni* contained a female and isopod eggs; the other ostracodes contained either larvae or males (no attempt was made to differentiate larvae from males).

Two ostracode species parasitized by cyproniscids, *Metavargula adinothrix* and *Anarthron chilensis*, were also parasitized by chonistomatid parasites. Because the parasites were found loose in the vial containing more than one specimen of *A. chilensis*,

it is not known whether both the copepod and isopod parasitized the same specimen. In the case of *M. adinothrix*, however, 2 specimens were parasitized by isopods and a different specimen by a copepod.

Shiino (1942:87) found more females than males of *Vargula hilgendorfi* parasitized by isopods. Sars (1899:235) found a few males of *Vargula norvegica* parasitized by isopods, but the parasites were never fully developed, and Sars concluded that the parasites do not reach maturity when they infest males. No adult male ostracodes were present among the few specimens parasitized by isopods in the present study.

Myodocopina apparently are more commonly parasitized by copepods than by isopods. In the present study area, 18 species are parasitized by copepods and only 5 by isopods. Skogsberg (1920:262), however, reported that 30 percent of specimens of *Vargula norvegica* collected in the Trondhiem and Koster Fjords contained isopods.

NEMATODA.—Müller (1894:17) reported nematodes in the podocopid ostracode *Cythereis convexa* in the Gulf of Naples. The parasites are reported now from 3 additional genera and 3 (possibly 4) additional species, including the first record from Myodocopina. Their range is extended south to New Zealand and to the tip of South Africa (Figure 31). Nematodes were collected in the following ostracode species.

Ostracode species	Sex and developmental stage of ostracode	Station	Water depth (m)	Locality
Philomedidae				
<i>Scleroconcha flexilis</i>	adult female	Lyttelton Harbor	1.8-9.1	New Zealand
<i>Scleroconcha</i> species indet.	female	E-20-91	intertidal	New Zealand
Cylindroleberididae				
<i>Archasterope</i> species indet.	juvenile	V-14-32	1861	south of South Africa
Sarsiellidae				
<i>Cymbicopia brevicosta</i>	adult female	Akaroa Harbor	12	New Zealand

The fact that the parasites are nematodes was verified by Dr. Duane Hope, who is of the opinion that they were probably parasitic on the ostracodes.

The nematodes have been deposited in the Division of Worms, National Museum of Natural History, Smithsonian Institution.

PROTISTA.—These generally consist of stalked cuplike organisms (Figures 158*i*, 165*s*, 182*s*)

and segmented filaments (Figures 159*j*; 165*u*). Collin (1912:350) described a suctorian of the former type from "*Cypridina*" *mediterranea* Costa (?). The suctorian, *Loricophrya cypridinae* (Collin, 1912) (see Schröder, 1908, and Matthes, 1956, for discussion of group) was collected on the carapace of the ostracode. Stalked cuplike organisms fit the description of many taxa, and no attempt is made

TABLE 13.—Distribution of species (number of samples) within study area (depths in meters)

Species	Antarctic region			Subantarctic region			Subantarctic boundary to 35°S		
	0-200	200-2000	2000+	0-200	200-2000	2000+	0-200	200-2000	2000+
CYPRIDINIDAE									
CYPRIDININAE									
<i>Bathyvargula waldorfi</i>								1	
<i>Cypridinodes asymmetrica</i>								1	
<i>C. danae</i>				1 locality unknown					
<i>C. favus</i>									
<i>C. reticulata</i>								1	
<i>C. wyvillethomsoni</i>								4	
<i>Doloria isaaci</i>	1	3							
<i>D. levinsoni</i>			1		2	1			1
<i>D. levis</i>	12	4							
<i>D. mawsoni</i>				1					
<i>D. pectinata</i>				17	4			1	1
<i>D. septenaria</i>					1				
<i>Hadacypridina bruuni</i>									1
<i>Metavargula adinothrix</i>			2			2			1
<i>M. iota</i>								1	
<i>Paradoloria australis</i>									1
<i>Pterocypridina excreta</i>								1	
<i>Rugosidoloria serrata</i>								1	
<i>Siphonostra hallex</i>								1	
<i>Vargula antarctica</i>	2	3						1	
<i>V. dentata</i>					5				
<i>V. hamata</i>		1			6			1	
<i>V. lusca</i>								1	
<i>V. puppis</i>								2	
<i>V. stathme</i>								1	
<i>V. subantartica</i>				2	1			1	1
<i>V. sutura</i>			1						
<i>V. tubulata</i>								1	
AZYGOCYPRIDININAE									
<i>Azygocypridina africanus</i>								2	1
<i>A. imperator</i>									1
<i>Isocypridina quatuorsetae</i>		1	1						1
PHILOMEDIDAE									
<i>Anarthron chilensis</i>								3	
<i>A. dithrix</i>				4				13	1
<i>A. evexum</i>				1	1			2	
<i>A. pholion</i>				3	1				
<i>A. reticulata</i>								2	2
<i>Euphilomedes agilis</i>								3	
<i>E. ferox</i>								1	
<i>Igene walleni</i>			2						1
<i>Philomedes assimilis</i>	33	10							
<i>P. charcoti</i>	4								
<i>P. cubitum</i>				2					
<i>P. eugeniae</i>				3	1				
<i>P. heptathrix</i>	3	5							
<i>P. lofthousae</i>				5					

TABLE 13.—Continued

Species	Antarctic region			Subantarctic region			Subantarctic boundary to 35°S		
	200—			200—			200—		
	0—200	2000	2000+	0—200	2000	2000+	0—200	2000	2000+
<i>P. minys</i>				2					
<i>P. orbicularis</i>	41	23							1
<i>P. ramus</i>									1
<i>P. rotunda</i>	4	2							
<i>P. subantarctica</i>					2		1	1	
<i>P. tetrathrix</i>			4		2				1
<i>Scleroconcha arcuata</i>							3		
<i>S. appelloefi</i>	3	2							
<i>S. flexilis</i>							3		
<i>S. frons</i>						1		1	
<i>S. gallardoi</i>	8	15							
<i>S. sculpta</i>							1		
<i>S. wolffi</i>							1		
CYLINDROLEBERIDIDAE									
CYLINDROLEBERIDINAE									
<i>Archasterope bulla</i>					2				
<i>A. dentata</i>							3		
<i>Bathyleberis grossmani</i>			2						1
<i>B. monothrix</i>							3		1
<i>B. oculata</i>							1		
<i>Diasterope schmitti</i>	3	2							
<i>D. grisea</i>							1		
<i>Doloasterope johanseni</i>							1		
<i>Empoulsenia antarctica</i>		1							
<i>E. pentathrix</i>	3	11			4				
<i>E. quinquesetae</i>		2							
<i>E. weddellensis</i>		1							
<i>Homasterope curta</i>	3								
<i>H. glacialis</i>	1								
<i>H. micra</i>							1		
<i>H. maccaini</i>	8								
<i>Parasterope anommata</i>								1	
<i>P. crinita</i>								1	
<i>P. longiseta</i>				9					
<i>P. micrommata</i>				1	1				
<i>P. proluxa</i>				3					
<i>P. ohlini</i>	8	4							
<i>P. pseudoquadrata</i>							1		
<i>P. quadrata</i>							2		
<i>P. styx</i>									1
<i>Skogsbergiella macrothrix</i>				2	2		16	4	
<i>S. pax</i>								1	
<i>S. plocus</i>							1		
<i>S. scotti</i>	4	1		1					
<i>S. skogsbergi</i>		1							
<i>S. spinifera</i>		7		2			1		
<i>Synasterope arnaudi</i>				1					
<i>S. brachythrix</i>				1	2				
<i>S. dimorpha</i>							4	2	1
<i>S. duplex</i>			1						

TABLE 13.—Continued

Species	Antarctic region			Subantarctic region			Subantarctic boundary to 35°S		
	200–			200–			200–		
	0–200	2000	2000+	0–200	2000	2000+	0–200	2000	2000+
<i>S. mystax</i>			1			1			
<i>S. empoulseni</i>									1
<i>S. polythrix</i>			1						
CYCLASTEROPINAE									
<i>Asteropella rotundicostata</i>									1
<i>A. species A</i>									2
<i>Asteropteron hulingsi</i>									1
<i>A. magnum</i>									1
<i>Cycloleberis bradyi</i>									1
<i>C. ovulum</i>									1
<i>C. poulseni</i>									1
<i>C. zealandica</i>									2
SARSIELLIDAE									
<i>Adelta theta</i>									2
<i>Cymbicopia brevicosta</i>									2
<i>C. hanseni</i>									2
<i>C. hispida</i>									2
<i>C. zealandica</i>									1
<i>Sarsiella lunata</i>									1
<i>S. magna</i>									1
<i>Spinacopia antarctica</i>		2							
<i>S. bisetula</i>					1				
<i>S. mastix</i>			1						
<i>S. menziesi</i>			3						
<i>S. octo</i>			3						
<i>S. variabilis</i>					2		1	1	
RUTIDERMATIDAE									
<i>Rutiderma gerdhartmanni</i>									1
<i>R. ovata</i>									1
<i>R. species A</i>									1
<i>R. species B</i>					2				
<i>Scleraner chacaoi</i>					2				1

here to differentiate them. Some are definitely suc-torians (see Figures 138*d,f*;161), others probably peritrichs (see Figure 184*e*). Differences observed in length of the stalks and shape of the cup and in shape and size of segments of filaments suggest that more than one species of each type is present (Figures 138*d,f*; 184*e*).

Another category consisting of branching stalks with ball-like terminals were rare (Figures 183*i,k*; 182*h,t*; 195*h*).

The stalked cuplike protistans and the segmented filaments were very common on members of the Philomedidae, and specimens of that family were seldom collected without them. The protistans were sparse on members of other families. The protistans are present on the appendages, the body of the animal between appendages, and along the anterior and posterior margins of the carapace, both along the inner and outer edges and on the infold.

Branching, segmented algal filaments like those

TABLE 14.—Distribution of species (number of samples) in the Antarctic region (depth in meters)

Species	Continental subregion						Outside Continental subregion			
	Scotia subregion			Outside Scotia subregion						
	South Georgia district		Outside South Georgia district							
	200–0–200	2000–2000+	200–0–200	2000–2000+	200–0–200	2000–2000+	200–0–200	2000–2000+	200–0–200	2000–2000+
CYPRIDINIDAE										
<i>Doloria isaaci</i>						1	3			
<i>D. levinsoni</i>					1					
<i>D. levis</i>	3	2	7	2		2				
<i>Metavargula adinothrix</i>					2					
<i>Vargula antarctica</i>						2	3			
<i>V. hamata</i>		1								
<i>V. sutura</i>										1
<i>Isocypridina quatuorsetae</i>			1		1					1
PHILOMEDIDAE										
<i>Igene Walleni</i>										2
<i>Philomedes assimilis</i>			3	3		30	7			
<i>P. charcoti</i>			8			1				
<i>P. heptathrix</i>						1	5			
<i>P. orbicularis</i>				58		3	1			
<i>P. rotunda</i>	4	2								
<i>P. tetrathrix</i>					4					
<i>Scleroconcha apelloefi</i>	3	2								
<i>S. gallardoi</i>			8	10		3	2			
CYLINDROLEBERIDIDAE										
<i>Bathyleberis grossmani</i>								1		1
<i>Diasterope schmitti</i>							3	2		
<i>Empoulsenia antarctica</i>					1					
<i>E. pentathrix</i>			4	7			3			
<i>E. quinquesetae</i>		2								
<i>E. weddellensis</i>							1			
<i>Homasterope curta</i>	3									
<i>H. glacialis</i>							1			
<i>H. maccaini</i>			8							
<i>Parasterope ohlini</i>	3	1	5	3						
<i>Skogsbergiella scotti</i>			3	1						
<i>S. skogsbergi</i>				1						
<i>S. spinifera</i>		1		6						
<i>Synasterope duplex</i>								1		
<i>S. mystax</i>						1				
<i>S. polythrix</i>										1
SARSIELLIDAE										
<i>Spinacopia antarctica</i>				2						
<i>S. mastix</i>								1		
<i>S. menziesi</i>			1			2				
<i>S. octo</i>								3		

TABLE 16.—Gut contents of myodocopid Ostracoda

Taxon	Stage of development and sex	Gut content	Source
CYPRIDINIDAE			
<i>Azygocypridina</i> sp., USNM 120519 (Kornicker, 1969b)	gravid female	large pieces of animals	personal observation
<i>A. rudjakovi</i> Kornicker, 1970	adult female	many exoskeletons of small crustaceans (mysids?), pellet of fine-grained sediment	Kornicker (1970a)
<i>Codonocera</i> sp., USNM 120511, 2 (pelagic) (Kornicker, 1969b)	?	large pieces of animals	personal observation
<i>Cypridina</i> sp., USNM 141813, (pelagic)	?	animal fragments, some detritus	personal observation
<i>Cypridinodes</i> sp., USNM 120516, (Kornicker, 1969b)	?	large pieces of animals	personal observation
<i>Doloria levis</i> Skogsberg, 1920, USNM 127376	juvenile	unidentifiable fine organic matter	personal observation
<i>D. pectinata</i> Skogsberg, 1920, USNM 139102	juvenile	particulate organic matter, slender spines, crustacean fragment	personal observation
<i>Gigantocypris muelleri</i> Skogsberg, 1920 (pelagic)	?	large copepods, young fish, giant <i>Sagitta</i>	Cannon (1933, 1940)
<i>Macrocypridina castanea</i> (Brady, 1897) (pelagic)	?	large crustacea, mysid	Cannon (1933)
<i>Pyrocypris</i> sp. (pelagic)	?	heteropod	Müller (1890)
<i>Vargula antarctica</i> (Müller, 1908)	?	minute detritus	Cannon (1933)
<i>V. hamata</i> , n. sp., USNM 128141	gravid female	worm (nematode?) eggs, 1 unidentified spine, a few diatom fragments, cells	personal observation
<i>V. harveyi</i> Kornicker and King, 1965	gravid female	spines (polychaete?)	Kornicker and King (1965)
<i>V. hilgendorfi</i> (Müller, 1890), USNM 95646	?	diatoms, unidentified particulate organic matter	personal observation
<i>V. norvegica</i> (Baird, 1860)	?	bristles of polychaetes, some sand, never copepods	Elofson (1969)
PHILOMEDIDAE			
<i>Anarthron dithrix</i> , n. sp., USNM 128852	gravid female	polychaete spines, particulate matter	personal observation
<i>Euphilomedes</i> sp., USNM 141557	adult female	detritus	personal observation
<i>E. multichelata</i> (Kornicker, 1958), USNM 141562	adult male	diatom, unidentified organic matter	personal observation
<i>Paramecodon poulsenii</i> Kornicker, 1968	adult female	polychaete? spines	Kornicker (1968)

TABLE 16.—Continued

Taxon	Stage of development and sex	Gut content	Source
<i>Philomedes cubitum</i> , n. sp., USNM 138656	adult female without eggs	polychaete fragments	personal observation
<i>P. globosus</i> (Lilljeborg, 1853)	?	silt with sand grains, larger and smaller foraminifers	Elofson (1969)
<i>P. globosus</i> (Lilljeborg, 1953)	adult male	empty	Müller (1894), Skogsberg (1920)
<i>P. lilljeborgi</i> Sars, 1866	female	diatoms and globigerinid type foraminifers	Darby (1965)
<i>P. lilljeborgi</i> Sars, 1866	?	silt, mineral grains, sponge spicules, polychaete, bristles, skeletons of minute crustaceans, and balanid larvae, hydroid tubes	Elofson (1969)
<i>P. lofthousae</i> , n. sp., USNM 139853	juvenile female	copepod fragments	personal observation
<i>Pseudophilomedes ferulanus</i> Kornicker, 1958, USNM 120510 (Kornicker, 1969b)	adult female	empty	personal observation
CYLINDROLEBERIDIDAE			
<i>Parasterope pollex</i> Kornicker, 1967f	?	empty	personal observation
<i>Skogsbergiella macrothrix</i> , n. sp., USNM 137064	adult male	fine, unrecognizable material	personal observation
<i>Synasterope norvegica</i> (Sars, 1869)	?	homogeneous, hyaline mass, (no bristles or sand grains)	Elofson (1969)
SARSIELLIDAE			
<i>Cymbicopia brevicosta</i> , n. sp., holotype	gravid female	pellets of sedimentary debris, no recognizable organisms	personal observation
<i>Sarsiella disparalis</i> Darby, 1965	gravid female	nematodes (free living, partly digested), whole harpacticoid copepod, several arthropod appendages, and a diatom	Kornicker (1967e)
<i>S. greyi</i> Darby, 1965	gravid female	copepods	Darby (1965)
<i>S. lunata</i> , n. sp., USNM 137688	female	copepods	personal observation
<i>S. lunata</i> , n. sp., USNM 137690	N-1 male	two small crustaceans	personal observation
<i>S. pilipollicus</i> Darby, 1965	gravid female	copepods	Darby (1965)
<i>S. zostericola</i> Cushman, 1906	juvenile female	copepod (complete)	Kornicker (1967e)
<i>S. zostericola</i> USNM 141811	adult female	detritus	personal observation
<i>Spinocopia bisetula</i> Kornicker, 1969	adult female	copepod fragments	Kornicker (1969a)
<i>S. sandersi</i> Kornicker, 1969	juvenile male and female	copepods, polycope and podocopic ostracode	Kornicker (1969a)

TABLE 16.—Continued

Taxon	Stage of development and sex	Gut content	Source
<i>S. sandersi</i> Kornicker, 1969	adult male	empty	Kornicker (1969a)
<i>S. variabilis</i> Kornicker, 1969	adult female	copepods, nematodes, polycope ostracode, pellets	Kornicker (1969a)
RUTIDERMATIDAE			
<i>Rutiderma dinochelata</i> Kornicker, 1958	female	annelids, diatoms, nearly whole copepods	Darby (1965)
<i>R. ovata</i> , n. sp., USNM 137684	gravid female	nematodes, crustacean fragments, annelid spines, sedimentary particles	personal observation
<i>R. ovata</i> , n. sp., USNM 137682	N-1 male	annelid spines and at least 2 different genera of nematodes	personal observation
<i>R. ovata</i> , n. sp., USNM 137687	adult male	copepod, segmented worm, particulate matter	personal observation

TABLE 17.—Number of Ommatidia in lateral eyes of *Myodocopina*

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
CYPRIDINIDAE			
CYPRIDININAE			
<i>Cypridinodes acuminata</i> Skogsberg, 1920	?	very large	25
<i>C. asymmetrica</i> Müller, 1906a	?	15	0-100
<i>C. favus</i> Brady, 1902	?	16	?
<i>C. galathea</i> Poulsen, 1962	?	15	20
<i>C. inermis</i> Poulsen, 1962	20	?	86
<i>C. minuta</i> Poulsen, 1962	well developed	well developed	33-40
<i>C. poulseni</i> , n. sp.	15-20	15-20	50-100
<i>C. reticulata</i> Poulsen, 1962	absent	?	610
<i>Doloria isaacsi</i> , n. sp.	24-27	27	193-300
<i>D. levinsoni</i> , n. sp.	absent	5-6	2818
<i>D. levis</i> Skogsberg, 1920	25	25 (larger than ♀)	6-320
<i>D. mawsoni</i> , n. sp.	18	?	69
<i>D. pectinata</i> Skogsberg, 1920	25	25 (larger than ♀)	21-434
<i>D. septenaria</i> , n. sp.	27	?	434
<i>Hadacypridina bruuni</i> Poulsen, 1962	absent	absent	5340-6000
<i>Metavargula adinothrix</i> , n. sp.	3-4	?	1796-3775
<i>M. ampla</i> (Kornicker, 1970a)	5	?	1927-1997
<i>M. iota</i> , n. sp.	3-4	?	117
<i>M. optilus</i> (Kornicker, 1968)	5	?	1000-1200
<i>Metavargula</i> sp. indet. herein	small	?	3658
<i>Metavargula</i> sp. indet. herein	absent	?	3658
<i>Metavargula</i> sp. indet. herein	absent		248-262
	(sex unknown)		
<i>Paradoloria acorensis</i> (Granata & Caporiacco, 1949)	?	?	1455-1482
<i>P. angulata</i> Poulsen, 1962	well developed	?	25
	(juvenile)		

TABLE 17.—Continued

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
<i>P. australis</i> Poulsen, 1962	?	absent	1350
<i>P. capensis</i> (Cleve, 1908)	well developed	?	277
<i>P. dorsoserrata</i> (Müller, 1908)	well developed	well developed	subtidal ?
<i>P. nuda</i> Poulsen, 1962	well developed	?	ca. 100
<i>P. vanhoeffeni</i> (Müller, 1908)	well developed	well developed	20–80 ?
<i>Pterocypridina alata</i> Poulsen, 1962	?	15–20	10–20
<i>P. birostrata</i> Poulsen, 1962	well developed	?	shallow water
<i>P. excreta</i> Poulsen, 1962	12–15	?	60–90
<i>Siphonostra hallex</i> , n. sp.	25	25 (larger than ♀)	?15
<i>S. spinifera</i> (Skogsberg, 1920)	well developed	?	25
<i>Vargula antarctica</i> (Müller, 1908)	4	4	193–650
<i>V. bullae</i> Poulsen, 1962	well developed	?	27–45
<i>V. dentata</i> , n. sp.	absent	absent	429–1978
<i>V. hamata</i> , n. sp.	16	16	429–1212
<i>V. harveyi</i> Kornicker & King, 1965	16	?	washed up onto beach
<i>V. hilgendorfi</i> (Müller, 1890)	well developed	well developed	1–25 (incomplete)
<i>V. lusca</i> , n. sp.	absent	?	912
<i>V. norvegica</i> (Baird, ?1860)	(small) 9–10	14–16	150–200 (incomplete)
<i>V. plicata</i> Poulsen, 1962	?	well developed	15
<i>V. puppis</i> Poulsen, 1962	well developed	?	50–180
<i>V. spinosa</i> Poulsen, 1962	(well developed)	12 ?	180–550
<i>V. spinulosa</i> Poulsen, 1962	well developed	?	50
<i>V. stathme</i> , n. sp.	4–5	?	117
<i>V. subantarctica</i> , n. sp.	14–16	14–16	119–611
<i>V. sutura</i> , n. sp.	absent	?	3431
<i>V. tubulata</i> Poulsen, 1962	well developed	?	55–90
AZYGOCPRIDININAE			
<i>Azygocypridina africanus</i> (Stebbing, 1901)	modified to hirsute flap		156–229
<i>A. grimaldi</i> (Granata, 1919)	modified to hirsute flap		2320
<i>A. rudjakovi</i> Kornicker, 1970a	modified to hirsute flap		1411–1450
<i>Isocypridina quatuorseta</i> , n. g., n. sp.	modified to hirsute flap		248–3382
PHILOMEDIDAE			
PHILOMEDINAE			
<i>Anarthron chilensis</i> (Hartmann, 1965)	2	18	100–112
<i>A. dithrix</i> , n. sp.	2	18	71–1173
<i>A. evexum</i> , n. sp.	2	?	79–284
<i>A. pholion</i> , n. sp.	2	?	82–284
<i>A. reticulata</i> (Hartmann, 1965)	2–3	20	139–260
<i>Euphilomedes africana</i> (Klie, 1940)	?	?	shallow
<i>E. agilis</i> (Thomson, 1879)	small reddish	well developed 9 (N–1)	0–3
<i>E. aspera</i> (Müller, 1894)	?	(large) 13–16	30
<i>E. arostrata</i> Kornicker, 1967a	absent	19	0–1
<i>E. bradyi</i> Poulsen, 1962	?	large	surface (night)
<i>E. carcharodonta</i> (Smith, 1051)	absent	well developed	5.5–7.3 m
<i>E. corrugata</i> (Brady, 1897)	?	?	3.7–18.3
<i>E. debilis</i> (Brady, 1902)	?	?	?
<i>E. ferox</i> Poulsen, 1962	absent	?	70–100

TABLE 17.—Continued

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
<i>E. fonsecensis</i> (Hartmann, 1959)	?	?	0-2
<i>E. grafi</i> (Hartmann, 1964)	?	?	0-1
<i>E. ?interpuncta</i> (Baird, 1850b)	small	well developed	less than 100
<i>E. japonica</i> (Müller, 1890)	?	?	18.3-21.9
<i>E. longiseta</i> (Juday, 1907)	absent	20	surface (night) -90
<i>E. moroides</i> (Brady, 1890)	small reddish	well developed	5.5-11
<i>E. multichelata</i> (Kornicker, 1958)	absent	17	surface (night)
<i>E. nodosa</i> Poulsen, 1962	absent	20	2
<i>E. oblonga</i> (Juday, 1907)	absent ^a	well developed	20-91
<i>E. polae</i> (Graf, 1931)	absent	19	surface
<i>E. producta</i> Poulsen, 1962	absent	well developed	20
<i>E. smithi</i> Poulsen, 1962	absent	?	9
<i>E. sordida</i> (Müller, 1890)	?	?	?shallow
<i>E. walfordi</i> Poulsen, 1962	?	well developed	50
<i>Igene walleni</i> , n.g., n. sp.	absent	absent (N-1)	3702-4303
<i>Philomedes assimilis</i> Brady, 1907	2	well developed	9-876
<i>P. cubitum</i> , n. sp.	2	2 (N-1)—twice diameter of female	21-28
<i>P. charcoti</i> Daday, 1908	2	20	14-92
<i>P. curvata</i> Poulsen, 1962	absent	?	ca. 900
<i>P. dentata</i> Poulsen, 1962	?	?	40-70
<i>P. eugeniae</i> Skogsberg, 1920	2	?	20-270
<i>P. heptathrix</i> , n. sp.	2-3	23	250-570
<i>P. lofthousae</i> , n. sp.	2-3	?	25-130
<i>P. minys</i> , n. sp.	2-3	?	31-108
<i>P. orbicularis</i> (Brady, 1907)	2-3	20	15-405
<i>P. ramus</i> , n. sp.	2 (with hairs)	?	3219
<i>P. rotunda</i> Skogsberg, 1920	2	15 (N-1)	69-237
<i>P. subantarctica</i> , n. sp.	3	42	129-572
<i>P. tetrathrix</i> , n. sp.	2-3	20 (N-1)	566-3382 (♂ to 3219)
<i>Scleroconcha appelloefi</i> , Skogsberg, 1920	2-4	?	75-250
<i>S. arcuata</i> Poulsen, 1962	2-3	23	6-146
<i>S. flexilis</i> (Brady, 1898)	2	well developed	6-26
<i>S. frons</i> , n. sp.	?	large with 0-4 poorly defined ommatidia in N-1 instar (no pigment)	957-1226
<i>S. gallardoi</i> Kornicker, 1971	2	12 (N-1)	33-1180
<i>S. sculpta</i> (Brady, 1897)	?	well developed	1
<i>S. trituberculata</i> (Lucas, 1931)	?	?	90-145
<i>S. wolffi</i> , n. sp.	small	?	11
CYLINDROLEBERIDIDAE			
CYLINDROLEBERIDINAE			
<i>Archasterope bulla</i> , n. sp.	absent	absent (N-1)	279
<i>A. dentata</i> Poulsen, 1965	8-12	?	180
<i>Bathyleberis grossmani</i> , n. sp.	absent		3431-4303
<i>B. monothrix</i> , n. sp.	absent		71-601
<i>B. oculata</i> , n. sp.	18		110
<i>Diasterope bisetosa</i> Poulsen, 1965	?	well developed	surface (night)

TABLE 17.—Continued

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
<i>D. canina</i> Poulsen, 1965	?	present (juvenile)	7
<i>D. grisea</i> Poulsen, 1965	18	22 (larger than ♀)	11
<i>D. pilosa</i> Poulsen, 1965	well developed	?	45
<i>D. schmitti</i> , n. sp.	8	9 (N-2)	28-266
<i>D. tenuiseta</i> Poulsen, 1965	?	well developed (juvenile)	30
<i>Empoulsenia antarctica</i> , n. sp.	3		230
<i>E. pentathrix</i> (Kornicker, 1971)	3		40-1212
<i>E. quinquesetae</i> (Skogsberg, 1920)	9-10		237-281
<i>E. weddellensis</i> , n. sp.	3		650
<i>Homasterope curta</i> (Skogsberg, 1920)	well developed	(larger than ♀)	13-28
<i>H. glacialis</i> (Müller, 1908)	?	well developed	385
<i>H. maccaini</i> , n. sp.	20	20 (larger than ♀)	6-24
<i>H. micra</i> , n. sp.	10-11	?	110
<i>Parasterope anommata</i> , n. sp.	absent	?	426-572
<i>P. corrugata</i> Poulsen, 1965	?	20	18
<i>P. crinita</i> , n. sp.	16	?	51
<i>P. jenseni</i> Poulsen, 1965	10 (small)	?	180-500
<i>P. longiseta</i> (Skogsberg, 1920)	16	?	71-108
<i>P. longungues</i> Poulsen, 1965	absent	?	900
<i>P. mckenziei</i> Kornicker, 1970a	ca. 19	?	1
<i>P. micrommata</i> , n. sp.	3	?	93-118
<i>P. muelleri</i> (Skogsberg, 1920)	well developed	well developed	1-35
<i>P. nana</i> Poulsen, 1965	10-12 (small)	18	18
<i>P. obesa</i> Poulsen, 1965	20	?	shallow
<i>P. ohlini</i> (Skogsberg, 1920)	9-11	?	22-369
<i>P. pectinata</i> Poulsen, 1965	10-12 (small)	?	100
<i>P. pollex</i> Kornicker, 1967f	6 (small)	16	1-6
<i>P. proluxa</i> , n. sp.	16		20-40
<i>P. pseudoquadrata</i> (Hartmann, 1965)	9	20 (larger than ♀)	28-266
<i>P. quadrata</i> (Brady, 1898)	17 (N-1)	17 (N-1) (larger than ♀)	11
<i>P. skogsbergi</i> Poulsen, 1965	present (usual)	present (usual)	2
<i>P. styx</i> , n. sp.	absent	?	4303
<i>P. zamboangae</i> Kornicker, 1970b	19	?	1-2
<i>Skogsbergiella macrothrix</i> , n. sp.	2-6	3-6	70-1173
<i>S. pax</i> , n. sp.	absent	?	1475
<i>S. plocus</i> , n. sp.	19	19	112
<i>S. scotti</i> , n. sp.	23	?	6-300
<i>S. skogsbergi</i> (Kornicker, 1971)	18	?	274
<i>S. spinifera</i> (Skogsberg, 1920)	5-6	?	60-663
<i>Synasterope arnaudi</i> , n. sp.	absent	absent (N-1)	50
<i>S. bassana</i> Poulsen, 1965	10-12	?	180
<i>S. brachythrix</i> , n. sp.	absent	?	78-425
<i>S. dimorpha</i> (Hartmann, 1965)	absent	absent	112-2563
<i>S. duplex</i> , n. sp.	absent	?	378
<i>S. implumis</i> Poulsen, 1965	well developed	well developed	shallow
<i>S. knudseni</i> Poulsen, 1965	well developed	?	intertidal

TABLE 17.—Continued

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
<i>S. longiseta</i> Poulsen, 1965	well developed	?	?shallow
<i>S. mystax</i> , n. sp.	absent	absent	2747-4006
<i>S. oculata</i> (Brady, 1902)	?	large, well developed	surface (night)
<i>S. polythrix</i> , n. sp.	absent	?	4008
<i>S. empoulseni</i> , n. sp.	15	?	12-110
<i>S. quadrisetosa</i> Poulsen, 1965	?	15 (well developed)	surface
<i>S. serrata</i> Poulsen, 1965	15 (small)	?	50
<i>S. species A</i> Kornicker, 1970a	?	absent (juvenile)	2504-2514
<i>S. species B</i> Kornicker, 1970a	absent (juvenile)	?	4516-4383
CYCLASTEROPINAE			
<i>Asteropella agassizii</i> (F. Müller, 1870)	small	small, but larger than those on ♀	?shallow
<i>A. monambon</i> (Kornicker, 1958)	?	?	3-20
<i>A. mortenseni</i> Poulsen, 1965	absent	absent	20-40
<i>A. punctata</i> Poulsen, 1965	absent	?	25-30
<i>A. rotundicostata</i> (Hartmann, 1965)	?	?	12
<i>A. scammonensis</i> McKenzie, 1965	?	?	?-20
<i>A. species A</i> , herein	?	?	44-57
<i>Asteropteron hirsutum</i> Poulsen, 1965	?	50	30
<i>A. hulingsi</i> , n. sp.	10	?	44
<i>A. magnum</i> Poulsen, 1965	absent	absent	65-100
<i>A. nodulosum</i> Poulsen, 1965	?	25	20
<i>A. skogsbergi</i> Poulsen, 1965	25	ca. 25	33-40
<i>A. spinosum</i> Poulsen, 1965	25 (juvenile)	?	33
<i>A. thailandicum</i> Poulsen, 1965	?	?absent	8-28
<i>Cycloleberis americana</i> (Müller, 1890)	well developed, 20 (juvenile)	?	7-30
<i>C. biminiensis</i> Kornicker, 1958	?	?	3-10
<i>C. bradyi</i> Poulsen, 1965	80 (juvenile)	80	22-65
<i>C. brevis</i> (Müller, 1890)	small	?	21.9-38
<i>C. galathea</i> Poulsen, 1965	well developed	well developed	20
<i>C. lobiancoi</i> (Müller, 1894)	ca. 50	?	10-30
<i>C. orbicularis</i> (Brady, 1897)	present	?	?
<i>C. ovulum</i> (Brady, 1898)	present	?	1
<i>C. poulseni</i> Mognilevsky & Ramirez, 1970	?	?	15
<i>C. priacanthus</i> (Tressler, 1949)	well developed	?	? (fish stomach)
<i>C. similis</i> (Brady, 1902)	?	?	14.6
<i>C. sphaerica</i> (Tressler, 1949)	well developed (larger than than on <i>C. tripla</i>)	?	intertidal-19
<i>C. tripla</i> (Tressler, 1949)	well developed	?	intertidal-17
<i>C. zealandica</i> (Baird, 1850b)	present	?	5
SARSIFLIDAE			
<i>Adelta theta</i> , n. g., n. sp.	4	?	15
<i>Cymbicopia brevicosta</i> , n. sp.	2	?	10
<i>C. hanseni</i> (Brady, 1898)	2	2	10
<i>C. hispida</i> (Brady, 1898)	2	2	10

TABLE 17.—Continued

MYODOCOPINA	OMMATIDIA		
	Female	Male	Depth (m)
<i>C. zealandica</i> (Poulsen, 1965)	4	?	10
<i>Sarsiella alata</i> (Poulsen, 1965)	ca. 5 (juvenile)	?	5
<i>S. angusta</i> Darby, 1965	5	?	41
<i>S. armata</i> (Poulsen, 1965)	4	4	9-18
<i>S. cornuta</i> (Poulsen, 1965)	4-6	?	5
<i>S. dentifera</i> (Poulsen, 1965)	4	?	35-40
<i>S. disparalis</i> Darby, 1965	5-6	?	12.5-200
<i>S. georgiana</i> Darby, 1965	?	10	81
<i>S. greyi</i> Darby, 1965	5	? nonbifid lenses	81
<i>S. guttata</i> (Poulsen, 1965)	4	4	1-17
<i>S. longicornis</i> (Poulsen, 1965)	?	?	9-18
<i>S. longipenna</i> (Poulsen, 1965)	3 (juvenile)	?	18
<i>S. lunata</i> , n. sp.	6	6	179
<i>S. maculata</i> (Poulsen, 1965)	5-6	5-6	9-27
<i>S. magna</i> (Poulsen, 1965)	4	?	70-100
<i>S. multispinosa</i> (Poulsen, 1965)	4-5	4-5	7-18
<i>S. nana</i> (Poulsen, 1965)	4-6	?	10-20
<i>S. nodimarginis</i> Darby, 1965	5	?	99-373
<i>S. ovalis</i> (Poulsen, 1965)	4-5	4-5	50
<i>S. parvispinosa</i> (Poulsen, 1965)	5	5	10-20
<i>S. pilipollicis</i> Darby, 1965	? (not observed)	?	373
<i>S. radiocosta</i> Darby, 1965	6	?	81
<i>S. rugosa</i> Poulsen, 1965	?	6	9
<i>S. spicata</i> (Poulsen, 1965)	5-6	?	50
<i>S. spinulosa</i> (Poulsen, 1965)	typical	?	9-18
<i>S. striata</i> (Poulsen, 1965)	usual type	usual type	9-18
<i>S. tumida</i> (Scott, 1905)	small, few ommatidia	?	33
<i>S. tubipora</i> Darby, 1965	5	?	121
<i>S. verae</i> (Poulsen, 1965)	3-5	4-6	78-18
<i>S. zostericola</i> Cushman, 190	6-7	6	1-22
<i>Spinacopia antarctica</i> Kornicker, 1970a	absent	absent (N-1)	216
<i>S. bisetula</i> Kornicker, 1969a	absent	?	1622
<i>S. mastix</i> , n. sp.	absent	absent	3035
<i>S. menziesi</i> Kornicker, 1969a	absent	?	2818-3500
<i>S. octo</i> Kornicker, 1969a	absent	(N-1)	3495-4758
<i>S. sandersi</i> Kornicker, 1969a	absent	absent	1135-1153
<i>S. torus</i> Kornicker, 1970a	absent	?	3994-4364
<i>S. variabilis</i> Kornicker, 1969a	absent	absent (N-1)	135-1475
RUTIDERMATIDAE			
<i>Rutiderma fusca</i> Poulsen, 1965	?	well developed	surface (night)
<i>R. gerdhartmanni</i> , n. sp.	5	19	12
<i>R. hartmanni</i> Poulsen, 1965	?	well developed (juvenile)	9
<i>R. mortenseni</i> Poulsen, 1965	?	20	?
<i>R. normani</i> Poulsen, 1965	small, rudimentary	20	2-17
<i>R. ovata</i> , n. sp.	5	14	196
<i>R. rostrata</i> Juday, 1906	?	25-30	littoral to 21
<i>R. rotunda</i> Poulsen, 1965	present	?	shallow
<i>R. species A</i> herein	?	?	12
<i>Scleraner chacaoi</i> (Hartmann, 1965)	5	5 (N-1)	21-240

TABLE 18.—Clutch size and carapace length of ovigerous females

Taxon	Number of eggs or embryos	Number of specimens	Length of longest specimen (mm)	Reference
CYPRIDINIDAE				
Previous records				
<i>"Cypridina" mediterranea</i> Costa, 1845	34	?	3.90	Müller (1895:174)
<i>Skogsbergia crenulata</i> Poulsen, 1962	up to 20	several	1.65	Poulsen (1962:173)
<i>Vargula harveyi</i> Kornicker and King, 1965	22-24	several	2.42	Kornicker and King (1965:108)
<i>V. norvegica</i> (Baird, 1860)	more than 20	?	4.00	Elofson (1969:134)
	not unusual			
<i>V. spinosa</i> Poulsen, 1962	15	1	3.90	Poulsen (1962:192)
<i>Paravargula ensifera</i> Poulsen, 1962	ca. 20	1	2.93	Poulsen (1962:209)
<i>P. nanipollex</i> Kornicker, 1970b	1-7	2	1.64	Kornicker (1970b:6)
<i>Hadacypridina bruuni</i> Poulsen, 1962	10	1	3.60	Poulsen (1962:230)
<i>Pterocypridina excreta</i> Poulsen, 1962	7	1	1.87	Poulsen (1962:240)
<i>Paracypridina aberrata</i> Poulsen, 1962	ca. 10	1	1.91	Poulsen (1962:248)
<i>Monopia flaveola</i> Claus, 1873	25-30	several	4.10	Poulsen (1962:276)
<i>Gigantocypris muelleri</i> var. <i>minor</i> Skogsberg, 1920	24-27	2	—	Skogsberg (1920:219)
<i>G. muelleri</i> Skogsberg, 1920	30-85	many	—	Skogsberg (1920:213)
<i>G. muelleri</i> Skogsberg, 1920	20	1	—	Poulsen (1962:69)
<i>Macrocypridina castanea</i> (Brady, 1897)	50-75	many	—	Skogsberg (1920:294)
<i>Metavargula optilus</i> Kornicker, 1968	31	1	3.70	Kornicker (1968:488)
New records				
<i>Siphonostra hallex</i> , n. sp.	8-11	2	1.91	herein
<i>Rugosidoloria serrata</i> , n. sp.	9	1	2.85	herein
<i>Doloria isaacsi</i> , n. sp.	26	1	4.65	herein
<i>D. levis</i> Skogsberg, 1920	6-15	8	2.79	herein
<i>D. pectinata</i> Skogsberg, 1920	12-21	9	2.71	herein
<i>Vargula stathme</i> , n. sp.	7	1	1.95	herein
<i>V. subantarctica</i> , n. sp.	2-20	4	2.81	herein
<i>V. antarctica</i> Müller, 1908	26	1	3.81	herein
<i>V. hamata</i> , n. sp.	3-25	12	4.12	herein
<i>V. lusca</i> , n. sp.	19	1	2.79	herein
<i>V. dentata</i> , n. sp.	10-11	2	2.21	herein
<i>Isocypridina quatuorsetae</i> , n. sp.	27 ^a	1	8.0	herein
<i>Azygocypridina</i> species ^b	34	1	8.5	herein
PHILOMEDIDAE				
Previous records				
<i>Philomedes globosus</i> (Lilljeborg, 1853)	8-16	many	3.00	Elofson (1941; 1969:134)
<i>Philomedes</i> spp.	4-9	?	1.33	Müller (1894:174)
<i>P. orbicularis</i> Brady, 1907	5-13	4	2.65	Kornicker (1971:181)
<i>Scleroconcha gallardoi</i> Kornicker, 1971	24-27	2	4.13	Kornicker (1971:194, 196)
<i>Paramekodon poulseni</i> Kornicker, 1968	1	1	1.81	Kornicker (1968:469)
<i>Pseudophilomedes ferulanus</i> Kornicker, 1958	2-6	4	1.73	Kornicker (1967d:13)
<i>Pseudophilomedes</i> spp.	2-4	?	1.23	Müller (1894:174)
<i>Euphilomedes multichelata</i> (Kornicker, 1958)	5	1	1.07	Kornicker (1967b:9)
<i>E. arostrata</i> Kornicker, 1967a	10	1	1.37	Kornicker (1967a:6)
<i>E. carcharodonta</i> (Smith, 1951)	22	1	2.37	personal observation

TABLE 18.—Continued

Taxon	Number of eggs or embryos	Number of specimens	Length of longest specimen (mm)	Reference
New records				
<i>Philomedes assimilis</i> Brady, 1907	3-14	16	2.00	herein
<i>P. heptathrix</i> , n. sp.	4-16	3	2.60	herein
<i>P. lofthousae</i> , n. sp.	12-17	3	2.65	herein
<i>P. minys</i>	4-11	2	1.26	herein
<i>P. rotunda</i> Skogsberg, 1920	26	2	2.12	herein
<i>P. subantarctica</i> , n. sp.	23	2	2.70	herein
<i>P. tetrathrix</i> , n. sp.	6-8	2	2.61	herein
<i>P. orbicularis</i> Brady, 1907	9-18	10	2.58	herein
<i>P. eugeniae</i> Skogsberg, 1920	4-11	2	1.75	herein
<i>Scleroconcha wolffi</i> , n. sp.	12	1	1.94	herein
<i>S. flexilis</i> Brady, 1898	16-30	2	2.21	herein
<i>S. appelloefi</i> , Skogsberg, 1920	25	1	3.60	herein
<i>S. gallardoii</i> Kornicker, 1971	30-32	2	4.35	herein
<i>Anarthron chilensis</i> (Hartmann, 1965)	6	1	1.98	herein
<i>A. reticulata</i> (Hartmann, 1965)	9	1	1.84	herein
<i>A. evexum</i> , n. sp.	3-10	5	2.00	herein
<i>A. pholion</i> , n. sp.	4-17	2	1.93	herein
<i>A. dithrix</i> , n. sp.	4-15	8	2.31	herein
<i>Igene walleni</i> , n. sp.	3-6	3	1.44	herein
CYLINDROLEBERIDAE				
Previous records				
" <i>Cylindroleberis</i> " <i>mariae</i> (Baird, 1850b)	6-14	?	2.0	Müller (1894:174)
<i>Asteropteron skogsbergi</i> Poulsen, 1965	ca. 15	1	3.4	Poulsen (1965:210)
<i>Bruuniella breviata</i> Poulsen, 1965	8	1	0.91	Poulsen (1965:323)
<i>Heptonema serrata</i> Poulsen, 1965	10	1	1.14	Poulsen (1965:329)
<i>Diasterope pilosa</i> Poulsen, 1965	6-7	2	2.3	Poulsen (1965:347)
<i>Parasterope obesa</i> Poulsen, 1965	12	1	1.38	Poulsen (1965:364)
<i>P. ohlini</i> (Skogsberg, 1920)	17	1	2.14	Kornicker (1971:203)
<i>P. skogsbergi</i> Poulsen, 1965	15	1	1.25	Poulsen (1965:379)
<i>P. nana</i> Poulsen, 1965	10	1	1.20	Poulsen (1965:396)
<i>P. zamboangae</i> Kornicker, 1970b	10	1	1.21	Kornicker (1970b:26)
<i>Synasterope implumis</i> Poulsen, 1965	10	1	1.27	Poulsen (1965:421)
<i>S. serrata</i> Poulsen, 1965	7	1	1.00	Poulsen (1965:427)
<i>Cylindroleberis minuta</i> (Poulsen, 1965)	8-10	2	1.20	Poulsen (1965:436)
<i>C. verrucosa</i> (Poulsen, 1965)	15	1	1.56	Poulsen (1965:440)
<i>Empoulsenia quinquesetae</i> (Skogsberg, 1920)	16	1	2.88	Kornicker (1971:215)
<i>Skogsbergiella skogsbergi</i> (Kornicker, 1971)	16	1	3.55	Kornicker (1971:211)
<i>S. spinifera</i> (Skogsberg, 1920)	9	1	2.63	Kornicker (1971:210)
<i>Empoulsenia pentathrix</i> (Skogsberg, 1920)	11-12	2	2.47	Kornicker (1971:209)
New records				
<i>Diasterope grisea</i> (Brady, 1898)	20	1	2.64	herein
<i>D. schmitti</i> , n. sp.	12	1	3.51	herein
<i>Parasterope prolixa</i> , n. sp.	6	1	1.35	herein
<i>P. crinita</i> , n. sp.	13	1	1.28	herein
<i>P. longiseta</i> (Skogsberg, 1920)	2-12	9	1.66	herein
<i>P. micrommata</i> , n. sp.	11-12	2	1.78	herein
<i>P. ohlini</i> (Skogsberg, 1920)	8-15	6	2.33	herein

TABLE 18.—Continued

Taxon	Number of eggs or embryos	Number of specimens	Length of longest specimen (mm)	Reference
<i>P. anommata</i> , n. sp.	3	1	1.72	herein
<i>P. styx</i> , n. sp.	9	1	2.01	herein
<i>Skogsbergiella plocus</i> , n. sp.	14	1	2.06	herein
<i>S. scotti</i> , n. sp.	17-24	6	2.90	herein
<i>S. macrothrix</i> , n. sp. ^c	6-21	17	2.43	herein
<i>S. pax</i> , n. sp.	21	1	2.61	herein
<i>Empoulsenia antarctica</i> , n. sp.	18	1	3.37	herein
<i>E. quinquesetae</i> (Skogsberg, 1920)	13	1	2.90	herein
<i>E. pentathrix</i> (Skogsberg, 1920)	1-11	7	2.49	herein
<i>Homasterope maccaini</i> , n. sp.	6-10	5	1.84	herein
<i>H. micra</i> , n. sp.	5	1	1.25	herein
<i>Bathyleberis oculata</i> , n. sp.	23	1	2.60	herein
<i>B. monothrix</i> , n. sp.	3-12	4	2.30	herein
<i>B. grossmani</i> , n. sp.	12	1	2.63	herein
<i>Archasterope bulla</i> , n. sp.	11	1	2.04	herein
<i>Synasterope dimorpha</i> , n. sp.	1-9	3	1.63	herein
SARSIELLIDAE				
Previous records				
<i>Cymbicopia zealandica</i> (Poulsen, 1965)	4-8	2	1.45	Poulsen (1965:58, 62)
" <i>Muelleriella</i> " <i>setifera</i> (Scott, 1905)	4	1	0.71	Poulsen (1965:62)
<i>Anscottiella crispata</i> (Poulsen, 1965)	4	1	0.90	Poulsen (1965:65)
<i>Sarsiella magna</i> (Poulsen, 1965)	10	1	2.20	Poulsen (1965:89)
<i>S. dentifera</i> (Poulsen, 1965)	4	1	1.15	Poulsen (1965:92)
<i>S. maculata</i> (Poulsen, 1965)	3-7	2	1.05	Poulsen (1965:95)
<i>S. striata</i> (Poulsen, 1965)	6	1	1.44	Poulsen (1965:98)
<i>S. cornuta</i> (Poulsen, 1965)	4	1	0.99	Poulsen (1965:105)
<i>S. armata</i> (Poulsen, 1965)	5	1	1.00	Poulsen (1965:129)
<i>S. nana</i> (Poulsen, 1965)	2	1	0.62	Poulsen (1965:135)
<i>S. parvispinosa</i> (Poulsen, 1965)	12	1	1.25	Poulsen (1965:142)
<i>S. nodimarginis</i> Darby, 1965	10	2	1.68	Darby (1965:33)
<i>S. sculpta</i> Brady, 1890	6	1	1.20	Darby (1965:34)
<i>S. pilipollicis</i> Darby, 1965	10	1	1.37	Darby (1965:35)
<i>S. greyi</i> Darby, 1965	8-16	2	1.14	Darby (1965:39)
<i>S. tubipora</i> Darby, 1965	6	1	1.55	Darby (1965:40)
<i>S. disparalis</i> Darby, 1965	6	2	1.50	Darby (1965:40)
<i>S. disparalis</i> Darby, 1965	6-8	2	1.50	Kornicker (1967e:4)
<i>S. zostericola</i> Cushman, 1906	5-16	12	1.40	Kornicker (1967e:1)
<i>Spinacopia variabilis</i> Kornicker, 1969a	2-6	9	1.92	Kornicker (1969a:18)
<i>S. bisetula</i> Kornicker, 1969a	5	1	2.03	Kornicker (1969a:23)
<i>S. sandersi</i> Kornicker, 1969a	2-4	12	1.80	Kornicker (1969a:25)
<i>S. antarctica</i> Kornicker, 1970a	6	1	1.92	Kornicker (1970a:24)
<i>S. torus</i> Kornicker, 1970a	7	1	2.18	Kornicker (1970a:26)
New records				
<i>Adelta theta</i> , n. sp.	4-5	2	1.07	herein
<i>Cymbicopia brevicostata</i> , n. sp.	2-5	4	1.10	herein
<i>C. hanseni</i> (Brady, 1898)	4-5	3	1.06	herein
<i>C. hispida</i> (Brady, 1898)	6-7	3	1.16	herein
<i>Spinacopia mastix</i> , n. sp.	4-5	2	2.36	herein
<i>S. octo</i> Kornicker, 1970a	7	1	2.68	herein

TABLE 18.—Continued

Taxon	Number of eggs or embryos	Number of specimens	Length of longest specimen (mm)	Reference
RUTIDERMATIDAE				
Previous records				
<i>Rutiderma dinochelata</i> Kornicker, 1958	4	2	1.22	Darby (1965:29)
<i>R. mollita</i> Darby, 1965	4	2	1.45	Darby (1965:29)
<i>R. normani</i> Poulsen, 1965	4	1	1.25	Poulsen (1965:22)
<i>R. rotunda</i> Poulsen, 1965	2-4	many	1.33	Poulsen (1965:35)
New records				
<i>Rutiderma gerdhartmanni</i> , n. sp.	4	2	1.39	herein
<i>R. ovata</i> , n. sp.	2-4	5	1.63	herein

* One questionable egg was present in a specimen (not included here) which also contained a parasitic isopod.

† Specimen 8.5 mm long from Hokkaido, Japan (Station 5036, coll. 1906, U.S. Fisheries Steamer *Albatross*, 848.3 m).

‡ An additional specimen not included here had 2 eggs plus a copepod parasite.

Swimming

Swimming is accomplished by a sweeping movement of the exopodite of the 2nd antennae causing the long hairs on exopodial bristles to exert a backward thrust against the water. Not all exopodial bristles bear long hairs; those with long hairs are termed natatory bristles. In order to learn which taxa are capable of swimming and which are not, and whether the number of exopodial joints with natatory bristles is of use in taxonomic discrimination, they were counted on the species studied. Similar information on other species was obtained from a review of the literature (Tables 19, 20).

Among all the species, adult females of only *Tetragonodon rhamphoides* and *Igene walleni*, both members of the Philomedinae; never have natatory bristles on the second antennae. Both species are known from only deep water. Of the two species, only the male of *I. walleni*, which has natatory bristles, is known.

In the Cypridinidae, juveniles and adults of both sexes have the same number of joints with natatory bristles; members of the subfamily Azygocypridininae have them on joints 2-9, whereas, members of the Cypridininae have them on joints 3-9.

Adult males in the Philomedidae have natatory bristles on joints 3-9, but one species, *Euphilomedes carcharodonta*, has them on joints 4-9, and it may be predicted that species of *Paramekodon*, when

collected, will have them on joints 2-9, because females of that genus have natatory bristles on those joints, and no known myodocopid males have fewer joints with natatory bristles than females of the same species. Although constant for a given species, adult females of this family have natatory bristles on joints varying in number from 2-9 to 6-9, but most have them either on joints 5-9 or 6-9. The adult females of most species of *Philomedes* and some species of *Scleroconcha* bite or break off the natatory bristles after mating and are no longer capable of swimming (this phenomenon is discussed more fully later).

In the subfamily Cyclasteropidinae of the Cylindroleberididae all specimens have natatory bristles on joints 2-9; whereas, in the subfamily Cylindroleberidinae, natatory bristles are present on either joints 2-9 or 3-9. In some species in the latter subfamily, the bristle on the 2nd joint has short hairs, and in other species these hairs are long. Thus, the decision as to whether the hairs are long enough to be considered natatory hairs becomes subjective. When in doubt I have designated in Table 20 the natatory bristles as being on joints "2-, 3-9."

In the Sarsiellidae all specimens have natatory bristles on joints 2-9. Adult males in the Rutidermatidae have natatory bristles on joints 3-9, adult females have them on joints 6-9.

Known juveniles in the Rutidermatidae and Philomedidae, except *Euphilomedes longiseta* (Juday,

TABLE 19.—Distribution of natatory bristles on 2nd antennae in species of Philomedidae

Taxon	Gravid female			Adult	Juvenile		Reference
	Joints without natatory bristles	Joints with broken bristles	Joints with natatory bristles	Male	Female Joints with natatory bristles	Male	
<i>Philomedes lilljeborgii</i> (Sars, 1866)	2-5	6-9	0	3-9	-	-	Poulsen (1962), Skogsberg (1920)
<i>P. dentata</i> Poulsen, 1962	2-5	6-9	9	-	-	-	Poulsen (1962)
<i>P. curvata</i> Poulsen, 1962	2-5	0	6-9 ^b	-	-	-	Poulsen (1962)
<i>P. globosus</i> (Lilljeborg, 1853)	2-5	6-9	0	-	-	-	Skogsberg, (1920)
<i>P. eugeniae</i> Skogsberg, 1920	2-5	0	6-9	-	-	0	Skogsberg (1920), herein
<i>P. rotunda</i> Skogsberg, 1920	2-5	6-9	0	-	0	0	Skogsberg (1920)
<i>P. orbicularis</i> Brady, 1907	2-5	6-9	0	3-9	0?	-	Kornicker (1971)
<i>P. assimilis</i> Brady, 1907	2-5	6-9	0	-	-	-	Kornicker (1971)
<i>P. charcoti</i> Daday, 1908	-	-	-	3-9	-	-	Kornicker (1971)
<i>P. heptathrix</i> , n. sp.	2-5	6-9	0	3-9	-	-	herein
<i>P. tetrathrix</i> , n. sp.	2-5	6-9	0	-	-	-	herein
<i>P. subantarctica</i> , n. sp.	2-5	6-9	0	3-9	-	-	herein
<i>P. minys</i> , n. sp.	2-5	6-9	0	-	-	-	herein
<i>P. ramus</i> , n. sp.	2-5	6-9	0	-	-	-	herein
<i>P. lofthousae</i> , n. sp.	2-5	6-9(?)	0	-	-	-	herein
<i>P. cubitum</i> , n. sp.	2-5	6-9	0	-	-	-	herein
<i>P. brenda</i> (Baird, 1850)	2-5	6-9	0	-	0(? ♀)	-	Müller (1898)
<i>Euphilomedes nodosa</i> Poulsen, 1962	2-5	0	6-9	3-9	0	-	Poulsen (1962)
<i>E. walfordi</i> Poulsen, 1962	-	-	-	3-9	-	-	Poulsen (1962)
<i>E. smithsi</i> Poulsen, 1962	2-4	0	5-9	-	-	-	Poulsen (1962)
<i>E. carcharodonta</i> (Smith, 1951)	2-4	0	5-9	4-9	0	-	Poulsen (1962)
<i>E. producta</i> Poulsen, 1962	2-5	0	6-9 ^a	-	-	-	Poulsen (1962)
<i>E. bradyi</i> Poulsen, 1962	-	-	-	3-9	-	-	Poulsen (1962)
<i>E. agilis</i> (Thomson, 1879)	-	-	-	3-9	-	0	Poulsen (1962), herein
<i>E. ferox</i> Poulsen, 1962	-	-	-	-	0	-	Poulsen (1962)
<i>E. arostrata</i> Kornicker, 1967a	2-3	0	4-9	3-9	-	-	Kornicker (1967a)
<i>E. aspera</i> (Müller, 1894)	-	-	-	3-9	-	-	Kornicker (1967d)
<i>E. multichelata</i> (Kornicker, 1958)	2-3	0	4-9	3-9	-	-	Kornicker (1958, 1967b)
<i>E. polae</i> (Graf, 1931)	2-3	0	4-9	3-9	-	-	Kornicker (1967c)
<i>E. longiseta</i> (Juday, 1907)	-	-	-	3-9	3-9 ^d	3-9 ^d	Juday (1907), personal observation
<i>Scleroconcha flexilis</i> (Brady, 1898)	2-4	0	5-9	-	0	-	Poulsen (1962), herein
<i>S. arcuata</i> Poulsen, 1962	2-4	0	5-9	3-9	-	-	Poulsen (1962), herein
<i>S. appelloefi</i> Skogsberg, 1920	2-4	5-9	0	-	-	-	Skogsberg (1920)
<i>S. gallardoi</i> Kornicker, 1971	2-4	5-9	0	-	-	-	Kornicker (1971)
<i>S. frons</i> , n. sp.	-	-	-	-	-	0	herein
<i>S. wolffi</i> , n. sp.	2-4	0	5-9	-	-	-	herein
<i>Anarthron reticulata</i> (Hartmann, 1965)	2-3	0	4-9	-	-	-	herein
<i>A. chilensis</i> (Hartmann, 1965)	2-4	0	5-9	-	-	-	herein
<i>A. dithrix</i> , n. sp.	2-4	0	5-9	-	-	-	herein
<i>A. pholion</i> , n. sp.	2-4	0	5-9	-	-	-	herein
<i>A. evexum</i> , n. sp.	2-4	0	5-9	-	-	-	herein

TABLE 19.—Continued

Taxon	Gravid female			Adult	Juvenile		Reference
	Joints without natatory bristles	Joints with broken bristles	Joints with natatory bristles	Male	Female Joints with natatory bristles	Male	
<i>Igene walleni</i> , n. sp.	2-9	0	0	3-9	-	-	herein
<i>Paramekodon poulseni</i> Kornicker, 1968	0	0	2-9	-	-	-	Kornicker (1968)
<i>P. inflatus</i> Brady and Norman, 1896	0	0	2-9	-	-	-	Kornicker (1968)
<i>Tetragonodon rhamphodes</i> Kornicker, 1968	-	-	-	-	0(?)	-	Kornicker (1968)
<i>T. rhabdion</i> (Kornicker, 1970a)	2-9 ^e	0	0	-	-	-	Kornicker (1970a), herein
<i>Paraphilomedes unicornuta</i> Poulsen, 1962	2-5	0	6-9	3-9	-	0(?)	Poulsen (1962)
<i>Pseudophilomedes ferulanus</i> Kornicker, 1958	0	0	2-9	-	-	-	Kornicker (1967d)
<i>P. foveolatus</i> Müller, 1894	2-9(?) ^e	0	0(?) ^e	-	0	-	Müller (1894), Kornicker (1967d)

^a Female without eggs (adult).

^b Females without eggs (either adult or immature).

^c A gravid female (USNM 141106; carapace length 1.41 mm) from the Peru-Chile Trench was examined to obtain this information.

^d A juvenile female (USNM 142379) and a juvenile male (USNM 142378), both from near El Segunda, California, were examined to obtain this information.

^e May not be mature.

1907) (personal observation), are without natatory bristles. This information is useful in distinguishing between the adult female and next to last instar, except in the two species mentioned earlier in which adults are also without natatory hairs.

REMARKS CONCERNING BROKEN BRISTLES ON 2ND ANTENNAE.—Sars (1866:112) observed both short and long bristles on females of *Philomedes globosus* (Lilljeborg, 1853) and *Philomedes lilljeborgii* (Sars, 1866), and he stated that those with long bristles were capable of swimming but those with short bristles could not. He did not believe that the presence of short bristles was a factor of age because of finding them on both young and adult specimens. Apparently, Sars had not differentiated between bristles on juveniles that were naturally short and those of adult females that had been broken.

Müller (1894) determined by culturing specimens of "*Philomedes*" from the Gulf of Naples that juvenile females and males have short bristles on the exopodite of the second antennae, whereas, adult females and males have long bristles. He apparently believed that he had refuted the conclusion of Sars, noted above, that females have both long and short bristles. This may not have been so, however, because none of the species reported by Müller in the Gulf of Naples has adult females

with broken bristles. (Those species he identified as *Philomedes* are now in the genus *Euphilomedes*, and females of that genus do not have broken bristles.)

Müller (1898), working with *Philomedes globosus* (Lilljeborg, 1853), concluded that juveniles of both sexes of that species have short bristles on the exopodite of the second antennae and that these become long on the adults. He stated that females rise in the water to mate with the males, after which they bite off the ends of their natatory bristles with the endopodite of the fifth limb and then adopt a benthic habit. Several investigations have favored the analysis of Müller (Skogsberg, 1920:356; Sars, 1922:13; Elofsen, 1941, 1969:165). Fage (1933:142; 1934:260) disagreed only to the extent that he thought the ends of the bristles might fall off after copulation, rather than being bitten off. Elofsen (1941, 1969:165) found some specimens with bristles only partly "broken-off" and was unable to break these off completely. He believed that the tenacity of the unbroken part of the bristles was evidence against the hypothesis of Fage. I do not consider the question as to whether the bristles fall off or are bitten off to be resolved. To these methods could be added the possibility that they are rubbed off.

TABLE 20.—Distribution of natatory bristles on 2nd antennae in species of Cypridinidae, Cyndroleberididae, Sarsiellidae, and Rutidermatidae

Taxon	Joints with natatory bristles				Reference
	Adult		Juvenile		
	Female	Male	Female	Male	
CYPRIDINIDAE					
<i>Gigantocypris agassizi</i> Müller, 1895	3-9	3-9	3-9	3-9	Poulsen, (1962)
<i>G. muelleri</i> Skogsberg, 1920	3-9	3-9	3-9	3-9	Skogsberg (1920), Poulsen (1962)
<i>G. danae</i> Poulsen, 1962	3-9	3-9	3-9	3-9	Poulsen (1962)
<i>Macrocypridina castanea</i> Brady, 1897	3-9	3-9	3-9	3-9	Skogsberg (1920), Poulsen (1962)
<i>Paradoloria angulata</i> Poulsen, 1962	-	-	3-9	-	Poulsen (1962)
<i>P. australis</i> Poulsen, 1962	-	3-9	-	-	Poulsen (1962)
<i>P. nuda</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>P. dorsoserrata</i> (Müller, 1908)	3-9	3-9	-	-	Poulsen (1962)
<i>P. vanhoeffeni</i> (Müller, 1908)	3-9	3-9	-	-	Poulsen (1962)
<i>Skogsbergia minuta</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>S. curvata</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>S. crenulata</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>S. hesperida</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>S. menezii</i> Kornicker, 1970	3-9	3-9	-	-	Kornicker (1970b)
<i>Bathyvargula parvispinosa</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>Melavargula japonica</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>Hadacypridina bruuni</i> Poulsen, 1962	3-9	-	-	3-9	Poulsen (1962), herein
<i>Pterocypridina alata</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>P. excreta</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>P. birostrata</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>Paracypridina aberrata</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>Amphisiphonostira naviformis</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>Cypridina multipilosa</i> Poulsen, 1962	-	3-9	-	-	Poulsen (1962)
<i>C. nana</i> Poulsen, 1962	3-9	3-9	-	-	Poulsen (1962)
<i>Doloria levinsoni</i> , n. sp.	3-9	-	-	-	herein
<i>D. septenaria</i> , n. sp.	3-9	-	-	-	herein
<i>D. isaacsi</i> , n. sp.	3-9	-	-	-	herein
<i>D. mawsoni</i> , n. sp.	3-9	-	-	-	herein
<i>Siphonostira spinifera</i> Skogsberg, 1920	3-9	-	-	-	Skogsberg (1920)
<i>S. hallex</i> , n. sp.	3-9	3-9	-	-	herein
<i>Vargula hilgendorfi</i> (Müller, 1890)	3-9	3-9	-	-	Poulsen (1962)
<i>V. sutura</i> , n. sp.	3-9	-	-	-	herein
<i>V. bullae</i> Poulsen, 1962	3-9	-	-	-	Poulsen (1962)
<i>V. hamata</i> , n. sp.	3-9	3-9	3-9	-	herein
<i>V. subantarctica</i> , n. sp.	3-9	3-9	-	-	herein
<i>V. dentata</i> , n. sp.	3-9	3-9	-	-	herein
<i>V. lusca</i> , n. sp.	3-9	-	-	-	herein
<i>V. stathme</i> , n. sp.	3-9	-	-	-	herein
<i>Rugosidoloria serrata</i> , n. sp.	3-9	-	-	-	herein
<i>Metavargula ampla</i> Kornicker, 1970	3-9	-	-	-	Kornicker (1970a)
<i>M. adinothrix</i> , n. sp.	3-9	-	-	-	herein
<i>M. optilus</i> Kornicker, 1968	3-9	-	-	-	Kornicker (1968)
<i>M. iota</i> , n. sp.	3-9	-	-	-	herein
<i>Paravargula digitata</i> Kornicker, 1970	-	-	-	3-9	Kornicker (1970b)
<i>P. nanipollex</i> Kornicker, 1970	3-9	-	-	-	Kornicker (1970b)
<i>P. hirsuta</i> (Müller, 1906a)	3-9	3-9	-	-	Poulsen (1962)
<i>Cypridinodes</i> species Kornicker 1970	-	-	3-9	-	Kornicker (1970b)
<i>Cypridinodes acuminata</i> Skogsberg, 1920	-	3-9	-	-	Skogsberg (1920)
<i>Isoocypridina quatuorsetae</i> , n. sp.	2-9	2-9	-	-	herein
<i>Azygocypridina rudjakovi</i> Kornicker, 1970	-	2-9	-	-	Kornicker (1970a)

TABLE 20.—Continued

Taxon	Joints with natatory bristles				Reference
	Adult		Juvenile		
	Female	Male	Female	Male	
CYLINDROLEBERIDAE					
<i>Asteropteron hulingsi</i> , n. sp.	—	—	2-9	—	herein
<i>A. magnum</i> Poulsen, 1965	2-9	2-9	2-9	—	Poulsen (1965)
<i>A. hirsutum</i> Poulsen, 1965	—	—	—	2-9	Poulsen (1965)
<i>A. thailandicum</i> Poulsen, 1965	—	—	2-9	2-9	Poulsen (1965)
<i>A. nodulosum</i> Poulsen, 1965	—	2-9	—	—	Poulsen (1965)
<i>A. skogsbergi</i> Poulsen, 1965	2-9	—	—	2-9	Poulsen (1965)
<i>Microasteropteron parvum</i> Poulsen, 1965	2-9	—	—	—	Poulsen (1965)
<i>Asteropella mortenseni</i> Poulsen, 1965	2-9	2-9	2-9	—	Poulsen (1965)
<i>Cycloleberis brevis</i> (Müller, 1890)	3-9	—	—	—	Poulsen (1965)
<i>C. americana</i> (Müller, 1890)	—	—	3-9	—	Poulsen (1965)
<i>C. galathea</i> Poulsen, 1965	2-9	—	—	2-9	Poulsen (1965)
<i>C. bradyi</i> Poulsen, 1965	—	2-9	2-9	—	Poulsen (1965)
<i>Cylasterope fascigera</i> Brady, 1902	2-9	2-9	2-9	2-9	Poulsen (1965)
<i>C. bisetosa</i> Poulsen, 1965	2-9	—	—	2-9	Poulsen (1965)
<i>Doloasterope johanseni</i> Poulsen, 1965	—	—	3-9	—	Poulsen (1965)
<i>Bruuniella breviata</i> Poulsen, 1965	3-9	—	3-9	—	Poulsen (1965)
<i>Heptonema serrata</i> Poulsen, 1965	2, 3-9	—	—	—	Poulsen (1965)
<i>H. keiensis</i> Poulsen, 1965	—	—	3-9	3-9	Poulsen (1965)
<i>Diasterope pilosa</i> Poulsen, 1965	2-, 3-9	—	—	—	Poulsen (1965)
<i>D. schmitti</i> , n. sp.	3-9	—	—	—	herein
<i>D. tenuiseta</i> Poulsen, 1965	—	—	—	2-, 3-9	Poulsen (1965)
<i>D. grisea</i> (Brady, 1898)	3-9	—	—	—	herein
<i>D. canina</i> Poulsen, 1965	—	—	—	3-9	Poulsen (1965)
<i>Parasterope obesa</i> Poulsen, 1965	3-9	—	—	—	Poulsen (1965)
<i>P. pectinata</i> Poulsen, 1965	3-9	—	—	—	Poulsen (1965)
<i>P. muelleri</i> (Skogsberg, 1920)	3-9	2-9	3-9	—	Poulsen (1965)
<i>P. longungues</i> Poulsen, 1965	3-9	—	—	—	Poulsen (1965)
<i>P. jenseni</i> Poulsen, 1965	3-9	—	—	—	Poulsen (1965)
<i>P. corrugata</i> Poulsen, 1965	—	3-9	—	—	Poulsen (1965)
<i>P. nana</i> Poulsen, 1965	2-, 3-9	3-9	—	—	Poulsen (1965)
<i>P. ohlini</i> (Skogsberg, 1920)	3-9	—	—	—	herein
<i>P. pseudoquadrata</i> (Hartmann, 1965)	3-9	—	—	—	herein
<i>P. zamboangae</i> Kornicker, 1970	2-, 3-9	—	—	—	Kornicker (1970b)
<i>P. micrommata</i> , n. sp.	3-9	—	—	—	herein
<i>P. crinita</i> , n. sp.	3-9	—	—	—	herein
<i>P. anommata</i> , n. sp.	3-9	—	—	—	herein
<i>P. styx</i> , n. sp.	3-9	—	—	—	herein
<i>P. proluxa</i> , n. sp.	3-9	2-9	—	—	herein
<i>Synasterope bassana</i> Poulsen, 1965	2-, 3-9	—	—	—	Poulsen (1965)
<i>S. empoulseni</i> , n. sp.	3-9	—	—	—	Poulsen (1965, p. 412)
<i>S. longiseta</i> Poulsen, 1965	3-9	—	—	—	Poulsen (1965)
<i>S. implumis</i> Poulsen, 1965	2-9	2-9	—	—	Poulsen (1965)
<i>S. serrata</i> Poulsen, 1965	2-, 3-9	—	—	—	Poulsen (1965)
<i>S. knudseni</i> Poulsen, 1965	—	—	2-9	—	Poulsen (1965)
<i>S. dimorpha</i> , n. sp.	3-9	—	—	—	herein
<i>S. duplex</i> , n. sp.	3-9	—	—	—	herein
<i>S. polythrix</i> , n. sp.	2-9	—	—	—	herein
<i>S. mystax</i> , n. sp.	2-9	2-9	—	—	herein
<i>S. brachythrix</i> , n. sp.	3-9	—	—	—	herein

TABLE 20.—Continued

Taxon	Joints with natatory bristles				Reference
	Adult		Juvenile		
	Female	Male	Female	Male	
<i>S. arnaudi</i> , n. sp.	3-9	-	-	-	herein
<i>Skogsbergiella macrothrix</i> , n. sp.	3-9	-	-	-	herein
<i>S. plocus</i> , n. sp.	-	2-9	-	-	herein
<i>Empoulsenia weddellensis</i> , n. sp.	-	2-9	3-9	3-9	herein
<i>E. antarctica</i> , n. sp.	3-9	-	-	-	herein
<i>Homasterope maccaini</i> , n. sp.	3-9	2-9	-	-	herein
<i>H. micra</i> , n. sp.	3-9	-	-	-	herein
<i>Bathyleberis grossmani</i> , n. sp.	3-9	-	-	2-9	herein
<i>B. monothrix</i> , n. sp.	3-9	-	-	-	herein
<i>B. oculata</i> , n. sp.	3-9	-	-	-	herein
<i>Cylindroleberis minuta</i> Poulsen, 1965	2-9	-	-	-	Poulsen (1965)
<i>C. verrucosa</i> Poulsen, 1965	2-9	-	-	2-9	Poulsen (1965)
<i>C. thailandica</i> Poulsen, 1965	2-, 3-9	-	-	-	Poulsen (1965)
<i>C. nodulifera</i> Poulsen, 1965	-	2-9	-	-	Poulsen (1965)
<i>C. variabilis</i> Kornicker, 1970	2-9	-	-	-	Kornicker (1970b)
<i>Archasterope bulla</i> , n. sp.	2-9	-	-	-	herein
<i>A. dentata</i> Poulsen, 1965	2-, 3-9	-	-	-	Poulsen (1965)
SARSIELLIDAE					
<i>Cymbicopia zealandica</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>C. hanseni</i> (Brady, 1898)	2-9	2-9	-	-	herein
<i>C. hispida</i> (Brady, 1898)	2-9	2-9	-	-	herein
<i>C. brevicosta</i> , n. sp.	2-9	2-9	-	-	herein
<i>Adelta theta</i> , n. sp.	2-9	-	-	-	herein
" <i>Muelleriella</i> " <i>setifera</i> Poulsen, 1965	2-9	-	-	-	Poulsen, (1965)
<i>Anscottiella crispata</i> (Poulsen, 1965)	2-9	2-9	-	-	Poulsen, 1965
<i>Parasarsiella globulus</i> (Brady and Norman, 1896)	-	-	-	2-9	Poulsen (1965)
<i>Sarsiella rugosa</i> Poulsen, 1965	-	2-9	-	-	Poulsen (1965)
<i>S. tumida</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. magna</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. dentifera</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. maculata</i> (Poulsen, 1965)	2-9	2-9	-	-	Poulsen (1965)
<i>S. striata</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. spinosa</i> (Poulsen, 1965)	2-9	-	3-9	-	Poulsen (1965)
<i>S. longipenna</i> (Poulsen, 1965)	-	-	2-9	-	Poulsen (1965)
<i>S. cornuta</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. alata</i> (Poulsen, 1965)	-	-	2-9	-	Poulsen (1965)
<i>S. verae</i> (Poulsen, 1965)	2-9	2-9	-	-	Poulsen (1965)
<i>S. longicornis</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. ovalis</i> (Poulsen, 1965)	2-9	-	-	2-9	Poulsen (1965)
<i>S. gutata</i> (Poulsen, 1965)	-	2-9	2-9	2-9	Poulsen (1965)
<i>S. armata</i> (Poulsen, 1965)	2-9	2-9	-	-	Poulsen (1965)
<i>S. spicata</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. nana</i> (Poulsen, 1965)	2-9	-	-	-	Poulsen (1965)
<i>S. multispinosa</i> (Poulsen, 1965)	2-9	2-9	2-9	2-9	Poulsen (1965)
<i>S. parvispinosa</i> (Poulsen, 1965)	2-9	2-9	-	3-9	Poulsen (1965)
<i>S. lunata</i> , n. sp.	2-9	2-9	-	2-9	herein
<i>S. disparalis</i> Darby, 1965	2-9	-	-	-	Kornicker (1967e)
<i>S. zostericola</i> Cushman, 1906	2-9	2-9	2-9	2-9	Kornicker (1967e)
<i>Spinacopia menziesi</i> Kornicker, 1969	2-9	-	2-9	-	Kornicker (1969a), herein
<i>S. variabilis</i> Kornicker, 1969	2-9	-	2-9	2-9	Kornicker (1969a)
<i>S. bisetula</i> Kornicker, 1969	2-9	-	-	-	Kornicker (1969a)

TABLE 20.—Continued

Taxon	Joints with natatory bristles				Reference
	Adult		Juvenile		
	Female	Male	Female	Male	
<i>S. sandersi</i> Kornicker, 1969	2-9	2-9	2-9	2-9	Kornicker (1969a)
<i>S. antarctica</i> Kornicker, 1970	2-9	-	-	-	Kornicker (1970a)
<i>S. torus</i> Kornicker, 1970	2-9	-	-	-	Kornicker (1970a)
<i>S. mastix</i> , n. sp.	2-9	2-9	-	-	herein
<i>S. octo</i> Kornicker, 1970a	2-9	-	-	2-9	herein
RUTIDERMATIDAE					
<i>Rutiderma rostrata</i> Juday, 1907	-	3-9	-	-	Poulsen (1965)
<i>R. normani</i> Poulsen, 1965	6-9	3-9	0(? ♀)	0	Poulsen (1965)
<i>R. hartmanni</i> Poulsen, 1965	6-9	-	-	0	Poulsen (1965)
<i>R. rotunda</i> Poulsen, 1965	6-9	-	0	-	Poulsen (1965)
<i>R. mortenseni</i> Poulsen, 1965	-	3-9	-	-	Poulsen (1965)
<i>R. fusca</i> Poulsen, 1965	-	3-9	-	-	Poulsen (1965)
<i>R. gerdhartmanni</i> , n. sp.	6-9	3-9	-	-	herein
<i>R. ovata</i> , n. sp.	6-9	3-9	-	0	herein
<i>R. species B</i> , herein	-	3-9	-	-	herein
<i>Scleraner chacaoi</i> (Hartmann, 1965)	6-9	-	0	-	herein

The bristles on the exopodite are formed of numerous joints. The morphology of the joint at which the breaking takes place does not appear to differ from that of other segments (Skogsberg, 1920:356; also, personal observation).

It is not known exactly when the natatory bristles become broken, although indirect evidence, some of it conflicting, indicates an association with egg laying. Skogsberg (1920:356) believed that bristles of *P. globosus* are probably broken off soon after fertilization, because he observed some females with broken bristles and very small eggs in their ovaries. Elofsen (1941, 1969:165) observed a few gravid females of *P. lilljeborgii* with unbroken bristles and concluded that "the modification of the antennae often takes place simultaneously with or shortly after the passage of eggs into the brood chamber." Unless each species behaves differently, the different conclusions reached by Skogsberg and Elofsen can be resolved if it is assumed that the small eggs within the ovaries of the specimens observed by Skogsberg were the second batch of eggs produced by ostracodes, whose bristles had been broken after production of the first batch.

Skogsberg (1920:356) suggested that, because females with broken bristles could not swim up to mate with males, they die soon after bearing young,

but Elofsen (1941, 1969:165) refuted this by finding in *P. globosus* that "the ovaries of the females with a recently emptied brood chamber are packed with a fresh batch of rapidly growing eggs." He believed, and I concur, that the second fertilization was by sperm that had remained in the spermatheca of females from the initial impregnation.

Skogsberg (1920:368) believed that the breaking off of bristles is the result of convergence rather than common inheritance, as suggested by Müller (1908), because the phenomenon occurs in distantly related forms such as *Philomedes globosus* and *Scleroconcha appelloefi*, and does not occur in *Philomedes eugeniae*, which he believed closely related to *P. globosus*. Skogsberg (1920) suggested that the convergence might be caused by climatic factors because of the prevalence of the forms with broken bristles in the Arctic and Antarctic. Elofsen (1941; 1969:166) attempted to explain the distribution by the effect of temperature on the metabolic rate of spermatozoa. The scarcity of the broken-bristles phenomenon in temperate to tropical waters is, at least in part, the result of the scarcity of the members of the genus *Philomedes* (sensu Poulsen, 1962) in those waters, where its niche has apparently been filled by members of the genus *Euphilomedes*.

Subclass OSTRACODA Latreille, 1806

Sars (1866) recognized four major sections of equal rank in the Ostracoda (Table 21). These were accepted by Brady and Norman (1896) and Calman (1909), although he considered them to be orders. Müller (1894) condensed the four sections of Sars into two suborders, whereas Skogsberg (1920) expanded them into five suborders. Sars (1922:2) considered his four sections to be suborders and rejected the classifications of Müller and Skogsberg. Kozur (1972) followed Müller in recognizing two major categories for living Ostracoda but considered them superorders (Myodocopamorphes, Podocopamorphes).

The relationships of higher taxa of Ostracoda are not well understood. Subjective evaluation of characters has not led to a unique classification. A character to which little attention has been paid is the relative position of the anus and furca. The anus is dorsal to the furca in some ostracodes and ventral to it in others (Calman, 1909:64; Bowman, 1971). With few exceptions, position of the anus relative to the caudal rami is the same in species within a particular higher taxon of Crustacea (Bowman, 1971:173). Therefore, in the Ostracoda the relative position of the furca and the anus might be given more weight in classification than criteria previously used. The present study showed consistency of the anal position within lower taxa and enabled placing of these in two orders based on the position of the anus relative to the furca. The position of the furca relative to the anus is not generally stated in descriptions of ostracodes, but my studies and examples in the literature indicate that the following suborders (using the subordinal names of Skogsberg) have the furca dorsal to the anus: Cypridiniformes (Figure 32e) (also see Bow-

man, 1971:168, fig. 14; Müller, 1894, figs. 1-8, 34-21, -24); Halocypriformes (Figure 32f) (also see Müller, 1894, figs. 34-15, 35-16); Polycopiformes (Figure 32d) (also see Hartmann, 1955:217, fig. 18).

A "furca" dorsal to the anus is not homologous to one ventral to the anus. The former was termed "telson" and the latter "uropod" by Bowman (1971), but I have not used these terms herein.

Members of the suborder Cypriformes have the furca ventral to the anus (Figure 32a) (also see Bowman, 1971:168, fig. 12; Müller, 1894, figs. 1-1, 1-3; Claus, 1876:99, fig. 24). I could find no references or illustrations in the literature showing the position of the anus relative to the furca in members of the suborder Cytherelliformes. Therefore, I examined five specimens of *Cytherella* sp. (USNM 142373, 142374). The anal canal and anus were indistinct, but appeared to be located dorsal to the furca (Figure 32b).

Thus, the anus is ventral to the furca in the Cypridiniformes, Halocypriformes, and Polycopiformes and dorsal to the furca in the Cypriformes and Cytherelliformes. This division supports the classification of Müller which recognizes two major divisions, the Myodocopa and Podocopa, or using the endings favored in the Treatise on Invertebrate Paleontology (Moore, 1961), the Myodocopida and Podocopida. These groups were considered suborders by Müller but orders in the "Treatise" and are considered orders herein.

Members of *Saipanetta*, a genus not known in the time of G. W. Müller, have a furca with some characters of Myodocopa and others of Podocopa (McKenzie, 1967a,b; 1968b). McKenzie (1967b) considered the genus to belong in the superfamily Healdiacea, which had been included in the sub-

TABLE 21.—Equivalent major groupings recognized by G. W. Müller, G. O. Sars, and T. Skogsberg

Müller (1894)	Sars (1866)	Skogsberg (1920)
Suborder Myodocopa	Section Myodocopa	Suborder Cypridiniformes Suborder Halocypriformes
	Section Cladocopa	Suborder Polycopiformes
Suborder Podocopa	Section Podocopa	Suborder Cypriformes
	Section Platycopa	Suborder Cytherelliformes

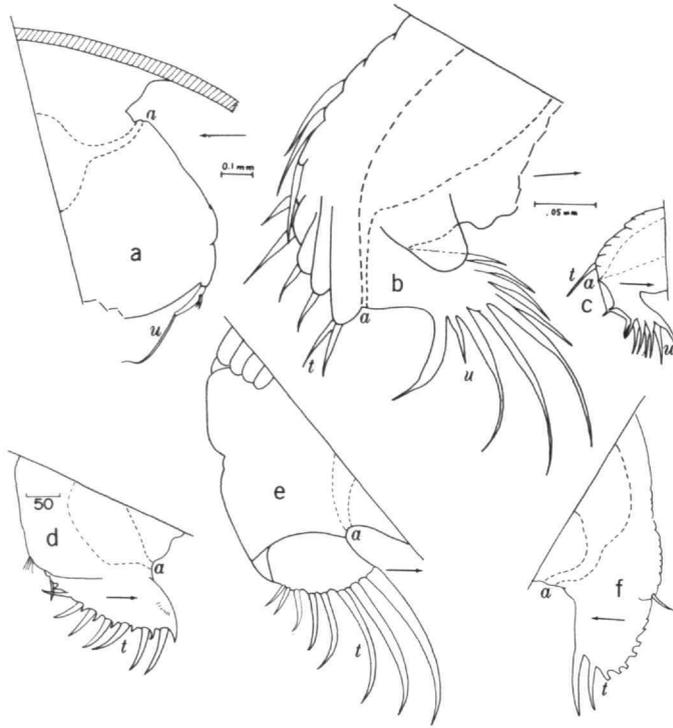


FIGURE 32.—Lateral view of posterior of Ostracoda showing position of gut (stippled), anus (a), telson (t), and uropod (u): a, Podocopina, *Macrocypris* sp., adult female, USNM 142375; b, Platycopina, *Cytherella* sp., juvenile male, USNM 142373; c, Metacopina?, *Saipanetta kelloughae* Maddocks, 1972, adult female, USNM 141443; d, *Polycope* sp., USNM 127266; e, Myodocopina, *Cylindroleberidinae* (new genus), N-1 male, USNM 142377; f, Halocypridina (new genus) species related to *Thaumatoocypris orchidani* Danielopol, 1972, juvenile, USNM 126136. (Same magnification in microns: a,f; d,e; b,c.)

order Metacopina, order Podocopida by Scott (1961). The Metacopina was raised to ordinal rank by Becker (1971:37).

In order to determine the position of the anus relative to the furca of species of *Saipanetta*, I examined a wholemount of *S. bensoni* Maddocks, 1972 (USNM 134404) and a specimen of *S. kellou-*

ghae Maddocks, 1972 (USNM 141443). The posterior of the latter specimen mounted in glycerine on a slide without a cover slip is illustrated in Figure 32c. The canal leading to the anus is indistinct, but it appears to terminate dorsal to the furca; therefore, the furca of *Saipanetta* is not homologous to that of Myodocopida.

Key to Orders

- Exopodite of 2nd antennae with no more than 2 joints..... PODOCOPIDA
 Exopodite of 2nd antenna with 8-9 joints.....MYODOCOPIDA

Order MYODOCOPIDA Sars, 1866

Müller (1894) recognized three families, Cypridinidae, Halocypridae, and Polycopidae in the sub-order Myodocopa. Skogsberg (1920), Poulsen (1962,

1965, 1969), and Hartmann (1963) also considered the three groups to have equivalent status (as sub-orders). In the classifications of Sars (1866), Pokorny (1958), Scott (1961), and Bate et al. (1967) the Cypridinidae and Halocypridae (or

their equivalents) are considered to be more closely related to each other than to the Polycopidae (or its equivalent). With inadequate evidence to indicate that one of these three groups is more closely related to the other, I believe it more conservative

to consider them to have equal rank, and do so herein, as suborders: Myodocopina, Halocypridina, Cladocopina. These group names are equivalent, respectively, to the suborders Cypridiniformes, Halocypridiformes, Polycopiformes of Skogsberg (1920).

Key to Suborders

1. Body with 5 pairs of limbs; furca with short conical projection between adjacent claws; 1st joint of exopodite of 2nd antenna with ventral bristle.....CLADOCOPINA
Body with 7 pairs of limbs¹; furca without short conical projection between claws; 1st joint of exopodite of 2nd antenna without ventral bristle..... 2
2. 7th limb short with 2 terminal bristles; claw 1 of furca offset proximally on anterior margin; medial eye absent.....HALOCYPRIDINA
7th limb elongate vermiform, reduced or absent; claw 1 of furca on anteroventral corner except on members of Azygocypridininae; medial eye present².....MYODOCOPINA

¹ Seventh limb absent or reduced on males of some species.

² Medial eye reduced in genus *Igene*.

Suborder MYODOCOPINA Sars, 1866

Müller (1912) considered the following taxa to have equivalent rank: Asteropinae, Sarsiellinae, Cypridininae, and Philomedinae. Skogsberg (1920) raised the above to family rank, but removed the genus *Rutiderma* from the Philomedinae establish-

ing the Rutidermatidae, and combined the remaining genera in the Philomedinae with the Cypridininae to form the family Cypridinidae containing two subfamilies, Cypridininae and Philomedinae. The classification of Skogsberg was followed by Hartmann (1963) and Poulsen (1962, 1965). Pokorny (1958), considering only groups

Key to Families

(Includes juveniles and adult males and females)

1. Posterior part of body usually with 7-8 flat gill-like structures¹; protopodite of maxilla with ventral comb of long thin bristles; anterior part of 5th limb comblike... CYLINDROLEBERIDIDAE
Gill-like structures absent,² maxilla and 5th limb without comb..... 2
2. Mandible with 2 stout claws on last 2 joints forming pincers.....
..... RUTIDERMATIDAE (females and juvenile males)
Mandible without pincers 3
3. Exopodite of mandible well developed, at least half length of dorsal margin of 1st endopodite joint 4
Exopodite of mandible missing or minute, less than one-third length of 1st endopodite joint...
..... SARSELLIDAE
4. Exopodite of mandible with 2 bristles, at least one of these as long or longer than exopodite... 5
Exopodite of mandible without bristle as long or longer than exopodite.....
..... RUTIDERMATIDAE (adult males)
5. Exopodite of 5th limb well developed and bearing strong pectinate teeth..... 6
Exopodite of 5th limb reduced and with, at most, weak fingerlike teeth
..... PHILOMEDIDAE (adult males)
6. 2nd joint of exopodite of 5th limb forming large squarish tooth
..... PHILOMEDIDAE (females and juvenile males)
2nd joint of exopodite of 5th limb without large squarish tooth..... CYPRIDINIDAE

¹ Members of the genus *Bruuniella* may not have gills (Poulsen, 1965:166).

² Males of some species of *Paradoloria* have posterior folds (Poulsen, 1962:148).

with both fossil and recent representatives, also recognized the Philomedinae and Cypridininae as subfamilies of Cypridinidae. Sylvester-Bradley (1961) considered the following taxa to have equivalent rank: Cypridinidae, Cylindroleberididae, and Sarsiellidae. He considered the Cypridinidae to contain the subfamilies Philomedinae and Cypridininae and demoted the Rutidermatidae to generic rank, placing the genus *Rutiderma* in the Sarsiellidae. Kornicker (1967d) recognized six families: Rutidermatidae, Sarsiellidae, Pseudophilomedidae, Philomedidae, Cylindroleberididae, and Cypridinidae, but in 1968 reduced this to five by making the Pseudophilomedidae a subfamily of Philomedidae.

I have studied the upper lips of members of each family with the aid of the scanning electron microscope. The upper lip of both the Philomedidae and Cypridinidae bear similar glandular openings not present on the lips of other families. Most species of the Cylindroleberididae bear anterior spines (possibly with terminal pores) not present on lips of members of other families. The upper lips of members of the Rutidermatidae and Sarsiellidae are without glandular openings or spines and are relatively simple in structure. Based on the upper lips, a three-fold division such as that used by Sylvester-Bradley is indicated.

If additional evidence supports a three-fold division, I would prefer that it be at the superfamily level in order to permit expansion of lower taxa and to balance the many superfamilies already present in the Podocopida.

In this paper the five families of Kornicker (1968) are recognized.

Summary of Classification

- Order Myodocopida
 - Suborder Halocypridina
 - Suborder Cladocopina
 - Suborder Myodocopina
 - Family Cypridinidae
 - Subfamily Cypridininae
 - Subfamily Azygocypridininae
 - Family Philomedidae
 - Subfamily Philomedinae
 - Subfamily Pseudophilomedinae
 - Family Cylindroleberididae
 - Subfamily Cylindroleberidinae
 - Subfamily Cyclasteropinae

- Family Sarsiellidae
- Family Rutidermatidae

CYPRIDINIDAE Baird, 1850

The family Cypridinidae contains two subfamilies, Cypridininae Baird, 1850a, and Azygocypridininae Kornicker, 1970a. Both subfamilies are represented in the study area.

DIAGNOSIS OF FAMILY.—Carapace length varying from about 1 mm to 32 mm; surface usually smooth but ornate in some forms; posterior evenly rounded or with caudal process or siphon; incisor always present, but not slitlike with dorsal margin overlapping ventral margin as in the Cylindroleberidinae.

First antenna: Both d- and e-bristles of 8th joint well developed; b- and c-bristles on adult male with suctional discs.

Second antenna: Exopodite: Lengths of joints similar in males and females; joints generally with basal spines. Endopodite: Female limb with 1–3 joints; male limb either similar to that on female or 3-jointed with 3rd joint reflexed on second.

Mandible: Coxale endite usually well developed in males and females as spinous process with bifurcate tip [endite not present on *Sheina orri* Harding (Harding, 1966:373)]; exopodite well developed, generally about same length as dorsal margin of 1st endopodite joint.

Maxilla: Coxale and precoxale with thin transparent epipodial appendage with hirsute margin; 3 endites present; exopodite well developed, with 3 bristles; 1st endopodite joint with sclerotized cutting edge on posterior distal corner.

Fifth limb: 3 endites present; protopodite with elongate sclerotized process on posterior distal margin. Exopodite: 1st joint with main tooth generally consisting of 6 teeth and proximal peg; 2nd joint without large tooth characteristic of the Philomedidae.

Sixth limb: Limb consisting of several bristles in place of epipodial appendage, 4 endites, and end joint; posterior end of end joint usually not extending markedly past endites.

Seventh limb: Similar in male and female. Limb with considerable variation in numbers of bristles and types of end combs; numerous species with end combs having short square-tipped teeth proximally and long recurved teeth distally.

Rod-shaped organ: Generally short, bulbous, or peglike; never elongate as on most species in other families.

Furca: Each lamella with 4 to 28 claws.

Lateral eye: Flaplike, hirsute on Azygocypridinae, with ommatidia or absent on Cypridinae.

Medial eye: Usually large, pigmented.

Brushlike organ: Present on many species (usually difficult to find).

DISTRIBUTION.—Members of the family Cypridinae have been reported from all oceans, and from shallow to abyssal depths.

Key to Subfamilies

- Each lamella of furca with 4–14 claws; lateral eyes with ommatidia or absent.....CYPRIDININAE
 Each lamella with 18–28 claws; lateral eyes flaplike, without ommatidia.....AZYGOCYPRIDININAE

CYPRIDININAE Brady and Norman, 1896

This subfamily is represented by 12 genera in the study area: *Bathyvargula* Poulsen, 1962; *Cypridnodes* Brady, 1902; *Doloria* Skogsberg, 1920; *Hadacypridina* Poulsen, 1962; *Metavargula* Kornicker, 1970a; *Paradoloria* Poulsen, 1962; *Pterocypridina* Poulsen, 1962; *Rugosidoloria*, new genus; *Siphonostra* Skogsberg, 1920; *Vargula* Skogsberg, 1920; *Gigantocypris* Müller, 1895; and *Macrocypridina* Skogsberg, 1920. Genera in the subfamily not collected in the study area are: *Cypridina* Milne-Edwards, 1840; *Skogsbergia* Poulsen, 1962; *Amphisiphonostra* Poulsen, 1962; *Monopia* (Claus, 1873); *Codonocera* Brady, 1902; *Sheina* Harding, 1966; *Melavargula* Poulsen, 1962; *Paravargula* Poulsen, 1962; *Paracypridina* Poulsen, 1962. Some genera of Cypridinae are pelagic and only accidentally collected in the samples studied herein. Therefore, the presence of specimens of *Gigantocypris* and *Macrocypridina* is noted in the station list, but not considered further in the text.

DIAGNOSIS OF SUBFAMILY.—Carapace variable, smooth in most genera, but ornate in others; incisur always present, but more highly developed in some genera than others; upper margin of incisur never overlapping lower margin proximally as in *Cylindroleberidinae*; posterior either evenly rounded or with caudal process, or developed into siphonlike process; males without vertical row of lateral hairs

near posterior as in males of *Cylindroleberidinae*.

First antenna: 2nd joint without bristles; b- and c-bristles of 7th joint on male limb with suckers.

Second antenna: Bristle on 2nd joint of exopodite with 5 or more spines along ventral margin (exceptions are the genus *Macrocypridina* on which spines are absent and *Bathyvargula* and *Gigantocypris* which bear only 1 spine); 9th joint of exopodite with 3 or 4 bristles (except *Doloria septenaria*, n. sp., which has 7). Endopodite of female 1–3 jointed; endopodite of male similar to that of female or 3-jointed and formed as clasping organ.

Fifth limb: Outer lobe of 3rd joint with 2 bristles.

Upper lip: Undivided or divided into unpaired anterior part and paired posterior part; anterior part with 0–2 anterior processes; posterior paired part with 0–2 pairs of short to long tusks; anterior and posterior parts as well as tusks provided with glandular openings.

Furca: Each lamella with 4–14 claws.

Lateral eye: Male eye generally similar in size and number of ommatidia to that of female, or slightly larger with same number or more ommatidia; in *Doloria levinsoni*, female without lateral eyes and male with eye bearing 5 or 6 ommatidia.

DISTRIBUTION.—Members of the subfamily Cypridinae have been reported from all oceans and from littoral to abyssal depths.

Key to Genera

Expanded from Poulsen (1962:16) with many changes

- | | |
|--|-----------------------------------|
| 1. Furca with 4 claws on each lamella..... | <i>Codonocera</i> |
| Furca with more than 4 claws on each lamella..... | 2 |
| 2. Upper lip undivided..... | 3 |
| Upper lip divided into unpaired anterior and paired posterior parts..... | 4 |
| 3. Upper lip almost straight, no posteroventral processes..... | <i>Gigantocypris</i> |
| Upper lip semicircular with small posterolateral processes..... | <i>Macrocypridina</i> |
| 4. Upper lip with 2 unpaired anterior processes..... | <i>Cypridina</i> |
| Upper lip with none or 1 unpaired anterior process (anterior process may have digitate or forked tip in <i>Melavargula</i>)..... | 5 |
| 5. Upper lip with serrated process posterior to long paired tusks..... | 6 |
| Upper lip without serrated process posterior to long paired tusks (tusks present or absent)..... | 7 |
| 6. Endopodite of 2nd antenna of female 2-jointed..... | <i>Hadacypridina</i> ¹ |
| Endopodite of 2nd antenna of female 3-jointed..... | <i>Cypridinodes</i> |
| 7. Endopodite of female 2nd antenna 1-jointed, or with short 2nd joint..... | 8 |
| Endopodite of female 2nd antenna 2-jointed with long 2nd joint, or 3-jointed..... | 9 |
| 8. Sensory bristle on 5th joint of female 1st antenna with short proximal filaments (same size as distal filaments)..... | <i>Paracypridina</i> |
| Sensory bristle on 5th joint of female 1st antenna with proximal filaments much longer than distal filaments..... | 10 |
| 9. 2nd joint of endopodite of female 2nd antenna with 1 short bristle..... | 11 |
| 2nd joint of endopodite of female 2nd antenna without short bristle..... | 12 |
| 10. Carapace with lateral processes..... | 13 |
| Carapace without lateral processes..... | 14 |
| 11. Furca with 5 claws on each lamella..... | <i>Monopia</i> |
| Furca with 8-13 claws on each lamella..... | <i>Vargula</i> |
| 12. Carapace with rugose ornamentation..... | <i>Rugosidoloria</i> |
| Carapace smooth..... | 15 |
| 13. Carapace with anterior siphon..... | <i>Amphisiphonostra</i> |
| Carapace without anterior siphon..... | <i>Pterocypridina</i> |
| 14. Carapace with black pigmentation..... | <i>Melavargula</i> |
| Carapace without black pigmentation..... | 16 |
| 15. Furca with 7 claws on each lamella; posterior paired tusks on upper lip long; endopodite on male 2nd antenna similar to that on female..... | <i>Sheina</i> |
| Furca with 9 or 10 claws on each lamella; posterior paired tusks on upper lip short; endopodite on male 2nd antenna similar to that of female..... | <i>Paradoloria</i> |
| Furca with 11-13 claws; posterior paired tusks on upper lip short; endopodite on male 2nd antenna formed as clasper..... | <i>Doloria</i> |
| 16. Upper lip without pair of prominent tusks..... | 17 |
| Upper lip with pair of prominent tusks..... | 18 |
| 17. Furcal claws 2 and 4 united with lamella..... | <i>Siphonostra</i> |
| Furcal claw 2 united with lamella or all furcal claws united with lamella..... | <i>Skogsbergia</i> |
| 18. Lateral eyes well developed..... | <i>Paravargula</i> |
| Lateral eyes absent or small..... | 19 |
| 19. Bristle on 2nd joint of exopodite of 2nd antenna with 1 spine..... | <i>Bathyvargula</i> |
| Bristle on 2nd joint of exopodite of 2nd antenna with numerous ventral spines..... | <i>Metavargula</i> ² |

¹ Upper lip of juvenile male described herein of *Hadacypridina bruuni* without serrated process posterior to tusks.

² Some females of *Metavargula ampla* Kornicker, 1970a, with minute 3rd joint on endopodite of 2nd antenna.

Microstructures

The scanning electron microscope was used to observe structures on the carapace not clearly visible with the light microscope. The microstructures give additional morphological information useful in the classification of ostracodes. The photographs of complete valves are presented mainly for orienting photographs of microstructures; the valves often became distorted during the freeze-dry operation preparatory to photography, and, therefore, accompanying drawings of the carapace are more reliable representations.

NORMAL PORES.—These pores penetrate the shell, sometimes contain bristles, and have been useful in the taxonomy of Podocopida.

Siphonostra hallex: Two types of pores were observed on the shell of this species, a simple pore with a low peripheral ridge (Figure 78d) and a pore similar to the simple pore except for having an off-center node (Figure 78e); both have a centrally located bristle. For future reference, I am designating the latter type pore "noded pore." The noded pore resembles the "elliptical" pore of Puri and Dickau (1969) and the pore with "toothlike plates" of Omatsola (1970), but these might not have a central bristle.

Rugosidoloria serrata: This species has both simple (Figures 112f; 113a) and noded pores (Figure 113b,e,f). The node may be present within the raised peripheral rim or may interrupt the rim. On some pores the outer rim does not quite meet, suggesting a spiral where the ends overlap (Figure 113b). The inner margin of the rim of the pore may be slightly serrate (Figure 113b).

ORNAMENTATION.—Most species in the subfamily Cypridininae are without ornamentation and appear smooth under low magnification.

Siphonostra hallex: The shell of this species has a rippled appearance under high magnification (Figure 78d).

Rugosidoloria serrata: Unlike most species of this subfamily, the shell has longitudinal ribs and large flat pits (Figures 112a-c; 113c,d). Microstructures on the surface consist of minute papillae (Figure 112e).

SURFACE BRISTLES.—These bristles project through pores in the shells.

Siphonostra hallex: A single bristle is present in the middle of both the simple and noded pores

(Figure 78d,e). The bristles are slender and short.

Rugosidoloria serrata: A single long bristle with ridges on the proximal end project out of both simple and noded pores (Figures 112f; 113a,b,e,f).

SELVAGE.—A finely lined selvage with smooth outer margins is present in the incisur of *Metavargula iota* (Figure 71) and *Siphonostra hallex* (Figure 77d).

INFOLD.—The infold in this subfamily is broad along the anterior and posterior margins of the carapace and narrower along the ventral margins.

Metavargula: The posterior of the carapace of *M. adinothrix* and *M. iota* have an extended siphonlike caudal process (Figures 68,71). The list on the broad posterior infold of *M. iota* bears processes with pores on their tips and minute bristles near their bases (Figure 71d).

Siphonostra: *Siphonostra hallex* has a complex hingelike process on the posterior list (Figures 76; 77a-c; 78a,b,f). The process contains numerous minute pores on its lateral surface and along its edge (Figure 78c), some of the latter contain short hairs with a pore at the tip. Bristles on the infold of the rostrum and along the anteroventral margin are shown in Figures 78d,f.

SECOND ANTENNA.—On the 2nd antenna of *Vargula subantarctica* the basal spines, the spines forming a row along the distal margin of each joint, and the spines along the ventral margin of the bristle on the 2nd exopodite joint have a similar shape (Figures 94c,d,f).

MANDIBLE.—On the mandible of *Vargula subantarctica* the tip of the exopodite has hairs placed in discrete tufts (Figure 95c). The bristle at the base of the coxale endite has a blunt tip, which suggests a pore may be present.

SEVENTH LIMB.—The ventral tip of the 7th limb bears a crescent-shaped row of teeth called the comb; the teeth point dorsally when the limb is in its natural position. Several teeth at each end of the crescent are shorter than the others and have squarish tips. The inner teeth have rounded tips and serrate margins. The middle tooth is longer and more curved than the others on some species. A process, which varies in shape among different species, is sometimes present opposite the comb on the dorsal side of the tip of the limb. An inner stout muscle extends from the dorsal side of the limb below the dorsal process to the tip of the limb on some species. This muscle is used apparently to

bring the comb teeth and the dorsal process together like a jaw (see Skogsberg, 1920:244, 247). On some species the dorsal process appears to serve as a device to contain the tips of the comb teeth.

Doloria: The tip of the 7th limb of *D. pectinata* was photographed (Figures 47, 48f). A pore is present at the tips of the comb teeth. The tip of the long central tooth was not observed, so that the presence or absence of the pore on that tooth is not known. The shorter teeth with squarish tips differ from the longer teeth in having 5 tubular processes along the lateral side. The middle tube is longer than the others and its tip bends inward over the end of the tooth. The tubular processes on each side of the longer middle tube seem to have closed pointed tips. The tubes appear to fit within a recess along the lateral sides of the teeth. Toward the distal end of the teeth, the edges of the recess tend to overlap the tubes. These terminal pores and tubular processes have not previously been reported and their function is not known. The dorsal process on this species consists of a central prong and 2 lateral digitate prongs. Its position suggests that it might receive the tip of the central comb tooth when the muscle at the tip of the limb is contracted.

Vargula: The 7th limbs of two species of *Vargula*, *V. hamata* and *V. subantarctica*, were examined (Figures 86, 96). Both species have 5 tubes extending along the outer side of the short square-tipped comb teeth. The tips of the short comb teeth on both species differs from those on *Doloria pectinata* in having minute papillae around the terminal pore. The terminal pore on the long comb teeth of *V. subantarctica* (Figure 96g) is more proximally located than that on *D. pectinata*. The middle comb tooth is not much longer than the adjacent bristles on either *V. hamata* or *V. subantarctica*. The hook that lies within the crescent of the comb of *V. hamata* does not show clearly on the photographs. The barbed peg near the middle of the tip of the limb of *V. subantarctica* is shown in Figure 96b,c. The tip of one of the bristles on the 7th limb of *V. hamata* is shown in Figure 86c.

FURCA.—The furca of *Doloria pectinata* (Figures 48b-e) has rows of minute distally pointed spines along the anterior surface of each claw (Figure 48c,d).

ANTERIOR PROCESS.—This process is on the anterior margin of the animal between the upper lip

and medial eye. The process on *Doloria pectinata* is without pores (Figure 48a). Cannon (1931:444) gave the name "frontal knob" to this process.

UPPER LIP.—The gross morphology of the upper lip has been used extensively in subdividing genera within the Cypridinidae. I have examined upper lips of several species to determine whether the glandular openings vary.

Doloria: The upper lips of species in this genus have an unpaired anterior glandular field and a paired posterior field. Prominent tusks are absent. A low lobe with a shallow medial groove is present behind the glandular fields. The upper lips of *D. levis* (Figure 43), *D. pectinata* (Figure 46), and *D. levinsoni* (Figure 51) were examined in detail. In these three species a small glandular field is present slightly proximal and lateral to the posterior half of the paired posterior glandular field. Each glandular field contains numerous glandular processes with a tip bisected by a straight flap. Presumably, a glandular fluid is excreted through the linear flap. The ends of the linear flap in *D. levis* and *D. levinsoni* do not reach the circular peripheral ridge at the tip of the process. The linear flap intersects the peripheral ridge in *D. pectinata*, but this seems to be due to a foreign growth on both the peripheral ridge and the linear flap of this specimen. On that species a hemispherical ?protistan with a central pore is present in large numbers between the processes and on the peripheral ridge and linear flap. Most of the linear flaps on the processes on the posterior fields of *D. pectinata* seem to be oriented parallel to the adductor muscles.

Metavargula: The upper lips of species in this genus have an anterior glandular field and a pair of lateral tusks bearing glandular processes. The upper lip of *M. adinothrix* was examined in detail (Figure 69). The glandular openings are in general similar to those observed in *Doloria*, except the distal end of the linear flap appears to project farther. The processes occur along the outer side and posterior edge of each tusk. The processes on the tusk and anterior field seem similar. The tip of each tusk bears about 7 elongate processes. Hairs are present on the tusks and posterior central lobe of the lip. A prominent hirsute lobe is present posterior to the tusks.

Siphonostra: The upper lip of species in this genus has an anterior glandular field, a paired mid-

dle glandular field and 1 or 2 small paired posterior fields. The upper lip of *S. hallex* was examined in detail (Figure 79). The anterior field has a single row of about 6 glandular processes anteriorly and about 9 widely distributed processes posteriorly. The middle paired glandular fields have 12 processes in each field. The short posterior pair of the posterior paired glandular fields is not clearly seen in photographs (Figure 79e) but each lobe has 1 or 2 processes. The posterior part of the anterior unpaired field projects ventrally beyond the paired posterior fields. The linear flap bisecting the tips of the processes is missing on many processes of the specimen examined, probably because of damage during preparation of the specimen, except possibly for 2 small processes in the middle paired glandular fields. The linear flap may also be absent on the processes of the anterior pair of the posterior fields. A small process at the posterior part of the outer edge of the middle paired fields is found in the same place on each field; possibly the function of the small processes differs from that of the larger processes.

Vargula: The upper lips of species in the genus *Vargula* are quite variable but have in common an unpaired anterior glandular field and a pair of prominent posterior tusks. The upper lips of three species, *V. dentata* (Figure 103), *V. hamata* (Figure 87), and *V. subantarctica* (Figure 97) were examined. Each of these species has only a large anterior unpaired field and a pair of tusks bearing glandular processes. The proximal posterior margin of each tusk on *V. dentata* bears a large tooth. The tusks are followed by a prominent lobe which has a deep medial groove in *V. hamata* and *V. subantarctica*. The groove contains many hairs, especially the groove in the lip of *V. subantarctica*. The anterior lobe of *V. subantarctica* contains about 50 processes, all about the same size. The tusks on that species bear 6–7 processes along the posterior margin and about 9 at the tip. The tusks of *V. dentata* bear long hairs on their medial surface, whereas, the tusks on the other two species are bare. The linear flap on the processes of the anterior field of *V. subantarctica* seems to be oriented anteriorly-posteriorly. The linear flaps on the tusks of that species seem to be oriented medially-laterally.

COPULATORY ORGAN.—The tip of the clasping apparatus (Figure 80) on the male of *Siphonostira*

hallex has bristles on the proximal lobes with rounded tips (Figure 80b). The inner distal lobe bears rows of small spines with their pointed ends oriented posteriad. The “flap” bears nodes on its inner surface (Figure 80c,d).

EPIBIOTA.—Minute hemispheres with central pores are present on the upper lip of *Doloria pectinata* (Figure 46d-f).

***Bathyvargula* Poulsen, 1962**

TYPE-SPECIES.—*Bathyvargula parvispinosa* Poulsen, 1962:216.

This genus is represented in the study area by only one species, *B. walfordi* Poulsen, 1962.

DIAGNOSIS OF GENUS.—Carapace with well-developed rostrum, incisor, and caudal process, surface smooth or striate.

First antenna: Sensory bristle on male with broad flat proximal filaments (male known only for one species).

Second antenna: Endopodite 1-jointed or weakly 2-jointed; bristles on 2nd joint of exopodite bare except for single spine near tip.

Mandible: Distal pair of bristles on ventral margin of 2nd endopodite joint with medial bristle much broader than lateral bristle and with marginal spines or teeth.

Sixth limb: Endites III and IV without medial bristles.

Seventh limb: Limb with 12 to 15 bristles; terminus with comb of 7 to 9 teeth opposite single elongate peg.

Furca: Each lamella with 8 claws decreasing in size posteriorly and separated from lamella by suture.

Rod-shaped organ: Short with peg or teeth at tip.

Lateral eyes: Known species either without eyes or with reduced eyes with few ommatidia in both sexes.

Upper lip: Anterior part large; posterior part with 1 pair of tusks.

DISTRIBUTION.—This genus contains only two species: *B. parvispinosa* from near the Virgin Islands, West Indies, and *B. walfordi* in the Tasman Sea (Figure 33). Both species were collected in deep water: *B. parvispinosa* at 900 m, *B. walfordi* at 610 m.

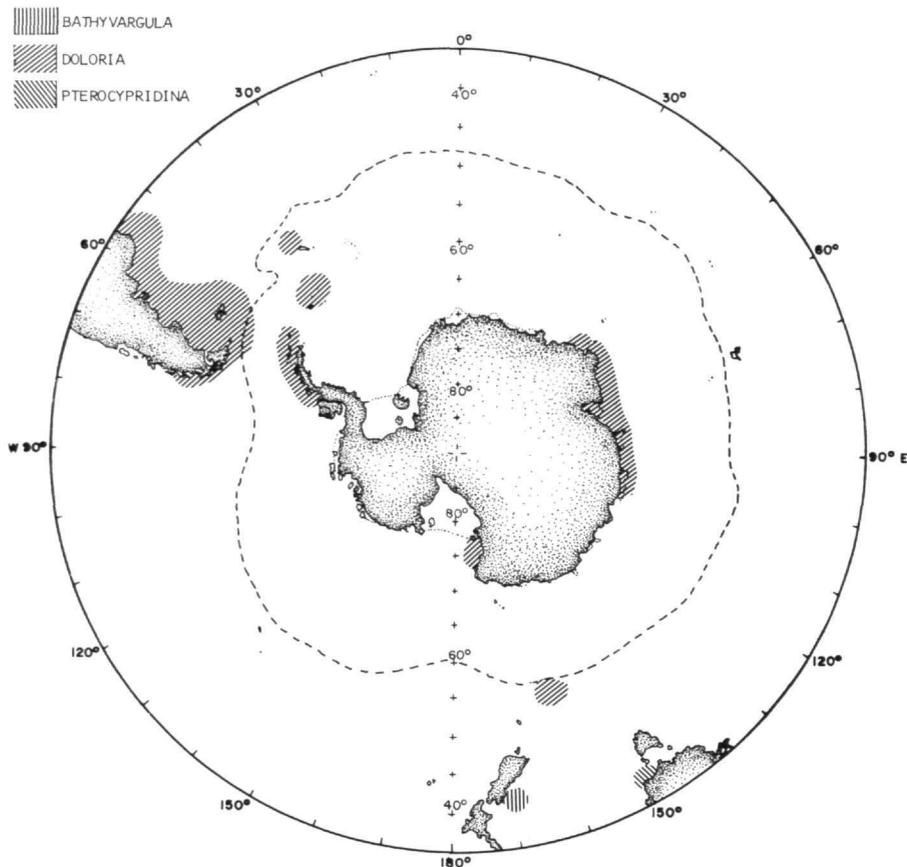


FIGURE 33.—Distribution map.

1. *Bathyvargula walfordi* Poulsen

Bathyvargula walfordi Poulsen, 1962:222, fig. 105.—Eagar, 1971:60.

HOLOTYPE.—1 ♂ in last larval stage, unique specimen, Universitets Zoologiske Museum, Copenhagen, Denmark.

TYPE-LOCALITY.—*Galathea* station 626, lat. 42° 10'S, long. 170° 10'E, Tasman Sea, 610 m.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Surface of carapace finely striate. Length of N-1 instar 2.8 mm.

First antenna: Sensory bristle of 1st joint with 7 proximal fairly broad filaments.

Lateral eyes: Absent.

Upper lip: Posterior tusks short and followed by small teeth.

DISTRIBUTION.—The species is known only from the type-locality (Figure 34).

Cypridinodes Brady, 1902

TYPE-SPECIES.—*Cypridinodes favus* Brady, 1902.

Three species in this genus are represented in the study area: *C. wyvillethomsoni* (Brady, 1880), *C. reticulata* Poulsen, 1962, and *C. asymmetrica* (Müller, 1906a). The type-locality of *C. favus* is unknown, and, conceivably, it could be in the study area.

DIAGNOSIS OF GENUS.—Carapace ovoid in lateral view with overhanging rostrum, fairly broad deep incisur, and caudal process; surface smooth, punctate, or with lateral projections and longitudinal ribs; some species with lunate process below incisur of right valve.

First antenna: Adult male with sucking discs on b- and c-bristles.

Second antenna: Endopodite similar in male and female, 3-jointed: 1st joint with 4 or 5 bristles, 2nd

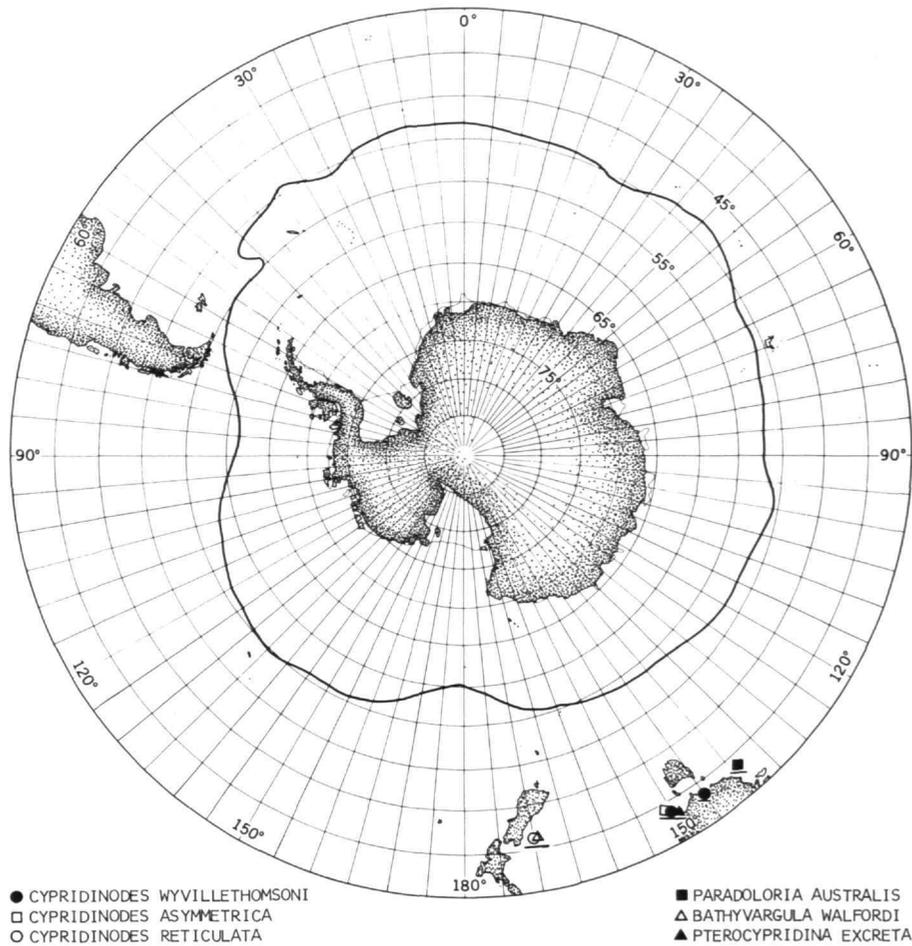


FIGURE 34.—Distribution map.

joint bare or with small distal bristles, 3rd joint with long terminal filament.

Maxilla: Exopodite small, 1st joint of endopodite long, narrow.

Sixth limb: End joint elongate, strongly tapering posteriorly, with 2 broad plumose bristles at tip.

Seventh limb: Terminus with large movable jaw opposite comb.

Furca: Each lamella with 6 to 8 claws; claw 2 either separated from lamella by suture or fused to lamella, remaining claws with basal suture.

Lateral eyes, medial eye, and rod-shaped organ: Well-developed lateral eyes except in *C. reticulata*; medial eye large, cylindrical, pigmented; rod-shaped organ short.

Upper lip: Lip consisting of anterior lobe and 2 posterior tusks, each with posterior margin of broad proximal part toothed or serrate.

DISTRIBUTION.—The three species of *Cypridinodes* represented in the study area are from the Tasman Sea between Australia and New Zealand (Figure 35).

This genus is found in the Indo-West-Pacific region as defined by Ekman (1953:11). The range extends eastward into the Pacific as far as the Samoa Islands and westward into the Indian Ocean in the vicinity of Madagascar and into the Red Sea. The northernmost extent of its range is the South China Sea (Pescadore Islands). The southernmost extent

is in the Tasman Sea between Australia and New Zealand. The southernmost latitude at which a member of the genus has been collected is 42°10'S in the Tasman Sea.

Cypridinodes wyvillethomsoni was collected in only one locality, at a depth of 610 m; *C. asymmetrica* is represented by only 1 juvenile collected at a depth of 70–100 m. Species of the genus have been

Key to Species

(Includes only species south of 35°S)

- 1. Carapace with lunate process below incisur of right valve.....2
- Carapace without lunate process below incisur of right valve.....3
- 2. Carapace with lateral ribs along ventral and dorsal margins and two lateral protuberances near valve middle.....2. *C. favus**
- Carapace without ribs or protuberances.....3. *C. asymmetrica*
- 3. Carapace with protuberance near middle of valve and lateral ribs along ventral and dorsal margins.....5. *C. wyvillethomsoni*
- Carapace without protuberance and with narrow ridge along posterodorsal margin.....
-4. *C. reticulata*

* *Cypridinodes favus* included in key because its locality is unknown.

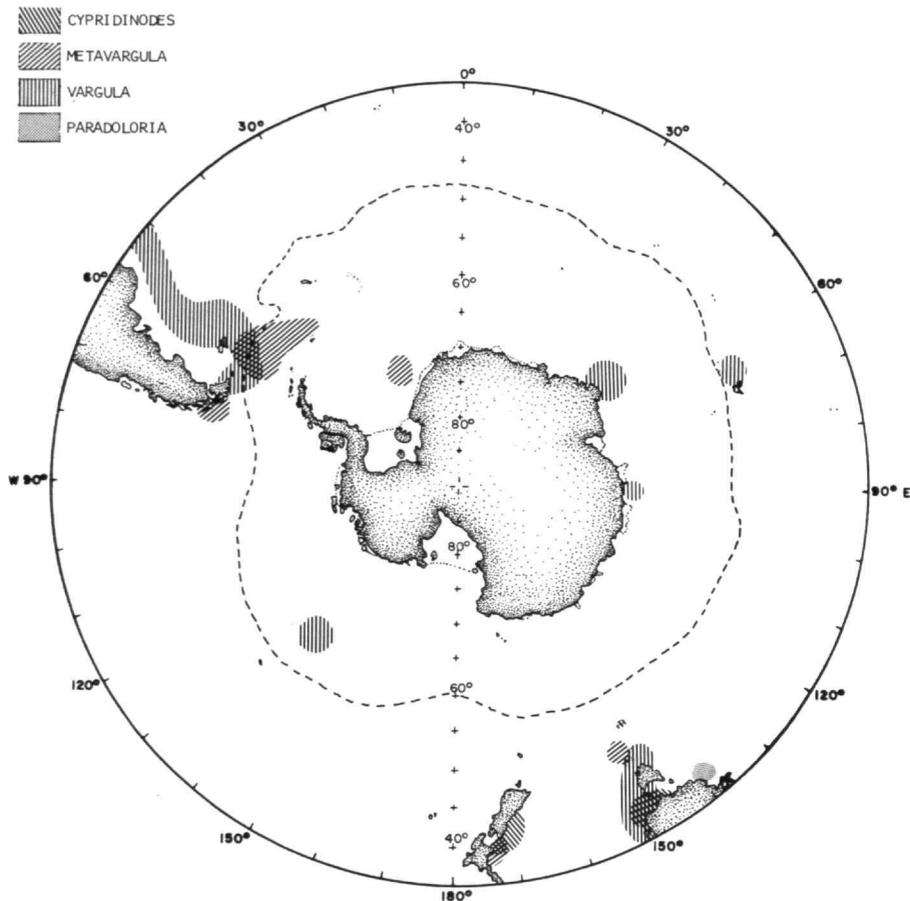


FIGURE 35.—Distribution map.

collected in shallow coastal waters (8 m) as well as at depths of 610 m., but most species live in shelf waters shallower than 100 m. Males and juveniles are occasionally collected in coastal surface waters. It is probably significant that the only species without lateral eyes is *C. reticulata*, collected at a depth of 610 m. Species in the genus collected at depths of less than 100 m. have well-developed lateral eyes.

2. *Cypridinodes favus* Brady

FIGURES 36, 37

Cypridinodes favus Brady, 1902:187, pl. 22: figs. 20–31.—Skogsberg, 1920:190, 191 [discussion].—Not Poulsen, 1962: 281, figs. 128–130.

Cypridinotes favus Brady.—Müller, 1906:13 [discussion; generic name spelled incorrectly].

Cypridina favus (Brady)—Müller, 1912:10 [key], 13.

Monopia (*Cypridinodes*) *favus* Brady.—Skogsberg, 1920:333, 334, 347 [discussion].

LECTOTYPE.—Designated herein; carapace and right 7th limb; in collection of Universitets Zoologiske Museum, Copenhagen, Denmark; probably juvenile.

PARALECTOTYPE.—Designated herein; carapace only; also in Copenhagen; possibly adult ♂.

TYPE-LOCALITY.—Unknown.

MATERIAL.—At my request for type-specimens of *Cypridinodes favus* Brady from the Universitets Zoologiske Museum, Copenhagen, I received through the courtesy of Dr. Torben Wolff a vial containing four disarticulated valves and three labels. The labels are as follows: (1) "*Cypridinodes favus*"; (2) "*Cypridina favus* Brady = *Cypridinodes f.*, Loc. inkendt., TYPE"; (3) "*Cypridina favus* Brady (= *Cypridinodes f.* Brady), Brady's orig. spec." Dr. Wolff asked that I select a lectotype, and I have done so herein. The right valve of the specimen I selected as lectotype contained a 7th limb. The limb was mounted on a slide and returned to Copenhagen with the valves of both specimens.

Because of differences in size of the four disarticulated valves in the type collection, I was able to match right and left valves and divide them into two specimens. The smaller specimen was selected as the lectotype because it had cleaner valves and also the right valve contained a 7th limb; the larger specimen was designated paralectotype. The proximal position of the dorsal jaw on the 7th limb leads

me to believe that the smaller specimen is that of a juvenile. By process of elimination, the larger specimen is the adult male.

REMARKS.—Brady (1902) described a new species, *Cypridinodes favus*, from an unknown locality. He did not mention the number of specimens in the collection, but said that he was describing a female with a carapace length of 3 mm. In the figure captions he indicated that the limbs and carapace illustrated are from a female. Skogsberg (1920:334) stated that he reexamined the type specimen which

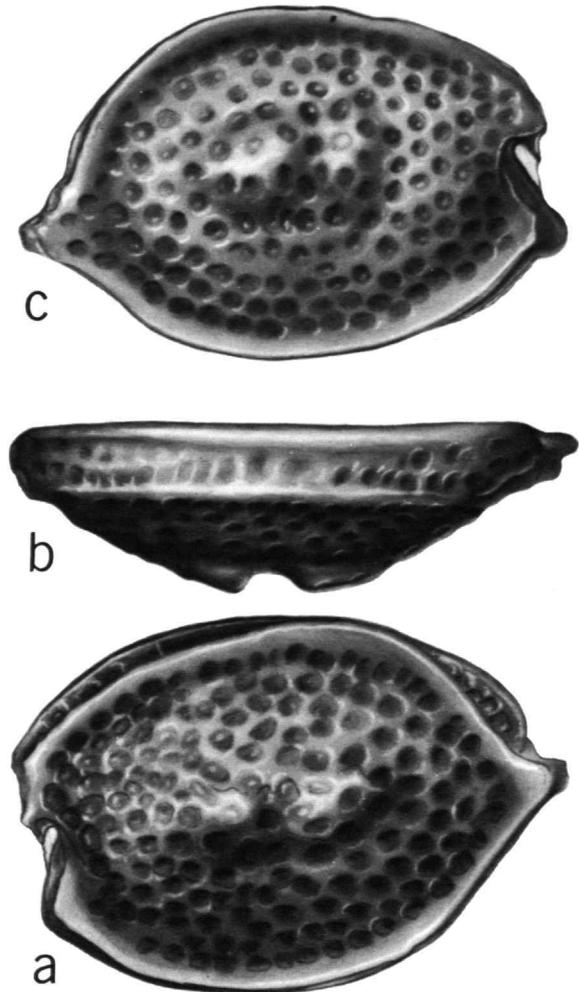


FIGURE 36.—*Cypridinodes favus*, adult male?, paralectotype, left valve, length 2.95 mm: a, lateral view; b, dorsal view. Right valve, length including lunate process 2.93 mm: c, lateral view.

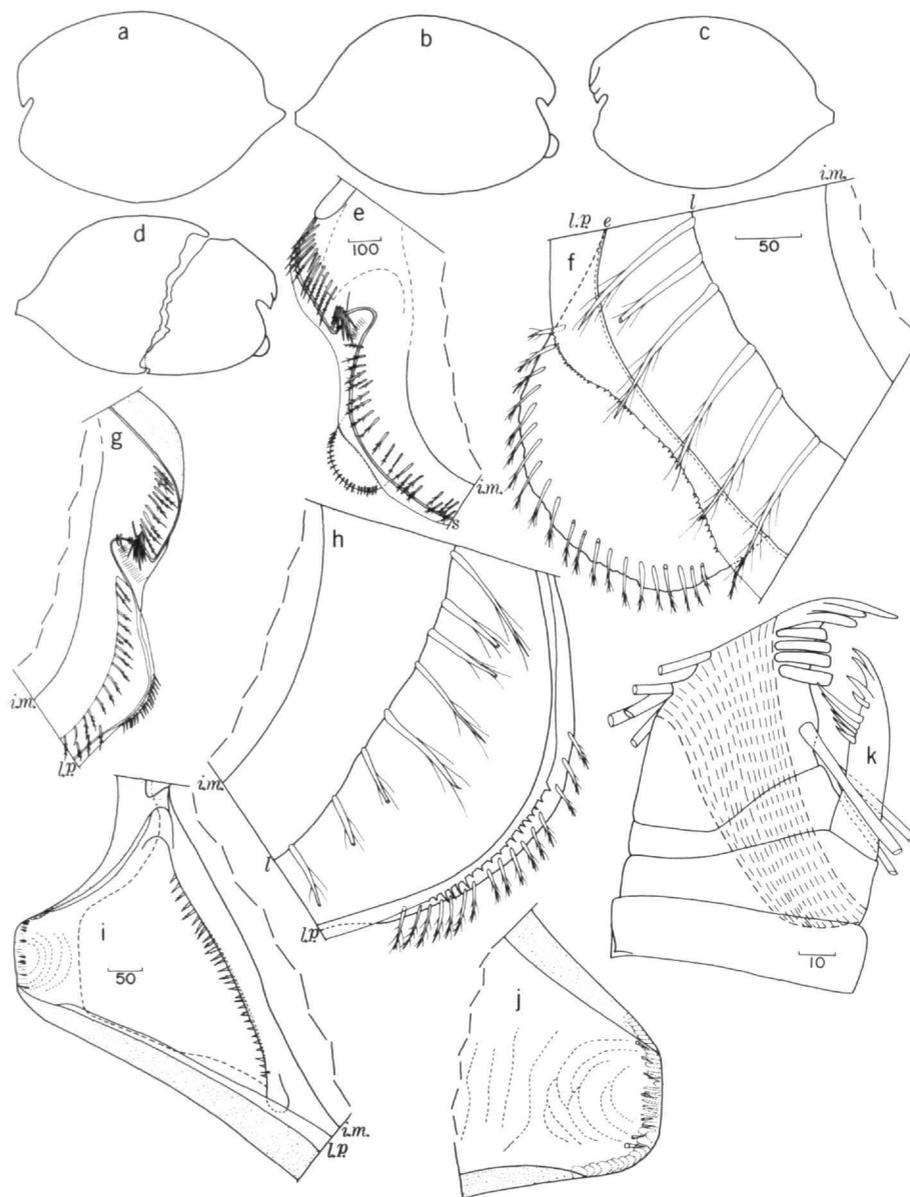


FIGURE 37.—*Cypridinodes favus*, adult male?, paralectotype, carapace: *a*, left valve, lateral view, length 2.95 mm; *b*, right valve, lateral view, length including lunate process 2.93 mm. Lectotype, juvenile?: *c*, left valve, lateral view, length 2.74 mm; *d*, broken right valve, lateral view, height of posterior half 1.83 mm; *e*, anterior of right valve, medial view; *f*, detail of lunate process illustrated in “*e*,” medial view; *g*, anterior of left valve, medial view; *h*, detail of anteroventral valve margin illustrated in “*g*,” medial view; *i*, posterior process of left valve, medial view; *j*, tip of caudal process on right valve, medial view; *k*, tip of 7th limb. (Same magnification in microns: *e,g; f,h,j*.)

consisted of the shell without organs. Poulsen (1962: 281) concluded that the female described by Brady belongs to a late larval stage because of the stage of development of the 2nd antenna, 5th and 6th limbs illustrated. It is possible that the apparent lack of development of the appendages is the result of inaccurate illustrating by Brady, but I am inclined to agree with the conclusion of Poulsen except, because of the similarity of appendages in larval males and females, I must leave open the sex of the juvenile. In his description of the "female," Brady described and illustrated the 1st antenna (pl. 16: fig. 22). The limb is obviously that of an adult male. Therefore, I tentatively conclude that Brady included at least two specimens in his description, a juvenile and an adult male, and this conclusion is supported by finding the carapaces of two specimens in the vial containing the types.

I was quite surprised on examining the valves of the lectotype and paralectotype to find a lunate process ventral to the incisur on each right valve. Its presence was not indicated by Brady or by Skogsberg, who examined the "type specimen." Specimens referred to *Cypridinodes favus* by Poulsen (1962:281) do not have the lunate process and, therefore, are referred questionably to *Cypridinodes wyvillethomsoni* (Brady, 1880).

DIAGNOSIS.—Right valve with lunate process below incisur; both valves with lateral ribs along ventral and dorsal margins and 2 protuberances near valve middle.

DESCRIPTION OF LECTOTYPE.—Anterior of rostrum without superior corner, inferior corner pointed (Figure 37c,d); anterior margin of right valve ventral to narrow incisur with small lunate process; anterior margin of left valve ventral to incisur with bulge in place of lunate process; prominent caudal process slightly ventral to valve middle with truncate posterior edge.

Ornamentation: Prominent dorsal rib present with anterior end on rostrum and posterior end on caudal process; prominent ventral rib with anterior end starting just ventral to incisur and posterior end on caudal process; 2 protuberances present anterior and posterior to valve middle; surface strongly punctate; in transmitted light central part of each punctuation appearing translucent.

Infold of left valve (Figure 37g-i): Rostrum with 10 bristles parallel to anterior margin and cluster of 8 bristles near incisur; inner margin of incisur

with 2 long bristles; list below incisur with 17 bristles forming row between incisur and point opposite ventral end of bulge on anterior margin of valve; about 17 bristles along outer margin of bulge; numerous long bristles present along ventral infold; anterior ridge on posterior process with about 30 spinelike bristles with marginal spines or teeth; posterior edge of process with about 9 faint bristles.

Infold of right valve (Figure 37e,f,j): Rostrum with 13 bristles parallel to anterior margin and cluster of 7 or 8 bristles near incisur (bristles with short marginal spines or teeth), inner margin of incisur with 2 long bristles; list below incisur with 13 bristles forming row between incisur and point opposite ventral end of lunate process on anterior margin of valve; about 22 bristles present along outer margin of lunate process; numerous long bristles present along ventral infold; anterior ridge on posterior process broken but with 18 spinelike bristles on remaining part (bristles similar to those on left valve); posterior edge of process with 8 short bristles.

Selvage: Lamellar prolongation present along anterior, ventral, and posterior margins (except posterior end of caudal process) of both valves, prolongation weakly divided and striate in incisur; outer margin of prolongation smooth except for minute spines in area of bulge on anterior of left valve and crescent process on anterior of right valve; outer margin of prolongation close to valve edge on bulge of left valve and distant from valve edge on crescent process of right valve.

Size: Left valve, length 2.72 mm, height 1.96 mm; right valve height only 1.83 mm.

Seventh limb (Figure 37k): Distovalvular group with 5 bristles; 3 bristles at base of comb between comb and dorsal process; 14 proximal bristles, 6 ventral, 8 dorsal; each bristle with 3 bells; comb consisting of 16 teeth, 4 or 5 proximal teeth on each side short and with square tips, middle 7 teeth long with rounded tips; dorsal process with long marginal spines.

DESCRIPTION OF PARALECTOTYPE.—Shape and ornamentation similar to that on lectotype (Figures 36; 37a,b).

Infold of left valve: Rostrum obscure but with more than 7 bristles parallel to anterior margin and a cluster of about 7 bristles near incisur; inner margin of incisur with 2 long bristles; list below incisur

with about 17 bristles forming row between incisur and point opposite ventral margin of bulge on anterior margin of valve; no bristles observed along outer margin of bulge; numerous long bristles present along ventral infold; anterior ridge on posterior process with about 28 (some may be obscured by debris) spinelike bristles; posterior edge of process with about 7 faint bristles.

Infold of right valve: Rostrum with 11 bristles parallel to anterior margin and cluster of about 8 bristles near incisur; inner margin of incisur with 2 long bristles; list below incisur with 16 bristles forming row between incisur and point opposite ventral end of crescent process on anterior margin of valve; about 25 bristles along outer margin of crescent process; numerous long bristles present along ventral infold; anterior ridge on posterior process with 34 spinelike bristles; posterior edge of process with 8 short bristles.

Selvage: Similar to that on lectotype.

Size: Left valve, length 2.95 mm, height 2.11 mm; right valve, length including lunate process 2.93 mm, excluding lunate process 2.87 mm, height 1.94 mm.

DISTRIBUTION.—Unknown.

3. *Cypridinodes asymmetrica* (G. W. Müller)

Cypridina asymmetrica Müller, 1906:14, pl. 6: figs. 1–12; 1912:10 [key], 13.—Skogsberg, 1920:190 [discussion].—Monod, 1932:6, pls. 7–10.

Cypridinodes asymmetrica (Müller).—Poulsen, 1962:297, figs. 136, 137.

HOLOTYPE.—None designated.

SYNTYPE-LOCALITY.—Malayan Archipelago.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Right valve with lunate process on anteroventral margin below incisur. Carapace length: adult males 2.7–2.9 mm, adult females 2.8–3.0 mm (Poulsen, 1962); males 2.1 mm, females 2.3 mm (Müller, 1906).

Second antenna: Second joint of endopodite bare.

Seventh limb: Terminal comb with 25 teeth, movable jaw with marginal teeth; limb with 68 bristles.

Furca: Each limb with 7 claws, separated from lamella by suture.

Lateral eye: Well developed.

Upper lip: Posterior margin of proximal part of each tusk with 12 teeth.

DISTRIBUTION.—This species was originally described by Müller from the Malayan Archipelago. Monod (1932) and Poulsen (1962) recorded specimens from the same general area. Poulsen (1962) extended the range to Samoa and Thailand and also reported a juvenile from the Red Sea and a juvenile from the Tasman Sea, (37°05'S, 150°05'E, 70–100 m). The latter is the only report of the species within the present study area (Figure 34). The species has been collected from surface waters as well as at depths of 70–100 m. The species apparently is confined to shelf waters.

4. *Cypridinodes reticulata* Poulsen

FIGURES 38, 39

Cypridinodes reticulata Poulsen, 1962:287, figs. 131, 132.

Cypridinoides reticulata Poulsen.—Eagar, 1971:60 [listed].

LECTOTYPE.—Gravid ♀ with about 12 eggs, length 4.13 mm, height 3.09 mm, in collection of the Universitets Zoologiske Museum, Copenhagen; designated herein.

TYPE-LOCALITY.—*Galathea* station 626, Tasman Sea, 610 m, 42°10'S, 170°10'E. Poulsen (1962:287) lists collection date as "20–11–1952"; the date this station was occupied is 20 January 1952 according to Bruun (1959).

MATERIAL EXAMINED.—Valves of lectotype.

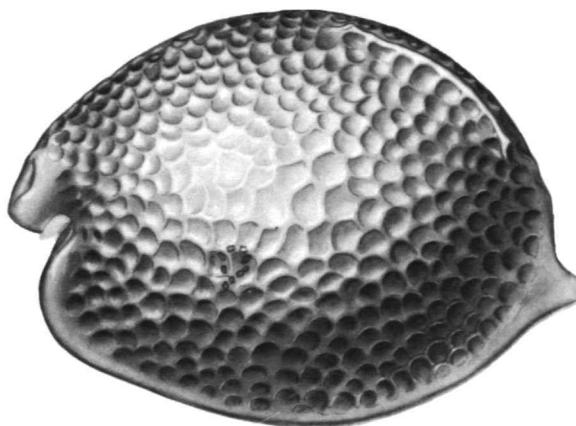


FIGURE 38.—*Cypridinodes reticulata*, female, lectotype, right valve, length 4.13 mm.

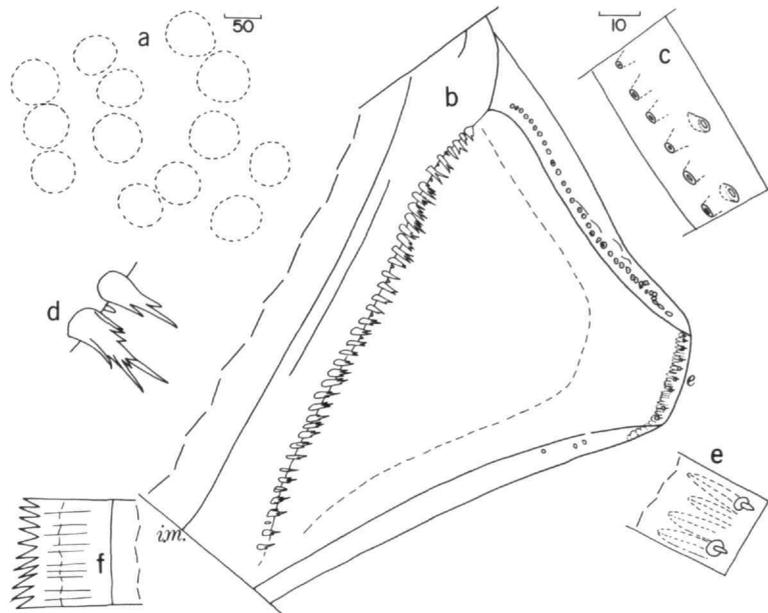


FIGURE 39.—*Cypridinodes reticulata*, female, lectotype, left valve: *a*, central muscle scars, lateral view. Right valve: *b*, caudal process, medial view; *c*, detail of pores and processes along dorsal margin of caudal process shown in "b"; *d*, detail of process on list of caudal process shown in "b"; *e*, detail of minute processes on posterior edge of caudal process shown in "b"; *f*, detail of selvage along rostrum, medial view. (Same magnification in microns: *a,b*; *c-f*.)

REMARKS.—Because it was not clear to me from Poulsen's (1962:287) description of the carapace of *C. reticulata* whether or not the surface bears longitudinal ridges, I requested loan of a syntype from Dr. Wolff, who kindly sent it to me from the Copenhagen Museum. Poulsen (1962) designated 2 females with embryos as "Type." I have selected the specimen I received from Denmark, which is labeled "Type" as the lectotype. The carapace of the lectotype is illustrated herein.

DIAGNOSIS.—Surface of carapace with distinct reticulations formed around oval punctae and a low, narrow, posterodorsal ridge (Figures 38, 39).

Carapace length: Females 4.1–4.2 mm.

Second antenna: Endopodite with bristle on 2nd joint.

Seventh limb: Terminal comb with 15 teeth, movable jaw with marginal teeth; limb with 55 bristles.

Furca: Each lamella with 7 claws, claw 2 fused to lamella.

Lateral eye: Absent.

Upper lip: Posterior margin of proximal part of each tusk with 7 teeth.

SUPPLEMENTARY DESCRIPTION.—Narrow ridge present just within posterodorsal valve margin. Outer surface of valve along dorsal margin of caudal process with tubelike pores forming row; about 9 small spines or processes present on infold along posterior end of caudal process. Selvage with lamellar prolongation along anterior and ventral margins and across incisur; outer edge of prolongation minutely serrate, serrations longer along anterior margin of rostrum. Central muscle scars consisting of about 13 indistinct individual scars.

DISTRIBUTION.—Known only from the type-locality, Tasman Sea, 610 m (Figure 34).

5. *Cypridinodes wyvillethomsoni* (Brady)

Philomedes wyville-thomsoni Brady, 1880:160, pl. 36: figs. 1a-c.—Müller, 1912:52 [species referred to "Cypridinidarum genera dubia et species dubia"].—Skogsberg, 1920:380 [considered it possible that the species may belong in *Sclerocoencha*].

Cypridinodes favus? Poulsen, 1962:281 [not *C. favus* (Brady, 1880)].

HOLOTYPE.—Unique specimen, carapace length 5.2 mm; British Museum (Natural History), Registration No. 81.12.

TYPE-LOCALITY.—*Challenger* station 161 (lat. about 38°S, long. 145°E), off entrance to Port Phillip, Victoria, Australia.

ADDITIONAL SPECIMENS (data from Poulsen, 1962: 281).—2 ♀♀ without eggs, length only, 4.8 mm, 5.0 mm, + 3 juveniles, length only, 1.9 mm, 2.6 mm, 3.0 mm, Tasman Sea, 37°05'S, 150°05'E, 70–100 m, 30 Sept. 1914; 2 ♀♀ with embryos, length only 5.2 mm, 5.3 mm + 8 juveniles, length only 3–4 mm, Tasman Sea, 37°05'S, 150°05'E, 50–90 m, 30 Sept. 1914; 1 ♀, length only, 5.2 mm, Disaster Bay, Australia, 50–70 m, 1 Oct. 1914; 1 ♂, length only 4.1 mm, + 1 juvenile, length only 2.5 mm, from *Galathea* station 545, Coral Sea, lat. 29°57'S, long. 153°24'E, 75 mm, 11 Nov. 1951.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Carapace with lateral ribs along ventral and dorsal margin, lateral process near middle of valve, and truncate caudal process.

Carapace length: adult females 4.8–5.3 mm, adult male 4.1 mm.

Second antenna: Second joint of endopodite of 2nd antenna with 1 bristle.

Seventh limb: Terminal comb with 20 teeth, movable jaw with marginal teeth; limb with 80 bristles.

Furca: Each limb with 7 claws, claw 2 fused to lamella.

Lateral eye: Well developed.

Upper lip: Posterior margin of proximal part of each tusk with 5 or 6 triangular teeth.

REMARKS.—McKenzie (written comm., 1971) after examining the holotype believed that it belongs in the genus *Cypridinodes*. Because of the similarity in carapace outline and size, and locality, I have referred specimens misidentified by Poulsen (1962: 281) as *Cypridinodes favus* Brady to *C. wyville-thomsoni*. Appendages of the unique holotype are unknown, and the anterior margin of the rostrum of the specimen illustrated by Brady is more rounded than that illustrated by Poulsen. Therefore, I have questioned the referral.

DISTRIBUTION.—This species has been collected along the east and south coasts of Australia in deep

water (Figure 34). The most southern collecting station is at about 38°S, 145°E.

Doloria Skogsberg, 1920

TYPE-SPECIES.—*Cypridina* (*Doloria*) *levis* Skogsberg, 1920:225.

Six species in this genus are represented in the study area: *D. isaacsi*, new species; *D. levinsoni*, new species; *D. levis* Skogsberg, 1920; *D. mawsoni*, new species; *D. pectinata* Skogsberg, 1920; *D. septenaria*, new species.

DIAGNOSIS OF GENUS.—Carapace oval in lateral view with small incisur and narrow caudal process on some species; length 2.1 to 5.6 mm; surface smooth and without ornamentation.

First antenna: Adult male with sucking discs on b- and c-bristles.

Second antenna: Exopodite bristles with natatory hairs; 9th joint with 4 bristles except *D. septenaria* which has 7. Endopodite 3-jointed (straight in female; 3rd joint elongate, reflexed in adult male). Female 1st joint with 5 bristles, 2nd joint without bristles, 3rd joint with long filament; male 1st joint with 5 bristles, 2nd joint with 2 to 4 ventral bristles; 3rd joint with 1 proximal dorsal bristle and 2 small terminal bristles.

Mandible: End joint with total of 6 or 7 claws and bristles.

Seventh limb: Limb with abundant bristles (60–100); tip of limb with about 25 stout teeth; opposing stout tooth with small lateral teeth.

Furca: Each lamella with 11 claws (rarely 10); all claws separated from lamella by suture; claws decreasing in length and stoutness posteriorly along lamella.

Lateral eyes: Eyes well developed (18–27 ommatidia) in both sexes except for *D. levinsoni* female on which eyes are absent and male which has 5 or 6 ommatidia.

Upper lip: Lip with undivided anterior part and paired posterior part, posterior tusks, when present, small, not extending beyond ventral margin of anterior part of lip.

DISTRIBUTION.—Members of this genus have been reported from only inside the study area (Figure 33). The northernmost locality (39°57'30"S, 54°49'30"W) is off the Atlantic coast of South America; the southernmost locality is in the Ross

Sea (71°17'S, 171°30'E). Species of the genus are found mostly in water shallower than 450 m, but one species, *D. levinsoni* was collected at a depth of 2818 m. The female of *D. levinsoni* is without lateral eyes, and the male has reduced eyes. Two

juveniles of an indeterminate species, also without lateral eyes, were collected at 2923 m. Remaining species have well-developed eyes in both sexes. The shallowest water in which the genus has been collected is 6 m (*D. levis*).

Key to Species

- 1. Carapace shorter than 3.0 mm.....2
Carapace longer than 3.4 mm.....3
- 2. Short proximal bristle present on dorsal margin of mandibular basale.....7. *D. pectinata*
No short proximal bristle present on dorsal margin of mandibular basale.....6. *D. levis*
- 3. Lateral eyes with more than 15 ommatidia.....4
Lateral eyes of male with 5-6 ommatidia; female without lateral eyes.....8. *D. levinsoni*
- 4. End joint of exopodite of 2nd antenna with 7 bristles.....9. *D. septenaria*
End joint of exopodite of 2nd antenna with 4 bristles.....5
- 5. Dorsal margin of mandibular basale with proximal bristle, lateral teeth present on hooklike tooth opposite terminal comb on 7th limb, carapace shorter than 4.8 mm.....10. *D. isaacsi*
No proximal bristle on dorsal margin of mandibular basale, no lateral teeth on tooth opposite terminal comb on 7th limb, carapace longer than 5.4 mm.....11. *D. mawsoni*

6. *Doloria levis* Skogsberg

FIGURES 40, 41, 43

Cypridina (Doloria) levis Skogsberg, 1920:9, 225, figs. 31-34.
Doloria levis Skogsberg.—Poulsen, 1962:146.—Kornicker, 1971:170, fig. 3.

HOLOTYPE.—Swedish State Museum (Riksmuseum) Stockholm (see Skogsberg, 1920:237).

TYPE-LOCALITY.—South Georgia, S.A.E. Station 34, off mouth of Cumberland Bay, lat. 54°11'S, long. 36°18'W, depth 252-310 m, grayish clay with scattered stones, bottom temperature +1.45°C.

MATERIAL.—USNM 125819, gravid ♀; USNM 125832, gravid ♀; USNM 125833, 4 gravid ♀ ♀ +

12 juveniles; USNM 125983, gravid ♀; USNM 125837, gravid ♀; USNM 127290, gravid ♀; USNM 127370, gravid ♀; USNM 127371, gravid ♀; USNM 127372, 7 gravid ♀ ♀; USNM 127373, adult ♀; USNM 127374, 1 adult ♀ with unextruded eggs; USNM 127375, adult ♀; USNM 127376, 1 juvenile ♂, length 1.94 mm, height 1.38 mm; USNM 127377, 1 juvenile; USNM 127378, 1 gravid ♀ + 2 juveniles; USNM 127380, 1 juvenile ♀, length 2.00 mm, height 1.43 mm; USNM 127379, 5 gravid ♀ ♀ + 2 juveniles; USNM 136170, gravid ♀; USNM 136171, adult ♂; USNM 136172, 1 N-1 ♂; USNM 136173, 2 gravid ♀ ♀ (not dissected); USNM 136576, juvenile ♀; USNM 136579, gravid ♀.

USNM 125819 from *Eltanin* Cruise 12, station 1082; USNM 125832, 125833, 125983 from *Eltanin* Cruise 22, station 1535; USNM 125837 from *East-*

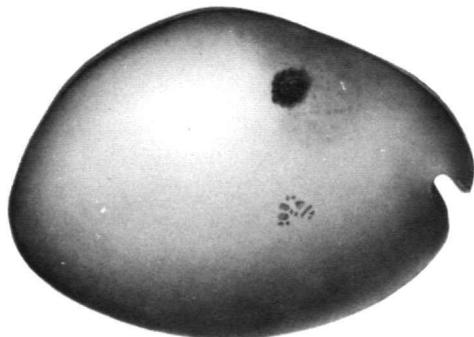


FIGURE 40.—*Doloria levis*, female, USNM 125833, complete specimen, lateral view, length about 2.6 mm.

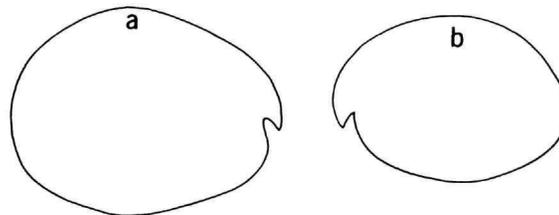


FIGURE 41.—*Doloria levis*, carapaces of complete specimens. Female, USNM 136170: a, lateral outline, length 2.55 mm. Male USNM 136171: b, lateral outline, length 2.22 mm.

wind station 004 A; USNM 127290 from Palmer Station AH4-60; USNM 127370-127377 from Palmer Station AH4-80; USNM 127378 from Palmer Station AH4-20; USNM 127380 from Palmer Station AH4-45; USNM 127379 from Palmer Station AH4-50; USNM 136170-136173 from *Octans*, sample AZ. Wilkes station; USNM 136576, 136579, from *Eltanin* Cruise 27, station 1896.

DIAGNOSIS.—Carapace length of adult female 2.40–2.79 mm, of adult male 2.10–2.22 mm.

Mandible: Dorsal margin of basale with 1 bristle near middle and 2 terminal.

Maxilla: d-bristles of end joint either smooth or with few spines.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figures 40, 41a).—Carapace size (Figure 42): USNM 125819, length 2.79 mm, height 1.89 mm; USNM 125832, length 2.60 mm, height 1.73 mm; USNM 125837, length 2.73 mm, height 1.91 mm; USNM 127290, length 2.42 mm, height 1.92 mm;

USNM 127370, length 2.48 mm, height 1.69 mm; USNM 127371, length 2.42 mm, height 1.79 mm; USNM 127373, length 2.45 mm, height 1.69 mm; USNM 127374, length 2.47 mm, height 1.75 mm; USNM 136170, length 2.55 mm, height 1.90 mm; USNM 136173, length 2.47 mm, height 1.75 mm; length 2.51 mm, height 1.83 mm; USNM 136579, length 2.54 mm, height 1.95 mm.

Upper lip: See Figure 43.

Eggs: USNM 125819, 10 eggs; USNM 125832, 13 eggs; USNM 125837, 15 eggs; USNM 127290, 6 eggs; USNM 127370, 12 eggs; USNM 127371, 9 eggs; USNM 137170, 14 eggs; USNM 136579, 8 eggs.

Parasites: USNM 125819 with 5 isopod larvae.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figure 41b).—Carapace size (Figure 42): USNM 136171, length 2.22 mm, height 1.58 mm.

Gut content: Gut of USNM 127376, a juvenile, with unidentifiable fine organic matter.

DISTRIBUTION.—This species was collected only in

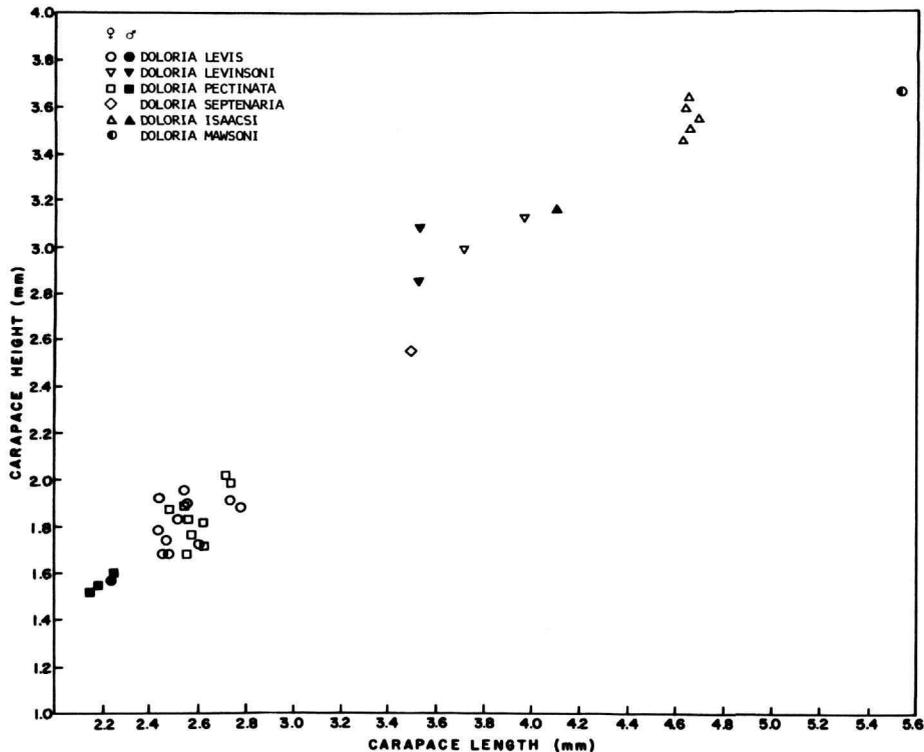


FIGURE 42.—Comparison of relationship between carapace length and height of adult species of *Doloria*.

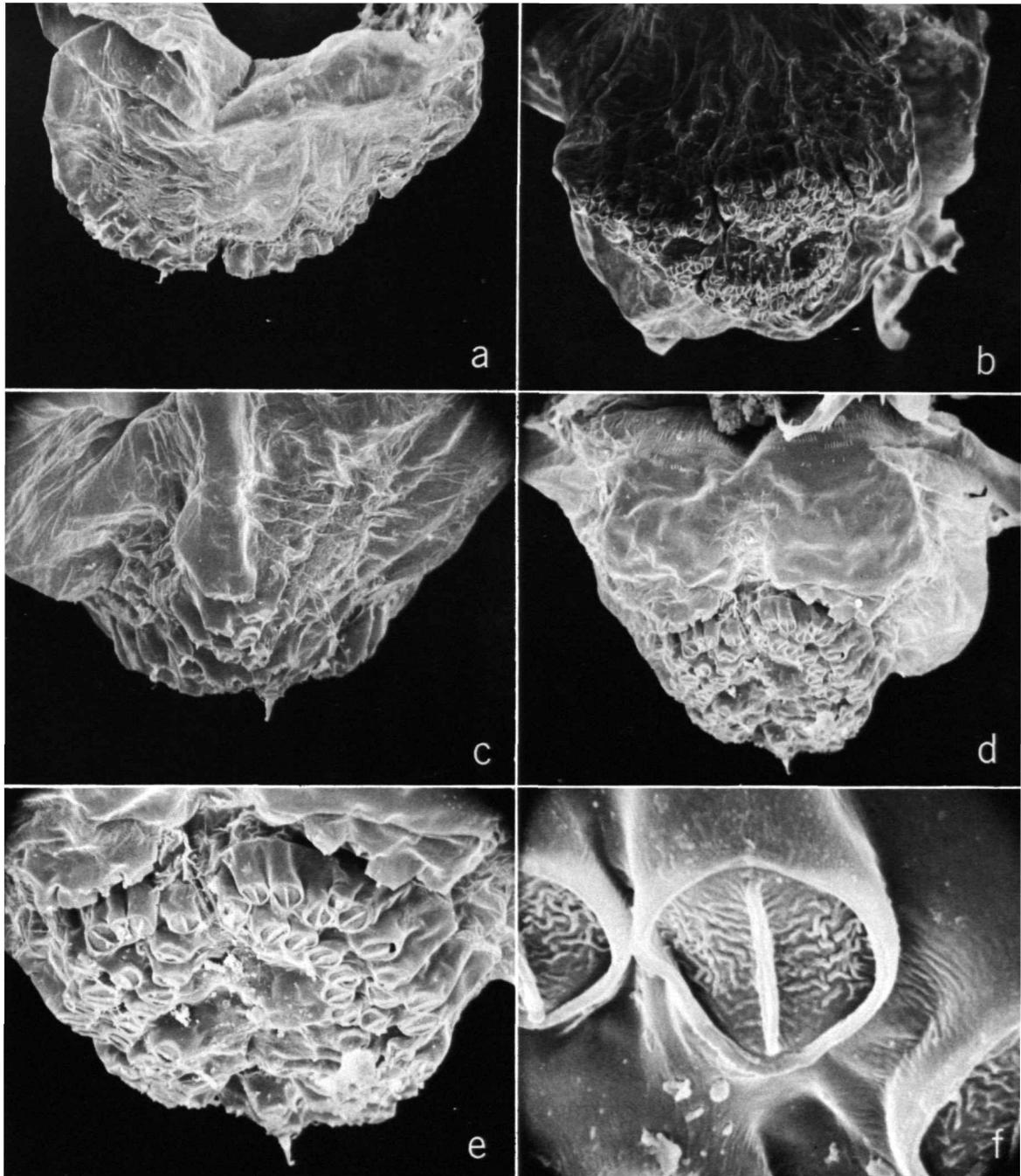


FIGURE 45.—*Doloria levis*, juvenile female, USNM 125492, upper lip (specimen described by Kornicker, 1971): *a*, lateral view, anterior to left, $\times 324$; *b*, oblique lateral view, anterior to left, $\times 280$; *c*, anterior view, $\times 470$; *d*, posterior view, $\times 320$; *e*, detail of "*d*," $\times 475$; *f*, detail of glandular openings shown in "*e*," $\times 4800$.

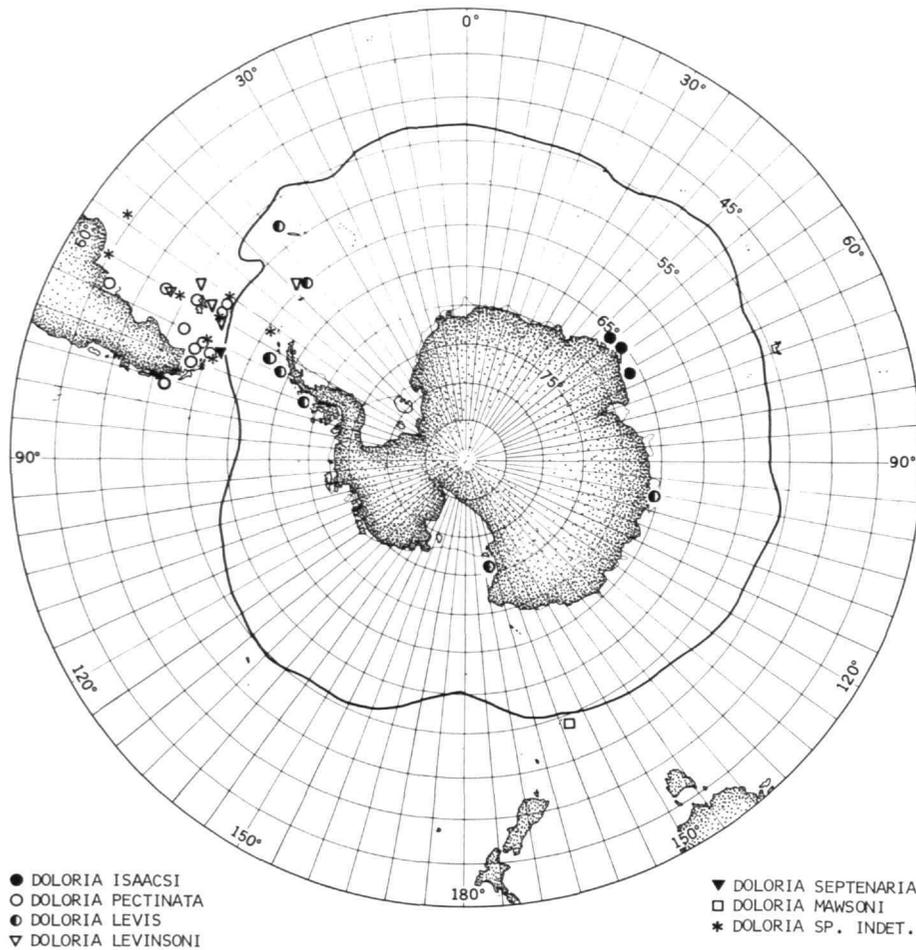


FIGURE 44.—Distribution map of species of *Doloria*.

the Continental subregion of Antarctica at depths of 6 to 302 m (Figure 44).

7. *Doloria pectinata* Skogsberg

FIGURES 45–48

Cypridina (*Doloria*) *pectinata* Skogsberg, 1920:9,132,144,146, 198, 237, figs. 35–37.

Doloria pectinata Skogsberg.—Poulsen, 1962:146.

HOLOTYPE.—Swedish State Museum (Riksmuseum) Stockholm (see Skogsberg, 1920:245), R.M.S. 147.

TYPE-LOCALITY.—Falkland Islands, S.A.E. Station

58, lat. 52°29'S, long. 60°36'W, depth 197 m, sand and gravel, bottom temperature +4.1°C.

MATERIAL.—USNM 128049, gravid ♀; USNM 128050, gravid ♀; USNM 128051, gravid ♀; USNM 128057, adult ♂; USNM 128048, gravid ♀; USNM 128142, gravid ♀; USNM 128150, 1 juvenile; USNM 128160, 1 gravid ♀ + 8 juveniles (some of these may be ♂♂); USNM 128058, gravid ♀; USNM 128059, adult ♂ + 2 adult ♀♀ without eggs + 3 juveniles; USNM 128272, gravid ♀; USNM 137381, gravid ♀; USNM 137382, 1 gravid ♀ + 3 adult ♀♀ without eggs + 19 juveniles (juveniles may include adult ♂♂); USNM 137448, 19 juveniles; USNM 137468, adult ♀; USNM 137471, gravid ♀; USNM 137478, 1 specimen;

USNM 137385, gravid ♀; USNM 137386, 1 gravid ♀; USNM 137441, gravid ♀; USNM 137442, 3 juveniles; USNM 137443, 1 adult ♀ + 7 juveniles; USNM 137458, 1 stage II instar, length 1.42 mm, height 0.97 mm; USNM 137459, adult ♂; USNM 137462, 1 juvenile ♀, length 1.60 mm, height 1.17 mm, + 4 juveniles; USNM 137463, 1 juvenile; USNM 138024, 1 adult ♀; USNM 138025, 13 gravid ♀♀, 3 adult ♀♀ without eggs, 24 juveniles (may include some adult ♂♂); USNM 138029, 1 N-1 ♂, length 1.85 mm, height 1.30 mm; USNM 139102, 1 juvenile ♀, length 1.74 mm, height 1.22 mm; USNM 139103, 1 juvenile ♀, length 2.19 mm, height 1.59 mm + 116 juveniles; USNM 139104, 1 juvenile ♀ + 3 juveniles; USNM 137452, 13 juveniles.

USNM 128049–128051, 128057 from *Eltanin* Cruise 22, station 1594; USNM 128048 from *Eltanin* Cruise 5, station 219; USNM 128142, 128150, 128160 from *Eltanin* Cruise 9, station 740; USNM 128058, 128059 from *Eltanin* Cruise 11, station 958; USNM 128272 from *Eltanin* Cruise 22, station 1596; USNM 137381, 137382, 137448, 137468, 137471, 137478 from *Vema* Cruise 15, station V-15-102;

USNM 137385, 137386 from *Vema* Cruise 18, station V-18-12; USNM 137441, 137442 from *Vema* Cruise 17, station V-17-48; USNM 137443 from *Vema* Cruise 14, station V-14-19; USNM 137458 from *Vema* Cruise 17, station V-17-47; USNM 137459 from *Vema* Cruise 17, station V-17-22; USNM 137462 from *Vema* Cruise 14, station V-14-2; USNM 137463 from *Vema* Cruise 14, station V-14-14; USNM 138024, 138025 from *Eltanin* Cruise 11, station 958; USNM 138029 from *Eltanin* Cruise 4, station 162; USNM 139102, 139103 from *Hero* Cruise 69-5, station 48; USNM 139104 from *Hero* Cruise 69-5, station 49; USNM 137452 from *Vema* Cruise 17, station V-17-51.

DIAGNOSIS.—Carapace length of adult female, 2.45–2.80 mm; of adult male, 2.14–2.24 mm.

MANDIBLE: Dorsal margin of basale with 1 short proximal bristle, 1 bristle near middle and 2 terminal bristles.

Maxilla: d-bristles of end joint strongly pectinate.

SUPPLEMENTAL DESCRIPTION OF ADULT FEMALE (Figures 45a-g, 46).—Size of carapace (Figure 42): USNM 128049, length 2.55 mm, height 1.89 mm; USNM 128050, length 2.48 mm, height 1.88 mm;

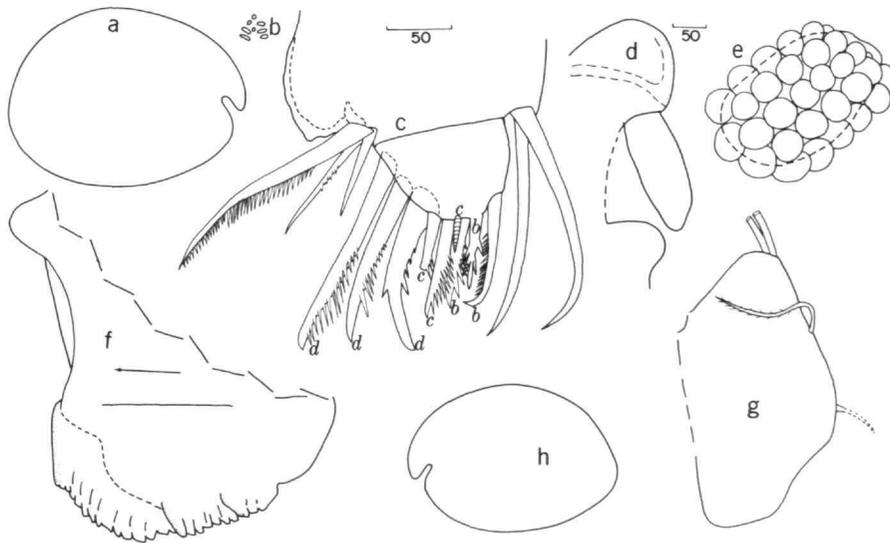


FIGURE 45.—*Doloria pectinata*, female, USNM 128050: a, outline of complete specimen, lateral view, length 2.48 mm; b, central muscle scars on left valve, lateral view; c, tip of left maxilla, medial view; d, medial eye and rod-shaped organ; e, left lateral eye, anterior to right; f, upper lip, lateral view, anterior to left. Female, USNM 128048: g, mandibular basale showing dorsal bristles. Male, USNM 128051: h, outline of complete specimen, lateral view, length 2.19 mm. (Same magnification in microns: d-g.)

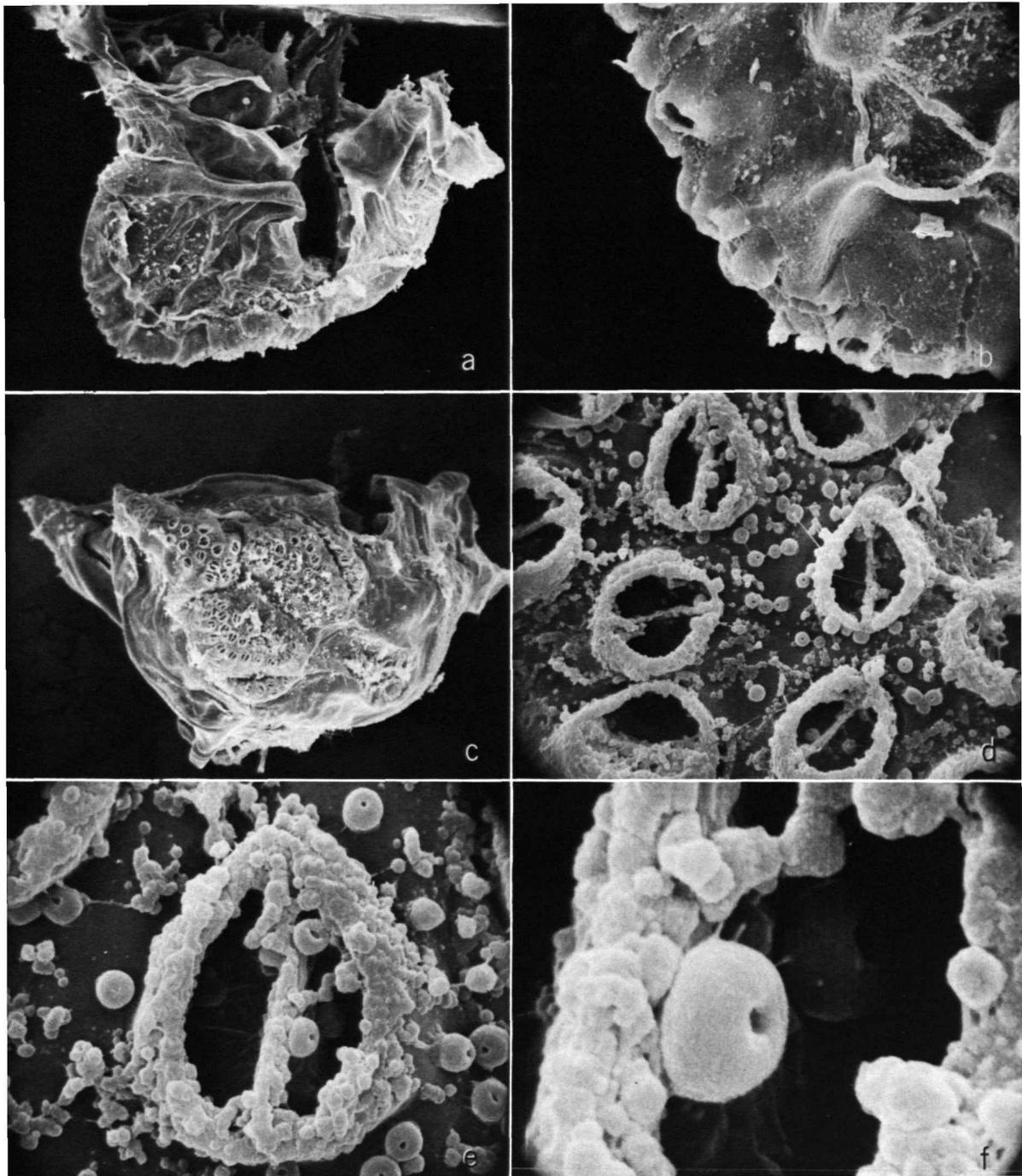


FIGURE 46.—*Doloria pectinata*, female, USNM 137381, upper lip: *a*, left lateral view, anterior to left, $\times 180$; *b*, detail of anteroventral corner of "a" $\times 900$; *c*, ventral view, anterior toward upper left, $\times 190$; *d*, detail of glandular openings in "c," $\times 1900$; *e*, detail of glandular openings in "d," $\times 4750$; *f*, detail of globular objects in "e," $\times 19,000$.

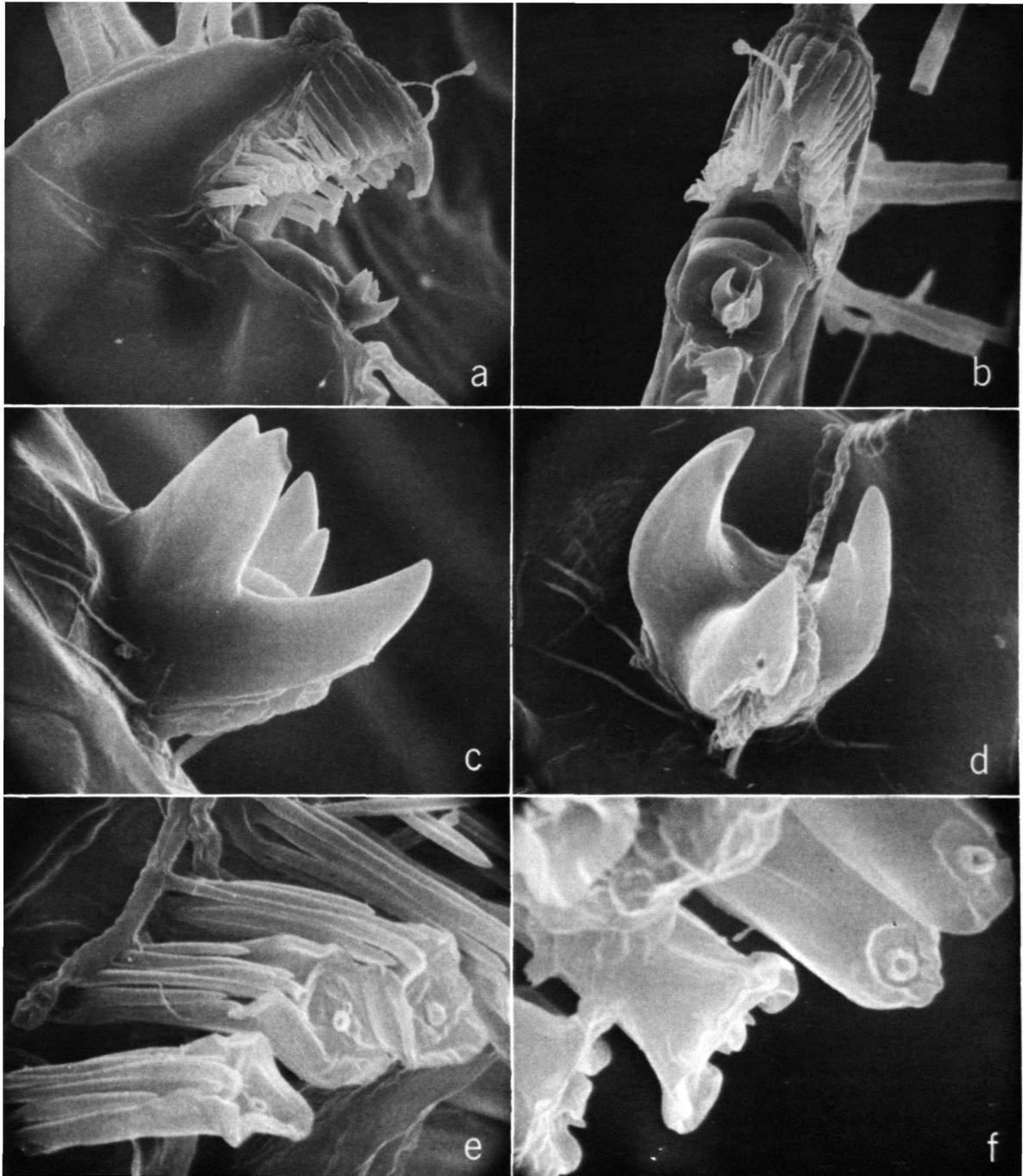


FIGURE 47.—*Doloria pectinata*, juvenile (N-1) female, USNM 139103, 7th limb: *a*, lateral view tip, $\times 1200$; *b*, end view of tip, $\times 1200$; *c*, detail of process opposite comb in "a," $\times 6500$; *d*, detail of end view of process opposite comb in "b," $\times 6500$ ("string" across tooth is debris); *e*, detail of proximal "square-tipped" teeth of terminal comb in "a," $\times 6000$; *f*, detail of top of two "square-tipped" and two spinous teeth of comb in "a," $\times 10,000$.

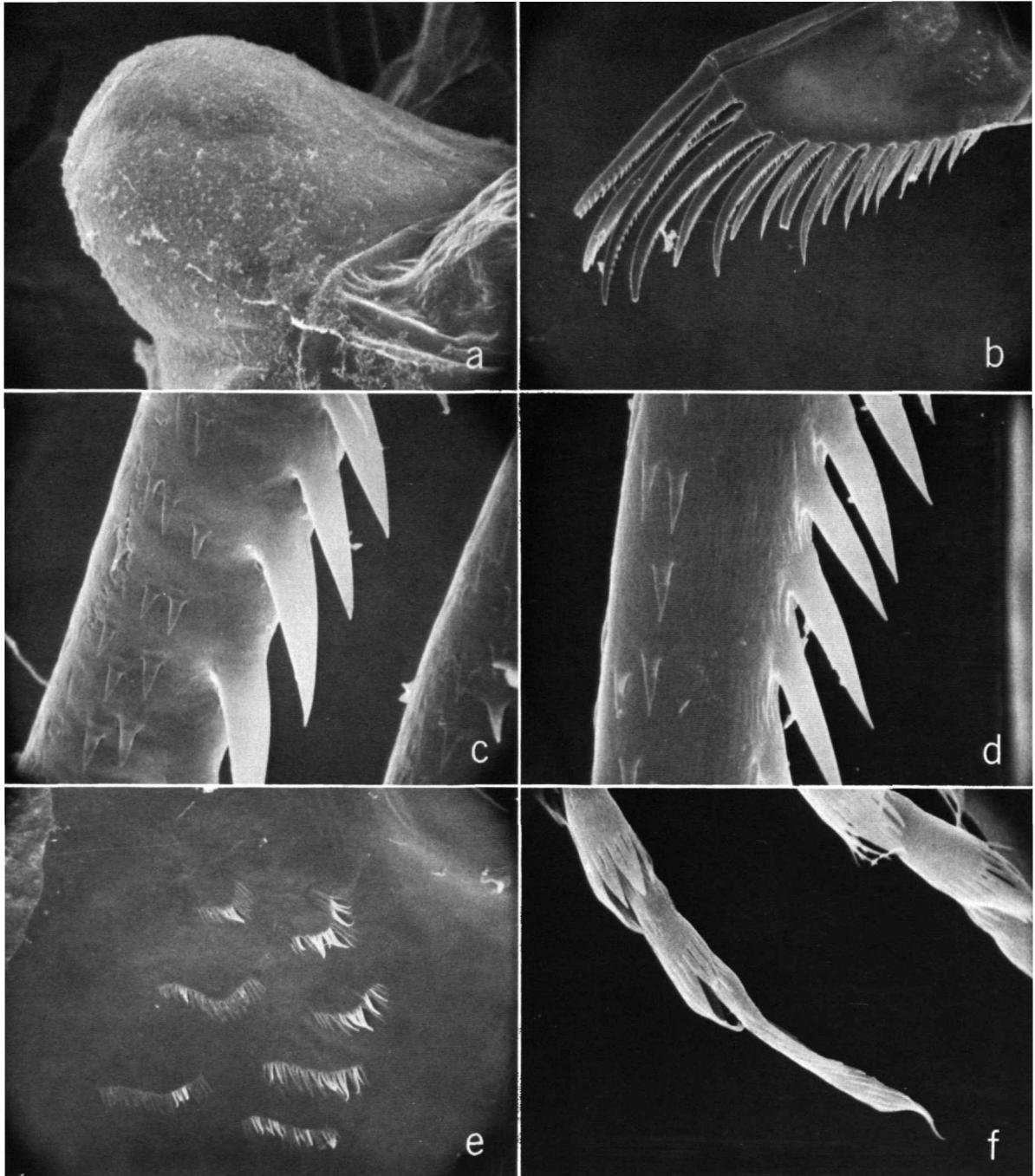


FIGURE 48.—*Doloria pectinata*, juvenile N-1 female, USNM 139103: *a*, anterior process between upper lip and rod-shaped organ, $\times 1250$; *b*, furca, $\times 160$; *c*, detail of claw number 1, in "*b*," $\times 2500$; *d*, detail of claw number 4 in "*b*," $\times 4400$; *e*, detail of proximal lateral spines on lamella shown in "*b*," $\times 1250$; *f*, detail of bristle on 7th limb.

USNM 128051, length 2.54 mm, height 1.91 mm (not dissected); USNM 128048, length 2.56 mm, height 1.83 mm; USNM 128142, length 2.61 mm, height 1.82 mm; USNM 128058, length 2.55 mm, height 1.69 mm; USNM 128272, length 2.73 mm, height 1.99 mm; USNM 137381, length 2.57 mm, height 1.77 mm; USNM 137468, left valve only, length 2.74 mm, height 1.84 mm; USNM 137385, length 2.71 mm, height 2.01 mm; USNM 137441, length 2.63 mm, height 1.76 mm; USNM 137443, shell distorted, length only, about 2.34 mm.

Upper lip: See Figures 45f, 46.

Eggs: USNM 128049, 17 eggs; USNM 128050, 16 eggs; USNM 128048, 15 eggs; USNM 128142, 16 eggs; USNM 128058, 12 eggs; USNM 128272, 21 eggs; USNM 137381, 15 eggs; USNM 137385, 17 eggs; USNM 137441, 19 eggs.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figure 45h).—Size of carapace (Figure 42): USNM 128057, length 2.19 mm, height 1.55 mm; USNM 128059, length 2.14 mm, height 1.15 mm; USNM 137459, length 2.24 mm, height 1.60 mm.

SUPPLEMENTAL DESCRIPTION OF JUVENILE (N-1) FEMALE, USNM 139103.—See Figures 47, 48.

Parasites: Adult ♀, USNM 138024, with 1 pupa of a choniostomatid and 2 copepodites. Adult ♂, USNM 128059, with 1 ♂ and 1 ♀ choniostomatid. Juvenile ♀, USNM 139102, with ♀ choniostomatid.

Gut content: Gut of USNM 139102, a juvenile ♀, with particulate organic matter, slender spines, and crustacean fragments.

DISTRIBUTION.—This species was taken in Subantarctic and Subantarctic-to-35°S regions of the American Quadrant between latitudes 41°49'S to about 56°S at depths of 21 to 439 m (Figure 44). It is most abundant in the Magellanic subregion at shelf depths.

8. *Doloria levinsoni*, new species

FIGURES 49-53

HOLOTYPE.—USNM 127283, ♀, length 3.71 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 7, station 480, Atlantic Quadrant, Antarctica.

ETYMOLOGY.—The species is named for Dr. Stuart A. Levinson.

PARATYPES.—USNM 127284, 1 juvenile with frag-

mented carapace, and USNM 127285, 1 juvenile, length 3.01 mm, height 2.20 mm, from same sample as holotype. USNM 127974, 1 instar II from *Eltanin* Cruise 7, station 557.

ADDITIONAL SPECIMENS.—USNM 127963, adult ♂; USNM 128609, juvenile (instar II); length 1.93 mm, height 1.48 mm; USNM 137387, adult ♂; USNM 137388, 3 juveniles; USNM 137466, adult ♀ (appendages missing); USNM 137467, 1 juvenile. USNM 127963 from *Eltanin* Cruise 6, station 340; USNM 128609 from *Eltanin* Cruise 6, station 350; USNM 137387, 137388, 137466, 137467 from *Vema* Cruise 18, V-18-12.

DIAGNOSIS.—Carapace length of adult female, about 3.7 mm; of adult male, about 3.5 mm.

Mandible: Dorsal margin of basale with 1 or 2 proximal bristles.

Fifth limb: 4th Bristles on 4th and 5th joints of female with only short marginal spines.

Lateral eye: Absent on female; with 5 or 6 ommatidia on male.

DESCRIPTION OF FEMALE (Figures 49, 50a-g, 51).—Carapace oval with rounded posterior and fairly deep incisur with overhanging rostrum; surface smooth (Figure 49a).

Infold (Figure 49b-d): Infold broad in ventral part of shell, narrow ventrally and slightly broader posteriorly. Infold posterior to rostrum with about 17 long bristles forming vertical row; 2 long and several short bristles present around inner margin of incisur; anteroventral and ventral infold with numerous double bristles and pores, which might have contained bristles; inner margin of posterior infold with raised list with about 28 short bristles and crenulate posterior edge.

Selvae: Wide striate lamellar prolongation with smooth outer margin present along anterior, ventral, and posterior margins; prolongation along ventral margin consisting of 2 laminae (Figure 49c).

Size (Figure 49): USNM 127283, length 3.71 mm, height about 3 mm; USNM 137466, right valve length 3.96 mm, height 3.13 mm.

First antenna: First joint bare; 2nd joint with numerous clusters of minute spines along dorsal and ventral margins; 3rd joint with 2 bristles with short marginal spines, ventral bristle subterminal, dorsal bristle proximal; 4th joint with 2 terminal bristles with short marginal spines, 1 ventral bristle reaching beyond 5th joint, 1 dorsal bristle almost reaching end of 5th joint; sensory bristle of 5th



FIGURE 49.—*Doloria levinsoni*, female, USNM 127283, complete specimen: *a*, lateral outline, length 3.71 mm. Right valve: *b*, anterior, medial view; *c*, lamellar prolongation of selvage on ventral margin, medial view; *d*, infold on posteroventral corner, medial view. Left 2nd antenna: *e*, proximal part showing part of protopodite, endopodite, and 1st joint of exopodite, medial view; *f*, tip of bristle on 2nd joint of exopodite, medial view. Right 2nd antenna: *g*, tip of exopodite showing 9th joint and part of 8th joint, lateral view. Right mandible: *h*, basale, exopodite, and 1st endopodite joint, lateral view. Left mandible: *i*, tip of endopodite, medial view; *j*, tip of coxale endite, medial view. Fifth limb: *k*, main tooth, posterior view. Right maxilla: *l*, exopodite and "cutting tooth" on 2nd endopodite joint, lateral view. (Same magnification in microns: *b,h*; *c,d,i*; *e,l*; *f,j,k*.)

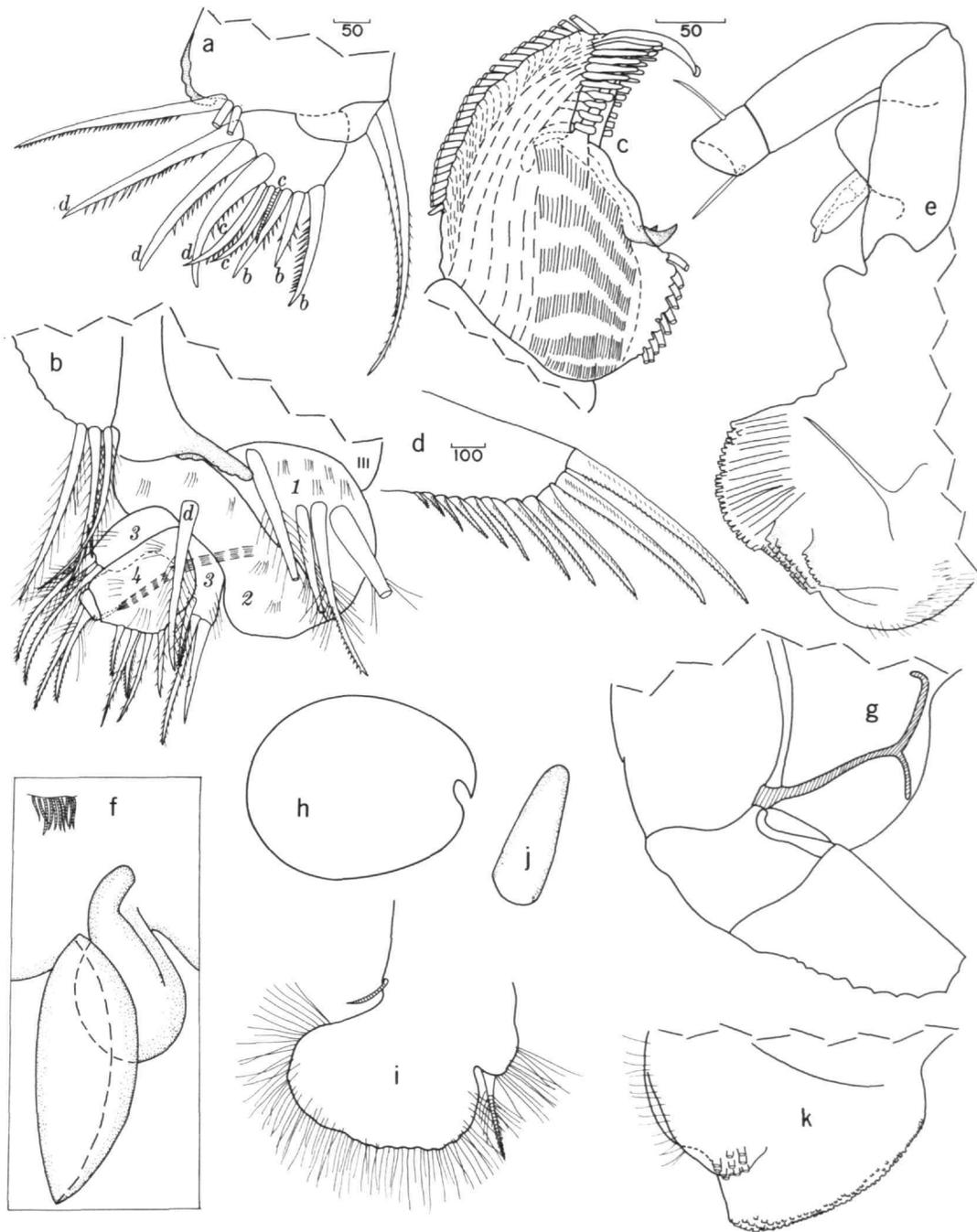


FIGURE 50.—*Doloria levinsoni*, female, USNM 127283: a, tip of left maxilla, medial view (a-bristles not shown); b, tip of right 5th limb, anterior view; c, tip of 7th limb; d, right lamellae of caudal furca, lateral view (not under cover slip); e, anterior of body showing proximal part of left 1st antenna, medial eye and rod-shaped organ, anterior process and upper lip; f, right brushlike organ and spermatophore, anterior to right; g, posterior of body showing caudal furca without claws and sclerite. Instar II, USNM 127974: h, outline of complete specimen, lateral view, length 2.15 mm; i, right 6th limb, lateral view; j, right 7th limb, lateral view; k, upper lip, lateral view, anterior to right. (Same magnification in microns: a,b,f,i-k; d,e,g.)

joint with 9 long bare proximal filaments and 4 shorter distal marginal bare filaments, most distal of these very short; medial bristle of 6th joint with widely spaced short marginal spines. Seventh joint: a-bristle longer than bristle of 6th joint and with same type of marginal spines; b-bristle with 5 pectinate marginal filaments; c-bristle with about 10 pectinate marginal filaments. Eighth joint: d- and e-bristles bare, longer than b-bristle; f- and g-bristles similar to c-bristle.

Second antenna (Figure 49e-g): Protopodite with fairly long medial bristle with short marginal spines. Endopodite 3-jointed: 1st joint with 4 proximal bristles (3 short bare, 1 long spinous) and 1 long spinous distal bristle; 3rd joint with long terminal filament reaching 6th joint of exopodite. Exopodite: basal spines present on joints 3 to 9; some spines may be bifurcate at tip; spines on distal joints longer than those on proximal joints, spine of 9th joint about one and one-half times length of 9th joint; bristle of 2nd joint reaching 9th joint, with about 23 teeth along ventral margin and 1 subterminally on dorsal margin; natatory hairs present on bristles of joints 3 to 8; 9th joint with 4 bristles, all with natatory hairs, dorsal bristle shorter than others.

Mandible (Figure 49h-j): Coxale endite strongly spinous with 2 stout spines at tip, one of these with additional marginal spines (Figure 49j). Basale: dorsal margin with 1 or 2 short proximal bristles, 1 long distal bristle, and 2 long terminal bristles, all bristles with short marginal spines; ventral margin of basale of left limb with 3 medium and 1 short a-bristles, 2 b-bristles (1 short, 1 medium), 1 medium c-bristle, and 1 long d-bristle; right limb with 1 b- and 2 c-bristles. Exopodite reaching past end of 1st endopodite joint, with pointed hirsute tip and 2 medium length bristles. Endopodite: ventral margin of 1st joint with 4 terminal bristles, 1 short, 1 medium, 2 long; ventral margin of 2nd joint with 3 groups of bristles with 1, 1, and 2 slender bristles in each group; dorsal margin with 7 long bristles, 3 medium bristles with short marginal spines, and about 15 short bristles with fairly long marginal spines; 1 short bristle present at midlength separated by space from proximal group; end joint with 3 stout subequal claws with some proximal teeth on ventral margin, and 4 bristles.

Maxilla (Figures 49l, 50a): 1st endite with about

12 spinous bristles; 2nd endite with about 7; 3rd endite with about 6; coxale with 1 stout plumose bristle. Basale with 3 bristles on distal margin, 1 long spinous, 2 short with few short marginal spines. Endopodite: 1st joint with 2 long α -bristles with short marginal spines, and 3 β -bristles (1 inner short bristle with short marginal spines, 1 stout outer bristle with strong marginal teeth, 1 medium middle bristle with weak marginal teeth); surface of 1st joint with clusters of spines; end joint with 4 a-bristles with proximal marginal teeth, 3 strongly pectinate b-bristles, 3 c-bristles (2 pectinate, 1 bristlelike), 3 strongly pectinate d-bristles. Exopodite with 1 marginal and 2 terminal bristles, all with long marginal spines.

Fifth limb (Figures 49k, 50b): Epipodial appendage with 70 bristles (next to last distal bristle of both limbs of holotype bifurcate at tip). Protopodite with elongate sclerotized anterior process on distal margin. Exopodite: anterior surface of 1st joint with 1 proximal plumose bristle and 3 distal spinous bristles; main tooth consisting of 6 teeth and proximal triangular process; 1 spinous bristle with few small teeth distally present near process; 2nd joint with spinose c- and d-bristle, 4 pectinate a-bristles, and 7 pectinate b-bristles; inner lobe of 3rd joint with 3 bristles, outer lobe with 2; 4th joint with 5 to 6 spinous bristles with short marginal spines; 5th joint separated by suture from 4th and with 2 bristles; 3rd to 5th joints hirsute, 1st and 2nd joints with fewer hairs.

Sixth limb: 5 bare bristles present in place of epipodial appendage. First endite with 4 plumose bristles, 2 long terminal, 2 short medial; 2nd endite with 5 plumose and spinous bristles, 2 long and 1 short terminal, 2 short medial; 3rd endite with 5 or 6 plumose or spinous bristles, 3 or 4 long and 1 short terminal, 1 long medial; 4th endite with 7 plumose or spinous bristles, 6 long and 1 short terminal, 1 long medial; end joint with 28 or 29 plumose or spinous bristles; spines present along ventral margin on lateral side of end joint, medial surface of end joint hirsute; posterior 2 plumose bristles of end joint longer than others.

Seventh limb (Figure 50c): Tip with comb of 25 teeth, proximal teeth shorter than distal teeth and with square ends, middle tooth longer than others and recurved; stout tooth present opposite comb

with small triangular tooth near middle of inner margin. Limb with total of about 81 bristles: 39 distal (27 + 12), 42 proximal (19 + 23); each bristle with 3 to 8 bells.

Furca (Figure 50d): Each lamella with 10 to 11 claws with teeth forming lateral and medial row along posterior margins; claws decreasing in length and stoutness posteriorly along lamella (claw 4 of right lamella of holotype slightly more slender than 5th claw).

Upper lip: Lip consisting of unpaired anterior part with glandular pegs along margin, 2 pairs of short tusks or lobes near middle, and unpaired hir-

sute posterior lobe; anterior pair of tusks with several rows of glandular pegs, posterior pair with only 1 (Figures 50e, 51).

Eyes and rod-shaped organ (Figure 50e): Lateral eyes absent; medial eye large without hairs; rod-shaped organ cylindrical with small fingerlike process at tip.

Genitalia and brushlike organ (Figure 50f): Holotype with spermatophore attached to right genital opening. About 10 minute bristles present above genitalia.

Dorsum: Posterior end of body without distinct folds (Figure 50g).

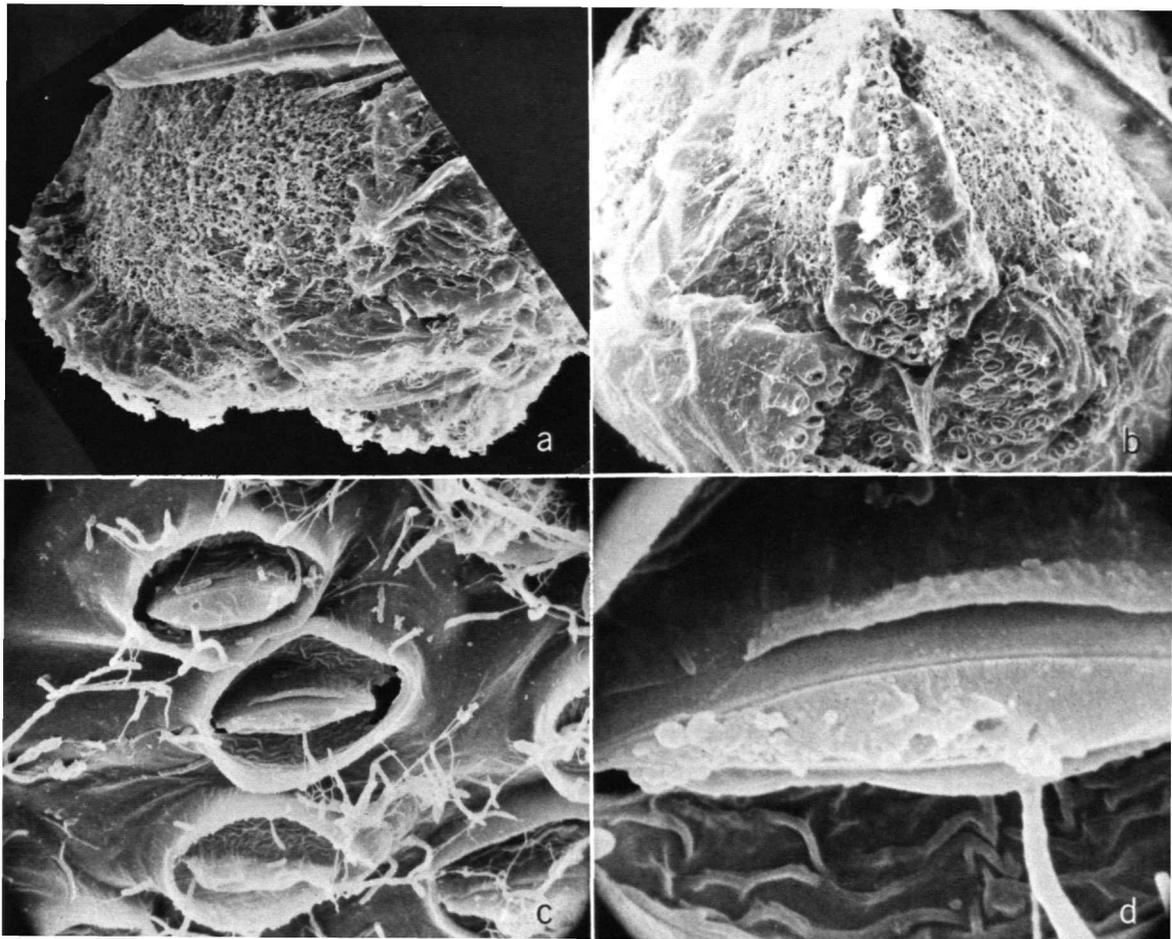


FIGURE 51.—*Doloria levinsoni*, female, USNM 137466, upper lip: *a*, left lateral view, anterior to left, $\times 200$; *b*, ventral view, anterior toward top, $\times 200$; *c*, detail of glandular openings, $\times 2000$; *d*, detail of central glandular opening in "*c*," $\times 10,000$.

Gut content: Holotype gut filled with diatoms and few sediment particles.

DESCRIPTION OF ADULT MALE (Figures 52, 53).—Shape of carapace similar to that of female, slightly smaller (Figure 52a,b). Size (Figure 44): USNM

127963, length 3.52 mm, height 2.85 mm; USNM 137387, length 3.52 mm, height 3.09 mm.

First antenna (Figure 52c,d): Joints 1 to 3 same as those of female; ventral and dorsal bristles of 4th joint spinous, both about same length as 5th joint;



FIGURE 52.—*Doloria levinsoni*, male, USNM 127963: a, complete specimen, lateral view, length 3.52 mm; b, central muscle scars on left valve, lateral view; c, tip of right 1st antenna, medial view; d, detail of b-bristle on left 1st antenna, lateral view. Left 2nd antenna: e, joints 6-9 on exopodite, lateral view; f, detail of bristle on 2nd joint of exopodite, medial view; g, endopodite, medial view. Left mandible: h, basale and 1st endopodite joint and exopodite, medial view; i, tip of endopodite, medial view. Right maxilla: j, tip of endopodite, medial view; k, detail of "cutting tooth," lateral view. Left 5th limb: l, distal end, lateral view. Seventh limbs: m, left limb, lateral view (bristles not shown); n, tip of right limb, medial view; o, detail of teeth on tip of left limb, lateral view. Body: p, anterior showing lateral eye, rod-shaped organ, anterior process, upper lip, and ?glandular sac; q, posterior showing weak segmentation and anterior three furcal claws. (Same magnification in microns: c,e; d,f,g,j,l; h,m,p; k,n,o.)

sensory bristle of 5th joint with about 9 proximal and 4 distal filaments; medial bristle of 6th joint short with few widely spaced marginal spines. Seventh joint: a-bristle similar to medial bristle of 6th joint but longer; b-bristle (broken) with short stout proximal filament with bulbous base followed by disc and small wartlike process (bulbous base of filament with medial crenulated buttonlike disc), 1 filament with small spine and 4 discs, 1 filament with 5 discs, and 1 distal bare filament; c-bristle (broken) with stout proximal filament similar to that of b-bristle but with larger disc, 1 filament with minute spine and 4 discs, 1 filament with minute spine and 4 to 5 discs, and additional filaments (at least 8) mostly broken. Eighth joint: d- and e-bristles bare; f- and g-bristles broken, but with at least 9 filaments, some with short marginal spines.

Second antenna (Figure 52e-g): Protopodite similar to that of female with spinous medial bristle. Endopodite 3-jointed: 1st joint with 5 bristles, 4 in proximal group (1 long with few marginal spines, 3 short bare), and 1 distal with marginal spines; ventral margin of 2nd joint with 2 minute spines and 3 or 4 short bristles distally; 3rd joint recurved with 1 long proximal filament and terminus with many spines and 2 short bristles. Exopodite: ventral margin of bristle on 2nd joint with 2 slender proximal spines and 13 or 14 stout spines, dorsal margin with scattered short hairs; joints 3 to 9 with basal

spines; bristles of joints 3 to 9 with only natatory hairs; only 4 bristles present on 9th joint but sockets of possibly 2 more evident.

Mandible (Figure 52h,i): Basale: dorsal margin with 1 short proximal bristle, 1 longer distal bristle near middle, and 2 long terminal bristles, all with marginal spines; ventral margin with 4 a-bristles, 3 b-bristles on left limb and 2 on right, 1 c-bristle, and 1 long d-bristle. Endopodite: 1st and 2nd joints similar to those of female; end joint with 4 bristles as on female, but with only 2 claws, dorsal claw very small, other claw broad, both claws without marginal teeth (some indication present that 1 large claw missing from each limb of USNM 127963).

Maxilla (Figure 52j,k): 1st endite with 11 bristles; 2nd endite with 7 bristles; 3rd endite with 7 bristles plus 1 proximal bristle. Distal margin of basale with 3 spinous bristles, 2 long, 1 short. Exopodite with 1 marginal and 2 terminal bristles, all with long spines. Endopodite: 1st joint with 2 α -bristles, both with short marginal spines, and 2 β -bristles, both with short marginal spines; cutting tooth with undulate margin (Figure 52k); end joint with 2 a-bristles, both with short marginal spines, 2 b- and c-bristles with long proximal and short distal spines, and 3 pectinate d-bristles.

Fifth limb (Figure 52l): Epipodial appendage with 70 bristles; anterior process on protopodite small. Exopodite: 4th joint with 4 to 5 bristles; all

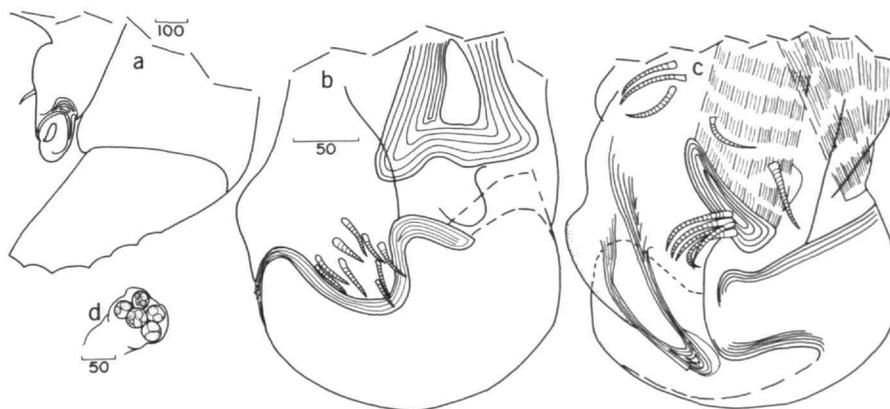


FIGURE 53.—*Doloria levinsoni*, male, USNM 127963: a, lateral view from left of copulatory apparatus and furcal lamellae (furcal claws not shown); b, tip of right copulatory limb, posterior view; c, tip of left copulatory limb, anterior view. Male, USNM 137387: d, left lateral eye. (Same magnification in microns: b,c.)

bristles on 3rd to 5th joints with long proximal and short distal spines; limb otherwise similar to limb of female.

Sixth limb: 5 bare bristles in place of epipodial appendage. First endite with 4 spinous bristles, 2 long terminal, 2 short medial; 2nd endite with 3 spinous bristles, 2 long terminal, 1 short medial; 3rd endite with 4 spinous bristles, 3 long, 1 short; 4th endite with 6 spinous bristles, 5 long, 1 short. End joint with 24 to 25 bristles; posterior 2 bristles plumose to tip, remaining bristles with long spines proximally and shorter spines distally; medial surface hirsute; row of spines present along lateral side of ventral margin.

Seventh limb (Figure 52*m-o*): Each limb coiled clockwise distally; comb teeth similar to that of female; dorsal tooth similar to that of female but with 1 to 3 lateral teeth. Each limb with about 74 bristles: 37 distal (25 ventral, 12 dorsal), 37 proximal (17–20 ventral, 18–20 dorsal).

Furca: Each lamella with 11 claws decreasing in length and stoutness posteriorly along lamella; each claw separated from lamella by suture as on female; 4th claw slightly more slender than 5th claw.

Upper lip: In general, similar to that of female (Figure 52*p*).

Eyes and rod-shaped organ (Figures 52*p*, 53*d*): Male differs from female in having small lateral eyes with 5 or 6 divided ommatidia. Medial eye normal with rod-shaped organ similar to that of female.

Copulatory organ (Figure 53*a-c*): Consisting of 2 lobes: longer lobe 2-jointed with 6 bristles on 1st joint and broad sclerotized hooklike process at terminus of 2nd joint; shorter lobe with about 12 short bristles and terminating in narrow sclerotized process. Penis consisting of short conelike process between left and right paired lobes.

Dorsum: Posterior subdivided into 5 jointlike ridges (Figure 52*q*).

REMARKS.—The adult male described herein was not found with females, and it cannot be certain that it is conspecific with the female holotype. It is identified as *D. levinsoni* primarily because of the reduced lateral eyes on the specimen and its size. The 5th limb and exopodite of the 2nd antenna are more like those on the female of *D. septenaria*, and it possibly belongs in that species, or is a new species. Because of reservations concerning the

identity of this specimen, I do not consider it a paratype.

DESCRIPTION OF INSTAR II (Figure 50*h-k*).—Carapace similar in shape to adult female (Figure 50*h*).

Size: USNM 127974, length 2.15 mm, height 1.80 mm.

Second antenna: Endopodite similar to adult female but with fewer proximal bristles on 1st joint.

Mandible: Dorsal margin of basale with 1 bristle near middle and 2 terminal bristles.

Sixth limb (Figure 50*i*): Limb divided into end joint and endopodite; endopodite with 1 spinous bristle and long marginal spines; end joint with long spines, medial side hirsute, lateral side with spines along ventral margin. Epipodial appendage with 1 bare bristle.

Seventh limb: Short, bare (Figure 50*j*).

Furca: Each lamella with 6 claws, all separated from lamella by suture; each claw decreasing in length proximally along lamella.

Upper lip: Similar to that of adult (Figure 50*k*).

Lateral eyes: Small, unpigmented with 4 or 5 ommatidia (male character?).

REMARKS.—In a key to the stage of development of myodocopid instars, Kornicker (1969a:3) stated that an instar with a 6th limb having only 1 bristle is at stage II, whereas, more than 1 bristle (usually many) indicates stage III. The present specimen has 1 epipodial bristle in addition to the usual single bristle but is considered a stage II instar here because of the shortness of the 7th limb.

COMPARISONS.—Two previously described species of *Doloria*—*D. levis* Skogsberg, 1920, and *D. pectinata* Skogsberg, 1920—are about 1 mm shorter than the new species *D. levinsoni*. Also, the lateral eyes are well developed in those species; whereas, in *D. levinsoni*, they are lacking in the female, and reduced in the male.

DISTRIBUTION.—This species was collected between latitudes of about 47°S to 58°S at bathyal and abyssal depths (426–2818 m) (Figure 44). Its range includes the Antarctic, Subantarctic, and Subantarctic-to-35°S regions.

9. *Doloria septenaria*, new species

FIGURES 54, 55

HOLOTYPE.—USNM 128143, ♀ (probably adult), length 3.49 mm. Valves and some appendages in alcohol, remaining appendages on 2 slides.

TYPE-LOCALITY.—*Eltanin* Cruise 9, station 740, Subantarctic region.

ETYMOLOGY.—The specific name is from the Latin "septenarius" [= consisting of seven], and refers to the 7 bristles present on the 9th joint of the exopodite of the 2nd antenna of the female.

MATERIAL.—Holotype.

DIAGNOSIS.—Carapace length of ?adult female, about 3.5 mm.

Second antenna: 9th joint of exopodite with 7 bristles.

Mandible: Dorsal margin of basale with 1 proximal bristle.

Fifth limb: Bristles on 4th and 5th joints with long proximal and short distal spines.

Lateral eye: With about 27 ommatidia.

DESCRIPTION OF FEMALE (probably adult).—Carapace oval with rounded posterior; surface smooth; fairly deep incisur with overlapping rostrum; inferior rostral corner pointed (Figures 54a,c).

Infold (Figure 54b): Infold behind rostrum with about 27 long bristles; several bristles present around inner margin of incisur; anteroventral and ventral infold with numerous double bristles; inner margin of posterior infold with raised list with about 30 short bristles and crenulate posterior edge similar to that of *D. levinsoni*.

Selvage: Similar to that of *D. levinsoni*.

Size (Figure 42): USNM 128143, length 3.49 mm, height 2.56 mm.

First antenna: Joints 1 to 3 similar to those on *D. levinsoni*, except ventral bristle of 3rd joint terminal; 4th joint with 2 terminal bristles (1 dorsal reaching almost to end of 5th joint, 1 ventral reaching middle of ventral margin of 5th joint); sensory bristle of 5th joint and bristles of 6th to 8th joints similar to those of *D. levinsoni*.

Second antenna (Figure 54d-f): Protodopite and endopodite similar to those of *D. levinsoni* except for 2 long bristles of 1st endopodite joint being shorter. Exopodite: basale spines of joints 3 to 8 with shoulders near middle bearing several minute spines; lateral spine of 9th joint about one and one-half times length of 9th joint; bristle of 2nd joint with about 11 spines on ventral margin consisting of 4 or 5 minute proximal spines and 6 or 7 stout distal spines; bristle on right limb of USNM 128143 also with spine on dorsal margin near tip (Figure 54e); natatory hairs present on bristles of joints 3

to 9; joint 9 with 7 bristles, dorsal bristle much shorter than others.

Mandible (Figure 54g-i): Coxale endite spinous with small bristle near base. Basale dorsal margin with 1 short proximal bristle, 1 longer distal bristle, and 2 terminal bristles; ventral margin with 3 or 4 a-bristles, 3 b-bristles (1 longer than others), 1 short c-bristle, 1 long d-bristle (on left limb of USNM 128143 one of b-bristles may be c-bristle). Exopodite and 1st joint of endopodite similar to those of *D. levinsoni*. Second endopodite joint: distribution of bristles on dorsal margin of 2nd endopodite joint similar to those of *D. levinsoni* except for not having bristle at middle of margin separated by space from proximal group; ventral margin with 3 groups of bristles with 1, 1, and 2 slender bristles in each group (proximal bristle not present on right limb of holotype). Armature of end joint differing from that on *D. levinsoni*: dorsal claw slender and less than one-half length of 2 long claws; 2 longer of 4 bristles reaching point on long claws about three-fourths of the claw's length measured from their bases (Figure 54g,h); all claws without teeth along ventral margin.

Maxilla (Figure 54j,k): Coxale with stout plumose dorsal bristle. Exopodite with 1 marginal and 2 terminal bristles, all with long marginal spines. Endopodite: 1st joint with 2 long α -bristles with short marginal spines, and 1 6-bristle pectinate along anterior margin; cutting tooth with undulate margin. End joint with 2 a-bristles with few marginal spines, 2 b-bristles with long slender spines proximally, 3 c-bristles with slender spines, and 3 d-bristles coarsely pectinate along anterior margin.

Fifth limb (Figure 54l,m): Epipodial appendage with 70 bristles; anterior sclerotized process on protopodite small. Exopodite: anterior surface of 1st joint with 4 distal spinous bristles; main tooth consisting of 6 pectinate teeth and proximal triangular process, spinous bristle present proximal to process; 2nd joint with spinous c- and d-bristle; inner lobe of 3rd joint with 3 bristles, outer lobe with 2 bristles; 4th joint with 4 bristles, 5th joint with 2; 4th joint not separated from 5th by suture; all bristles on joints 3 to 5 have long proximal and short distal marginal spines.

Sixth limb (Figure 54n,o): 5 bare bristles present in place of epipodial appendage. First endite with 5 spinous bristles, 3 long terminal, 2 short medial; 2nd endite with 6 spinous bristles, 3 long and 1



FIGURE 54.—*Doloria septenaria*, female, USNM 128143, complete specimen: *a*, lateral outline, length 3.49 mm. Anterior of right valve: *b*, medial view; *c*, lateral view. Second antenna: *d*, endopodite of left limb, medial view; *e*, tip of bristle on 2nd joint of exopodite of right limb, lateral view; *f*, exopodite of right limb showing 9th joint and part of 8th joint, lateral view. Mandible: *g*, tip of left limb, lateral view; *h*, tip of right limb, medial view; *i*, basale of right limb, medial view. Maxilla: *j*, end joint of left limb showing b- and c-bristles, medial view; *k*, tip of right limb, medial view. Fifth limb: *l*, tip of right limb, posterior view; *m*, protopodite process and bristle on 1st endopodite joint of left limb, anterior view. Sixth limb: *n*, right limb, medial view; *o*, epipodial bristle on left limb, lateral view. (Same magnifications in microns: *b,i*; *c,d,k-o*; *e,f*; *h,j*.)

short terminal, 2 short medial; 3rd endite with 4 spinous bristles, 3 long terminal, 1 long medial; 4th endite with 7 spinous bristles, 6 long terminal, 1 long medial; end joint with 25 bristles, posterior 2 bristles plumose and longer than others, remaining bristles with long proximal and short distal spines, without large space between bristles; medial surface of end joint hirsute, lateral surface with spines along margin.

Seventh limb (Figure 55a,b): Tip with comb of 23 to 25 teeth, proximal teeth with square ends, middle tooth longer than others, recurved; strong sclerotized tooth opposite comb with 2 to 4 teeth on each side (one limb of holotype with comb teeth in contact with dorsal teeth, but whether this represents aberration is not known); each limb with 62–64 bristles: 29–31 distal (16–17 ventral, 12–15 dorsal), 33 proximal (16–17 ventral, 16–17 dorsal), each bristle with up to 6 bells.

Furca: Each lamella with 11 claws, each claw separated from lamella by suture and decreasing in length and stoutness posteriorly along lamella; each claw with teeth forming medial and lateral row along posterior margins; claw 4 slightly more slender than claw 5.

Upper lip (Figure 55c): Lip consisting of unpaired anterior part with glandular pegs along margin and paired anterior part also with glandu-

lar pegs along margin; posterior lobe hirsute.

Eyes and rod-shaped organ (Figure 55c): Lateral eye large with about 27 ommatidia; medial eye about same size as lateral eye; rod-shaped organ cylindrical, short.

Genitalia (Figure 55d): Genitalia present with attached spermatophore; brushlike organ not observed.

Dorsum: Posterior similar to that of *D. levinsoni*.

Eggs: USNM 128143 with 11 or 12 small unextruded eggs on each side.

COMPARISONS.—The new species *D. septenaria* differs from *D. levinsoni* in having well-developed lateral eyes with about 27 ommatidia. The single specimen of *D. septenaria* bears 7 bristles on the 9th joint of the exopodite of the 2nd antenna, whereas, previously described species have only 4 (an exception to this is the male ascribed to *D. levinsoni* herein, on which the bristles on the 9th joint are mostly absent, but sockets indicate that 6 bristles may have been present). The female of *D. septenaria*, bears on the 4th and 5th joints of the 5th limb, bristles with long proximal and short distal spines; the female of *D. levinsoni* bears only short spines on these bristles.

DISTRIBUTION.—This species was collected at only one locality in the Magellanic subregion at a depth of 384–494 m (Figure 44).

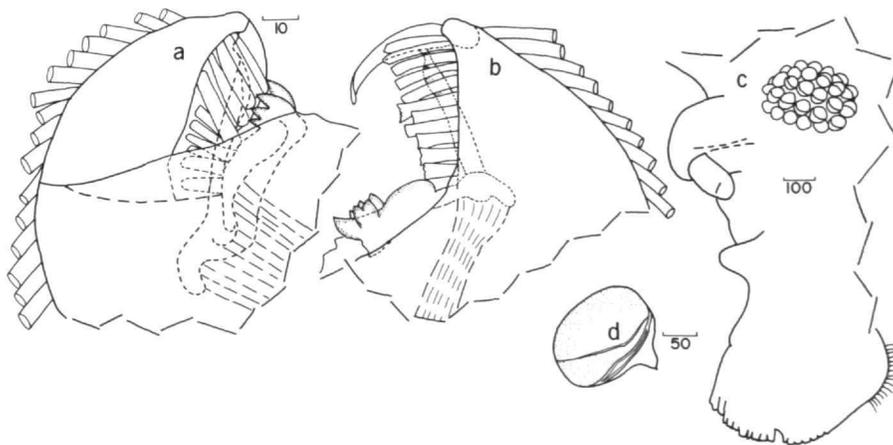


FIGURE 55.—*Doloria septenaria*, female, USNM 128143, 7th limb: a, tip with jaw closed; b, tip with jaw open. Body: c, anterior showing lateral eye, rod-shaped organ, anterior process and upper lip; d, part of right posterior showing spermatophore. (Same magnification in microns: a,b.)

10. *Doloria isaacsi*, new species

FIGURES 56, 57

Cypridina (sensu lato) sp. [part] Lofthouse; 1967:143.

HOLOTYPE.—Gravid ♀, length 4.62 mm, appendages mounted on slide by P. Lofthouse, identified by Lofthouse as *Cypridina* sp., in collection of British Museum (Natural History).

TYPE-LOCALITY.—*Discovery* Cruise 1, station 39.

ETYMOLOGY.—The species is named in honor of Mr. William Isaacs.

PARATYPES.—In collection of British Museum (Natural History): 2 gravid ♀♀ and 2 juveniles from same station as holotype; 1 gravid ♀ from *Discovery* Cruise 2, station 107; 1 adult ♂ from *Discovery* Cruise 1, station 42. In collection of South Australian Museum: 1 gravid ♀ from *Discovery* Cruise 1, station 41; 1 specimen from *Discovery* Cruise 1, station 42; 1 specimen from *Discovery* Cruise 2, station 107; 4 specimens from same sample as holotype.

REMARKS CONCERNING MATERIAL.—Through Dr. K. G. McKenzie, I received 2 slides and 1 vial containing specimens from *Discovery* Cruise 1, station 39, identified by P. Lofthouse (1967:143) as *Cypridina* (sensu lato) sp. The labels on the slides state, "90 *Cypridina* sp. B.A.N.Z.A.R.E. St. 39, 17-1-30. TML 300 m, from 1966.7. 20.44." The vial contains more-or-less similar labels. One of the slides bears the appendages of an adult ♀, the other slide the appendages of a juvenile ♀. The vial bears a pair of disarticulated valves and ostracode eggs presumably belonging to the adult ♀ whose appendages are mounted on one of the slides, 2 gravid ♀♀ (one of these is designated specimen K herein) and parts of 2 juveniles. I also received 1 vial containing an adult ♂ from *Discovery* Cruise 1, station 42, identified as *Cypridina* sp. by Lofthouse, and 1 vial containing a gravid ♀ from *Discovery* Cruise 2, station 107, identified also as *Cypridina* sp. by Lofthouse.

Through Mr. David C. Lee, I received from The South Australian Museum the following specimens, which had been identified by Lofthouse (1967:143) as *Cypridina* (sensu lato) sp.:

1. A vial with the label, "TML 41, 24-130, 195 m" and 1 specimen of *D. isaacsi*. This sample is from *Discovery* Cruise 1, station 41.

2. A vial with the label, "TML 42, 26-1-30, 220

m" and 1 specimen of *D. isaacsi*. This sample is from *Discovery* Cruise 1, station 42.

3. A vial with the label, "DTL 107, 16-2-31, 219 m" and 1 specimen of *D. isaacsi*. This sample is from *Discovery* Cruise 2, station 107.

4. A vial with the label, "TML 39, 17-1-30, 300 m" and 4 specimens of *D. isaacsi*. This sample is from *Discovery* Cruise 1, station 39.

DIAGNOSIS.—Carapace length of adult female, 4.62-4.66 mm; of adult male, about 4.1 mm.

Second antenna: 9th joint of exopodite with 4 bristles.

Mandible: Dorsal margin of basale with 1 or 2 proximal bristles.

Lateral eye: With 24-27 ommatidia.

DESCRIPTION OF ADULT FEMALE (Figure 56).—Shape of carapace similar to that of *D. levinsoni* and *D. septenaria* (Figure 56a).

Infold (Figure 56b,c): Infold behind rostrum with about 21 bristles; several bristles present around inner margin of incisur; about 65 double bristles present on list of anteroventral and ventral infold; about 33 short bristles present along list of posterior infold; posterior list with crenulate posterior margin; about 4 bristles present between posteroventral list and posteroventral margin of valve.

Selvage: Similar to that of *D. levinsoni*.

Size (Figure 42): Specimen K, length 4.63 mm, height 3.60 mm; holotype (carapace with body removed) length 4.62 mm, height 3.47 mm; gravid ♀ (sta. 39) length 4.65 mm, height 3.51 mm; gravid ♀ (sta. 41) length 4.66 mm, height 3.65 mm.

First antenna: Joints 1 to 3 similar to those on limb of *Doloria septenaria*; 4th joint with 1 dorsal and 1 or 2 ventral bristles (dorsal bristle about two-thirds length of 5th joint; longer of ventral bristles reaching end of 5th joint); sensory bristle of 5th joint with 8 long proximal filaments, 4 shorter distal filaments, and bifurcate tip (all filaments bare); bristle of 6th joint short, with short marginal spines. Seventh joint: a-bristle longer than bristle of 6th joint and with short marginal spines; b-bristle with 5 marginal filaments (proximal 4 of these pectinate); c-bristle with 9 marginal filaments (some pectinate) and bifurcate tip. Eighth joint: d- and e-bristles bare, slightly shorter than b-bristle; f- and g-bristles similar to c-bristle.

Second antenna (Figure 56h): Protopodite and endopodite similar to those on *Doloria levinsoni*, but with shorter distal bristle on 3rd endopodite



FIGURE 56.—*Doloria isaaci*, female, paratype, specimen k, complete specimen: a, lateral outline, length 4.63 mm. Left valve: b, medial view of valve; c, detail of posteroventral infold, medial view. Appendages: d, claws 3-5 of left furcal lamella, lateral view (marginal teeth not shown); e, medial eye and rod-shaped organ; f, left lateral eye, anterior to left; g, posterior of body showing ridges. Female, holotype; h, endopodite of left second antenna, lateral view; i, basale of left mandible, lateral view; j, basale of right mandible, medial view; k, left 6th limb (not all bristles shown); l, tip of 7th limb, m, detail of jaw teeth on opposing 7th limb; n, claws 3-5 of right furcal lamella (marginal teeth not shown). (Same magnification in microns: b,e,g,i,j; c,d,f,h,k,n; l,m.)



FIGURE 57.—*Doloria isaaci*, male, paratype from *Discovery* Cruise 1, station 42: *a*, outline of complete specimen, lateral view, length 4.10 mm; *b*, endopodite or right 2nd antenna, medial view; *c*, detail of tip of right endopodite shown in "*b*"; *d*, detail of tip of endopodite of left 2nd antenna, lateral view; *e*, jaw of 7th limb; *f*, left lateral eye, anterior to right; *g*, medial eye and rod-shaped organ; *h*, tip of left copulatory appendage, posterior view; *i*, tip of right copulatory appendage, anterior view; *j*, posterior of body showing ridges and furca without claws; *k*, upper lip, anterior to right. Juvenile, paratype, *Discovery* Cruise 1, station 39: *l*, lateral outline, length 2.34 mm; *m*, claws 3-5 of left lamella of furca, lateral view; *n*, upper lip, anterior to right. (Same magnification in microns: *c,d*; *b,g,h*; *f,i,k*.)

joint. Exopodite similar to that of *D. levinsoni* (4 bristles on 9th joint).

Mandible (Figure 56i,j): Coxale endite similar to that of *D. levinsoni*. Basale: dorsal margin with 1 or 2 short proximal bristles, 1 long distal bristle, and 2 long terminal bristles; ventral margin with 4 a-bristles, 3 b-bristles (1 longer than others), 1 short c-bristle, and 1 long d-bristle. Exopodite, 1st endopodite joint, ventral margin of 2nd endopodite joint, and end joint similar to those of *D. levinsoni*. Dorsal margin of 2nd endopodite joint with about 8 long and 27 short bristles.

Maxilla: Similar to that of *D. levinsoni* (3 bristles on 2nd endopodite joint).

Fifth limb: Similar to that of *D. levinsoni* (anterior process of protopodite elongate; suture between 4th and 5th joints of exopodite).

Sixth limb (Figure 56k): Similar to that of *D. levinsoni*, but specimen examined with 8 bristles on 4th endopodite, 7 terminal, 1 proximal.

Seventh limb (Figure 56l,m): Tip of comb with 25 or 26 teeth, proximal teeth shorter than distal teeth and with square tips, middle tooth longer than others and recurved; stout crescent-shaped tooth present opposite comb; serrated ridge with 2 to 5 teeth present on each side of crescent-shaped tooth. Each limb with about 80 bristles, about half on each side; each bristle with up to 7 bells.

Furca (Figure 56d,n): Each lamella with 11 claws, each separated from lamella by suture; each claw with lateral and medial teeth forming row along posterior margin; claw 4 slightly shorter and more slender than claw 5, remaining claws decreasing in length posteriorly along lamella.

Upper lip: Lip similar to that of *D. septenaria*.

Eyes and rod-shaped organ (Figure 56e,f): Lateral eye large with 24–27 ommatidia. Medial eye about same size as lateral eye; rod-shaped organ short, cylindrical.

Genitalia and brushlike organ: Gravid female with spermatophore attached to genital opening. Brushlike organ not observed.

Dorsum (Figure 88g): Posterior end with crenulate appearance.

Eggs: Specimen K with 26 eggs.

DESCRIPTION OF ADULT MALE (Figure 57).—Carapace smaller than that of female, otherwise similar (Figure 57a). Size (Figure 42): length 4.10 mm, height 3.08 mm.

First antenna: First joint bare, 2nd joint with

spines forming clusters along ventral and dorsal margins; 3rd joint with proximal dorsal bristles and terminal ventral bristle; 4th joint with 2 short terminal bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with 9 long bare proximal filaments and 4 shorter distal filaments (proximal of the distal filaments with marginal spines); bristle of 6th joint short with short marginal spines; bristles of 7th and 8th joints similar to those of male on *D. levinsoni*.

Second antenna (Figure 57b-d): Protopodite with medial bristle. Endopodite 3-jointed: 1st joint with 5 bristles, 4 proximal (1 longer than others), 1 distal (long, spinous); 2nd joint with 3 short distal bristles on ventral margin; 3rd joint long recurved with long proximal filament and 2 minute terminal bristles; basal part of 3rd joint enlarged. Exopodite: bristle on 2nd joint with 10 stout ventral spines and slender dorsal spines; bristles on remaining joints with natatory setae; joints 3 to 8 with long basal spine; 9th joint with long lateral spine and 4 bristles.

Mandible: Similar to that of female.

Fifth limb: Exopodite: 4th joint with 6 bristles with short marginal spines; 5th joint separated from 4th by suture and with 2 bristles, inner bristle with short marginal spines, outer bristle with long proximal and short distal spines. Anterior process of protopodite elongate, similar to that on *D. levinsoni*.

Seventh limb (Figure 57e): Each limb short and coiled clockwise; comb of limb examined aberrant; tooth opposite comb beaklike with 3 small teeth forming row on each side; 75 bristles present (39+36).

Furca: Most claws missing, but sockets indicate 11 claws present on each lamella.

Lateral eye (Figure 57f): Eyes large, each with about 27 divided ommatidia.

Medial eye and rod-shaped organ (Figure 57g): Medial eye about same size as lateral eye; rod-shaped organ cylindrical with produced tip.

Copulatory organ (Figure 57h,i): Similar to that of *D. levinsoni*.

Posterior and upper lip (Figure 57j,k): Similar to those on female.

Epizoa: Small oval protists present in depression in infold of caudal process.

DESCRIPTION OF JUVENILE.—See Figure 57l-n.

COMPARISONS.—The new species *D. isaaci* is more than 1 mm longer than previously described species

in the genus. It also differs from *D. levinsoni* in having well-developed lateral eyes, and from *D. septenaria* in having only 4 bristles on the 9th joint of the exopodite of the 2nd antenna.

DISTRIBUTION.—This species was collected off the Kemp Coast, Antarctica, at depths of 193 to 220 m (Figure 44).

11. *Doloria mawsoni*, new species

FIGURES 58, 59

Cypridina (sensu lato) sp. [part] Lofthouse, 1967:143 [specimens from *Discovery* Cruise 2, station 83].

HOLOTYPE.—Adult ♀, length 5.53 mm, some appendages mounted on slide; remaining appendages and valves in alcohol. In collection of the South Australian Museum, Adelaide, South Australia.

TYPE-LOCALITY.—*Discovery* Cruise 2, station 83.

ETYMOLOGY.—The species is named after Sir Douglas Mawson.

PARATYPES.—One juvenile ♀, length 3.94 mm, height 2.60 mm, from same sample as holotype.

REMARKS CONCERNING MATERIAL.—Through the courtesy of Mr. David C. Lee, I received from the South Australian Museum specimens identified by Lofthouse (1967:143) as *Cypridina* (sensu lato) sp. This consisted of one vial with the label, "DRL 83, 5-12-50, 69 m." and two specimens of *D. mawsoni*.

DIAGNOSIS.—Carapace length of adult female, about 5.5 mm.

Second antenna: 9th joint of exopodite with 4 bristles.

Mandible: Dorsal margin of basale without proximal bristle.

Seventh limb: Tooth opposite comb without lateral teeth.

DESCRIPTION OF ADULT FEMALE.—Carapace oval with rounded posterior and fairly deep incisur with overhanging rostrum; surface smooth (Figure 58a).

Infold (Figure 58b-d): Infold broad in ventral part of shell, narrow ventrally and slightly broader posteriorly. Infold behind rostrum with about 26 medium length bristles mostly forming vertical row; in addition, 5 bristles forming cluster near anterior corner of rostrum and 1 bristle posterior to vertical row; 2 long and several short bristles

present around inner margin of incisur; infold of anteroventral and ventral margins with about 100 bristles and pores (may have contained bristles) forming single row; inner margin of posterior infold with raised list with about 50 minute bristles and slightly crenulate posterior edge.

Selvage: Wide striate lamellar prolongation with smooth outer margin present along anterior, ventral, and posterior margins.

Size (Figure 42): Specimen number 1 from station 83, length 5.53 mm, width 3.69 mm.

First antenna: First joint bare; 2nd joint with short spines forming row on medial surface and along ventral margin; 3rd joint with 2 bristles with short marginal spines, ventral bristle subterminal, dorsal bristle proximal; 4th joint with 2 short bristles with few short marginal spines, 1 ventral, 1 dorsal; sensory bristle of 5th joint with 9 long proximal bare filaments and 4 short bare distal filaments (most distal of these very short); medial bristle of 6th joint bare or with few faint spines. Seventh joint: a-bristle longer than bristle of 6th joint and with widely spaced short marginal spines; b-bristle with 5 marginal filaments, some pectinate; c-bristle with 10 pectinate marginal filaments and bifurcate tip. Eighth joint: d- and e-bristles bare; f-bristle with 9 marginal filaments, some pectinate, and bifurcate tip; g-bristle with 10 marginal filaments, some pectinate, and bifurcate tip.

Second antenna (Figure 58e): Protopodite with fairly long medial bristle; Endopodite 3-jointed: 1st joint with 4 proximal bristles (3 short, 1 longer) and 1 fairly long distal bristle; 3rd joint with long terminal bristle (suture separating bristle from 3rd joint not distinct). Exopodite: basal spines present on joints 3 to 9, spines on distal joints longer than those on proximal joints, spine on 9th joint longer than 9th joint; bristle of 2nd joint reaching just beyond 9th joint, with double row of minute teeth along ventral margin (each row with about 40 teeth); dorsal margin of bristle of 2nd joint with numerous slender spines; natatory hairs present on bristles on joints 3 to 8; 9th joint with 4 bristles, dorsal bristle shorter than others; faint short spines forming row along distal margins of joints 2-8.

Mandible (Figure 58f,g): Coxale endite spinous with small process between 2 large terminal spines; small bristle present near base of endite. Basale: dorsal margin with 1 long bare bristle at mid-length and 2 long terminal bristles (medial of these

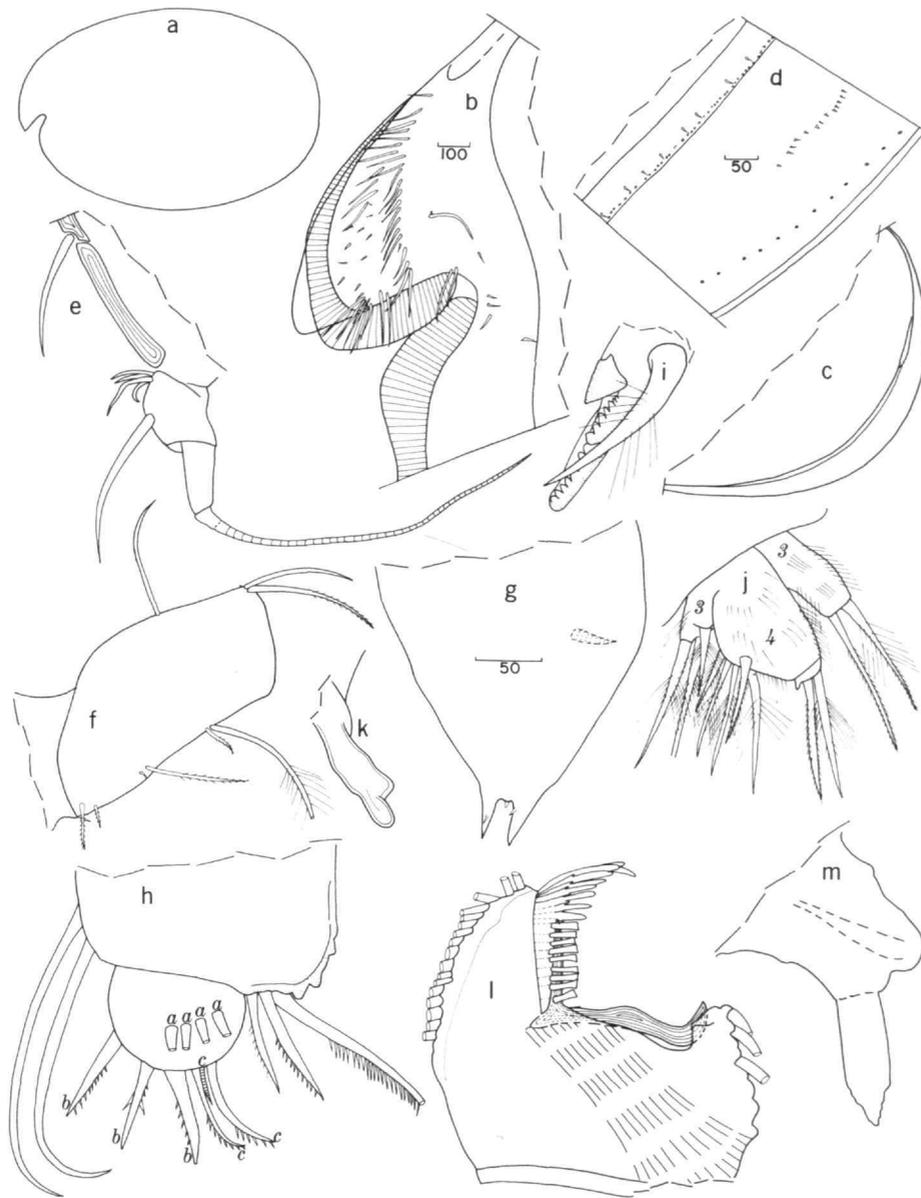


FIGURE 58.—*Doloria mawsoni*, holotype, female, complete specimen: *a*, lateral outline, length 5.53 mm. Right valve: *b*, medial view of valve; *c*, posterior end, medial view; *d*, detail of infold on posteroventral margin shown in "*c*," medial view. Right 2nd antenna: *e*, endopodite and part of protopodite, medial view. Left mandible: *f*, basale, medial view; *g*, coxale endite, medial view (spines not shown). Left maxilla: *h*, tip of endopodite (d-bristles not shown), lateral view. Fifth limb: *i*, main tooth of right limb, posterior view (distal 4 teeth not shown); *j*, joints 3-5 of exopodite of right limb, posterior view; *k*, protopodite process on left limb, anterior view. Seventh limb: *l*, tip of limb (not all bristles shown). Medial eye and rod-shaped organ: *m*, right lateral view. (Same magnification in microns: *b,f; d,e,i,j,m; g,h,k,l*.)

with short marginal spines); ventral margin with 3 short medial a-bristles, 2 c-bristles (1 short, 1 medium), and 2 d-bristles (1 very short, 1 long). Exopodite reaching beyond end of 1st endopodite joint, with pointed hirsute tip and 2 bristles (outer bare bristle about half length inner spinous bristle). Endopodite: ventral margin of 1st joint with 3 or 4 bristles, 1 or 2 long, 1 medium, 1 minute; ventral margin of 2nd joint with 3 groups of bristles with 1, 1, and 2 slender bristles in each group; dorsal margin with 7 long bristles, 4 medium bristles, and about 24 short bristles; end joint with 3 stout subequal claws and 4 bristles.

Maxilla (Figure 58*h*): 1st endite with 12 spinous bristles; 2nd endite with 7, 3rd endite with 1 short proximal bristle and 6 distal bristles; coxale with stout plumose bristle. Basale with 3 bristles along distal margin. Endopodite: 1st joint with 2 long α -bristles, bare or with marginal spines, and 3 β -bristles (inner short bristle with spines along inner margin, outer 2 bristles pectinate along inner margin); joint hirsute on inner surface; end joint with 4 a-bristles with few short proximal spines, 3 pectinate b-bristles, 3 c-bristles (2 pectinate, 1 bristle-like), 3 strongly pectinate d-bristles. Exopodite

with 1 marginal and 2 terminal bristles, all with long marginal spines, surface hirsute.

Fifth limb (Figure 58*i-k*): Epipodial appendage with 75 bristles. Protopodite with distal elongate sclerotized anterior process with undulate margin. Exopodite: anterior surface of 1st joint with 1 proximal plumose bristle and 3 distal spinous bristles; main tooth consisting of 6 teeth and proximal triangular process; 1 spinous bristle present near triangular process; 2nd joint with numerous a- and b-bristles and 1 spinous c- and d-bristle; inner lobe of 3rd joint with 3 bristles, outer lobe with 2; 4th joint with 5 bristles (1 with short marginal spines, others with long proximal spines); 5th joint separated from 4th by suture and with 2 spinous bristles; small pustule present on inner margin of 5th joint; 3rd to 5th joints hirsute; 1st and 2nd joints hirsute on anterior surfaces.

Sixth limb: 5 or 6 bristles in place of epipodial appendage; 1st endite with 4 or 5 spinous bristles, 2 or 3 short medial, 2 long terminal; 3rd endite with 6 or 7 spinous bristles; 4th endite with 8–10 spinous bristles; end joint with 25 bristles, no large space between bristles, posterior 7 bristles hirsute to tip, remaining bristles with long proximal and

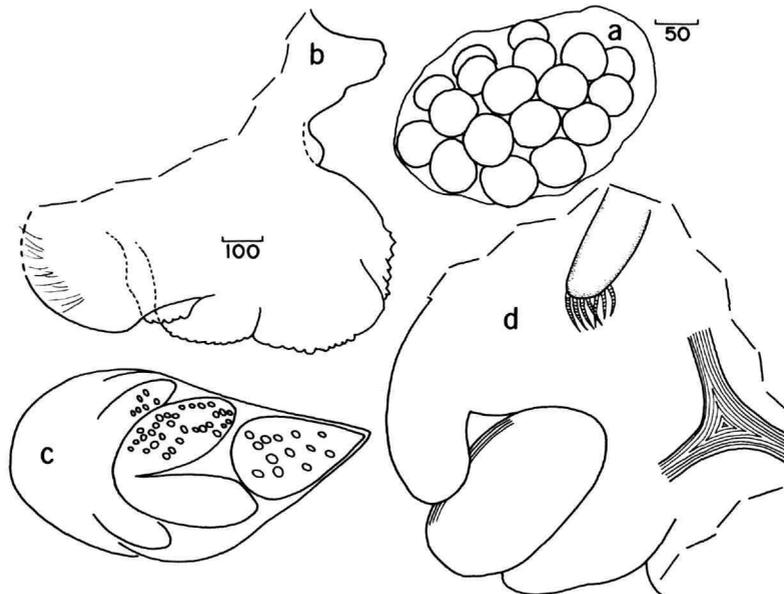


FIGURE 59.—*Doloria mawsoni*, holotype, female: *a*, right lateral eye, anterior to right; *b*, anterior process and upper lip, anterior to right; *c*, upper lip, ventral view, anterior to right (not all glandular openings shown); *d*, left brushlike organ and spermatophore (oval). (Same magnification in microns: *a,d*; *b,c*.)

shorter distal spines; medial surface hirsute; ventral margin of end joint with spines forming row.

Seventh limb (Figure 58l): Comb at tip with 35 teeth, proximal teeth shorter than distal teeth and with square tips, middle tooth longer than others, recurved; stout hook without lateral teeth present opposite comb. Each limb with about 90 bristles, about half on each side; each bristle with up to 8 bells.

Furca: Each lamella with 11 claws, each separated from lamella by suture; each claw with lateral and medial row of teeth along posterior margin; claw 4 slightly shorter and more slender than claw 5, remaining claws decreasing in length posteriorly along lamella.

Upper lip (Figure 59b,c): Lip with unpaired anterior part with glandular openings followed by 2 paired processes with glandular openings and globose hirsute posterior part.

Eyes and rod-shaped organ (Figures 58a, 59m): Lateral eyes large, pigmented with 18 ommatidia. Medial eye about same size as lateral eye; rod-shaped organ short, cylindrical with pointed tip.

Genitalia and brushlike organ (Figure 59d): Spermatophore attached to genital opening. Brushlike organ flaplike with about 7 minute ringed bristles along distal tip.

Dorsum: Posterior end undulate.

Eggs: Specimen 1 with about 14 large unextruded eggs on each side.

COMPARISONS.—This species is larger than previously described species in this genus. It differs from *D. isaaci*, *D. levinsoni*, and *D. septenaria* in not having lateral teeth on the hooklike tooth opposite the terminal comb of the 7th limb. It also differs from those species in not having a proximal bristle on the dorsal margin of the mandibular basale.

DISTRIBUTION.—Collected at only one station near Macquarie Island in the Kerguelen subregion of the Subantarctic region at a depth of 69 m (Figure 44).

Doloria Species Indeterminate

MATERIAL.—USNM 128148, 1 juvenile ♀, length 1.89 mm, height 1.22 mm; USNM 128151, 1 ♀ instar III, length 2.42 mm, height 2.01 mm; USNM 136583, 1 juvenile ♀, length 2.19 mm, height 1.66 mm; USNM 137375, 1 juvenile, length 1.67 mm,

height 1.16 mm; USNM 137453, 1 juvenile ♀, length 2.66 mm, height 1.73 mm; USNM 137479, incomplete specimen; USNM 137452, 1 juvenile ♀, length 2.03 mm, height 1.41 mm, + 13 juveniles; USNM 137454, 1 stage III ♀, length 1.57 mm, height 1.10 mm; USNM 137456, 1 juvenile; USNM 137460, 1 juvenile, length 1.57 mm, height 1.10 mm; USNM 138149, 1 N-1 ♂, length 3.00 mm, height 2.07 mm, + 1 juvenile.

USNM 128148, 128451 from *Eltanin* Cruise 9, station 740; USNM 136583 from *Eltanin* Cruise 12, station 993; USNM 137375 from *Vema* Cruise 17, station V-17-59; USNM 137453, 137479 from *Vema* Cruise 15, station V-15-132; USNM 137454 from *Vema* Cruise 15, station V-15-107; USNM 137460 from *Vema* Cruise 17, station V-17-61; USNM 137456 from *Vema* Cruise 17, station V-17-69; USNM 138149 from *Eltanin* Cruise 7, station 542.

DISTRIBUTION.—See Figure 44.

Hadacypridina Poulsen, 1962

TYPE-SPECIES.—*Hadacypridina bruuni* Poulsen, 1962:230, monotypy.

This genus contains one species, *H. bruuni*. Only one specimen was collected in the study area. The species was described by Poulsen on the basis of a single specimen, an adult female, collected just outside the study area, in the Kermadec Deep, north of New Zealand.

DIAGNOSIS OF GENUS (adult male unknown).—Carapace oval in lateral view with short incisur and upsweeping caudal process; outer surface smooth without ornamentation.

Second antenna: Endopodite 2-jointed. 1st joint of adult female with 5 bristles, 2nd joint with 2 terminal bristles, 1 long, 1 short.

Seventh limb: Single elongate peg opposite comb consisting of about 7 teeth.

Furca: Each lamella on adult female with 8 or 9 claws, all separated from lamella by suture; claws decreasing in length posteriorly along lamella.

Upper lip: Anterior part unpaired with crenulate margin; posterior part with a long tusk on each side; paired posterior lobes smooth on juvenile male or serrated on adult female.

Lateral eyes: Absent.

DISTRIBUTION.—The only species in the genus has been collected in deep water (5340–6000 m) north and east of New Zealand (Figure 60).

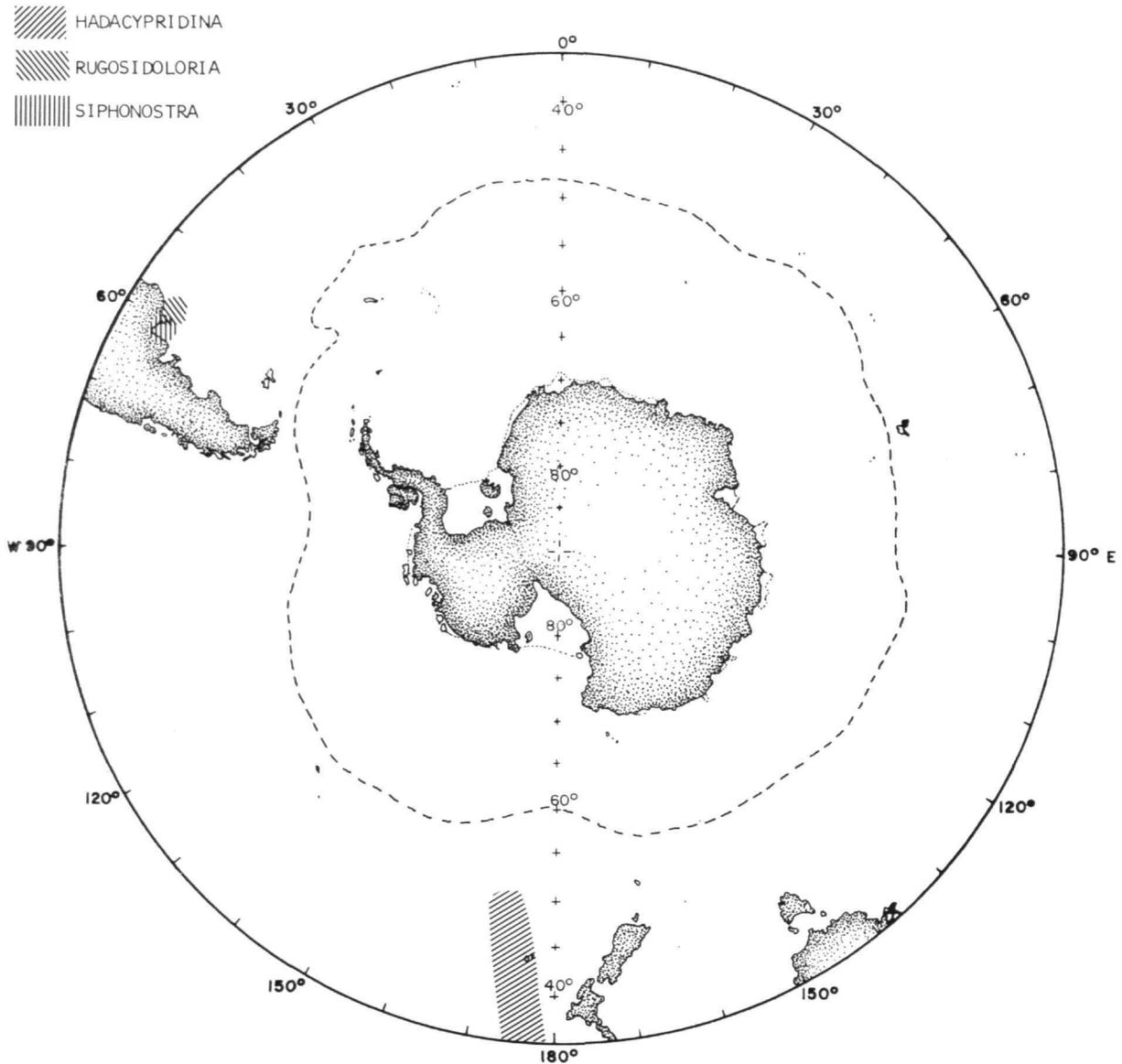


FIGURE 60.—Distribution map.

12. *Hadacypridina bruuni* Poulsen

FIGURES 61, 62

Hadacypridina bruuni Poulsen, 1962:230, figs. 109, 110.

HOLOTYPE.—Unique ♀, length 3.60 mm, Universitets Zoologiske Museum, Copenhagen.

TYPE-LOCALITY.—Kermadec Deep, 32°10'S, 175°54'W, 6000 m depth, *Galathea* station 654, 18 February 1952.

MATERIAL.—One juvenile ♂ from *Eltanin* Cruise 25, station 366, depth 5340 m.

REMARKS.—The original description was based on an adult female. A juvenile male is described

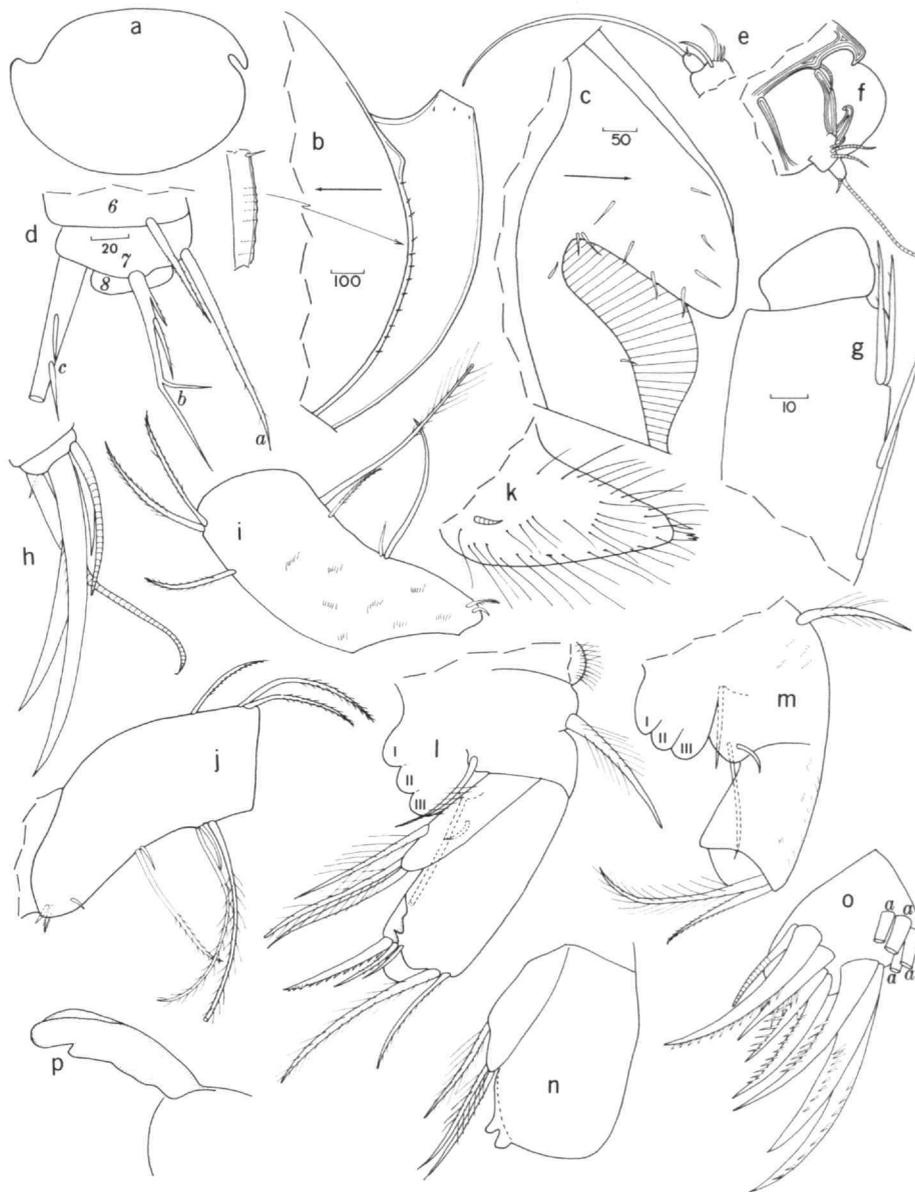


FIGURE 61.—*Hadacypridina bruuni*, juvenile male, USNM 128610: *a*, outline of complete specimen, lateral view, length 2.54 mm; *b*, posterior right valve, medial view; *c*, anterior left valve, medial view; *d*, tip of left 1st antenna, medial view (bristles of 5th and 8th joints not shown). Second antenna: *e*, endopodite of right limb, medial view; *f*, endopodite and part of protopodite of left limb, medial view. Mandible: *g*, dorsal bristles of 2nd endopodite joint of left limb, medial view; *h*, end joint of right limb, lateral view; *i*, basale of left limb, medial view; *j*, basale of right limb, lateral view; *k*, coxale endite of right limb, medial view. Maxilla: *l*, right limb, lateral view (not all bristles shown); *m*, left limb, medial view (not all bristles shown); *n*, exopodite and 1st endopodite joint of left limb, lateral view (not all bristles shown on endopodite); *o*, end joint of left limb, medial view (not all bristles shown). Fifth limb: *p*, anterior process on protopodite. (Same magnification in microns: *c,e,f,i,j,l-n*; *d,p*; *h,k,o*.)

herein. The upper lip of the juvenile male differs from that of the adult female—the posterior margins of the posterior lobes of the upper lip are smooth on the former and toothed on the latter. This difference could indicate that the present species is new; however, because both specimens were collected in the same general region, and only a single juvenile male is in the present collection, I have assumed that the smooth margins on the posterior lobes of the present specimen is either a juvenile character or due to intraspecific variability.

DIAGNOSIS.—Same as for genus.

DESCRIPTION OF JUVENILE MALE.—Carapace broadly rounded anteriorly with fairly deep incisur (Figure 61a); posteriorly with upsweeping caudal siphon; lateral surface smooth.

Infold (Figure 61b,c): Infold broad in area of rostrum and caudal process, narrower elsewhere; infold behind rostrum with about 7 bristles; infold

behind incisur with 1 pair of bristles and ventrally 1 short bristle; infold of anteroventral margin with 7 short bristles; ventral infold with about 15 bristles, some quite long; list of caudal process with about 9 short bristles; posterior margin of list smooth except for minute protuberances containing single pore; 2 or 3 minute bristles present on infold of caudal process near tip.

Selvage: Wide lamellar prolongation with smooth outer margin present along lower margin of incisur, narrow elsewhere; prolongation striate where broad.

Size: USNM 127610, length 2.54 mm, height 1.66 mm.

First antenna (Figure 61d): First joint bare; medial surface of 2nd joint with numerous short spines forming clusters; 3rd and 4th joints each with short ventral and dorsal bristle with short marginal spines; sensory bristle of 5th joint with 8 long proximal filaments and 2 short distal fila-

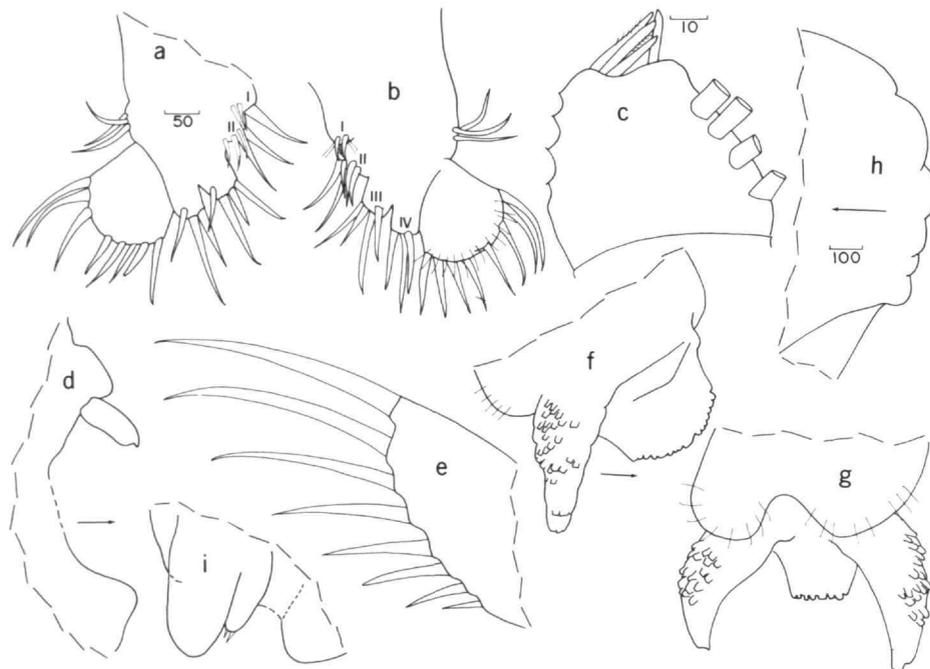


FIGURE 62.—*Hadacypridina bruuni*, juvenile male, USNM 128610: *a*, left 6th limb, medial view (spines on bristles not shown); *b*, right 6th limb, medial view (spines on bristles not shown); *c*, tip of 7th limb (all bristles not shown); *d*, anterior of body showing medial eye, rod-shaped organ, and anterior process; *e*, left furcal lamella, lateral view; *f*, upper lip, lateral view; *g*, upper lip, posterior view; *h*, posterior of body; *i*, left copulatory limb, anterior to left (posterior lobe with 2 terminal bristles). (Same magnification in microns: *a, b, d, g, i*.)

ments, tip bifurcate; bristle of 6th joint medial, with short widely spaced marginal spines. Seventh joint: a-bristle with short widely spaced marginal spines, bristle about twice length of bristle of 6th joint; b-bristle about same size as a-bristle, with 4 short filaments including tip; c-bristle long, with 7 marginal filaments (some pectinate) and bifurcate tip. Eighth joint: b- and d-bristles bare, almost half length of c-bristle, d- and e-bristles slightly shorter than c-bristle, with 7 marginal filaments (some pectinate) and bifurcate tip.

Second antenna (Figure 61e,f): Protopodite with short bare medial bristle. Endopodite 2-jointed: 1st joint with 3 or 4 bristles, proximal 1 or 2 of these shorter than others; 2nd joint with 1 long terminal filament with short bristle near base. Exopodite: bristle of 2nd joint with 15 distinct spines along ventral margin and 1 or 2 proximally on dorsal margin, tip not bifurcate, reaching 9th joint; bristles on joints 3 to 8 with natatory hairs and without spines; joint 9 with 3 long bristles with natatory hairs and 1 short bare bristle; joints 4 to 8 with small basal spines; lateral spine of 9th joint about twice length of basal spine of 8th joint; joints 2 to 8 with faint spines forming row along distal margins.

Mandible (Figure 61g-k): Coxale endite spinous with 2 stout distal spines and minute bristle near base. Basale: dorsal margin with 1 distal bristle and 2 terminal bristles, all with short marginal spines; ventral margin of left limb with 2 a-bristles, without b-bristles, 2 c- and d-bristles; ventral margin of right limb with 2 a-bristles, 1 b-bristle, 2 c-bristles (distal of these very short), and 3 d-bristles; exopodite about same length as dorsal margin of 1st endopodite joint and with 2 spinous bristles. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long spinous, 1 short with spines, 1 minute bare; dorsal margin of 2nd endopodite joint with 5 long bristles and 8 short bristles; ventral margin with 3 groups of bristles having 1, 1, and 2 bristles; medial bristle of terminal pair not markedly different from lateral bristle; end joint with 3 claws and 4 bristles, longest claw with spines along middle of ventral margin.

Maxilla (Figure 61l-o): 1st endite with about 8 bristles, 2nd endite with about 5, 3rd endite with 5 terminal bristles; epipodial appendage with hair forming fringe; coxale with stout plumose bristle; exopodite with proximal bristle, 1 outer hairsute

terminal bristle and 1 inner bare terminal bristle. Endopodite: cutting edge of 1st joint with 2 large teeth; 2 α -bristles present, shorter of these with short marginal spine, longer bristle with long marginal hairs; 3 β -bristles present, inner short bristle bare, middle bristle with short marginal spines, outer long bristle pectinate; 2nd joint with 4 bare a-bristles; b-, c-, and d-bristles mostly stout pectinate.

Fifth limb (Figure 61p): Epipodial appendage with 52 hairsute bristles; distoanterior process of protopodite elongate with undulate margin; main tooth of 1st endopodite joint with 5 pectinate teeth, proximal peg and spinous bristle; 2nd endopodite joint with numerous bristles (anterior side of both limbs obscure); inner lobe of 3rd joint with 3 bristles, shorter proximal bristle spinous, terminal 2 bare or with few short spines; outer lobe with 2 hairsute bristles; 4th and 5th joints united with few spines forming cluster between 2 groups of bristles; 4th joint with 3 bristles; 5th with 2; posterior surfaces of endopodite joints 2 to 5 hairsute.

Sixth limb (Figure 62a,b): 3 bare bristles in place of epipodial appendage; 1st endite with 3 bristles, 2 medial, 1 terminal (this bristle missing on right limb); 2nd endite with 5 bristles, 3 medial, 2 terminal; 3rd endite with 4 bristles, 1 medial, 3 terminal; 4th endite with 3 bristles, 1 medial, 2 terminal (medial bristles on 3rd and 4th endites are almost terminal); end joint with 8 bristles, 2 posterior bristles hairsute, others with long proximal and short distal spines; small space present between posterior 3 bristles and remaining bristles of end joint; end joint hairsute.

Seventh limb (Figure 62c): Distal group with 15 bristles, 7 ventral, 8 dorsal, each with 1 to 3 bells; proximal group with 8 bristles, 3 ventral, 5 dorsal, each with 1 bell; bristles strongly tapering distally (juvenile character); terminal comb with 5 elongate teeth; peg similar to comb teeth present opposite comb.

Furca (Figure 62e): Each lamella with 7 claws separated from lamella by suture; claws decrease in length posteriorly along lamella, each claw with lateral and medial row of teeth along posterior margin.

Upper lip (Figure 62f,g): Anterior part unpaired with crenulate margin; 1 pair of posterior tusks present, each tusk with numerous glandular open-

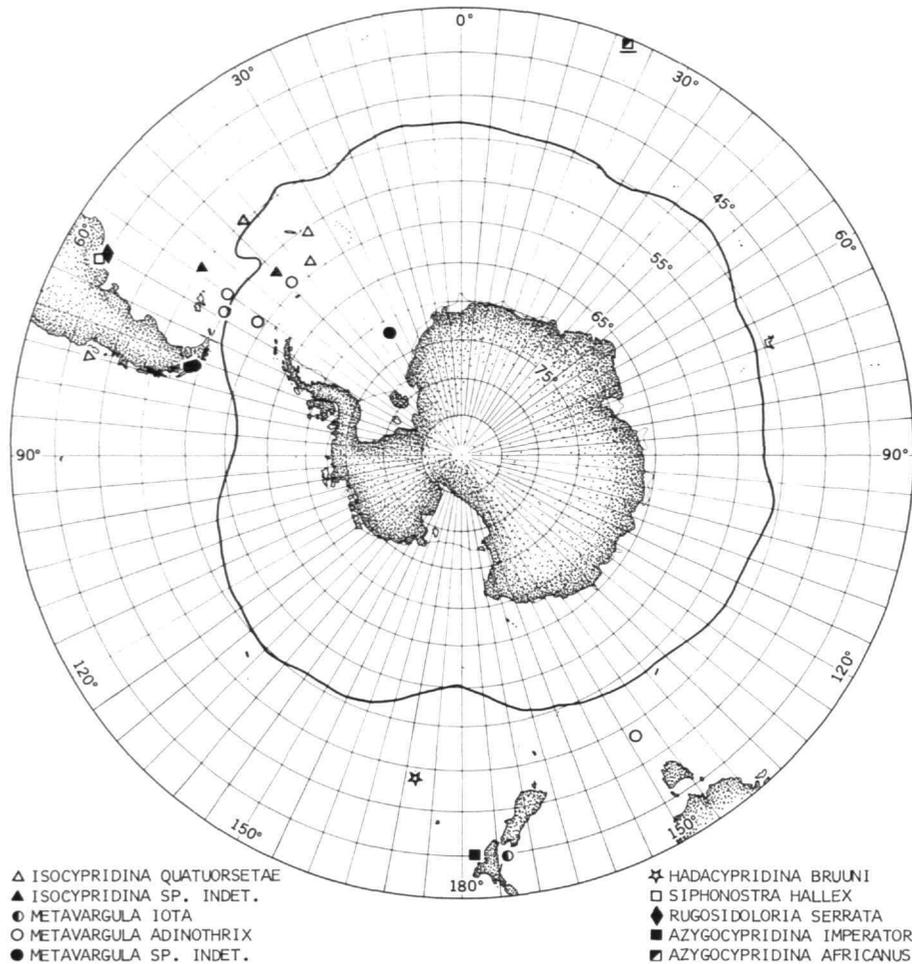


FIGURE 63.—Distribution map.

ings on lateral surface; paired lobes posterior to tusks rounded hirsute.

Lateral eyes: Absent.

Medial eye and rod-shaped organ (Figure 62d): Medial eye small unpigmented. Rod-shaped organ short with spinelike process at tip.

Posterior (Figure 62h): Posterior undulate in lateral view.

Copulatory appendage (Figure 62i): Appendage consisting of 2 lobes, smaller of these with 2 minute bristles.

REMARKS.—From the appendages and development of the copulatory organ, it is possible to estimate that the holotype is older than a stage III instar and not yet an adult.

DISTRIBUTION.—Collected at abyssal depths north and east of New Zealand (Figure 63).

Metavargula Kornicker, 1970

TYPE-SPECIES.—*Metavargula ampla* Kornicker, 1970a.

Two species in this genus were collected in the study area, *M. adinothrix*, new species, and *M. iota*, new species.

DIAGNOSIS OF GENUS (adult male unknown).—Carapace with well-developed rostrum, incisor, and caudal process; surface smooth, but with minute punctae visible under high magnification.

Second antenna: Endopodite weakly 2- or 3-

jointed (terminal joint small with weak suture at base); bristle on 2nd joint of exopodite with numerous marginal spines in addition to large sub-terminal spine; long bristles on 3rd to 9th joints of exopodite with or without marginal spines.

Mandible: Medial bristle of terminal ventral pair on 2nd endopodite joint broad and with teeth along inner margin.

Sixth limb: 2–10 bristles in place of epipodial appendage; 3rd and 4th endites generally without medial bristles; end joint broad posteriorly.

Seventh limb: Each limb with 13–27 cleaning bristles; terminus with comb with 7–11 elongate teeth; 1 incurved peg opposite comb.

Furca: Each lamella with 8 or 9 claws decreas-

ing in size posteriorly and separated from lamella by suture.

Upper lip: Anterior part large, undivided; posterior part divided and with 1 pair of tusks.

Lateral eyes: Small.

DISTRIBUTION.—Members of the genus have been reported previously from the Gulf of Mexico and the Pacific Ocean off Peru. The present collection is from off New Zealand, south of Australia, near the tip of South America, and in the American Quadrant of the Antarctic (Figure 35). Its southernmost record is in the Weddell Sea, 72°47'30"S, 30°28'18"W. Depth range of the genus is 117 to 3658 m, but 8 of the 10 localities at which the genus has been collected are deeper than 1000 m.

Key to Species

1. Furcal lamella with 8 claws.....2
Furcal lamella with 9 claws.....3
2. Carapace longer than 4.5 mm, 10 bristles in place of epipodial appendage on 6th limb.....
.....13. *M. adinothrix*
Carapace shorter than 3.5 mm, 2 bristles in place of epipodial appendage on 6th limb.....
.....14. *M. iota*
3. Carapace longer than 4.30 mm, 7th limb with 17–24 bristles *M. ampla* (Kornicker, 1970)
Carapace shorter than 4.0 mm, 7th limb with 13 bristles..... *M. optilus* (Kornicker, 1968)

13. *Metavargula adinothrix*, new species

FIGURES 64–66, 68, 69

HOLOTYPE.—USNM 125825, ♀, length 5.22 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 7, station 480, Atlantic Quadrant, Antarctica.

ETYMOLOGY.—The specific name “adinothrix,” from the Greek “adinos” [= thick, dense, crowded] and “thrix” [= hair], refers to the abundance of bristles on the 7th limb and in place of the epipodial appendage of the 6th limb.

PARATYPES.—USNM 125829, adult, ♀; USNM 125831, stage III instar, length 2.95 mm, height 1.69 mm; USNM 125974, 15 specimens, mostly juveniles; USNM 126120, 1 juvenile, length 4.31 mm, height 2.26 mm; USNM 126121, 1 juvenile, length 4.49 mm, height 2.57 mm. USNM 125829, 125831, 125974, 126120 from *Eltanin* Cruise 6, station 350; USNM 126121 from *Eltanin* Cruise 27, station 1980.

ADDITIONAL SPECIMENS.—USNM 138141, 1 juve-

nile (not dissected), length 3.72 mm, height 1.99 mm, + 1 juvenile with only small part of shell, both from *Eltanin* Cruise 6, station 394; USNM 137469, ovigerous female dissected by N. Hulings, his number 233, appendages missing, valves and upper lip present, right valve length 6.31 mm, height 3.96 mm, from *Vema* Cruise 17, station V-17-63.

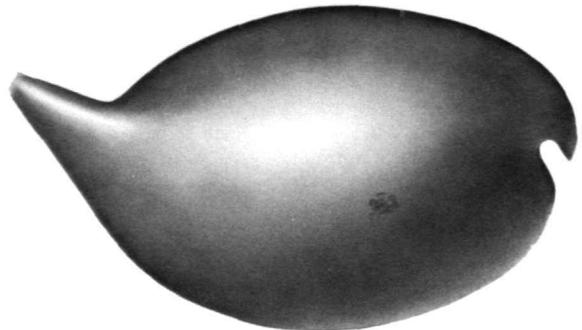


FIGURE 64.—*Metavargula adinothrix*, USNM 125825, length 5.22 mm.

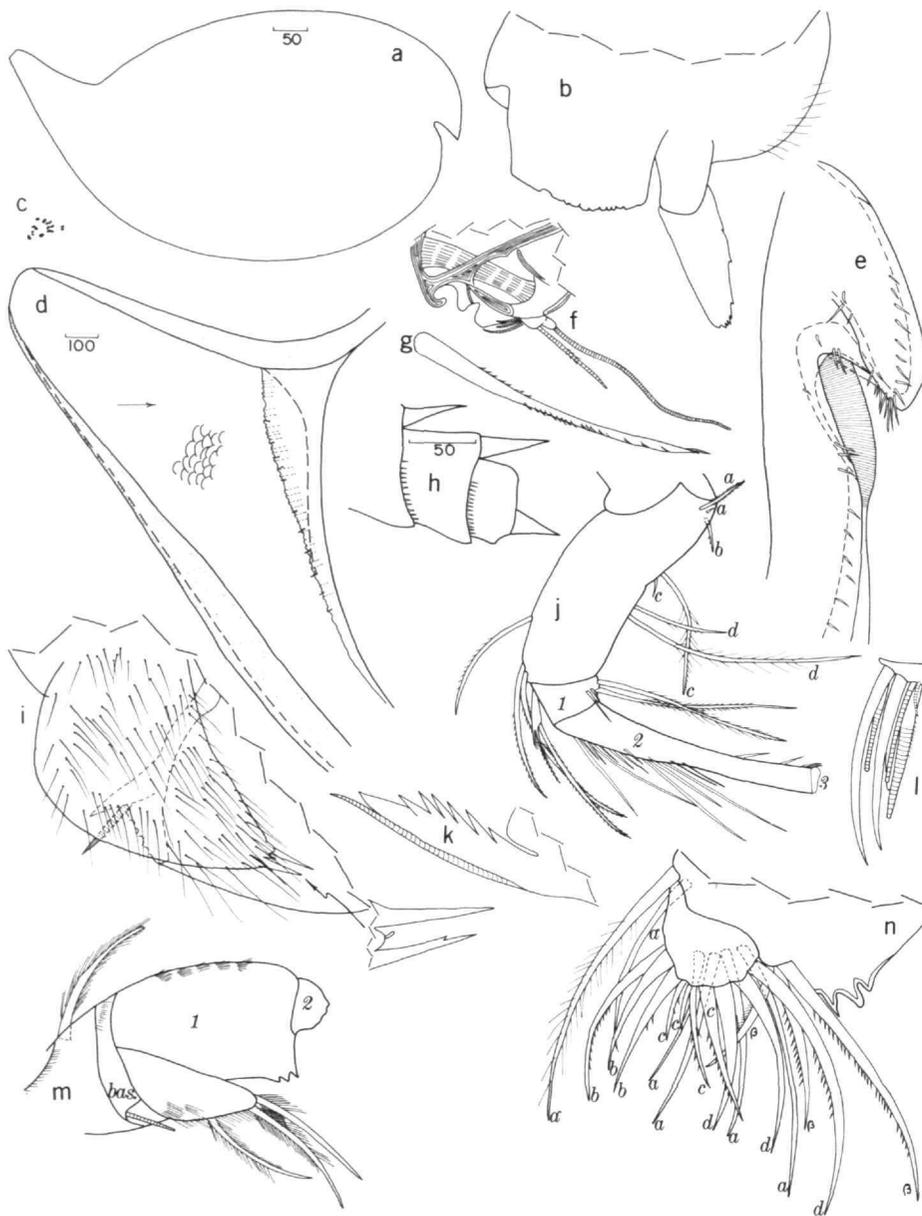


FIGURE 65.—*Metavargula adinothrix*, juvenile, USNM 126121: *a*, outline of complete specimen, lateral view, length 4.49 mm; *b*, upper lip, anterior to left. Female, USNM 125829: *c*, sketch of central muscle scars on left valve, lateral view. Female, USNM 125825: *d*, caudal process, medial view; *e*, anterior, medial view. Right 2nd antenna: *f*, endopodite and part of protopodite, medial view; *g*, bristle on 2nd exopodite joint, medial view; *h*, joints 7-9 on exopodite, lateral view. Right mandible: *i*, coxale endite, medial view; *j*, complete limb excluding coxale, medial view; *k*, terminal ventral bristles on 2nd endopodite joint, medial view; *l*, end joint, medial view. Right maxilla: *m*, distal part of limb, lateral view (all bristles not shown); *n*, tip of endopodite, medial view. (Same magnification in microns: *a,g,l,n*; *d-f,j,m*.)

DIAGNOSIS.—Carapace length of adult female, 5.22–6.31 mm.

Sixth limb: 10 small bristles in place of epipodial appendage.

Seventh limb: Each limb with about 54 bristles.

Furca: Each lamella with 8 claws.

DESCRIPTION OF FEMALE.—Carapace with broadly rounded anterior and fairly deep incisur (Figures 64, 65e, 68a); posterior with elongate upsweeping caudal siphon (Figures 65d, 68b).

Ornamentation: Surface smooth but scalelike under high magnification.

Infold (Figures 65d,e; 68): Infold broad in area of rostrum and caudal process, narrower elsewhere; infold behind rostrum with about 24 bristles; infold behind incisur with 1 small bristle; infold of anteroventral and ventral margin with 16 short bristles followed by 7 to 10 minute bristles or pores and then about 20 short bristles; list on infold in front of caudal process with about 34 small proc-



FIGURE 66.—*Metavargula adinothrix*, female, USNM 125825, distal end of right 5th limb: *a*, anterior view (all bristles not shown); *b*, posterior view (all bristles not shown). Sixth limb: *c*, left limb, medial view (marginal spines on bristles not shown); *d*, right limb, medial view. Right seventh limb: *e*, tip of limb. Body: *f*, anterior of body showing joints 1 and 2 of right 1st antenna, right lateral eye, medial eye and rod-shaped organ; *g*, anterior of body showing medial eye and rod-shaped organ, anterior process and upper lip; *h*, right brushlike organ and spermatophore, anterior to right; *i*, spermatophores and pustulose genitalia, anterior view. Carapace: *j*, detail of vestment in area of caudal process, medial view. (Same magnification in microns: *a,b,h,i,j*; *c,d,f,g*.)

esses and about 10 minute bristles; vestment in area of caudal process with reticulate structure (Figure 66j).

Selvage: Wide lamellar prolongation with smooth outer margin present along anterior and ventral margins, being quite broad in area of incisur; prolongation striate along lower margin of incisur and anteroventral valve margin.

Central muscle scars: Scars indistinct but consisting of 16 to 19 individual scars (Figure 65c); in 1 juvenile specimen in process of molting individual scars are arranged in a series of inverted chevrons.

Size (Figure 67): USNM 125825, length 5.22 mm, height 3.08 mm; USNM 125829, length 5.91 mm, height 3.37 mm; USNM 137469, right valve, length 6.31 mm, height 3.96 mm.

First antenna: 3rd and 4th joints each with ventral and dorsal bristle; sensory bristle of 5th joint

with 9 long proximal filaments and 2 shorter distal filaments, tip bifurcate; bristle of 6th joint bare, about one and one-half times length of joint. Seventh joint: a-bristle bare, slightly longer than bristle of 6th joint; b-bristle with 4 short filaments; c-bristle with 9 filaments. Eighth joint: d- and e-bristles about half length of c-bristle and about one and three-quarters length of b-bristle; f- and g-bristles broken but with at least 9 filaments; proximal filaments of g-bristle with few marginal teeth.

Second antenna (Figure 65f-h): Protopodite with short bare medial bristle. Endopodite weakly 2-jointed: 1st joint with 3 bare proximal bristles, 1 long and 2 short, and 1 long distal bristle with few spines; 2nd joint short with long terminal filament. Exopodite: bristle of 2nd joint with about 17 minute spines along ventral margin and about 7 proximal spines along dorsal margin, bifurcate

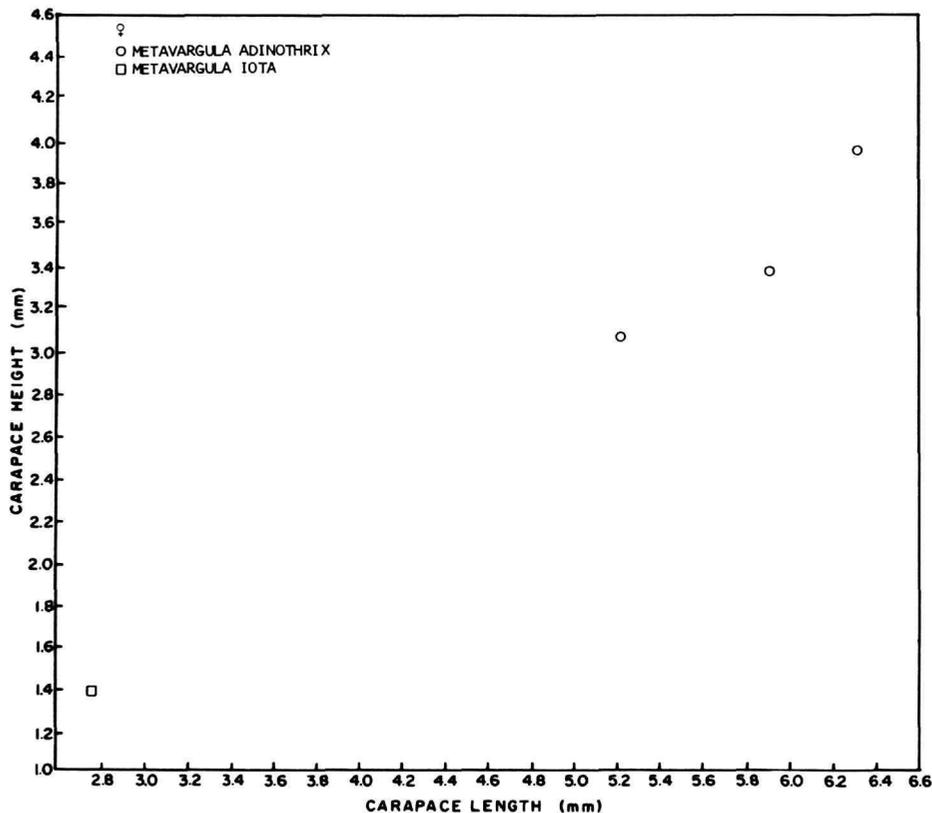


FIGURE 67.—Comparison of relationship between carapace length and height of *Metavargula adinothrix* and *M. iota*.

tip reaching 9th joint; bristles on joints 3 to 9 with natatory hairs and without spines; 9th joint with 4 bristles, 3 long, 1 short; joints 3 to 8 with short spines forming row along distal margins; joints 3 to 9 with basal spines; basal spines smaller on proximal joints, but lateral spine on 9th joint smaller than basal spine of 8th joint.

Mandible (Figure 65i-l): Coxale endite spinous with 2 terminal spines stouter than others and with short peg between them; short process and bristle present at base of endite. Basale: dorsal margin with 1 distal bristle with few marginal spines and

2 terminal bristles, both with short marginal spines; ventral margin with 2 a-bristles with bases on medial side, 1 very short, 1 b-bristle with base on lateral surface, 2 c-bristles (1 long spinous proximal, other short bare) and 2 d-bristles. Exopodite slightly longer than dorsal margin of 1st exopodite joint and with 2 spinous bristles, tip of exopodite hirsute. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long spinous, 2 short bare; ventral margin of 2nd joint spinous, with 3 groups of bristles having 1, 1, and 2 bristles, all short; medial bristle of terminal pair broad and

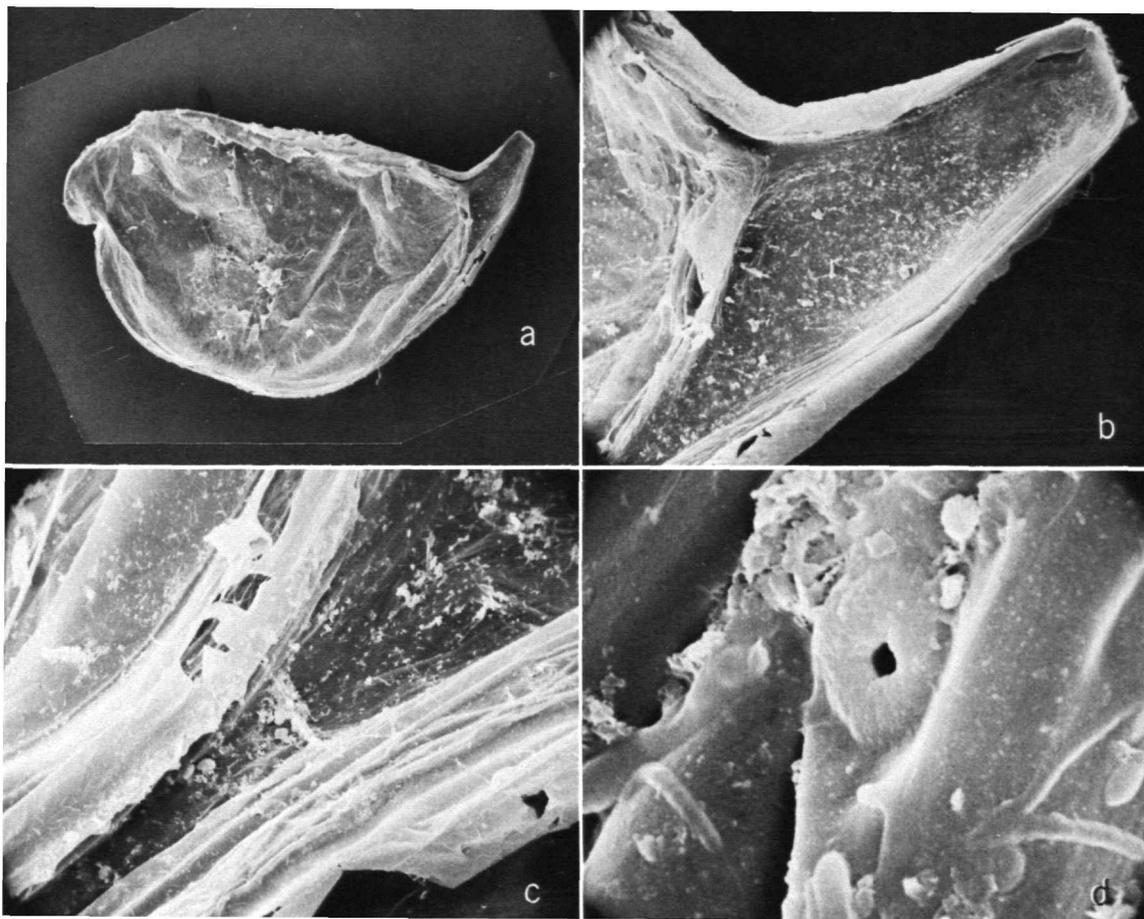


FIGURE 68.—*Metavargula adinothrix*, female, USNM 137469, right valve, medial view: *a*, complete valve (dorsal margin folded), $\times 13$; *b*, caudal process, $\times 65$; *c*, detail of part of caudal process just ventral to that shown in "b" (note small processes on list), $\times 320$; *d*, pore on posterior list, $\times 6500$.

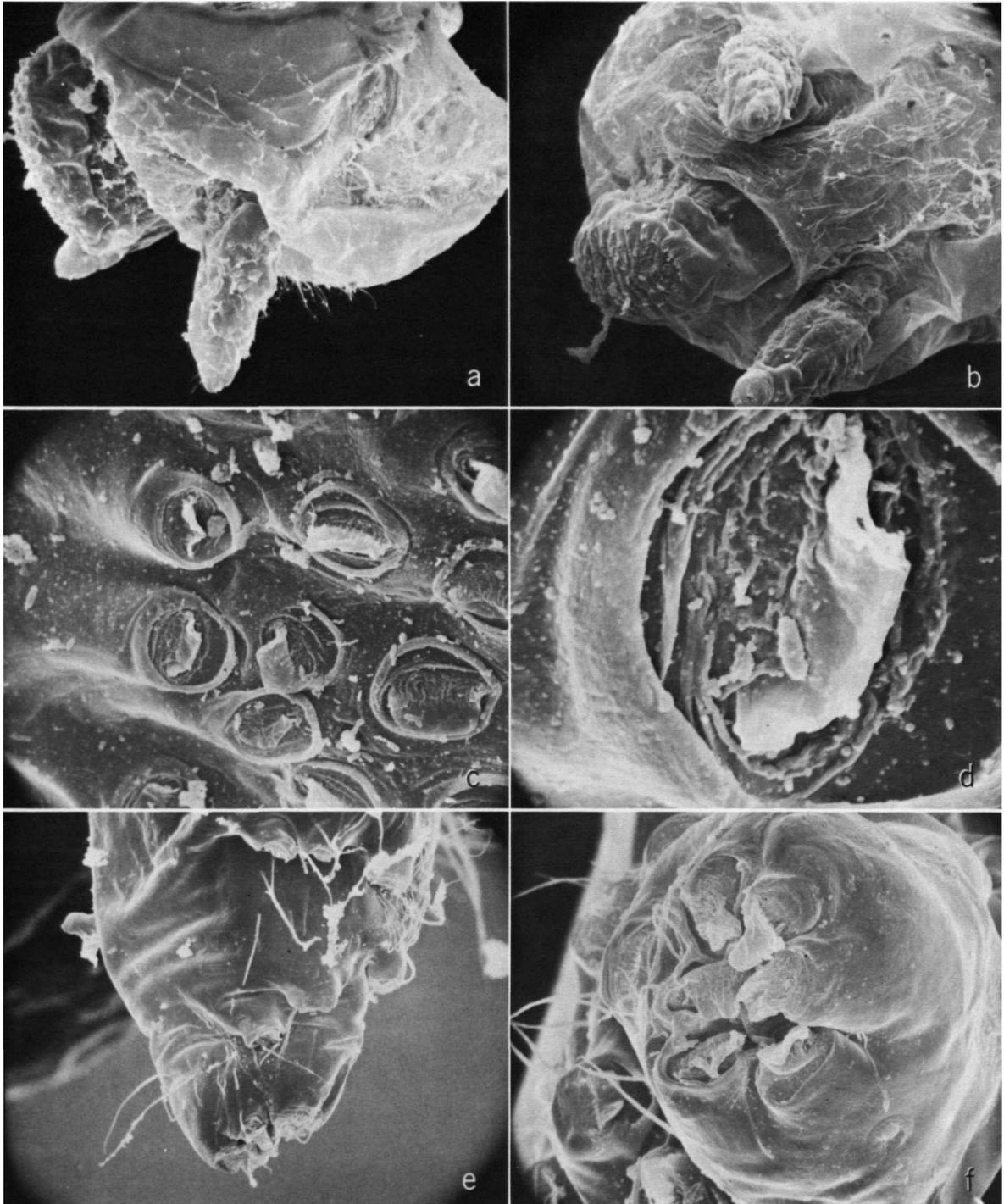


FIGURE 69.—*Metavargula adinothrix*, juvenile, USNM 138141, upper lip: *a*, lateral view, anterior to left, $\times 180$; *b*, ventral view, anterior to left, $\times 200$; *c*, detail of central field in "*b*," $\times 2000$; *d*, detail of glandular opening in "*c*," $\times 10,000$; *e*, tip of right tusk in "*a*," $\times 900$; *f*, end view of tip of tusk, $\times 2000$.

with teeth along inner margin; dorsal margin of 2nd joint with about 6 long and 10 short bristles; end joint with 4 claws (one of these more bristle-like than others) and 3 bristles.

Maxilla (Figure 65*m,n*): Coxale with stout plumose bristle. Exopodite broad with usual 3 bristles, all with long marginal spines proximally. Endopodite: cutting edge of 1st endopodite joint with 3 large teeth; 2 α -bristles present, outer bristle spinous, inner shorter bristle bare; 3 β -bristles present with spines along inner margin; 2nd joint with 4 α -bristles consisting of 2 slender bare inner bristles and 2 longer outer bristles with a few proximal marginal spines; 3 β -bristles present, middle bristle bare, others with spines on inner margin; 4 γ -bristles present, short bristle bare, others with marginal spines; 3 δ -bristles present, 2 inner bristles nonannulate and bare, outer bristle annulate and with marginal spines.

Fifth limb (Figure 66*a,b*): Epipodial appendage with 64 hirsute bristles; distoanterior process of protopodite small; 1st endite with 6 spinous bristles, 2nd endite with 5 large spinous bristles and 1 small bare posterior bristle; 3rd endite with 7 spinous bristles; main tooth of 1st endopodite joint consisting of usual 6 pectinate teeth and peg with proximal posterior bristle; anterior side of 1st joint with 4 bristles, 2 long, 2 short, all with marginal spines; 2nd endopodite joint with plumose anterior bristle and numerous bristles on margin adjacent to main tooth of 1st joint; inner lobe of 3rd joint with 3 bristles, shorter bristle spinous, other 2 with only 1 or 2 spines; outer lobe with 2 spinous bristles; 4th plus 5th joints united with small spined peg at border; 4th joint with 4 bristles, 5th with 2; posterior surfaces of endopodite joints 2 to 5 hirsute.

Left 6th limb (Figure 66*c*): 10 small bare bristles in place of epipodial appendage; 1st endite with 4 bristles, 3 medial, 1 terminal; 2nd endite with 6 bristles, 4 medial, 2 terminal; 3rd and 4th endites each with 3 terminal bristles; medial bristles of endites with slender marginal hairs; terminal bristle of 1st endite with long marginal spines; terminal bristles of remaining endites with fronds of long spines proximally and short spines distally; end joint with 19 bristles, 2 posterior bristles hirsute, others with long proximal spines and short distal spines; medial surface of endites and end joint hirsute; ventral margin of end joint with

lateral spines except in space between 4 posterior bristles and 15 anterior bristles.

Right 6th limb (Figure 66*d*): 2nd endite with 8 bristles, 5 medial, 3 terminal; 4th endite with 4 bristles, 1 medial, 3 terminal; end joint with 18 bristles. In remaining characters, right limb same as left.

Seventh limb (Figure 66*e*): Distal group with 27 bristles, 15 ventral, 12 dorsal, each with 3 to 6 bells; proximal group with 24 bristles, 11 ventral, 13 dorsal, each with 3 to 6 bells; terminal comb with 11 elongate recurved teeth with marginal spines; elongate incurved peg present opposite comb; teeth and peg annulate.

Furca: Each lamella with 8 claws separated from lamella by suture; claws decrease in length posteriorly along lamella, each claw with teeth along posterior margin.

Upper lip (Figure 66*g*): Anterior part large, unpaired and with crenulate margin; 1 pair of posterior tusks present; bulge posterior to tusks hirsute.

Lateral eye (Figure 66*f*): Eyes small, pigmented, each with 3 or 4 ommatidia.

Medial eye and rod-shaped organ (Figures 66*f,g*): Medial eye large, pigmented along midline. Rod-shaped organ short, cylindrical.

Genitalia and brushlike organ (Figure 66*h,i*): Genitalia with pustulose surface and attached cup-like structures (spermatophores?). Brushlike cluster of 7 or more minute annulate bristles present dorsal to genitalia.

Eggs: USNM 137469 with 28 eggs.

Parasites: USNM 125829 contained within its shell, attached to the body in the area of the lateral right eye, a female copepod (Choniostomatidae). USNM 125825 contained within its shell, attached to the posterodorsal part of the body, 2 isopod larvae. USNM 126120 also contained an isopod, either a larva or an adult δ . Remaining specimens without parasites.

DESCRIPTION OF JUVENILE.—See Figure 65*a* for outline of carapace, and Figures 65*b*, 69 for illustrations of upper lip. It is similar to that on the adult female.

COMPARISONS.—This species is larger than other members of the genus and has many more bristles both on the 7th limb and in place of the epipodial appendage of the 6th limb.

DISTRIBUTION.—This species has been collected

from Antarctic, Subantarctic, and Subantarctic-to-35°S regions (lat. 48°S to 59°S) at bathyal and abyssal depths (1796–3775 m) (Figure 63).

14. *Metavargula iota*, new species

FIGURES 70, 71

HOLOTYPE.—USNM 137472, ♀, length 2.77 mm. Right valve and some appendages in alcohol; left valve dry, gold plated; remaining appendages on 1 slide.

TYPE-LOCALITY.—*Vema* Cruise 18, station V-18–113.

ETYMOLOGY.—The specific name from the Greek letter in reference to the relatively small size of the species.

MATERIAL.—Holotype.

DIAGNOSIS.—Carapace length of female, about 2.77 mm.

Sixth limb: 2 bristles in place of epipodial appendage.

Seventh limb: Each limb with 15 or 16 bristles.

Furca: Each lamella with 8 claws.

DESCRIPTION OF FEMALE.—Carapace elongate with broadly rounded anterior with fairly deep incisur (Figures 70a, 71); posterior with backward projecting caudal process; surface smooth.

Infold (Figures 70b,c; 103): Infold broad in area of caudal process and rostrum, narrow elsewhere; infold behind rostrum with about 14 bristles, of these, bristles at inner end of list longer than others; pair of bristles and 3 single bristles present near inner end of incisur; infold of anteroventral and ventral margin with 42 bristles, spacing between bristles wider along posterior part of ventral margin; list on infold in front of caudal process with 23 to 28 fairly large processes and about 8 small bristles (each bristle generally at base of a process); 2 or 3 minute bristles on infold near tip of caudal process.

Selvae: Similar to that on *M. adinothrix*.

Size (Figure 67): USNM 137472, length 2.77 mm, height 1.39 mm; height 50 percent of length.

First antenna (Figure 70d): Joints 1 to 3 similar to those on *M. adinothrix*; sensory bristle of 5th joint with 10 long proximal filaments 2 distal shorter filaments and bifurcate tip; bristle of 6th joint about one and one-half times length of joint, with few short faint marginal spines. Seventh

joint: a-bristle bare, slightly shorter than bristle on 6th joint; b-bristle with 5 short marginal filaments, some pectinate; c-bristle with 8 marginal filaments (tip of bristle missing). Eighth joint: d- and e-bristles bare, about one-half length of c-bristle and about one and one-half times length of b-bristles; f- and g-bristles long with about 10 marginal filaments (some pectinate) and bifurcate tip.

Second antenna (Figure 70e,f): Protopodite and endopodite similar to those on *M. adinothrix*. Exopodite: joints 3 to 9 with basal spines; basal spines smaller on proximal joints; lateral spine on 9th joint much larger than that on 8th; 9th joint with 4 bristles, 3 long, 1 short; joints 2 to 8 with short spines forming row along distal margin; bristle of 2nd joint with about 14 minute spines along ventral margin and about 2 faint proximal spines along dorsal margin, bifurcate tip reaching 8th joint; long bristles on exopodial joints 2–9 with natatory hairs.

Mandible (Figure 70g,h): Coxale endite similar to that on *M. adinothrix*. Basale: dorsal margin with 1 bare bristle and 2 terminal bristles, shorter of these bare, other with short marginal spines; ventral margin with 2 a-bristles, both with short marginal spines, 1 short b-bristle with short marginal spines, 2 c-bristles (proximal of these short bare, other long with long proximal and short distal marginal spines), and 2 d-bristles (proximal bare, distal long spinous). Exopodite and endopodite similar to those on *M. adinothrix*.

Maxilla (Figure 70i,j): Coxale with stout plumose bristle. Exopodite broad with usual 3 bristles, proximal 2 bristles with long marginal proximal hairs, terminal bristle with few long spines proximally and short spines distally. Endopodite: cutting edge of 1st endopodite joint with 3 rounded teeth; 2 α -bristles present, outer bristle spinous, inner shorter bristle with widely separated short marginal spines; 3 β -bristles present, 2 outer bristles pectinate along inner margins, inner shorter bristle bare; 2nd joint with 4 a-bristles consisting of 2 slender bare inner bristles and 2 long stout outer bristles (outer of these with about 10 teeth along middle of inner margin, other with about 25 teeth along inner margin continuing to tip of bristle), 3 b-bristles, 3 c-bristles, 3 d-bristles, all pectinate.

Fifth limb (Figure 70k): Epipodial appendage

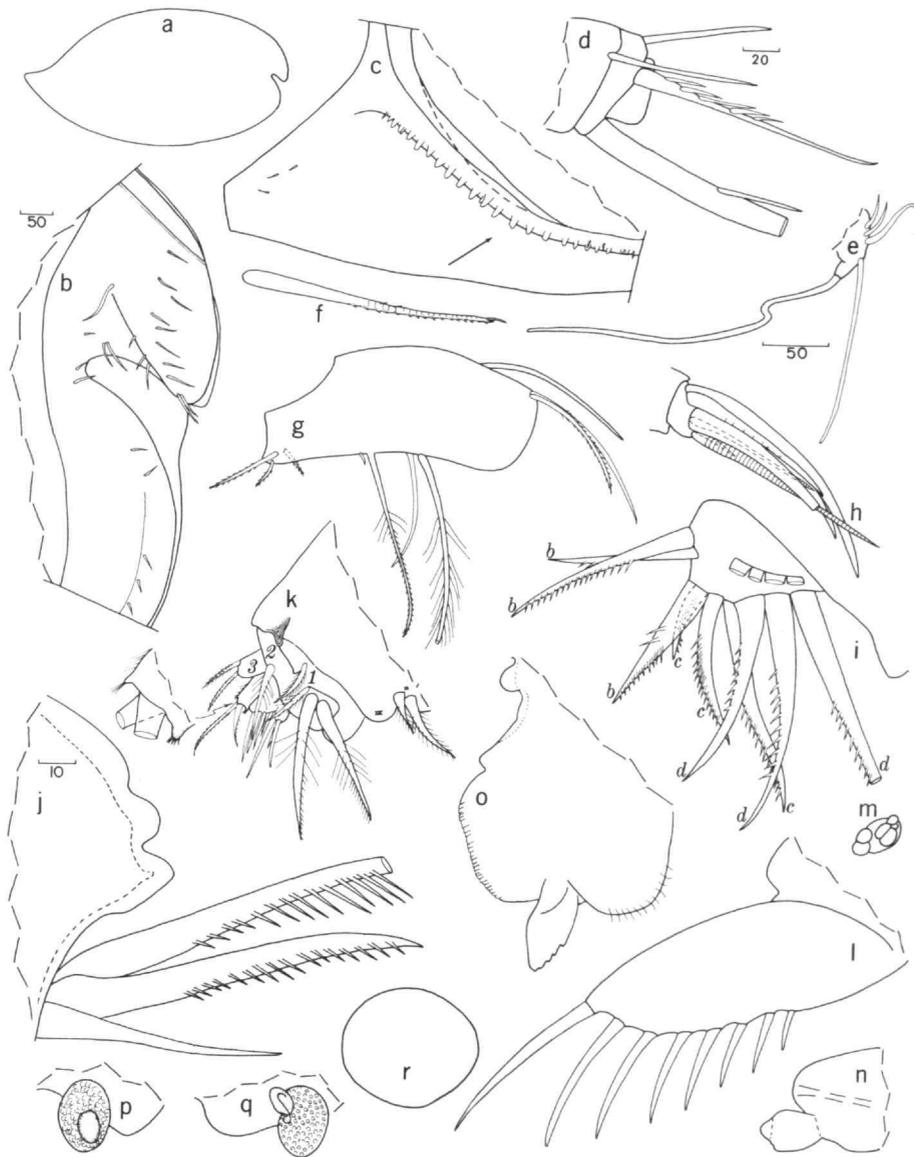


FIGURE 70.—*Metavargula iota*, female, USNM 137472, complete specimen: *a*, lateral outline, length 2.77 mm. Left valve: *b*, medial view of valve; *c*, caudal process, medial view. Left 1st antenna: *d*, bristles on 6th and 7th joints, medial view. Left 2nd antenna: *e*, endopodite, medial view; *f*, bristle on 2nd exopodite joint, lateral view. Mandible: *g*, basale of left limb, medial view; *h*, end joint of right limb, lateral view. Left maxilla: *i*, tip of endopodite, lateral view; *j*, cutting tooth and 6-bristles, lateral view. Right fifth limb: *k*, distal end, anterior view. Furca: *l*, left lamellae, lateral view. Body: *m*, right lateral eye, anterior to right; *n*, medial eye and rod-shaped organ; *o*, anterior process and upper lip, anterior to left; *p*, spermatophore on left side, lateral view; *q*, spermatophore on right side, lateral view; *r*, unextruded egg. (Same magnification in microns: *b,c,g,k-r*; *d,h*; *e,f*.)

with 43 bristles; distoanterior process of protopodite small; 1st endite with 7 spinous bristles, 2nd endite with 5 large spinous bristles and 1 small bare bristle, 3rd endite with about 6 bristles; main tooth consisting of 6 pectinate teeth, proximal triangular peg and posterior bristle; anterior side of 1st joint with 4 bristles, 2 long, 2 short, all with spines; 2nd endopodite joint with plumose anterior bristle and numerous bristles on margin adjacent to main tooth of 1st joint; inner lobe of 3rd joint with 3 bristles, outer lobe with 2; 4th plus 5th joints united with small spined peg between bristle clusters; 4th joint with 4 or 5 bristles, 5th with 2; small hirsute process present on outer edge of 5th joint near base of bristles ob-

served on right limb only; 3rd to 5th joints hirsute.

Sixth limb: Shape of limb similar to that of *M. adinothrix*; 2 bristles in place of epipodial appendage; 1st endite with 3 bristles, 2 medial, 1 terminal; 2nd endite with 5 bristles, 3 medial, 2 terminal; 3rd and 4th endites each with 3 terminal bristles; 4th endite slightly longer and narrower than 3rd; end joint with 13 bristles on left, 15 on right of USNM 127472; 2 posterior bristles on end joint hirsute, others with long proximal and short distal spines; medial surface of endites and end joint hirsute; ventral margin and end joint with lateral spines except at bases of 2 posterior bristles; ventral margin with short space between 3 posterior bristles and remaining bristles.

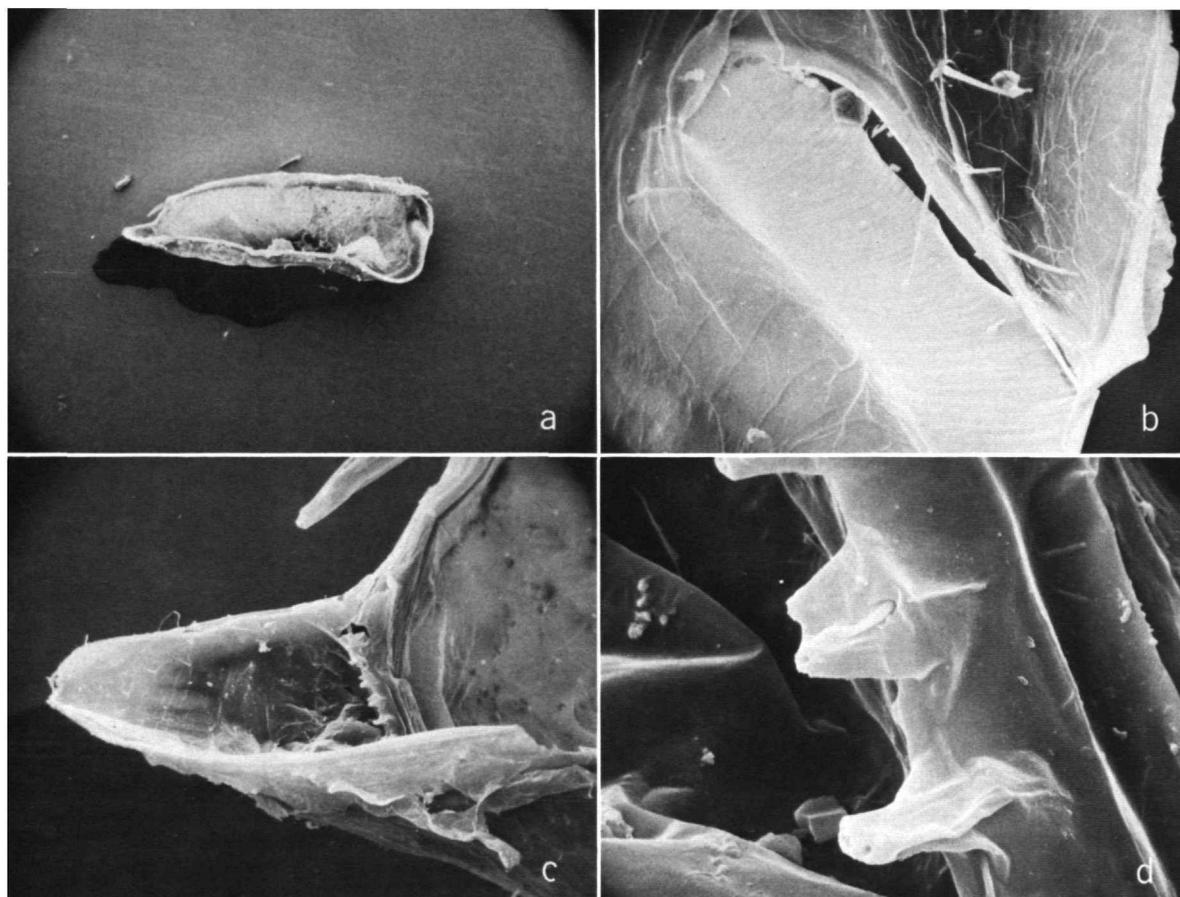


FIGURE 71.—*Metavargula iota*, female, USNM 137472 right valve, medial view: *a*, complete valve (ventral margin folded), $\times 20$; *b*, anterior incisur showing selvage, $\times 500$; *c*, caudal process $\times 200$; *d*, detail of "c" showing processes along list, $\times 2000$.

Seventh limb: Each limb with 15 or 16 bristles: distal group with 9 or 10 bristles, 4 or 5 ventral, 5 dorsal, each with 3 to 8 bells; proximal group with 6 bristles, 3 ventral, 3 dorsal each with 3 or 4 bells; terminal comb with 7 elongate recurved annulate teeth with marginal spines and digitate tips; elongate incurved annulate peg with digitate tip present opposite comb; comb teeth and peg similar type to those on *M. adinothrix*.

Furca (Figure 70l), *upper lip*, *eyes and rod-shaped organ* (Figure 70m-o): In general, similar to those on *M. adinothrix*.

Genitalia: Small sclerotized oval with ovoid spermatophore attached (Figure 70q).

REMARKS.—The well-developed eggs within the body (Figure 70r) and the presence of spermatophores on the genitalia indicate that the holotype is mature.

COMPARISONS.—The new species is smaller and more elongate than previous species referred to this genus. Measurements are compared below:

Species	Length (mm)	Height (mm)	Height
			(as % of length)
<i>M. adinothrix</i> Kornicker, herein	5.22-6.31	3.08-3.96	57-63
<i>M. optilus</i> (Kornicker, 1968)	3.65-3.70	2.01-2.19	55-59
<i>M. ampla</i> Kornicker, 1970	4.65	2.62-2.70	56-58
<i>M. iota</i> Kornicker, herein	2.77	1.39	50

The new species also differs from *M. adinothrix* in having fewer epipodial bristles on the 6th limb and larger processes along the list of the caudal process. *Metavargula iota* has only 8 claws on the furca compared to 9 on *M. optilus* and *M. ampla*, and the distal bristle on the 1st joint of the endopodite of the 2nd antenna on *M. iota* is much longer.

DISTRIBUTION.—This species was collected at only one station, Cook Strait, New Zealand, at a depth of 117 m (Figure 63).

Metavargula Species Indeterminate

MATERIAL.—USNM 126215, adult ♀ with unextruded eggs, length 3.91 mm, height 2.24 mm; USNM 126216, ♀ with distorted carapace, length about 4.15 mm; USNM 126217-a, juvenile, length 3.12 mm, height 1.67 mm; USNM 126217-b, 2 juveniles, all from IWSOE, USCGC *Glacier*, station 0023; USNM 137470, juvenile, length 3.10

mm, height 1.52 mm, from *Vema* Cruise 17, station V-17-18.

REMARKS.—USNM 126215, 126217, 137470 without lateral eyes; USNM 126216 with small lateral eyes.

DISTRIBUTION.—See Figure 63.

Paradoloria Poulsen, 1962

TYPE-SPECIES.—*Cypridina dorsoserrata* Müller, 1908, by subsequent designation (Hanai, in press).

This genus is represented in the study area by only 1 species, *Paradoloria australis* Poulsen, 1962.

DIAGNOSIS OF GENUS.—Carapace without lateral processes.

Second antenna: Endopodite elongate, 2-jointed with long 2nd joint, or 3-jointed with bare 2nd joint, end joint with long terminal filament; endopodite of both male and female similar.

Maxilla: 1st joint of endopodite broad with well-developed cutting tooth; exopodite large.

Sixth limb: 3 to 5 bristles in place of epipodial appendage; posterior 2 bristles on end joint usually longer than remaining ventral bristles.

Seventh limb: Jaw opposite comb bare or with 1 or more low teeth; limb with 25-50 bristles.

Furca: Each lamella with 9 to 11 claws, claw 2 either fused to lamella or separated from it by suture, remaining claws with basal suture.

Lateral eyes, medial eye, and rod-shaped organ: Lateral eyes either well developed or absent; medial eye fairly large; rod-shaped organ, short, bulbous, with minute terminal peg.

Upper lip: Lip without long tusks.

DISTRIBUTION.—Members of this genus live in the Indo-West-Pacific region with one questionable species reported from the Atlantic. The southernmost occurrence of the genus is Austral Bay, Australia, 37°28'S, 138°55'E (Figure 67). Another species considered by Poulsen (1962) as probably belonging to this genus is *Paradoloria capensis* (Cleve, 1908) which was collected in plankton off the tip of South Africa (about 35°05'S, 21°E). (Because of inadequate knowledge of the morphology of *Cypridina capensis* Cleve, I consider any generic assignment questionable.)

Recorded depth range of the genus is from just below the intertidal zone to 1350 m. Some species have been collected only in nets well above the sea bottom. Except for the Austral Bay locality at

1350 m, benthic members of the genus have been collected on the shelf at a maximum depth of 80 m. Pelagic species have been collected as deep as 100 m. Lateral eyes are well developed in all species except that collected at 1350 m, which is without lateral eyes.

15. *Paradoloria australis* Poulsen

Paradoloria australis Poulsen, 1962:154, fig. 78.

HOLOTYPE.—Adult ♂, length 2.3 mm (unique specimen), Universitets Zoologiske Museum, Copenhagen.

TYPE-LOCALITY.—*Galathea* station 554, Austral Bay, Great Australian bight, Australia, 37°28'S, 138°55'E, water depth 1350 m.

MATERIAL.—None examined.

DIAGNOSIS.—Surface of carapace smooth without ornamentation. Carapace length: adult male 2.3 mm.

Seventh limb: Limb with 45 bristles.

Furca: Each lamella with 10 claws, all claws with basal sutures, claw 4 smaller than claw 5.

Upper lip: Posterior paired portion without long tusks.

DISTRIBUTION.—The species is represented by only one specimen collected at the type-locality (Figure 34).

Pterocypridina Poulsen, 1962

TYPE-SPECIES.—*Pterocypridina excreta* Poulsen, 1962, designated herein.

Pterocypridina excreta Poulsen is the only species of this genus that has been collected in the study area.

DIAGNOSIS OF GENUS.—Carapace with lateral processes.

First antenna: Proximal filament of b- and c-bristles on male with large dislike sucker (male known for one species).

Second antenna: Endopodite short, 1-jointed.

Maxilla: Exopodite well developed; 1st endopodite joint broad with cutting tooth.

Sixth limb: 6 to 8 bare bristles in place of epipodial appendage; posterior bristles of end joint not markedly differing from remaining bristles of joint.

Seventh limb: Sclerotized ridge opposite comb with several small teeth.

Furca: 2nd, or 2nd and 4th claws united to lamella.

Lateral eyes, medial eye, and rod-shaped organ: Lateral eyes and medial eye well developed; rod-shaped organ small, pear-shaped.

Upper lip: Posterior paired tusks absent, or short when present.

DISTRIBUTION.—Members of this genus have been collected off Thailand, Singapore, and southeast Australia (Figure 33). Depth range is 10 to 19 meters.

16. *Pterocypridina excreta* Poulsen

Pterocypridina excreta Poulsen, 1962:240, fig. 113.

HOLOTYPE.—♀ with embryos, length 1.87 mm (unique specimen), Universitets Zoologiska Museum, Copenhagen.

TYPE-LOCALITY.—Tasman Sea off southeast coast of Australia, 37°05'S, 150°05'E, 60–90 m, 30 September 1914.

DIAGNOSIS.—Posterior part of each valve with lateral alate process. Carapace length, adult female 1.87 mm.

Second antenna: Endopodite 1-jointed with 4 bristles plus 1 terminal slender bristle or filament.

Furca: Each lamella with 7 claws, claw 2 united with lamella.

Upper lip: Lip without tusks.

DISTRIBUTION.—This species is known by only one specimen collected at the type-locality in the Tasman Sea southeast of Australia (Figure 34).

Siphonostra Skogsberg, 1920

TYPE-SPECIES.—*Cypridina (Siphonostra) spinifera* Skogsberg, 1920.

This species is represented by one species in the study area, *Siphonostra hallex*, new species.

DIAGNOSIS OF GENUS.—Carapace oval in lateral view with prominent rostrum, fairly deep incisor and caudal process with narrow opening posteriorly (siphon); surface of carapace smooth without ornamentation.

First antenna: c- and b-bristles of adult male with buttonlike process and large disc at base, and with several filaments with small discs.

Second antenna: Endopodite 2-jointed in both

sexes; 1st joint with 3 or 4 bristles; 2nd joint very small and with long terminal filament.

Mandible: Ventral margin of 2nd endopodite joint with three groups of bristles with 1, 1, and 2, bristles, all similar in shape—pointed and slightly recurved.

Sixth limb: 3–5 bristles present in place of epipodial appendage; 1 or 2 medial bristles present on each endite; end joint short and with 9–11 bristles.

Seventh limb: Each limb with 10–14 bristles; terminal ventral comb with 13 teeth (lateral 2 or 3 of these short with truncate tips); sclerotized ridge with single or double hook at tip present opposite comb.

Furca: Each lamella with 7 or 8 claws; claws 2

and 4 united to lamella, remaining claws separated from lamella by suture; claw 3 weaker than claw 4; all claws rather short and stout.

Upper lip: Lip with unpaired anterior and paired posterior part, latter with 2 minute posterior tusks.

Rod-shaped organ and eyes: Medial eye pigmented; rod-shaped organ short, crinkled. Lateral eye well developed, about same size as medial eye, and with about 25 ommatidia. Lateral eye of male larger than that of female.

DISTRIBUTION.—The genus is known from only two localities: Cape Jaubert, Australia (about 19°S) and off the Atlantic coast of Argentina (39°21'S, 61°08'W) (Figure 60). The depth range is from 15 m to 25 m.

Key to Species

Carapace larger than 2.20 mm, furca with 8 claws.....	<i>S. spinifera</i>
Carapace shorter than 1 mm, furca with 7 claws.....	<i>S. hallex</i>

17. *Siphonostra hallex*, new species

FIGURES 72–74, 76–80

HOLOTYPE.—USNM 137264, gravid ♀, length 1.67 mm. Valves and some appendages in alcohol, remaining appendages on slide.

TYPE-LOCALITY.—*Vema* Cruise 17, station V-17-52 or V-17-72 (2 labels in vial.)

ETYMOLOGY.—Specific name from the Latin “hallex” [= great toe], in reference to the elongate sclerotized process on the protopodite of the 5th limb.

PARATYPES.—USNM 137265, 1 adult ♂; USNM 137266, 1 adult ♀; USNM 137267, 1 adult ♂; USNM 137268, 1 adult ♂ not dissected; 137269, 1 gravid ♀ not dissected; USNM 137370, 3 adult ♀♀ without eggs, 1 adult ♂, 6 juveniles. Paratypes from same sample as holotype.

REMARKS.—Vial contained two labels: V-17-52 (940 m depth), in pencil, and V-17-72 (15 m depth), in ink. I have been unable to determine which station is correct and have arbitrarily listed the species under V-17-72 in the species list, because the well-developed lateral eyes suggest shallow water, and the only other species in the genus is from shallow water (25 m).

This species is referred to *Siphonostra* because of the similarity of the upper lip, endopodite of the 2nd antenna and furca to those of *Siphonostra spinifera* Skogsberg, 1920, the only other species in the genus. The new species bears only 7 claws on each furcal lamella. This number of claws has been observed previously on only three genera of Cypridininae, *Cypridinodes*, *Sheina*, and *Monopia*; species in these genera differ considerably from the new species.

DIAGNOSIS.—Carapace length of adult female, 1.67–1.91 mm; of adult male, 1.55–1.62 mm. Posterior with small caudal process with narrow aperture.

Furca: Each lamella with 7 claws.

DESCRIPTION OF FEMALE (Figures 72*b-l*; 73).—Carapace in lateral view more convex dorsally than ventrally (Figure 72*b,c*); posterior with small projecting caudal process, which leaves narrow posterior opening (siphon) when valves are closed; incisur fairly deep.

Infold (Figure 72*d-f*): Infold behind rostrum with about 16 bristles, mostly bifurcate; inner margin of incisur with 2 bristles, longer of these bifurcate; 2 or 3 short bristles present posterior to incisur; anteroventral infold with 16 or 17 long

bifurcate bristles forming row; ventral infold bare or with only 2 or 3 bristles. Posterior infold complex with tooth on right valve fitting socket on left; infold below tooth and socket crenulate with few minute bristles.

Selvae: Lamellar prolongation with smooth margin present along anterior and ventral margins; prolongation divided at incisur.

Size (Figure 75): USNM 137264, length 1.67 mm, height 1.23 mm; USNM 137266, length 1.81 mm, height 1.17 mm; USNM 137269, length 1.91 mm, height 1.21 mm.

First antenna: 2nd joint with spines forming

clusters on ventral margin and medial and lateral surfaces; 3rd joint short with minute ventral bristle and dorsal bristle inserted proximal to middle of margin, latter bristle reaching about three-fourths length of dorsal margin of 4th joint and with short marginal spines; medial surface of joint with row of short spines; 4th joint with minute ventral terminal bristle and without dorsal bristle; sensory bristle of 5th joint with 11 bare filaments including tip of stem (proximal bristles consisting of 1 long slender medial bristle and 1 long broad lateral bristle, following bristles consisting of 3 long broad bristles, 1 short slender bristle, 1 long



FIGURE 72.—*Siphonostira hallex*, juvenile, female, USNM 137370: a, sketch of central muscle scars of left valve, lateral view. Female, USNM 137264, complete specimen: b, lateral outline. Right valve: c, caudal process, lateral view; d, anterior, medial view; e, caudal process, medial view. Left valve: f, caudal process, medial view. Second antenna: g, endopodite and part of protopodite of right limb, medial view, h, exopodite of left limb, lateral view (not all bristles shown); i, detail of middle of bristle on 3rd exopodite joint of left limb, lateral view. Mandible: j, distal end of left limb, medial view; k, basale, exopodite, and 1st endopodite joint of left limb, medial view; l, tip of coxale endite of right limb, medial view. (Same magnification in microns: d-f,k; g,h; i,j,l)



FIGURE 73.—*Siphonostira hallex*, female, USNM 137264, maxilla: *a*, right limb, lateral view (not all bristles shown); *b*, cutting tooth and 6-bristles of right limb, lateral view (not all bristles shown); *c*, end joint of left limb, medial view. Right 5th limb: *d*, anterior process on protopodite and 1st and 2nd joints of exopodite; *e*, anterior process on protopodite and joints 3-5 of exopodite. Sixth limb: *f*, left limb, medial view. Seventh limb: *g*, tip of limb. Furca: *h*, right lamella, lateral view. Body: *i*, anterior showing outline of lateral eye, medial eye, rod-shaped organ, anterior process, and upper lip; *j*, upper lip, ventral view, anterior to left; *k*, genitalia and ovoid spermatophores. (Same magnification in microns: *a,i,j,k*; *b,c,e,g*.)

broad bristle, 4 short slender filaments including tip of stem); medial bristle of 6th joint with short marginal spines, bristle shorter than a-bristle of 7th joint. Seventh joint: a-bristle with few widely separated marginal spines; b-bristle with 5 filaments including tip, some pectinate; c-bristle with 9 filaments including tip, some strongly pectinate. Eighth joint: d- and e-bristles bare, slightly longer than b-bristle; f- and g-bristles long, with 11 or 12 filaments including tip, some pectinate.

Second antenna (Figure 72g-i): Protopodite with long spinous medial bristle. Endopodite 2-jointed:

1st joint with 3 proximal bristles (1 long with faint spines, 2 short bare) and 1 long spinous distal bristle; 2nd joint very small with terminal filament (possibly broken) slightly longer than distal bristle of 1st joint. Exopodite: Ventral margin of bristle of 2nd joint with 7 or 8 stout ventral spines and few dorsal hairs; joints 3 to 8 with basal spines; joint 9 with lateral spine; 9th joint with 3 bristles; 2 long, 1 short, all with natatory hairs; bristles of joints 3 to 8 with natatory hairs; bristles of joints 3 and 4 with 13 to 16 large spines along middle of ventral margin; middle bristle of 9th

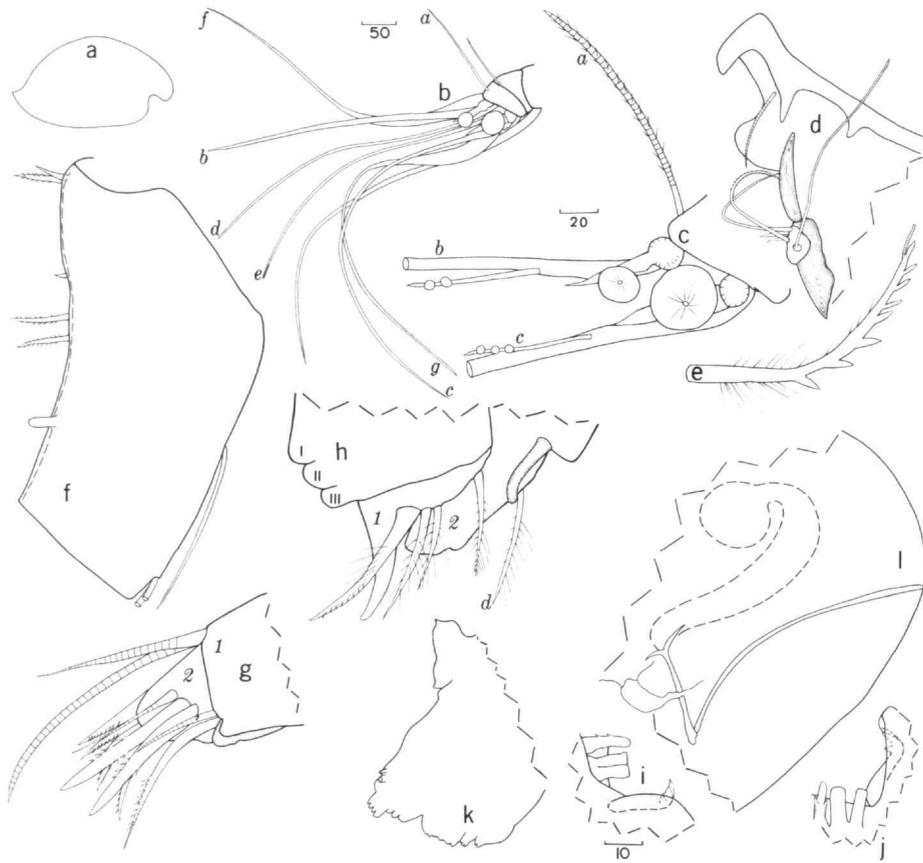


FIGURE 74.—*Siphonostra hallex*, male, USNM 137265, complete specimen: a, lateral view, outline, length 1.62 mm. Right 1st antenna: b, tip of limbs, medial view (filaments and spines on bristles not shown); c, detail of proximal part of bristles on 7th joint, medial view. Right 2nd antenna: d, endopodite and part of protopodite, medial view; e, bristle on 2nd exopodite joint, medial view. Left mandible: f, basale, medial view. Maxilla: g, tip of endopodite, lateral view (not all bristles shown). Left 5th limb: h, distal part, anterior view. Seventh limbs: i, j, tips of limbs. Body: k, anterior process and upper lip, lateral view, anterior to left; l, posterior showing outline of left testis and sclerite. (Same magnification in microns: b,k,l; c-h; i,j.)

joint with large spines along middle of dorsal margin.

Mandible (Figure 72j-l): Coxale endite large, spinous with minute bristle near base; large peg present between 2 terminal spines of endite. Basale: ventral margin with 2 spinous a-bristles, 1 minute b-bristle, 2 spinous c-bristles, and 1 long spinous d-bristle; dorsal margin with 3 spinous bristles, 1 near middle, 2 subterminal. Exopodite reaching about three-fourths length of dorsal margin of 1st endopodite joint, and with 2 spinous bristles, inner bristle more than twice length of outer bristle. Endopodite: ventral margin of 1st joint with 4 terminal bristles, 2 long spinous, 1 short spinous, 1 minute bare; dorsal margin of 2nd joint with 11 spinous bristles; ventral margin with three groups of bristles with 1, 1, and 2 bristles and medial spines (all bristles similar in shape—

pointed, slightly recurved); (right limb of holotype slightly aberrant in having 3 ventral bristles on 2nd endopodite joint); end joint with 3 claws and 4 bristles, all claws with teeth along ventral margin, short bristle bulbous proximally.

Maxilla (Figure 73a-c): Endite I with 8 bristles, endite II with 6 bristles, endite III with 1 proximal and 5 terminal bristles, some bristles with triaenid tips. Coxale with short plumose bristle. Exopodite with short spinous proximal bristle and 2 long terminal bristles, one of these with short marginal spines, other (middle bristle) with long marginal spines. First joint of endopodite with 2 α -bristles, both with short marginal spines, and 3 β -bristles (bristles of end joint of holotype obscure, but of type generally present on members of genus).

Fifth limb (Figure 73d,e): Epipodial appendage with 50 bristles; 3 endites with 3 to 6 spinous bris-

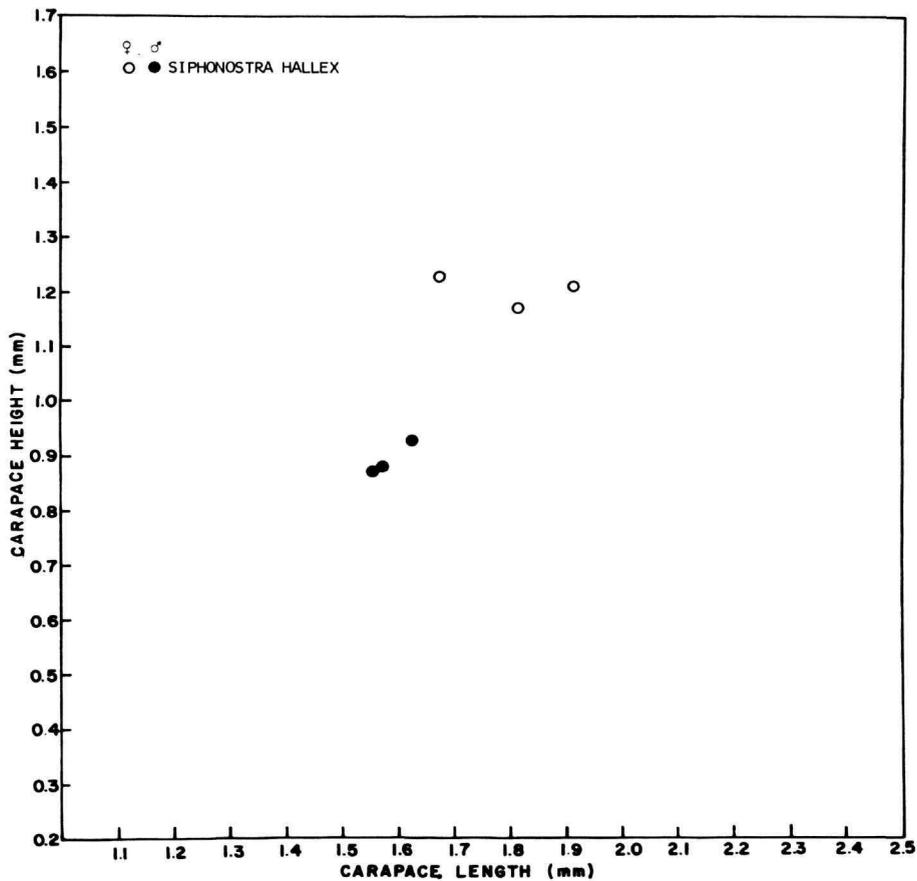


FIGURE 75.—Relationship between carapace length and height of adults of *Siphonostira hallex*.

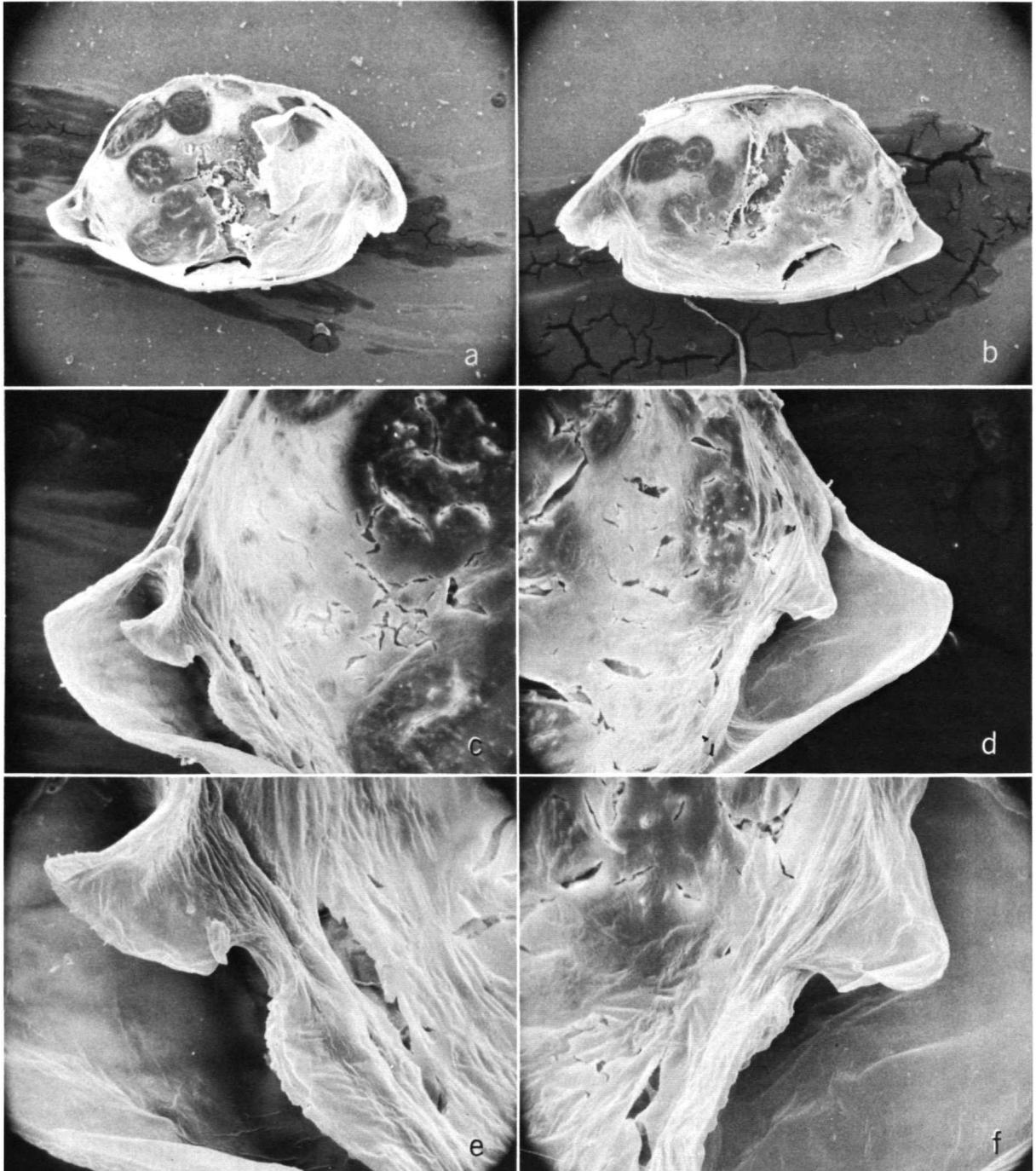


FIGURE 76.—*Siphonostira hallex*, male, USNM 137267, valves, medial view: *a*, left valve, $\times 50$; *b*, right valve, $\times 50$; *c*, caudal process, left valve, $\times 200$; *d*, caudal process, right valve, $\times 200$; *e*, detail of "*c*," $\times 500$; *f*, detail of "*d*," $\times 500$.

cles; sclerotized process of protopodite elongate. Exopodite: anterior margin of 1st joint with 1 plumose bristle near protopodite process and 3 spinous distal bristles, inner of these pectinate distally; main tooth with 6 teeth, minute proximal peg and spinous bristle; 2nd joint with posterior c-bristle, 1 anterior d-bristle, 3 a-bristles, and 5 b-bristles; inner lobe of 3rd joint with 1 proximal bristle with long proximal and short distal spines, and 2 terminal bristles with short marginal spines; outer lobe of 3rd joint with 2 bristles, both bristles with long proximal spines and short distal spines; 4th and 5th jointed united, with 3 bristles (minute sclerotized area between outer 2 bristles (?5th joint) and single inner bristle (?4th joint); joints 3 to 5 hirsute.

Sixth limb (Figure 73f): Limb small; 3 or 4 bare bristles in place of epipodial appendage; endite I with 1 medial and 1 terminal bristle, endite II with 1 medial and 3 terminal bristles, endite III with 1 medial and 3 terminal bristles, endite IV with 1 medial and 4 terminal bristles; end joint with total of 10 or 11 bristles [1 small anterior bristle, 1 long bristle with long proximal hairs and short distal spines, 1 short bristle with long stout proximal spines and short distal spines, 4 or 5 short bristles with long proximal and short distal spines (some with trident tips), short space along margin and then 1 stout bristle with long proximal hairs and short distal spines, and 2 long stout bristles with long marginal hairs]; medial surface of end joint with short spines forming scattered clusters; lateral surface with similar clusters of short spines and also long spines along ventral margin (long spines absent in area of 3 posterior bristles).

Seventh limb (Figure 73g): Each limb with 10 bristles, 2 proximal (1 on each side), 8 distal (4 on each side); each bristle with 3 to 6 bells; terminal ventral comb with 9 elongate teeth with marginal backward-pointing short spine; 2 short square-tipped teeth present on either side of elongate teeth; sclerotized ridge with double hook at tip present opposite comb.

Furca (Figure 73h): Each lamella with 7 claws; claws 2 and 4 united to lamella, remaining claws separated from lamella by suture; claw 3 weaker than claw 4; claws 4 to 7 short, stout; claws 1, 2, and 4 with teeth forming 2 rows; single row on claws 3, 5, 6; no teeth on claw 7.

Rod-shaped organ and eyes (Figure 73i): Medial eye pigmented; rod-shaped organ short, crinkled. Lateral eye large, about same size as medial eye, pigmented with about 25 ommatidia.

Upper lip (Figure 73i,j): Lip consisting of unpaired anterior part and paired posterior part; each side of posterior pair consisting of large anterior field followed by 2 minute tusks. Large anterior process present between upper lip and medial eye (Figure 73i).

Genitalia: See Figure 73k.

Eggs: USNM 137264 with 8 eggs; USNM 137269 with about 11 eggs.

Parasites: Adult ♀, USNM 137266, with 1 ♀ choniostomatid copepod; gravid ♀, USNM 137264, with 1 pupa of a choniostomatid copepod.

Description of adult male (Figures 74, 76–80): Carapace slightly shorter than that of female and with considerably less height (Figures 74a, 76–78).

Size (Figure 75): USNM 137265, length 1.62 mm, height 0.93 mm; USNM 137267, length 1.55 mm, height 0.87 mm; USNM 137268, length 1.57 mm, height 0.88 mm.

First antenna (Figure 74b,c): 2nd joint with faint spines forming clusters on ventral margin and medial surface; 3rd joint with minute ventral bristle and dorsal bristle similar to that on female; 4th joint with minute ventral terminal bristle and without dorsal bristle; sensory bristle of 5th joint with 7 long stout proximal filaments and 5 distal slender filaments including tip of stem; medial bristle of 6th joint slender with short marginal spines. Seventh joint: a-bristle about twice length of bristle on 6th joint and with short marginal spines; b-bristle with stout proximal process with proximal buttonlike process and large disc, 2 filaments near middle of bristle, each with 2 small discs, and 3 distal filaments (including tip of stem) without discs; c-bristle with stout proximal process with proximal buttonlike process and large disc (disc about twice diameter of that on b-bristle), 1 slender filament with 3 small discs, 1 slender filament with 2 small discs, and 7 slender filaments (including stem) without discs. Eighth joint: d- and e-bristles bare, slightly longer than b-bristle; f-bristle slightly longer than b-bristle, with stout proximal part with abundant slender filamentous hairs and 5 distal pectinate marginal filaments (excluding tip of stem); g-bristle longer than f-bristle, about same length as c-bristle, with stout proximal

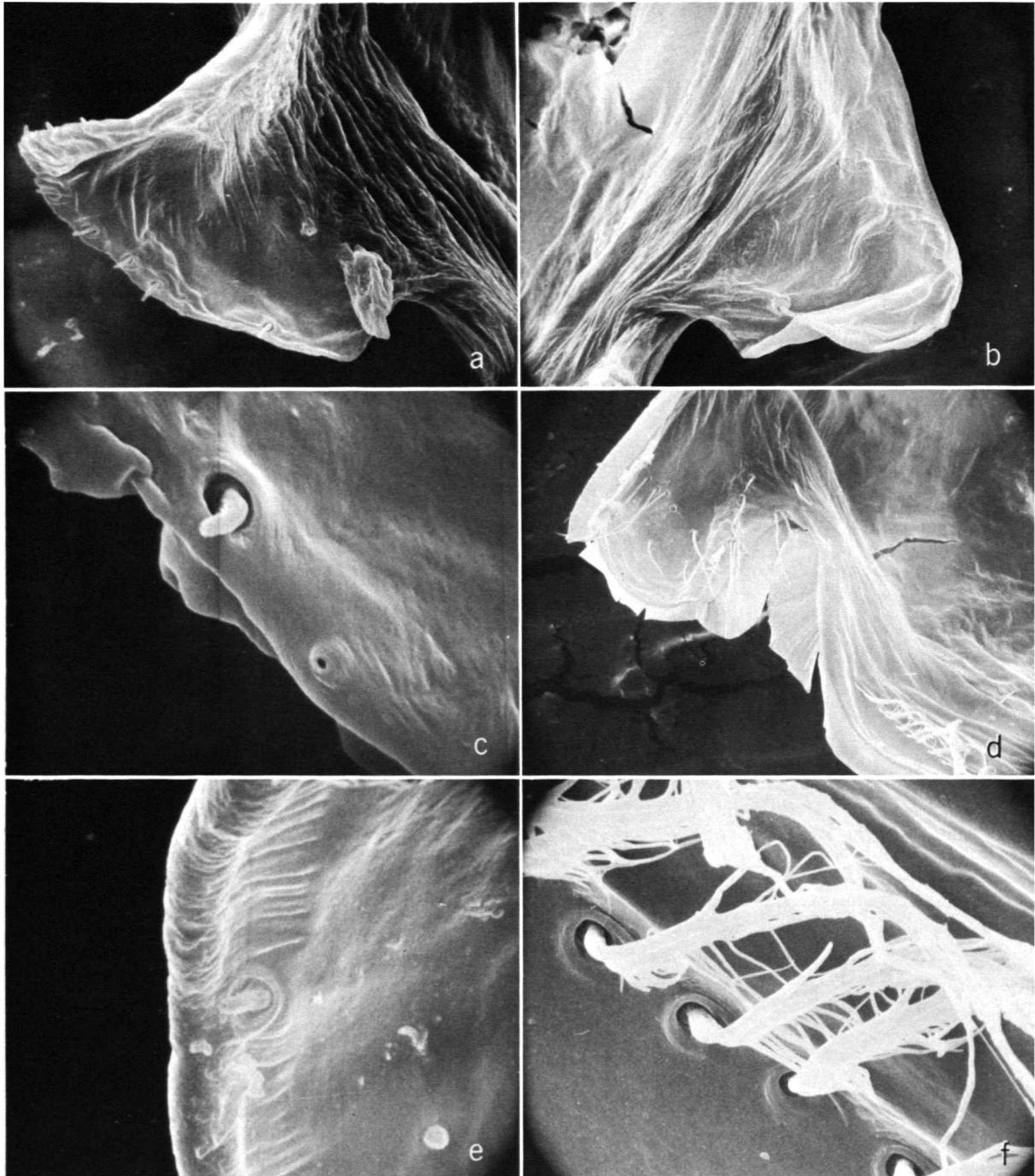


FIGURE 77.—*Siphonostira hallex*, male, USNM 137267, valves, medial view: *a*, detail of socket process shown in Figure 76*e*, $\times 1000$; *b*, detail of tooth process shown in Figure 76*f*, $\times 1000$; *c*, detail of process below socket process shown in Figure 76*e*, $\times 5000$; *d*, anterior, right valve, medial view, $\times 200$; *e*, posterior edge of caudal process, left valve, medial view, $\times 5000$; *f*, detail of anterior ventral bristles of infold shown in "d," $\times 2000$.

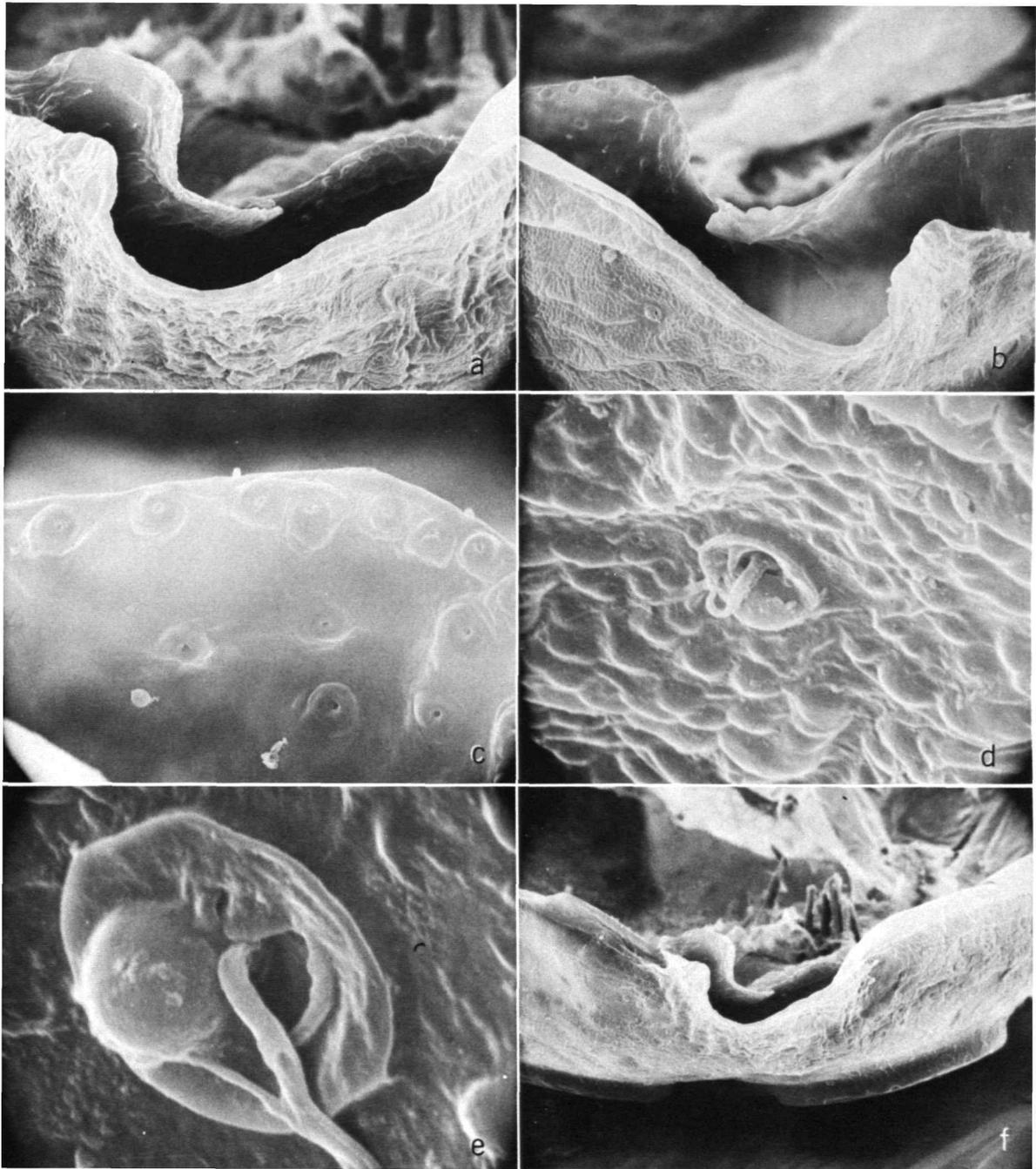


FIGURE 78.—*Siphonostra hallex*, male, USNM 137267: *a*, siphon on left valve, posterior view, ventral margin to right, $\times 500$; *b*, siphon on right valve, posterior view, ventral margin to left, $\times 500$; *c*, detail of surface of process below tooth shown in "b," $\times 2000$; *d*, bristle on outer surface of valve shown in "b," $\times 5000$; *e*, same, $\times 10,000$; *f*, siphon on left valve, posterior view (projections on outer surface of valve caused by concretions), $\times 200$.

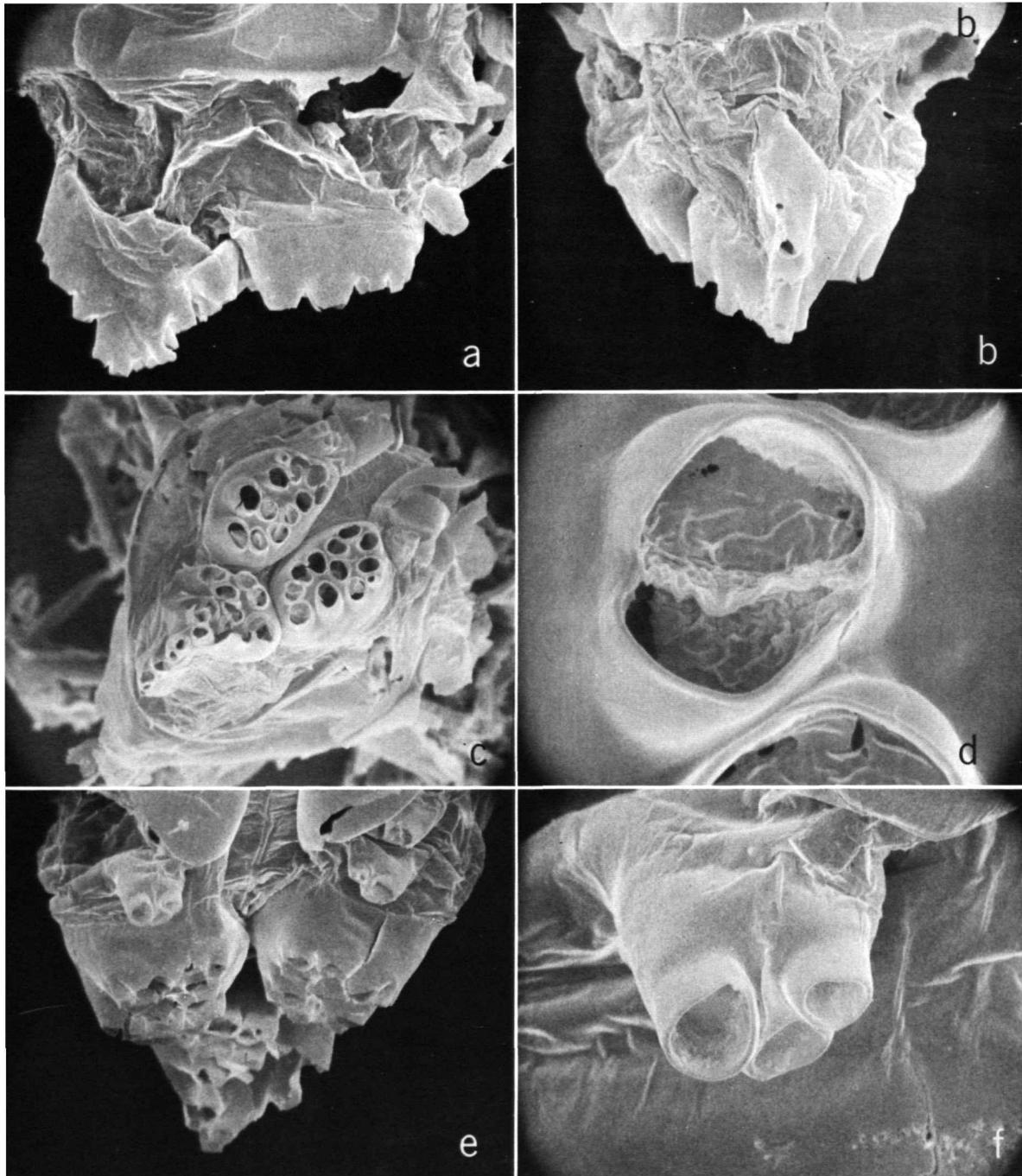


FIGURE 79.—*Siphonostira hallex*, male, USNM 137267, upper lip (openings in glandular processes probably caused by excessive vibrations during cleaning process): *a*, lateral view, anterior toward left, $\times 500$; *b*, anterior view, $\times 500$; *c*, ventral view, anterior toward lower left, $\times 350$; *d*, detail of glandular opening in right middle field shown in "*c*," $\times 5000$; *e*, posterior view of lip, $\times 700$; *f*, detail of small posterior tusks shown in "*e*," $\times 2800$.

part with abundant filamentous hairs and 8 distal slender filaments including tip of stem.

Second antenna (Figure 74d,e): Medial bristle of protopodite shorter than that on protopodite of female; endopodite similar to that of female but with longer filament on 2nd joint. Exopodite: bristle of 2nd joint similar to that on female but with more proximal hairs (Figure 74e); joints 5 to 8 with basal spines, joint 9 with lateral spine;

9th joint with 3 bristles, 2 long, 1 short, all with natatory hairs; bristles of joints 3 and 4 with 7 to 10 large spines along middle of ventral margin; middle bristle of 9th joint with 9 broad spines along middle of dorsal margin; ventral long bristle of 9th joint with hairs somewhat thickened and spinelike along middle of dorsal margin, but not nearly as broad as spines of midbristle.

Mandible (Figure 74f): d-bristle of basale con-

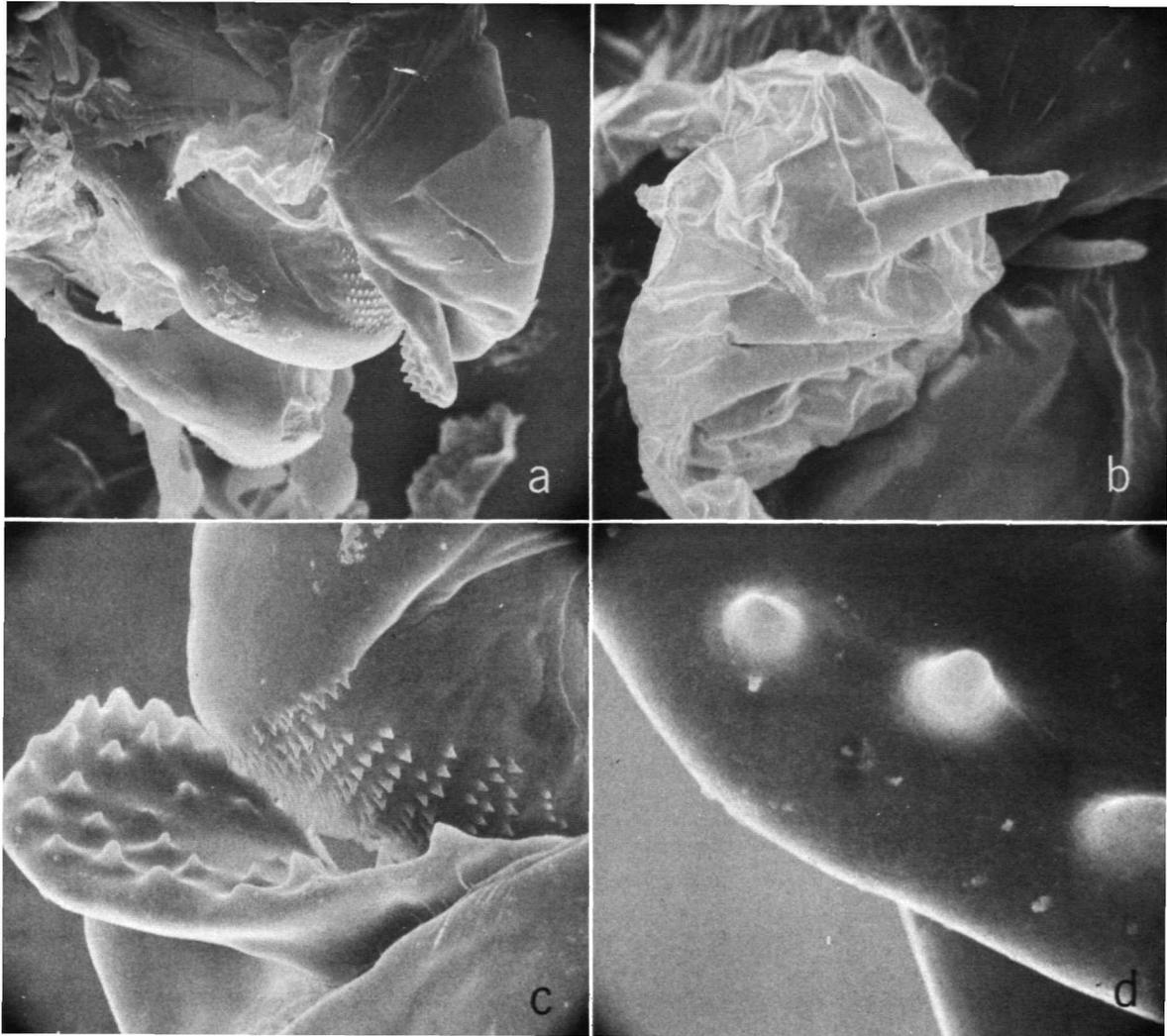


FIGURE 80.—*Siphonostra hallex*, male, USNM 137267 copulatory organ: *a*, lateral view, $\times 750$; *b*, detail of bristles on proximal lobe shown in "*a*," but oriented with ventral end to left, $\times 2500$; *c*, detail of tip of limb shown in "*a*," $\times 2000$; *d*, detail of processes on flap shown in "*c*," $\times 7500$. (Reduction, 14%.)

sisting of short peg with rounded tip on USNM 137265 but similar to that on female on USNM 137266; dorsal margin of 2nd endopodite joint with about 16 bristles. Limb otherwise similar to that on female.

Maxilla (Figure 74g): 1st endopodite joint with 2 α -bristles and, 2 δ -bristles, 1 pectinate, 1 with short marginal spines.

Fifth limb (Figure 74h): Epipodial appendage with 51 bristles. Limb similar to that on female.

Sixth limb: End joints of both limbs with 10 bristles, limb otherwise similar to that of female.

Seventh limb (Figure 74i,j): Process opposite terminal comb with small triangular process to one side of double hook at tip; limb shorter than that on female but otherwise similar.

Furca, rod-shaped organ, and medial eye, upper lip (Figures 74k, 79): Similar to those on female.

Lateral eye: Lateral eye similar to that of female but slightly larger. (It is possible to separate males from juvenile females by larger diameter of the lateral eye as seen through shell.)

Posterior: See Figure 74l.

Copulatory organ: See Figure 80.

DESCRIPTION OF JUVENILE.—See Figure 72a for sketch of central muscle scars.

COMPARISONS.—Only one species has previously been assigned to this genus, *Siphonostra spinifera* Skogsberg (1920:298). That species is larger and the carapace has a shape differing from the new

species, and it has 8 furcal claws compared to 7 for *S. hallex*.

DISTRIBUTION.—This species was collected at only one station in the Subantarctic-to-35°S region, Atlantic Ocean, off Argentina. The exact station is in doubt (see remarks), but the assumed depth is 15 m (Figure 63).

Vargula Skogsberg, 1920

TYPE-SPECIES.—*Cypridina* (*Vargula*) *norvegica* Baird, 1860.

This genus is represented by 9 species in the study area: *V. antarctica* (Müller, 1908); *V. dentata*, new species; *V. hamata*, new species; *V. lusca*, new species; *V. stathme*, new species; *V. subantarctica*, new species; *V. sutura*, new species; *V. tubulata* Poulsen, 1962; *V. puppis* Poulsen, 1962.

DIAGNOSIS OF GENUS.—Carapace oval in lateral view with well-defined incisur and narrow-to-elongate caudal process; surface smooth and without lateral ornamentation except for *V. tubulata* which bears short lateral processes on each side of rostrum.

First antenna: b- and c-bristles of 7th joint of male with suctorial discs; f- and g-bristles of 8th joint of males with marginal filaments similar to those on female.

Second antenna: Exopodite with large basal spines and large lateral spine on 9th joint; bristles

Key to Species

(Includes only those species south of latitude 35°S; does not include *Vargula? danae* (Brady, 1880), specimen number 24 herein)

- | | |
|---|-----------------------------|
| 1. Tusks on upper lip with prominent proximal tooth oriented posteriad..... | 2 |
| Tusks on upper lip without proximal tooth..... | 3 |
| 2. Posterior of carapace with tubelike caudal process..... | 20. <i>V. tubulata</i> |
| Posterior of carapace with narrow caudal process..... | 25. <i>V. dentata</i> |
| 3. Seventh limb with hook-shaped process within terminal comb..... | 21. <i>V. hamata</i> |
| Seventh limb with single peg opposite terminal comb..... | 4 |
| 4. All claws of furca separated from lamella by suture..... | 22. <i>V. sutura</i> |
| Claws 2 and 4 of furca united to lamella (claw 3 also united on males of some species)..... | 5 |
| 5. Posterior margins of tusks on upper lip steplike in lateral view..... | 6 |
| Posterior margins of tusks on upper lip fairly linear..... | 7 |
| 6. Lateral eyes well developed..... | 8 |
| Lateral eyes absent..... | 26. <i>V. lusca</i> |
| 7. Carapace shorter than 2.25 mm..... | 27. <i>V. stathme</i> |
| Carapace longer than 2.8 mm..... | 18. <i>V. antarctica</i> |
| 8. Carapace of female (male unknown) with broad flat caudal process..... | 19. <i>V. puppis</i> |
| Carapace of female with very narrow caudal process..... | 23. <i>V. subantarctica</i> |

of 2nd joint with 6–12 spines along ventral margin and few short dorsal hairs. Endopodite 3-jointed; 1st joint with 3–5 bristles; 2nd joint with 1 distal bristle; 3rd joint with terminal filament.

Mandible: Medial bristle of distal pair on ventral margin of 2nd endopodite joint larger than lateral bristle and with rounded or tapering tip.

Maxilla: Longest α -bristle with abundant marginal hairs.

Fifth limb: Small process with spines or hairs present on margin between 4th and 5th joints of exopodite.

Furca: On female, 2nd, or 2nd and 4th claws united to lamella; except *V. sutura* on which no claws are united to lamella; on male, 2nd to 4th claws united to lamella on some species. Claw 3 often more slender and shorter than 4th; each lamella with 8 to 13 claws.

Upper lip: Lip with undivided anterior and divided posterior parts, the latter with long tusk on each side.

DISTRIBUTION.—The genus *Vargula* is widespread; its range extends from about 80°N to 74°S. Its depth range in the study area is from about 55 m to 3431 m. Distribution in the study area is shown in Figure 67.

18. *Vargula antarctica* (Müller)

FIGURE 81

Cypridina antarctica Müller, 1908:84, pl. 4: figs. 4, 11–13, pl. 5: figs. 9–12; 1912:11 [key], 12.—Skogsberg, 1920:265.
Cypridina (Vargula) antarctica Müller.—Skogsberg, 1920:9, 266, fig. 43.

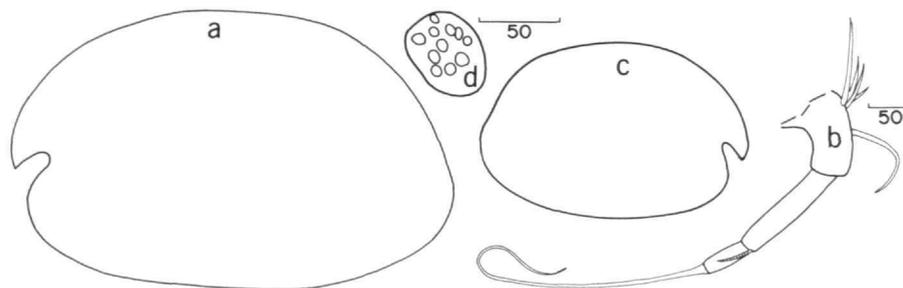


FIGURE 81.—*Vargula antarctica*, ovigerous female, *Discovery* station 41: a, outline of complete specimen, lateral view, length 3.81 mm. Female, *Discovery* station 42: b, endopodite of left 2nd antenna, medial view. Juvenile male, USNM 126218: c, outline of complete specimen, lateral view, length 2.33mm; d, right lateral eye, anterior to right.

Vargula antarctica (Müller).—Poulsen, 1962:181, fig. 91 [?].—Lofthouse, 1967:143.

HOLOTYPE.—None designated.

SYNTYPE LOCALITY.—Gausstation, Antarctica.

REMARKS.—In the synonymy above, the identification of *V. antarctica* off the SE coast of Australia by Poulsen (1962:181) has been questioned only because of the difference in size of that female specimen (length, 3.00 mm) and those reported by Müller and herein (length, 3.63–3.9 mm).

MATERIAL.—USNM 126218, 1 juvenile δ , length 2.33 mm, height 1.50 mm from IWSOE, *Glacier* Cruise 1, station 0001; 1 adult δ , length about 3.3 mm, height about 2.2 mm (carapace with appendages removed and somewhat distorted) from *Discovery* Cruise 1, station 39; 1 φ , shell distorted, approximate length 3.45 mm, from *Discovery* Cruise 1, station 42; 1 gravid φ with 26 eggs, length 3.81 mm, height 2.50 mm + 1 specimen (not dissected), length 3.63 mm, height 2.34 mm from *Discovery* Cruise 1, station 41.

Through Dr. K. G. McKenzie, I received from the British Museum (Natural History) on loan 1 specimen, an adult δ , of *V. antarctica* identified by Lofthouse (1967:143) and which had been collected on *Discovery* Cruise 1. The appendages are on a slide and the valves in alcohol. The label on the slide reads: "90.5 *Vargula antarctica*, B.A.N.-Z.A.R.E., st. 39, 17–1–30, 300 m. TML, from 1966.7.20.42." The label in the vial is similar. The valves are somewhat distorted but are approximately 3.3 mm long and 2.2 mm high. I confirm the identification by Lofthouse.

TYPE-LOCALITY.—Disaster Bay, off southeast Australia (about 37°S, 150°E), 55–75 m, sand and ooze bottom.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Carapace with broad caudal process; dorsal margin of process more or less horizontal; length of adult females 3.22–3.60 mm.

Seventh limb: Proximal group with 10 bristles (6 dorsal, 4 ventral), distal group with 14 bristles (7 dorsal, 7 ventral); terminal comb with 8 teeth (long medial tooth with 2 long and 5 shorter more blunt teeth on each side); 1 fingerlike peg opposite comb.

Furca: Each lamella with 9 claws; 2nd and 4th claws united to lamella, remaining claws separated from lamella by suture; claw 3 weaker than claw 4.

Lateral eyes: Well developed.

Upper lip: Anterior lobe with small squarish marginal processes bearing glandular openings; paired posterior tusks with fairly large glandular processes at tip and along posterior margins.

DISTRIBUTION.—Collected at three localities in the vicinity of Disaster Bay, southeast Australia, at depths of 50 to 180 m. The two localities other than the type-locality are 38°12'S, 149°40'E, 180 m, and 37°05'S, 150°05'E, 50–80 m (Figure 83).

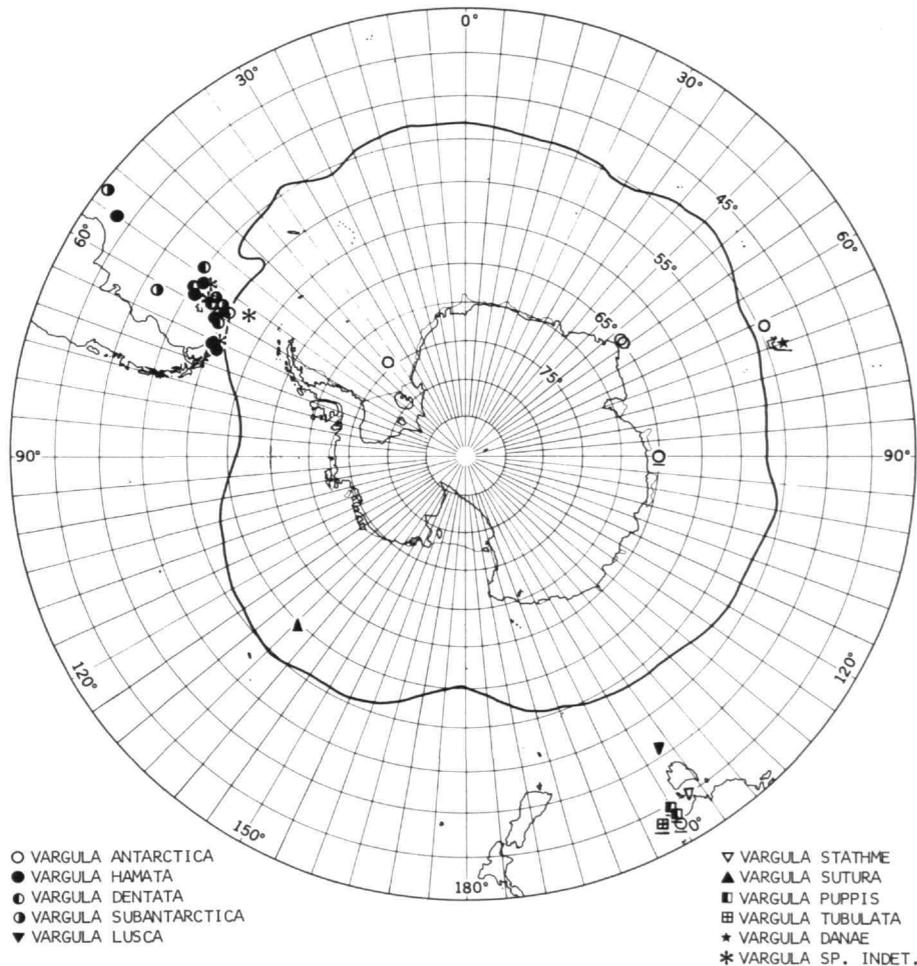


FIGURE 83.—Distribution map of species of *Vargula*.

20. *Vargula tubulata* Poulsen

Vargula tubulata Poulsen, 1962:198, fig. 98.

HOLOTYPE.—A mature ♀ with embryos, length 4.17 mm, Universitets Zoologiske Museum, Copenhagen.

TYPE-LOCALITY.—Off southeast Australia, 37°05'S, 150°05'E, 55–90 m, sand and ooze bottom.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Carapace with tubelike dorsally oriented caudal process; infold of caudal process with anterior ridge with numerous spines; length of gravid female 4.17 mm.

Seventh limb: Limb with 19–20 bristles along ventral margin, 9 along dorsal margin, and 1 lateral bristle on each side of base of terminal dorsal jaw; comb opposite jaw with 16 teeth; 2 small triangular teeth present within comb.

Furca: Each lamella with 8 claws; claws 2 and 4 united with lamella, remaining claws separated from lamella by suture; claw 3 shorter and weaker than claw 4; 2 low processes with minute teeth present on lamella following claw 8.

Lateral eyes: Well developed.

Upper lip: Posterior paired tusks with large medial tooth on proximal posterior margin.

DISTRIBUTION.—Collected only at type-locality (Figure 83).

21. *Vargula hamata*, new species

FIGURES 84–89

HOLOTYPE.—USNM 127263, N-1 juvenile, length 2.87 mm, height 1.81 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 22, station 1536.

ETYMOLOGY.—The specific name "hamata," derived from the Latin "hamus" [= hooked], refers to the hooklike process within the comb of the 7th limb.

PARATYPES.—USNM 127526, 1 gravid ♀; USNM 127527, 1 juvenile; USNM 127528, 16 juveniles; USNM 127529, 127530, 127531, 3 gravid ♀♀; USNM 127532, 9 adult ♀♀, 3 of them gravid; USNM 128039, 1 gravid ♀; USNM 127964, 1 adult ♀ with unextruded eggs; USNM 127965, 3 adult ♀♀, 7 juveniles; USNM 127971, 127972, 2 adult ♂♂. USNM 127526 and 127527 from *Eltanin* Cruise 7,

station 558; USNM 127528 to 127532 from same cruise, station 557. USNM 128039, 127964, 127965, 127971, 127972 from *Eltanin* Cruise station 340.

ADDITIONAL SPECIMENS.—USNM 128141, gravid ♀; USNM 128146, adult ♂; USNM 128147, 2 adult ♀♀ without eggs + 7 juveniles; USNM 128960, gravid ♀, USNM 128961, 2 juveniles; USNM 137372, gravid ♀; USNM 137374, 5 juveniles; USNM 137373, 1 juvenile ♂, length 2.46 mm, height 1.51 mm; USNM 137446, gravid ♀, + 3 juveniles. USNM 128141, 128146, 128147 from *Eltanin* Cruise 9, station 740; USNM 128960, 128961 from *Vema* Cruise 17, station V-17-53; USNM 137372, 137373, 137374 from *Vema* Cruise 17, station V-17-59; USNM 137446 from *Vema* Cruise 17, station V-17-101.

DIAGNOSIS.—Carapace length of adult female, 3.39–4.12 mm; of adult male, 2.66–2.72 mm.

Seventh limb: Hook-shaped process present within terminal comb.

Furca: Claws 2 and 4 on female, and 2, 3, 4 on male continuous with lamella.

DESCRIPTION OF N-1 JUVENILE (Figures 84; 85a,b).—Carapace smooth, oval in lateral view with small but distinct caudal process (Figure 84a,c). Bristles present on anterior and ventral infolds, but somewhat obscure because of debris (Figure 84d). Central muscle scars consisting of about 22 individual scars (Figure 84b).

Size: USNM 127263, length 2.87 mm, height 1.81 mm.

First antenna: First joint with few small spines forming cluster on medial surface; 2nd joint extremely spinous; 3rd joint short, spinous, with 2 spinous bristles, 1 ventral, 1 dorsal; 4th joint elongate with 2 spinous bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with about 9 long proximal filaments and several shorter distal filaments; medial bristle of 6th joint spinous, about same length as bristles on 3rd and 4th joints. Seventh joint: a-bristle spinous, longer and stouter than bristle on 6th joint; b-bristle longer than a-bristle and with about 4 short filaments; c-bristle long with about 9 short filaments. Eighth joint: d- and e-bristles bare, of equal length; f- and g-bristles long with about 10 filaments, some with marginal spines.

Second antenna (Figure 84e-g): Protopodite with spinous medial bristle. Endopodite 3-jointed: 1st joint with 3 bare proximal bristles, 1 longer than



FIGURE 84.—*Vargula hamata*, juvenile, USNM 127263, complete specimen: *a*, lateral outline, length 2.87 mm. Right valve: *b*, sketch of central muscle scars, lateral view. Left valve: *c*, caudal process, medial view; *d*, anterior, medial view. Second antenna: *e*, endopodite and part of protopodite of right limb, medial view; *f*, bristle on 2nd joint of exopodite of left limb, lateral view; *g*, joints 5–9 of exopodite of left limb, lateral view (bristles not shown). Right mandible: *h*, basale and 1st endopodite joint, medial view; *i*, distal end of dorsal margin of 2nd endopodite joint, medial view. Maxilla: *j*, exopodite and 1st endopodite joint; *k*, detail of cutting tooth in “*j*.” Right 5th limb: *l*, distal end, anterior view; *m*, detail of anterior process of protopodite shown in “*l*,” anterior view. Sixth limb: *n*, left limb, lateral view. Furca: *o*, left lamella, lateral view. (Same magnification in microns: *c,d,o*; *e,h,j,l,n*; *f,g*; *k,m*.)

others, and 1 spinous distal bristle; 2nd joint with 1 bare bristle; 3rd joint with long terminal filament. Exopodite: bristle of 2nd joint of right limb aberrant, about twice length of joints 3 to 9 and with long natatory hairs along both distal ventral and dorsal margins proximal to 5 large teeth; bristle of 2nd joint of left limb normal, reaching 8th joint of exopodite, and with 1 minute proximal spine and 10 stout spines along ventral margin; basal spines present on joints 2 or 3 to 9; distal dorsal margins of joints 2 to 8 with short spines forming row; 9th joint with 1 short bristle with few short marginal spines, and 3 long bristles with natatory hairs; bristles of joints 3 to 8 with natatory hairs.

Mandible (Figure 84*h,i*): Coxale endite spinous with 2 stout terminal spines with small process between them; small bristle present at base of endite. Basale: ventral margin with 2 a-bristles, 1 b-bristle, 2 c-, and 2 d-bristles; dorsal margin with 1 subterminal and 2 terminal bristles. Exopodite about equal in length to dorsal margin of 1st endopodite joint, with 2 spinous bristles, outer bristle about half length of inner bristle. Endopodite: ventral margin of 1st joint short with 4 bristles, 2 long spinous, 1 short spinous, 1 minute bare; dorsal margin of 2nd joint with about 19 bristles; ventral margin with 2 single bristles and terminal pair consisting of lateral bristle and broad medial spine; end joint with 3 claws and 4 normal bristles, medial claw with rather long spines along middle of concave margin.

Maxilla (Figure 84*j,k*): Plumose bristle of coxale with short spines distally; outer margin of coxale with spines forming fringe. Basale with only 2 bristles observed on terminal margin. Exopodite: proximal and outer of terminal bristles plumose proximally and with short marginal spines distally, inner terminal bristle with short marginal spines. Endopodite: cutting edge with large squarish tooth with undulate margin; 2 α - and 2 β -bristles present, larger of latter with short marginal spines, other shorter, bare; margins of 1st endopodite joint spinous. Endite I with about 10 bristles with bladelike, tapering, and triaenid tips; endite II with 6 bristles, most with triaenid tips; endite III with about 6 bristles. Bristles of end joint obscure.

Fifth limb (Figure 84*l,m*): Anterior process of protopodite large with undulating outer margin; anterior margin of 1st exopodite joint with 1

spinous bristle near protopodite process in addition to usual 3 bristles; main tooth normal for genus; anterior margin of 2nd exopodite joint with 1 spinous bristle distal to prodopodite process; 3rd exopodite joint with 3 bristles on inner lobe and 2 on outer lobe; 4th joint with 1 spinous proximal bristle on posterior side and 2 spinous terminal bristles; 5th joint with 2 spinous bristles; several stout spines present on 5th joint near bases of terminal bristles; distinct suture present separating 4th and 5th joints.

Sixth limb (Figure 84*n*): Epipodial appendage with 4 bristles, 1 bristle longer than others; 1st endite with 3 spinous bristles, 2 medial, 1 distal; 2nd endite with 5 spinous bristles, 3 medial, 2 terminal; 3rd endite with 4 to 5 spinous bristles, 1 medial, 3 to 4 terminal; 4th endite with 3 spinous bristles, 1 medial, 2 terminal; 4th endite smaller than 3rd; end joint with 8 anteroventral bristles followed by a gap and then 1 spinous and 2 hirsute stout bristles on posterior corner; posterior end of end joint not extending posteriorly; ventral margin of end joint with long spines inserted on lateral side.

Seventh limb (Figure 85*a*): Each limb with total of 18 bristles, 6 distal (2+4; 1+5) and 12 proximal (7+5; 6+6); terminal comb with 13 spinous teeth; hooklike sclerotized process with smooth margin present inside comb; no peg present opposite comb; each bristle tapering distally with only 1 to 3 bells (juvenile traits).

Furca (Figure 84*o*): Each lamella with 8 claws, claws 2 and 4 united to lamella; teeth forming medial and lateral row along posterior margins of claws; anterior margin of each lamella with few short spines.

Rod-shaped organ and eyes (Figure 85*b*): Rod-shaped organ short, fingerlike with fine annulations at tip. Medial eye large pigmented. Lateral eye about same size as medial eye with about 16 ommatidia; black pigment present between ommatidia.

Upper lip (Figure 85*b*): Lip consisting of unpaired anterior part (somewhat obscured by debris in holotype) and single posterior pair of rather small tusks: bulge posterior to tusks hirsute.

DESCRIPTION OF ADULT FEMALE (Figures 85*c-o*, 86, 87).—Carapace oval in lateral view with distinct rounded caudal process and deep incisor (Figure 85*c*); upper margin of caudal process join-



FIGURE 85.—*Vargula hamata*, juvenile, USNM 127263: a, tip of 7th limb; b, anterior of body showing left lateral eye, proximal part of right 1st antenna, medial eye, and rod-shaped organ, upper lip. Female, USNM 127526, complete specimen: c, lateral outline, length 3.58 mm. Right valve, medial view: d, caudal process; e, normal pores. Left valve, medial view: f, caudal process; g, anterior; h, inner end of incisur. Appendages: i, tip of left mandible, lateral view; j, tip of 7th limb; k, right lateral eye, medial eye, and rod-shaped organ; l, upper lip, anterior to right; m, upper lip, posterior view; n, genitalia and spermatophores. Valves, lateral view: o, foreign markings and scratches on surface. (Same magnification in microns: a,b,d,f-h,j,k-n; e,o.)

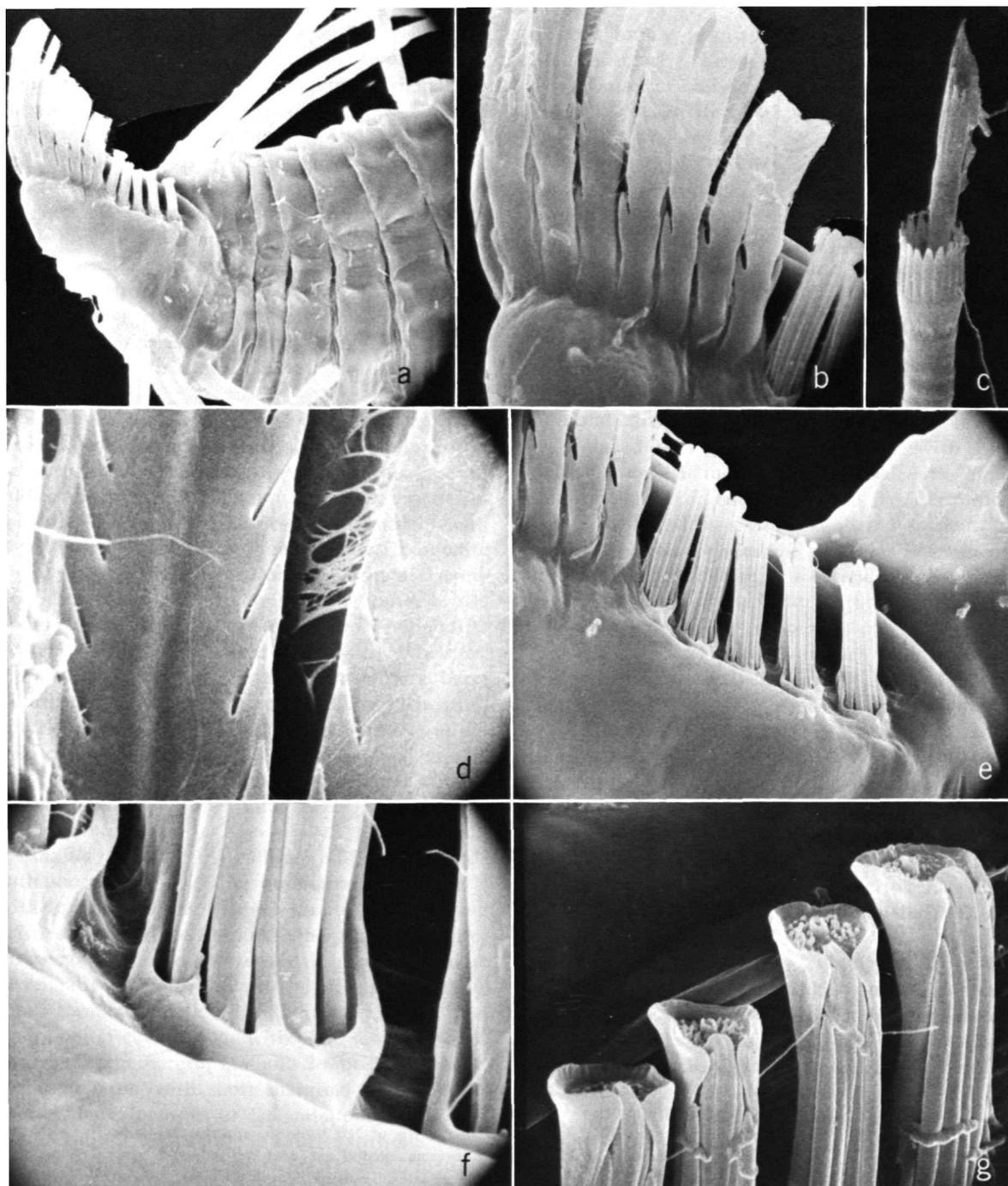


FIGURE 86.—*Vargula hamata*, female, USNM 128141, 7th limb: *a*, tip of limb, $\times 600$; *b*, detail of comb tooth in "*a*," $\times 2000$; *c*, tip of bristle, $\times 2800$; *d*, detail of long ventral teeth in "*a*," $\times 2000$; *e*, detail of short lateral teeth in "*a*," $\times 2000$; *f*, detail of base of lateral teeth in "*e*," $\times 1200$; *g*, detail of tips of 4 short lateral bristles on opposite side of limb, $\times 5000$.

ing posterior shell margin in slight concavity; lower margin of caudal process joining ventral margin of shell without concavity.

Ornamentation: Surface with minute pores, otherwise smooth.

Infold (Figure 85*d-h*): Infold of rostrum with about 20 bristles; inner end of incisur with 2 bristles, upper bristle double, and about twice length of lower (Figure 85*h*); infold below incisur with 3 bristles near inner margin of incisur followed by gap and then about 44 to 48 double bristles forming row extending onto anteroventral infold; about 10 to 17 double bristles present between row of anteroventral bristles and inner margin of infold; midventral infold bare; infold of caudal process of right valve wider than that of left valve; ridge, with minute spines along posterior edge, present along inner margin of infold of caudal process on each valve.

Selvaige: Narrow lamellar prolongation along anterior and ventral margins widening along lower margin of incisur where it is distinctly striate; striations faint on ventral lamellar prolongation.

Shell markings: Outer surfaces of valves of USNM 127526 with linear and ovoid markings apparently of organic foreign origin (Figure 85*o*).

Size (Figure 82): USNM 127526, length 3.58 mm, height 2.47 mm; USNM 127529, length 3.65 mm, height 2.56 mm; USNM 127530, length 3.44 mm, height 2.45 mm; USNM 127531, length 3.39 mm, height 2.35 mm (not dissected); USNM 128039, length 3.53 mm, height 2.64 mm; USNM 127964, length 3.39 mm, height 2.36 mm; USNM 128141, length 3.45 mm, height 2.29 mm; USNM 128960, length 4.12 mm, height 2.81 mm; USNM 137372, length 3.58 mm, height 2.47 mm; USNM 137446, length 3.62 mm, height 2.49 mm.

First antenna: Sensory bristle of 5th joint with 10 long proximal filaments and 3 short distal filaments, otherwise joint similar to that of N-1 female.

Second antenna: Ventral margin of bristle on 2nd joint of exopodite with 10 stout spines, limb otherwise similar to that of N-1 female.

Mandible: Process between terminal spines of coxale endite not observed. Dorsal margin of 2nd endopodite joint with 5 long bristles, 3 medium bristles, and about 22 short bristles. End joint: ventral lateral bristle somewhat broadened in proximal two-thirds (Figure 85*i*); proximal spines pres-

ent along concave margins of both ventral claws, dorsal claw bare; only 3 bristles observed. Limb otherwise similar to that of N-1 female.

Maxilla: Endite III with 5 terminal and 1 proximal bristle. Cutting tooth of endopodite obscured. Limb similar to that of N-1 female.

Fifth limb: Epipodial appendage with 54 bristles. Exopodite: 4th joint with 1 posterior and 3 terminal bristles. Limb similar to that of N-1 female.

Sixth limb: Epipodial appendage with 5 bristles of which 2 distal bristles longer than others. End joint with 12 anteroventral bristles followed by a gap and then 1 spinous and 2 hirsute stout bristles on posteroventral corner. Appendages otherwise similar to that of N-1 female.

Seventh limb (Figures 85*j*, 86): Each limb with total of 21 to 27 bristles, 11 or 12 distally (7 ventral and 4 or 5 dorsal) and 10 to 15 proximally (5 to 7 ventral and 6 to 9 dorsal); each bristle with 1 to 5 bells; terminal comb with 13 spinous teeth; 4 short square-tipped teeth present on each side of spinous teeth; hooklike sclerotized process with smooth margin present inside comb; no peg present opposite comb.

Furca: Each limb of USNM 127526 with 9 claws; claws 2 and 4 united to lamella; claw 3 about same thickness or slightly thinner than claw 4; limb similar to that of N-1 female. Furca of USNM 127529 similar except 11 claws on right limb and 9 on left.

Rod-shaped organ and eyes (Figure 85*k*): Similar to those of N-1 female.

Upper lip (Figures 85*l,m*; 87): Similar to that of N-1 female. Each tusk with 6 or 7 glandular openings along posterior margin plus several additional openings at tip; posterior bulge bilobate, hirsute; anterior unpaired part with crenulate margin; tufts of hairs present near glandular openings.

Genitalia: Ovoid spermatophore attached to genital opening on each side (Figure 87*n*); spermatophore containing numerous filaments.

Eggs: USNM 127526 with 9 eggs in brood chamber; USNM 127529 with 10; USNM 127530 with 18, and USNM 127531 with 3; USNM 127532, 3 gravid females with 3, 5, and about 20 eggs; USNM 128039, 18 eggs; USNM 128141, 25 eggs; USNM 128960, 14 eggs; USNM 137372, 10 eggs; USNM 137446, 13 eggs.

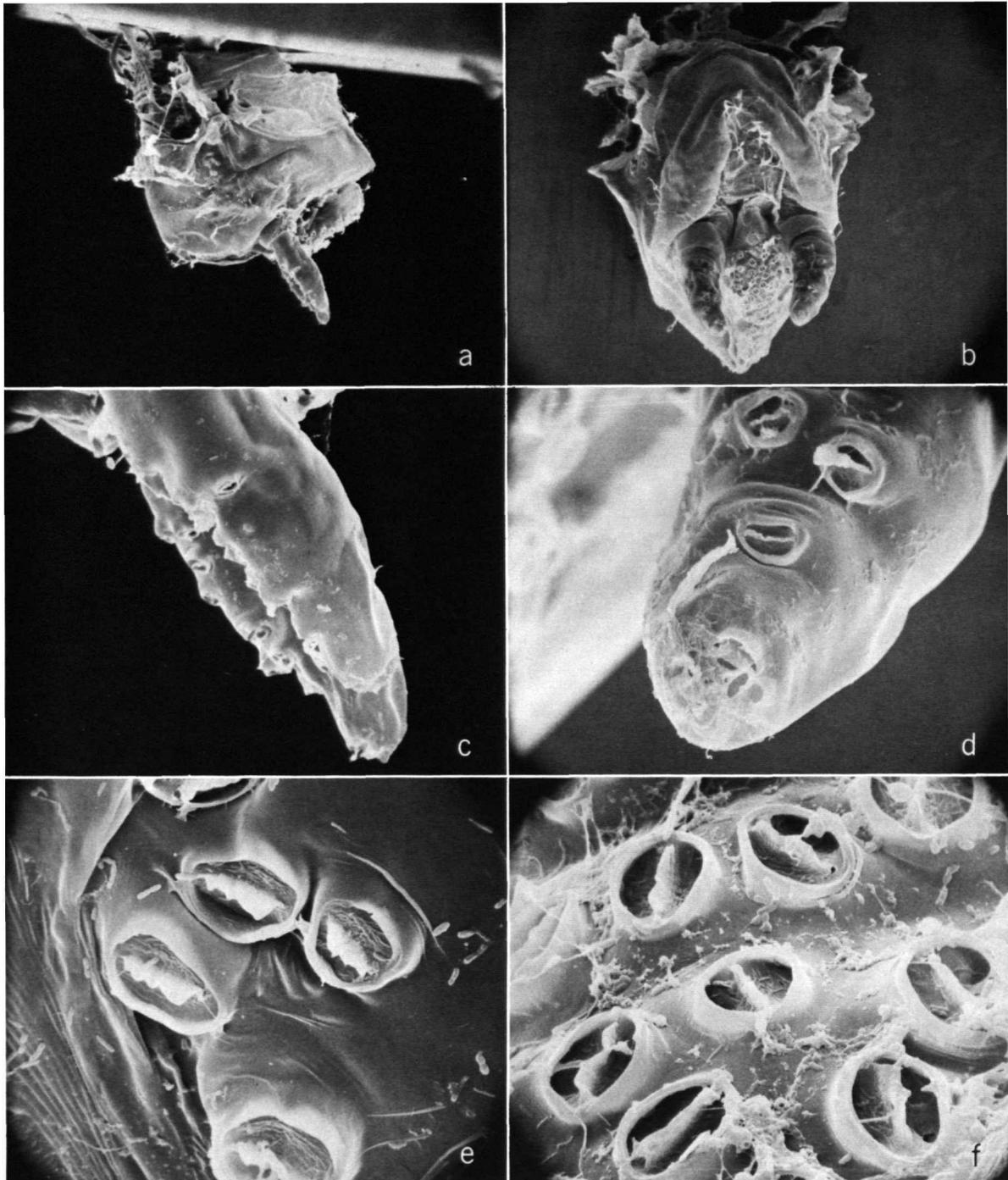


FIGURE 87.—*Vargula hamata*, female, USNM 128141, upper lip: *a*, complete lip, right lateral view, $\times 90$; *b*, complete lip, posteroventral view; *c*, tusks, right lateral view (detail from “*a*”), $\times 1800$; *d*, top of right tusk, posteroventral view (detail from “*b*”), $\times 1000$; *e*, proximal lateral field on left side (detail from “*a*”) $\times 1800$; *f*, detail of ventral field, $\times 2000$.

Gut contents: USNM 128141, a gravid female, contained in the gut 1 small unidentified spine, a few diatom fragments, and numerous minute eggs with a thick shell identified by Dr. Duane Hope as worm (nematode?) eggs. The gut was packed with spherical cells which may have been part of

the ostracode, or at least could not be distinguished as foreign matter.

DESCRIPTION OF ADULT MALE (Figures 88, 89).—Carapace smaller than female, otherwise similar (Figure 88a). Size (Figure 82): USNM 127971, length 2.66 mm, height 1.89 mm; USNM 127972,

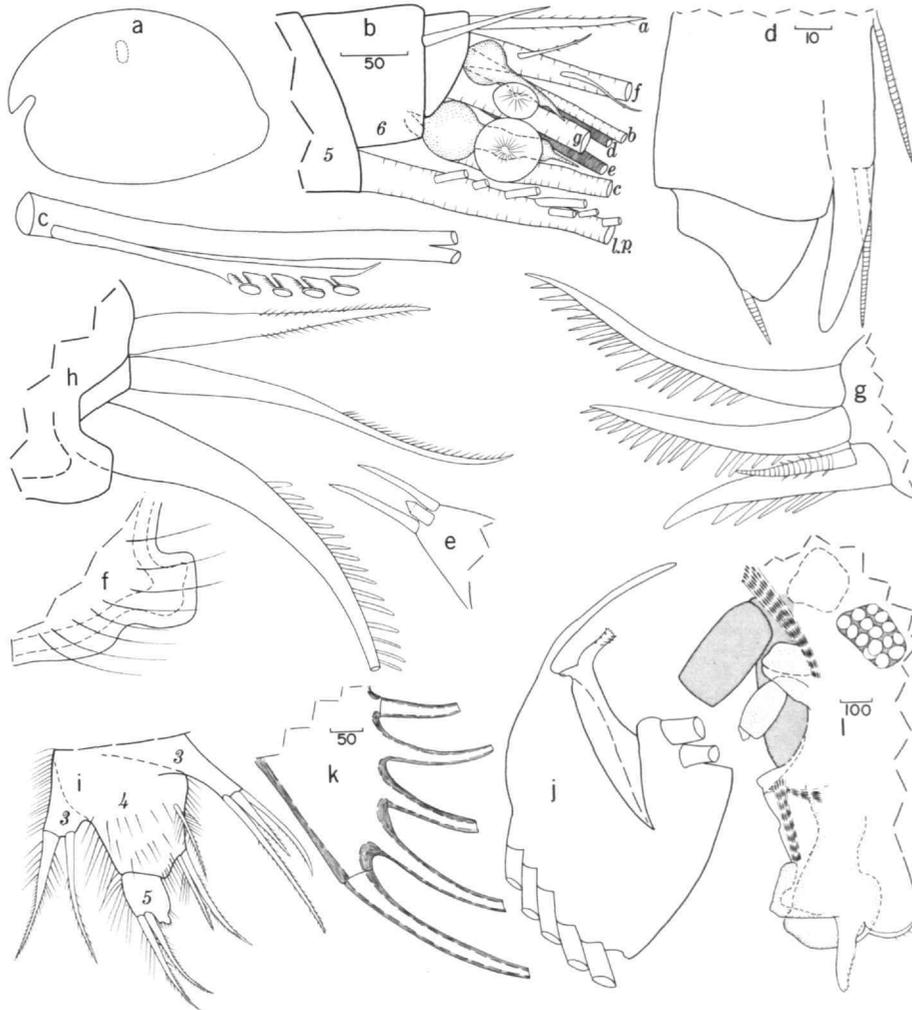


FIGURE 88.—*Vargula hamata*, male, USNM 127971, complete specimen: a, lateral outline, length 2.66 mm. First antenna: b, tip of left limb, medial view; c, part of b-bristles on right limb, lateral view. Mandible: d, tip of right limb medial view (not all bristles shown); e, tip of coxale endite of right limb, medial view. Maxilla: f, detail of "cutting tooth" on right limb, medial view; g, detail of c-bristles on right limb, medial view; h, 6-bristles of left limb, lateral view. Right 5th limb: i, distal end, posterior view. Seventh limb: j, tip of limb (only 1 comb tooth shown). Furca: k, tip of left lamella, lateral view. Body: l, anterior showing position of heart (dashed outline), left lateral eye, proximal part of right 1st antenna (pattern), medial eye and rod-shaped organ, upper lip. (Same magnification in microns: c-j.)

length 2.72 mm, height 1.87 mm (not dissected); USNM 128146, length 2.68 mm, height 1.85 mm.

First antenna (Figure 88*b,c*): Joints 1 to 4 similar to female; sensory bristle of 5th joint with 10 long proximal filaments and 3 slender distal filaments; medial bristle of 6th joint with few marginal spines. Seventh joint: a-bristle with few spines, longer and stouter than bristle on 6th joint; b-bristle with proximal filament with bulbous base and large disc, filament near middle with small spine and 4 discs, and distal filament without discs, c-bristle with proximal filaments with bulbous base and disc larger than that on b-bristle, 2 filaments with 3 or 4 discs, and about 5 filaments without discs. Eighth joint: d- and e-bristles bare; f- and g-bristles with about 10 filaments, most with marginal spines.

Second antenna: Bristle of 2nd joint of Exopo-

dite with 9 ventral spines. Limb similar to that of female.

Mandible: Coxale endite with small process between terminal spines (Figure 88*e*). Medial spine of terminal pair on ventral margin of 2nd endopodite joint quite broad (Figure 88*d*). End joint with 4 bristles and 3 claws; large lateral claw with few minute teeth near base, claws otherwise smooth; medial ventral bristle very short; medial lateral bristle with marginal spines and slightly broadened base, other bristles bare. Limb otherwise similar to that of female.

Maxilla (Figure 88*f-h*): Distal margin of basale with 3 bristles. Outer α -bristle of 1st endopodite joint plumose almost to tip, inner α -bristle with scattered short marginal spines; 3 β -bristles present, outer bristle pectinate, inner shorter bristles with short marginal spines. End joint with 4 a-bristles,

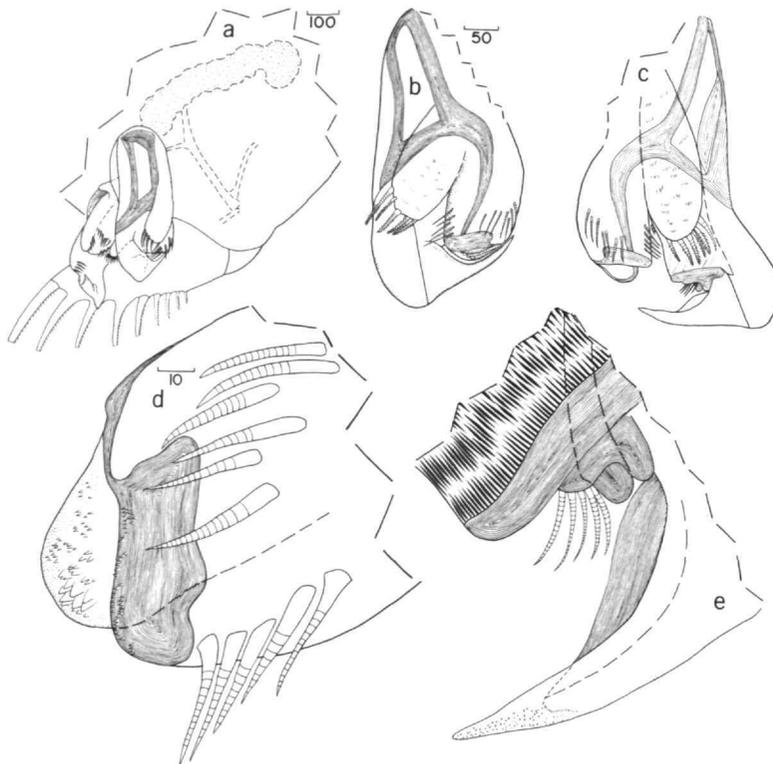


FIGURE 89.—*Vargula hamata*, male, USNM 127971, body: *a*, posterior showing furca, copulatory organs, and sclerite, anterior to left (both copulatory appendages were not on same side prior to dissection). Copulatory limbs: *b*, left limb (orientation uncertain); *c*, right limb (orientation uncertain); *d*, tip of right limb shown in "*c*"; *e*, tip of right limb shown in "*c*." (Same magnification in microns: *b,c,d,e*.)

some with few marginal teeth, 2 pectinate b-bristles, 4 c-bristles (3 clawlike pectinate, 1 short with marginal spines), and 3 pectinate d-bristles. Endite I with about 10 bristles; only 4 or 5 bristles observed on endites II and III; triaenid tips present on some bristles of 1st 2 endites. Limb otherwise similar to female.

Fifth limb (Figure 88i): Epipodial appendage with 56 to 60 bristles. Right limb of USNM 127971: 4th joint of exopodite with 3 spinous bristles; 5th joint with 2 spinous bristles; spined process present on inner side of terminal margin of 5th joint. Left limb of USNM 217971 aberrant, without inner lobe on 3rd joint, with 2 bristles fused together at proximal part on outer lobe of third joint, 7 bristles on 4th joint, and 3 on 5th. Limb otherwise similar to female.

Sixth limb: Epipodial appendage with 5 bristles. End joint of left limb of USNM 127971 with 11 anterior bristles on ventral margin, right limb with 9. Limb otherwise similar to that of female.

Seventh limb (Figure 88j): Each limb with total of 22 bristles, 10 distally (7 ventral and 3 dorsal) and 12 proximal (7 ventral and 5 dorsal); each bristle with 3 to 5 bells; 3 to 5 blunt teeth present on each side of 12 to 14 long curved spinous teeth of comb; hooklike process inside comb with many minute teeth near tip.

Furca (Figures 88k, 89a): Each lamella with 9 claws, claws 2, 3, and 4 united to lamella; short spines forming row along margin of lamella following last claw; each claw with lateral and medial row of teeth as on claws of female.

Rod-shaped organ, eyes, upper lip (Figure 88l): Similar to those on female.

Copulatory organ (Figure 89): Each limb consisting of 2 lobes connected by inner sclerotized process; longer of lobes with large hooklike tip and proximal joint with 5 or 6 spinous bristles; additional minute bristles present on lobe with hooked tip; smaller lobe with rounded sclerotized knob at tip with small pustules on surface and 2 groups of 5 to 7 bristles proximal to tip. Lobes may be separated (Figure 89c), or hook of longer lobe may fit over knob of shorter lobe (Figure 89d).

REMARKS.—The furca of the male in this species has the 2nd, 3rd, and 4th claws joined to the lamella without a suture, whereas, the furca of the female has only the 2nd and 4th claws joined

without a suture. Skogsberg (1920:259, 261) reported similar sexual dimorphism in the species *Vargula norvegica* (Baird, 1960:200).

COMPARISONS.—The hooklike process inside the comb of the 7th limb distinguishes *V. hamata* from other species of the genus. The hook is somewhat similar to that on *V. hilgendorfi* Müller, 1890, but only the 2nd furcal claw on the female of that species is united with the furca, whereas, both the 2nd and 4th are united on *V. hamata*. The hook is absent on both *V. sutura* and *V. antarctica*, which are also present in the Antarctic Ocean. These two species have a peg opposite the comb that is absent on *V. hamata*. *Vargula sutura* also differs in having no claws of the furca united with the lamella. The outline of the carapace of *V. hamata* resembles that of *Cypridina glacialis* Brady, 1907 (appendages unknown), but it is smaller . . . carapace length 4.12 mm (USNM 128960) compared to 5 mm.

DISTRIBUTION.—This species was collected only in the American Quadrant in Antarctic, Subantarctic, and Subantarctic-to-35°S regions, at bathyal depths (429–1212 m) (Figure 83).

22. *Vargula sutura*, new species

FIGURES 90, 91

HOLOTYPE.—USNM 127506, ♀, fragments of valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 14, station 1248, Pacific Quadrant, Antarctic Ocean.

ETYMOLOGY.—The specific name “*sutura*” from the Latin “*sutura*” [= seam] refers to the suture or seam separating all claws of the furca from the lamellae.

PARATYPES.—USNM 127504, 127505, 127507 (2 specimens), all juveniles from same sample as holotype.

DIAGNOSIS.—Medial bristle of distoventral pair on 2nd endopodial joint of mandible pointed and not longer than lateral bristle.

Furca: Female with all claws separated from lamella by suture.

DESCRIPTION OF FEMALE.—(Carapace of adult holotype consisting of fragments; following description of shell from juvenile paratypes USNM 127504, 127505.) Carapace smooth, oval in lateral



FIGURE 90.—*Vargula sutura*, N-1 juvenile, USNM 127504: *a*, outline of complete specimen, lateral view, length 2.26 mm. N-1 (or N-2) juvenile, USNM 127505: *b*, caudal process, right valve, medial view; *c*, anterior, left valve, medial view; *d*, tip of 7th limb. Female, USNM 127506: left 2nd antenna: *e*, endopodite and part of protopodite, medial view. Exopodite, right 2nd antenna: *f*, bristle on 2nd joint, medial view; *g*, joints 1 and 2, medial view; *h*, joints 5-9 showing basale spines, medial view (bristles not shown). Mandible: *i*, basale and endopodite of right limb, lateral view (not all bristles shown); *j*, tip of left limb, medial view. Right maxilla: *k*, endite I, lateral view; *l*, exopodite and 1st endopodite joint, lateral view. (Same magnification in microns: *b,c,e,g,h,l; f,k; d,j*)

view with small but distinct caudal process (Figure 90a).

Infold (Figure 90b,c): Infold broad in area of rostrum and caudal process, narrower elsewhere; infold behind rostrum with about 15 bristles; infold of anteroventral margin with about 13 double bristles forming row paralleling margin; infold of ventral margin without bristles; posterior edge of list along anterior margin of infold of caudal process smooth, with numerous pores, some larger than others, and with single small bristle present at ventral end.

Selvage: Lamella prolongation with smooth outer margin present along anterior and ventral margins and caudal process, being quite broad and striate along lower margin of incisur.

Size: Size of adult unknown. Size of two juveniles, N-1 or N-2 stage: USNM 127504, length 2.26 mm, height 1.46 mm; USNM 127505, length 2.15 mm, height 1.44 mm.

First antenna: 1st joint bare, 2nd joint with spines along ventral and dorsal margins; 3rd and 4th joints each with 2 spinous bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with 13 long proximal filaments and several short distal filaments; medial bristle of 6th joint short spinous. Seventh joint: a-bristle short spinous; b-bristle with 5 proximal filaments, some with marginal spines, distal margin of b-bristle with about 4 pairs of marginal spines; c-bristle with 9 marginal filaments and bifurcate tip, proximal filaments with marginal spines. Eighth joint: d- and e-bristles bare; f- and g-bristles with about 10 marginal filaments and bifurcate tip, most filaments with marginal spines.

Second antenna (Figure 90e-h): Protopodite with bare medial bristle. Endopodite distinctly 3-jointed: 1st joint with 4 or 5 proximal bristles, 3 or 4 short, 1 longer, and 1 long distal ventral bristle, all bristles bare; 2nd joint elongate with 1 fairly long bare distal bristle; 3rd joint short with 1 long bare terminal filament. Exopodite: bristle of 2nd joint reaching 9th joint and with 12 ventral spines; 9th joint with single or bifurcate lateral spine and 4 bristles, 1 short, bare, 3 long with natatory hairs; bristles of joints 3 to 8 with natatory hairs, but without spines; basal spines present on joints 3 to 8, spine on 8th joint only three-fourths length of 9th joint; lateral spine of 9th joint slightly longer than 9th joint; 1st joint with minute spines along dorsal margin.

Mandible (Figures 90i,j; 91b): Coxale endite extremely spinous with short peg present between 2 stout terminal spines; short stout bristle present at base of endite. Basale: ventral margin with 2 spinous a-bristles (medial), 1 short spinous b-bristle (lateral) near a-bristles, 2 c-bristles, 1 short bare, 1 medium spinous, and 2 spinous d-bristles; minute process present on margin between c-bristles; dorsal margin with 3 spinous bristles. Exopodite reaching end of 1st endopodite joint and with 2 spinous bristles. Endopodite: 1st joint with 3 ventral bristles, 2 short, 2 long, and short spines forming row near distal margin; dorsal margin of 2nd joint with 4 long, 2 medium, and 8 short bristles, all with bases on proximal half of margin; ventral margin of 2nd joint with 2 single short slender distal bristles and terminal group with short lateral bristles and medial spine; end joint with 3 claws and 4 bristles, each claw with several minute proximal teeth along concave margin.

Maxilla (Figure 90k,l): First endite with 10 bristles, some with triaenid tips, others with either broad tip, or normally tapering (tips of bristles similar to those illustrated for *Gigantocypris muelleri* Poulsen (Poulsen, 1962:62, fig. 28); 2nd endite with 6 bristles, some with triaenid tips; 3rd endite with 5 bristles, some with triaenid tips; 1 small bristle present on basale near base of 3rd endite. Coxale with usual stout plumose bristle. Basale with 2 bristles on distal margin near base of exopodite, 1 long, 1 short. Exopodite hirsute with 1 hirsute proximal bristle and 2 terminal bristles, outer terminal bristle with long marginal hairs, inner bristle with widely separated short spines. Endopodite 1st joint: short spines on anterior margin and long hairs on posterior margin; cutting edge of joint not well defined; 2 α -bristles present, longer of these with long marginal hairs continuing to tip, shorter bristle with short marginal spines; 2 or 3 β -bristles present, 2 stout pectinate, 1 short with single tooth near tip. Endopodite 2nd joint: 5 a-bristles present, 2 posterior of these with few marginal teeth, other bristles bare; 3 b-bristles, 3 c-bristles, and 3 d-bristles present, all except outer c-bristle pectinate; 2nd joint bending inwards forming almost right angle with 1st joint.

Fifth limb (Figure 91a): Epipodial appendage with 62 bristles; protopodite with usual anterior process. Exopodite: main tooth of 1st joint with proximal peg and 6 pectinate teeth; 1 spinous bris-

tle present proximal to peg; 2nd joint with 1 spinous proximal posterior bristle, 1 spinous proximal anterior bristle, and distally, 4 or 5 pectinate a-bristles, and 6 pectinate b-bristles; 3rd joint with 3 spinous bristles on inner lobe and 2 on outer lobe; 4th and 5th joints separated by distinct suture; 4th joint with 3 spinous bristles on inner side; 5th joint with 2 spinous bristles; no process present between 4th and 5th joints, although a few stout spines were observed on 1 limb; 3rd to 5th joints hirsute. Three endites present.

Sixth limb (Figure 91c): Epipodial appendage with 4 bare bristles; 1st endite with 3 or 4 spinous bristles, 2 or 3 medial, 1 terminal; 2nd endite with 4 or 5 spinous bristles; 3rd endite with 4 or 5 spinous bristles, 1 or 2 medial, 3 terminal; 4th endite with 4 spinous bristles, 2 medial, 2 terminal; 4th endite slightly smaller than 3rd. End joint

with 16 or 17 bristles: anteroventral margin with 11 broad bristles with long proximal and short distal marginal spines; posteroventral margin with 1 spinous bristle and 4 longer hirsute bristles; small space present between anteroventral and posteroventral bristles; 1 short spinous bristle with base on medial surface present near 4th bristle in anteroventral group of right limb of holotype, but not on left; medial and lateral surfaces and ventral margin of end joint hirsute.

Seventh limb: (Both 7th limbs of only adult in the collection are missing. Therefore, the 7th limbs of a juvenile, USNM 127505, is described here. The juvenile bears 7 claws on the furca and is either an N-1 or, more likely, an N-2 instar). Each limb with 4 bristles in terminal group and 1 or 2 bristles in proximal group, each bristle tapering distally and with 1 bell. Terminal comb consisting

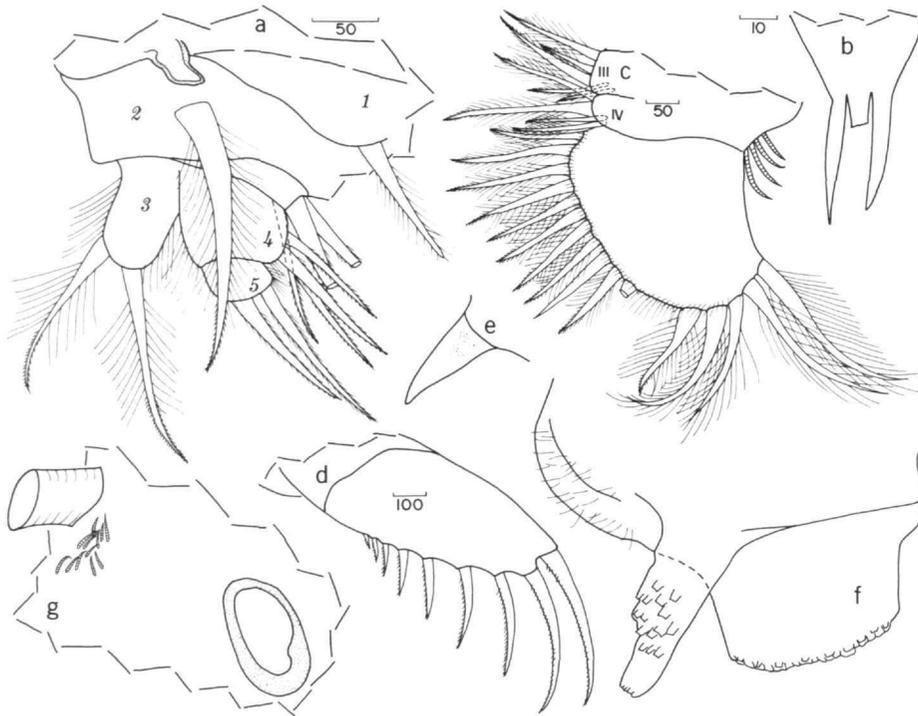


FIGURE 91.—*Vargula sutura*, female, USNM 127506: a, tip of right 5th limb, anterior view; b, tip of coxale endite on right mandible, medial view (surface spines not shown); c, left 6th limb, lateral view; d, right lamella of furca, lateral view; e, medial eye and rod-shaped organ; f, upper lip, anterior to left; g, proximal end of right 7th limb, brushlike organ, and genitalia, anterior to left. (Same magnification in microns: c,e-g.)

of 5 teeth including 1 short spinous tooth on each end of comb (Figure 90d); fingerlike peg, which may have spines, present opposite comb.

Furca (Figure 91d): Each lamella with 9 claws separated from lamella by suture, each claw decreasing in length dorsally; base of 3rd claw only very slightly narrower than base of 4th claw, or both claws about same width; all claws, except possibly last 2, with medial and lateral row of teeth along posterior margin; anterior margin of lamella with few short spines.

Rod-shaped organ and eyes (Figure 91e): Rod-shaped organ short, tapering. Lateral eyes absent, medial eye not well defined.

Upper lip (Figure 91f): Lip consisting of anterior unpaired part and 1 pair of posterior tusks followed by unpaired hirsute lobe; anterior unpaired part with several rows of glandular openings on ventral surface; tusks with glandular openings forming row at tip and 4 or 5 irregular rows near middle of lateral surface.

Genitalia and brushlike organ (Figure 91g): Genitalia on each side represented by sclerotized ring. Brushlike organ consisting of about 12 minute bristles located dorsal to genitalia near base of 7th limb.

COMPARISONS.—The furca of *Vargula sutura* differs from previously described species of the genus in having all claws of the furca separated from the lamellae by sutures. Also, the medial bristle of the distoventral pair on the 2nd endopodial joint of the mandible is pointed and not longer than the lateral bristle.

DISTRIBUTION.—This species was collected at only one locality in the Pacific Quadrant of the Antarctic region at a depth of 3386–3477 m (Figure 83).

23. *Vargula subantarctica*, new species

FIGURES 92–98

HOLOTYPE.—USNM 127961, gravid ♀, length 2.78 mm. Valves and some appendages in alcohol, remaining appendages on slide.

TYPE-LOCALITY.—*Eltanin* Cruise 6, station 340, South Atlantic, Subantarctic.

PARATYPES.—USNM 127959, 1 gravid ♀; USNM 127962, 1 gravid ♀; USNM 127966, 1 juvenile without carapace; USNM 127960, 1 juvenile instar

III, length 1.43 mm, height 1.02 mm; USNM 127967, 1 adult ♂. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 127273, 1 juvenile, length 2.41 mm, height 1.63 mm; USNM 128285, adult ♂; USNM 137450, gravid ♀; USNM 137451, 2 juveniles; USNM 137461, 1 juvenile, length 2.17 mm, height 1.51 mm. USNM 128273 from *Eltanin* Cruise 22, station 1596; USNM 128285 from *Eltanin* Cruise 6, station 344; USNM 137450, 137451 from *Vema* Cruise 18, station V-18-15; USNM 137461 from *Vema* Cruise 18, station V-18-9.

DIAGNOSIS.—Carapace length of female, 2.74 mm; of male, 2.29–2.42 mm. Posterior of female with very narrow caudal process.

Seventh limb: Peg with few spines near tip present opposite comb.

Furca: Claws 2 and 4 of female and 2, 3, and 4 of male continuous with lamella.

DESCRIPTION OF FEMALE (Figures 92–97).—Carapace oval in lateral view with narrow anterior incisur; posterior margin evenly rounded without projecting caudal process, but with considerable intraspecific variability in degree of curvature of ventral half—some specimens with both ventral and dorsal margins of posterior margin with about same degree of curvature (USNM 127961, Figure 92a), others with ventral half of posterior margin less rounded than dorsal half (USNM 127962, Figure 93g).

Infold (Figures 92c-g): Infold behind rostrum with about 20 double bristles; inner corner of incisur with usual 2 bristles; lower margin of incisur with 2 short double bristles near inner corner and row of about 43 long double bristles forming row on list extending along anteroventral infold; row of 12 double bristles continuing along ventral margin, but with bristles more widely spaced; list on anteroventral infold undulating with minute crenulations on undulations (Figure 92f); anteroventral infold with about 15 long double bristles between inner margin of infold and list. Posterior infold: crescent shaped, extending from ventral margin to point located on posterior margin at about three-fourths valve height; ridge along inner margin of crescent with about 19 minute bristles; pores present along outer edge of crescent.

Selvage: Lamella prolongation with smooth outer margin present along anterior and ventral margins,



FIGURE 92.—*Vargula subantarctica*, female, USNM 127961, complete specimen: *a*, lateral outline showing position of eggs; *b*, sketch of central muscle scars on left valve, lateral view; *c*, posterior right valve, medial view; *d*, infold along ventral margin of left valve, medial view; *e*, anterior of right valve, medial view; *f*, anteroventral infold on left valve, medial view; *g*, posteroventral infold on left valve, medial view. Right 2nd antenna: *h*, endopodite and part of protopodite, medial view; *i*, joints 8 and 9 of exopodite, medial view; *j*, joints 6-9 of exopodite, lateral view (bristles not shown); *k*, bristle on 2nd joint of exopodite, medial view. Right mandible: *l*, tip of endopodite, medial view (not all bristles shown); *m*, tip of endopodite, medial view. Left mandible: *n*, basale, lateral view. Maxilla: *o*, basale, exopodite, and endopodite of left limb, lateral view (1 *b*-bristle and 1 *c*-bristle not shown); *p*, tip of right limb, medial view (*a*-bristles not shown). Left 5th limb: *q*, tip of limb, posterior view; *r*, parts of protopodite and 1st and 2nd joint of exopodite, anterior view. Right mandible: *s*, tip of coxale endite, medial view (surface spines not shown). (Same magnification in microns: *c, d, f, g; e, h, j, k, n, r; l, m, s.*)

being broad and striate along lower margin of incisur.

Muscle scars: Central muscle scars consisting of about 21 individual scars (Figures 92*b*, 93*h*).

Size (Figure 82): USNM 127959, length 2.81 mm, height 1.89 mm; USNM 127961, length 2.78 mm, height 2.04 mm; USNM 127962, length 2.74 mm, height 1.93 mm; USNM 137450, length 2.81 mm, height 2.02 mm.

First antenna: Distal lateral surface of 1st joint with short spines forming clusters perpendicular to dorsal margin; 2nd joint with spines forming clusters on ventral and dorsal margins and medial surface; 3rd joint with 2 spinous bristles, 1 dorsal and near middle, 1 ventral and subterminal; 4th joint with 2 spinous terminal bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with about 10 long filaments and 3 shorter filaments; medial bristle of 6th joint with spines and slightly shorter than a-bristle of 7th joint. Seventh joint: a-bristle with about 5 pointed spinelike teeth; b-bristle with

about 5 short filaments; tip of c-bristle broken off, 9 filaments on stump. Eighth joint: d- and e-bristles bare, slightly longer than b-bristles; f- and g-bristles long with about 11 filaments.

Second antenna (Figures 92*h-k*, 94): Protopodite with short spinous medial bristle. Endopodite 3-jointed: 1st joint with 4 proximal bristles, 1 longer than others, and 1 medium spinous distal bristle; 2nd joint with 1 medium length bristle with sparse faint spines; 3rd joint elongate with long terminal filament. Exopodite: ventral margin of bristle of 2nd joint with 8 stout spines and 3 slender distal spines; joints 3 to 9 with basal spines; 9th joint with 4 bristles, 1 short bare, 3 long with natatory hairs; bristles of joints 3 to 8 with natatory hairs and without spines; joints 2 to 8 with short spines along distal margins; joint 1 with 2 faint spines on dorsal margin.

Mandible (Figures 92*l-n,s*; 95): Coxale endite spinous with small bristle near base; peg present between 2 stout terminal spines of endite (Figure

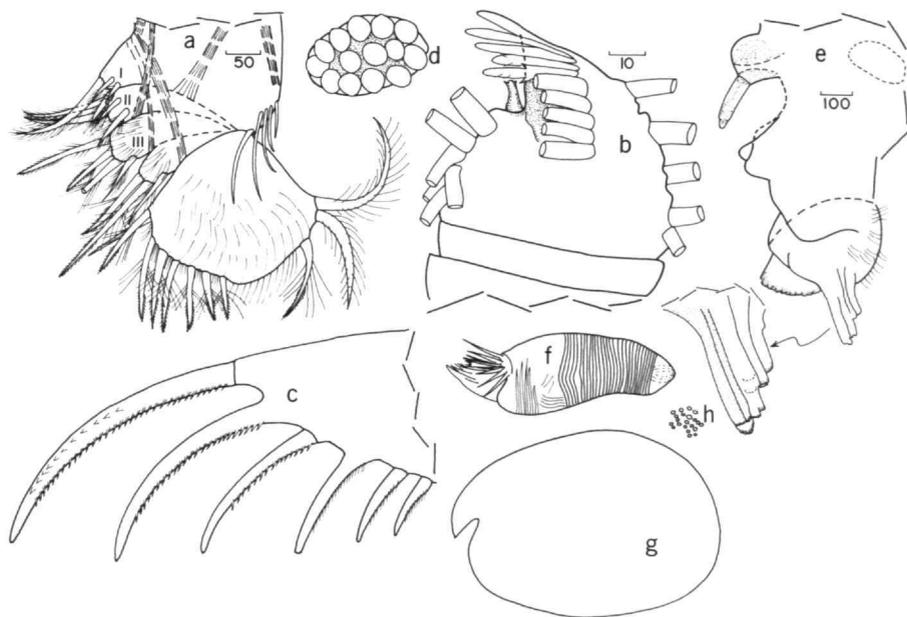


FIGURE 93.—*Vargula subantarctica*, female, USNM 127961: *a*, right 6th limb, medial view; *b*, tip of 7th limb; *c*, distal part of left lamella of furca, lateral view; *d*, left lateral eye, anterior to bottom; *e*, anterior of body showing outline of lateral eye, medial eye and rod-shaped organ, anterior process and upper lip; *f*, unidentified organic object attached to tip of 7th limb, left end attached. Female, USNM 127962: *g*, outline of complete specimen, lateral view, length 2.74 mm; *h*, sketch of central muscle scars on left valve, lateral view. (Same magnification in microns: *a,c,d*; *b,f*.)

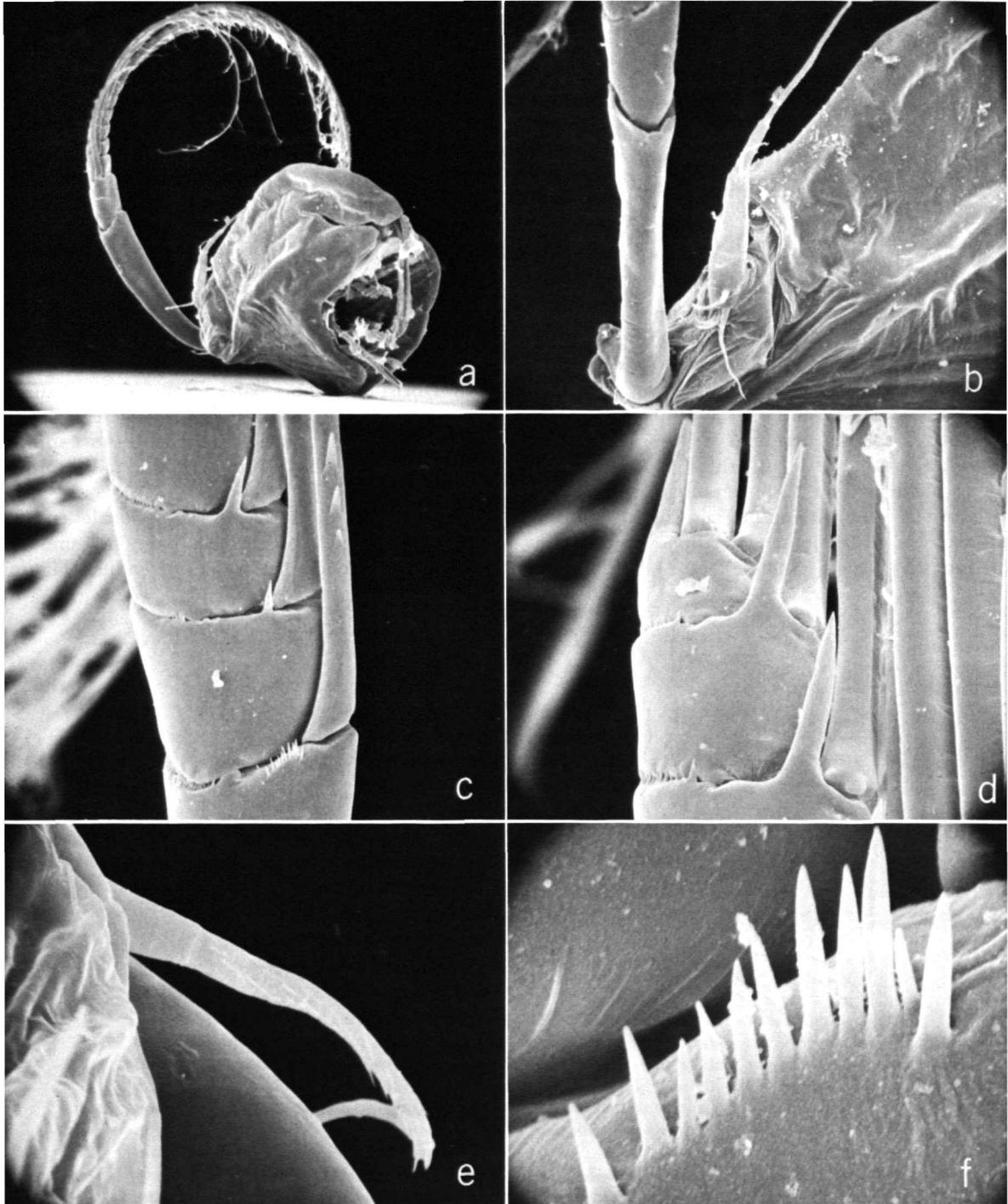


FIGURE 94.—*Vargula subantarctica*, female, USNM 127959, left 2nd antenna: *a*, complete limb, $\times 81$; *b*, detail of “*a*” showing endopodite, $\times 190$; *c*, joints 2 to 5 of exopodite, $\times 475$; *d*, joints 7 to 9 of exopodite, $\times 900$; *e*, bristle on 2nd joint of exopodite, $\times 1800$; *f*, spines along distal margin of 2nd joint of exopodite, $\times 4750$.

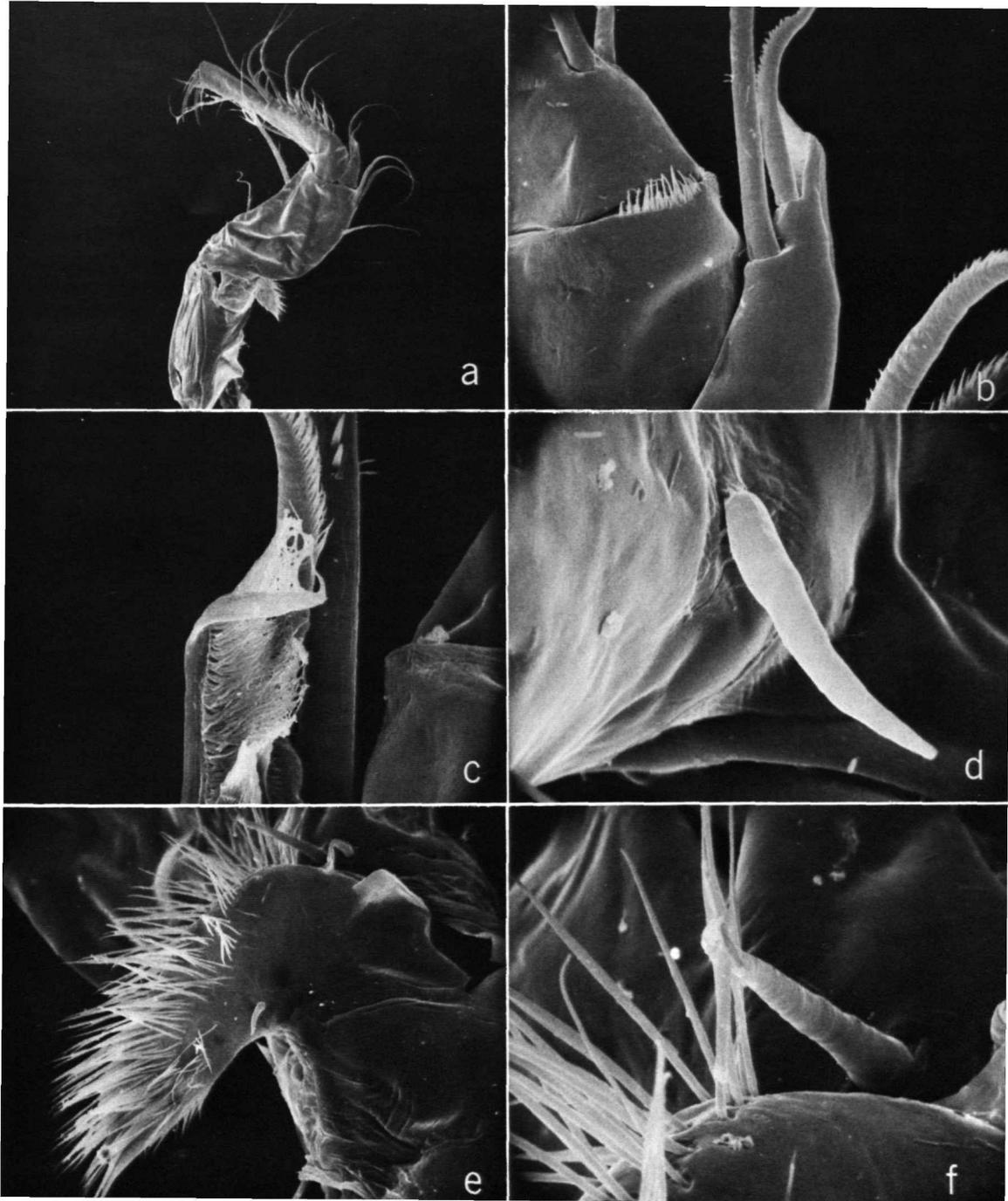


FIGURE 95.—*Vargula subantarctica*, female, USNM 127959, left mandible: *a*, complete limb, lateral view, $\times 90$; *b*, detail of "a" showing distal part of exopodite, $\times 782$; *c*, tip of exopodite, medial view, $\times 1445$; *d*, detail of bristle near base of endite shown in "e," $\times 3300$; *e*, coxale endite, medial view, $\times 390$; *f*, detail of "e" showing bristles distal to endite, $\times 14,445$.

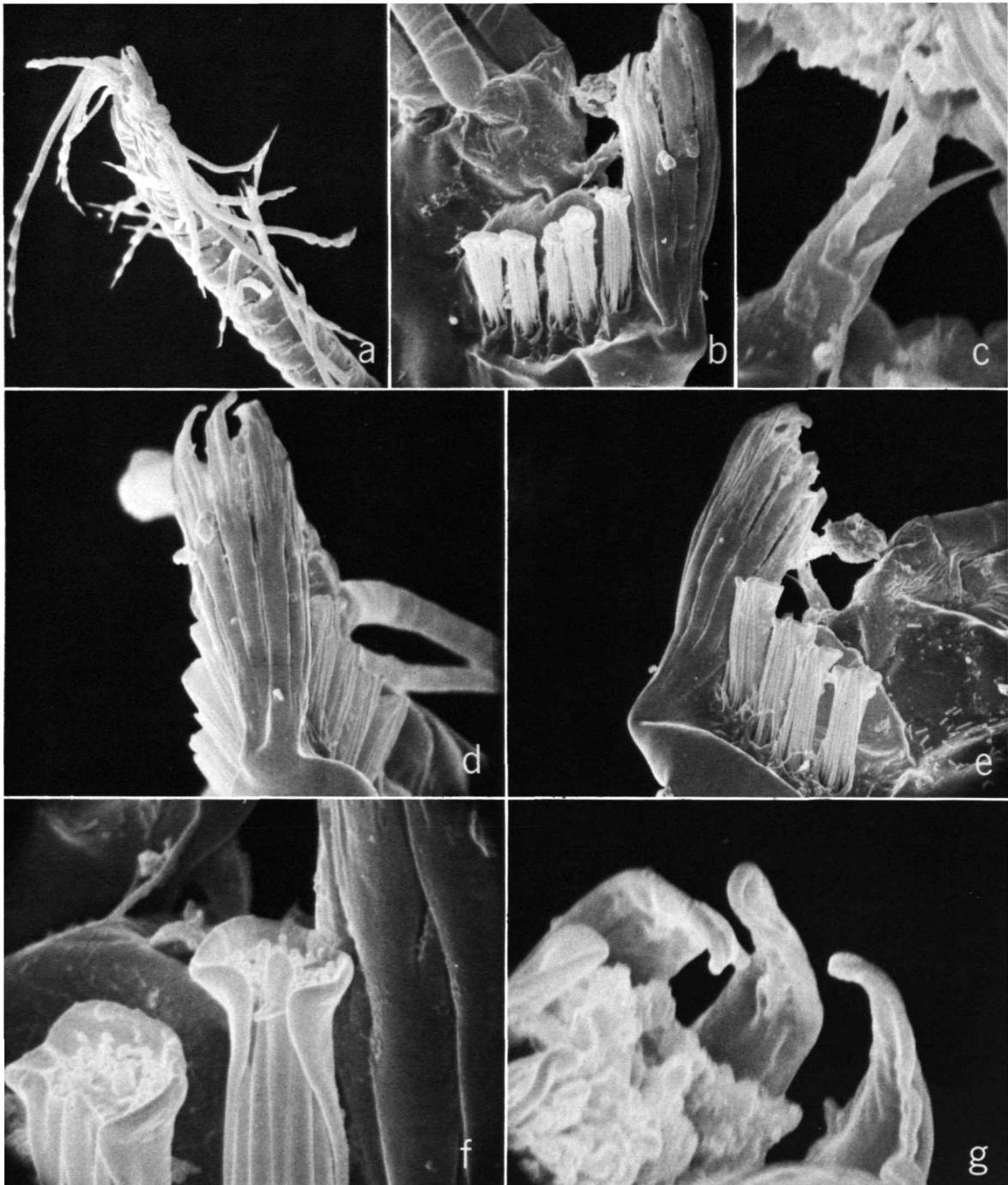


FIGURE 96.—*Vargula subantarctica*, female, USNM 127959, left 7th limb: *a*, distal part of limb, lateral view, $\times 330$; *b*, terminal comb, ventral view, $\times 2000$; *c*, end comb, lateral view, $\times 1700$; *d*, end comb, medial view, $\times 1750$; *e*, detail of tips of short teeth shown in “*c*,” $\times 5000$; *f*, detail of inner side of long ventral teeth (note pore), $\times 9000$; *g*, detail “*c*” showing dorsal peg (note spines), $\times 5000$.

92s). Basale: ventral margin with 2 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles (Figure 92n); dorsal margin with 1 spinous bristle distal to middle and 2 spinous terminal bristles. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long, 1 short, 1 minute; dorsal margin of 2nd endopodite joint with 5 long spinous bristles, 3 medium spinous bristles, 1 short bristle with stout marginal spines, and about 14 short bristles with fine marginal spines; ventral margin with 3 groups of bristles with 1, 1, and 2 bristles; medial bristles of distal pair spinelike (Figure 92l); end joint with 3 claws and 4 bristles (medial ventral bristle minute, long ventral bristle with proximal spines and slightly broadening near base, all claws with minute proximal teeth) (Figure 92m). Exopodite reaching past end of 1st endopodite joint and with 2 spinous bristles, inner bristle about twice length of outer bristle.

Maxilla (Figure 92o,p): Endite I with 10 bristles, endite II with 5 bristles, endite III with 1 proximal and 5 terminal bristles; some endite bristles with triaenid tips; 3 or 4 clusters of spines present on coxale near dorsal margin. Only 2 bristles observed on distal margin of basale. Exopodite hirsute with usual 3 bristles, proximal bristle and outer terminal bristle plumose, inner terminal bristle with short marginal spines. First joint of endopodite with 2 a-bristles, outer bristle with long marginal hairs almost to tip, inner bristle bare, and 2 or 3 b-bristles, longer of these pectinate, others bare or with few spines; cutting edge consisting of quadrate tooth. Second joint of endopodite with 4 a-bristles, 3 b-, c-, and d-bristles: anterior a-bristle bare, next with few marginal spines, next with about 6 fairly stout spines, posterior bristle longer than others and with few marginal spines; anterior 2 b-bristles pectinate along posterior margins, posterior bristle with 4 strong teeth near middle of anterior margin and 1 tooth on posterior margin; 1 c-bristle short with 1 or 2 small spines, middle bristle with 8 long teeth along anterior margin, posterior bristle with 13 long teeth along anterior margin; anterior d-bristle with 6 teeth along middle of anterior margin, middle bristle with about 5 teeth near middle on anterior margin, posterior bristle longer than others and with about 21 teeth along anterior margin.

Fifth limb (Figure 92q,r): Epipodial appendage

with 47 bristles; sclerotized anterior process of protopodite with undulating margin. Exopodite: anterior margin of 1st joint with plumose bristle near protopodite process and 3 hirsute distal bristles, 2 longer of which have proximal spines and distal teeth; main tooth with 6 teeth, proximal peg and spinous bristle; 2nd joint with 1 posterior c-bristle, 1 anterior d-bristle, 4 a-bristles, 4 b-bristles, and 3 b-bristles; inner lobe of 3rd joint with 1 proximal plumose bristle and 2 longer terminal bristles with short marginal spines; outer lobe of 3rd joint with 2 bristles, outer bristle plumose, inner bristle with short marginal spines; 4th joint separated from 5th by faint suture; 4th joint with 4 spinous bristles; 5th joint with 2 spinous bristles; small spined process present on inner corner of terminal margin of 5th joint; joints 3 to 5 hirsute.

Sixth limb (Figure 93a): Epipodial appendage with 4 or 5 bare bristles; endite I with 1 plumose terminal bristle and 2 short plumose medial bristles; endite II with 4 or 5 bristles, 2 plumose terminal bristles and 2 or 3 short plumose medial bristles; endite III with 3 terminal bristles with long proximal and short distal spines, and 1 medial bristle with long proximal spines; endite IV smaller than endite III, with 1 medial and 2 terminal bristles, all with long proximal spines; anterior end of ventral margin of end joint with 1 or 2 bristles with short marginal spines, bases of bristles on lateral surface; ventral margin of end joint with 7 anterior bristles with long proximal and short distal marginal spines followed by gap and then 1 bristle with long proximal and short distal spines and 2 long plumose bristles; medial surface of 3rd and 4th endites and end joint hirsute; lateral surface of end joint with long spines along ventral margin; posterior margin of end joint not produced.

Seventh limb (Figures 93b, 96): Each limb with 22 to 26 bristles, 11 to 14 in distal group (5 to 8 ventral, 6 or 7 dorsal), and 11 to 13 in proximal group (6 or 7 ventral, 5 or 6 dorsal); each bristle with 1 to 5 bells; terminal ventral comb with 9 elongate teeth; 4 or 5 short square-tipped teeth present on each side of elongate teeth; single peg with few spines near tip present opposite comb.

Furca (Figure 93c): Each lamella with 9 claws; claws 2 and 4 united to lamella, remaining claws separated from lamella by suture; claw 3 slightly narrower than claw 4.

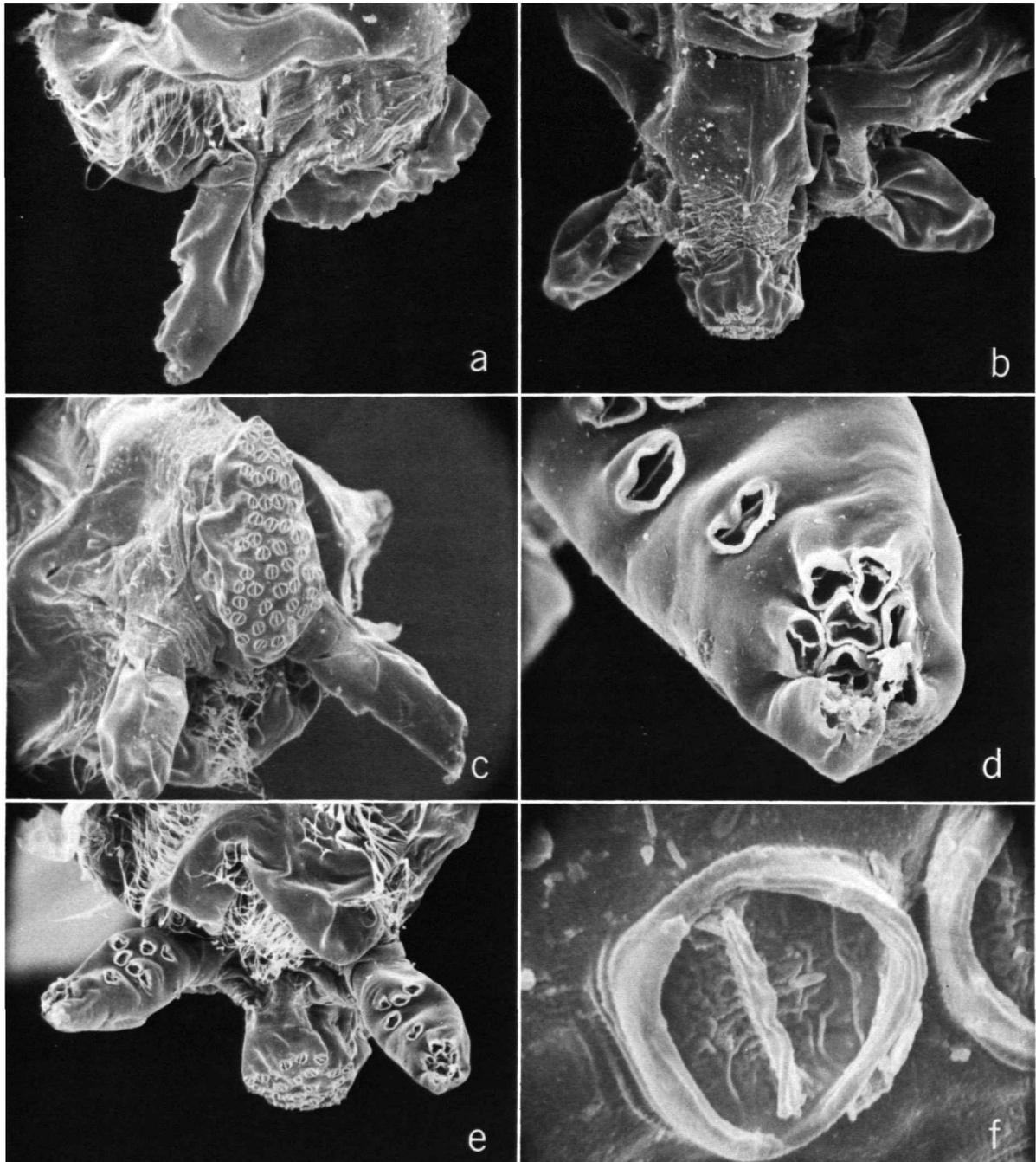


FIGURE 97.—*Vargula subantarctica*, female, USNM 127959, upper lip: *a*, lateral view, anterior toward right, $\times 261$; *b*, anterior view, $\times 259$; *c*, ventral view (slightly oblique), anterior toward top, $\times 259$; *d*, detail of right tusk shown in "e," $\times 1000$; *e*, posterior view, $\times 241$; *f*, glandular opening in middle glandular field shown in "c," $\times 5000$.

Rod-shaped organ and eyes (Figure 93e): Rod-shaped organ short, fingerlike. Medial eye normal size, about same size as lateral eye. Lateral eye large, pigmented with 14 to 16 ommatidia (Figure 93d).

Upper lip (Figures 93e, 97): Anterior part unpaired; posterior part with large tusk on each side; posterior margin of each tusk with glandular openings on broad horizontal steps; bulge posterior

to tusks hirsute. Large unpaired anterior process present between upper lip and medial eye.

Eggs: USNM 127959 with 20 eggs; USNM 127961 with 18 eggs; USNM 127962 with 14 eggs; USNM 137450, 2 eggs.

DESCRIPTION OF ADULT MALE (Figure 98).—Carapace smaller than female and with small but distinct caudal process (Figure 98a). Size (Figure 82): USNM 127967, length 2.29 mm, height 1.66 mm;



FIGURE 98.—*Vargula subantarctica*, male, USNM 127967, complete specimen: *a*, lateral outline, length 2.29 mm. Right 1st antenna: *b*, tip of limb, medial view; *c*, tip of proximal filament on *b*-bristle, lateral view; *d*, tip of *b*-bristle, lateral view; *e*, tip of filament on *c*-bristle, lateral view. Maxilla: *f*, tip of right limb, lateral view (not all bristles shown). Seventh limb: *g*, tip of limb. Furca: *h*, left caudal lamella, lateral view (only proximal part of some claws shown). Lateral eye: *i*, left eye, anterior to right. Body: *j*, anterior showing left lateral eye, medial eye and rod-shaped organ, proximal 2 joints of right 1st antenna, anterior process and upper lip; *k*, posterior showing copulatory organs, furca, and sclerite. Copulatory limbs: *l*, left limb, lateral view; *m*, left and right limbs, posterior view. (Same magnification in microns: *b-e,g; f,l; h,i,m; j,k*.)

USNM 128285, length 2.42 mm, height 1.65 mm.

First antenna (Figure 98b-e): Joints 1 to 6 similar to those of female. Seventh joint: a-bristle short with few marginal spines; b-bristle with proximal filament with bulbous base and large disc, filament near middle with small spine and 4 discs, distal filament bare, and filament near tip with spine and 4 discs; c-bristle long with about 8 filaments, 2 of these with short spine and 4 discs similar to those on b-bristle. Eighth joint: d- and e-bristles bare; f- and g-bristles with about 10 filaments, some filaments with 2 or 3 spines.

Second antenna: Bristle of 2nd joint of exopodite with 8 spines; limb similar to that of female.

Mandible: Similar to that of female.

Maxilla (Figure 98f): 1st endopodite joint with 3 6-bristles on each limb, longer of these pectinate, others bare; 4 a-bristles on end joint bare; otherwise limb similar to that of female.

Fifth limb: Epipodial appendage with 56 bristles; anterior margin of 1st exopodite joint without bristle near protopodial process; limb otherwise similar to that of female.

Sixth limb: Epipodial appendage with 3 to 5 bare bristles; endite II with 2 terminal and 5 medial bristles; end joint with 10 to 12 anterior bristles on ventral margin; limb otherwise similar to that of female.

Seventh limb (Figure 98g): Each limb with 22 to 24 bristles, 13 or 14 in distal group (7 ventral, 6 or 7 dorsal), and 9 or 10 in proximal group (3 or 4 ventral, 6 dorsal); each bristle with 1 to 5 bells; 4 or 5 square-tipped teeth present on each side of 8 elongate teeth; single peg with few spines near tip present at inner margin of dorsal part of terminus opposite comb.

Furca (Figure 98h): Each lamella with 9 claws; claws 2, 3, and 4 united with lamella, others separated from lamella by suture.

Upper lip, rod-shaped organ: Similar to those of female.

Lateral eye: Slightly larger than that of female.

Copulatory organ: Similar to that of *V. hamata*.

PARASITES.—USNM 127960, a stage III juvenile, with parasitic copepods (Choniostomatidae) in brood chamber—1 adult ♀ and 12 copepodites. (The 7th limb of the stage III instar is completely bare, making identification of the species difficult. Designation of the species as *V. subantarctica* rather than *V. hamata* is based on the steplike pro-

file of the posterior margin of the tusk on its upper lip.) A single protistan is attached to the tip of the 7th limb of USNM 127861, a gravid ♀ (Figure 93f).

COMPARISONS.—The new species *V. subantarctica* differs from *V. hamata* in that the tip of the 7th limb does not have a hooklike process within the comb and has a dorsal peg opposite the comb. The furca differs from that of *V. sutura* in having the 2nd and 4th claws of the female continuous with the lamella. The lateral eyes of *V. subantarctica* are large, not small like those on *V. antarctica*. Carapace length of the female of *V. subantarctica* (2.74–2.81 mm) is much less than reported for females of *V. antarctica* (3.63–3.9 mm) from Antarctica (Müller 1908:84; herein), but only slightly smaller than a specimen from New Zealand identified by Poulsen (1962:182) as *V. antarctica* (3.00 mm). The new species differs from *V. norvegica* in carapace size, morphology of the tusks on the upper lip, and in having a shorter end joint on the 6th limb (for detailed description of *V. norvegica* see Skogsberg, 1920:248).

DISTRIBUTION.—This species was collected in the American Quadrant in both the Subantarctic and Subantarctic-to-35°S regions (36°17'S to 54°39'S) at depths of 119 to 611 m (Figure 83).

24. *Vargula? danae* (Brady)

FIGURE 99

Cypridina danae Brady, 1880:156, pl. 36: figs. 2A-D; 1897:89, pl. 16: fig. 24.—Müller, 1912:15 [listed].

HOLOTYPE.—Unique specimen, carapace at British Museum (Natural History), Registration No. 80.38; slide with some appendages at Hancock Museum, Newcastle-on-Tyne.

TYPE-LOCALITY.—Off Kerguelen Island, about 49°S, about 70°E, water depth 219.5 m.

MATERIAL.—In answer to my request to borrow the carapace and appendages of this specimen from the British Museum, Dr. K. McKenzie informed me (written comm., 1971) that no appendages are in the collection, and that he is of the opinion that the species belongs in the genus *Cypridinodes*. He later communicated (written comm., 1972) that the appendages are on a slide in the Brady collection of the Hancock Museum presently being held at the British Museum. Through Dr. G. M. Ben-

nell, Department of Zoology (Crustacea), British Museum (Natural History), I received on November 13, 1972, a slide with appendages and a box within a box containing the dried carapace of *Cypridina danae*. The label on the slide reads: "*Cypridina Danae* n. sp., Challenger No. . . , Depth 120 faths., Kerguelen Island, G. S. Brady, Hancock Museum, Newcastle-on-Tyne." The label on an outer box containing the dried carapace bears the label, "90 *Cypridina danae* Brady, Challenger, Kerguelen Is. 120 fms. 29 Jan. 1874, Type, 80.38.18." The inner box bears the label "(80-38), 29 Jan. 1874, Kerguelen 120 fathoms, *Cypridina Danae*, n. sp."

This slide is in good condition except for the appendages being faint. Phase contrast microscopy was used in studying the appendages. The slide contained two 1st antennae, 2nd antennae, mandibles, 6th limbs (together), 7th limbs, one maxilla and the furca. The taxonomically important upper lip, medial eye, and rod-shaped organ are not present on the slide. The dried carapace is also in good condition. Both valves of the carapace are together so that it is not possible to examine the inner sides of the valves. I could not determine from the outside whether or not the missing organs are inside the carapace.

DISCUSSION.—The 3-jointed endopodite on the 2nd antenna of the holotype shows that it does not belong in the genus *Cypridina* (sensu Poulsen, 1962). The morphology of the maxilla, which has a broad endopodite with a cutting tooth on the 1st joint, and also a plumose bristle on the coxale shows that the specimen does not belong in the genus *Cypridinodes* as suggested by McKenzie (written comm., 1971). Without the upper lip it is not possible to refer the species to any known genus with certainty. The distribution of bristles on the 6th limb are unlike those on 6th limbs of *Monopia* and *Rugosidoloria*, but because only 1 species is known in those two genera, the variability of the 6th limb is not known. I have referred the species to *Vargula* with a question because in a few characters (carapace, 7th limb) the holotype indicates a possible relationship with *Vargula tubulata* Poulsen. Also, species of *Vargula* in the Antarctic are common, and it would not be unusual for this species to belong to that genus. In time, additional collections from the vicinity of the Kerguelen Islands should permit referral of

this distinct species to the proper genus. Because the species is without doubt more closely related to *Vargula* than to *Cypridina*, I feel justified in changing the combination.

DIAGNOSIS.—Carapace length of unique specimen about 6 mm; posterior margin below middle with small caudal process with opening.

Seventh limb: Large bare dorsal jaw present opposite comb.

Furca: Each lamella with 8 claws (possibly 7); each claw separated from lamella by suture.

DESCRIPTION.—External features of carapace adequately described and illustrated by Brady (1880: 156, pl. 36: figs. 2a-d). In posterior view the caudal process forms a round opening. Brady gave length as 6 mm, which is close to my measurement of the dry specimen: length 5.84 mm, height 4.23 mm.

First antenna (Figure 99a): First joint bare; 2nd joint with spines on lateral and medial surfaces and along dorsal and ventral margins; 3rd joint short with 2 spinous bristles, 1 ventral, 1 dorsal; 4th joint elongate with 2 terminal bristles, 1 ventral bristle reaching past 8th joint, 1 dorsal bristle reaching middle of 6th joint; sensory bristle of 5th joint with about 8 proximal filaments and 5 terminal filaments including stem; 6th joint short with medial bristle about twice length of joint. Seventh joint: a-bristle longer and stouter than bristle of 6th joint; b-bristle with 5 marginal filaments; c-bristle with 9 marginal filaments (some with marginal spines) and bifurcate tip. Eighth joint: d- and e-bristles bare; long f- and g-bristles with about 10 marginal filaments (some with marginal spines) and bifurcate tip. The c-, f-, and g-bristles about same length and longer than b-bristle and sensory bristle on 5th joint; sensory bristle longer than b-bristle. Length of d- and e-bristles could not be determined on specimen.

Second antenna (Figure 99b): Protopodite bare and with short medial bristle. Endopodite 3-jointed: 1st joint with 1 long and 3 short proximal bristles and 1 long distal bristle; 2nd joint only slightly longer than 1st joint and with 1 short distal bristle; 3rd joint about three-fourths length of 2nd joint and with long terminal bristle. Exopodite: bristle of 2nd joint reaching past 9th joint and with 18 broad spines along ventral margin; joints 2 to 8 with basal spines increasing in length on distal joints; basal spine on 8th joint just reaching beyond distal margin of 9th joint;



FIGURE 99.—*Vargula danae*, holotype, sex unknown: *a*, right 1st antenna, medial view (all bristles of joints 7 and 8 not shown); *b*, endopodite and part of protopodite of right 2nd antenna, medial view; *c*, left mandible, lateral view (middle bristle on dorsal margin of basale missing); *d*, left maxilla, medial view (bristles on end joint not shown); *e*, end joint of left maxilla, medial view; *f*, right 5th limb, posterior view; *g*, left 6th limb, lateral view (endites I and II and marginal spines on some bristles not shown); *h*, tip of 7th limb (some comb teeth and bristles not shown); *i*, lamellae of furca (folded). (Same magnification in microns: *b,e,c,d,g,i*.)

9th joint with lateral spine shorter than spine on 8th joint, and 3 long bristles and 1 medium length bristle; all bristles except bristle on 2nd joint with natatory hairs, but no spines.

Mandible (Figure 99c): Coxale endite large, spinous with small bristle near base. Basale: dorsal margin with 2 long subterminal bristles and 1 bristle distal to middle of margin (this bristle broken off on both limbs of holotype); ventral margin with 2 a-bristles, 1 long and 1 short, 1 short b-bristle, 2 c-bristles, 1 long and 1 short, 2 d-bristles, 1 very long, 1 short. Exopodite short, reaching distal margin of 1st endopodite joint, with hirsute tip and 2 bristles, outer of these short. Endopodite: 1st joint with 4 ventral bristles, 2 long, 2 short; proximal part of dorsal margin of 2nd joint with about 8 long and 28 short bristles; ventral margin with 2 short individual bristles distal to middle and 2 short terminal bristles, 1 of these broad; end joint with 3 short claws and 4 bristles.

Maxilla (left limb on slide) (Figure 99d,e): Exopodite not observed because of position of limb. Dorsal bristle of coxale plumose. Endopodite: 1st joint with faint, broad cutting edge, 2 α -bristles (outer bristle broken, inner bristle bare), and 3 β -bristles, all with spines along inner margin. Second joint with 4 a-bristles (3rd bristle from anterior with spines along anterior margin, other bristles bare), 3 b-bristles with spines along posterior margins, 3 c-bristles (middle bristle short and with few minute teeth, outer bristles with spines along anterior margins), 3 d-bristles, all with spines along anterior margins.

Fifth limb (Figure 99f): Epipodial appendage with about 78 bristles. Endite I with 8 spinous bristles; endite II with 5 spinous and pectinate bristles; endite IV with 6 spinous and pectinate bristles. Exopodite: 1st joint with 3 spinous bristles in anterior group, 2 long, 1 short, and single plumose proximal anterior bristle; main tooth with 6 teeth (each with 7 to 27 marginal teeth), stout proximal peg and single proximal stout spinous bristle; 2nd joint with numerous terminal bristles with broad marginal spines, single posterior bristle with long marginal hairs, and single anterior bristle with long marginal hairs; inner lobe of 3rd joint with 3 bristles (short proximal bristle with long proximal marginal hairs, 2 longer terminal bristles spinous); outer lobe of 3rd joint with 2 stout equal bristles with long proximal and short

distal spines; 4th and 5th joints hirsute, only weakly divided; 4th joint with 7 spinous bristles; 5th joint with 2 spinous bristles.

Sixth limb (Figure 99g): Four bare bristles in place of epipodial appendage. Endite I with 2 short medial and 1 long terminal bristle, all with spines; endite II with 2 short medial and 3 long terminal bristles, all with spines; endite III with 4 spinous bristles; endite IV with 6 spinous bristles. End joint with posterior end protracted and with about 29 hirsute and spinous bristles along margin; posterior 2 bristles not markedly longer or more hirsute than adjacent bristles; end joint and endites hirsute.

Seventh limb (Figure 99h): Dorsal side with about 40 bristles, ventral side with about 19 proximal and 22 on tip, each with up to 6 bells; 2 bristles at inner end of comb, each with 6 bells; dorsal jaw bare, tip of jaw reaching beyond mid-length of comb; about 34 teeth in comb, distal teeth slender with rounded tips, proximal teeth short and with squarish tips; sclerotized hooklike process within comb.

Furca (Figure 99i): Left lamella with 8 claws, right with 7, but claw 3 could be broken off on right lamella; all claws separated from lamella by suture; teeth forming 1 or 2 rows along posterior margin of each claw (Furca on slide in folded position; left lamella shown as it appears on slide.)

DISTRIBUTION.—Collected only at type-locality (Figure 83).

25. *Vargula dentata*, new species

FIGURES 100-103

HOLOTYPE.—USNM 127968, adult δ , length 1.94 mm, height 1.43 mm; valves and some appendages in alcohol, remaining appendages on slide.

TYPE-LOCALITY.—*Eltanin* Cruise 6, station 340.

ETYMOLOGY.—The specific name "dentata" is derived from the Latin "dentatus" [= toothed], in reference to the single tooth on each tusk of the upper lip.

PARATYPES.—USNM 127969, 1 adult δ , and USNM 127970, 1 juvenile, instar II, from same sample as holotype. USNM 127975, 1 juvenile, instar III, from *Eltanin* Cruise 7, station 557.

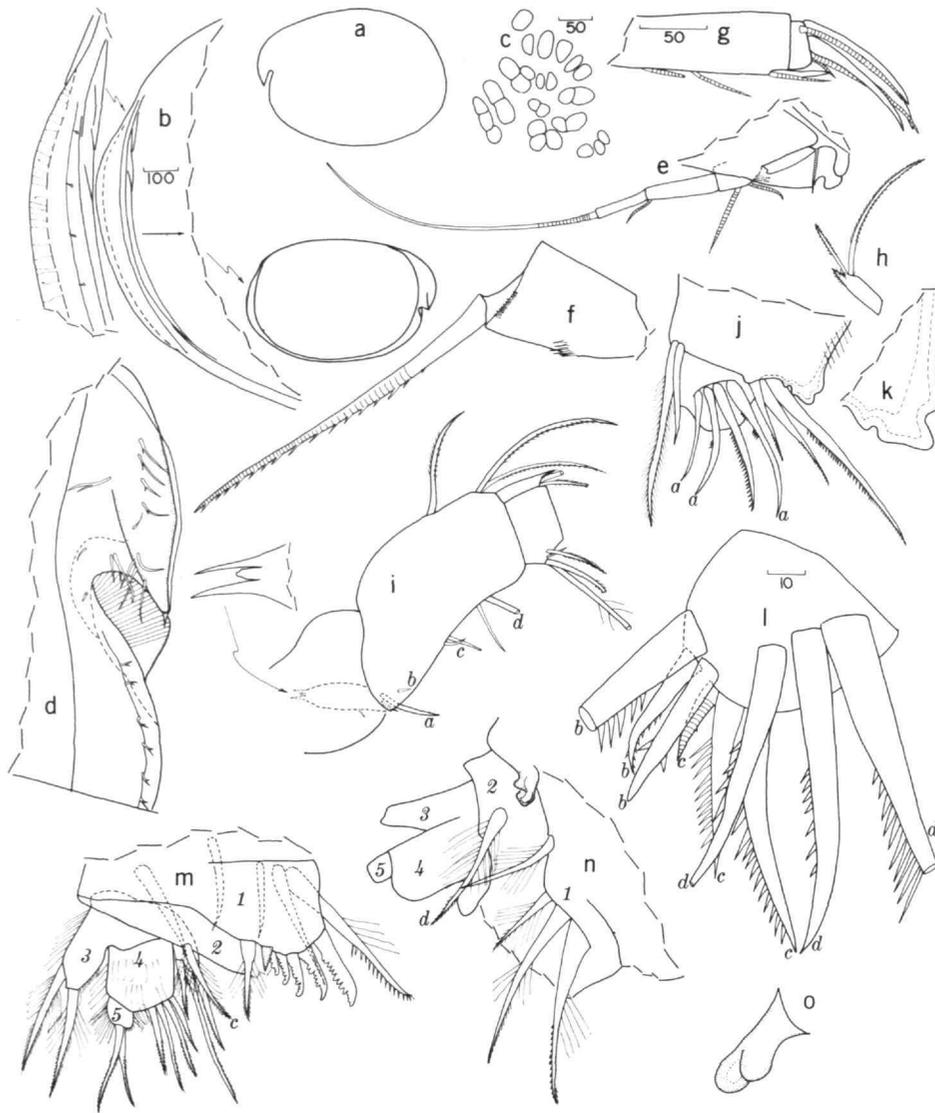


FIGURE 100.—*Vargula dentata*, male, USNM 127968, complete specimen: *a*, lateral outline, length 1.94 mm. Valves: *b*, left valve and details of posterior margin, medial view; *c*, central muscle scars of right valve, medial view; *d*, anterior left valve, medial view. Second antenna: *e*, endopodite and part of protopodite of left limb, medial view; *f*, bristle on 2nd joint of exopodite of right limb, medial view. Mandible: *g*, distal end of right limb, lateral view; *h*, exopodite on left limb, medial view; *i*, coxale, basale, exopodite and 1st endopodite joint of right limb, lateral view. Left maxilla: *j*, tip, lateral view (*b*-, *c*-, and *d*-bristles not shown); *k*, detail of "cutting tooth" shown in "*j*"; *l*, end joint, lateral view (*a*-bristles not shown). Fifth limb: *m*, distal part of left limb, posterior view (all bristles of 2nd joint not shown); *n*, distal part of right limb, anterior view (all bristles of 2nd to 5th joints not shown); *o*, anterior process of protopodite on left limb. (Same magnification in microns: *c-e,h,i*; *f,g,j,m,n*; *k,l,o*.)

ADDITIONAL SPECIMENS.—USNM 137371, gravid ♀ from *Vema* Cruise 17, station V-17-66; USNM 137464, 1 juvenile, length about 1.52 mm, height about 1.05 mm + 1 unmeasured juvenile, both from *Vema* Cruise 17, station V-17-59; USNM 138032, 1 gravid ♀, from *Eltanin* Cruise 6, station 354.

DIAGNOSIS.—Carapace length of adult female, 1.91–2.21 mm; of adult male, 1.83–1.94 mm. Caudal process narrow.

Upper lip: Each tusk with large proximal tooth oriented posteriad.

DESCRIPTION OF ADULT MALE (Figures 100, 101a-n).—Carapace oval in lateral view with small incisur; very slight concavity present near top of narrow caudal process, otherwise posterior margin evenly rounded (Figure 100a).

Infold (Figure 100b,d): Infold behind rostrum with only 10 or 11 double bristles (weaker branch of double bristle very faint); usual 2 bristles present at inner end of incisur, longer of these double; anteroventral infold with about 20 double bristles forming row along list; 2 or 3 bristles present along ventral infold; infold of caudal process with inner ridge with about 10 or 12 minute bristles and numerous pore canals (about 6 to 9 pore canals between bristles), which seem more distinct and abundant in lower half of ridge.

Muscle scars: Central muscle scars consisting of about 28 individual scars (Figure 100c).

Size (Figure 82): USNM 127968, length 1.94 mm, height 1.43 mm; USNM 127969, length 1.83 mm, height 1.44 mm (shell somewhat distorted).

First antenna (Figure 101h,k): 2nd joint with spines forming clusters along ventral and dorsal margins and on medial surface; 3rd joint with spines on medial surface, 1 dorsal bristle near middle of margin and 1 subterminal ventral bristle, both bristles with short marginal spines; 4th joint with 2 short bristles with short marginal spines, 1 dorsal, 1 ventral; sensory bristle of 5th joint with 7 long proximal filaments and at least 3 shorter distal filaments (bristle broken); short medial bristle of 6th joint with few marginal spines. Seventh joint: a-bristle short with marginal spines; b-bristle (broken) with proximal filament with bulbous base and round disc followed by small wart; b-bristle with additional filament near middle with small spine and 4 small discs, distal filament without discs, and filament near tip with small spine and

4 discs; c-bristle with proximal filament similar to that on b-bristle but with larger discs, 2 additional filaments with small spine and 4 small discs, and additional filaments with only spines. Eighth joint: d- and e-bristles bare; f- and g-bristles broken, with more than 8 spined filaments.

Second antenna (Figure 100e,f): Protopodite with short medial bristle. Endopodite 3-jointed: 1st joint short with 3 proximal bristles, 1 longer than others, and 1 distal bristle; 2nd joint elongate with 1 terminal bristle; 3rd joint about three-fourths length of 2nd joint and with long terminal filament. Exopodite: bristle of 2nd joint with 15 or 16 ventral spines; 2nd joint with spines forming cluster on ventral margin; joints 3 to 9 with basal spines, spine of 8th joint longer than length of 9th joint; joints 2 to 8 with spines forming row along distal margin; joint 9 with 3 long and 1 short bristles; long bristles of 9th joint and bristles of joints 3 to 8 with natatory hairs.

Mandible (Figure 100g-i): Coxale endite spinous with small peg between 2 large terminal spines; small bristle present at base of endite. Basale: ventral margin with 2 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles; dorsal margin with 1 long bristle distal to middle and 2 long terminal bristles. Exopodite normal for genus. Endopodite: 1st joint with 4 ventral bristles, one very small; ventral margin of 2nd joint with 3 groups of bristles with 1, 1, and 2 bristles; medial bristle of distal pair broad, spinelike, about same length as lateral bristle; dorsal margin of 2nd joint with numerous long and short bristles typical of genus; end joint with 3 claws and 4 bristles, ventral bristle very short.

Maxilla (Figure 100j-l): Endite I with 10 bristles, some with triaenid and knifelike tips; endite II with 8 bristles, and endite III with about 6. Stout bristle of coxale with long proximal and short distal marginal spines. Exopodite with 3 bristles—proximal bristle and outer terminal bristle with long proximal and short distal marginal spines, inner terminal bristle with short marginal spines. Endopodite: 1st joint with 2 α -bristles, longer of these hirsute, smaller bristle bare, or with very faint marginal spines; 3 β -bristles present, outer bristle coarsely pectinate, others with short marginal spines; cutting tooth digitate with 3 or 4 projections. Second joint with 4 a-bristles (anterior of these bare, next with few small spines,



FIGURE 101.—*Vargula dentata*, male, USNM 127968: *a*, left 6th limb, medial view; *b*, tip of 7th limb; *c*, tip of bristle on 7th limb; *d*, distal part of right lamella of furca, lateral view (some claws missing and broken); *e*, anterior of body showing proximal 2 joints of left 1st antenna, rod-shaped organ, anterior process with attached protists, and upper lip; *f*, upper lip, anterior to left; *g*, organic foreign object attached to 5th limb. Male, USNM 127969, right 1st antenna: *h*, detail of proximal part of b- and c-bristles, medial view; *i*, detail of tip of b-bristle, medial view; *j*, detail of tip of proximal filament on c-bristle, medial view; *k*, b-bristle, medial view. Furca: *l*, left lamella, lateral view (ends of some claws and claw 1 not shown). Right copulatory limb: *m*, lateral(?) view; *n*, medial(?) view. Ovigerous female, USNM 137371: *o*, outline of complete specimen, lateral view, length 2.21 mm. Maxilla: *p*, "cutting tooth" and proximal parts of 6-bristles on right limb, lateral view; *q*, "cutting tooth" and proximal parts of 6-bristles on left maxilla, medial view. (Same magnification in microns: *a,m*; *b,c,g-j,n*; *d,f,l*; *e,k*; *p,q*.)

next finely pectinate with about 21 minute spines posterior bristle with few spines), and 3 b-, c-, and d-bristles (Figure 100l).

Fifth limb (Figure 100m-o): Epipodial appendage with about 46 bristles. Anterior protopodite process rather short, bilobate. Exopodite: 1st joint with 4 anterior bristles, 1 close to protopodite process with long proximal hairs and short distal marginal spines, 3 in distal group with long proximal and short marginal spines; main tooth with proximal peg and only 5 teeth; spinous bristle present proximal to peg; c- and d-bristles of 2nd joint with long proximal spines or hairs and short distal spines; inner lobe of 3rd joint with 1 proximal bristle with long proximal hairs and 2 terminal bristles with short marginal spines; outer lobe of 3rd joint with 2 bristles, both with long proximal and short distal spines; 4th and 5th joints separated by suture; 4th joint with 4 bristles, all with

short marginal spines; 5th joint with 2 bristles with short marginal spines; a few stout spines present on terminal margin of 5th joint near inner corner; outer lobe of 3rd joint, 4th and 5th joints hirsute.

Sixth limb (Figure 101a): Epipodial appendage with 4 bare bristles. Endite I with 2 bristles, 1 medial, 1 terminal; endite II with 5 bristles, 3 medial, 2 terminal; endite III with 4 bristles, 1 medial, 3 terminal; endite IV smaller than endite III and with 3 bristles, 1 medial, 2 terminal; end joint with 10 or 11 bristles (7 or 8 anterior bristles followed by short space, then 3 bristles) anterior of which have long proximal and short distal marginal spines, remaining 2 plumose; medial surface of limb hirsute; long spines forming lateral row along ventral margin of end joint.

Seventh limb (Figure 101b,c): Each limb with total of 21 or 22 bristles, 11 or 12 in distal group

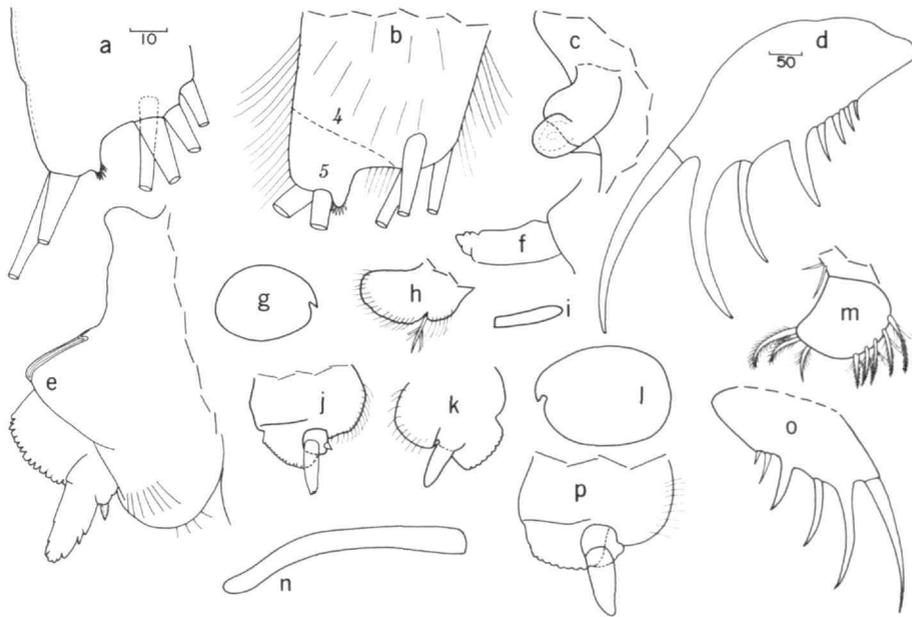


FIGURE 102.—*Vargula dentata*, female, USNM 137371, 5th limb: a, detail of 4th and 5th joints of right limb, anterior view; b, detail of 4th and 5th joints of left limb, posterior view; c, anterior process on protopodite of right limb, anterior view. Furca: d, left lamella, lateral view (marginal teeth not shown); e, upper lip, anterior to left; f, medial eye and rod-shaped organ. Instar II, USNM 127900: g, outline of complete specimen, lateral view, length 1.06 mm; h, sixth limb, anterior to right; i, seventh limb. Upper lip: j, lip, anterior to left; k, lip, anterior to right. Instar III, USNM 127975: l, outline of complete specimen, lateral view, length 1.43 mm; m, sixth limb, anterior to right; n, right 7th limb; o, right lamella of furca, lateral view; p, upper lip, anterior to left. (Same magnification in microns: a-c; d-f,h-k,m-p.)

(7 ventral, 4 or 5 dorsal), and 9 to 11 in proximal group (3 ventral, 6 to 8 dorsal); each bristle with 1 to 5 bells; terminal comb with 9 elongate teeth with 2 or 3 short square-tipped teeth on each side;

small peg with spines at tip present on dorsal side opposite comb.

Furca (Figure 101*d,l*): Each lamella with 8 claws; claws 2 and 4 united to lamella, remaining claws

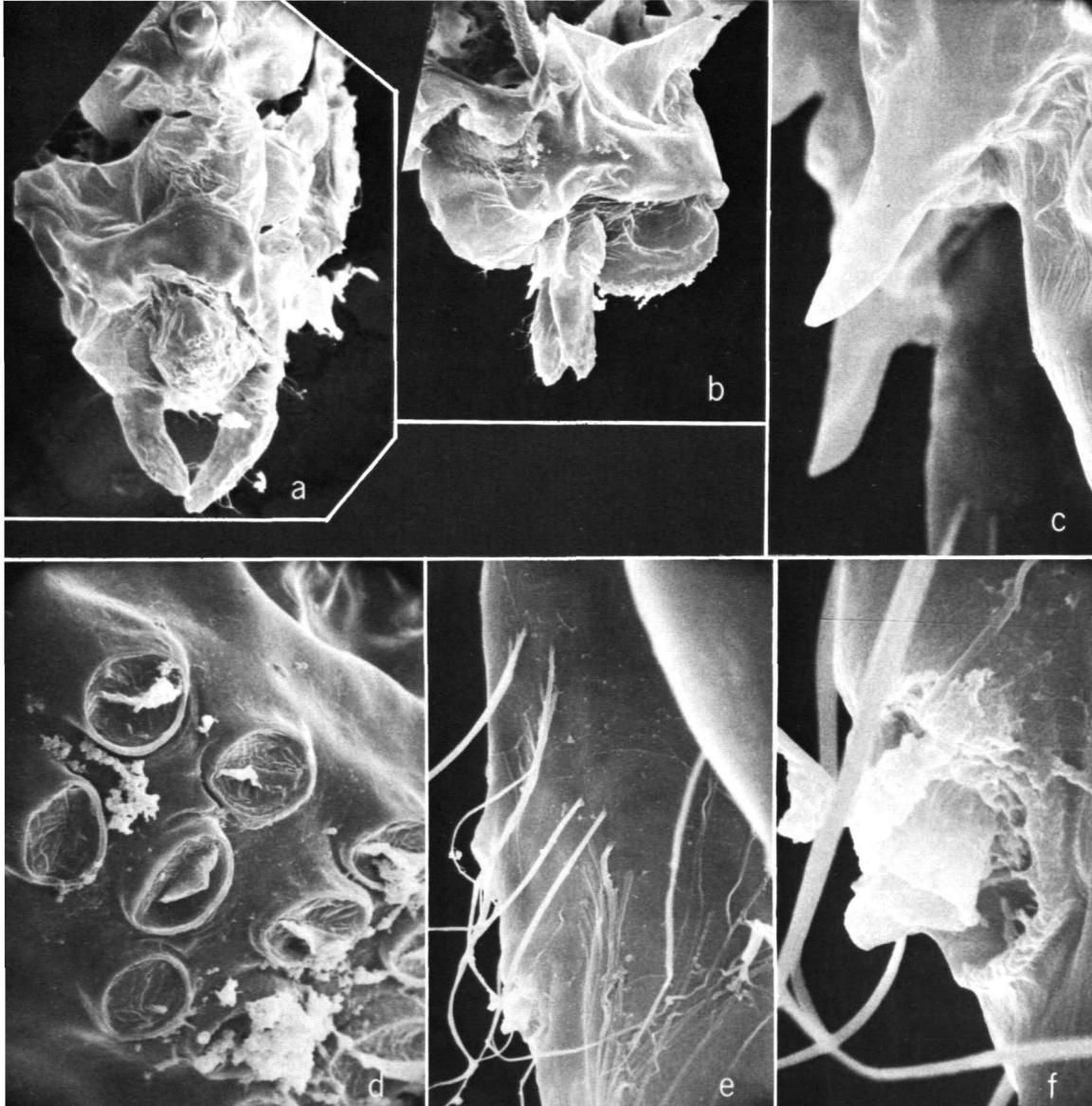


FIGURE 103.—*Vargula dentata*, female, USNM 137371, upper lip: *a*, anterior view, $\times 190$; *b*, right lateral view, anterior to right, $\times 120$; *c*, detail of tooth on each tusk, $\times 1900$; *d*, detail of glandular opening, anterior field, anterior toward upper left, $\times 1900$; *e*, detail of hairs on inner side of left tusk, $\times 1900$; *f*, detail of glandular opening on edge of tusk shown in "*e*," $\times 9500$.

separated by suture; claw 3 distinctly narrower at base than claw 4.

Rod-shaped organ and medial eye (Figure 101e): Rod-shaped organ fingerlike, medial eye not well defined.

Lateral eye: Absent.

Upper lip (Figure 101f): Anterior part unpaired with glandular openings projecting on small transparent tubes along ventral margin. Each tusk 2-jointed: proximal joint with posteroventral tooth; distal joint lateral with glandular openings and faint hairs; posterior bulge hirsute.

Copulatory organ (Figure 101m,n): In general similar to that of *V. hamata* and *V. subantarctica* except that hooklike sclerotized tip of longer lobe is shorter.

Parasites: Projection on body anterior between upper lip and medial eye with many protistans (Figure 101e), which are also present on other exposed parts of appendages (Figure 101g).

DESCRIPTION OF ADULT FEMALE (Figures 101o-q, 102a-f, 103).—Caudal process more prominent than on male and limited to ventral half of posterior margin (Figure 101o). Size (Figure 82): USNM 137371, length 2.21 mm, height 1.55 mm; USNM 138032, length 1.91 mm, height 1.43 mm.

First antenna: Second joint similar to that of male; 3rd joint with faint spines forming clusters on medial surface, 1 proximal bristle on dorsal margin and 1 distal bristle on ventral margin, both bristles with short marginal spines; 4th joint similar to that on male; sensory bristle of 5th joint with 7 long proximal filaments, 3 short distal filaments and bifurcate tip; 6th joint similar to that on male. Seventh joint: a-bristle short with few short marginal spines; b-bristle about twice length of a-bristle, with 4 pectinate marginal filaments excluding tip of stem; c-bristle long with 8 marginal filaments and bifurcate tip. Eighth joint: d- and e-bristles bare, longer than b-bristle; f- and g-bristles slightly longer than c-bristle, with about 9 marginal filaments (some pectinate) and bifurcate tips.

Second antenna, mandible: Limbs similar to those on male.

Maxilla (Figure 101p,q): Limb similar to that on male except cutting tooth of 1st endopodite joint less digitate.

Fifth limb (Figure 102a-c): Exopodite: suture between 4th and 5th joints weak or absent; 4th

joint with 3 or 4 bristles, all with short marginal spines; minute spinous process present on 5th joint near inner corner. Limb otherwise similar to that on male.

Sixth limb: Epipodial appendage with 4 or 5 bare bristles. Limb otherwise similar to that on male.

Seventh limb: Each limb with total of 30 bristles, 14 in distal group (7 ventral, 7 dorsal), and 14 to 16 in proximal group (6 or 7 ventral, 7 to 10 dorsal), each bristle with 1 to 6 bells; terminal comb with 7 elongate teeth and 5 or 6 short square-tipped teeth (2 or 3 on each side of row of elongate teeth; small peg with spines at tip present on dorsal side opposite comb (similar to peg on 7th limb of male).

Furca, medial eye and rod-shaped organ, upper lip (Figures 102d-f, 103): Similar to those on male. (Left tusk on USNM 138032 with 2 proximal teeth.)

Lateral eye: Absent as on male.

Eggs: USNM 127371 with 10 eggs in marsupium; USNM 137032 with 11 eggs.

DESCRIPTION OF INSTAR II (Figure 102g-k).—Shape of carapace similar to that of adult male (Figure 102g). Size: USNM 127970, length 1.06 mm, height 0.78 mm. Sixth limb with only 1 bristle (Figure 102h); 7th limb small, bare; upper lip similar to that of adult male, except tooth of left tusk less well defined than that on right tusk (Figure 102j,k).

DESCRIPTION OF INSTAR III (Figure 102l-p).—Shape of carapace similar to that of adult male (Figure 102l). Size: USNM 127975, length 1.43 mm, height 1.09 mm. Sixth limb with numerous bristles (Figure 102m); 7th limb bare (Figure 102n); caudal furca with 6 claws on each lamella, claws 2 and 4 united to lamella, claw 3 more slender and slightly longer than claw 4 (Figure 102o); upper lip similar to that of adult male, but tooth rounded (Figure 102p). (This instar is described here in order to illustrate the furca which was broken on adult males.)

COMPARISONS.—The new species, *V. dentata*, has a distinctive tooth oriented posteriad on the proximal part of each tusk of the upper lip. Only the upper lip of *Vargula tubulata* Poulsen (1962:198) has a similar tooth, but the carapace of that species has a prominent tubelike caudal process absent on *V. dentata*.

DISTRIBUTION.—This species was collected only in the American Quadrant of the Subantarctic region at bathyal depths (429–1978 m) (Figure 83).

26. *Vargula lusca*, new species

FIGURES 104, 105

HOLOTYPE.—USNM 128056, gravid ♀, length 2.79 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 27, station 1981, subantarctic.

ETYMOLOGY.—The specific name “*lusca*” from the Latin “*luscus*” [= one-eyed, half-blind] refers to the absence of lateral eyes.

MATERIAL.—Holotype.

DIAGNOSIS.—Carapace length of female, about 2.79 mm. Caudal process narrow or not evident.

Seventh limb: Single spinous peg present opposite comb.

Furca: Claws 2 and 4 of female continuous with lamella.

Upper lip: Posterior margins of tusks with glandular openings forming narrow steps.

Lateral eye: Absent.

DESCRIPTION OF FEMALE.—Carapace elongate with convex dorsal and almost linear ventral outline in lateral view (Figure 104a); incisur narrow, deep (Figure 104g); posterior with small projecting caudal process (Figure 104b); on left valve of holotype, upper end of caudal process defined by concavity where merging with posterior margin of valve above caudal process; on right valve concavity less evident and posterior margin evenly rounded.

Infold (Figure 104c-f): Infold behind rostrum with about 15 or 16 bristles, some double; inner corner of incisur with usual 2 bristles; lower margin of incisur with 1 or 2 short bristles near inner corner and row of about 30 long double bristles forming row on list along anteroventral infold; 2 or 3 bristles observed on list along ventral margin. Posterior infold: crescent shaped, extending from ventral margin to point located on posterior margin at about one-half to three-fourths of valve height; ridge along inner margin of crescent with about 16 minute bristles; ridge on right valve broadening near upper part (Figure 104c); pores present along outer edge of crescent.

Selvae: Similar to that on *V. subantarctica*.

Muscle scars: Central muscle scars consisting of about 16 individual scars.

Size (Figure 82): USNM 128056, length 2.79 mm, height 1.75 mm.

First antenna: Distal lateral surface of 1st joint with short spines forming clusters oblique to dorsal margin; 2nd joint with spines forming clusters on ventral and dorsal margins and medial and lateral surfaces; 3rd joint with 2 spinous bristles, 1 dorsal near middle, 1 ventral terminal; medial surface with clusters of short spines; 4th joint with 2 spinous terminal bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with 10 long proximal and 3 shorter distal filaments, some proximal filaments finely pectinate; medial bristle of 6th joint with spines, shorter than a-bristle of 7th joint. Seventh joint: a-bristle with widely separated small marginal spines; b-bristle with 5 short filaments, some pectinate; c-bristle broken, 8 filaments on remaining part, some pectinate. Eighth joint: d- and e-bristles bare, about twice length of b-bristle; f- and g-bristles long with 12 filaments, including tip, some filaments pectinate.

Second antenna (Figure 104h,i): Protopodite with short spinous medial bristle. Endopodite 3-jointed: 1st joint with 4 proximal bristles, 1 longer than others, and 1 medium length distal bristle with faint marginal spines; 2nd joint with 1 bristle reaching beyond distal end of 3rd joint; 3rd joint with long terminal filament. Exopodite: ventral margin of bristle of 2nd joint with 8 or 9 stout spines; joints 3 to 9 with basal spines; 2nd joint with short spines along ventral margin; 9th joint with 4 bristles, 1 short bare, 3 long with natatory hairs and without spines; joints 2 to 8 with faint short spines along distal margins; bristles on joints 3 to 8 with natatory hairs.

Mandible (Figure 104j-l): Coxale endite spinous with small bristle near base; peg present between 2 stout terminal spines of endite. Basale: ventral margin with 2 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles (Figure 104j); dorsal margin with 3 spinous bristles, 1 distal to middle, 2 terminal. Exopodite reaching end of 1st endopodite joint and with 2 spinous bristles, inner bristle 2 to 3 times length of outer bristle. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long, 1 short, 1 minute; dorsal margin of 2nd joint with about 20 bristles, long and short, similar to those of *V.*



FIGURE 104.—*Vargula lusca*, female, USNM 128056, complete carapace: *a*, lateral outline, length 2.79 mm. Valves: *b*, posterior of left valve, lateral view; *c*, posterior of right valve, medial view; *d*, posterior of left valve, medial view (bristles not shown); *e*, anterior of left valve, medial view; *f*, anterior of right valve, medial view; *g*, anterior of left valve, lateral view. Second antenna: *h*, endopodite of right limb, lateral view; *i*, bristle on 2nd exopodite joint of left limb, medial view. Mandible: *j*, basale, exopodite and 1st endopodite joint of right limb, lateral view (bristles on endopodite not shown); *k*, tip of ventral margin of 2nd endopodite joint of left limb, medial view; *l*, end joint of left limb, medial view. Maxilla: *m*, tip of left limb, medial view. (Same magnification in microns: *i,m*; *c,d,g*; *e,f,h,j*; *k,l*.)

subantarctica. Ventral margin of 2nd joint with 3 groups of bristles with 1, 1, and 2 bristles; medial bristle of distal pair spinelike (Figure 104k); end joint with 3 claws and 4 bristles, medial ventral bristle minute, 2 large ventral claws with rather large teeth near middle of ventral margin.

Maxilla (Figures 104m, 105a): Endite I with about 11 bristles, endite II with 5 bristles, endite III with 1 proximal and 5 terminal bristles; some endite bristles with triaenid tips; spines present on coxale near dorsal margin. Coxale with stout plumose bristle. Exopodite hirsute with usual 3 bristles, similar to that on *V. subantarctica*. First joint of endopodite with 2 a-bristles (outer bristle plumose to tip, inner bristle with short marginal spines), and 3 b-bristles, outer 2 pectinate, inner and shorter bristle with few spines; cutting edge consisting of rounded tooth. Second joint of endopodite with 4 a-bristles, 3 b-, c-, and d-bristles: anterior 2 a-bristles with few marginal spines, next with 12 stout spines, posterior bristle longer than others and 5 marginal spines; anterior 2 b-bristles pectinate along posterior margins, posterior b-bristle with 4 strong teeth near middle of anterior margin and 1 tooth on posterior margin; 1 short bare c-bristle, middle c-bristle with about

18 teeth along anterior margin, posterior c-bristle with 19 long teeth along anterior margin; anterior d-bristle with about 8 teeth along anterior margin, middle d-bristle with 12 teeth on anterior margin, posterior d-bristle longer than others and with about 26 teeth along anterior margin.

Fifth limb (Figure 105b): Epipodial appendage with 57 bristles; sclerotized process of protopodite with undulate margin. Exopodite: anterior margin of 1st joint with plumose bristle near protopodite process and 3 spinous distal bristles similar to those on *V. subantarctica*; main tooth with 6 teeth, proximal peg and spinous bristle; 2nd joint with 1 posterior c-bristle, 1 anterior d-bristle, 4 a-bristles, 4 b-bristles, and 3 b'-bristles; inner lobe of 3rd joint with 1 proximal plumose bristle and 2 longer terminal bristles with short marginal spines; outer lobe of 3rd joint with 2 bristles (outer bristle with long proximal and short distal spines, inner bristle with short marginal spines); 4th joint separated from 5th by suture; 4th joint with 4 spinous bristles; 5th joint with 2 spinous bristles; small spined process present on inner corner of terminal margin of 5th joint; joints 3 to 5 hirsute.

Sixth limb (Figure 105c): Smaller than 6th limb of *V. subantarctica*, but with similar distribution

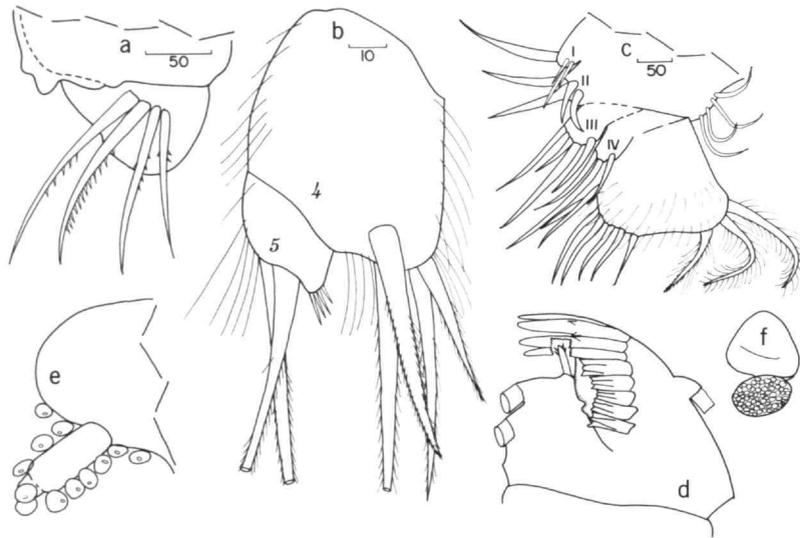


FIGURE 105.—*Vargula lusca*, female, USNM 128056: a, tip of right maxilla, lateral view (only a-bristles shown); b, tip of left 5th limb, posterior view; c, right 6th limb, medial view (marginal spines on some bristles not shown); d, tip of 7th limb (some bristles not shown); e, medial eye and rod-shaped organ with attached foreign organisms; f, left genital organ and attached spermatophore, anterior to left. (Same magnification in microns: b,d; c,e,f.)

of bristles, except all bristles of end joint with long proximal and short distal spines except posterior 2, which are plumose; total number of bristles on end joint 10 or 11.

Seventh limb: Each limb with 25 or 26 bristles, 12 or 13 in distal group (6 or 7 ventral, 6 dorsal), and 12 to 14 in proximal group (5 or 6 ventral, 7 or 8 dorsal); each bristle with 1 to 6 bells; terminal ventral comb with 7 elongate teeth; 4 or 5 short square-tipped teeth present on either side of elongate teeth; single peg with spines near tip present opposite comb (Figure 105d).

Furca: Similar to *V. subantarctica*.

Rod-shaped organ and eyes (Figure 105e): Medial eye and rod-shaped organ similar to that of *V. subantarctica*. Lateral eyes absent.

Upper lip: Similar to that of *V. subantarctica* except for glandular openings along posterior margins of tusks which form narrower horizontal steps.

Genitalia: See Figure 105f.

Eggs: USNM 128056 with 19 eggs in brood chamber.

Parasites: Appendages of USNM 128056 with numerous ovoid protistans.

COMPARISONS.—The new species *V. lusca* is closely related to *V. antarctica* and *V. subantarctica*. It differs from both species in lacking lateral eyes. Its carapace is also smaller than that of *V. antarctica*. The posterior margin of the tusks on the upper lip of *V. lusca* is not as steplike in lateral view as the tusks of *V. subantarctica*. The tusks of *V. lusca* do not bear the inner tooth present on *V. dentata*. The furca of *V. lusca* differs from that of *V. sutura* in having the 2nd and 4th claws united to the lamella. The 7th limb of *V. lusca* does not have the hooklike process present on the 7th limb of *V. hamata*.

DISTRIBUTION.—This species was collected only at the type-locality south of Tasmania at a depth of 910–915 m (Figure 83).

27. *Vargula stathme*, new species

FIGURES 106, 107

HOLOTYPE.—USNM 128847, gravid ♀, length 1.95 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Vema* Cruise 18, station V-18-113, Cook Strait, New Zealand.

ETYMOLOGY.—The specific name, from the Greek "stathme" [= carpenter's line or rule], refers to the straight posterior margin of the tusks on the upper lip of this species.

MATERIAL.—Holotype.

DIAGNOSIS.—Carapace length of female, about 1.95 mm.

Mandible: Dorsal margin of 2nd endopodial joint with about 13 bristles.

Seventh limb: Each limb with 19 or 20 bristles; single peg present opposite comb.

Furca: Claws 2 and 4 of female united to lamella.

Upper lip: Posterior margin of tusks linear, without steps.

Lateral eye: Small, with 4 or 5 ommatidia.

DESCRIPTION OF FEMALE, MALE UNKNOWN.—Carapace oval in lateral view with narrow incisur (Figure 106a); posterior margin evenly rounded without projecting caudal process; ventral and dorsal margins only slightly convex.

Infold (Figure 106c-f): 11 to 14 double bristles including single bristle posterior to anterior row behind rostrum; inner corner of incisur with usual 2 bristles on upper margin; lower margin of incisur with 2 short double bristles near inner corner, and about 4 long and 43 short double bristles forming row on list extending along anteroventral infold, posterior 9 or 10 of these more widely spaced; about 6 minute single widely spaced bristles present on posterior part of ventral list; about 6 short double bristles present on anteroventral infold between list and inner margin; about the same number of minute single bristles present on ventral infold between list and inner margin. Posterior infold: posteroventral part broad, with ridge along inner margin of infold on right valve and slightly posterior to inner margin on left valve; about 11 minute bristles present near anterior margin of ridge; numerous pores present on ridge near inner margin and along outer margin; about 10 distinct pores present near outer edge of valve posterior to ridge.

Selvage: Lamella prolongation with smooth outer margin present along anterior and ventral margins; prolongation along lower margin of incisur broad, striate and with short spines along outer margin.



FIGURE 106.—*Vargula stathme*, female, USNM 128847, complete specimen: *a*, lateral outline; length 1.95 mm. Valves: *b*, central muscle scars on right valve, medial view; *c*, posteroventral corner of left valve, medial view; *d*, posterior of left valve, medial view (bristles on infold not shown); *e*, anterior of right valve, medial view (bristles on infold not shown); *f*, posterior of right valve, medial view (bristles on infold not shown). Second antenna: *g*, joints 7 to 9 of exopodite of left limb, lateral view; *h*, endopodite and part of protopodite on left limb, medial view; *i*, bristle on 2nd exopodite joint on right limb, lateral view. Mandible: *j*, basale, exopodite and 1st endopodite joint of right limb, medial view (endopodite bristles not shown); *k*, distal part of 2nd joint and end joint of left limb, medial view (most bristles of end joint not shown); *l*, second endopodite joint of left limb, medial view. Maxilla: *m*, tip of left limb, lateral view; *n*, detail of "cutting tooth" on 2nd endopodite joint of right limb, lateral view. (Same magnification in microns: *b,e,j; c,h; d,f; g,k,m,n; i,l*.)

Muscle scars: Central muscle scars consisting of about 21 individual scars (Figure 106b).

Size (Figure 82): USNM 128847, length 1.95 mm, height 1.34 mm.

First antenna: 1st joint bare; 2nd joint with spines forming clusters along ventral and dorsal margins; 3rd joint with 2 spinous bristles, 1 dorsal near middle, 1 ventral terminal; 4th joint with 2 spinous bristles, 1 ventral, 1 dorsal; sensory bristle of 5th joint with 10 long proximal filaments, 2 slender distal filaments, and bifurcate tip; bristle of 6th joint spinous, shorter than a-bristle of 7th joint. Seventh joint: a-bristle short with about 6 pairs of marginal spines; b-bristle with 5 short filaments; c-bristle with about 9 or 10 filaments including tip; d- and e-bristles long, bare; f- and g-bristles with 9 or 10 filaments plus bifurcate tip.

Second antenna (Figure 106g-i): Protodopodite with short spinous medial bristle. Endopodite 3-jointed: 1st joint with 4 proximal bristles, 1 longer than others, and 1 medium length spinous distal bristle; 2nd joint with short bare distal bristle; 3rd joint elongate with long terminal bristle. Exopodite: ventral margin of bristle of 2nd joint with 14 stout spines; joints 3 to 9 with basal spines; 9th joint with 4 bristles, 1 short bare, 1 medium with rather stout marginal hairs, 2 long with natatory hairs; bristles of joints 3 to 8 with natatory hairs and without spines; joints 2 to 8 with minute triangular teeth along distal margins.

Mandible (Figure 106j-l): Coxale endite spinous with small peg present between 2 stout terminal spines. Basale: ventral margin with 2 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles (Figure 106j); dorsal margin with 1 spinous bristle distal to middle and 2 spinous terminal bristles. Exopodite reaching distal end of 1st endopodite joint and with 2 spinous bristles, inner bristle more than twice length of outer bristle. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long, 1 short, 1 minute; dorsal margin of 2nd joint with 5 long spinous bristles and 8 short spinous and pectinate bristles; ventral margin with 3 groups of bristles with 1, 1, and 2 bristles; medial bristle of distal pair spinelike (Figure 106k); end joint with 3 claws and 4 bristles, medial ventral bristle minute, long ventral bristle with proximal spines, lateral claw with minute proximal teeth on concave margin.

Maxilla (Figure 106m,n): Endite I with 11 bris-

gles; endite II with 5 bristles; endite III with 1 proximal and 5 terminal bristles; some endite bristles with triaenid tips. Coxale with stout bristle plumose proximally. Only 2 bristles, 1 long, 1 short, observed on distal margin of basale. Exopodite hirsute with usual 3 bristles, proximal bristle and outer terminal bristle plumose, inner terminal bristle bare. First joint of endopodite with 2 α -bristles, outer bristle with long marginal hairs almost to tip, inner bristle with short marginal spines, and 3 β -bristles, longer of these pectinate, others bare; cutting edge consisting of large and small tooth. Second endopodite joint with 4 bare a-bristles, 3 b-, c-, and d-bristles (short c-bristle bare or with few spines, remaining b-, c-, and d-bristles pectinate).

Fifth limb (Figure 107a): Epipodial appendage with about 46 bristles; sclerotized anterior process short. Exopodite: anterior margin of 1st joint with plumose bristle near protopodite process and 3 bristles (1 short plumose, 2 long with long stout proximal spines and distal teeth); main tooth with 6 teeth, proximal peg, and spinous bristle; 2nd joint with 1 posterior spinous c-bristle, 1 anterior spinous d-bristle, 4 a-bristles, 4 b-bristles, 3 b'-bristles; inner lobe of 3rd joint with 1 proximal bristle with long proximal hairs and short distal spines and 2 longer terminal bristles with short marginal spines; outer lobe of 3rd joint with 2 bristles (outer bristle with long proximal hairs and short distal spines, inner bristle with short marginal spines); 4th joint not separated from 5th by suture; 4th joint with 3 spinous bristles; 5th joint with 2 spinous bristles; small spined process present on inner corner of terminal margin of 5th joint; joints 3 to 5 hirsute.

Sixth limb (Figure 107b): Epipodial appendage with 4 bare bristles; endite I with 2 short plumose bristles and 1 longer spinous terminal bristle; endite II with 5 or 6 spinous bristles (3 medial, 2 or 3 terminal); endite III with 1 medial and 3 terminal spinous bristles; endite IV slightly smaller than endite III and with 1 medial and 2 terminal spinous bristles; anteroventral margin of end joint with 7 or 8 bristles with long proximal and short distal spines, followed by a gap and then 1 bristle with long proximal and short distal spines and 2 long plumose bristles; medial surface of 3rd and 4th endites and end joint hirsute; lateral surface of end joint with long spines along ventral margin;

posterior margin of end joint slightly produced posteriorly.

Seventh limb (Figure 107c,d): Each limb with 19 or 20 bristles, 12 or 13 in distal group (7 ventral, 5 or 6 dorsal), and 7 in proximal group (4 ventral, 3 dorsal); each bristle with 3 to 6 bells; terminal ventral comb with about 9 elongate alate teeth; 3 or 4 short square-tipped teeth present on each side of elongate teeth; single peg present opposite comb (details of this peg obscured by debris on holotype).

Furca (Figure 107e): Each lamella with 9 claws; claws 2 and 4 united to lamella, remaining claws separated from lamella by suture; claw 3 distinctly narrower than claw 4.

Rod-shaped organ and eyes (Figure 107f-g): Rod-shaped organ short, fingerlike with small protuberance at tip. Lateral eyes fairly small with

only 4 or 5 ommatidia (black pigment present between ommatidia). Medial eye small (maximum length about same as length of rod-shaped organ).

Upper lip (Figure 107g,h): Anterior part unpaired; posterior part with long tusk on each side; posterior margin of each tusk without "steps," except for small ones at distal end; bulge posterior to tusks hirsute. Large unpaired anterior process present between upper lip and medial eye.

Eggs: USNM 128847 with 7 eggs in marsupium.

COMPARISONS.—The carapace of this new species is smaller than those previously described herein. It bears larger lateral eyes and fewer bristles on the 7th limb than are present on *V. antarctica*. The posterior margin of the tusks of the upper lip is not steplike as it is on the tusks of *V. subantarctica*, *V. hamata*, and *V. lusca*. It also differs from *V. hamata* in not having a hooklike process on the

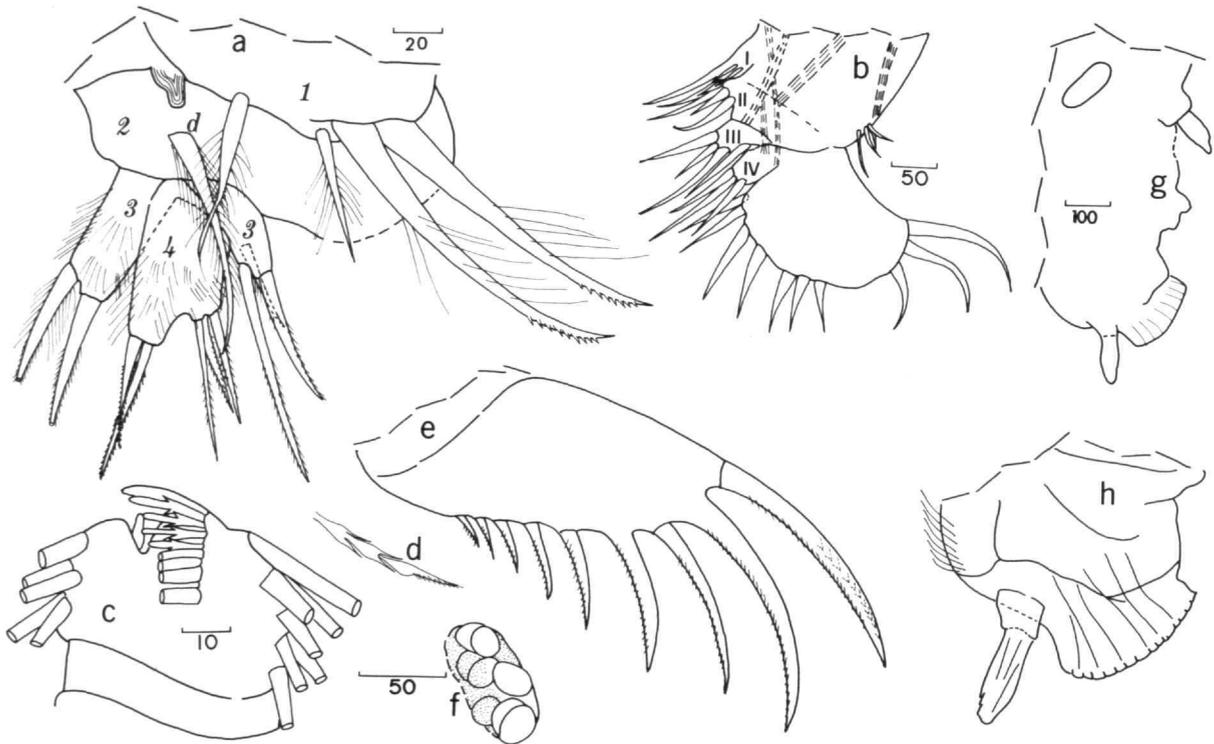


FIGURE 107.—*Vargula stathme*, female, USNM 128847: a, tip of right 5th limb, anterior view (not all bristles shown); b, right 6th limb, medial view (marginal spines on bristles not shown); c, tip of 7th limb; d, outline of tip of bristle on 7th limb; e, right lamella of furca, lateral view; f, lateral eye; g, anterior of body showing outline of right lateral eye, medial eye and rod-shaped organ, anterior process, and upper lip; h, upper lip, anterior to right. (Same magnification in microns: b,e,h; c,d.)

tip of the 7th limb. The number of bristles on the dorsal margin of the 2nd endopodite joint of the mandible is also quite low compared to the species mentioned above. The tusks of the upper lip of the new species *V. stathme* does not have the large tooth present on tusks of *V. dentata*.

DISTRIBUTION.—This species was collected only at the type-locality, in Cook Strait, at a depth of 117 m (Figure 83).

Vargula Species Indeterminate

MATERIAL.—USNM 127973, 1 juvenile, length 1.77 mm, height 1.30 mm, + 1 juvenile, length 1.89 mm, height 1.23 mm, both specimens from *Eltanin* Cruise 7, station 557; USNM 127976, 2 juveniles from *Eltanin* Cruise 7, station 558; USNM 128043, 1 juvenile without carapace from *Eltanin* Cruise 6, station 340; USNM 128148, 1 ♀ with torn shell and unextruded small eggs, length about 3.0 mm, from *Eltanin* Cruise 9, station 740.

DISTRIBUTION.—See Figure 83.

Rugosidoloria, new genus

TYPE-SPECIES.—*Rugosidoloria serrata*, new species.

ETYMOLOGY.—The generic name is derived from the Latin “rugosus” [= wrinkled, shriveled] + “doloria” in reference to the longitudinal ribs on the carapace of the type-species. Gender: feminine.

Only the type-species of the new genus is known; therefore, variability within the genus is unknown.

DIAGNOSIS OF GENUS (adult male unknown).—Carapace rugose with 2 longitudinal ribs; posterior opening present on caudal process; right valve with anterior tooth and posterior socket fitting anterior socket and posterior tooth of left valve.

First antenna, maxilla, mandible, fifth, sixth, and seventh limbs: Similar to those of the genus *Doloria*.

Second antenna: Endopodite 3-jointed and without bristle on 2nd joint.

Furca: Each lamella with 9 claws, each separated from lamella by suture, and decreasing in length and stoutness posteriorly along lamella.

Rod-shaped organ: Short triangular, with small protuberance at tip.

Lateral eye: Small with 3 to 5 divided ommatidia.

Upper lip: Anterior half with short glandular pegs along anterior and ventral margins; posterior half divided by shallow groove on ventral margin; glandular openings along each side of ventral groove; lip apparently not divided into anterior and posterior fields except as indicated by anterior end of ventral groove.

Dorsum: Posterior part with small process with about 5 long hairs at tip.

COMPARISONS.—The upper lip of this new genus is similar to those on the genera *Paradoloria* and *Doloria*, but members of those genera have smooth carapaces. Because the male of the new genus is not known, it is not possible to determine to which of the two genera it is more closely related.

DISTRIBUTION.—Specimens in this genus were collected at only one locality, 40°11'S, 60°27'W, off the Atlantic coast of Argentina, at a depth of 44 m (Figure 60).

28. *Rugosidoloria serrata*, new species

FIGURES 108–113

HOLOTYPE.—USNM 136586, 1 gravid ♀, length 2.85 mm. Appendages on slides; valves and some appendages in alcohol.

TYPE-LOCALITY.—*Vema* Cruise 17, station V-17-71.

ETYMOLOGY.—The specific name is from the Latin “serratus” [= serrate] in reference to the serrate process on the peg opposite the comb of the 7th limb of the species.

PARATYPES: USNM 136588, 1 gravid ♀; USNM 136587, 1 juvenile; USNM 136934, 1 juvenile, not dissected, length 1.33, height 0.92 mm; USNM 136589, 5 juveniles; USNM 136934, 1 juvenile, not dissected, length 1.33 mm, height 1.16 mm; USNM 128683, 1 juvenile, length 1.68 mm, height 1.16 mm; USNM 137481, gravid ♀. Paratypes from same sample as holotype.

DIAGNOSIS.—Same as for genus.

DESCRIPTION OF FEMALE (male unknown) (Figures 108, 109, 110a-l, 112, 113).—Carapace with caudal process with opening in middle of posterior margin (Figures 108; 109a,g; 112, 113); left valve overlapping right along dorsal margin; prominent rostrum and incisor.

Ornamentation (Figures 109h, 112, 113): Surface coarsely punctate with prominent longitudinal

ridges above and below central muscle-scar area; lower ridge projecting more on USNM 136588 than on USNM 136586; surface hairs sparse.

Infold (Figure 109b-f): Twenty-three bifurcate bristles forming row parallel to outer margin behind rostrum and about 10 short bristles scattered on medial surface posterior to row of longer bristles; 2 stout bifurcate bristles present on margin at inner end of incisur; 3 or 4 short bristles present posterior to incisur; anteroventral infold with 21 long bristles with about 3 to 5 distal subdivisions; anterior half of ventral infold with 5 bristles along list; posterior half of ventral infold with 10 short bristles; inner margin of posterior infold with numerous minute bristles; 6 small inward-oriented bristles present along posterior margin of caudal process.

Selvage: Wide striate lamellar prolongation with smooth outer margin present along anteroventral and posterior margins; prolongation divided at incisur; selvage not observed along posterior end of tubular caudal process.

Hingement: Edge of right valve above rostrum forming tooth fitting into socket formed by recess in inner margin of infold of left valve; list on posterior infold of left valve forming tooth fitting into socket formed by indentation in list on right valve; anterior element in front of anterior juncture of

ligament, posterior element behind posterior juncture of ligament.

Size: USNM 136586, length 2.85 mm, height 1.92 mm; USNM 136588, length 2.51 mm, height 1.63 mm.

First antenna (Figure 109i): First joint bare, 2nd joint spinous; 3rd joint very short with 2 fairly long spinous bristles, 1 ventral, 1 dorsal; 4th joint with 2 spinous bristles, 1 ventral, 1 dorsal; sensory bristle with numerous long filaments (exact number obscure but about 7 present in proximal half); short medial bristle of 6th joint with widely spaced marginal spines. Seventh joint: a-bristle slightly longer than bristle on 6th joint and with similar marginal spines; b-bristle about one-half length of sensory bristle and with 4 marginal filaments (proximal 2 pectinate); c-bristle long with 10 filaments including tip (proximal 5 pectinate). Eighth joint: bare d- and e-bristles same length as sensory bristle; f- and g-bristles similar to c-bristle.

Second antenna (Figure 109j): Protopodite with fairly long medial bristle with short marginal spines. Endopodite 3-jointed: 1st joint with 1 long and 3 short bristles; 3rd joint with long terminal bristle reaching 3rd joint of exopodite. Exopodite: bristle of 2nd joint with about 45 spines along ventral margin and slender spines along dorsal margin; basal spines present on joints 3 to 8 and lateral spine

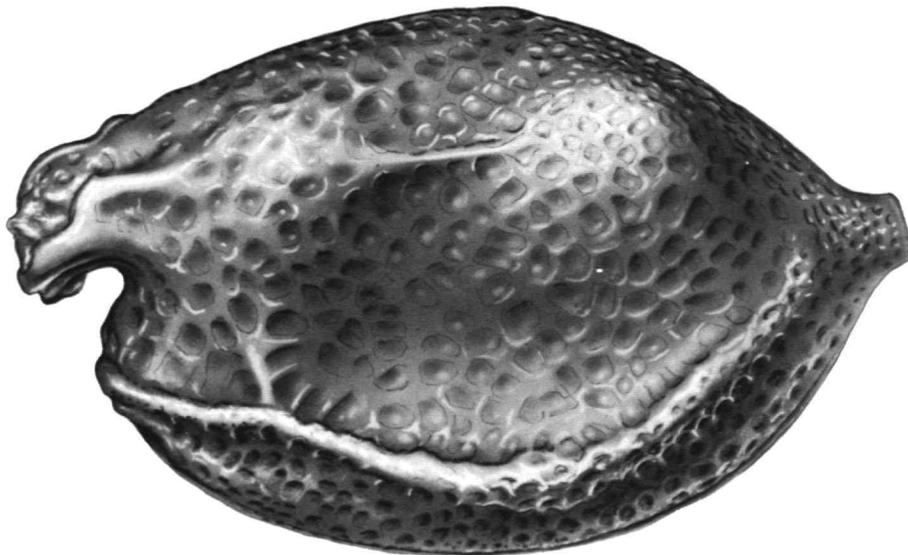


FIGURE 108.—*Rugosidoloria serrata*, female, USNM 136586, length 2.85 mm.

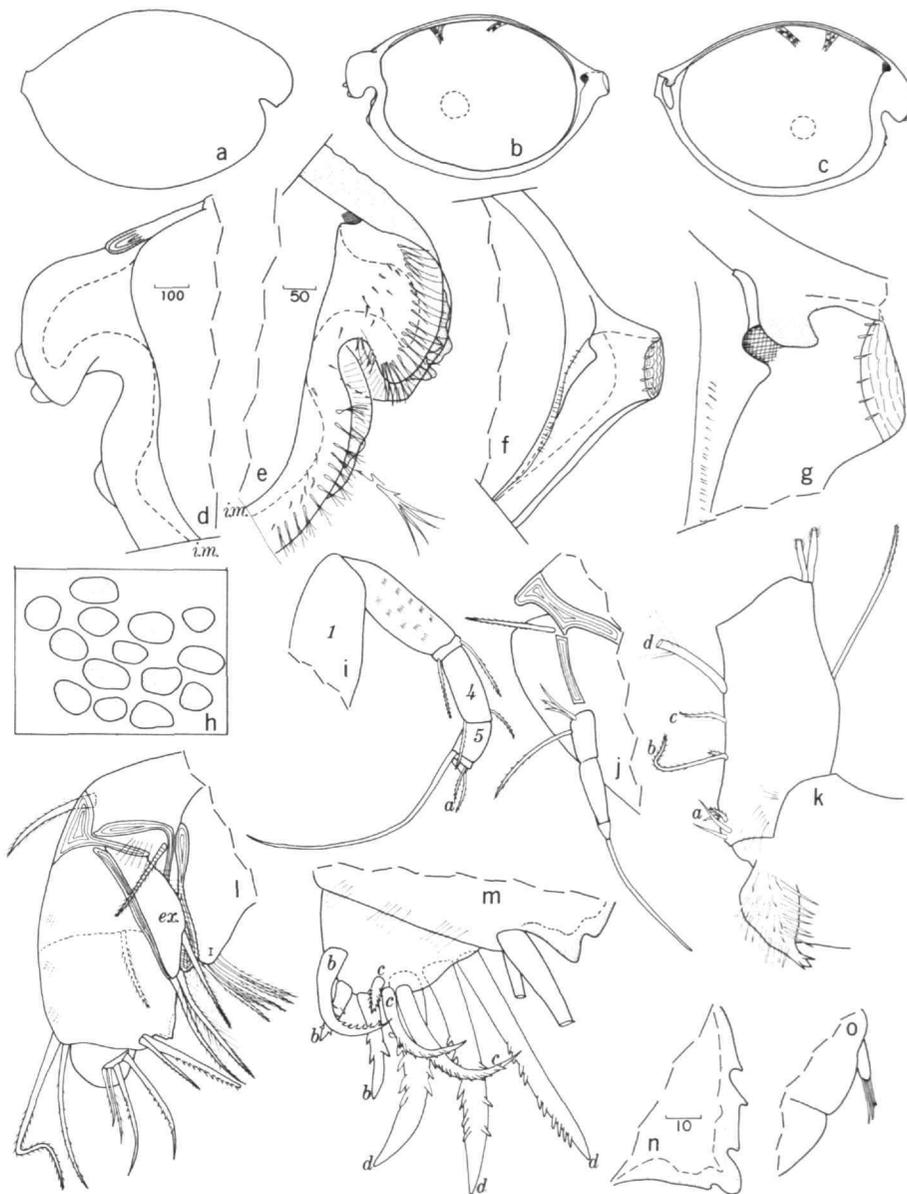


FIGURE 109.—*Rugosidoloria serrata*, female, USNM 136586, complete specimen: *a*, lateral outline, length 2.85 mm. Valves: *b*, right valve, medial view; *c*, left valve, medial view; *d*, anterior of right valve, medial view (bristles on infold not shown); *e*, anterior of left valve, medial view; *f*, posterior of right valve, medial view; *g*, detail showing posterior tooth of left valve (lateral view) and socket and posterior end of right valve (medial view); *h*, detail of surface punctae on left valve, lateral view. Left 1st antenna: *i*, medial view (some bristles on 7th joint and all bristles on 8th joint not shown). Right 2nd antenna: *j*, endopodite and part of protopodite, medial view. Right mandible: *k*, coxale and basale, medial view. Maxilla: *l*, left limb, lateral view (only a-bristles shown on end joint); *m*, bristle on end joint of right limb, medial view; *n*, detail of "cutting tooth" on left limb shown in "*l*," lateral view. Body: *o*, posterior process, anterior to left. (Same magnification in microns: *d,f,h,i*; *e,g,j-l,o*.)



FIGURE 110.—*Rugosidoloria serrata*, female, USNM 136586: *a*, right 5th limb, anterior view (all bristles and marginal spines on bristles not shown); *b*, tip of left 5th limb, posterior view; *c*, right sixth limb, lateral view; *d*, tip of 7th limb with jaw closed; *e*, medial eye and rod-shaped organ; *f*, right lamella of furca, lateral view; *g*, right lateral eye; *h*, outline of upper lip, anterior to left; *i*, upper lip, ventral view; *j*, anterior showing medial eye and rod-shaped organ, anterior process and upper lip. Juvenile, USNM 136587: *k*, posterior of carapace with valves open, medial view; *l*, outline of complete specimen, lateral view; *m*, posterior of complete carapace, dorsal view; *n*, anterior of carapace with valves open, medial view. (Same magnification in microns: *f,m,n*; *a,c,e,g-k*.)

present on 9th joint, latter spine about three-fourths length of 9th joint; 9th joint with 4 bristles, 2 long, 1 medium, 1 minute, all except last with natatory hairs; natatory hairs present on bristles of joints 3 to 8.

Mandible (Figure 109k): Coxale endite strongly spinous with single stout spine at tip and minute bristle near base. Basale: dorsal margin with 1 long bristle near middle and 2 terminal bristles, all with short marginal spines; ventral margin with 4 a-bristles (3 ventral, 1 lateral), 2 b-bristles (1 very short), 1 c-bristle and 1 long stout d-bristle. Exopodite reaching end of 1st endopodite joint, with pointed hairs tip and 2 bristles (proximal bristle longer than distal bristle). Endopodite: ventral margin of 1st joint with 4 terminal bristles (2 long, 1 short, 1 minute); ventral margin of 2nd joint with 3 groups of bristles with 1, 1, and 2 slender bristles in each group; dorsal margin with 6 long bristles, 4 medium bristles, and numerous short bristles; end joint with 3 subequal claws with a few teeth near tips, and 4 bristles.

Maxilla (Figure 109l-n): Three endites present; 3rd endite with short proximal bristle with short marginal spines; coxale with short stout plumose bristle; basale with short spinous bristle on medial margin. Endopodite: 1st joint with 2 spinous α -bristles and 2 β -bristles (longer of these pectinate, shorter with slender spines); cutting tooth triangu-

lar with several cusps; end joint with 4 spinous a-bristles, 3 pectinate b-, c-, and d-bristles. Exopodite with 1 hairs proximal bristle and 2 terminal bristles (inner of these with long proximal and short terminal spines, outer with short marginal spines).

Fifth limb (Figure 110a,b): Epipodial appendage with 55 bristles. Protopodite with short stout sclerotized process on distal margin. Exopodite: anterior surface of 1st joint with 1 proximal spinous bristle and 3 distal spinous bristles (inner bristle clawlike); main tooth of 1st joint consisting of 5 teeth and proximal triangular process; 1 spinous bristle present proximal to triangular process; 2nd joint with 4 pectinate a-bristles, 7 pectinate b-bristles, and 1 spinous c- and d-bristle; inner lobe of 3rd joint with 3 spinous bristles, outer lobe with 2; 4th and 5th joints not separated by suture; 4th joint with 3 spinous bristles and hairs bulge on margin near 5th joint; 5th joint with 2 spinous bristles and sclerotized peg near bulge of 4th joint (muscle attached near base of sclerotized process); 3rd to 5th joints hairs.

Sixth limb (Figure 110c): Right limb of holotype with 1 plumose and 4 bare bristles present in place of epipodial appendage, left limb with all 5 bristles bare. First endite with 3 spinous bristles, 2 short medial, 1 long terminal; 2nd endite of right limb with 4 spinous bristles, 2 short medial, 2 long terminal; 2nd endite of left limb of holotype with

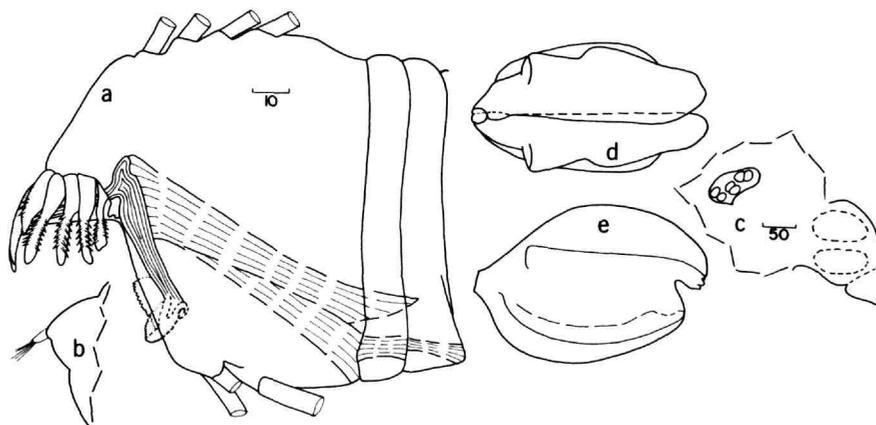


FIGURE 111.—*Rugosidoloria serrata*, juvenile, USNM 136587: a, tip of 7th limb; b, posterior of body showing hairs process; c, right lateral eye, medial eye and rod-shaped organ. Adult female, USNM 136588, complete specimen: d, dorsal view; e, lateral view. (Same magnification in microns: b,c.)

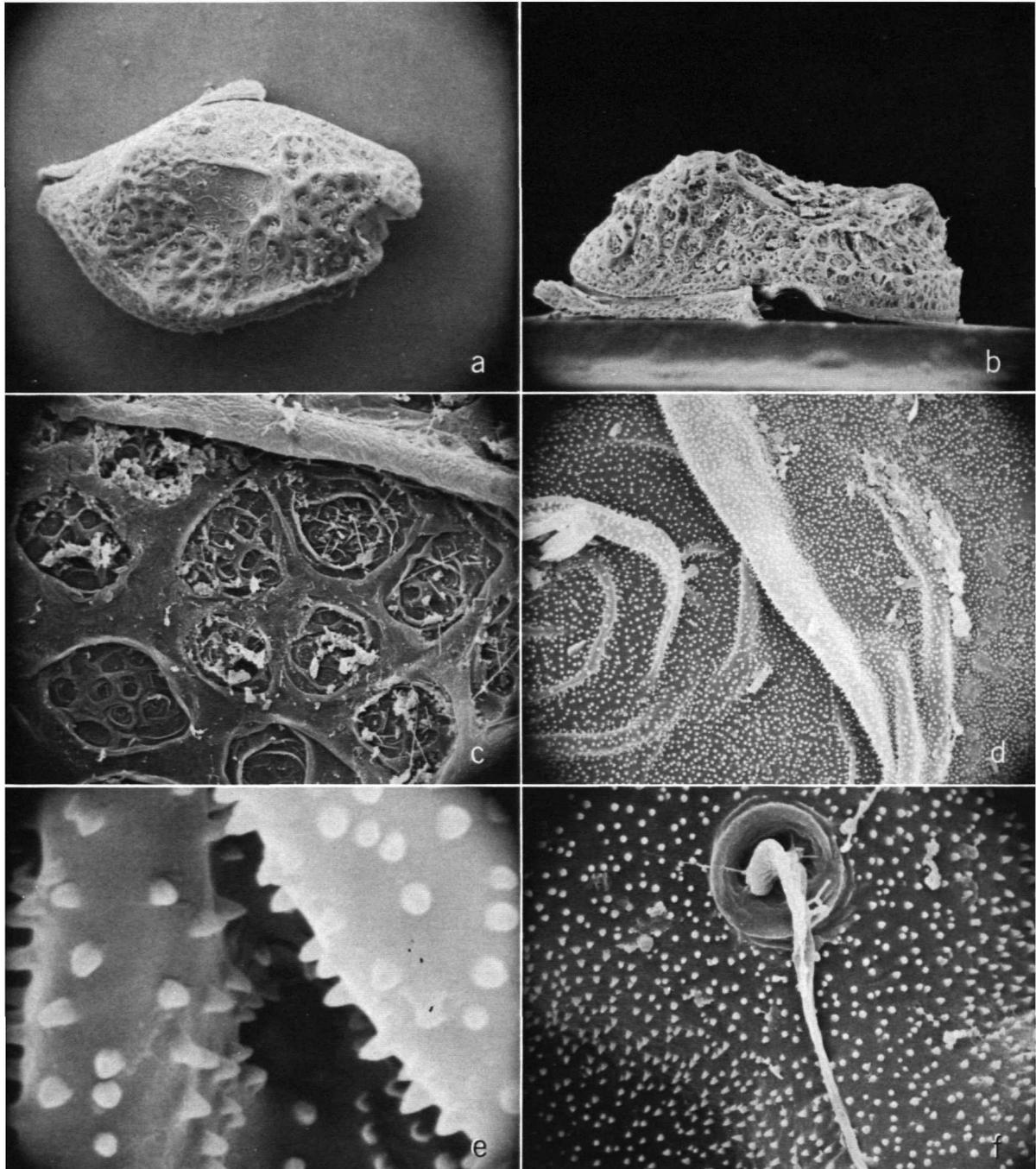


FIGURE 112.—*Rugosidoloria serrata*, female, USNM 136586, right valve: *a*, complete valve, $\times 30$; *b*, posterior view, ventral margin at right of figure, $\times 50$; *c*, detail of central area shown in "*a*," $\times 200$; *d*, detail of "*c*," $\times 2000$; *e*, detail from "*d*," $\times 20,000$; *f*, bristle in postero-ventral part of shell.

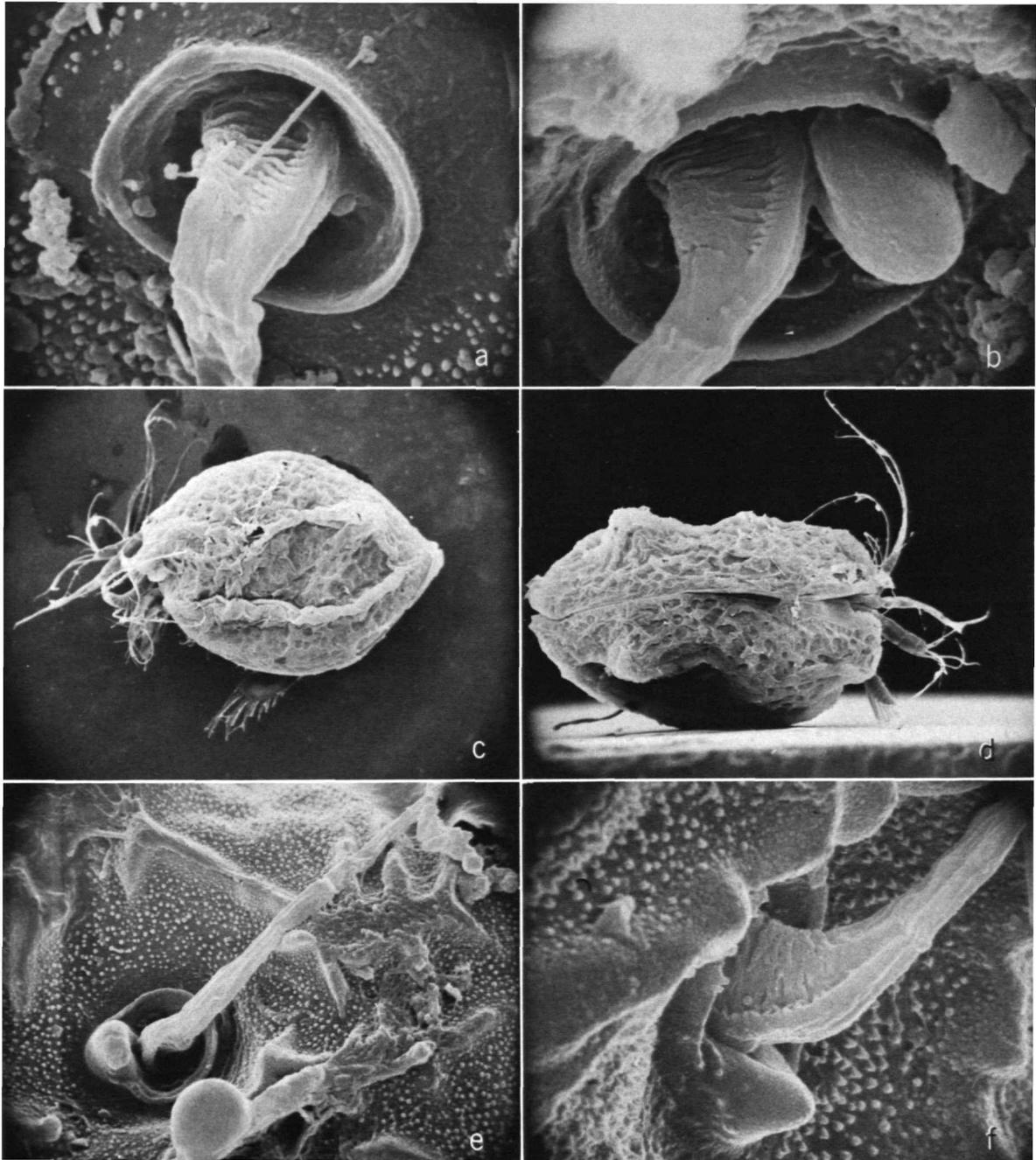


FIGURE 113.—*Rugosidoloria serrata*, female, USNM 136586, right valve, lateral view: *a*, detail of hair pore with protuberance, $\times 10,000$; *b*, detail of hair pore without protuberance, $\times 10,000$. Complete specimen, USNM 136934: *c*, left lateral view, $\times 56$; *d*, dorsal view $\times 64$; *e*, detail of hair and pore $\times 5600$; *f*, detail of hair pore, $\times 11,000$.

5 spinous bristles, 4 short medial, 1 long terminal; 3rd endite with 6 spinous bristles, 2 proximal medial, 4 terminal; 4th joint with 6 to 8 spinous bristles, 1 or 2 proximal medial, 5 or 6 terminal; end joint with 26 spinous or hirsute bristles; spines present along ventral margin on lateral side of end joint, medial surface hirsute; posterior 2 plumose bristles of end joint longer than others.

Seventh limb (Figure 110d): Dorsal comb with lateral spinous teeth and strongly sclerotized middle tooth with shorter sclerotized tooth on each side; stout tooth opposite comb with fanlike structure with serrate margin. Total of 27 or 28 bristles present on each limb: 17 or 18 terminal (10–12 dorsal, 6 or 7 ventral) and 10 proximal (4 or 5 dorsal, 5 or 6 ventral); each bristle with 2 to 5 bells. (Terminal jaw of holotype closed on both limbs.)

Furca (Figure 110f): Each lamella with 9 claws with teeth forming lateral and medial row along posterior margins; claws decreasing in length and stoutness posteriorly along lamella; each claw separated from lamella by suture.

Upper lip (Figure 110j): Lip triangular in ventral view with glandular pegs along margins and shallow central depression becoming wider and deeper posteriorly; in lateral view glandular pegs extending well up anterior margin.

Eyes and rod-shaped organ (Figure 110e,g,h): Lateral eyes small with 3–5 divided ommatidia; medial eye about twice diameter of lateral eye, bare; rod-shaped organ short triangular, protruding slightly at tip; large triangular process present between rod-shaped organ and upper lip.

Dorsum: Posterior with small process with about 5 long hairs at tip (Figure 109o).

Eggs: USNM 136586 with 9 eggs in marsupium.

DESCRIPTION OF JUVENILE (USNM 136587) (Figures 110k–n, 111a–c): Carapace (Figure 110k–n) similar to that of adult. Size: length 2.00 mm, height 1.48 mm.

Seventh limb (only 1 examined) (Figure 111a): Limb with total of 24 bristles, 13 distal (8 dorsal, 5 ventral), 11 proximal (5 dorsal, 6 ventral), each bristle strongly tapering and with 2 bells. Comb with 3 or 4 strongly sclerotized teeth at middle and 4 more weakly sclerotized spinous teeth on each side; peg opposite comb similar to that on adult female.

Furca: Each lamella with 8 claws, otherwise similar to furca on adult female.

Medial eye, rod-shaped organ, lateral eye (Figure 111c), *dorsum* (Figure 111b): Similar to those on adult female.

Parasites: Adult ♂, USNM 128683, with 1 ♀ and 1 ♂ chonistomatid copepod.

DISTRIBUTION.—This species was collected only at the type-locality, on the Atlantic shelf off Argentina at a depth of 44 m.

Cypridininae Genus Indeterminate

MATERIAL.—1 juvenile, length 1.04 mm, height 0.70 mm, from Deep Freeze IV, USCGC *Northwind*, station 8; 1 juvenile, length 1.19 mm, height 0.91 mm (tusks present on upper lip; endopodite of 2nd antenna short) from *Vema* Cruise 16, station V-16-15; 1 juvenile from *Vema* Cruise 14, station V-14-34; 1 juvenile from *Vema* Cruise 14, station V-14-32.

Subfamily AZYGOCYPRIDININAE

Crossophorinae Skogsberg, 1920:196.

Azygocypridininae Kornicker, 1970:9.

This subfamily contains two genera, *Azygocypridina* and *Isocypridina*. *Azygocypridina* contains seven species; *Isocypridina* contains only one species (Table 22). Both genera are represented in the study area.

EMENDED DIAGNOSIS OF SUBFAMILY.—Carapace large (length 4–15.5 mm), oval in lateral view with small rostrum and incisor, without caudal process; ornamentation lacking except for minute punctae; anterior, ventral, and posteroventral sections of selvage present parallel and just within outer edge of valve; posterodorsal selvage present on list; adductor muscles consisting of combination of individual elongate and ovoid scars.

First antenna: Joints 2 to 4 with numerous bristles; b- and c-bristles of male with numerous filaments having spoonlike tips possibly having suctional function; b-bristle varying in length, being shorter than sensory bristle of 5th joint on some species and as long as the c-, f-, and g-bristles on others (Table 22).

Second antenna: Bristle on 2nd joint of exopodite with numerous natatory hairs; 9th joint of exopodite with more than 4 bristles. Endopodite

of female 3-jointed: 1st joint with numerous bristles, 2nd joint with 1 bristle, 3rd joint with long terminal filament. In *Isocypridina*, endopodite of male similar to that of female; in *Azygocypridina*, endopodite of male with numerous bristles on 2nd joint, 3rd joint reflexed (Table 22).

Fifth limb: Outer lobe of 3rd joint with 2 bristles in *Azygocypridina* and 4 (?always) in *Isocypridina*. Considerable interspecific variability in morphology of 4th and 5th joints: some species with 2 lobes.

Upper lip: Lip consisting of narrow vertical ridge with 2 large lobes ventral and lateral to ridge; lobes supported by sclerotized skeleton having closed or open circle on each side.

Furca: Each lamella with more than 18 claws.

Lateral eye: Elongate, flaplike, hirsute, without ommatidia.

DISTRIBUTION.—Members of the subfamily Azygocypridininae have been reported from 44°09'N (Rudjakov, 1961) to 59°11'S (present study). The reported depth range is 180–3170 m.

Key to Genera

- Outer lobe of 3rd joint of 5th limb with 2 bristles; endopodite of 2nd antennae on male with numerous bristles on 2nd joint, 3rd joint reflexed..... *Azygocypridina*
 Outer lobe of 3rd joint of 5th limb with 4 bristles; endopodite of 2nd antennae on male with 1 bristle on 2nd joint, 3rd joint not reflexed..... *Isocypridina*

TABLE 22.—Comparison of some characters of species in Azygocypridininae

Species	First antenna:		Second antenna: endopodite of ♂	Fifth limb: number of bristles on outer lobe of 3rd exopodite joint	Seventh limb: group ^a	Source
	b-bristle longer (+) or shorter (-) Sex than sensory bristle					
<i>Azygocypridina</i>						
<i>imperator</i>	♂	(+)	reflexed	2	I	Brady, 1880; Kornicker, 1970a
<i>A. imperialis</i>	♀	(-)	-	2	I	Brady and Norman, 1896
<i>A. africanus</i>	♀	(-)	-	2	I	Stebbling, 1902; Müller, 1906c
<i>A. gibber</i>	♂	(+)	reflexed	?	II	Müller, 1906c
<i>A. grimaldi</i>	♂	(-)	reflexed	?	I	Granata, 1919
<i>A. birsteini</i>	♀	?	-	?	II	Rudjakov, 1961
<i>A. birsteini</i>	♂ ^b	(-)	reflexed	?	II	Rudjakov, 1961
<i>A. species</i>	♀	?	-	?	?	Kornicker, 1969b
<i>A. species</i>	♂ ^c	(+)	reflexed	?	?	Kornicker, herein
<i>A. rudjakovi</i>	♂	(+)	reflexed	2	III	Kornicker, 1970a
<i>A. species</i>	♀	?	-	?	I	McKenzie, 1968a
<i>Isocypridina</i>						
<i>quatuoresetae</i>	♀	(-)	-	4	I	Kornicker, herein
<i>Isocypridina</i>						
<i>quatuoresetae</i>	♂	(-)	straight	4	I	Kornicker, herein

^a Groups are based on morphology of tips of 7th limbs (see Kornicker, 1970:10)

^b Rudjakov (1961) identified as *A. species* a juvenile male collected in the same sample as a mature female identified as *A. birsteini*, new species. I herewith refer juvenile male to *A. birsteini*. Although the endopodite of the 2nd antenna of the juvenile male is not reflexed, it differs from that of the female and is the type that becomes reflexed in the adult.

^c The information here is based on examination of a male from the same sample as the female reported by Kornicker in 1969b.

Microstructures

Scanning electron microscope photographs were made on the carapace and appendages of only *Isocypridina quatuorsetae*, but the microstructures described here probably are present on other members of the subfamily.

Selvae.—The lamellar prolongation in the incisure area of the carapace bears pointed spines (Figure 120*b,c*). More flexible-appearing spines fringe the lamellar prolongation of the rostrum (Figure 120*d*). The inner margin of the selvae along the ventral and posteroventral margins of the valves bears minute spines (Figure 120*g,h*).

LIST.—The posterodorsal part of the list on the carapace is serrate (Figure 120*f*).

FIRST ANTENNA (Figure 121).—The d-bristle is "sauged" at its tip (Figure 121*c*), and the branch having terminal discs bears double row of spines (Figure 121*e,f*).

SECOND ANTENNA (Figure 122).—Minute spines forming clusters on the medial surface of the 1st exopodial joint are barely visible in Figure 122*c*. Natatory hairs are flat (Figure 122*f*).

SEVENTH LIMB (Figure 119).—Closely spaced chevron type serrations are present on the comb teeth (Figures 119*b,c*).

FURCA (Figure 124).—A field of clusters of minute blunt-tipped spines is present laterally on the posterior part of the body just proximal to the furcal lamellae (Figures 124*d-f*).

COPULATORY ORGAN (Figure 126).—The scoop-like triangular process bears clusters of minute pegs on the inner and outer surfaces (Figure 126*e,f*).

UPPER LIP (Figures 124*a*, 125).—The anterior glandular field contains about 107 glandular processes (Figure 125*f*). On each side of the lip are 2 glandular fields not previously reported in the subfamily (Figure 125*a,b*). The larger of these contains several hundred glandular processes, of which the posterior hundred or so are larger than the others. The second lateral field contains about 15 glandular processes and is posterior to the larger field (Figure 125*b*). The glandular processes (Figure 125*d*) are similar to those on species of Cypridininae.

Azygocypridina Sylvester-Bradley, 1950

TYPE-SPECIES.—*Crossophorus imperator* Brady, 1880.

This genus is represented by two species in the study area, *A. imperator* (Brady) and *A. africanus* (Stebbing, 1901). A third unnamed specimen has been reported from the Tasman Sea just outside the study area (34°03'S, 151°31'E) by McKenzie (1968*a*).

DIAGNOSIS OF GENUS.—Endopodite of adult male 2nd antenna reflexed; outer lobe of 3rd exopodite joint of 5th limb with 2 bristles; 2 or more short claws present between some large claws of furca.

DISTRIBUTION.—Although seldom collected in large numbers, the genus is widely distributed. The northernmost limit of its range is in the North Atlantic, west of Ireland (55°11'N, 11°31'W). Its southernmost limit is 40°28'S in the vicinity of New Zealand. Members of the genus have been collected at bottom depths of 156–2633 m (Figure 114).

Key to Species

(Includes only species collected south of 35°S)

- | | |
|--|-------------------------|
| Tip of 7th limb with 3 or 4 large teeth..... | 29. <i>A. imperator</i> |
| Tip of 7th limb with numerous small teeth..... | 30. <i>A. africanus</i> |

29. *Azygocypridina imperator* (Brady)

Crossophorus imperator Brady, 1880:158, pl. 38: figs. 1–11.—Müller, 1912:20 [key]. [Not *C. imperator* Brady; Brady and Norman, 1896.]

Azygocypridina imperator (Brady).—Sylvester-Bradley, 1950: 11 [new combination].—Kornicker, 1970*a*:14, fig. 1 [supplementary description].

Azygocypridina zealanica (Baird) [part].—Eagar, 1971:60 [only *C. imperator* included].

HOLOTYPE.—Adult ♂, unique specimen in collection of British Museum (Natural History).

TYPE-LOCALITY.—*Challenger* station no. 168, 40°28'S, 177°43'E, water depth 2012 m, bottom temperature 2.0° C.

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Carapace of adult male oval, length 8.4 mm.

Second antenna: Dorsal margin of 2nd joint with 15 or 16 bristles.

Seventh limb: Tip with 3 or 4 large recurved teeth opposite opposing large jaw with bifurcate tip.

DISTRIBUTION.—Collected only at type-locality (Figure 63).

30. *Azygocypridina africanus* (Stebbing)

Crossophorus africanus Stebbing, 1901:100; 1902:79, pls. 15A, 16; 1910:518.—G. W. Müller, 1906c:134, pl. 34 (30): figs. 1-9; 1912:20 [key].

Azygocypridina africanus (Stebbing).—Sylvester-Bradley, 1950: 11 [new combination].—Kornicker, 1970a [placed in Group I].

HOLOTYPE.—Not designated.

TYPE-LOCALITY.—67 to 73 miles northeast of Cape St. Blaize, South Africa, at depths of 165–225 m (about 35°05'S, 22°E).

MATERIAL EXAMINED.—None.

DIAGNOSIS.—Carapace of adult female oval, length 11.25–15.5 mm, height 8.75–13 mm.

Seventh limb: Tip with comb containing numerous small teeth opposing large jaw with small teeth proximally.

DISTRIBUTION.—Collected only near the tip of South Africa, at depths of 156–225 m (Figure 63).

REMARKS.—*Cyproniscus crossophori* Stebbing, 1901, was described from parasites in *C. africanus*.

Isocypridina, new genus

TYPE-SPECIES.—*Isocypridina quatuorsetae*, new species.

ETYMOLOGY.—The generic name is derived from the Greek "isos" [= like, equal] + *Cypridina*

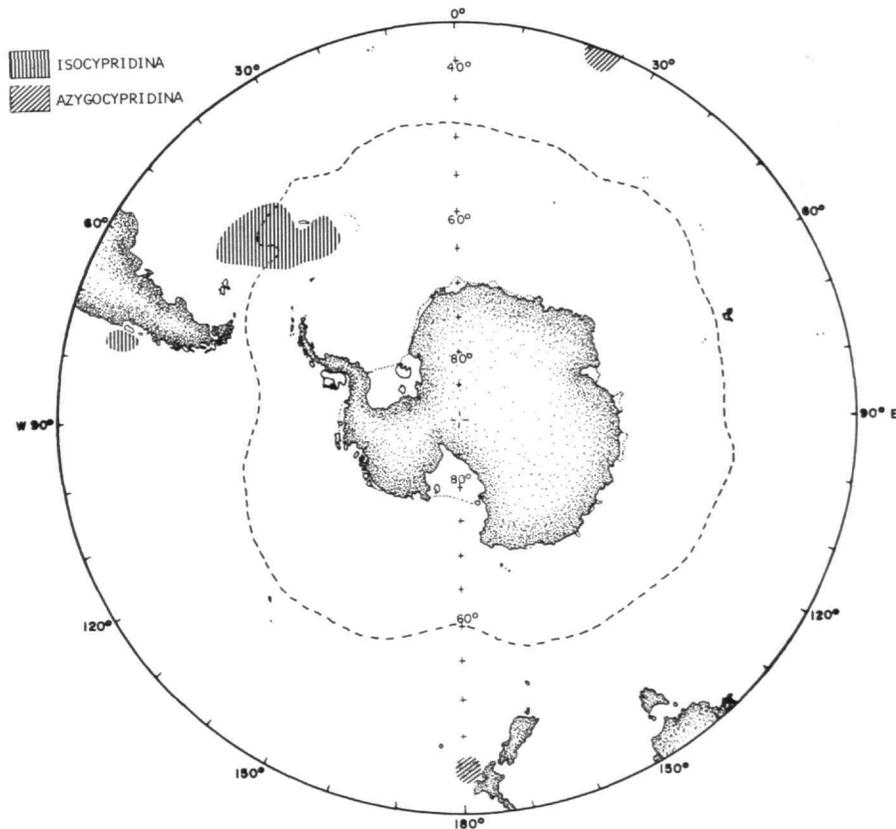


FIGURE 114.—Distribution map of *Isocypridina* and *Azygocypridina*.

in reference to the similarity of the endopodite of the 2nd antennae of both sexes. Gender: feminine.

The genus is monotypic.

DIAGNOSIS OF GENUS.—Second antenna: Endopodite on male similar to that on female, not reflexed as on members of the genus *Azygocypridina*.

Fifth limb: Outer lobe of 3rd exopodial joint with 4 bristles instead of 2 as on members of *Azygocypridina*.

Furca: Only 1 short claw present between each pair of large claws instead of the 2 or more present on members of *Azygocypridina*.

DISTRIBUTION.—Members of this genus have been collected only in the American Quadrant of the present study area (Figure 114). The northernmost locality is 43°24'S, 75°08'W off the Pacific coast of Chile; the southernmost locality is 59°10'S, 37°10'W, which is within the Antarctic Convergence. Specimens belonging to *Isocypridina* have been collected at depths of 248–3382 m, but 5 of the 6 stations at which the genus was collected are deeper than 1000 m.

31. *Isocypridina quatuorsetae*, new species

FIGURES 115–126

HOLOTYPE.—USNM 136174, 1 gravid ♀, some appendages on slides, others in alcohol; carapace in alcohol.

TYPE-LOCALITY.—*Vema* Cruise 17, station V-17-10.

ETYMOLOGY.—The specific name is derived from the Latin “quatuor” [= four] and “seta” [= bristle] in reference to the presence of 4 bristles on the outer lobe of the 3rd exopodite joint on the 5th limb.

PARATYPES.—USNM 136175, 136176, 2 adult ♂♂ from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 138142, 1 gravid ♀; USNM 138143, 6 specimens, both numbers from *Eltanin* Cruise 9, station 715; USNM 138144, 3 specimens from *Eltanin* Cruise 9, station 661; USNM 138145, 3 specimens from *Eltanin* Cruise 9, station 707.

DIAGNOSIS.—Same as for genus.

DESCRIPTION OF FEMALE (Figure 115, 116, 117a-j, 119).—Carapace oval in lateral view with greatest height near middle, without caudal process (Figure 115a); rostrum relatively small, acuminate; incisur small with continuous margin.

Ornamentation: Surface appearing smooth but with minute pores visible at high magnification (× 400).

Infold (Figure 115b-f): Infold behind rostrum with about 35 bristles along outer margin, 18 along list, and 16 between list and posterior margin of rostrum; numerous bristles on list extending along anteroventral, ventral, and posterior margins; additional bristles present on posterior infold between list and valve edge.

Selvage: Anterior part separated by small space at inner end of incisur; lamellar prolongation around rostrum finely striate and with minutely serrated margin; lamellar prolongation along anterior valve margin ventral to inner end of incisur with coarsely serrated margin; selvage discontinuous along posterior margin but present along valve edge on posterior ventral margin and along list on dorsal part of posterior infold.

Muscle scars: Obscure on specimens but with about 4 elongate and 11 ovoid individual scars.

Size: USNM 136174, length 8.0 mm, height 6.0 mm; USNM 138142, length 8 mm, height 7 mm.

First antenna (Figure 115g,h): 2nd joint with 3 or 4 ventral bristles, 10 dorsal bristles, and 1 distolateral bristle; 3rd joint with 1 ventral bristle and 7 dorsal bristles; 4th joint with 6 terminal ventral bristles and 4 dorsal bristles; sensory bristle of 5th joint with numerous long proximal and short distal filaments; 6th joint with 1 medial bristle about same length as 5th joint. Seventh joint: a-bristle stout spinelike, about same length as medial bristle of 6th limb, with short marginal spines; b-bristle shorter than sensory bristle of 5th joint and with numerous short filaments; c-bristle about twice length of sensory bristle and with numerous short marginal filaments. Eighth joint: d- and e-bristles bare; d-bristle about one-half diameter and less than two-thirds length of e-bristle; f- and g-bristles slightly longer than c-bristle and with numerous marginal filaments.

Second antenna (Figures 115i, 117j): Protodite with medial bristle with short faint marginal spines. Endopodite 3-jointed: 1st joint with 7 or 8 ventral bristles (4 or 5 proximal, 3 distal); 2nd joint with 1 distal ventral bristle; 3rd joint with 1 long terminal filament (filament almost three times length of stem). Exopodite: joints 3 to 8 with basal spines; lateral spine on 9th joint about one-half that on 8th joint; joints 2 to 8 with mi-

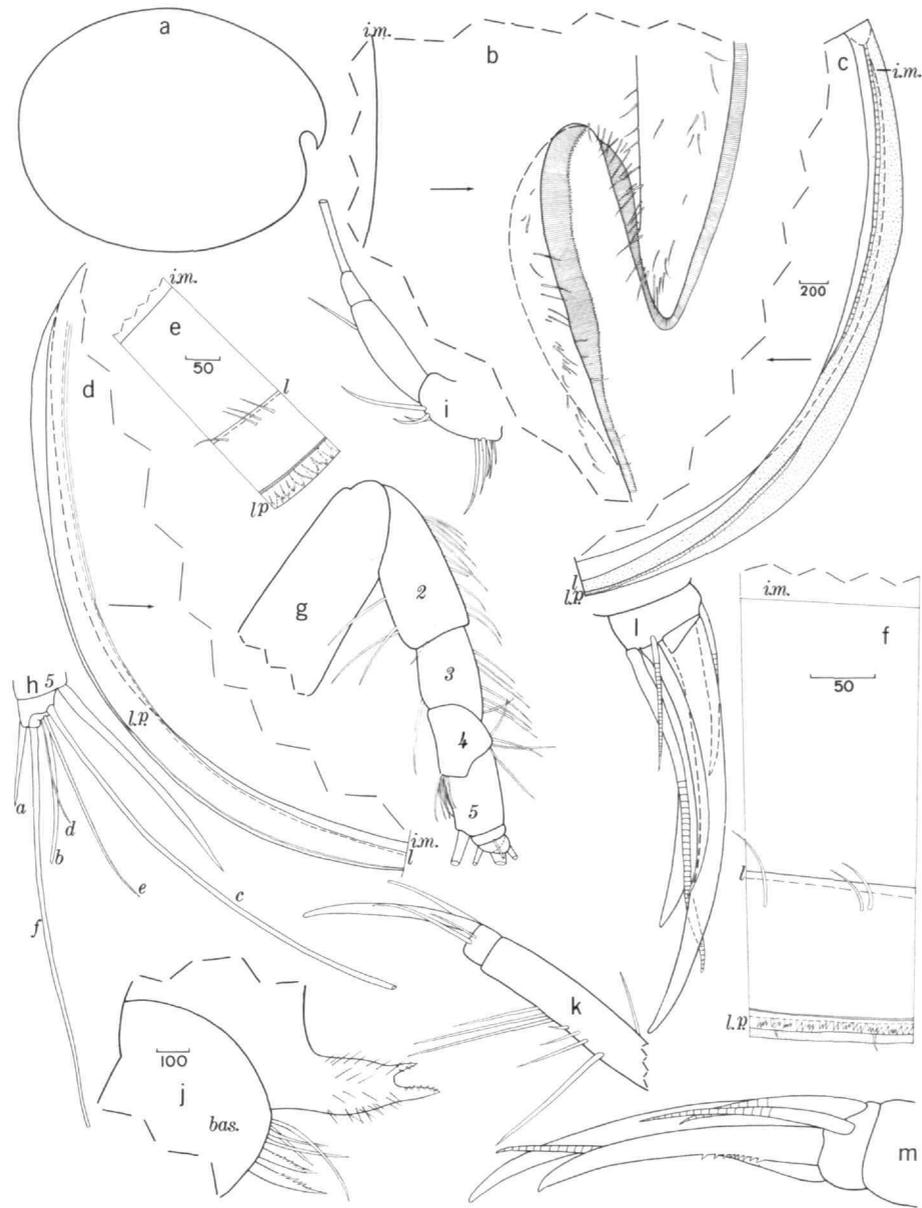


FIGURE 115.—*Isocypridina quatuorsetae*, female, USNM 136174, complete specimen: *a*, lateral outline, length 8.0 mm. Valves: *b*, anterior to left valve, medial view; *c*, posterior of right valve, medial view; *d*, posterior of left valve, medial view; *e*, anteroventral margin of left valve, medial view; *f*, detail of ventral margin of left valve, medial view. First antenna: *g*, left limb, medial view (some bristles of end joint not shown); *h*, tip of left limb, lateral view (*g*-bristle and filaments on bristles not shown); *i*, endopodite of right limb, medial view. Right mandible: *j*, coxale endite and proximal ventral bristles of basale, dorsal view; *k*, tip of limb, medial view (some bristles not shown on end joint). Left limb: *l*, end joint, medial view; *m*, end joint, lateral view. (Same magnification in microns: *e,l,m*; *c,d,g,h*; *b,i-k*.)



FIGURE 116.—*Isocypridina quatuorsetae*, female, USNM 136174, mandible: *a*, coxale (circle represents position of endite), basale, exopodite and 1st endopodite joint of right limb, medial view; *b*, same, left limb, medial view; *c*, foreign organisms on *d*-bristle on right limb, medial view. Left maxilla: *d*, distal part, medial view; *e*, "cutting tooth" and 6-bristles, lateral view. Right maxilla: *f*, endites and part of basale, lateral view. Left 5th limb: *g*, distal part, posterior view; *h*, middle part, anterior view. Left 6th limb: *i*, endite I, medial view; *j*, complete limb, medial view (bristles not shown). (Same magnification in microns: *a,b,j*; *c,e*; *d,f,g,h*.)

nute spines along distal margin; 9th joint with several broad minute lateral spines along distal margin (these spines in addition to larger lateral spine); bristle of 2nd joint reaching just beyond end of 9th joint and with natatory hairs; joint 9

with 8 bristles, 6 long, 1 medium, 1 short, all with natatory hairs; bristles of joints 3 to 8 with natatory hairs and without marginal spines.

Mandible (Figures 115j-m; 116a,c): Coxale endite spinous with 2 stout subequal terminal spines

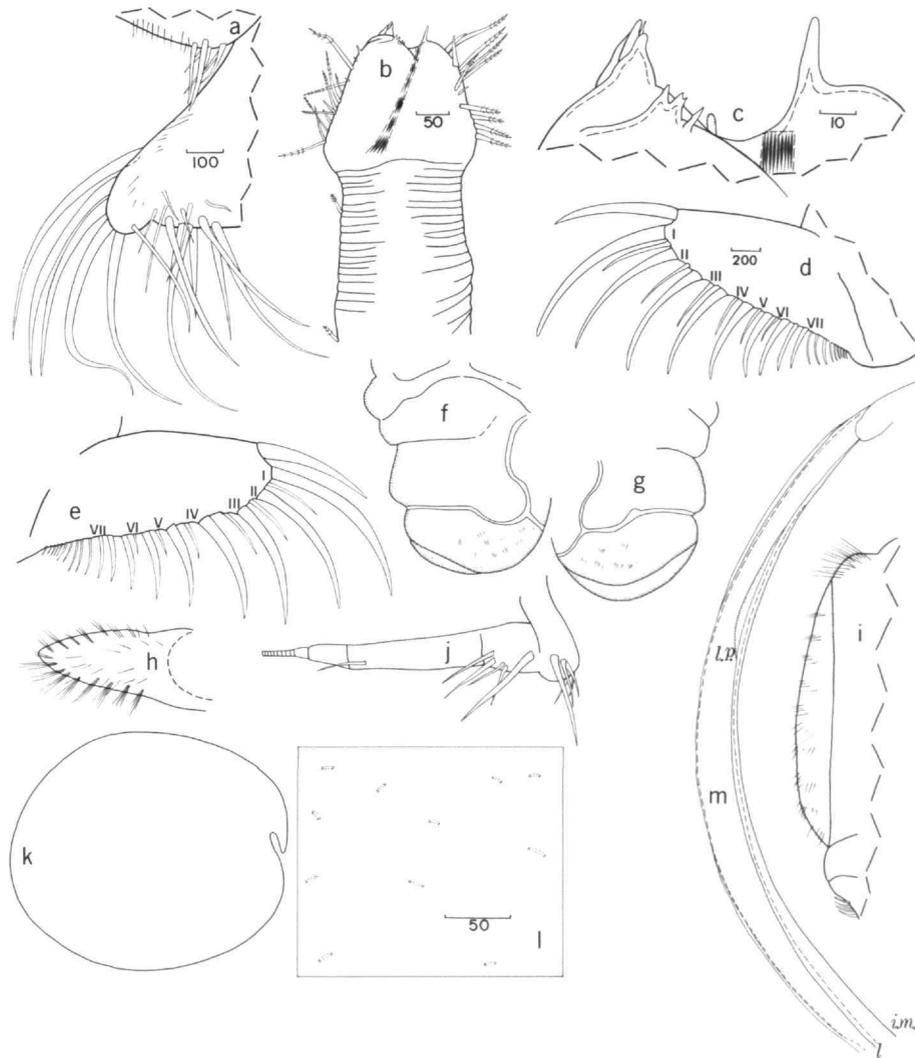


FIGURE 117.—*Isocypridina quatuorsetae*, female, USNM 136174: *a*, posterior end of left 6th limb, medial view. Seventh limb: *b*, distal end; *c*, detail of tip illustrated in “*b*.” Furca: *d*, left lamella, lateral view; *e*, right lamella, lateral view. Body: *f*, upper lip and anterior process, anterior to left; *g*, upper lip, anterior to right; *h*, left lateral eye, anterior to left; *i*, posterior of body and proximal part of furca. Adult male, USNM 136176: *j*, endopodite of left 2nd antenna, medial view. Adult male, USNM 136175, complete specimen: *k*, lateral outline, length 7.0 mm; *l*, detail of surface of left valve showing normal pores, lateral view; *m*, posterior of left valve, medial view (bristles not shown). (Same magnification in microns: *a,h,j; d-g,l,m*.)

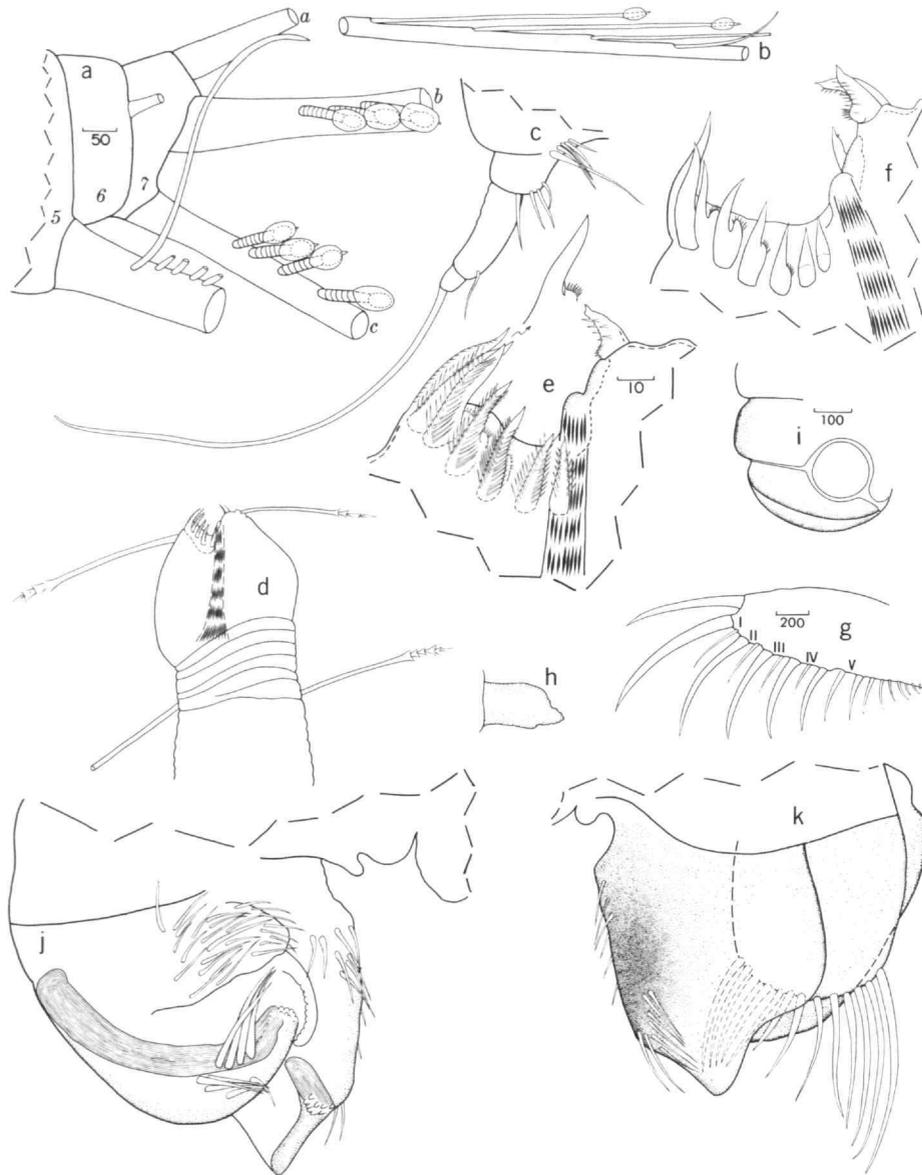


FIGURE 118.—*Isocypridina quatuorsetae*, male, USNM 136175, left 1st antenna: *a*, tip of limb, medial view (8th joint not shown); *b*, detail near tip of b-bristle, medial view. Left second antenna: *c*, endopodite, medial view. Seventh limb: *d*, tip of limb; *e*, detail of “*d*”; *f*, tip of opposing limb (marginal spines on comb teeth not shown). Furca: *g*, left lamella, lateral view. Body: *h*, rod-shaped organ, anterior to right; *i*, upper lip, anterior to left; *j*, left copulatory limb; *k*, right copulatory limb and brushlike organ. (Same magnification in microns: *a-c,j,k; e,f; h,i*.)

with marginal teeth. Basale: 1 short proximal bristle present on lateral side; ventral margin with 9–11 a-bristles (2 stout pectinate, 7 to 9 slender), 1 short b-bristle, 1 short c-bristle, and 2 d-bristles (1 short slender, 1 long stout spinous); dorsal margin with 9 bristles (7 forming fan extending onto medial side of joint, 2 subterminal); numerous spines forming clusters present on medial side. Exopodite reaching beyond end of 1st endopodite joint and with 2 subterminal bristles (proximal bristle slightly longer than distal bristle). Endopodite: 1st

joint with 4 long and 2 short ventral bristles (left limb aberrant in having only 4 bristles including 1 divided distally); dorsal margin of 2nd joint with abundant bristles; ventral margin with 7 distal bristles; end joint with 2 stout claws and 7 bristles (some of bristles clawlike).

Maxilla (Figure 116d-f): Endite I with 17 marginal stout bristles, some with triaenid tips, and 5 small medial bristles near posteroventral corner; endite II with 8 terminal bristles, some with triaenid tips, and numerous spines on medial surface;

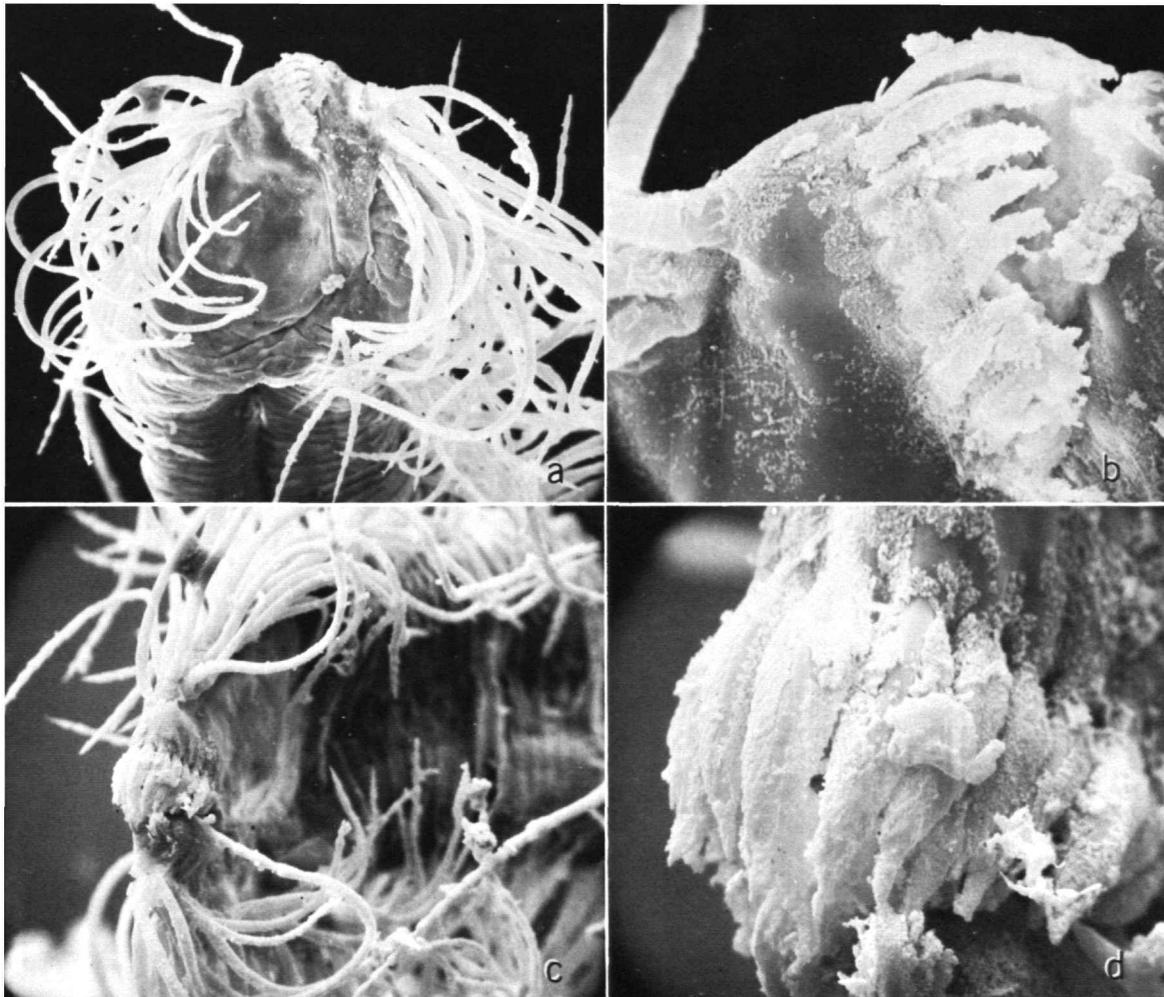


FIGURE 119.—*Isocypridina quatuorsetae*, female, USNM 138142, 7th limb: a, tip of limb, $\times 220$; b, detail of "a," $\times 1100$; c, tip of limb (other side), $\times 375$; d, detail of "c," $\times 1500$. Reduction, 17%.

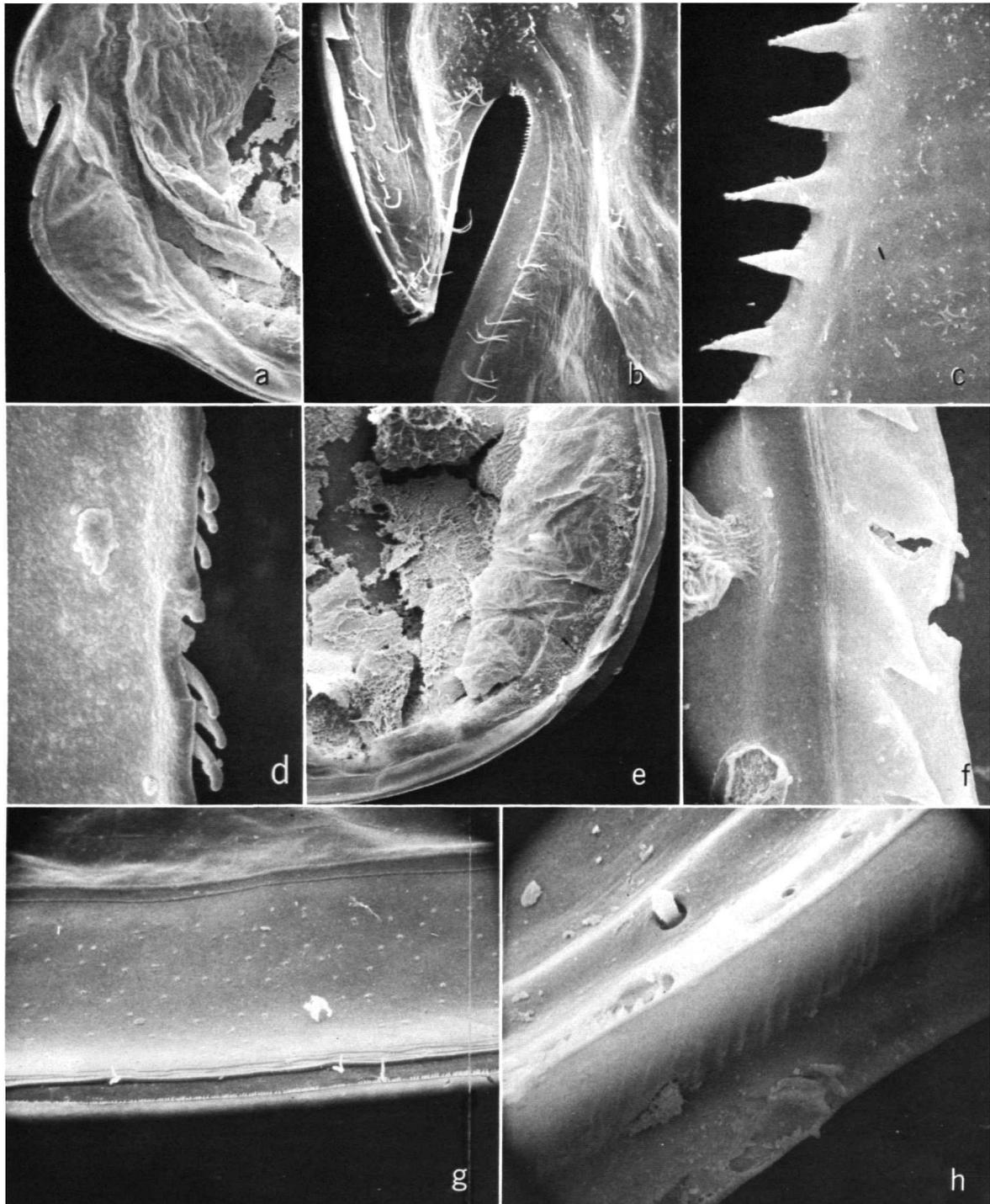


FIGURE 120.—*Isocypridina quatuorsetae*, male, USNM 136175, right valve, medial view: *a*, anterior, $\times 19$; *b*, anterior, $\times 89$; *c*, spines along edge of selvage on posterior margin of incisur, medial view, $\times 1880$; *d*, spines along edge of selvage on anterior margin of rostrum (lateral view of folded lamellar prolongation), $\times 5800$; *e*, posterior ventral margin, $\times 18$; *f*, spines on dorsal part of posterior, lateral view, $\times 1900$; *g*, ventral margin near middle, $\times 192$; *h*, posterior ventral selvage, $\times 1900$.

endite III with 6 bristles along anterior margin (ventral of these long stout), and about 6 terminal bristles. Precoxale with flaplike hirsute dorsal epipodial appendage. Coxale with stout plumose bristle. Basale with 1 long stout bristle near base of exopodite, 1 short slender bristle near base of endite III, and 6 bristles forming row on anterior medial margin. Exopodite broad hirsute with 1 short plumose proximal bristle and 2 long bare terminal bristles. Endopodite: 1st joint with 6 bare a-bristles and 4 b-bristles (outer b-bristle stout pectinate, others slender bare); end joint with 6 bare a-bristles, 6 pectinate b-bristles, 4 pectinate c-bristles, and 3 stout pectinate d-bristles.

Fifth limb (Figure 116g,h): Epipodial appendage with about 110 bristles; endites 1 to 3 with numerous bristles; distoanterior margin of protopodite sclerotized but not forming projecting process; main tool of 1st exopodite joint with peg, 6 pectinate teeth, and proximal bristle; 2nd joint with 4 strong pectinate teeth and about 11 bristles on posterior side; inner lobe of 3rd joint with 6 bristles, outer lobe with 4; no suture present separating inner lobe of 3rd joint from 4th and 5th joints; 4th joint separated from 5th by concavity along distal margin; 4th joint with 14 bristles; 5th joint with 10 bristles.

Sixth limb (Figures 116i,j; 117a): 6 to 9 spinous bristles present in place of epipodial appendage; 1st endite with 4 spinous bristles and 3 short spines; 2nd endite with 13 bristles and 5 medial spinelike bristles; 3rd endite with 16 bristles, some spinelike; 4th joint with 21 bristles; end joint with small lobe on posteroventral end; anterior lobe with numerous bristles, some with wreaths of long hairs, others bare; posterior lobe with 4 to 6 long bristles with long proximal and short distal spines; posterior margin of limb and medial and lateral surfaces of end joint hirsute.

Seventh limb (Figures 117b,c; 119): Each limb with numerous dwarf bristles scattered along sides of limb and at tip; terminus with vestigial comb and opposing jaw with single peg. (Both limbs of the holotype are probably aberrant. Limbs usually found on female are similar to those described here for the male; see note on variability following description.)

Furca (Figure 117d,e): Right lamella with 26 claws, left with 25; claw 1 shorter than claw 2 and with recessed base proximal to base of claw 2; sec-

ondary short claws only about half length of primary claws on each side; starting with claw 2, claws arranged in 7 groups with claws decreasing in length and diameter in each group; distribution and number of claws in groups on left and right lamellae are as follows:

	Group							Total (includes claw 1)
	I	II	III	IV	V	VI	VII	
Left	2	2	2	2	2	2	12	25
Right	2	2	2	2	2	2	13	26

Upper lip (Figure 117f): Consists of 2 lobes with clusters of short surface hairs; lobes supported by sclerotized framework.

Lateral eye (Figure 117h): Each eye elongate, flaplike, hirsute, and without ommatidia.

Rod-shaped organ: Small, thumblike.

Posterior (Figure 117i): Sclerotized plate posterior to furca with spines forming clusters.

Parasites: USNM 136174 with 1 isopod larvae. Same specimen also with growths on proximal anterior margin of d-bristles on basales of both mandibles.

Egg: USNM 136174 with 2 eggs in marsupium and about 20 large unextruded eggs. USNM 138142 with 27 eggs in marsupium.

Variability: USNM 138142, a gravid female, differs from holotype as follows: distal end of outer lobe of 3rd joint of exopodite of 5th limb more rounded; tip of 7th limb similar to that on adult male; starting with claw 2, claws of furca arranged in 5 or 6 groups with claws decreasing in length and diameter in each group, as follows:

	Group						Total
	I	II	III	IV	V	VI	
Left	2	2	2	2	12	-	20
Right	2	2	2	2	2	13	23

DESCRIPTION OF ADULT MALE (Figures 117k-m, 118, 120-126).—Carapace similar to that of female but slightly smaller. Size: USNM 136175, length 7.0 mm, height 6.2 mm; USNM 136176, length 7.0 mm, height 5.5 mm.

First antenna (Figures 118a,b; 121): 2nd joint with 13 bristles, 3 ventral, 9 dorsal, and 1 distolateral; 3rd joint with 8 bristles, 1 ventral, 7 dorsal; 4th joint with 9 terminal bristles, 6 ventral, 3 dorsal; bristles on 5th and 6th joints similar to those on female. Seventh joint: a-bristle similar to that

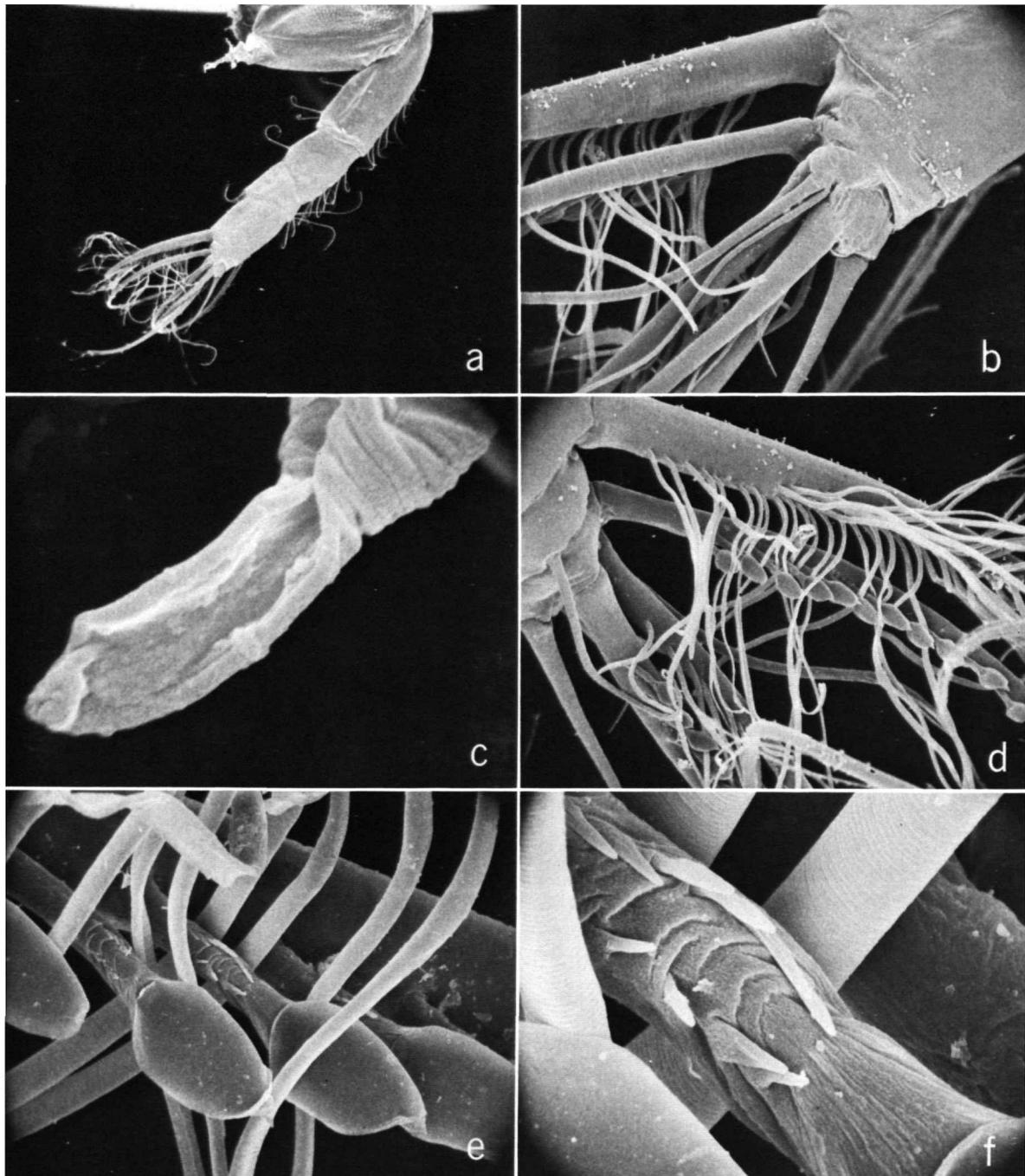


FIGURE 121.—*Isocypridina quatuorsetae*, male, USNM 136175, right first antenna: *a*, complete limb, lateral view, $\times 26$; *b*, tip of limb shown in "*a*," $\times 130$; *c*, tip of d-bristle, $\times 5000$; *d*, tip of limb, medial view, $\times 130$; *e*, detail of "*d*" showing discs on c-bristles, $\times 650$; *f*, detail of "*e*" showing spines on stem below disc, $\times 2600$.

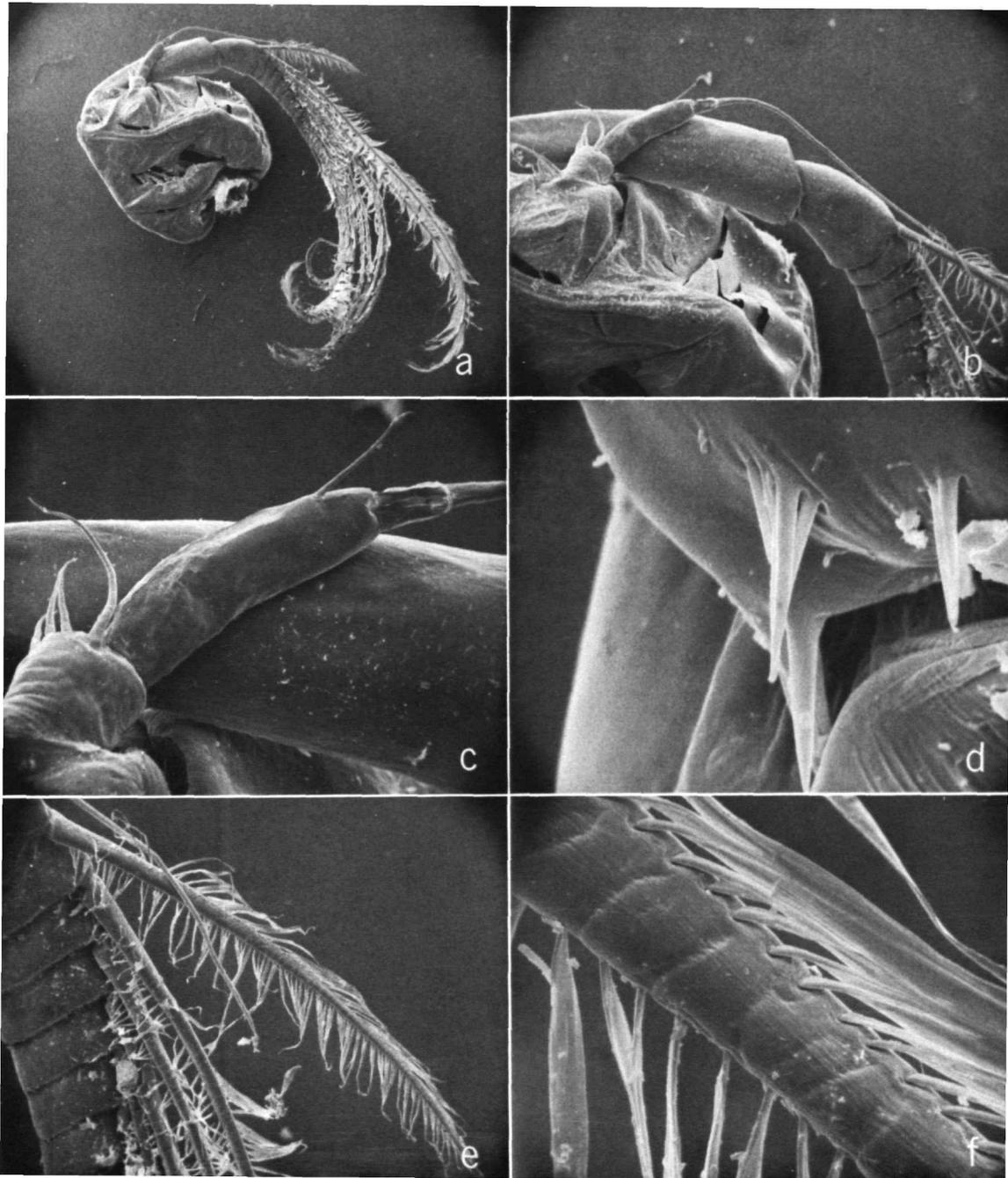


FIGURE 122.—*Isocypridina quatuorsetae*, male, USNM 136175, second antenna, medial view: *a*, complete limb, $\times 20$; *b*, endopodite, $\times 50$; *c*, proximal part of endopodite, $\times 157$; *d*, detail of spines on distal margin of 8th joint of exopodite, $\times 2500$; *e*, bristle on 2nd joint of exopodite, $\times 100$; *f*, detail of bristle in "e," $\times 1000$.

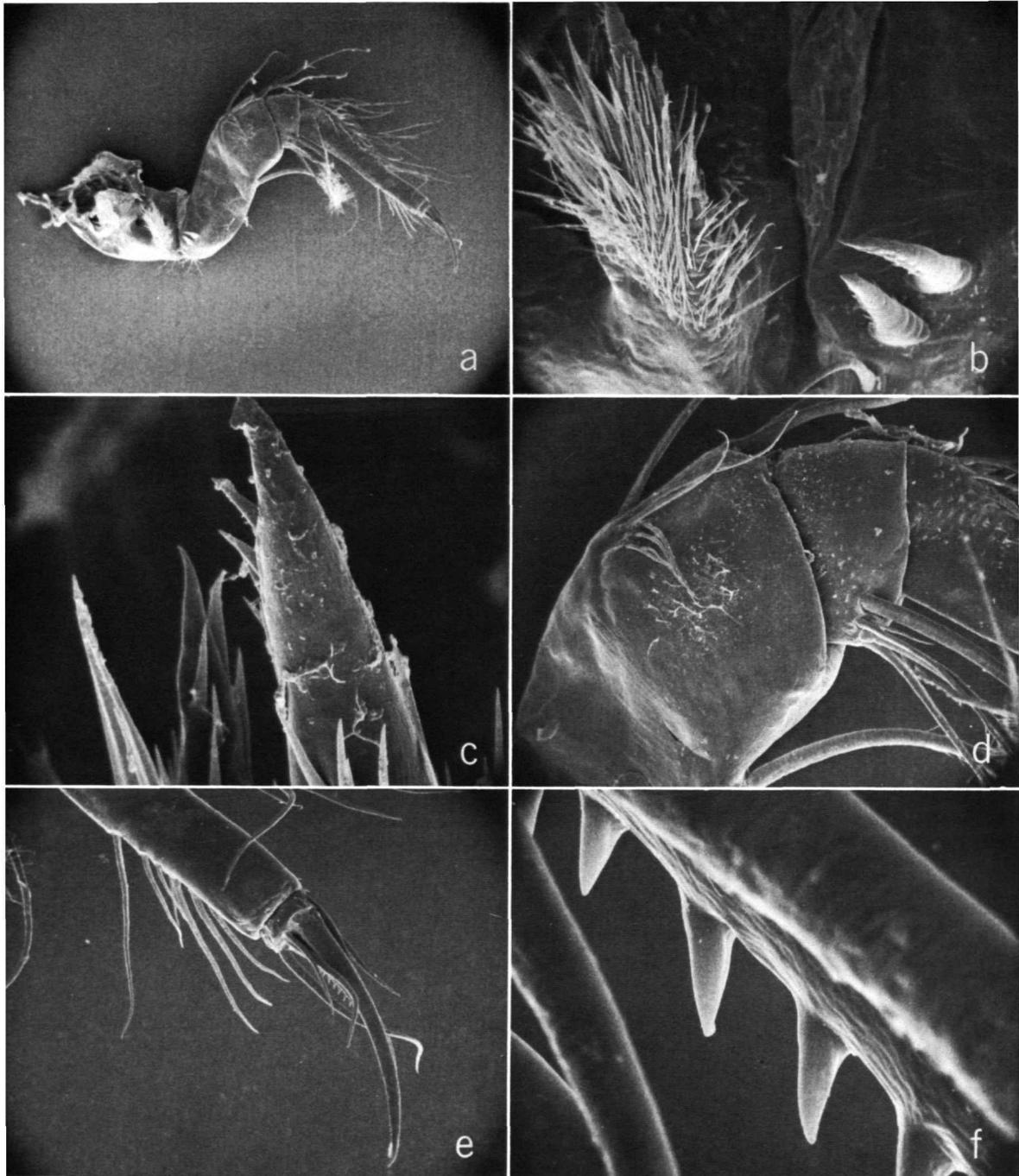


FIGURE 123.—*Isocypridina quatuorsetae*, male, USNM 136175, left mandible, medial view: *a*, complete limb, $\times 26$; *b*, coxale endite and proximal bristles on basale, $\times 200$; *c*, coxale endite in "*b*," $\times 1000$; *d*, part of basale and endopodite, $\times 100$; *e*, tip of endopodite, $\times 100$; *f*, teeth on claw shown in "*e*," $\times 2100$.

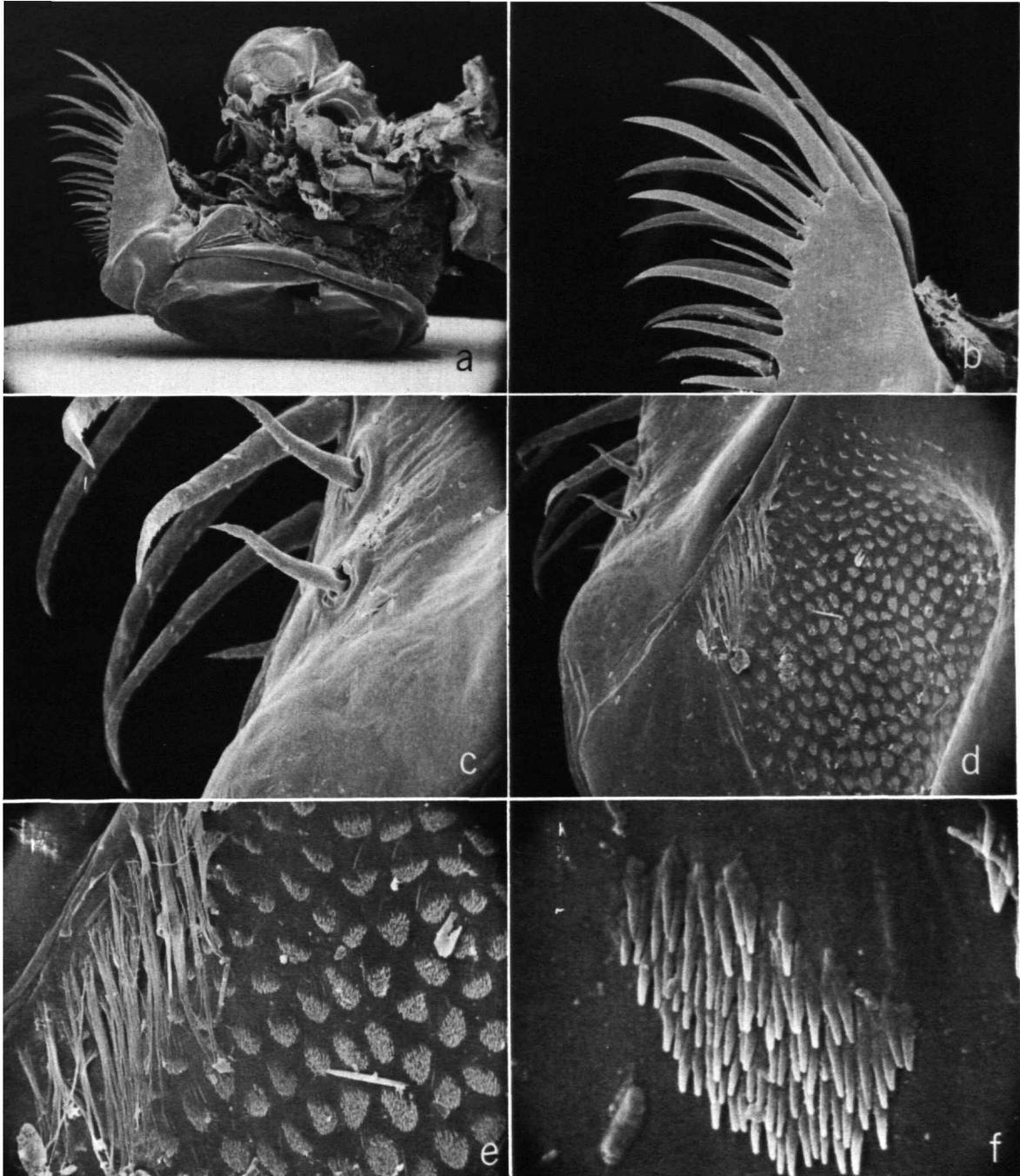


FIGURE 124.—*Isocypridina quatuorsetae*, male, USNM 136175: *a*, upper lip and furca, anterior toward top, $\times 20$; *b*, anterior of furca, $\times 50$; *c*, posterior furcal claws, $\times 5000$; *d*, spinous field on posterior part of furcal lamella, $\times 200$; *e*, detail of “*d*,” $\times 500$; *f*, detail of “*e*,” $\times 5000$.

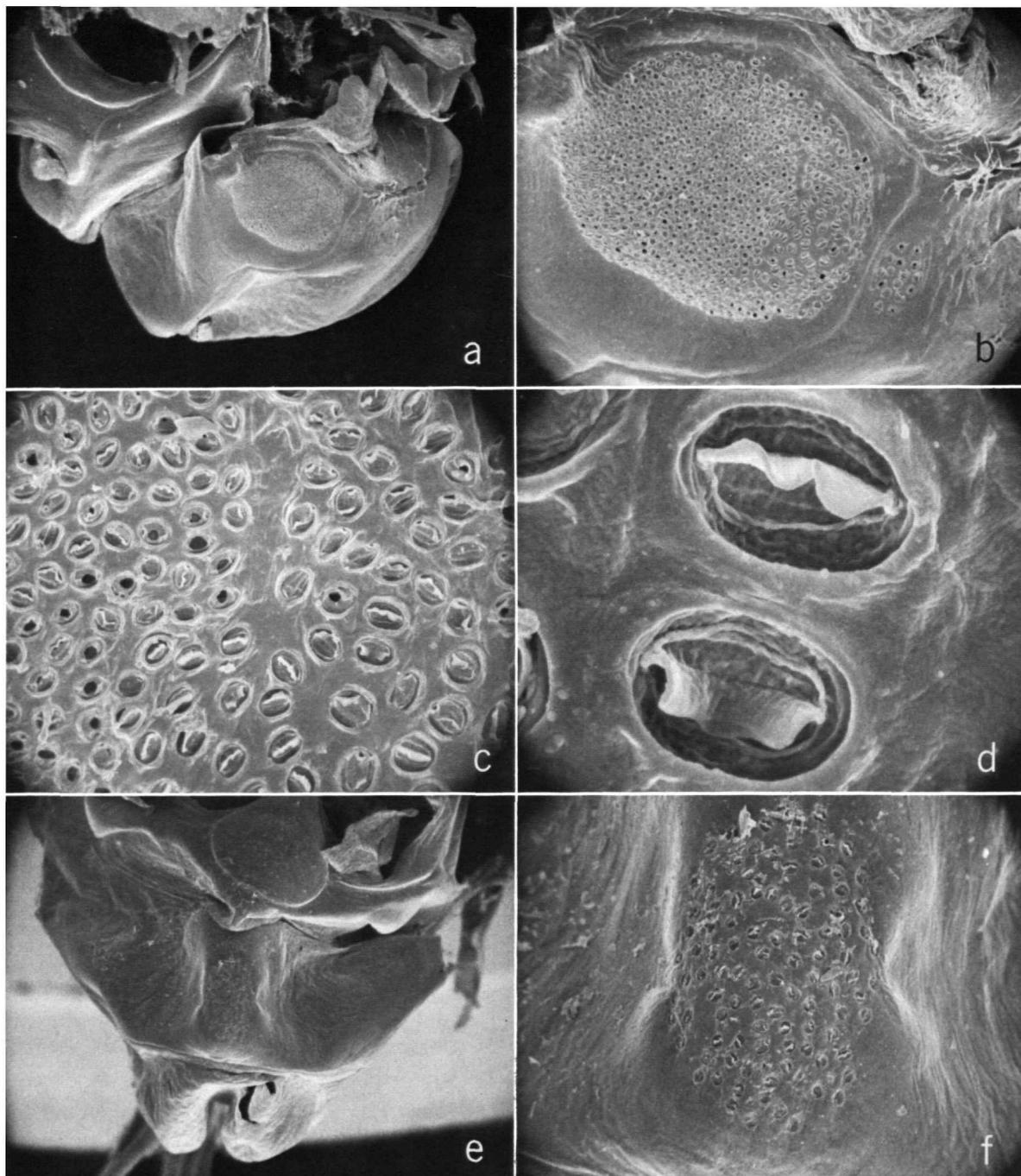


FIGURE 125.—*Isocypridina quatuorsetae*, male, USNM 136175, upper lip: *a*, lateral view, anterior toward lower left, $\times 60$; *b*, central glandular area shown in "*a*" (also note small glandular area below main area), $\times 180$; *c*, central glandular area in "*b*," $\times 700$; *d*, glandular openings in "*c*," $\times 4000$; *e*, anterior view of upper lip, $\times 60$; *f*, detail of anterior glandular field in "*e*," $\times 4000$.

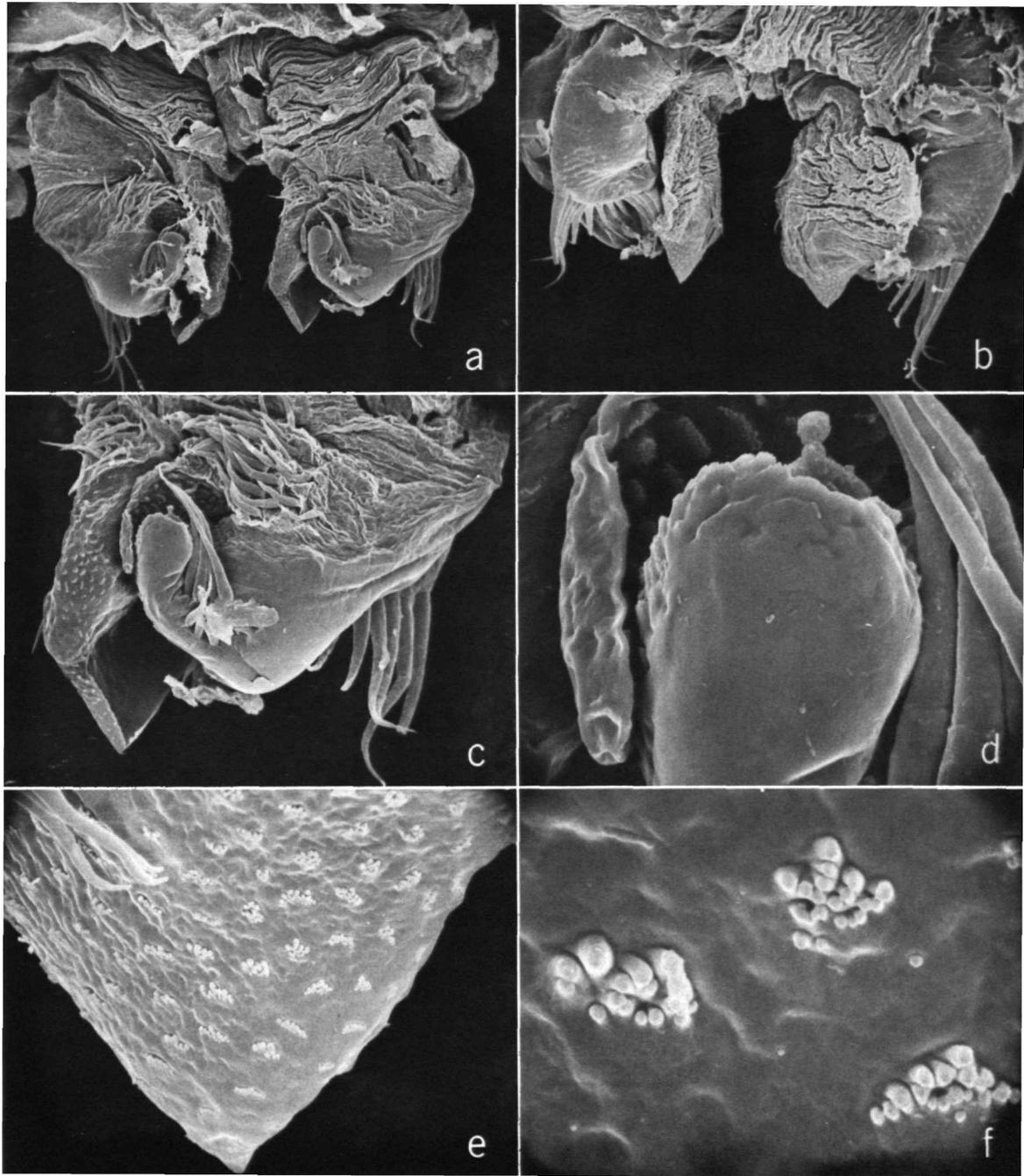


FIGURE 126.—*Isocypridina quatuorsetae*, male, USNM 136175: *a*, complete appendages from anterior, $\times 90$; *b*, complete limb from posterior, $\times 100$; *c*, left limb from anterior, $\times 200$; *d*, process shown in "*c*," $\times 1000$; *e*, scooplike triangular process shown in "*b*," $\times 1000$; *f*, minute clusters shown in "*e*," $\times 5000$.

on female; b-bristle slightly shorter than sensory bristle of 5th joint and with 18 marginal filaments with spoon-shaped tips and several short terminal filaments with plain tips (proximal spoon-tipped filaments shorter and stouter than distal spoon-tipped filaments); c-bristle about twice length of sensory bristle and with about 23 marginal filaments with spoon-shaped tips and about 7 terminal filaments with plain tips. Eighth joint: d- and e-bristles similar to those on female; f- and g-bristles same length as c-bristle and with numerous filaments, some with marginal spines.

Second antenna (Figures 118c, 122): Limb similar to that of female with following exceptions: 1st joint of endopodite with 8 to 10 bristles (5 proximal, 3 to 5 distal); joint 2 of exopodite with basal spines.

Mandible (Figure 123): Similar to that on female except ventral margin of 2nd joint of endopodite with 6 or 7 distal bristles.

Maxilla: Similar to that on female except anterior medial margin of basale with 5 or 6 bristles, and 1st joint of endopodite with 7 α -bristles and 3 β -bristles.

Fifth limb: Epipodial appendage with 104 bristles; 4th joint of exopodite with 11 to 13 bristles, 5th joint with 9 or 10; sclerotized anterior process on protopodite projecting slightly; limb otherwise similar to that on female.

Sixth limb: Limb similar to that on female.

Seventh limb (Figure 118d,e): Limb with about 150 bristles (one limb on USNM 136075 with 70 terminal and 88 proximal, other with 63 terminal and 83 proximal); each bristle with 2 to 10 bells and marginal spines; bristles vary considerably in length and diameter; terminus consisting of ventral comb with 13 spinous teeth opposite dorsal jaw with 1 or 2 spinous teeth; each tooth with smaller spinous tooth projecting from inner side at base; 1 limb with small spinous peg on inner margin of dorsal jaw near sclerotized process serving as anchor to muscle visible inside limb. (Jaw defined here as side of terminus where anchor of muscle is located.)

Furca (Figures 118g, 124): Right lamella with 21 claws, left with 20; starting with claw 2, claws arranged in 5 or 6 groups; distribution and number of claws in groups on left and right lamella of USNM 136175 are as follows:

	Group						Total (includes claw 1)
	I	II	III	VI	V	VI	
Left	2	2	2	2	11		20
Right	2	2	2	2	2	10	21

Upper lip (Figures 118i, 124a, 125): Lip similar to that on female except configuration of sclerotized framework somewhat different (forming completed circle on each side).

Lateral eye, rod-shaped organ (Figure 118h), *posterior*: Similar to those on female.

Copulatory organ (Figures 118j,k; 126): Small conical penis present between lobate copulatory organs; limb similar, in general, to that of *A. rudjakovi* Kornicker, 1970.

Brushlike organ: Broad flat process with 12 or 13 bristles along distal margin present at base of each copulatory limb.

DISTRIBUTION.—This species was collected only in the American Quadrant in Subantarctic and Antarctic regions (50°33'S to 59°10'S) at bathyal and abyssal depths (248–3170 m) (Figure 63).

Isocypridina Species Indeterminate

MATERIAL.—USNM 137465, 1 juvenile, length 2.46 mm, height 2.07 mm, + 1 juvenile, both specimens from *Vema* Cruise 17, station V-17-66. USNM 138151, 1 juvenile, length 3.02 mm, height 2.06 mm, from *Eltanin* Cruise 7, station 475.

DISTRIBUTION.—See Figure 63.

PHILOMEDIDAE Müller, 1912

The Philomedidae contain two subfamilies, Philomedinae Müller, 1912, and Pseudophilomedinae Kornicker, 1967d (see Kornicker, 1968). Only the former is represented in the study area.

DIAGNOSIS OF THE FAMILY.—Carapace smooth or ornamented; anterior with minute or well-developed incisur and slight to prominent rostrum; incisur never slitlike as in *Cylindroleberidinae*; posterior evenly rounded or with well-developed caudal process; selvage well developed and fringed with long hairs.

First antenna: Sensory bristle on female without long filaments and with basis on well-developed

5th joint; sensory bristle on male with numerous filaments and on small triangular 5th joint; b-bristle on 7th joint lacking in genus *Paramekodon*.

Second antenna: Protopodite without medio-distal bristle. Endopodite of female with 1 to 3 joints; endopodite of male 3-jointed with 3rd joint reflexed on 2nd (males not known for Pseudophilomedinae). Exopodite: some natatory bristles often broken off on mature females; 3rd joint on male more elongate than that on female.

Mandible: Coxale endite well developed on female, spinous and terminating in bifurcate spinous process; coxale endite in male reduced. Exopodite elongate with 2 long bristles.

Maxilla: 3 endites present, but distal endite reduced in Pseudophilomedinae; on some species in Pseudophilomedinae, 1 terminal bristle on end joint of endopodite developed as stout process.

Fifth limb: 1–3 endites present. Second joint of exopodite developed into large tooth; tooth prolonged fanglike in Pseudophilomedinae.

Sixth limb: 3 or 4 endites present; end joint

with 6–45 bristles; 1–4 bristles present in place of epipodial appendage.

Seventh limb: Limb with 6–35 cleaning bristles; terminus consisting of opposing combs or comb with opposing peg; limb absent in ♂ of *Igene*.

Furca: Each lamella with or without secondary claws; secondary claws when present either between primary claws, following primary claws, or both; all or some claws separated from lamella by suture.

Rod-shaped organ: Elongate with few or many joints; short, conical in the genus *Igene*.

Eyes: Medial eye usually well developed; lateral eyes with various stages of development; eyes of males often better developed than those of female.

Upper lip: Lip globose, hirsute, with few anterior processes and several glandular openings (the latter may be visible only under extremely high magnification).

DISTRIBUTION.—Members of the Philomedidae are widespread and have been collected from intertidal to abyssal depths.

Key to Subfamilies

- Rod-shaped organ with numerous joints; 2nd exopodite joint of 5th limb of female and juvenile male with fanglike prolongation..... PSEUDOPHILOMEDINAE
 Rod-shaped organ with few or numerous joints; 2nd exopodite joint of 5th limb of female and juvenile male not fanglike (2nd joint of *Euphilomedes ferox* resembles those in Pseudophilomedinae, but rod-shaped organ without numerous joints)..... PHILOMEDINAE

PSEUDOPHILOMEDINAE Kornicker, 1967

No representatives of this subfamily were collected in the study area.

DIAGNOSIS OF SUBFAMILY.—Infold of rostrum with only 4 or 5 long bristles; 2nd joint of 1st antenna with only 1 dorsal bristle; endopodite of 2nd antenna 1-jointed; distal endite of maxilla much shorter than 2 proximal endites; large tooth on 2nd exopodite joint of 5th limb fanglike; end joint of 6th limb not prolonged posteriorly and with only 7–9 bristles; 7th limb with only 6–14 bristles; furca with 6–10 claws on each lamella, claw 3 more

slender than claw 4; rod-shaped organ with numerous sutures.

DISTRIBUTION.—The northernmost locality at which members of this subfamily have been collected is in the Gulf of Naples, Mediterranean Sea; the southernmost locality is on the Great Bahama Bank (25°45'N, 79°15'W). Members of the family have also been reported from the northeast part of the Gulf of Mexico (28°13'30"N, 87°04'W) and along the southeastern shelf of North American, as well as in the Atlantic Ocean off Morocco. The known depth range of the subfamily is 1–1435 m.

Key to Genera

- 7th joint of 1st antenna with b-bristle..... *Pseudophilomedes*
 7th joint of 1st antenna without b-bristle..... *Paramekodon*

PHILOMEDINAE Müller, 1912

This subfamily is represented in the study area by five genera: *Philomedes* Lilljeborg, 1853; *Euphilomedes* Poulsen, 1962; *Igene*, new genus; *Scleroconcha* Skogsberg, 1920; and *Anarthron*, new genus.

DIAGNOSIS OF SUBFAMILY.—Carapace smooth, punctate or reticulate in *Philomedes*, *Euphilomedes*, *Tetragonodon*, and *Igene*, with longitudinal ribs in *Scleroconcha* and *Anarthron*, with posterodorsal hornlike processes in *Paraphilomedes*.

Maxilla: Endites 1 to 3 of about equal length; end joint of endopodite with 11–15 bristles in female, fewer in male.

Fifth limb: 2nd joint of exopodite on female and juvenile males with large squarish tooth with or without small processes on inner margin, except in *Euphilomedes ferox* Poulsen, 1962, which bears 2 large toothed processes on inner margin.

Sixth limb: End joint projecting posteriorly on *Philomedes*, *Paraphilomedes*, *Scleroconcha*, *Anarthron*, and most species of *Euphilomedes*, but not projecting posteriorly on *Igene* or *Tetragonodon*.

Seventh limb: Each limb with 6 to 35 bristles;

terminus consisting of toothed comb opposite 1 or more pegs or rarely small comb with few teeth; limb absent in male *Igene*.

Furca: With secondary claws between primary claws in *Euphilomedes*, *Scleroconcha*, and some species of *Anarthron* and *Tetragonodon*; secondary claws not between primary claws in remaining species; secondary claws following primary claws 1–4 in *Paraphilomedes* and in some species of *Anarthron* and *Philomedes*; claws decreasing in length posteriorly along lamella in *Igene* and in some species of *Philomedes* and *Tetragonodon*.

Eyes and rod-shaped organ: Rod-shaped organ cone-shaped in *Igene*; short cylindrical or absent in *Tetragonodon*; elongate with about 15 sutures in *Scleroconcha*; elongate without sutures or with 1 or 2 sutures in *Euphilomedes*, *Anarthron*, and *Philomedes* (*Anarthron* often with several incipient sutures and with crinkled appearance). Lateral eyes reduced, absent on most females of *Euphilomedes*, and minute on remaining species; only males with well-developed eyes; both males and females of *Igene* without eyes; known specimens of *Tetragonodon* (females and juveniles) also without lateral eyes.

Key to Genera

1. Carapace of female with longitudinal ridges (absent or reduced on male); rod-shaped organ elongate with 0–17 sutures..... 2
Carapace without longitudinal ridges; rod-shaped organ short conical or elongate with not more than 1 suture near middle..... 3
2. Rod-shaped organ with about 15 sutures..... *Scleroconcha*
Rod-shaped organ with wrinkles or few sutures..... *Anarthron*
3. Rod-shaped organ conelike..... *Igene*
Rod-shaped organ elongate..... 4
4. Carapace with hornlike process near dorsal margin..... *Paraphilomedes*
Carapace without hornlike processes..... 5
5. 9th joint of exopodite of 2nd antenna with 3 bristles; rod-shaped organ shorter than 1st joint of 1st antenna or absent..... *Tetragonodon**
9th joint of exopodite of 2nd antenna with more than 3 bristles; rod-shaped organ longer than 1st joint of 1st antenna..... 6
6. Furca with secondary claws between primary claws..... *Euphilomedes*
Furca without secondary claws, or secondary claws following primary claws..... *Philomedes*

* Included here is the species *Euphilomedes rhabdion* Kornicker, 1970 [= *Tetragonodon rhabdion* (Kornicker) new combination]; the rod-shaped organ has been described for only that species in the genus *Tetragonodon*.

Microstructures

NORMAL PORES.—*Philomedes*: Only simple pores, with and without raised rims, and which bear a bristle were observed on *P. assimilis* (Figure 129e), *P. charcoti* (Figure 134b), *P. eugeniae* (Figure 137e), *P. orbicularis* (Figures 141e-g, 142f), *P. rotunda* (Figure 146d,e), *P. tetrathrix* (Figure 154c,d), *P. heptathrix* (Figure 150e,f), *P. subantarctica* (Figure 160d,e), *P. minys* (Figure 166c,d), *P. ramus* (Figure 170d,e), *P. lofthousae* (Figures 173e,d;177e). Noded pores were absent.

Euphilomedes: The pores of *E. agilis* (USNM 128280) were examined at magnifications of $\times 8000$ (not illustrated herein) and are of the simple type without rims and each contains a bristle.

Scleroconcha: Pores consist of 2 types, one with a bristle and the other without a bristle. Both types of pores are simple, some have rims: *S. arcuata* (Figure 192b-d), *S. flexilis* (Figure 196c-f), *S. gallardoi* (Figure 201b-d), *S. frons* (Figure 209d-f), *S. wolffi* (Figure 213d,e).

Anarthron: Carapaces of this genus bear papillae similar to those on *Scleroconcha*, but the papillae do not contain pores; slight depressions occur in the middle of papillae of *A. dithrix* (Figure 228d). Pores with bristles appear to be the simple type, with and without rims: *A. reticulata* (Figure 217c), *A. chilensis* (Figure 224c,d,f), *A. pholion* (Figure 232d), *A. evexum* (Figure 235b).

ORNAMENTATION.—*Philomedes*: Species of this genus are without ribs. *P. charcoti* (Figure 134) and *P. rotunda* (Figure 146) have distinct polygonal muri (terminology of Sylvester-Bradley and Benson, 1971). *Philomedes lofthousae*, *P. eugeniae* (Figure 138b), *P. assimilis* (Figure 129c,f), *P. tetrathrix* (Figure 154c) have faint polygonal structures visible but not always forming raised muri. Polygonal structures were not observed in the shells of *P. heptathrix* (Figure 150), *P. subantarctica* (Figure 193), *P. ramus*, *P. orbicularis* (Figures 141,142). *Philomedes ramus* and *P. subantarctica* (Figure 161f) have stellate carinae extending from papillae; these carinae have a wrinkled appearance and suggest a leathery texture. The surface of a specimen of *P. orbicularis* (USNM 138159) (Figure 141d) suggests a leathery texture with "flow" lines. These lines are not visible at magnifications below about 1000, and do not

show up on another specimen of *P. orbicularis* (Figure 142). *P. orbicularis* (Figure 142c,d) and *P. rotunda* (Figure 146d,f) have rounded fossae (terminology of Sylvester-Bradley and Benson, 1971). *Philomedes tetrathrix* and *P. assimilis* have shallow depressions within the polygonal carinae.

Euphilomedes: *E. agilis* has a knobby structure both on the rostrum and near the posterior margin (Figures 181a,c,d; 184a,c,d). Shallow fossae are present on the surface except in the areas occupied by knobs (Figures 181a,b; 184a,b.). Minute hexagonal carinae cover the surface (Figures 181, 184).

Scleroconcha: Species of this genus generally have 4 longitudinal ribs, 1 above and 1 below the central muscle attachments, 1 near the ventral margin and 1 near the dorsal margin. On *S. wolffi* these ribs are very weakly developed and only the ventral rib is evident under low magnification. The 2 midribs appear as thin lines under high magnification (Figure 213a,b). Surfaces of the shells bear shallow fossae with round to polygonal margins. The interfossae areas form thin carinae on *S. gallardoi* (Figure 201b) and are broad on *S. flexilis* (Figure 196c), and *S. arcuata* (Figure 192b). All species observed had small papillae with a central pore which are more closely packed in the interfossae areas than on the bottom of the fossae. On *S. gallardoi* the papillae at the bottom of fossae seem to have their distal ends broken and have the appearance of a raised rim around a central pore (Figure 201b,d). On the same specimen the papillae in some areas coalesce to form an uneven pavement (Figure 201c). It is not uncommon for two adjacent papillae to have a common side (Figures 201b,d; 202d). On *S. arcuata* some papillae have several pores (Figure 192c) and those with single pores appear to have a raised rim around the pore (Figure 192d). On *S. gallardoi* (Figure 201d), *S. arcuata* (Figure 192d), and *S. flexilis* (Figure 196f) minute papillae without pores are present between the larger papillae with pores. The pores in the papillae of *S. wolffi* are larger than those in other species (Figure 213d). The papillae on some species are remarkably similar to the ?protists on the upper lip of *Doloria pectinata* (Figure 46d-f).

Anarthron: Species in this genus have longitudinal ribs similar to those on some species of *Scleroconcha*. An exception is *A. pholion* on which the ribs are weakly developed on the posterior half of

the shell and absent on the anterior half (Figures 231, 232a). Fossae are similar to those on members of *Scleroconcha*. Papillae differ from those on *Scleroconcha* in not having a central pore. The papillae on *A. evexum* may have minute pores encircling them (Figure 235c). The papillae on *A. dithrix* have a small central depression and some papillae seem connected by one or two rods (Figure 228d). These rods also appear on papillae of *E. evexum* (Figure 235d). The papillae seem to be just as abundant at the bottom of the fossae as on carinae between them, for example *A. chilensis* (Figure 224c). A cross section of the broken shell of *A. pholion* (Figure 232e,f) suggests that the papillae are perched upon the endocuticle. The papillae on *A. reticulata* (Figure 217c-f) are more widely dispersed than on other species. The papillae on some species, especially those on *A. dithrix*, resemble the protists on the upper lip of *Doloria pectinata* (Figure 46d-f).

BRISTLES.—*Philomedes*: Long bristles with broadened crenulate bases seem common to all species, but are generally sparse. They are mostly, but not completely, confined to the anterior, ventral, and posterior margins. Short stout bristles are abundant on *P. subantarctica* (Figure 160), *P. orbicularis* (Figure 141), and *P. ramus* (Figure 170). The short bristles on *P. subantarctica* and *P. ramus* do not have the extended whiplike tip present on the bristles of *P. orbicularis*. Short slender bristles are scattered over the surface of *P. eugeniae* (Figure 138), and *P. lofthousae* (Figure 173). A bristle situated at the intersection of carinae is shown in Figure 146d for *P. rotunda*, and in Figure 134b for *P. charcoti*.

Euphilomedes: *E. agilis* has long slender bristles with broad crenulated bases along the anterior, ventral, and posterior margins of the carapace (Figure 181a,c,d).

Scleroconcha: Species of this genus have long bristles with broad crenulated bases sparsely distributed on the carapace: *S. appelloefi* (Figure 188f), *S. arcuata* (Figure 192b), *S. flexilis* (Figure 196d,e), *S. gallardoi* (Figures 201c, 202f), *S. frons* (Figure 209d). *Scleroconcha wolffi* bears a few hairs without a broad crenulated base (Figure 213c).

Anarthron: Species in this genus have scattered slender hairs with broad crenulated bases: *A. reticulata* (Figure 217c), *A. chilensis* (Figure 224c,f).

Bristles are most abundant along the ventral and anterior margins. On the lateral surfaces of the shell bristles have their bases on intersections of carinae (Figures 217c; 224c,d; 228b; 235b).

SELVAGE.—The lamellar prolongations on the selvage in the *Philomedinae* have fringed margins and are present along the anterior, ventral, and posterior margins of the carapace. The prolongation is divided at the inner margin of the incisor of many species. The 2nd antennae protrude from the shell through this division during swimming or burrowing; for example *P. orbicularis* (Figure 141b) and *p. rotunda* (Figure 146b).

Philomedes: The selvage in the area of the incisor is illustrated on the following species: *P. eugeniae* (Figure 138d), *P. heptathrix* (Figure 150b,d), *P. tetrathrix* (Figure 154b), *P. subantarctica* (Figure 160b), *P. ramus* (Figure 202b), *p. lofthousae* (Figures 173b-d, 177b). The selvage is divided at the incisor for all species of *Philomedes* encountered in this study. Fringe along the outer edge of the selvage, which is typical for members of *Philomedidae*, is shown in Figure 141b (*P. orbicularis*), Figure 150d (*P. heptathrix*), Figure 173d (*P. lofthousae*). Hairs are present on the lateral side of selvage along the anteroventral margin of the shell of *P. orbicularis* (Figure 143b).

Euphilomedes: Although not clearly evident in the illustrations (Figures 181c, 184c), the narrow selvage on *E. agilis* is not divided at the incisor. A fringe is present along the edge of the lamellar prolongation along the anterior valve margin of *E. agilis* (Figure 181c).

Scleroconcha: The lamellar prolongation of selvage of this genus is divided at the inner end of the incisor and has a fringed margin similar to that on the selvage of *Philomedes*: *S. gallardoi* (Figure 199d), *S. frons* (Figures 209a, 210a), *S. wolffi* (Figures 213a,b). Hairs are present on the lateral surface of the lamellar prolongation of *S. frons* (Figure 210b) and *S. gallardoi* (Figure 199f). No medial hairs are present on the lamellar prolongation along the rostrum of *S. frons* (Figure 210c).

Anarthron: The lamellar prolongation of the selvage of this genus is similar to that on members of *Scleroconcha* and is divided at the inner end of the incisor: *A. dithrix* (Figure 229a), *A. evexum* (Figure 235a).

INFOLD.—The infold of *S. gallardoi* is similar to

other species in the genus in being broad anteriorly and posteriorly and narrower along the ventral margin (Figures 199a, d-f; 200a). The rostral bristles of *S. gallardoi* have marginal spines (Figure 199e) which are not as abundant as those on the shorter bristles on the anteroventral infold (Figure 200f). The posterior infold has naked bristles forming rows near the inner margin of the infold (Figure 200e).

VESTMENT.—The posterior vestment of *S. gallardoi* bears long hairs forming rows (Figure 200a,c).

SHELL MUSCLES.—The dorsal muscles of *S. gallardoi* have a fairly smooth outer sheath (Figure 199a-c). The central adductor muscles have a smooth outer sheath and appear fibrous in cross section (Figure 200d,e).

FIRST ANTENNA.—Lateral spines on the 2nd joint of the left 1st antenna of *Philomedes lofthousae* are longer than those on the 3rd joint (Figure 174e).

SECOND ANTENNA.—Spines on the dorsal margin of the protopodite of *Philomedes tetrathrix* are shorter than those on the medial surface (Figure 155b,c). The exopodial joints of that species bears short basal spines (Figure 155e), and the natatory bristles bear minute spines in addition to long hairs (Figure 155f).

SEVENTH LIMB.—*Philomedes*: Species in this genus do not have the short square-tipped teeth at the ends of the ventral comb like those on some members of the Cypridininae (Figures 156, 163, 174f, 175a). The comb teeth of *P. tetrathrix*, *P. subantarctica*, and *P. lofthousae* have terminal pores (Figures 156e, 163d, 175a). A terminal pore is also clearly shown on one of the dorsal pegs of *P. tetrathrix* (Figure 156c) and on the ring of pegs on *P. subantarctica* (Figure 163e,f). Possibly all the pegs on those three species have terminal pores. These pores have not previously been reported on the teeth and pegs of the 7th limb of members of the Philomedidae. The three species examined have only two serrations on each side of the comb teeth, fewer than noted on species of Cypridininae. The terminal pair of serrations on *P. subantarctica* are more strongly developed than on the other two species (Figure 163b,d). Bells of bristles on the 7th limb of *P. tetrathrix* (Figure 156f) are similar to those on *P. lofthousae* (Figure 175c).

Scleroconcha: Bells on bristles of *S. gallardoi* (Figure 204f) are similar to those on *Philomedes*. The weakly developed processes on the tip of the 7th limb may have terminal pores, but they could not be observed with certainty (Figure 204d,e).

FURCA.—The anterior margins of lamellae of *Philomedes lofthousae* have hairs forming clusters (Figure 175d,e); the primary claws bear large and small teeth along the inner margins (Figure 175e) and the secondary claws bear weak spines along both margins (Figure 175f).

ROD-SHAPED ORGAN.—The rod-shaped organ of *Anarthron reticulata* has a few segments near the middle (Figure 218). The proximal segment has minute hairs forming a row near the distal margin, whereas the 2nd and 3rd segments have hairs forming a row near both the proximal and distal margins (Figure 218c,d). Short hairs are also present on the long distal half of the organ (faintly visible in Figure 218a). The proximal part of the rod-shaped organ of *Scleroconcha gallardoi* is many segmented (Figure 204c).

ANTERIOR PROCESS (frontal knob).—This process on *Philomedes lofthousae* has numerous minute disclike objects with raised rims (Figure 174a-d); it is not known whether these are foreign objects or part of the anterior process. The anterior process of *Scleroconcha gallardoi* bears minute rimmed pores (Figures 204a,b).

UPPER LIP.—The upper lip of members of this family has received little study. Skogsberg (1920: 379) described the upper lip as "small and somewhat helmet-shaped, with an unpaired conical median process, pointing somewhat upward and forward; on the point of this process there is a small glandular field." The SEM photographs reveal lateral glandular fields and specific differences in the number and distribution of glandular processes and of hirsuteness of the lip.

Philomedes: The upper lips of two species of this genus were examined, *P. minys* and *P. lofthousae* (Figures 167, 176). The glandular processes resemble those on the upper lips of species of Cypridinidae, except the bisecting linear flap is longer, especially on *P. lofthousae*, and the peripheral rim of the process is less prominent. In addition to the glandular field on the anterior tip of the lip, 2 lateral fields are present, an anterior lateral field near the anterior tip, and a posterior lateral field near the center of the lip. On both

species examined the glandular field at the anterior tip contains 5–7 processes. The anterior lateral field of *P. minys* has 3 processes, whereas the anterior lateral field of *P. lofthousae* has 10–12 processes. The posterior lateral field of *P. minys* has about 6 processes compared to about 16 on *P. lofthousae*. Hairs on the upper lip of *P. minys* are more sparse than those on *P. lofthousae*. Hairs are not present in the glandular fields and are restricted to the lower half of the lip and only on each side of the posterior lateral glandular field.

Scleroconcha: The upper lip of *S. gallardoi* was examined (Figure 203). The glandular processes on the lip of this species have the raised rim present on species of Cypridinidae. The posterior lateral glandular field, which on this species contains about 6 processes, is more dorsally located on the lip than on the two species of *Philomedes* described above. Hairs are present on the lower half of the anterior part of the upper lip, and also form a fringe extending anteriorly-posteriorly below the posterior lateral glandular field. The hairs are longer than those on the two species of *Philomedes*.

Anarthron: The upper lips of *A. reticulata* and *A. dithrix* were examined (Figures 219, 230). Some of the glandular processes have an inner and outer rim (Figures 219d,f; 230b,f). *Anarthron reticulata* has 4 glandular processes at the tip and no anterior lateral glandular field; *A. dithrix* has about the same number of processes at the tip and about 4 processes which could be considered as being in an anterior lateral field, although they are close to the tip; *A. reticulata* has 3 processes in the posterior lateral field, and *A. dithrix* has at least 2. Hairs are fairly numerous on the bottom half of the lip where they form rows. About 11 hairs form a horizontal row below the tip of the upper lip of *A. reticulata* (Figure 219c).

EPIPHYTES AND EPIZOA.—*Protistans*: Suctorians are present in the vicinity of the incisur of *Philomedes eugeniae* (Figure 138d,f) and *Philomedes subantarctica* (Figures 160b, 161a-d). Cuplike protistans are present along the posterior margin of the carapace of *Euphilomedes agilis* (Figure 184a,e). Unsegmented or weakly segmented filaments are on the posterior infold of *S. gallardoi* (Figure 200a,b).

Diatoms: Diatoms were attached to the carapaces of a specimen of *Philomedes assimilis* (Figures 129a,d,e; 130).

Philomedes Lilljeborg, 1853

TYPE-SPECIES.—*Philomedes longicornis* Lilljeborg, 1853.

This genus is represented by 12 species in the study area: *P. charcoti* Daday, 1908; *P. assimilis* Brady, 1907; *P. orbicularis* Brady, 1907; *P. eugeniae* Skogsberg, 1920; *P. rotunda* Skogsberg, 1920; *P. cubitum*, new species; *P. heptathrix*, new species; *P. lofthousae*, new species; *P. minys*, new species; *P. ramus*, new species; *P. subantarctica*, new species; *P. tetrathrix*, new species.

DIAGNOSIS OF GENUS.—Carapace generally with prominent rostrum and wide incisur; incisur more open in male than in female; posterior with and without caudal process; surface smooth, punctate, or reticulate, but without ribs; selvage with fringed lamellar prolongation.

First antenna: 2nd joint with 0 to 4 ventral bristles, 0 or 1 lateral bristle, and 1 or 2 dorsal bristles.

Second antenna: Endopodite of female 2-jointed: 1st joint with 5–9 short bristles; end joint with 2 to 5 bristles. Exopodite: 9th joint with 6 bristles in male, 7 in female; some bristles broken off on gravid female of most species. Endopodite of male 3-jointed: 1st joint with 5 bristles; 2nd joint with 2 or 3 bristles; 3rd joint reflexed with 1 long proximal and 2 short terminal bristles.

Mandible: Dorsal margin of basale with 2 to 7 bristles.

Fifth limb: 2nd exopodite joint of female and juvenile males with large quadrate tooth.

Sixth limb: Limb with 3 or 4 bristles in place of epipodial appendage, 4 endites, end joint with 15 to 35 bristles.

Seventh limb: Terminus with 0 to 12 pegs opposite comb.

Furca: Secondary claws not present between main claws; claws either decreasing in length posteriorly along lamella or weak claws following strong claws.

Lateral eye: Female without eyes or with small eyes with 2 or 3 ommatidia; male generally with well-developed eyes with 20 to 42 ommatidia.

Rod-shaped organ: Organ elongate 1- or 2-jointed, without additional sutures.

DISTRIBUTION.—Members of this genus are widespread. One species, *P. globosa* Lilljeborg, 1853, ranges into Arctic waters of the North Atlantic. It

is a common genus in the Antarctic where the southernmost limit of its range is about 78°S in the Weddell and Ross seas. Species in the genus

have been collected from intertidal waters as well as at depths of 3382 m. The distribution of the genus in the study area is shown in Figure 127.

Key to Species

(Includes only species south of 35°S)

ADULT FEMALES

1. Carapace longer than 3.0 mm; tips of teeth and pegs on terminus of 7th limb bifurcate..... 41. *P. ramus*
Carapace shorter than 2.9 mm; tips of teeth and pegs on terminus of 7th limb not bifurcate..... 2
2. Ventral margin of 2nd joint of 1st antenna with 3 or 4 bristles; dorsal margin with 1 bristle..... 32. *P. assimilis*
Ventral margin of 2nd joint of 1st antenna with 2 bristles (rarely 3); dorsal margin with 2 bristles..... 42. *P. lofthousae*
Ventral margin of 2nd joint of 1st antenna with 0 or 1 bristle..... 3
3. 2nd joint of endopodite of 2nd antenna with 4 bristles..... 38. *P. tetrathrix*
2nd joint of endopodite of 2nd antenna with 5 bristles..... 4
2nd joint of endopodite of 2nd antenna with 2 or 3 bristles..... 5
4. 1st joint of endopodite of 2nd antenna with 7 bristles; 7th limb with fewer than 15 bristles..... 37. *P. heptathrix*
1st joint of endopodite of 2nd antenna with 8 or 9 bristles; 7th limb with more than 20 bristles..... 39. *P. subantarctica*
5. Dorsal margin of mandibular basale with 3 bristles..... 6
Dorsal margin of mandibular basale with 4-5 bristles..... 7
6. 7th limb with more than 20 bristles..... 8
7th limb with fewer than 18 bristles..... 9
7. 7th limb with 2 pegs and less than 20 bristles..... 34. *P. eugeniae*
7th limb with 7-12 pegs and more than 30 bristles..... 35. *P. orbicularis*
8. Carapace shorter than 1.6 mm, with right-angled bend in posterior selvage..... 43. *P. cubitum*
Carapace longer than 1.8 mm, without right-angled bend in posterior selvage..... 36. *P. rotunda*
9. Carapace longer than 1.6 mm; 7th limb with 2 pegs opposite comb..... 33. *P. charcoti*
Carapace shorter than 1.4 mm; 7th limb with 3 or 4 pegs opposite comb..... 40. *P. minys*

32. *Philomedes assimilis* Brady

FIGURES 128-130

Philomedes assimilis Brady, 1907:5, pl. 1: figs. 16-21; pl. 2: figs. 1-6.—Müller, 1908:87, pl. 6: figs. 9-17; pl. 7: figs. 14-16; 1912:26 [key], 31.—Scott, 1912:586.—Skogsberg, 1920:352, 367, 413.—Barney, 1921:178.—Lofthouse [part], 1967:143.—Kornicker, 1971:186, fig. 14.

Philomedes antarctica Brady, 1907:5, pl. 3: figs. 1-10.—Kornicker, 1971:189, fig. 15.

HOLOTYPE.—None selected.

SYNTYPE LOCALITY.—Winter Quarters, McMurdo Sound, Ross Sea, Antarctica.

MATERIAL.—USNM 125822, gravid ♀; USNM 125823, 13 specimens, mostly juveniles, no gravid ♀♀; USNM 125844, gravid ♀; USNM 125845, 14 specimens including gravid ♀♀ and juveniles; USNM 125846, 5 adult specimens; USNM 125847,

1 N-1 ♂, length 1.75 mm, height 1.11 mm; USNM 125848, gravid ♀; USNM 125849, adult ♀; USNM 125854, gravid ♀; USNM 125855, 23 specimens including 1 adult ♂, several adult ♀♀ and many juveniles; USNM 125856, gravid ♀; USNM 125857, 1 gravid ♀ + 2 adult ♀♀; USNM 125858, gravid ♀; USNM 125859, 2 juveniles; USNM 125861, gravid ♀; USNM 125862, 1 gravid ♀ + 5 juveniles; USNM 125863, 1 N-1 ♂, length 1.81 mm, height 1.13 mm; USNM 125972, gravid ♀; USNM 126094, gravid ♀; USNM 126097, gravid ♀; USNM 126098, gravid ♀; USNM 126099, gravid ♀; USNM 127491, gravid ♀; USNM 126100, 7 specimens including 2 gravid ♀♀; USNM 127492, 1 gravid ♀ + 3 adult ♀♀ + 4 juveniles; USNM 127497, gravid ♀; USNM 127499, 1 juvenile ♀, length 1.61 mm, height 1.11 mm + 1 adult ♂ + 1 juvenile; USNM 126122, gravid ♀; USNM

126123, adult ♀; USNM 126225, gravid ♀; USNM 136167, adult ♀; USNM 136168, 6 specimens; USNM 136179, adult ♀; USNM 136180, 8 specimens including 3 adult ♀♀ and juveniles; USNM 136570, adult ♀; USNM 125970, 1 juvenile ♀, length 1.37 mm, height 0.95 mm; USNM 136571, 1 juvenile, length 1.43 mm, height 0.90 mm; USNM 136572, 9 adult ♂♂; USNM 136573, 20 gravid ♀♀; USNM 136574, 257 adult ♀♀ and juveniles;

USNM 136578, 2 adult ♂♂ + 7 gravid ♀♀ + 41 adult ♀♀ and juveniles; USNM 136582, adult ♀; USNM 136584, adult ♀; USNM 138016, 1 adult ♀; USNM 138017, 2 gravid ♀♀ + 18 adult ♀♀ + 12 juveniles; USNM 138157, 1 adult ♀; *Hero* station 69-24, 1 juvenile returned to Chile + 1 adult ♀ (USNM 138164); *Hero* 69-37, 1 gravid ♀ returned to Chile; USNM 138652, 1 adult ♀ without eggs; USNM 139147, 2 gravid ♀♀ +

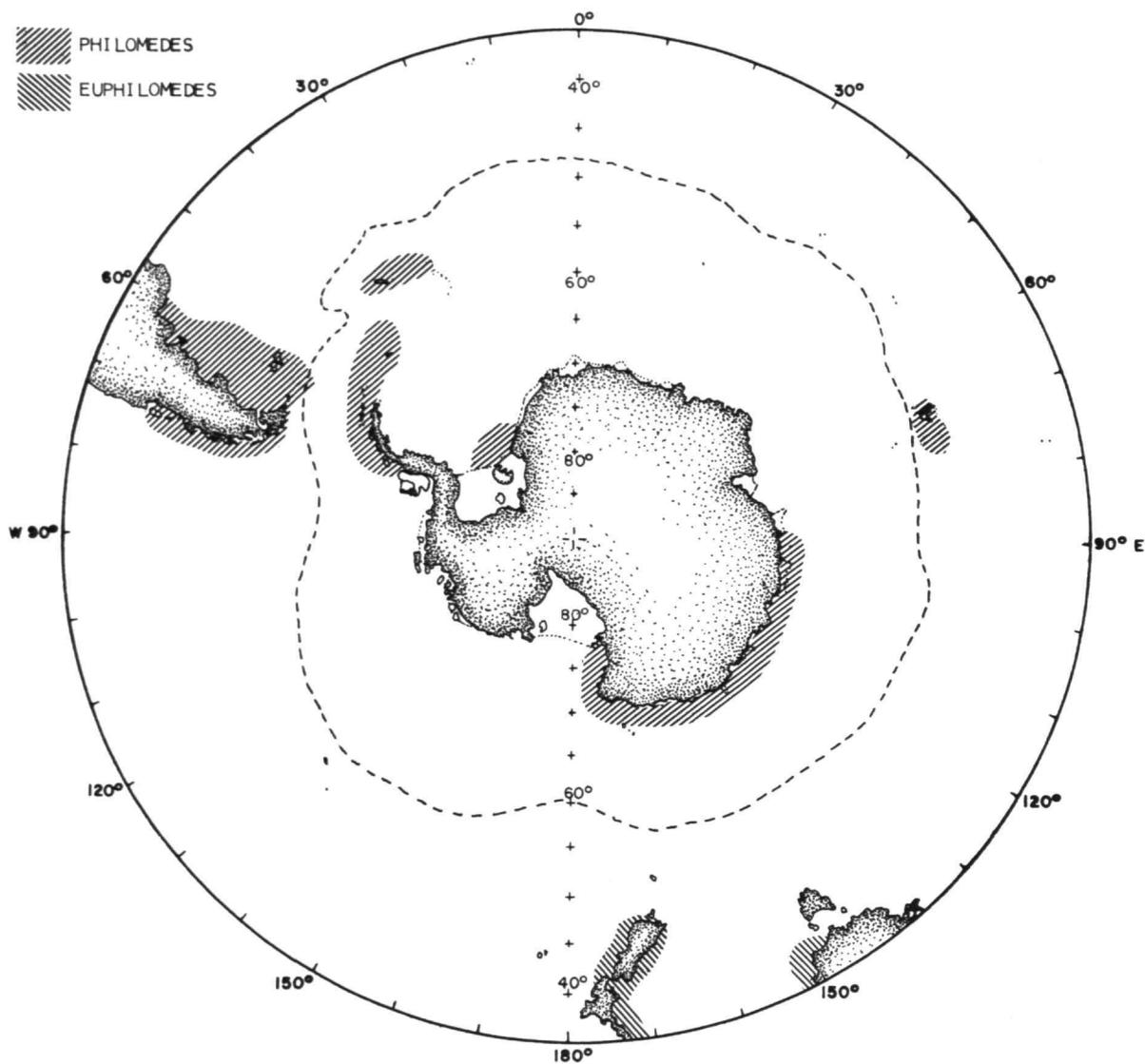


FIGURE 127.—Distribution map of *Philomedes* and *Euphilomedes*.

1 juvenile; USNM 139148, 1 N-1 ♂, length 1.76 mm, height 1.24 mm, + 3 specimens; USNM 139149, 1 gravid ♀ + 4 juveniles; USNM 139150, 1 specimen; USNM 139151, 1 specimen; USNM 139152, 1 gravid ♀; 2 specimens from TA-D51 returned to Dr. Patrick M. Arnaud.

Through Dr. K. McKenzie and Miss Rosemary L. Sayers of the British Museum, I received the following *Discovery* material which had been reported upon by Patricia Lofthouse (1967:143):

1. A vial containing the following label: "*Philomedes assimilis* Brady, Sta 105, off Antarctic coast, Res. 192. BANZARE, 1966. F.20.50." The vial contains 9 specimens of *P. assimilis*, including 2 or 3 adult ♀ ♀ plus juveniles.

2. Two slides, each bearing the following label: "*Philomedes assimilis* ♂ B.A.N.Z.A.R.E. Res. 192, off Antarc. coast. from 1966. F.20.50." One slide bears two valves, the other appendages. These two slides contain an adult ♂ of *P. assimilis*. This sample is from station 105.

Through Mr. David C. Lee of the South Australian Museum, I received the following material which had been correctly identified by Lofthouse (1967) as *Philomedes assimilis*.

1. A vial containing the label, "1741, 4-9-12, Adelie Sound" and 5 specimens of *P. assimilis*.

2. A vial with the label, "Coll. A 1784" and 2 juveniles of *P. assimilis*. I believe that these specimens are those listed as coming from Commonwealth Bay by Lofthouse (1967:143). Both this sample and vials 1 above and 7 below were probably collected on the Australasian Antarctic Expedition, 1911-1914.

3. A vial with the label, "Res. 192, *Philomedes assim*" and 19 specimens of *P. assimilis*. This residue is from *Discovery* station 105.

4. A vial with the label, "Res. 196 Ostracoda" and 1 juvenile ♀ of *P. assimilis*. This residue is from *Discovery* station 105.

5. A vial with the label, "Res. 231 Ostracoda" and 1 adult ♂ of *P. assimilis*. This residue is from *Discovery* station 105.

6. A vial with the label, "Res. 140 *Ph. assimilis*" and a gravid ♀ of *P. assimilis*. This residue is from *Discovery* station 106.

7. A vial with the label, "Res. 68" and 2 juveniles of *P. assimilis*. This residue is from station 1783 (see 2 above).

8. A vial with the label, "DRL 13-2-31, 105,

163 m" and 7 specimens of *P. assimilis* including 1 adult ♂ and 1 gravid ♀ with 12 eggs. This sample is from *Discovery* station 105.

USNM LOCALITIES.—USNM 125822, 125823 from *Eltanin* Cruise 12, station 1003; USNM 125844-125846 from U.S. Navy Expedition, station 104; USNM 125847 from U.S. Navy Expedition, station 234; USNM 125848, 125849 from Deep Freeze II, USS *Glacier*, station 19; USNM 125854, 125855 from Deep Freeze III, USS *Glacier*, station B1-12; USNM 125856, 125857 from Deep Freeze II, USS *Glacier*, station 1; USNM 125858, 125859 from Deep Freeze III, *Burton Island*, station 5; USNM 125861, 125862 from Deep Freeze III, USS *Glacier*, station B1-13, USNM 125863 from Deep Freeze III, USS *Atka*, station 25; USNM 125972 from Deep Freeze IV, USCGC *Northwind*, station 8; USNM 126094, 126097-126100, 127491, 127492, 127497, 127499 from Deep Freeze I, USS *Edisto*, stations 5, 6, 8 combined; USNM 126122, 126123 from *Eltanin* Cruise 7, station 499; USNM 126225 from IWSOE, USCGC *Glacier* Cruise 2, station 0004; USNM 136167, 136168 from *Octans*, station AZ; USNM 136179, 136180 from *Octans*, station AH; USNM 136570 from *Octans*, station AG; USNM 125970 from Deep Freeze II, USCGC *Glacier*, station 20; USNM 136571 from Deep Freeze II, USCGC *Glacier*, station 22; USNM 136572-136574, 136578 from *Eltanin* Cruise 27, station 1896; USNM 136582 from *Eltanin* Cruise 32, station 2035; USNM 136584 from *Eltanin* Cruise 27, station 1870; USNM 138016, 138017 from *Octans*, station TAT; USNM 138157 from Deep Freeze IV, *Edisto* Cruise 23, sample TR 9,

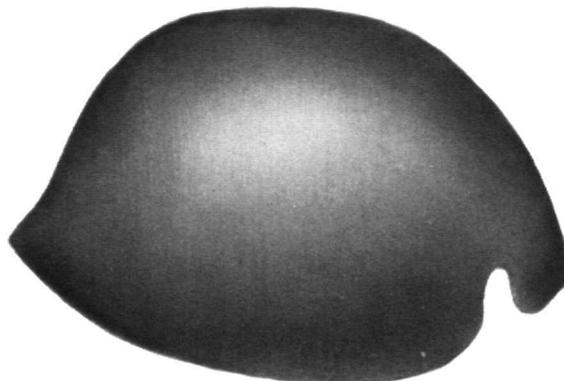


FIGURE 128.—*Philomedes assimilis*, female, USNM 126099, complete specimen, lateral view, length 1.83 mm.

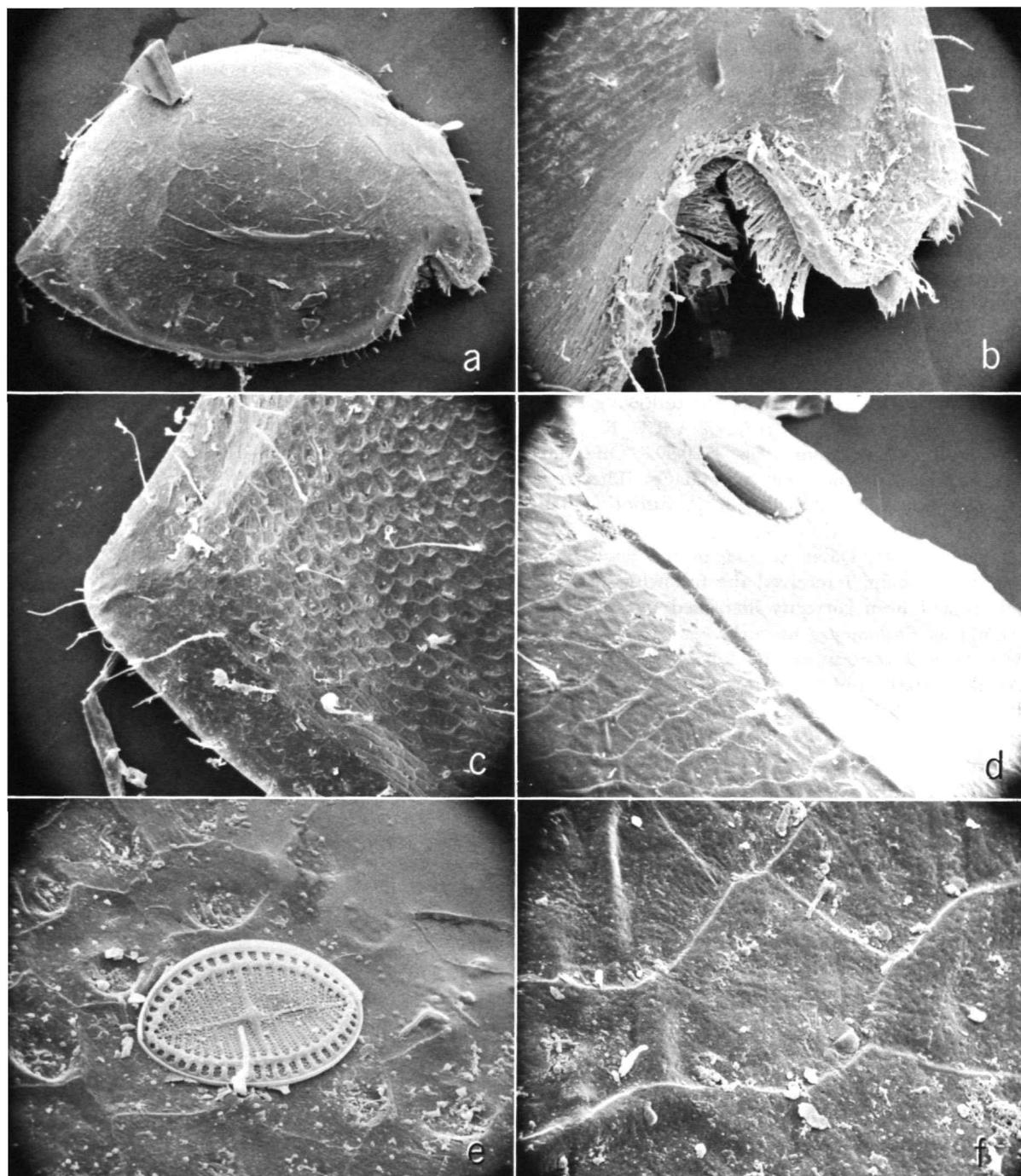


FIGURE 129.—*Philomedes assimilis*, female, USNM 136179, right valve, lateral view: *a*, complete valve, note attached diatoms, $\times 51$; *b*, anterior, $\times 200$; *c*, posterior caudal process, $\times 200$; *d*, surface detail and attached diatom in anterodorsal area, $\times 440$; *e*, diatom and surface hair in middorsal area, $\times 900$; *f*, detail of surface near middle of valve, $\times 1800$.

10, 11; *Hero* 69-24 from station on XXIII Exp. Ant. Chile (includes USNM 138164); *Hero* 69-37 (includes USNM 138652) from XXIII Exp. Ant. Chile. USNM 139147 from station TA-L19; USNM 139148 from TA-D67; USNM 139149 from TA-14-2-1965.B; USNM 139150 from TA-12-2-1965; USNM 139151 from TA-D104; USNM 139152 from TA-D151.

DIAGNOSIS OF FEMALE.—Carapace with truncate posterior and angular caudal process, length 1.67 mm to 2.00 mm.

First antenna: 2nd joint with 5 or 6 bristles, 3 or 4 ventral, 1 dorsal, 1 lateral.

Second antenna: Endopodite 2-jointed: 1st joint with 5 short bristles; 2nd joint with 1 long and 3 short ventral bristles and 1 long recurved terminal bristle.

Mandible: Dorsal margin of basale with 1 proximal bristle, 2 near middle and 2 terminal.

Seventh limb: Each limb with 9 bristles, 5 distal, 4 proximal; 2 pegs present opposite terminal comb.

Furca: Each lamella with 10 claws.

Lateral eye: Small with 2 divided ommatidia.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figures 128-130).—Carapace size (Figure 131): USNM 125822, length 1.82 mm, height 1.23 mm;

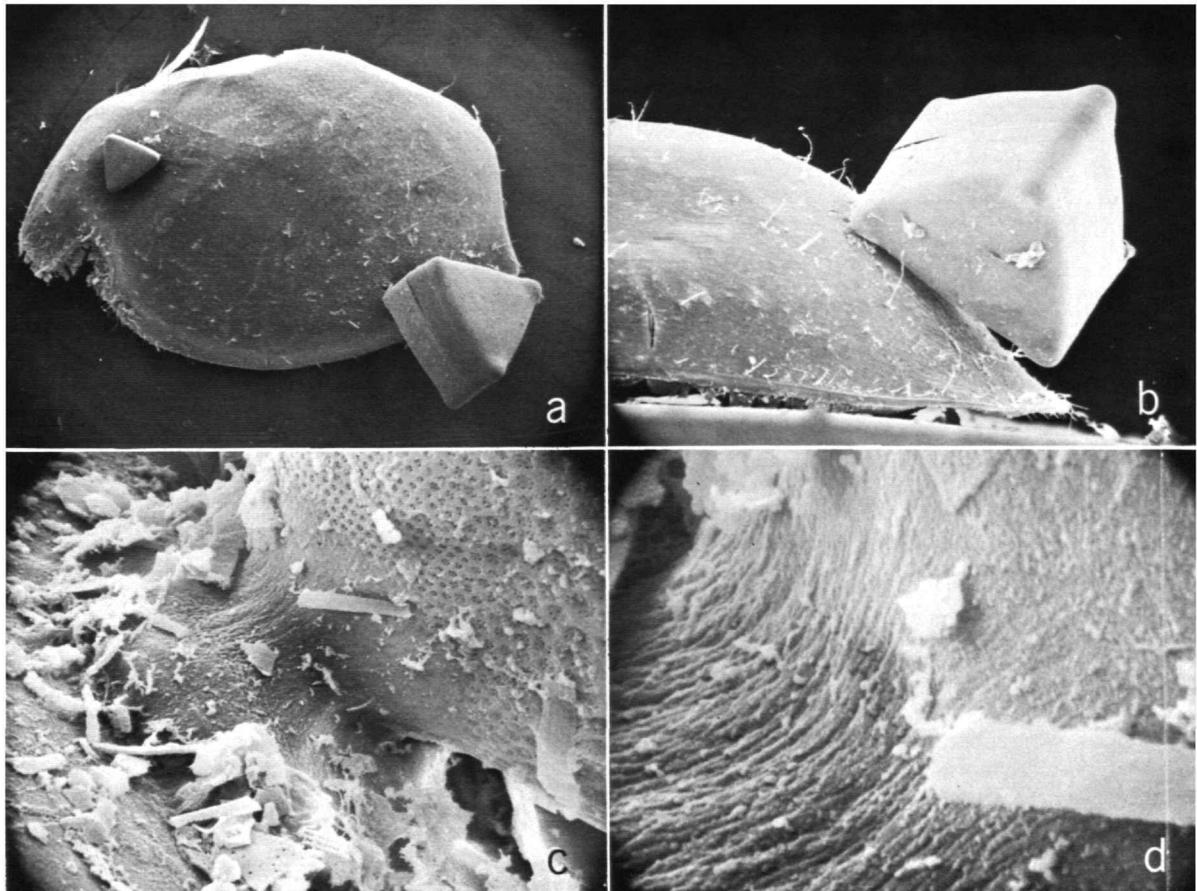


FIGURE 130.—*Philomedes assimilis*, female, USNM 136179, left valve, lateral view: *a*, valve, note attached diatoms, $\times 45$; *b*, ventral view showing diatom attached near posterior, $\times 90$; *c*, detail of attachment of diatom in "*b*," $\times 1750$; *d*, detail showing fibrous nature of attachment in "*c*," $\times 10,000$.

USNM 125844, length 1.89 mm, height 1.29 mm;
 USNM 125848, length 1.76 mm, height 1.25 mm;
 USNM 125849, length 1.81 mm, height 1.33 mm;
 USNM 125854, length 1.77 mm, height 1.29 mm;
 USNM 125856, length 1.83 mm, height, 1.28 mm;
 USNM 125858, length 1.91 mm, height 1.29, mm;
 USNM 125861, length 1.83 mm, height 1.26 mm;
 USNM 125972, length 1.79 mm, height, 1.22 mm;
 USNM 126094, length 1.83 mm, height 1.20 mm;
 USNM 126097, length 1.71 mm, height 1.32 mm;
 USNM 126098, length 1.90 mm, height 1.16 mm;
 USNM 126099, length 1.83 mm, height 1.26 mm
 (figured specimen); USNM 127491, length 2.00 mm,
 height 1.54 mm; USNM 127497, length 1.77 mm,
 height 1.37 mm; USNM 126122, length 1.87 mm,
 height 1.14 mm; USNM 126225, length 1.93 mm,

height 1.09 mm; USNM 136167, length 1.86 mm,
 height 1.36 mm; USNM 136179, length 1.85 mm,
 height 1.33 mm; USNM 136570, length 1.96 mm,
 height 1.42 mm; USNM 136573, length 1.67 mm,
 height 1.34 mm; USNM 136582, length 1.96 mm,
 height 1.33 mm; USNM 136584 (not dissected)
 length 1.91 mm, height 1.30 mm; *Discovery* Resi-
 due 140, length 1.96 mm, height 1.35 mm; *Dis-*
covery station 105, length 1.82 mm, height 1.37
 mm; USNM 138157, length 2.00 mm, height 1.31
 mm; USNM 138164, length 1.85 mm, height 1.34
 mm; *Hero* 69-37 (Chilean collection), length 1.75
 mm, height 1.31 mm; USNM 139147, length 1.91
 mm, height 1.34 mm; USNM 139152, length 1.93
 mm, height 1.28 mm (not dissected).

Eggs: USNM 125822, 9 eggs; USNM 125848, 14

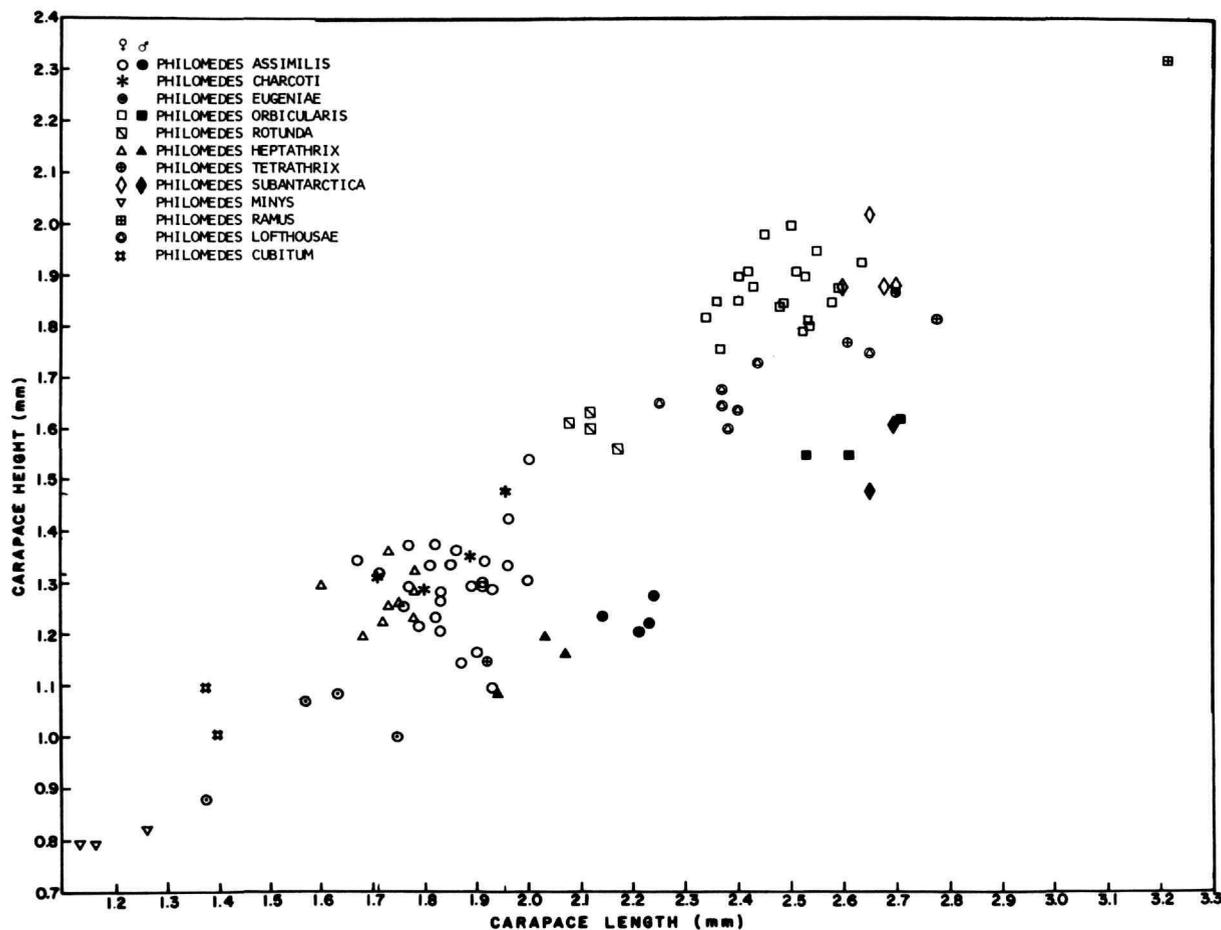


FIGURE 131.—Carapace graph of some species of *Philomedes*.

eggs; USNM 125854, 5 eggs; USNM 125856, 9 eggs; USNM 125858, 9 eggs; USNM 125861, 11 eggs; USNM 125972, 10 eggs; USNM 126094, 6 eggs; USNM 126097, 11 eggs; USNM 126098, 10 eggs; USNM 127497, 12 eggs; USNM 126122, 3 eggs; USNM 126225, 7 eggs; USNM 136573, 11 eggs; *Discovery* Residue 140, 12 eggs; *Hero* 69-37, 5 eggs; USNM 139147, 6 eggs.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE.—Carapace size (Figure 131): USNM 126572 (4 specimens, last 3 listed not dissected) length 2.23 mm, height 1.22 mm; length 2.21 mm, height 1.20 mm; length 2.14 mm, height 1.23 mm; length 2.24 mm, height 1.27 mm. *Discovery* Residue 231, length 2.21 mm, height 1.23 mm.

Parasites: USNM 136167 (adult ♀) with 1 chon-

iostomatid ♀; USNM 136179 (adult ♀) with 1 choniostomatid ♀ and 4 ovisacs; USNM 138016 (adult ♀) with 1 choniostomatid ♀ and 7 ovisacs; USNM 138652 with 1 choniostomatid ovisac. A paradoxostomatid ostracod present in the region of the 2nd antenna of an adult ♀ from *Discovery* station 105 may be a parasite. Diatoms are attached to the carapace of an adult ♀ (USNM 136179) (Figures 129, 130).

The paradoxostomid ostracode mentioned above has been identified by McKenzie (1972:161) as *Paradoxostoma* cf. *hypselum* Müller, 1908. McKenzie suggested that the occurrence may indicate that some paradoxostomids parasitize benthic myodocopids. Elofson (1941, 1969:216) has observed *Paradoxostoma*, which usually feed by sucking plant

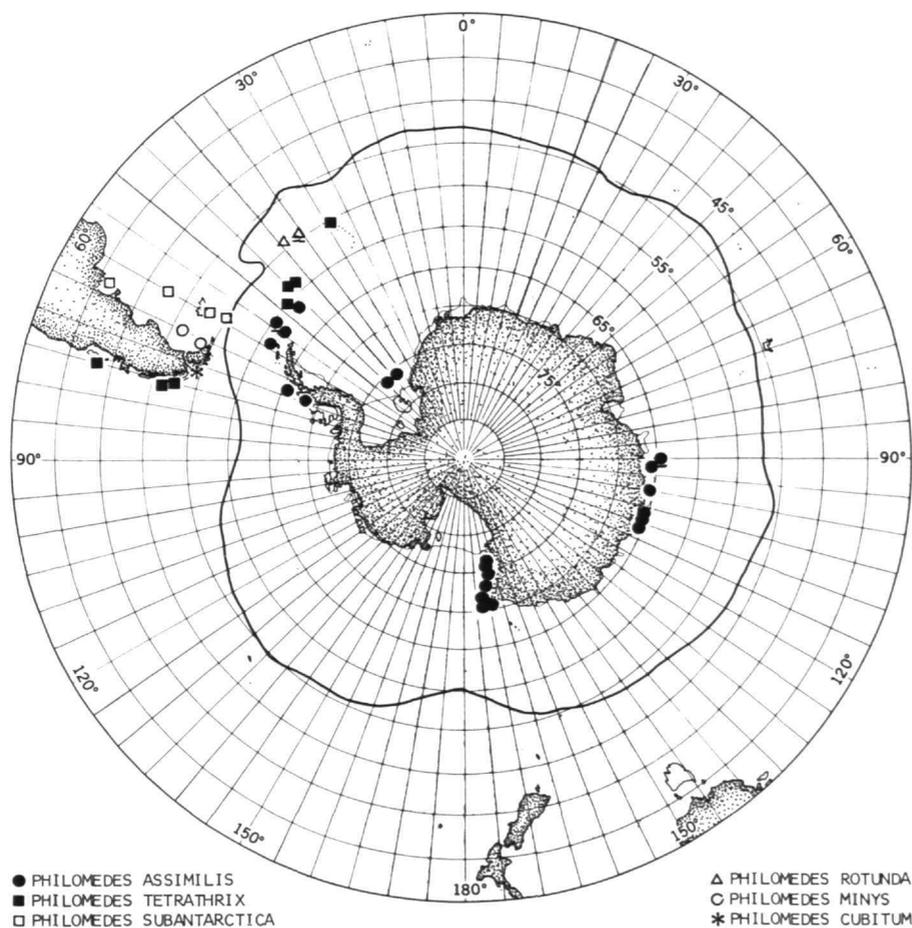


FIGURE 132.—Distribution map of some species of *Philomedes*.

juices, ". . . firmly sucking a dead polychaete, amphipod or similar object, suggesting that animal food is also used when available. G. O. Sars holds the same view (1865:92)."

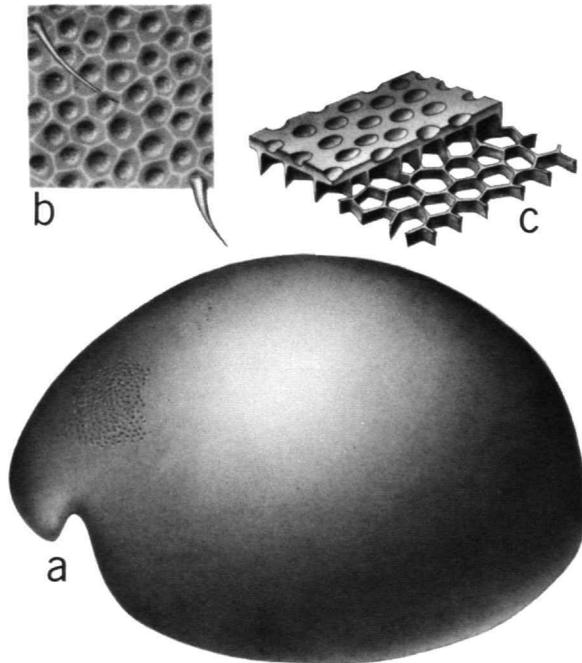


FIGURE 133.—*Philomedes charcoti*, female, USNM 137478: *a*, complete specimen, length about 2 mm; *b*, detail of surface punctae and bristles; *c*, diagrammatic sketch of shell showing punctae and underlying reticulate structure.

REMARKS CONCERNING SPECIMENS REPORTED BY BARNEY (1921).—I did not examine the 10 specimens collected by the Terra Nova Expedition in McMurdo Sound, but as this is the type-locality for *P. assimilis*, it is probable that all or some of the specimens identified as *P. assimilis* by Barney belong to that species.

DISTRIBUTION.—This species has been collected only in the Antarctic region at depths of 9 to 876 m (Figure 132).

33. *Philomedes charcoti* Daday

FIGURES 133, 134

Philomedes charcoti Daday, 1908:9, figs. 11, 12.—Müller, 1912:26 [key], 31.—Skogsberg, 1920:418.—Kornicker, 1971: 171, figs. 4, 5.

HOLOTYPE.—None selected.

SYNTYPE-LOCALITY.—Islands of Booth and Wandel, Graham Coast, Palmer Peninsula.

MATERIAL.—USNM 127475, adult female; USNM 127476, 5 juveniles and 5 adult females; USNM 127478, adult female without eggs; USNM 127483, adult female without eggs; USNM 127486, 2 juveniles; *Yelcho* station 70–22, 6 females without eggs (all specimens returned to Chile); *Hero* station 69–22 (1), 6 adult females without eggs (all specimens returned to Chile).

USNM 127475, 127476 from *Hero* Cruise 69–1, station 6; USNM 127483 from *Hero* Cruise 6, sta-

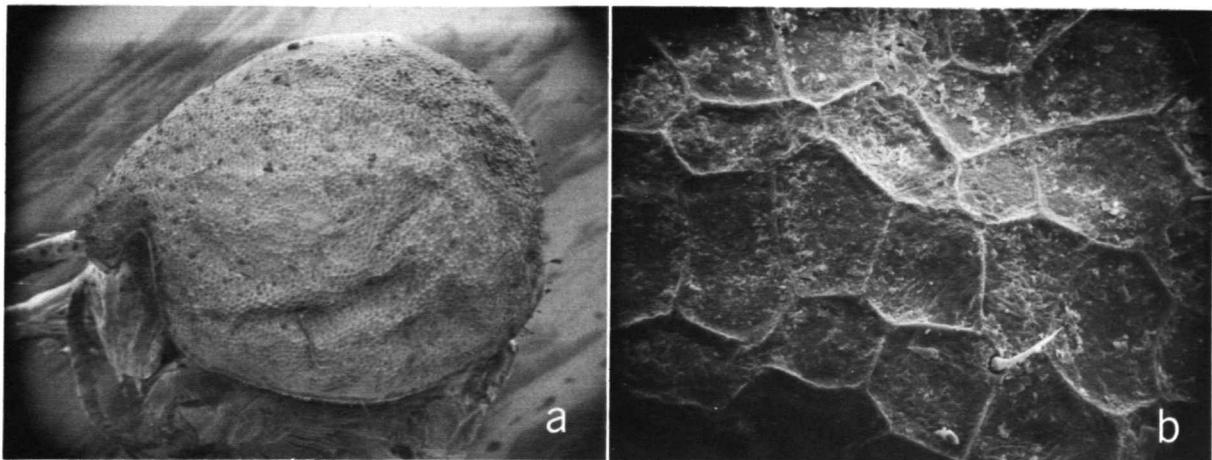


FIGURE 134.—*Philomedes charcoti*, female, USNM 127478: *a*, complete specimen, × 46; *b*, detail of reticulations, surface hair, and pore, × 1063.

tion 7; USNM 127483 from *Hero* Cruise 6, station 27; USNM 127486 from *Hero* Cruise 6, station 12-B;

DIAGNOSIS OF FEMALE.—Carapace with truncate posterior and rounded posteroventral corner; surface distinctly reticulate; carapace length 1.71 to 1.96 mm.

First antenna: 2nd joint with 2 or 3 bristles, 1 ventral, 1 dorsal, 0 or 1 lateral.

Second antenna: Endopodite 2-jointed: 1st joint with 6 short bare bristles; 2nd joint with 1 long ventral bristle and 1 long terminal bristle.

Mandible: Dorsal margin of basale with 3 bristles, 1 near middle, 2 terminal.

Seventh limb: Each limb with 15 or 16 bristles, 5 distal, 10 or 11 proximal; 2 pegs present opposite terminal comb.

Furca: Each lamella with 10 claws; main claws short, stout, often with rounded tips.

Lateral eye: Elongate, each with 2 ommatidia.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figures 133, 134).—Carapace size (Figure 131): USNM 127475, length 1.96 mm, height 1.47 mm; USNM specimen from *Yelcho* station 70-22, length 1.89 mm, height 1.35 mm; specimen from *Hero* station 69-22 (1), length 1.80 mm, height 1.29 mm; USNM 127483, length 1.71 mm, height 1.31 mm.

Second antenna: Bristles on joints 2-8 and 4

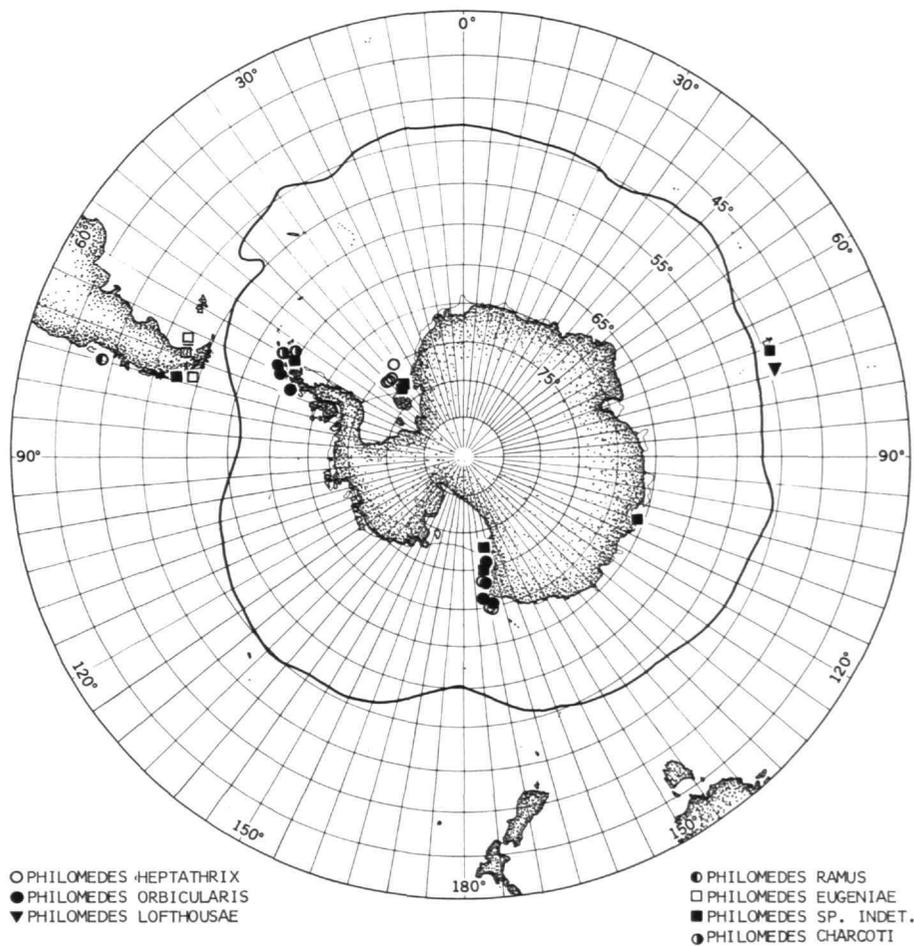


FIGURE 135.—Distribution map of some species of *Philomedes*.

bristles on 9th joint long, with natatory setae; bristles on joints 2–5 short and with ventral spines near middle.

Lateral eye: Small with 2 ommatidia.

DESCRIPTION OF N-1 MALE.—Carapace size: USNM 127486, length 1.65 mm, height 1.34 mm.

Second antenna: Endopodite 3-jointed with 5 short bristles on short 1st joint, 3 ventral bristles on elongate 2nd joint, 1 long proximal dorsal bristle and 2 short terminal bristles on elongate 3rd joint; bristles on exopodite with short spines.

Lateral eye: Eye larger than that of female and with 15 bifid small scattered ommatidia.

DISTRIBUTION.—This species was only collected in the Scotia subregion of Antarctica at depths of 15 to 112 m (Figure 135).

34. *Philomedes eugeniae* Skogsberg

FIGURES 136–138

Philomedes eugeniae Skogsberg, 1920:410, figs. 1–3, pl. 74.—Poulsen, 1962:345 [key].

HOLOTYPE.—On slides at Swedish State Museum (Riksmuseum), Stockholm (see Skogsberg, 1920:413).

TYPE-LOCALITY.—Strait of Magellan.

MATERIAL.—USNM 138023, 1 gravid ♀ from *Hero* Cruise 70–2, station 488; USNM 138655, 2 adult ♀ ♀ + 1 gravid ♀ + 59 adult ♀ ♀ without eggs and juveniles, all from *Hero* Cruise 69–5, station 45; USNM 141555, 5 N-1 ♂ ♂ from *Hero* Cruise 69–5, station 45.

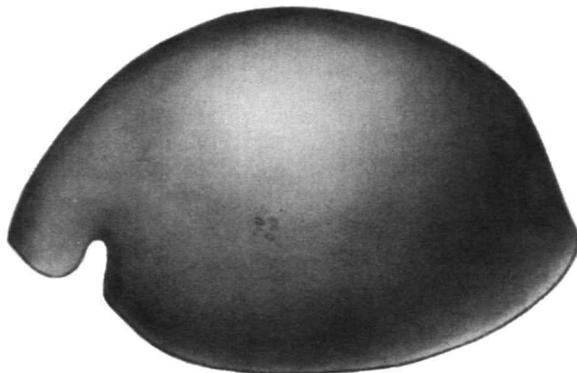


FIGURE 136.—*Philomedes eugeniae*, female, USNM 138655, complete specimen, length 1.58 mm.

REMARKS CONCERNING TYPE-LOCALITY.—Skogsberg (1920:413) listed two localities for *P. eugeniae*, both in the Strait of Magellan. One locality is for a sample collected at a depth of 7 m by the Swedish “*Eugenie*” Expedition, 1851–1853, the other for a sample collected off Cape Valentyne at a depth of 270 m. Because Skogsberg did not indicate from which station the holotype was collected, I wrote to Mr. Roy Oleröd, Naturhistoriska Riksmuseet, Stockholm, Sweden, who informed me that the holotype of *P. eugeniae* was taken at 4–6 fathoms depth. Therefore, the type-locality is the station at 7 m listed by Skogsberg.

DIAGNOSIS OF FEMALE.—Carapace with truncate posterior and angular caudal process, length 1.37 to 1.75 mm (usually 1.58–1.75 mm).

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: Endopodite 2-jointed: 1st joint with 6 short bristles; 2nd joint elongate with 2 ventral bristles, 1 long 1 short, and 1 long terminal bristle. Bristles on exopodite of 2nd antenna unbroken.

Mandible: Dorsal margin of basale with 4 bristles (rarely 5), 2 near middle, 2 terminal.

Seventh limb: Each limb with 14 to 18 bristles, 9 to 12 proximal, 5 distal; 2 pegs present opposite terminal comb.

Furca: Each lamella with 10 claws.

Lateral eye: Small, with 2 ommatidia.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 136–138).—Carapace size (Figure 131): USNM 138023, length 1.64 mm, height 1.07 mm; USNM 138655, length 1.58 mm, height 1.07 mm, + length

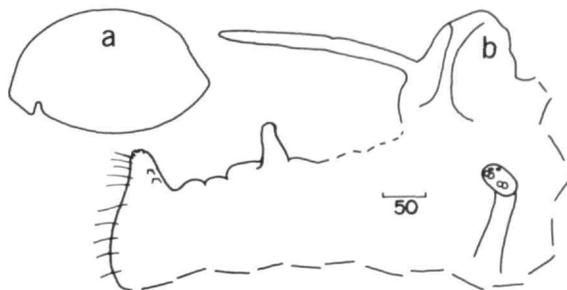


FIGURE 137.—*Philomedes eugeniae*, female, USNM 138023, length 1.64 mm: a, lateral view of complete specimen; b, anterior showing lateral eye, medial eye and rod-shaped organ, anterior process, and upper lip.

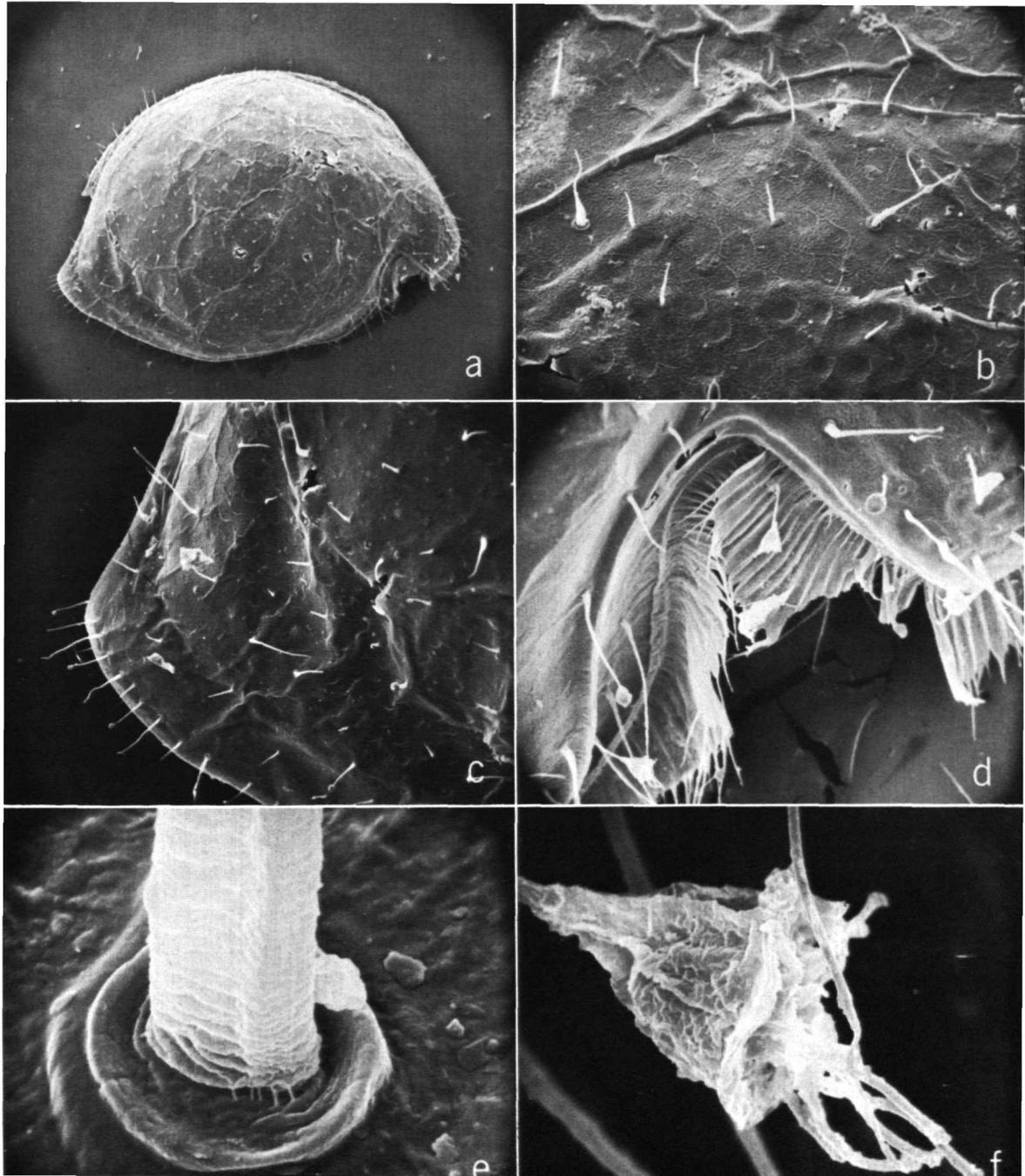


FIGURE 138.—*Philomedes eugeniae*, female, USNM 138023, right valve, lateral view: *a*, complete valve, $\times 50$; *b*, surface near posterior of "a," $\times 37$; *c*, posteroventral process, $\times 200$; *d*, anterior incisur, $\times 360$; *e*, detail of bristle pore, $\times 7500$; *f*, lowest ectoparasite shown in "d," $\times 3600$.

1.74 mm, height 1.00 mm, + length 1.37 mm, height 0.88 mm (gravid).

Egg: USNM 138023 with 11 eggs; USNM 138655 with 4 eggs.

DISTRIBUTION.—This species has been collected only in the Magellanic subregion of Subantarctica at depths of 7 to 270 m (Figure 135).

35. *Philomedes orbicularis* Brady

FIGURES 139–143

Philomedes orbicularis Brady, 1907:4, pl. 1: figs. 1–3, 6–15.—Müller, 1912:26 [key], 33.—Kornicker, 1971:191, fig. 16.
Philomedes trithrix Kornicker, 1971:176, figs. 6–12.

LECTOTYPE.—Dry specimen, length 2.45 mm, height 2.08 mm, on slide in Brady collection, Hancock Museum, Newcastle-on-Tyne, designated herein. Specimen illustrated by Kornicker (1971:191, fig. 16).

TYPE-LOCALITY.—Winter Quarters, McMurdo Sound.

MATERIAL.—USNM 125839 gravid ♀; USNM 125841, gravid ♀ + 1 adult ♀ + 20 juveniles; USNM 125980, adult ♀; USNM 125981, 2 juveniles; USNM 125984, 219 specimens; USNM 126090, gravid ♀; USNM 126091, gravid ♀; USNM 126092, adult ♀; USNM 126093, juvenile ♀, length only 2.31 mm; USNM 126096, 5 adult ♂♂ + 37 females and juveniles; USNM 126095, adult ♀; USNM 127472, gravid ♀; USNM 127473, adult ♀; USNM 127474, 10 adult ♀♀ (no eggs visible through shell) + 32 juveniles; USNM 127477, adult ♂; USNM 127479, 1 adult ♂ + 7 adult ♀♀ + 1 juvenile; USNM 127482, 1 juvenile; USNM 127484, adult ♀; USNM 127485, 3 gravid ♀♀ + 3 adult ♀♀ + 8 juveniles; USNM 127487, 2 adult ♂♂; USNM 127489, 3 gravid ♀♀ + 1 adult ♀; USNM 127495, 3 juveniles; USNM 127496, adult ♀; USNM 136084, gravid ♀; USNM 136085, 726 specimens (gravid ♀♀, adult ♀♀ without eggs and juveniles, no adult ♂♂); USNM 138021, 11 specimens (not dissected); USNM 138158, 1 gravid ♀; USNM 138159, 1 gravid ♀; USNM 138160, 1 gravid ♀; USNM 138163, 1 gravid ♀ (not dissected); USNM 138650, 1 adult ♀ without eggs.

USNM 125839, 125841 from *Eastwind* station 004 A; USNM 125980, 125981 from Deep Freeze IV, *USS Staten Island*, station S.I. 2; USNM

125984, 126090–126093, 126095, 126096 from Deep Freeze I, *USS Edisto*, stations 5, 6, 8 combined, vial 1; USNM 127472–127474, 127477 from *Hero* Cruise 691, station 6; USNM 127479 from *Hero* Cruise 691, station 7; USNM 127482 from *Hero* Cruise 691, station 12–B; USNM 127484 from *Hero* Cruise 691, station 5; USNM 127485 from *Hero* Cruise 691, station 3; USNM 127487, 127489, 127495, 127496 from Deep Freeze I, *USS Edisto*, stations 2, 6, 8 combined, vial 3; USNM 126084, 136085 from *Hero* Cruise 691, station 22; USNM 136177 from *Hero* Cruise 691, station 23; USNM 138021 from *Hero* Cruise 702, station 448; USNM 138158–138160 from XXIV Exp. Ant. Chile, *Yelcho* station 70–39; USNM 138163 from XXIII Exp. Ant. Chile, *Hero* station 69–47; USNM 138650 from XXIV Exp. Ant. Chile, *Yelcho* station 70–30.

In addition, the following specimens collected by the Chilean Antarctic Expeditions were identified and returned to the Departamento de Zoología, Instituto Central de Biología Universidad de Concepción, Concepción, Chile: XXIV, *Yelcho* station 70–39, 4 gravid ♀♀ + 11 specimens; XXIII, *Hero* station 69–40, 5 gravid ♀♀, 9 adult ♀♀ without eggs, 41 juveniles; XXIII, *Hero* station 69–47, 1 gravid ♀, 9 juveniles; XXIV, *Yelcho* station 70–25, 3 gravid ♀♀; XXIV, *Yelcho* station 70–30, 2 gravid ♀♀, 2 juveniles; XXIII, *Hero* station 69–35, 1 gravid ♀, 3 adult ♀♀, 1 juvenile; XXIV, *Yelcho* station 70–32, 2 gravid ♀♀, 8 juveniles; XXIII, *Hero* station 69–46, 1 gravid ♀, 9 adult ♀♀ without eggs, 6

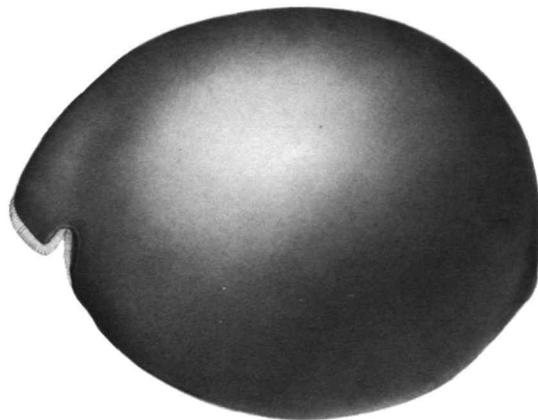


FIGURE 139.—*Philomedes orbicularis*, female, USNM 138163, complete specimen, length 2.53 mm (surface hairs not shown).

juveniles; XXIII, *Hero* station 69-42, 1 adult ♀ without eggs, 1 juvenile; XXIII, *Hero* station 69-33, 2 gravid ♀♀, 2 adult ♀♀ without eggs; XXIII, *Hero* station 69-48, 4 juveniles; XXIII

Hero station 69-45, 2 adult ♀♀ without eggs; XXIII, *Hero* station 69-28, 1 adult ♀ without eggs; XXIV, *Yelcho* station 70-28, 1 gravid ♀, 2 juveniles; XXIII, *Hero* station 69-26, 1 adult ♀



FIGURE 140.—*Philomedes orbicularis*, female, USNM 138159, length 2.53 mm: *a*, lateral view of complete specimen. Female from *Hero* station 69-35; *b*, sketch of central muscle scars on left valve, lateral view. Female, USNM 138158, medial view of right valve: *c*, rostrum and incisor; *d*, caudal process. Right 2nd antenna: *e*, endopodite, medial view. Right mandible: *f*, tip of exopodite, lateral view; *g*, basale, exopodite and 1st endopodite joint, lateral view. Left 6th limb: *h*, medial view (not all bristles shown). Right 5th limb: *i*, anterior view; *j*, posterior view (not all bristles shown). Seventh limb: *k*, tip. Right lateral eye: *l*, anterior to right (pigmented but no distinct ommatidia). Furca: *m*, right lamella, lateral view. Female, USNM 138160: *n*, anterior showing medial eye and rod-shaped organ, anterior process, and outline of upper lip. (Same magnification in microns: *c,e,g,h,i; d,i,j; f,k*.)

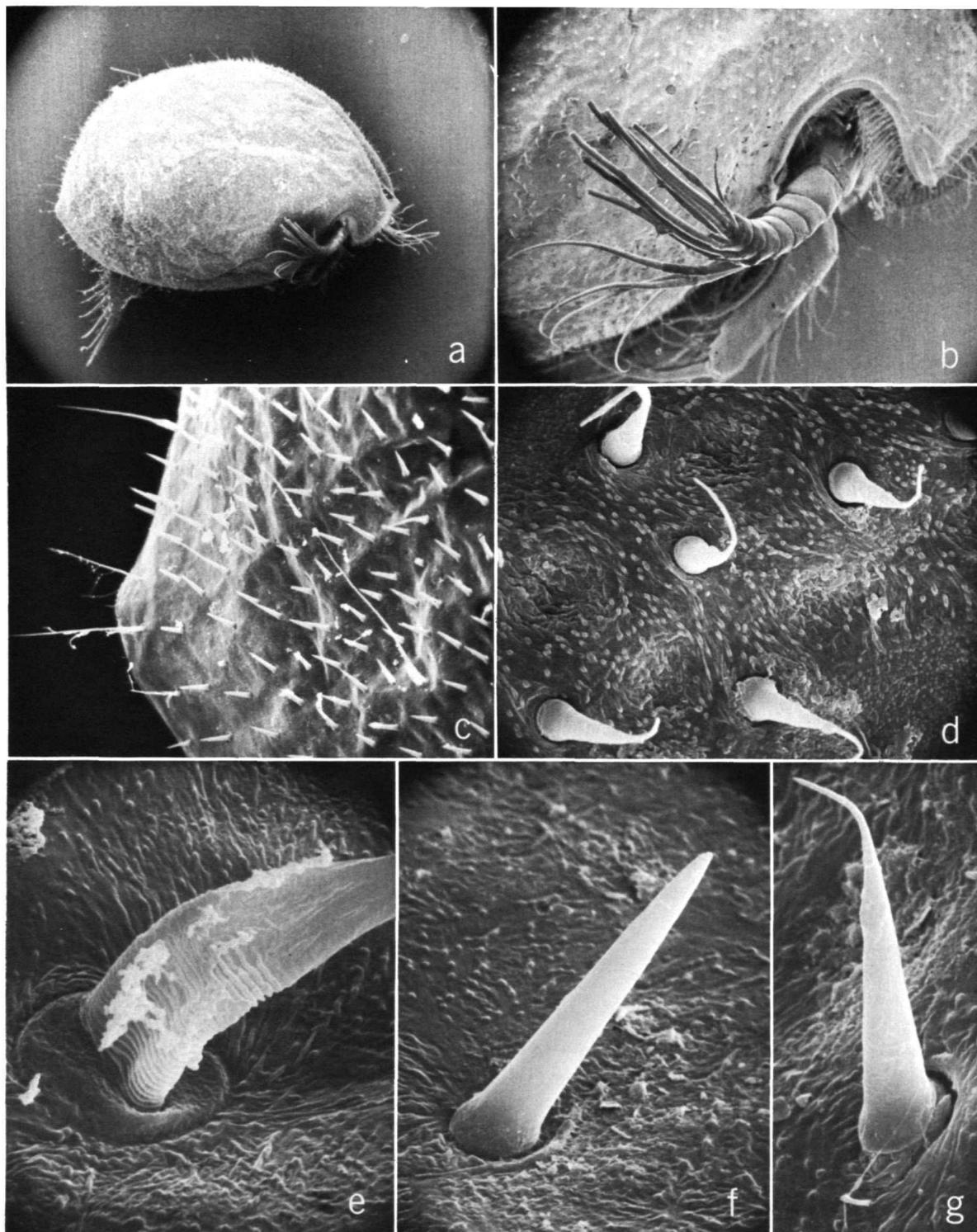


FIGURE 141.—*Philomedes orbicularis*, female, USNM 138159, paratype: *a*, right lateral view, $\times 30$ (caudal process appears more prominent than on specimen before freeze-drying); *b*, incisor and 2nd antenna, $\times 125$; *c*, caudal process, $\times 250$; *d*, bristles near middle of valve, $\times 1500$; *e,f,g*, details of bristles, $\times 3200$.

without eggs; XXIV, *Yelcho* station 70-42, 1 adult ♀ without eggs; XXIII, *Hero* station 69-37, 1 gravid ♀, 1 juvenile; XXIII, *Hero* station 69-30, 1 gravid ♀, 2 juveniles; XXIV, *Yelcho* station 70-44, 1 juvenile; XXIV, *Yelcho* station 70-46, 1 adult ♀ without eggs.

REMARKS.—Kornicker (1971) established a new species *Philomedes trithrix* to contain specimens collected on the Palmer Archipelago. He stated (p. 185), "When *P. orbicularis* becomes better known, it may be necessary to place *P. trithrix* in its synonymy." In the present study, abundant material was collected in the type-locality of *P. orbicularis*. It is quite clear now that only one of the several species of *Philomedes* collected there is that intended by Brady to bear the name *P. orbicularis*, although three species of the genus are present in the type-series (see Kornicker, 1971: 191). A lectotype is selected from the type-series herein, and *P. trithrix* is put into synonymy with *P. orbicularis*.

DIAGNOSIS OF FEMALE.—Carapace oval in lateral outline with minute caudal process often not visible in lateral view, surface with abundant short hairs; carapace length 2.34 to 2.64 mm.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: Endopodite 2-jointed: 1st joint with 5 short bristles; 2nd joint with 2 ventral bristles, 1 long, 1 short, and 1 long terminal bristle.

Mandible: Dorsal margin of basale with 4 bristles, 2 near middle, 2 terminal.

Seventh limb: Each limb with 32-43 bristles; 7-12 short pegs at tip arranged in circle with longer peg in middle (when appendage mounted under cover glass, circular arrangement not always evident).

Furca: Each lamella with 11 to 13 claws.

Lateral eye: Small, each with 2 or 3 ommatidia.

The following supplementary description is limited to characters not mentioned in previous descriptions, or show variability in the species.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 139-143).—Anteroventral part of infold of USNM 138158 with 8 or 9 striae and 12 to 15 spinous bristles; ridge paralleling inner margin of posteroventral and posterior infold with about 41 bristles in groups of 1 to 5 bristles; small "pocket" with 4 anterodorsal bristles and 2 or 3

longer posterior bristles present in infold of caudal process.

Carapace size (Figure 131): USNM 125839, length 2.34 mm, height 1.82 mm; USNM 125840, length 2.42 mm, height 1.91 mm; USNM 125980, length 2.53 mm, height 1.90 mm; USNM 126090, length 2.51 mm, height 1.91 mm; USNM 126091, length 2.59 mm, height 1.87 mm; USNM 126095, length 2.45 mm, height 1.98 mm; USNM 127472, length 2.50 mm, height 2.00 mm; USNM 127473, length 2.43 mm, height, 1.88 mm; USNM 136084, length 2.55 mm, height 1.95 mm; USNM 136177, length 2.58 mm, height 1.85 mm; USNM 136575, length 2.48 mm, height 1.84 mm (not dissected); USNM 138158, length 2.36 mm, height 1.76 mm; USNM 138159, length 2.53 mm, height 1.81 mm; USNM 138160, length 2.52 mm, height 1.80 mm; USNM 138650, length 2.64 mm, height 1.93 mm; USNM 138163, length 2.53 mm, height 1.88 mm.

First antenna: b-bristle with 4 proximal and 4 terminal filaments; c-bristle with 4 proximal and 5 terminal filaments; f-bristle with 4 proximal and 5 filaments; g-bristle with 3 proximal and 5 terminal filaments.

Second antenna (Figure 140e): Endopodite 2nd joint with 1 long proximal and 1 or 2 shorter distal bristles; joints 3 to 8 with minute basal spine.

Mandible (Figure 140f,g): Medial surface of coxale with spines forming clusters; dorsal margin of basale with 4 or 5 bristles, 2 or 3 near middle, 2 terminal; ventral margin of basale with 2 or 3 distal bristles; ventral margin of 1st endopodite joint with 5 or 6 bristles.

Maxilla: Coxale with epipodial fringe and plumose dorsal bristle. Endite I with 9 or 10 bristles, endite II with 6 bristles, endite III with about 7 bristles. Distal margin of basale with 3 long bristles. Exopodite short, only 2 bristles observed. Endopodite: 1st joint with 1 α -bristle with long proximal and short distal marginal spines, and 4 β -bristles with few marginal spines; end joint with 4 α -bristles, 3 stout pectinate claws and several bristles.

Fifth limb (Figure 140i): Anterior side of 1st endopodite joint with 2 bristles near middle of distal margin and 1 short spinous bristle with broad base near outer edge; protuberance in front of main tooth smooth or with minute indistinct proximal node; main tooth consisting of 3 coarsely

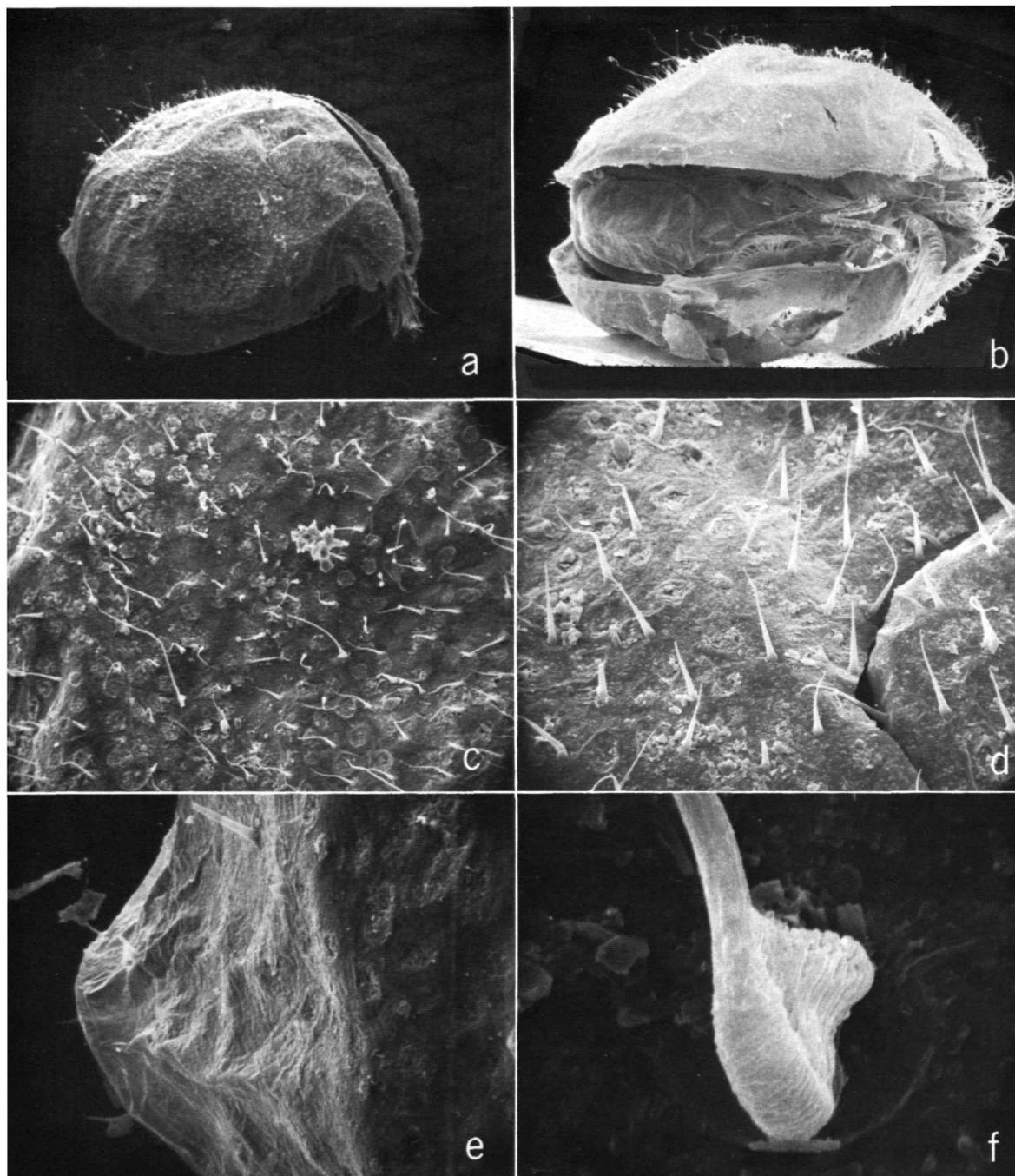


FIGURE 142.—*Philomedes orbicularis*, female, USNM 127474: *a*, complete specimen, $\times 50$; *b*, ventral view, $\times 600$; *c*, detail near middle right valve, $\times 250$; *d*, detail near tear on upper right valve, $\times 488$; *e*, caudal process, right valve, $\times 625$; *f*, base of long bristle shown in “*c*.”

pectinate teeth followed by peg with few minute teeth, and proximal spinous bristle; large triangular or quadrate tooth of 2nd joint with small node (node bearing 3 minute teeth) on inner margin; posterior side of 2nd joint with 1 c-bristle, usual cluster of 3 bristles distal to c-bristle and 1 minute bristle near outer corner of large tooth. Inner lobe of 3rd exopodite joint: proximal bristle bare except for 1 spine near tip, outer terminal bristle with few long proximal spines and teeth along outer margin, inner terminal bristle with long proximal and short distal spines. Fourth plus 5th exopodite joints fused, hirsute, with 6 spinous bristles.

Sixth limb (Figure 140h): 4th endite with 8

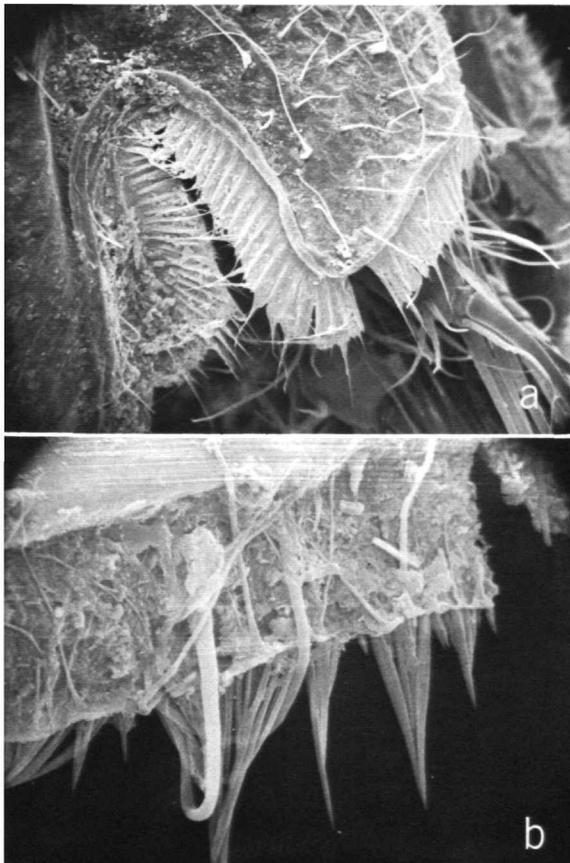


FIGURE 143.—*Philomedes orbicularis*, female, USNM 127474: a, incisur and rostrum complete specimen, $\times 250$; b, lamellar prolongation of selvage along anteroventral margin, lateral view right valve, $\times 2375$. Reduction, 25%.

bristles, 1 proximal, 7 terminal; end joint with 25 bristles, 8 medial, 17 ventral or slightly lateral; lateral surfaces of endite II to IV hirsute.

Seventh limb: Each limb with 32 or 33 bristles, each bristle with 2 to 6 bells and distal marginal spines; pegs opposite comb arranged with short pegs in circle and 1 longer peg in middle. (Circular arrangement of pegs was not noted in my 1971 description of *P. trithrix* because arrangement becomes obscure when appendage is flattened under a cover glass.)

Furca: See Figure 140m.

Upper lip: Lip hirsute with several glandular processes at tip (Figure 140n).

Lateral eye: Eye minute without well-defined ommatidia.

Posterior: Posterior margin hirsute.

Genitalia: Minute red spermatophore present on each side.

Eggs: USNM 125839, 14; USNM 126090, 15; USNM 126091, 16; USNM 127472, 10; USNM 136084, 9; USNM 138158, 14; USNM 138160, 17; USNM 138163, 11; *Yelcho* station 70–25, 13; *Yelcho* station 70–30, 18.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE.—Carapace size (Figure 131): USNM 126092, length 2.71 mm, height 1.62 mm; USNM 127477, length only (shell distorted) 2.45 mm; USNM 127487, length only 2.54 mm.

DISTRIBUTION.—This species was collected only in the Continental subregion of Antarctica at depths of 15 to 405 m (Figure 135).

36. *Philomedes rotunda* Skogsberg

FIGURES 144–146

Philomedes rotunda Skogsberg, 1920:366, 367, 368, 414, figs. 75, 76.—Poulsen, 1962:345 [key].

HOLOTYPE.—Swedish State Museum (Riksmuseum), Stockholm (see Skogsberg, 1920:418); mature ♀.

TYPE-LOCALITY.—South Georgia, S.A.E. Station 22, off May Bay, 54°17'S, 36°28'W, depth 75 m, clay bottom with scattered algae, bottom temperature 1.5°C.

MATERIAL.—USNM 128953, 1 gravid ♀; USNM 128954, 1 gravid ♀ + 3 gravid ♀♀ (not dissected), 1 juvenile; USNM 139843, 1 N–1 ♂. All specimens from *Vema* Cruise 14, station V–14–21.

DIAGNOSIS OF FEMALE.—Carapace oval in lateral view and without caudal process; surface reticulate; length 1.9 to 2.17 mm.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: Endopodite 2-jointed: 1st joint with 6 bristles; 2nd joint with 2 or 3 bristles (usually 2), 1 or 2 ventral, 1 terminal.

Mandible: Dorsal margin with 3 bristles, 1 near middle, 2 terminal.

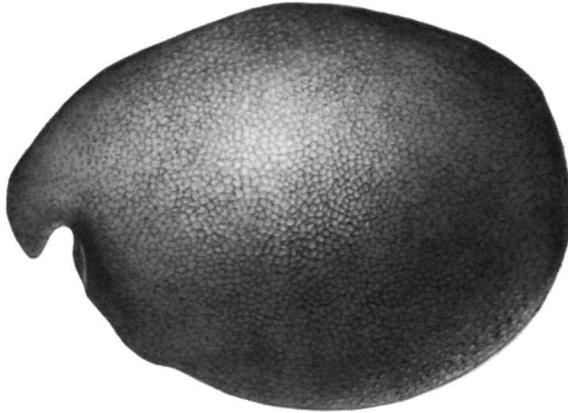


FIGURE 144.—*Philomedes rotunda*, female, USNM 128954, complete specimen, length 2.17 mm.

Seventh limb: Each limb with 23–26 bristles; 3 (occasionally only 2) pegs present opposite comb.

Furca: Each lamella with 10–12 claws.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 143, 144, 145a-g).—Carapace oval in lateral view and without caudal process, surface reticulate. **Size** (Figure 131): USNM 128953 length 2.12 mm, height 1.60 mm; USNM 128954, length 2.17 mm, height 1.56 mm; length 2.08 mm, height 1.61 mm (not dissected); length 2.12 mm, height 1.63 mm (not dissected).

Lateral eye (Figure 145e): Eye minute with 2 minute ommatidia (lateral eye could only be seen with certainty in one—USNM 128953—of two specimens examined; eye located high on head, some distance from medial eye).

Furca: USNM 128593 with 11 or 12 claws on each lamella, USNM 128593 with 9.

Seventh limb (Figure 145f): USNM 128593 with alate comb teeth and 2 pegs opposite comb on one limb, 3 pegs on other limb.

Eggs: USNM 128954 and USNM 128953 (1 specimen), both with 26 eggs in marsupia.

Parasites: Cup-shaped stalked protistans abundant on appendages (Figures 145g).

SUPPLEMENTARY DESCRIPTION OF N-1 MALE (Figure 145 g-i).—Carapace similar in shape to that of

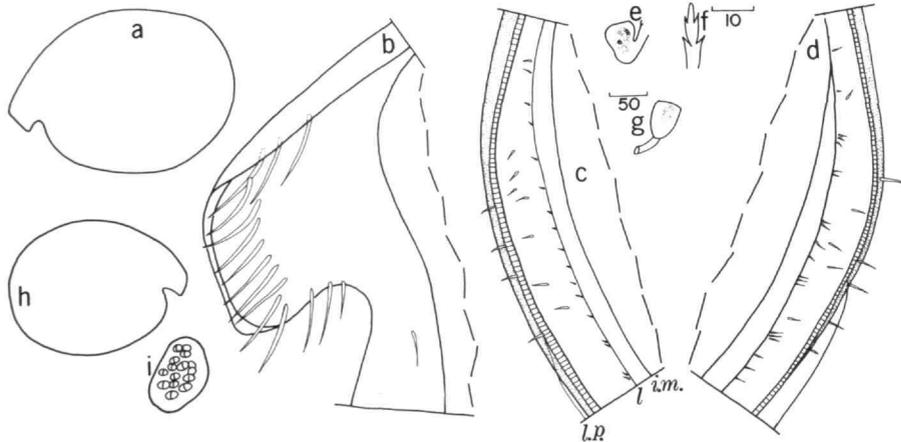


FIGURE 145.—*Philomedes rotunda*, female, USNM 128953, length 2.12 mm: a, complete specimen, lateral view; b, rostrum and incisor of right valve, medial view (lamellar prolongation not shown); c, posteroventral infold of left valve, medial view; d, posteroventral infold of right valve, medial view. Left lateral eye: e, anterior to left. Seventh limb: f, tip of comb tooth. Epizoa: g, protistan attached to 2nd antenna. N-1 male, USNM 139843, length 1.83 mm; h, complete specimen, lateral view. Lateral eye: i, right eye, anterior to right. (Same magnification in microns: b-e,g,i.)

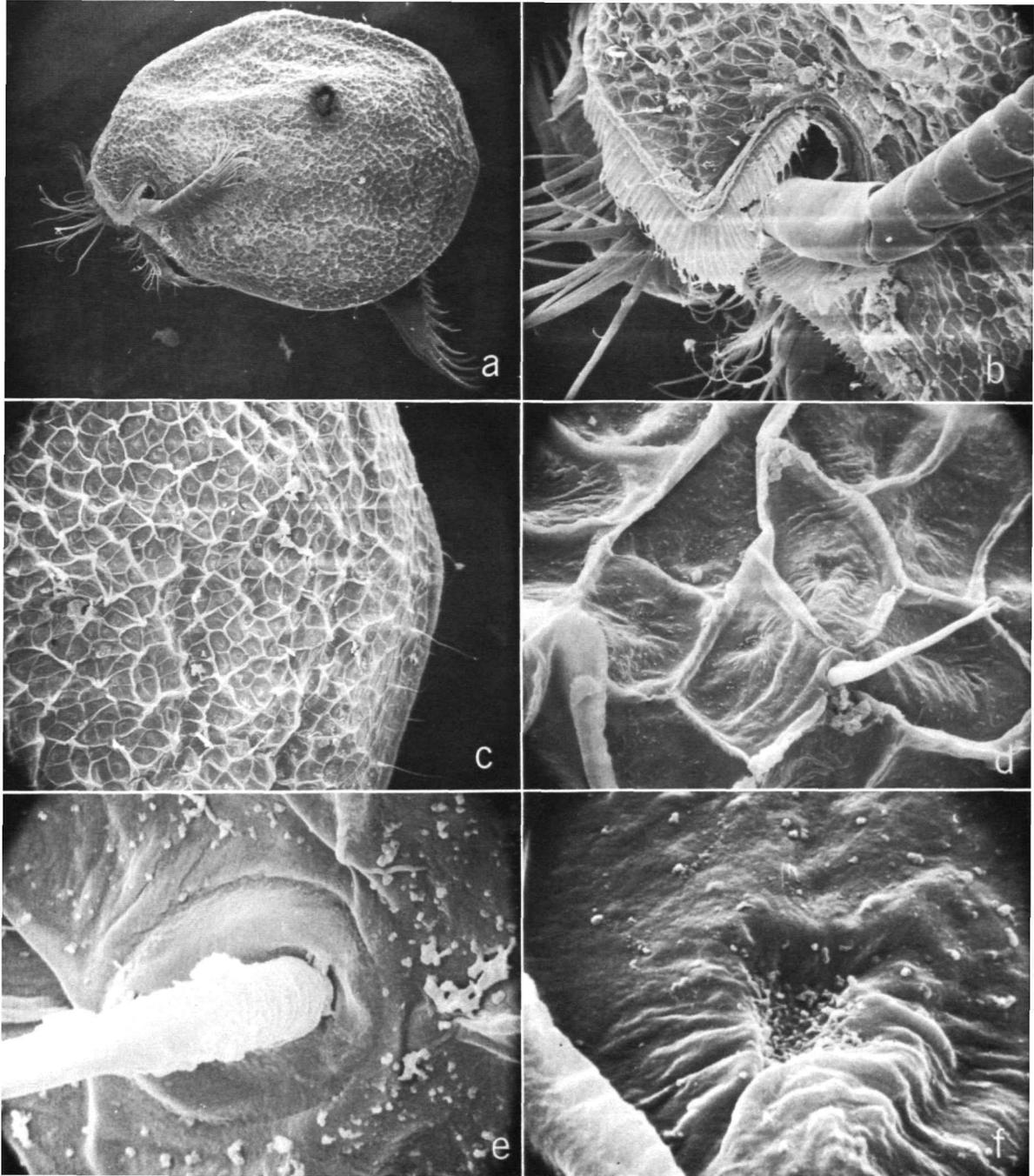


FIGURE 146.—*Philomedes rotunda*, juvenile, USNM 128954: *a*, lateral view, $\times 50$, complete specimen; *b*, anterior view, $\times 200$; *c*, posterior view, $\times 200$; *d*, detail of shell, $\times 1625$; *e*, hair base and pore, $\times 5500$; *f*, detail of depression within reticulation, $\times 7500$.

adult female. Size: USNM 1398 43, length 1.83 mm, height 1.36 mm.

Second antenna: Same as that illustrated by Skogsberg (1920:415 fig. 75-4).

Lateral eye: Eye well developed with about 15 ommatidia (Figure 145i).

Seventh limb: Well developed.

Furca: Each lamella with 9 claws.

Parasites: Cup-shaped stalked protistans abundant on appendages.

DISTRIBUTION.—This species was collected only in the South Georgia district of the Antarctic at depths of 69 to 237 m (Figure 132).

37. *Philomedes heptathrix*, new species

FIGURES 147-150

Philomedes species A, Kornicker, 1971:192, fig. 17 [?].

HOLOTYPE.—USNM 126219, gravid ♀, length 1.68 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—USCGC *Glacier* Cruise 2, station 0009, Weddell Sea.

ETYMOLOGY.—The specific name "heptathrix" from the Greek "hepta" [= seven] and "thrix" [= hair] refers to the 7 bristles on the dorsal margin of the mandibular basale on many specimens, and on the 1st endopodial joint of the 2nd antenna.

PARATYPES.—USNM 126220, adult ♂; USNM 126221, gravid ♀; USNM 126222, adult ♀; USNM 126223, adult ♂; USNM 126224, 48 adult ♂♂, 53 adult ♀♀, 481 juveniles; USNM 127276, adult ♀. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 127251, adult ♀; USNM 127256, 3 juveniles, USNM 127255, adult ♀; USNM 127257, adult ♀; USNM 127258, adult ♀ (not dissected) + adult ♂; USNM 127490, adult ♀; USNM 127493, gravid ♀; USNM 127494, adult ♂. USNM 127251 from IWSOE, USCGC *Glacier* Cruise 2, station 0007; USNM 127255, 127256, same cruise, station 0002; USNM 127257, 127258, same cruise, station 0008; USNM 127490, 127493, 127494, from Deep Freeze I, USS *Edisto*, stations 5, 6, 8 combined.

DIAGNOSIS OF FEMALE.—Posterior rounded with narrow caudal process; length 1.60-1.78 mm.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: 1st joint of endopodite with 7 bristles, 2nd with 5.

Mandible: Dorsal margin of basale with 6 or 7 bristles.

Seventh limb: Each limb with 9-12 bristles; 2 or 3 pegs present opposing terminal comb.

Furca: Each limb with 10 or 11 claws.

Lateral eye: Small with 2 or 3 ommatidia.

DESCRIPTION OF FEMALE (Figures 147, 148, 150).—Carapace oval in lateral view with prominent rostrum and broad incisur (Figure 147); posterior rounded with narrow caudal process; anterior corner of rostrum rounded, inferior corner more acute and with minute protuberance at tip; anterior margin of rostrum straight (Figures 147, 148a-c).

Infold (Figure 148b,c): Infold broad along anterior and posterior parts of valve, narrow ventrally; infold on rostrum with 19 long bristles forming L-shaped row, some with faint marginal spines; 1 small bristle present on infold posterior to incisur; anteroventral part with 9 or 10 striae and 17 short bristles; no bristles observed on ventral infold except near posterior; posterior infold with inner row of about 21 minute bristles, middle row of about 9 short bristles, and outer row of about 8 somewhat stouter bristles just within posterior edge of valve.

Marginal pore canals: Numerous canals present along anterior ventral and posterior margins leading to minute bristles or pores along valve edge and to longer bristles on outer surfaces of valve near edge.

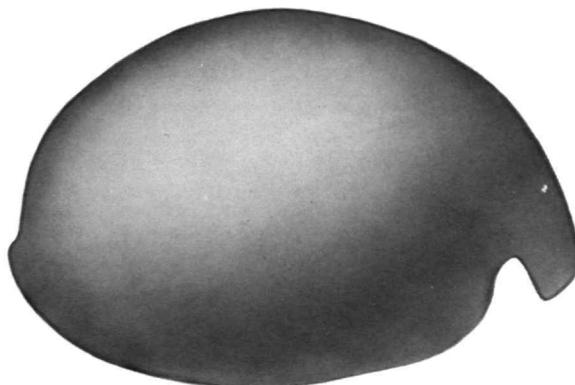


FIGURE 147.—*Philomedes heptathrix*, female, USNM 126224, complete specimen, length 1.62 mm.



FIGURE 148.—*Philomedes heptathrix*, female, USNM 126219, length 1.68 mm, carapace: *a*, complete specimen, lateral view. Left valve, medial view: *b*, anterior; *c*, posterior. Second antenna: *d*, endopodite. Right mandible: *e*, basale, exopodite and 1st endopodite joint, medial view. Right maxilla: *f*, 6-bristles, lateral view. Fifth limb: *g*, distal part of left limb, posterior view; *h*, tip of right limb, posterior view; *i*, outer margin of tip of left limb, anterior view; *j*, tip of left limb, anterior view. Right 6th limb: *k*, medial view (marginal spines not shown on all bristles). Seventh limb: *l*, tip. Furca: *m*, claw 1 of right lamella, lateral view. Anterior: *n*, proximal part of 1st antenna, left lateral eye, medial eye and rod-shaped organ, anterior process; *o*, anterior process and upper lip; *p*, detail of upper lip. Posterior: *q*, lateral view from left side. (Same magnification in microns: *b,c,k,n,o,q; d,e,m; f-j,l,p.*)

Selvae: Lamellar prolongation with marginal fringe present along anterior, ventral, and posterior margins; prolongation with typical segmentation along rostrum, incisur, and ventral margin; medial surface of prolongation below incisur and along anteroventral margin with long hairs in addition to marginal fringe.

Ornamentation: Carapace smooth but with faint reticulations; bristles present on anterior, ventral, and posterior margins and sparsely distributed on lateral surface.

Size (Figure 131): USNM 126219, gravid ♀, length 1.68 mm, height 1.19 mm; USNM 126221, length 1.73 mm, height 1.25 mm; USNM 127251, length 1.78 mm, height 1.28 mm; USNM 127255, length 1.78 mm, height 1.32 mm; USNM 127257 (right valve dimensions), length 1.78 mm, height 1.23 mm; USNM 127258, length 1.75 mm, height 1.26 mm; USNM 127490, length 1.60 mm, height 1.29 mm; USNM 127493, length 1.73 mm, height 1.36 mm.

First antenna: Spines forming clusters present on 1st, 2nd, medial surface on 3rd and 5th joints; 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral, all with wreaths of long spines proximally and faint short spines distally; 3rd joint with 3 bristles, 1 ventral, 2 dorsal; 4th joint with 5 bristles, 4 ventral, 1 dorsal; 5th to 8th joints normal for genus.

Second antenna (Figure 148d): Protopodite spinous along ventral and dorsal margins and on medial surface inward from margins. Endopodite 2-jointed: 1st joint with 7 bristles, 5 in proximal group, 2 in distal group; 2nd joint with 4 ventral bristles, 1 long with long proximal and short distal spines, 3 short with faint short marginal spines, and 1 recurved terminal bristle. Exopodite: bristles of joints 6 to 8 and 4 long bristles of joint 9 broken; bristles of joints 2 to 5 with spines forming row along middle of ventral margin and without natatory hairs; 9th joint with 7 bristles, 4 long, broken, bare, 3 short, unequal in length, with short marginal spines; small medial spine present on distal margin of 1st joint; joints 2 to 8 with several rows of short spines on medial surface and small basal spines.

Mandible (Figure 148e): Coxale endite spinous with bifurcate tip and small bristle near base. Basale: dorsal margin with 6 or 7 bristles; medial surface with 5 or 6 (usually 6) proximal bristles

near ventral margin, 2 or 3 (usually 3) stout pectinate, 3 slender; ventral margin with 3 (rarely 4) distal bristles; lateral surface with 5 slender bristles oriented venteriad. Exopodite about 80 percent length of dorsal margin of 1st endopodite joint, hirsute near pointed tip; both inner and outer bristle with short marginal spines. Endopodite: ventral margin of 1st joint with 4 terminal bristles; dorsal margin of 2nd joint with 3 bristles in proximal group and 5 or 6 in distal group; ventral margin with 3 bristles in proximal and distal groups; end joint with 3 claws and 4 bristles. All joints of mandible except end joint with clusters of surface spines. Number of dorsal and ventral bristles on mandibular basales of five specimens from type-locality is as follows:

<i>Specimen</i>	<i>Left mandible</i>		<i>Right mandible</i>	
	<i>dorsal</i>	<i>ventral</i>	<i>dorsal</i>	<i>ventral</i>
USNM 126219	7	3	7	3
USNM 126221	7	3	1	2
USNM 126222	7	3	7	3
USNM 127276	6	3	6	3
USNM 127490	6	3	6	3

Right mandible on USNM 126221: Mandibles of USNM 126219, USNM 126222, and left mandible of USNM 126221 same; right mandible of latter specimen with joint proportions normal but otherwise aberrant. Coxale endite consisting of single prong. Basale: dorsal margin with 1 bristle near middle, none terminally, proximal medial bristles not present; ventral margin with 2 distal bristles; lateral surface with 4 bristles oriented venteriad. Exopodite about 50 percent length of dorsal margin of 1st endopodite joint and with 1 bristle. Endopodite: 1st joint with 1 ventral bristle; dorsal margin of 2nd joint with 1 bristle; base of bristle proximal to middle; ventral margin with 2 bristles; 3rd joint with 4 bristles and 1 claw.

Maxilla (Figure 148f): Dorsal margin of precoxale and coxale with epipodial fringe; endite I with 10 bristles, endite II with 4, and endite III with 1 proximal and 10 distal bristles; anterior coxale bristle stout, spinous; anterior basale bristle short, bare; remaining 2 basale bristles long, spinous. Exopodite with 3 bristles: 1 short with short marginal spines; outer anterior bristle long with medium length marginal spines becoming progressively shorter distally on bristle; inner bristle long with wreaths of long spines proximally and short spines distally. Endopodite: anteromedial

surface of 1st joint spinous; α -bristle long with wreaths of marginal spines proximally, no short marginal spines observed distally; 5 β -bristles present, all except 1 with few stout marginal spines; end joint with 3 α -bristles 2 β -bristles, 3 γ -bristles and 3 δ -bristles; 1 β -bristle and 2 δ -bristles claw-like.

Fifth limb (Figure 148g-j): Epipodial appendage with about 54 bristles; 3 endites present of usual type for genus. Exopodite 1st joint: anterior side with 2 bristles in middle of distal margin and 1 stout and 2 small faint bristles near lateral corner; triangular protuberance in front of main tooth with proximal node on medial margin; 4 teeth of main tooth with secondary teeth along medial margin. Exopodite 2nd joint: large triangular tooth with 2 nodes on medial margin, distal node bifurcate consisting of blunt distal process and pointed proximal process; posterior side of lateral corner of triangular tooth with fairly large spinous bristle (in other members of subfamily this bristle, when present, is minute and bare); anterior side of joint with long stout proximal bristle (pectinate near tip), and usual group of 3 bristles distal to basis of stout bristle. Exopodite 3rd joint: medial lobe with 3 bristles, all dentate or spinose; lateral lobe with 2 bristles with long proximal and short distal spines. Fourth and 5th joints with surface hairs and 6 spinous bristles.

Sixth limb (Figure 148k): Epipodial appendage with 3 bristles with long proximal and short distal marginal spines; 1st endite with 2 or 3 bristles, 1 medial and 1 or 2 terminal; 2nd endite with 4 or 5 bristles, 1 medial, 3 or 4 terminal; 3rd endite with 8 or 9 bristles, 1 medial, 7 or 8 terminal; 4th endite with 8 or 9 bristles, 1 medial, 7 or 8 terminal; end joint with 23 bristles; all bristles on limb with marginal hairs or spines; long hairs present on medial and lateral surfaces of end joint. The distribution of bristles on endites of three specimens is listed below:

	<i>Endites</i>			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
USNM 126219				
left limb	2	4	9	8
right limb	3	4	9	9
USNM 127490				
left limb	3	5	8	9
right limb	fragment	4	8	9
USNM 127493				
left limb	3	4	8	9
right limb	3	4	9	9

Seventh limb (Figure 148l): Each limb with 9 to 12 bristles, 5 in distal group and 4 to 7 distributed along limb proximal to distal group; each bristle with 3-5 bells and distal marginal spines; end comb with 13 to 15 teeth, middle tooth longer than others and recurved; all teeth alate; 2 or 3 small blunt pegs present opposite comb. The number and distribution of bristles on six specimens are as follows (A and B are opposing limbs):

	<i>A</i>			<i>B</i>		
	<i>proxi- mal</i>	<i>distal</i>	<i>total</i>	<i>proxi- mal</i>	<i>distal</i>	<i>total</i>
USNM 126219	6	5	11	appendage lost		
USNM 126221	7	5	12	6	5	11
USNM 126222	4	5	9	6	5	11
USNM 127276	5	5	10	7	5	12
USNM 127490	5	5	10	5	5	10
USNM 127493	6	5	11	6	5	11

Furca (Figure 148m): Usual type for genus with all claws separated from lamella by suture and decreasing in length and stoutness proximally along lamella; each lamella with 10 or 11 claws; medial row of marginal teeth of claw 1 larger than lateral row and with larger teeth near middle; proximal 4 or 5 bristles with spines along both margins; long hairs present on lamellae at bases of distal 4 or 5 claws and following last claw.

Eyes and rod-shaped organ (Figure 148n): Lateral eye small with 2 or 3 ommatidia; medial eye large, pigmented, bare; rod-shaped organ elongated, 2-jointed, with rounded tip.

Upper lip (Figure 148o,p): Lip hirsute with several spines near tip; rounded process present between lip and base of 1st antenna.

Posterior (Figure 148q): Posterior margin and area hirsute.

Eggs: USNM 126219 and USNM 126221 with 4 eggs in marsupium; USNM 127493 with 16 eggs.

DESCRIPTION OF MALE (Figure 149).—Carapace more elongate than that of female; angle formed between inferior margin of rostrum and anterior margin of carapace below rostrum obtuse, not acute as on female; small protuberance present on anterior margin near inferior corner of rostrum.

Infold (Figure 149c): Infold broad along anterior and posterior parts of shell, narrow ventrally; infold on rostrum with 4 bristles along ventral margin, and 13 or 14 bristles paralleling anterior margin; 1 minute bristle present on infold below rostrum; about 12 bristles present in row on an-



FIGURE 149.—*Philomedes heptathrix*, male, USNM 126220, length 1.94 mm, carapace: *a*, lateral view of complete specimen showing position of lateral eye. Right valve: *b*, detail of rostrum and incisur, lateral view; *c*, same, medial view; *d*, detail of surface pores and hair, lateral view; *e*, posterior, lateral view. Appendages: *f*, endopodite of left 2nd antenna, medial view; *g*, basale, exopodite and 1st endopodite joint of right mandible, lateral view; *h*, left 6th limb, lateral view (marginal spines not shown on all bristles); *i*, tip of 7th limb; *j*, right copulatory limb and furca (claws of right lamella unstippled, claw of left lamella stippled); *k*, medial eye and rod-shaped organ, and proximal joints of right 1st antenna; *l*, right lateral eye, anterior to right; *m*, anterior showing medial eye, 1st joint of right 1st antenna, and upper lip; *n*, posterior of body, anterior to left. Male, USNM 126223, mandible: *o*, coxale, basale, exopodite and 1st endopodite joint right of limb, medial view; *p*, detail of coxale endite shown in "o"; *q*, coxale endite of left limb, medial view. Seventh limb: *r*, tip (bristles not shown). (Same magnification in microns: *c-f,h*; *j-o*; *g,i*.)

teroverventral infold; infold of caudal process with about 29 bristles forming row on or near list and 4 to 6 scattered bristles between list and posterior shell margin; 4 or 5 bristles present along posterior margin of infold of caudal process.

Selvage: Similar to that on female.

Ornamentation: Unlike female carapace, that of male strongly punctate; faint reticulations visible in transmitted light, especially on caudal process; bristles present along anterior, ventral, posterior margins, and scattered over valve surface.

Size (Figure 131): USNM 126220, length 1.94 mm, height 1.08 mm; USNM 126223, length 2.03 mm, height 1.19 mm; USNM 127258, length 1.75 mm, height 1.26 mm; USNM 127494, length 2.07 mm, height 1.16 mm.

First antenna: 1st joint bare; 2nd joint with spines forming clusters on medial surface and along ventral margin, and with 3 bristles: ventral bristle with long proximal and short distal spines; dorsal bristle with short marginal spines, lateral bristle reaching middle of 3rd joint. Third joint short, with 3 bristles, 1 ventral, 2 dorsal, and short spines forming clusters on medial surface; 4th joint with clusters of spines forming clusters on medial surface and 5 bristles, 4 ventral, 1 dorsal; sensory bristle of 5th joint with numerous filaments on broadened proximal part and 5 filaments forming tip; 6th joint with spinous medial bristle and few small spines forming clusters on medial surface. Seventh joint: a-bristle short spinous; b-bristle with 3 proximal and 4 terminal filaments; c-bristle very long with 13 marginal filaments (tip of bristle broken). Eighth joint: d- and e-bristle bare, similar in length, longer than b-bristle; f-bristle very long with 11 marginal filaments; g-bristle with 3 proximal and 4 terminal filaments.

Second antenna (Figure 149f): Protopodite bare. Endopodite 3-jointed: 1st joint with 5 proximal bristles and 1 distal bristle; 2nd joint elongate with 3 ventral bristles near middle, proximal bristle more slender than remaining bristles; 3rd joint elongate, reflexed on 2nd joint, with 1 proximal bristle and 2 short subterminal bristles. Exopodite: 1st joint with short medial spine; bristle on 2nd joint with 8 ventral spines near middle; 9th joint with 4 long and 2 short bristles; bristles of joints 3 to 9 with natatory hairs; joints 2 to 8 with comb of short spines along distal margin; joints 3 to 8 with small basal spine.

Mandible (Figure 149g,o-q): Coxale endite small with small adjacent bristle. Basale: medial surface with 5 or 6 short proximal bristles near ventral margin (2 pectinate, 3 or 4 spinous); proximal lateral surface and ventral margin with 4 spinous bristles; distal ventral margin with 2 or 3 (usually 3) spinous bristles; dorsal margin with 3 or 4 (usually 4) short bristles near middle and 2 terminal. Exopodite about 57 percent length of dorsal margin of 1st exopodite joint, with 2 terminal bristles, both with short marginal spines. Endopodite: 1st joint with 3 or 4 (usually 4) spinous ventral bristles; dorsal margin of 2nd joint with spinous bristles in 2 groups, proximal group with 3 bristles, distal group near middle of margin with 6 bristles; ventral margin with spinous bristles in 2 groups, each with 3 bristles; end joint with 3 claws and 4 bristles, all claws with minute teeth along ventral margins, medial and lateral claws also with teeth along middle of dorsal margin, lateral claw longer than medial claw, medial claw longer than dorsal claw. Medial surfaces of basale and 1st and 2nd joints of endopodite with spines forming clusters.

Maxilla and 5th limb: Both appendages reduced, epipodial appendage of 5th limb with 47 bristles.

Sixth limb (Figure 149h): 1st and 2nd endites with 3 spinous bristles; 3rd and 4th endites with 1 proximal and 8 terminal bristles; end joint with 16 bristles, 7 plumose, remaining with long proximal and short distal spines; 3 short bristles present in place of epipodial appendage; short spines forming clusters present on lateral surface of end joint, long hairs on medial surface.

Seventh limb (Figure 149i): 5 to 7 bristles in proximal group; 5 bristles in distal group; each bristle with 3 or 4 bells, some bristles with faint marginal spines distally; terminal comb with 9 to 11 alate teeth, middle tooth longer than others and curved; 2 small pegs present opposite comb.

Furca (Figure 149j): Each lamella with 9 or 10 claws decreasing in length posteriorly along lamella; all claws separated from lamella by sutures; hairs present at bases of claws 1 to 5 and following last claw.

Eyes and rod-shaped organ (Figure 149k-m): Lateral eyes large with about 23 ommatidia. Medial eye only slightly smaller than lateral eye, pigmented. Rod-shaped organ 2-jointed with rounded tip.

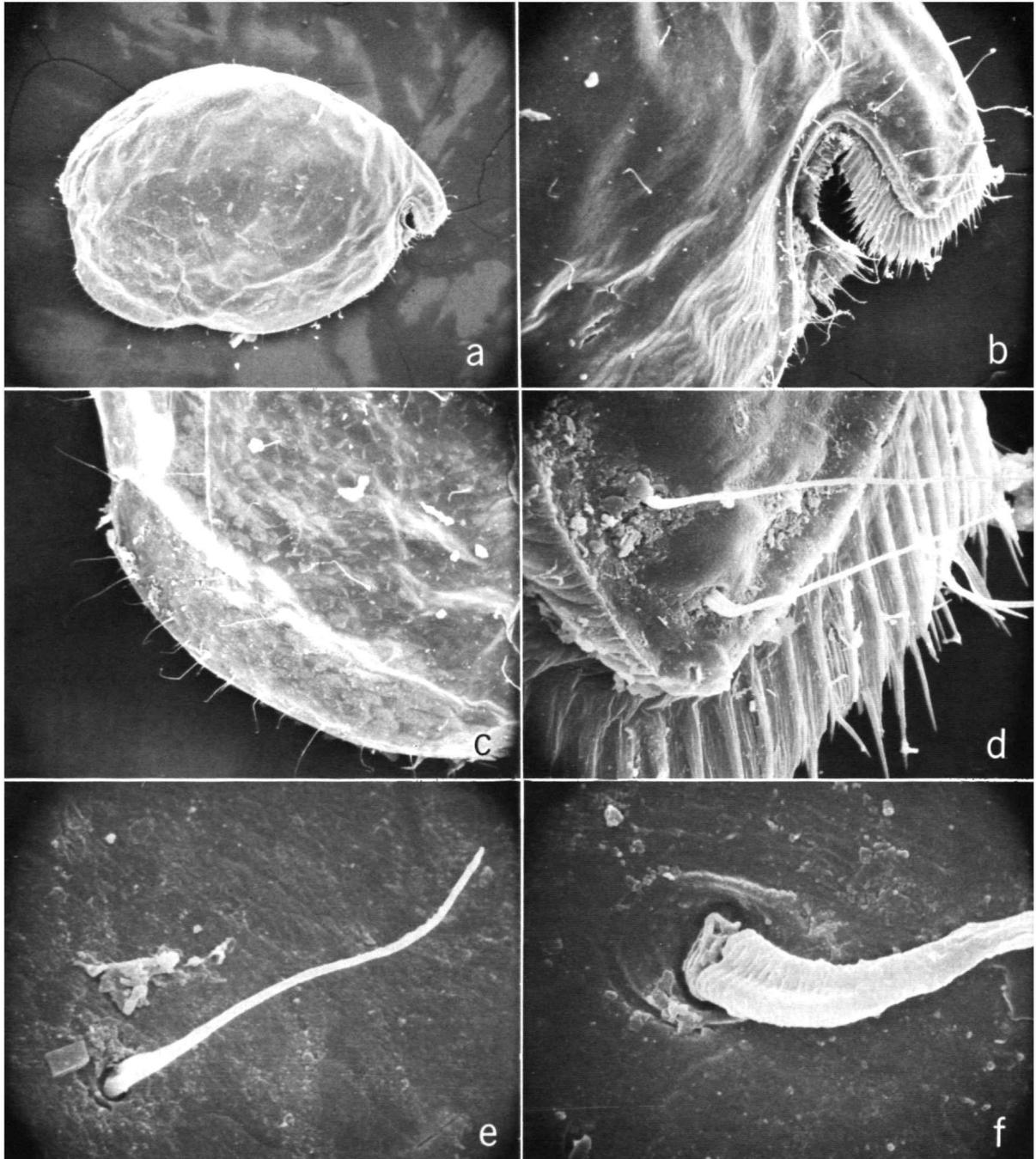


FIGURE 150.—*Philomedes heptathrix*, female, USNM 127490: *a*, $\times 51$ (posterior distorted—see Figure 147 for normal outline); *b*, anterior, $\times 200$; *c*, caudal process, $\times 200$; *d*, rostrum, $\times 1000$; *e*, hair, $\times 2000$; *f*, pore with hair, $\times 5000$.

Upper lip (Figure 149l): Lip elongate anteriorly with faint spines at tip.

Copulatory organ (Figure 149j): Elongate reaching to base of 1st claw of furca.

Posterior: Posterior margin hirsute (Figure 149n).

SEXUAL DIMORPHISM.—In addition to usual differences, 1st joint of endopodite of 2nd antenna of male has 6 bristles compared to 7 on female, dorsal margin of the mandibular basale of male bears only 5 or 6 (usually 6) compared to 6 or 7 (usually 7) on that of the female, and end joint of 6th limb bears 16 bristles compared to 23 on female.

Community structure: The sample from station 0009 contained 50 adult males, 57 adult females, and 481 juveniles. Four eggs were present in 2 of the adult females; remaining females were without eggs. Many adult females were observed with broken bristles on the exopodites of their 2nd antennae.

COMPARISONS.—This species is closely related to a specimen from McMurdo sound designated by Kornicker (1971) as *Philomedes* species A. That specimen is slightly larger than those from the Weddell Sea. Despite this and other minor differences *Philomedes* species A is placed herein in the synonymy of *P. heptathrix*, but with a question mark. The large number of bristles on both the endopodite of the 2nd antenna and the dorsal margin of the mandibular basale, combined with the presence of only 2 or 3 terminal pegs opposite the comb on the 7th limb, permits easy separation of *P. heptathrix* from previously described species of *Philomedes*.

DISTRIBUTION.—This species was collected only in the Weddell Sea and in the vicinity of the Ross Sea, primarily at shelf depths (Figure 135).

38. *Philomedes tetrathrix*, new species

FIGURES 151–156

HOLOTYPE.—USNM 127264, gravid ♀, length 2.70 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 7, station 480, Atlantic Quadrangle, Antarctic Ocean.

ETYMOLOGY.—The specific name “tetrathrix” from the Greek “tetra” [= four] and “thrix” [= hair] refers to the four bristles on the 2nd

joint of the endopodite of the female 2nd antenna.

PARATYPES.—USNM 127265, juvenile ♀, length 2.48 mm, height 1.47 mm; USNM 127269, 31 juveniles. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 128506, juvenile ♀, length 2.19 mm, height 1.37 mm; USNM 128507, N-1 ♂, USNM 128612, adult ♀; USNM 128613, 2 juveniles; USNM 135048a, 1 N-1 ♂; USNM 135048b 1 N-2 ♂, length 1.63 mm, height 0.90 mm; USNM 136090, gravid ♀; USNM 138147, 1 adult ♀; USNM 138148, 10 adult ♀♀ without eggs + 15 juveniles; USNM 138152, 1 adult ♀, length only 2.68 mm; USNM 138030, 1 juvenile. USNM 128506, 128507 from *Eltanin* Cruise 5, station 216; USNM 128612, 128613 from *Vema* Cruise 14, station V-14-25; USNM 135048a, 135048b, from *Vema* Cruise 17, station V-17-8A; USNM 136090 from *Vema* Cruise 18, station V-18-27; USNM 138147, 138148 from *Eltanin* Cruise 7, station 475; USNM 138030 from *Eltanin* Cruise 5, station 216.

DIAGNOSIS OF FEMALE.—Carapace with truncate posterior; length 1.92–2.78 mm (generally 2.61–2.78 mm).

First antenna: 2nd joint without ventral bristle, but with 1 or 2 dorsal bristles and 1 lateral bristle.

Second antenna: 2nd endopodial joint with 4 bristles.

Mandible: Dorsal margin of basale with 5 bristles.

Seventh limb: Each limb with 26–33 bristles; 2 or 3 pegs present opposite comb.

Furca: Each lamella with 10 claws.

DESCRIPTION OF FEMALE (Figures 151, 152,

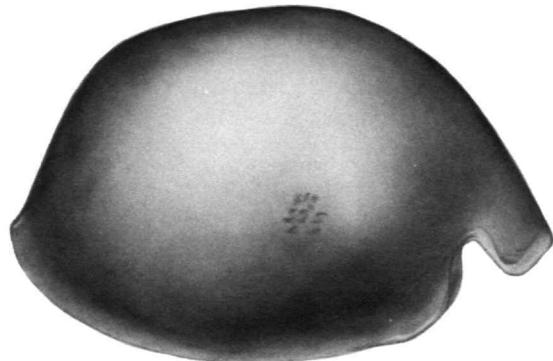


FIGURE 151.—*Philomedes tetrathrix*, female, USNM 138147, complete specimen, length 2.78 mm,

153a-g, 154-156).—Carapace with prominent rostrum, broad incisur and truncate posterior; anterior corner of rostrum slightly rounded, inferior corner well rounded (Figures 151, 152a-d, 154).

Ornamentation: Carapace smooth with bristles along anterior, ventral, and posterior margins, and sparsely distributed on lateral surface; faint reticulate structure visible in transmitted light.



FIGURE 152.—*Philomedes tetratrix*, female, USNM 127264, length 2.70 mm, carapace: a, complete specimen, lateral view. Medial view of right valve: b, rostrum and incisur; c, caudal process; d, anteroventral infold. Appendages: e, right 2nd antenna, protopodite with attached protistans, endopodite and 1st exopodite joint, medial view; f, basale, exopodite and 1st endopodite joint of left mandible, medial view; g, left maxilla, lateral view (not all bristles shown); h, right maxilla, medial view (not all bristles shown); i, tip of left 5th limb, anterior view. (Same magnification in microns: b,f,h.)

Infold (Figure 152b-d): Infold broad along anterior and posterior parts of shell and narrow ventrally; infold on rostrum with 25–29 bristles, some double and hirsute; 1 minute bristle present on infold posterior to incisur; anteroventral part of infold with about 15 striae and 16 to 18 bristles; no bristles present along middle part of ventral infold; posteroventral and posterior infold with numerous small bristles along raised list (about 80 bristles, many forming groups of 3); 4 to 7 scattered bristles present between list and posterior edge of shell; 5 or 6 bristles present on infold just within posterior edge of caudal process.

Selvage: Lamellar prolongation with marginal fringe present along anterior, ventral, and pos-

terior margins; prolongation with typical segmentation present along rostrum and incisur; long bristles with bases on lateral side of prolongation present on prolongation below incisur.

Size (Figure 131): USNM 127264, gravid ♀, length 2.70 mm, height 1.87 mm; USNM 128612, length 2.61 mm, height 1.77 mm; USNM 136090, length 1.92 mm, height 1.14 mm; USNM 138147, length 2.78 mm, height 1.86 mm.

First antenna: 1st joint with spines forming clusters on lateral and medial surfaces; 2nd joint with numerous clusters of spines and 2 or 3 spinous bristles, 1 or 2 dorsal, 1 lateral; 3rd joint short with 3 spinous bristles, 2 dorsal, 1 ventral; 4th joint with 1 spinous dorsal bristle and 4 ven-

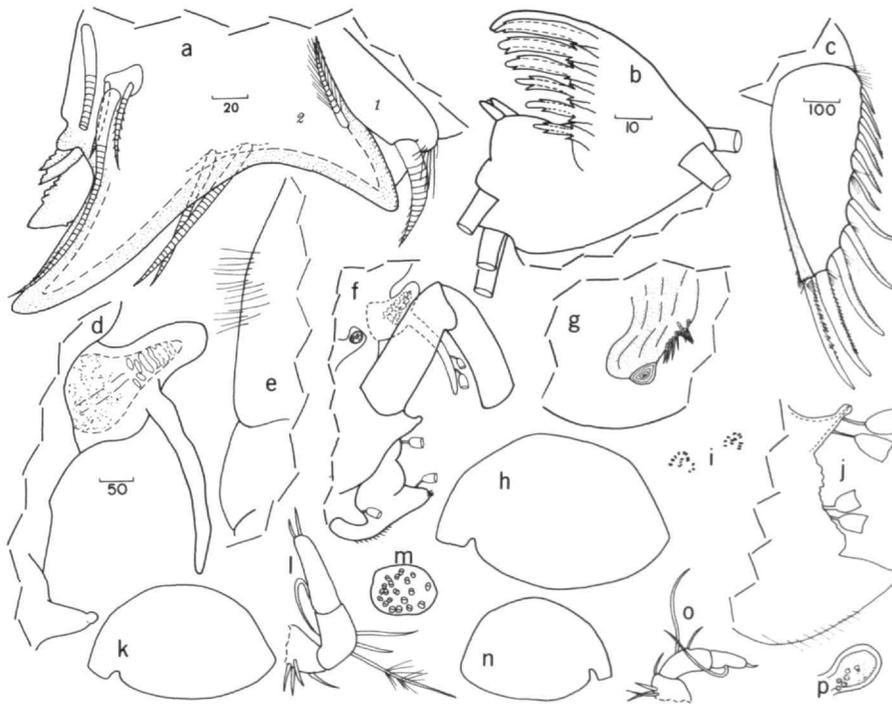


FIGURE 153.—*Philomedes tetratrix*, female, USNM 127264: a, tip of right 5th limb, posterior view; b, tip of 7th limb; c, furca, lateral view (only claw 1 of right lamella illustrated); d, anterior showing medial eye and rod-shaped organ, and anterior process; e, posterior, anterior to right; f, anterior showing lateral eye, medial eye and rod-shaped organ, proximal part of right 1st antenna (bristles not shown), anterior process, upper lip (note attached protistans); g, brushlike organ and genitalia. Juvenile female, USNM 127265, length 2.19 mm: h, complete specimen, lateral view; i, central muscle scars on left and right valve, lateral view; j, anterior showing anterior process and upper lip and attached protistans. N-1 male, USNM 128507, length 2.01 mm: k, complete specimen, lateral view; l, endopodite of left 2nd antenna, medial view; m, lateral eye. N-2 male, USNM 135048b, length 1.63 mm; n, complete specimen, lateral view; o, endopodite of 2nd antenna; p, left lateral eye. (Same magnification in microns: c,f; d,e,g,j,l-p.)

tral bristles, 3 long stout, 1 shorter and slender, surface of joint without spines; 5th joint with few spines forming clusters on surface; sensory bristle of 5th joint with 3 marginal filaments and tip consisting of 5 long filaments; medial bristle of 6th joint one-half to three-fourths the length of sensory bristle of 5th joint. Seventh joint: a-bristle spinous about two-thirds length of sensory bristle, b-bristle with 1 proximal and 3 terminal filaments; c-bristle with 4 proximal and 5 terminal filaments. Eighth joint: d- and e-bristles long bare, slightly shorter than sensory bristle of 5th joint; f-bristle with 4 proximal and 5 terminal filaments; g-bristle with about 3 proximal and 5 terminal filaments.

Second antenna (Figures 152e, 155): Protopodite with abundant long slender hairs along dorsal margin and short spines forming clusters on dorsal part of medial surface; few spines also present on ventral margin. Endopodite 2-jointed: 1st joint with 6 bristles, 5 proximal, 1 distal; 2nd joint with 1 long and 2 short spinous ventral bristles and 1 long recurved bare terminal filament. Exopodite: 1st joint with short medial spine; bristle of 2nd joint reaching beyond 9th joint and with 6 ventral spines near middle; bristles of joints 3 to 5 unbroken, with few ventral spines near middle and without natatory hairs; bristles of joints 6 to 8 and 4 long bristles of 9th joint broken; 9th joint with 4 long, 1 medium, 2 short bristles, medium and short bristles with slender marginal spines; distal margins of joints 2-8 with comb of short spines; spines forming clusters present on medial surfaces of joints 2 to 6; small basal spines present on joints 2 to 8, spine on 8th joint about three-fourths length of 9th joint.

Mandible (Figure 152f): Coxale with spines forming clusters on surface; endite spinous, pectinate, with bifurcate tip; short slender bristle present near base of endite. Basale: medial surface with 6 short proximal bristles, 3 stout pectinate, 3 slender spinous; lateral surface with 5 short spinous bristles forming row near ventral margin; ventral margin with 2 or 3 medium, spinous, distal bristles; dorsal margin with 5 long spinous bristles, 1 near middle, 2 distal to middle and 2 terminal; lateral and medial surfaces of joint with numerous spines forming clusters. Exopodite three-fourths length of dorsal margin of 1st endopodite joint, with 2 terminal bristles (inner bristle slightly

longer than outer bristle, both with marginal spines). Endopodite: 1st joint with 4 spinous ventral bristles, and few short terminal spines on dorsal corner; medial and lateral surfaces of 2nd joint with spines forming clusters; dorsal margin with spinous bristles in 2 groups, proximal group with 2 or 3 bristles, distal group with 6; ventral margin with 2 groups of spinous bristles, each with 3 bristles; end joint with 3 claws and 4 spinous bristles, dorsal short claw bare, other 2 with few small teeth along middle of ventral margin.

Maxilla (Figure 152g): Precoxale and coxale with fringe of hairs along anterior margin; 1st endite with 10 spinous bristles; 2nd endite with about 6 bristles; 3rd endite with about 8 terminal bristles and 2 slender proximal bristles on lateral side of coxale; coxale with stout plumose bristle; exopodite with 1 short proximal bristle and 2 long terminal bristles; distal margin of basale with 3 long bristles (inner bristle spinous, 2 outer bristles with few short spines and with bases close together on medial surface near anterior margin). Endopodite: 1st joint divided by faint suture into 2 parts; 1 long spinous medial bristle present on distal margin of proximal part; anterior margin of 1st joint with long hairs and 1 spinous a-bristle; distal margin with 4 b-bristles, bare or with few spines; end joint with 3 bare a-bristles, 2 b-bristles (anterior b-bristles spinous, inner bristle clawlike, pectinate), 3 bare c-bristles, 3 pectinate d-bristles (2 anterior d-bristles clawlike).

Fifth limb (Figures 152i, 153a): Epipodial appendage with 54 to 67 bristles; 1st endite with 7 bristles; 2nd endite with about 9 bristles; 3rd endite with about 8 bristles. Endopodite: anterior distal margin of 1st joint with 2 bristles near middle; protuberance in front of main tooth consisting of 2 teeth, proximal tooth about half length of distal tooth; main tooth consisting of 3 pectinate teeth followed by a smooth spine and 1 spinous bristle; large triangular tooth of 2nd joint with 1 or 2 nodes on inner margin; outer margin of tooth faintly serrate; posterior surface of joint with usual group of 3 bristles, all with spines, 1 spinous c-bristle, and 1 small spinous bristle near outer corner of large tooth; inner lobe of 3rd joint with 3 spinous bristles, outer lobe with 2; 4th + 5th joints hirsute with 6 spinous bristles.

Sixth limb: 3 short spinous bristles present in place of epipodial appendage; 1st endite with 3

spinous bristles (1 long terminal, 2 short medial); 2nd endite with 4 spinous bristles (3 long terminal, 1 short proximal and medial); 3rd endite with 9 or 10 spinous bristles (8 or 9 long terminal, 1 short proximal and medial); 4th endite with 9 spinous bristles (8 long terminal, 1 short proximal and medial); end joint with 27 to 30 bristles of which posterior 7 to 9 (or more) are plumose, others spinous; both surfaces of limb with long hairs forming clusters.

Seventh limb (Figures 153b, 156): Limb with 26–33 bristles (1 small specimen from *Vema* station V-17-27 with 19–21 bristles), 5 in distal group (3 + 2), 21–28 in proximal group, each bristle with 5 to 8 bells, some bristles with few marginal

spines distally; terminal comb with 10–13 alate teeth; 2 or 3 fairly long, tapering, closely spaced pegs present opposite comb.

Furca (Figure 153c): Each lamella with 10 claws; claws 1 to 4 primary, claws 5 to 10 secondary; hairs present medially at bases of claws and following last claw.

Eyes and rod-shaped organ (Figure 153d,f): Lateral eyes small with 2 or 3 ommatidia. Medial eye large, pigmented. Rod-shaped organ elongate, 1-jointed with rounded tip.

Upper lip (Figure 153f): Lip hirsute ventrally with several spines on anterior tip.

Brushlike organ (Figure 153g): Organ consisting of about 8 minute bristles above genitalia.

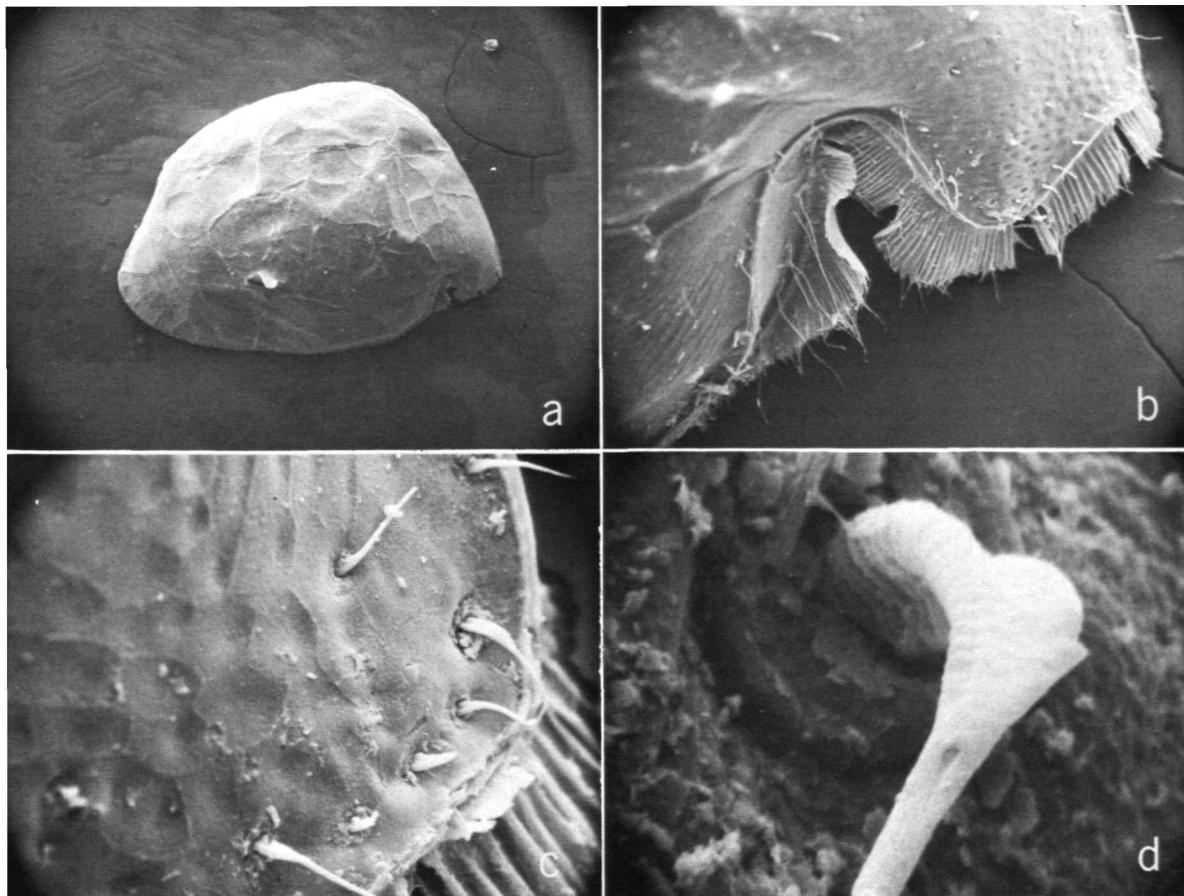


FIGURE 154.—*Philomedes tetratrix*, female, USNM 127264: a, right valve, $\times 27.5$; b, rostrum and incisor, $\times 150$; c, anterior corner of rostrum, $\times 750$; d, detail of base of bristle, $\times 6875$.

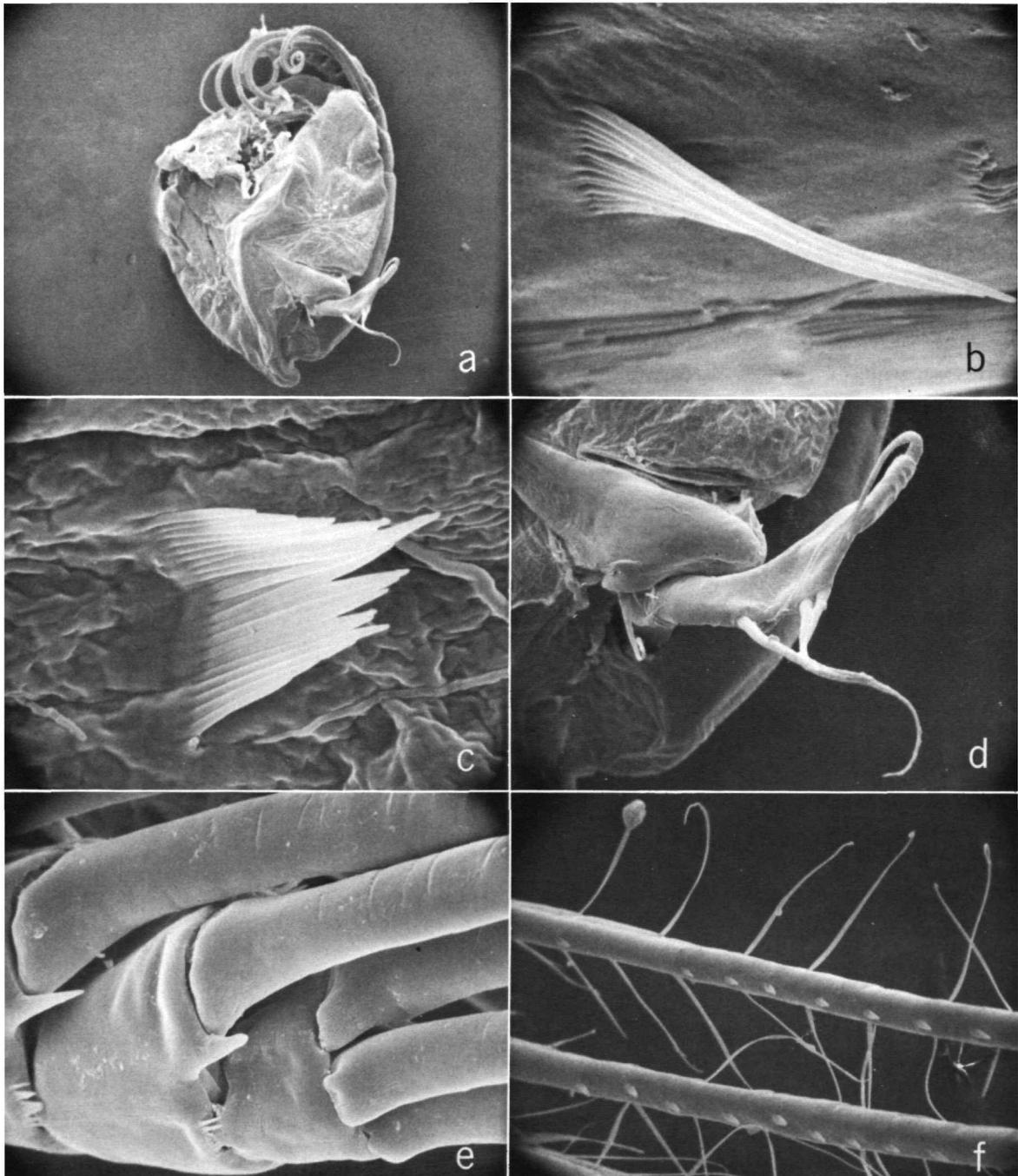


FIGURE 155.—*Philomedes tetratrix*, female, USNM 138147, 2nd antenna: *a*, medial view, $\times 85$; *b*, long spines on dorsal margin of protopodite, $\times 5000$; *c*, spines on medial surface of protopodite, $\times 5000$; *d*, endopodite, $\times 280$; *e*, distal 2 joints of exopodite, $\times 900$; *f*, detail of bristles on exopodite, $\times 1000$.

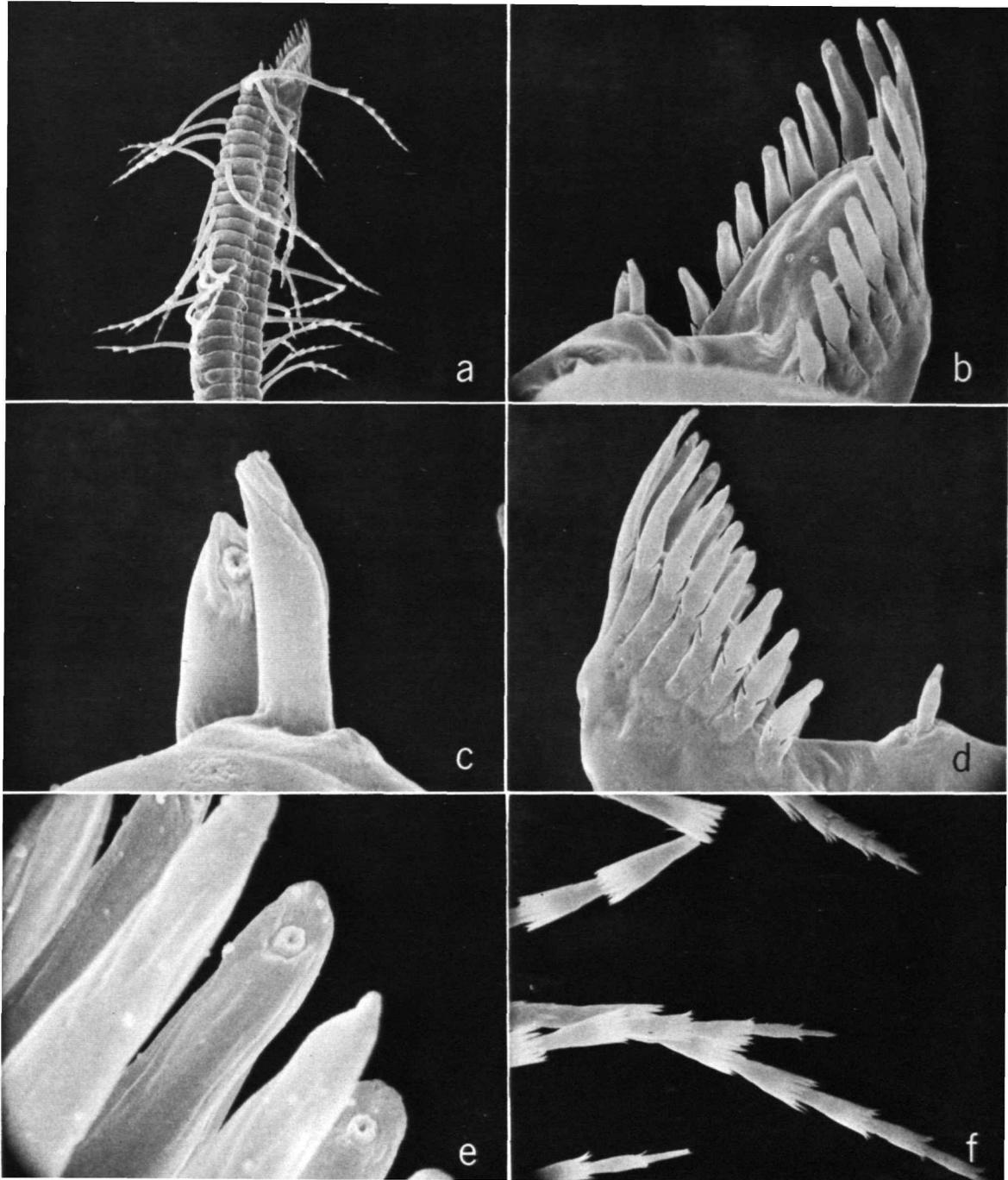


FIGURE 156.—*Philomedes tetrathrix*, female, USNM 137147, 7th limb: *a*, tip of limb bearing bristles, $\times 170$; *b*, detail of tip, $\times 1000$; *c*, detail of pegs in "b" (note pores), $\times 5000$; *d*, tip in profile, $\times 1000$; *e*, detail of tips of teeth in "d" (note pores), $\times 5000$; *f*, bristles, $\times 1000$.

Posterior of body (Figure 153e): Long hairs present near middle of posterior margin.

Anterior of body (Figure 153f): Single large triangular process present on anterior above upper lip.

Eggs: 6 eggs present in brood chamber of USNM 127264; USNM 128612 with 8 eggs.

Parasites: Cuplike stemmed protists abundant on appendages. Clusters of ovoid protists on USNM 128506.

DESCRIPTION OF N-1 MALE (Figure 153k-m).—Carapace shape similar to that of adult female (Figure 153k). Size: USNM 128507, length 2.01 mm, height 1.19 mm; USNM 135048a, length 1.97 mm, height 1.32 mm.

Second antenna (Figure 153l): Endopodite 3-jointed: 1st joint with 4 bristles, 2nd joint elongate with 3 ventral bristles; 4th joint elongate with 1 long proximal bristle and 2 short terminal bristles.

Mandible: Dorsal margin of basale with 5 bristles.

Seventh limb: Well developed.

Lateral eye: Well developed with about 20 small ommatidia (Figure 153m).

Parasites: Cuplike stemmed protists on appendages.

DESCRIPTION OF N-2 MALE (USNM 135048b) (Figure 153n-p).—Carapace similar in shape to N-1 male except caudal process more rounded (Figure 153n). Size: 1.63 mm, height 0.90 mm.

Second antenna (Figure 153o): Endopodite 3-jointed: 1st joint with 4 bristles; 2nd joint elongate with 2 ventral bristles; 3rd joint elongate with 1 long proximal bristle and 1 short terminal process.

Mandible: Dorsal margin of basale with 5 bristles.

Seventh limb: Well developed.

Lateral eye: Well developed with many minute indistinct ommatidia (Figure 153p).

Parasites: Cuplike stemmed protists abundant on appendages.

DISCUSSION OF SPECIMEN (USNM 136090) FROM *Vema* STATION V-18-27.—A single gravid female of the species in this sample differed from specimens from elsewhere in being smaller (length 1.92 mm, height 1.14 mm) and in having fewer bristles on the 7th limb (19 to 21 with 5 distal and 14 to 16 proximal).

COMPARISONS.—The absence of a ventral bristle

on the 2nd joint of the 1st antenna, and the presence of 4 bristles on the 2nd joint of the endopodite of the 2nd antenna, 5 bristles on the dorsal margin of the mandibular basale, and the abundance of bristles on the 7th limb, which bears 2 or 3 pegs, distinguishes this species from those previously described.

DISTRIBUTION.—This species was collected only in the American Quadrant in Antarctic, Subantarctic, and Subantarctic-to-35°S regions at depths of 566 to 3382 m (Figure 132).

39. *Philomedes subantarctica*, new species

FIGURES 157-163

HOLOTYPE.—USNM 127977, gravid ♀, length 2.70 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 6, station 340, Subantarctic.

PARATYPES.—USNM 127978, adult ♀; USNM 128040, 128041, 2 adult ♂♂; USNM 128042, 7 juveniles, all from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 137376, gravid ♀; USNM 137377, 1 gravid ♀, 2 adult ♀♀, 4 juveniles; USNM 137383, adult ♀; USNM 137384, 1 juvenile. USNM 137376, 137377 from *Vema* Cruise 14, station V-14-2; USNM 137383, 137384 from *Vema* Cruise 18, V-18-12. USNM 138034, 1 adult ♀ with distorted carapace, length about 2.93 mm, height about 1.72 mm, + 1 juvenile, both from *Eltanin* Cruise 6, station 354.

DIAGNOSIS OF FEMALE.—Posterior with small caudal process; length 2.60-2.70 mm; surface with abundant short stout hairs.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: 1st endopodial joint with 8 or 9 bristles, 2nd with 5.

Mandible: Dorsal margin of basale with 5 or 6 bristles.

Sixth limb: Each limb with about 42 bristles on end joint.

Seventh limb: Each limb with 27 or 28 bristles; terminus with about 11 short pegs opposite comb (pegs arranged in circle with slightly longer peg in middle).

Furca: Each lamella with 10 or 11 claws.

DESCRIPTION OF FEMALE (Figures 157-161).—Car-

apace with prominent rostrum, broad incisur and small caudal process; ventral margin more rounded than dorsal margin; anterior and inferior corners of rostrum evenly rounded; anterior margin of rostrum straight with small protuberance at lower end (Figures 157, 158a-i, 160).

Ornamentation: Carapace smooth but with minute pores visible under high magnification; short stout hairs abundant; few long hairs with broad base scattered over valve surface and along ventral margin.

Infold (Figure 158c,e,g-i): Infold broad along anterior, ventral, and lower part of posterior margins; infold on rostrum with 26 or 27 bifurcate, spinous bristles; 1 small bristle present on infold posterior to incisur; anteroventral part with 11 striae and 17 spinous double bristles; infold along ventral margin bare; ridge paralleling inner margin of posteroventral and posterior infold with about 57 bristles in groups of 1 to 5 bristles; "pocket" present in infold of caudal process; anterior margin of "pocket" with 9 to 12 short bare bristles; posterior margin of "pocket" with 5 or 6 short bare bristles along upper half; 4 or 5 short bristles present on posteroventral infold between its outer margin and ridge with 57 bristles.

Selvage: Lamellar prolongation striate, fringed, with additional long hairs with bases at middle of lateral side of anteroventral prolongation.

Size (Figure 131): USNM 127977, length 2.70 mm, height 1.88 mm; USNM 127978, length 2.63 mm, height 2.02 mm; USNM 137376, length 2.60

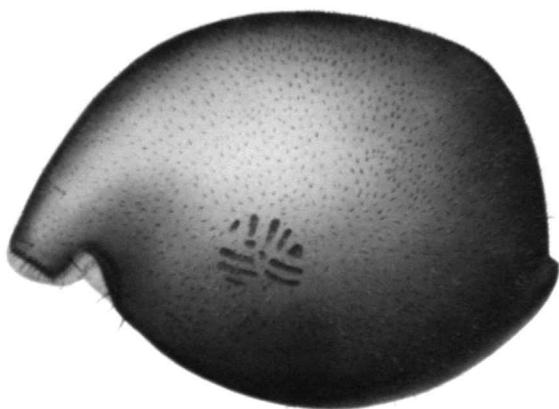


FIGURE 157.—*Philomedes subantarctica*, female, USNM 127978, complete specimen, length 2.63 mm.

mm, height 1.88 mm; USNM 137383, length 2.68 mm, height 1.88 mm.

First antenna: 1st joint with spines forming clusters on lateral surface near distodorsal corner, and on medial surface near distoventral corner; 2nd joint with spines along dorsal margin and on lateral surface near distodorsal corner and with 3 spinous bristles, 1 ventral, 1 dorsal, 1 lateral; 3rd joint with 3 terminal bristles, 1 spinous ventral, 2 dorsal (1 short bare, 1 longer spinous); 4th joint with 5 terminal spinous bristles, 4 ventral, 1 dorsal; sensory bristle of 5th joint with 5 short proximal filaments and 3 longer terminal filaments not including stem; medial bristle of 6th joint with long proximal and short distal marginal spines. Seventh joint: a-bristle similar to bristle of 6th joint but slightly longer; b-bristle proximal part obscure, distal part with 3 long filaments excluding tip; c-bristle with 4 short proximal filaments and 3 terminal filaments excluding stem. Eighth joint: d- and e-bristles bare; f-bristle with 3 proximal and 3 terminal filaments excluding stem; g-bristle with 3 proximal and 4 terminal filaments excluding stem; filaments of all bristles bare.

Second antenna (Figure 158j-l): Protopodite bare. Endopodite 2-jointed: 1st joint with 8 or 9 bare bristles forming 2 groups, proximal group with 5 or 6 bristles, distal group with 2 to 4; 2nd joint with 4 ventral bristles with wreaths of long spines and 1 recurved bare terminal bristle. Exopodite: 1st joint with small distomedial spine; bristles of 2nd to 9th joints bare; bristles on 6th to 8th joints broken; joints 3 to 8 with small basal spines; distal margins of joints 2 to 8 with short spines forming row; joint 9 with 7 bristles, 5 long broken, 2 shorter bare.

Mandible (Figure 158m): Coxale endite spinous with bifurcate tip and small bristle near base. Basale: dorsal margin with 5 or 6 bristles, 3 or 4 near middle, 2 terminal, all with wreaths of long spines; medial surface with 6 proximal bristles near ventral margin, 3 stout pectinate, 3 slender with wreaths of long spines; ventral margin with 3 or 4 distal long bristles with wreaths of long proximal spines and short distal spines; lateral surface with 7 to 9 bristles oriented venteriad, these form row approaching ventral margin proximally (the proximal bristle being on, or very close to, ventral margin). Exopodite about 80 percent



FIGURE 158.—*Philomedes subantarctica*, female, USNM 127977, length 2.70 mm, carapace: *a*, complete specimen, lateral view. Left valve: *b*, sketch of central muscle scars, lateral view; *c*, anterior, medial view; *d*, bristle on ventral margin of exterior surface; *e*, posterior medial view showing long bristles and representative short bristles on exterior surface; *f*, detail of exterior surface, medial view showing small bristles; *g*, caudal process, medial view; *h*, protistans on inner end on incisur, medial view. Right valve: *i*, caudal process, medial view. Second antenna: *j*, left endopodite, lateral view; *k*, right endopodite, medial view; *l*, joints 6–8 of right exopodite, lateral view. Left mandible: *m*, Basale and 1st endopodite joint, lateral view. Right maxilla: *n*, b- and d-claws on end joint. (Same magnification in microns: *c,e*; *f,h-j,l*; *g,k,m*.)

length of dorsal margin of 1st endopodite joint, hirsute near pointed tip, outer bristle with short marginal spines, inner longer bristle with proximal wreaths of long spines and distal short spines (exopodite of right mandible of USNM 127977 aber-

rant with 3 bristles, all with proximal wreaths of long spines and short distal spines). Endopodite: ventral margin of 1st joint with 4 terminal bristles, 2 long, 2 short; dorsal margin of 2nd joint with 5 or 6 bristles in proximal group and 6 in distal

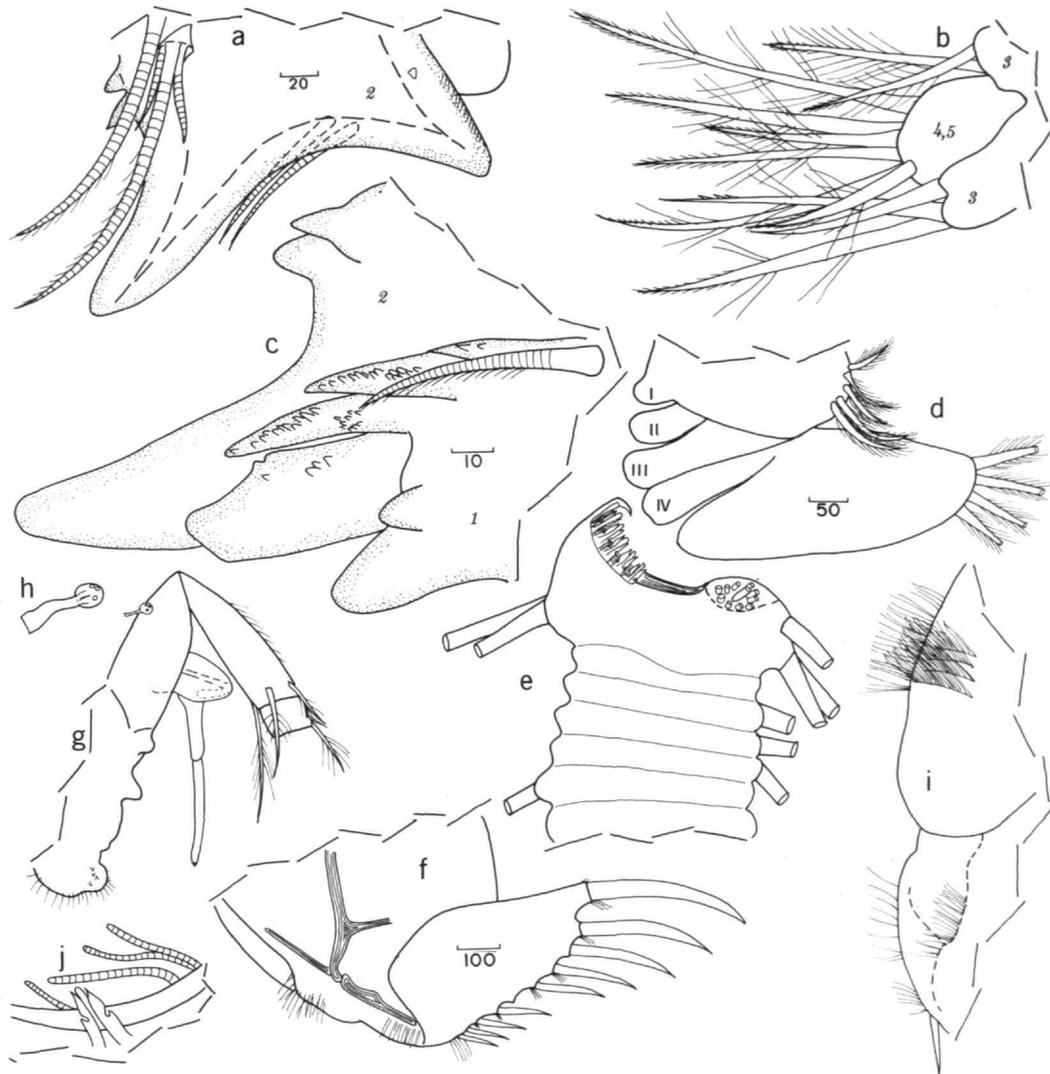


FIGURE 159.—*Philomedes subantarctica*, female, USNM 127977, fifth limb: *a*, 2nd exopodial joint on right limb, posterior view; *b*, exopodial joints 3-5 on left limb, anterior view; *c*, parts of exopodial joints 1 and 2 on left limb, anterior view. Sixth limb: *d*, right limb, medial view (not all bristles shown). Seventh limb: *e*, tip of limb. Furca: *f*, right lamella (teeth on claws not shown). Anterior: *g*, joints 1 and 2 of 1st antenna, medial eye and rod-shaped organ, right lateral eye, anterior process, upper lip; *h*, detail of lateral eye shown in "g." Posterior: *i*, right lateral view showing posterior claw of furca and posterior hairs. Protistans: *j*, segmented filaments attached to tip of 7th limb. (Same magnification in microns: *a,b,e; h,g,i*.)

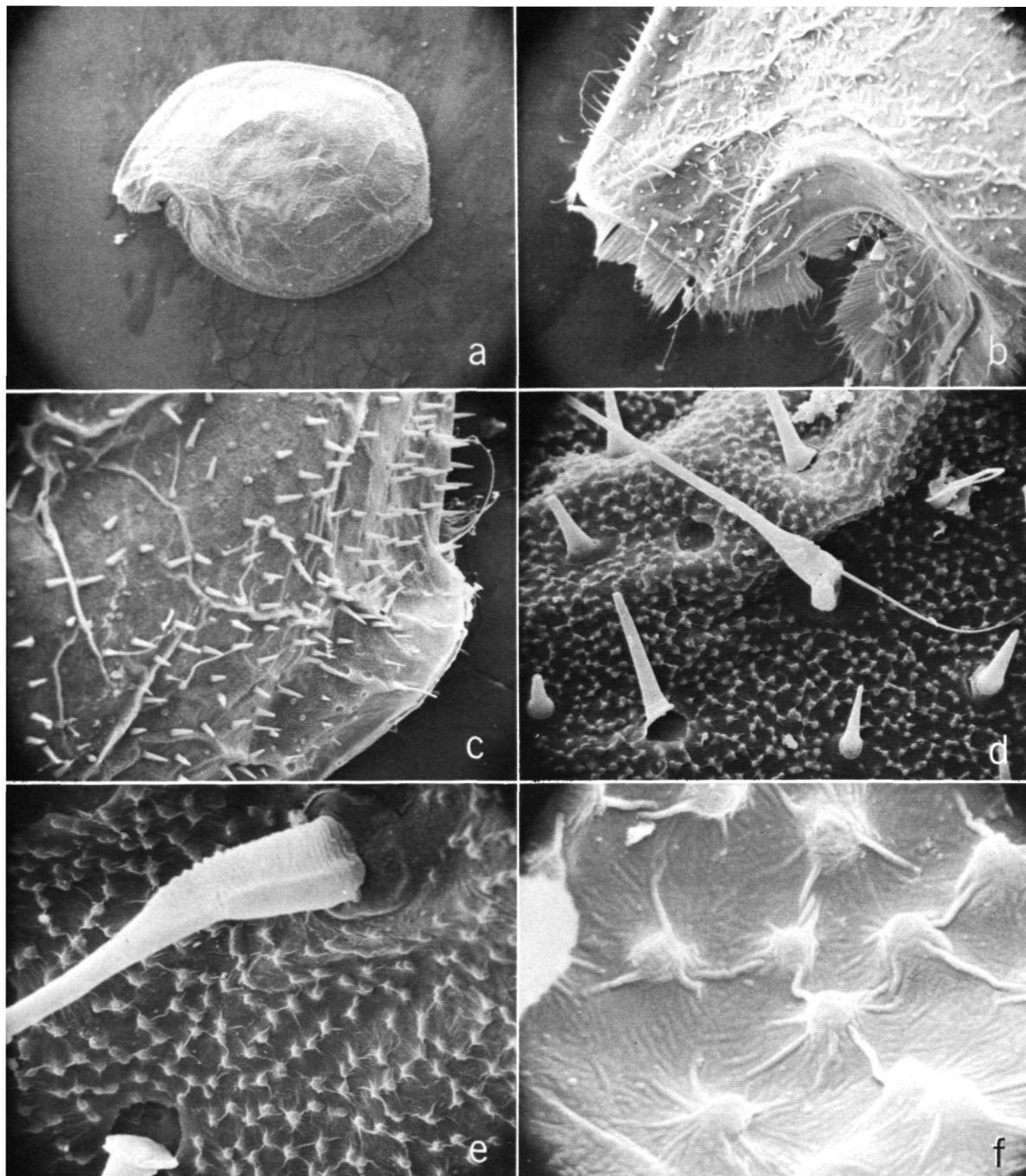


FIGURE 160.—*Philomedes subantarctica*, female, USNM 127977: a, left valve, $\times 27.5$; b, rostrum and incisur, $\times 138$; c, caudal process, $\times 238$; d, detail middle of rostrum, $\times 1125$; e, detail of rostrum ventral to ridge, $\times 2250$; f, detail of pustules in "e," $\times 11,250$.

group; ventral margin with 3 bristles in both proximal and distal groups; end joint with 3 claws and 4 bristles; surface of coxale, basale, and 2nd endopodite joint with spines forming clusters.

Maxilla (Figure 158n): Endite I with 11 bristles, endite II with 6, and endite III with 1 proximal and about 8 distal bristles. Exopodite very short with 3 bristles: proximal bristle short with short marginal spines; terminal bristles with long proximal and short distal spines. Distal margin of basale with 3 bristles. Endopodite: 1st joint spinous with spinous α -bristle, 6-bristles obscure; end joint with 5 spinous α -bristles, 2 β -bristles (anterior of these spinous, posterior clawlike), γ -bristles obscure, 3 δ -bristles (2 anterior bristles clawlike).

Fifth limb (Figure 159a-c): Epipodial appendage with 62 bristles. Exopodite 1st joint: triangular protuberance in front of main tooth with proximal node on medial margin; 4 teeth of main tooth with secondary teeth along medial margin. Exopodite 2nd joint: large triangular tooth with 2 nodes on medial margin; lateral corner with indication of socket but without minute bristle; posterior side with usual stout bristle and group of 3 bristles distal to it. Exopodite 3rd joint: medial lobe with 3 spinous bristles, one of these also pectinate; outer lobe with 2 bristles with long slender proximal spines and short distal spines. Fourth and 5th joints fused, with 6 spinous bristles.

Sixth limb (Figure 159d): Epipodial appendage with 5 hirsute bristles; 1st endite with 3 bristles, 1 short medial, 2 terminal (1 long, 1 short—the short terminal bristle is medial to longer bristle); 2nd endite with 4 bristles, 1 medial, 3 terminal; 3rd endite with 9 bristles, 1 medial, 8 terminal; 4th endite slightly narrower than 3rd endite and with 9 bristles, 1 medial, 8 terminal; end joint with 42 marginal bristles (about 15 medial, 9 lateral, 18 ventral); all bristles on limb with marginal hairs or spines; medial and lateral surfaces of end joint and lateral surfaces of endites I to IV extremely hirsute; end joint extending posteriorly.

Seventh limb (Figure 159e): Each limb with 27 or 28 bristles, 5 in distal group (3 dorsal, 2 ventral) and 22 or 23 proximal (8 ventral, 14 or 15 dorsal); each bristle with 3–6 bells and distal marginal spines; end comb with 13 or 14 alate teeth plus middle recurved longer tooth; 11 short pegs on dorsal side opposite comb (pegs arranged in circle with slightly longer peg in middle).

Furca (Figure 159f): Usual type for genus with all claws separated from lamella by suture and decreasing in length and stoutness proximally along lamella; each lamella with 10 or 11 claws; teeth in medial row of claw 1 slightly larger than those in lateral row and teeth near middle of row larger than those at either end; long hairs present at inner bases of claws and following last claw.

Eyes and rod-shaped organ (Figure 159g,h): Lateral eye minute with 3 small ommatidia; medial eye large, bare, pigmented; rod-shaped organ elongate, 2-jointed, with rounded tip bearing minute spine (always?).

Upper lip (Figure 159g): Lip hirsute with several anterior spines; single rounded process present between lip and medial eye.

Posterior (Figure 159i): Posterior margin and area hirsute.

Eggs: USNM 127977 and 137376 with 23 eggs.

Parasites (Figures 159j, 161): Segmented filaments attached to terminus of 7th limbs between comb, and cup-shaped stalked protists attached to carapace near incisur and caudal process. USNM 137383 with 1 choniostomatid δ and ♀ and 5 choniostomatid ovisacs.

DESCRIPTION OF ADULT MALE (Figure 162).—Carapace in lateral view more elongate than that of female and with shallow incisur. Selvage and distribution of bristles on infold more or less similar to those on that of female. Carapace smooth but with minute pores and faint reticulations visible in transmitted light. Long hairs with broad bases and shorter slender hairs scattered over valve surface and along margins; short stout hairs abundant on the female carapace absent on the male (Figure 162a-c).

Size (Figure 131): USNM 128040, length 2.65 mm, height 1.48 mm; USNM 128041, length 2.70 mm, height 1.61 mm (not dissected).

First antenna: 1st joint bare; 2nd joint spinous with 2 bristles with short marginal spines, 1 bristle dorsal, subterminal, 1 lateral near ventral margin, also subterminal; 3rd joint separated from 4th by suture and with 1 ventral bristle with long proximal and short distal spines, and 2 spinous dorsal bristles (1 very short with short marginal spines, 1 longer with proximal long spines and distal short spines); 4th claw short with 1 dorsal bristle with proximal long spines and distal short spines, and 4 ventral bristles, all with short marginal

spines, some also with few proximal long spines; sensory bristle of minute 5th joint with numerous thin filaments on broad base (distal part of bristle broken); bristle of 6th joint about twice length of combined 7th and 8th joints and with proximal long spines and distal short spines. Seventh and 8th joints: a-bristle shorter than bristle of 6th joint and with short marginal spines; b- and g-bristles broken; long c- and f-bristles broken, with 10 to 12 short filaments on remaining part, filaments bifurcate at tip; d- and e-bristles bare.

Second antenna (Figure 162e): Protopodite bare. Endopodite 3-jointed: 1st joint with 7 or 8 bristles forming 2 groups, proximal group with 5 bare

bristles, distal group with 2 or 3 bristles, some or all with long proximal marginal spines; 2nd joint with 3 ventral bristles with short marginal spines, proximal bristle more slender than others; 3rd joint with slender proximal bristle and 2 short subterminal bristles, tip of joint with 5 or 6 ridges. Exopodite: 1st joint with few slender spines along ventral margin and small medial terminal spine; bristle of 2nd joint reaching 5th joint and with 4 small spines near middle of ventral margin; joints 2 to 8 with short spines forming row along terminal margin; joint 3 longer than joint 2; small basal spines present on joints 3 or 4 to 8; 9th joint with 4 long medial bristles and 2 short lateral

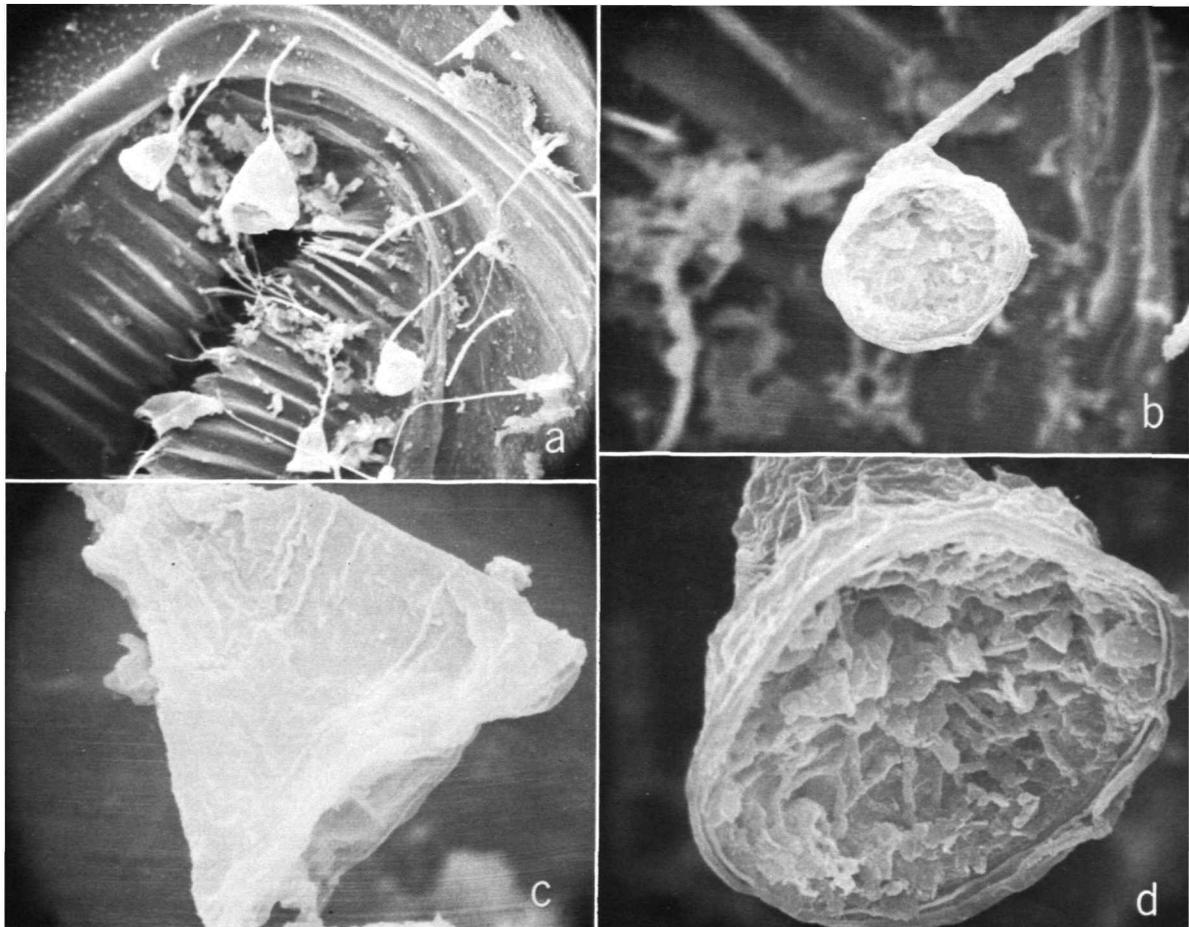


FIGURE 161.—*Philomedes subantarctica*, female, USNM 127977: a, epizoa on incisor, $\times 625$; b, single epizoa, $\times 2250$; c, side view of cup in "b," $\times 5625$ (note fingerlike projection from inside of cup); d, oblique view of cup in "b," $\times 5625$.



FIGURE 162.—*Philomedes subantarctica*, male, USNM 128040, length 1.48 mm, carapace: *a*, complete valve, lateral view. Left valve: *b*, reticulations at bases of attachments of central muscle scars, lateral view; *c*, anterior medial view; *d*, caudal process, medial view. Appendages: *e*, endopodite of left antenna, medial view; *f*, basale and 1st endopodial joint of left mandible, lateral view; *g*, left maxilla, lateral view; *h*, exopodial joints 1-5 of 5th limb; *i*, left 6th limb, lateral view (not all bristles shown). *j*, tip of 7th limb; *k*, lateral eye, medial eye and rod-shaped organ, anterior process, upper lip, joints 1-3 of left 1st antenna; *l*, detail of right lateral eye shown in "k"; *m*, left copulatory organ, anterior to left; *n*, detail of left copulatory organ, shown in "m." (Same magnification in microns: *b-g,i,l,m*.)

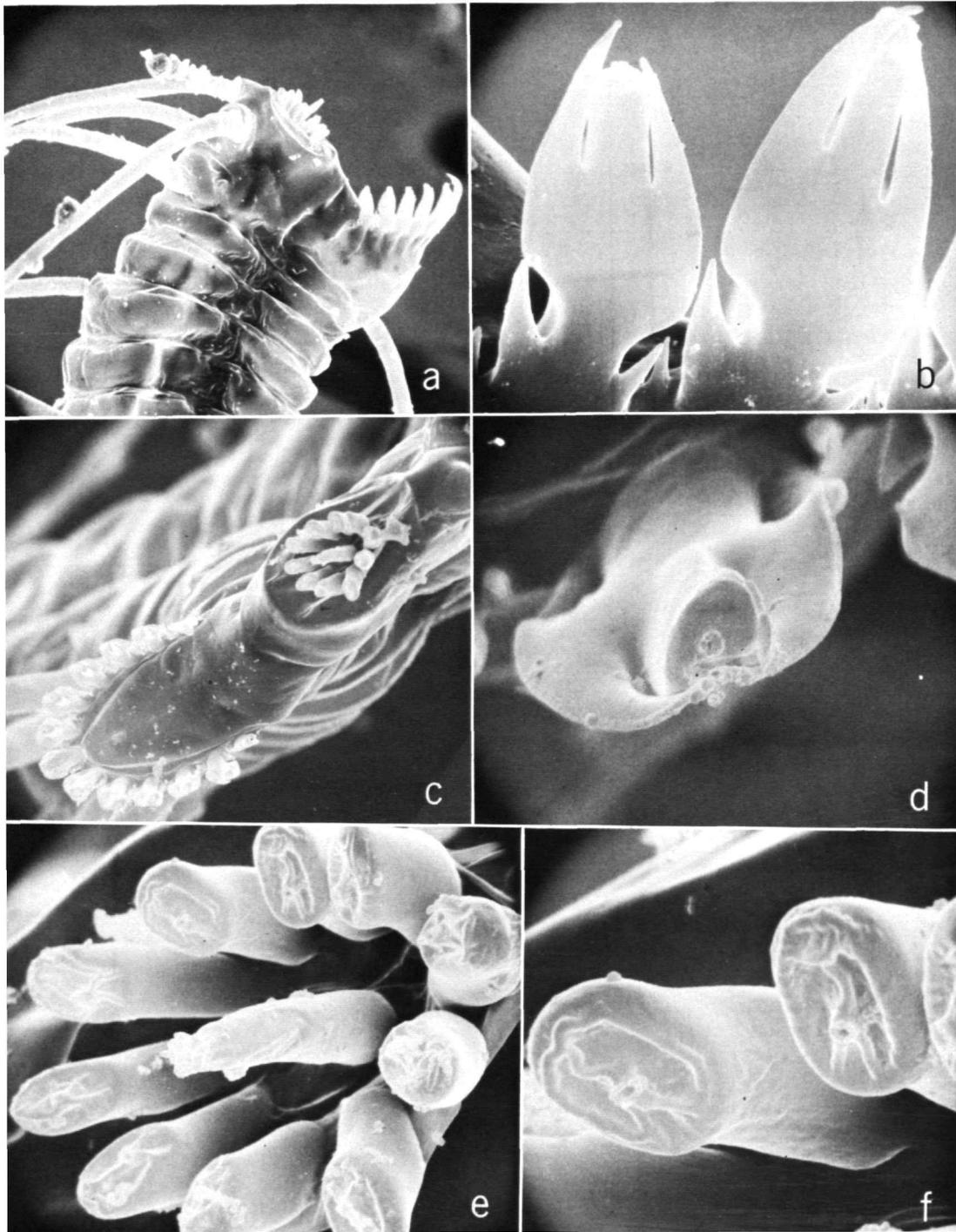


FIGURE 163.—*Philomedes subantarctica*, juvenile, USNM 138034, 7th limb: *a*, tip, lateral view, $\times 475$; *b*, detail of comb teeth, lateral view, $\times 5700$; *c*, tip, end view, $\times 1000$; *d*, detail of comb tooth, end view, $\times 5000$; *e*, detail of pegs opposite comb, end view, $\times 5000$; *f*, detail of tops of two upper pegs in "e," $\times 10,000$.

bristles; bristles of joints 3 to 9 with natatory hairs and without spines.

Mandible (Figure 162f): Coxale endite reduced, bifurcate, with short bristle near base about length of endite. Basale: medial surface with 6 proximal bristles, all with short marginal spines; ventral margin with 3 bristles distal to middle, all with long proximal and short distal spines; lateral surface with 5 or 6 bristles oriented venteriad, these form row approaching ventral margin proximally (proximal bristle actually on ventral side of margin on specimen examined), all bristles with long proximal and short distal spines; dorsal margin with 5 or 6 bristles (3 or 4 short bristles near middle with short marginal spines, 1 short terminal with short marginal spines, 1 long terminal with long spines near middle). Exopodite about 70 percent length of dorsal margin of 1st endopodite joint, hirsute at tip, shorter outer bristle and longer inner bristle both with short marginal spines. Endopodite: ventral margin of 1st joint with 5 long bristles, 1 or 2 of these with short marginal spines, remaining with long proximal and short distal spines; dorsal margin of 2nd joint with 2 groups of bare bristles, about 5 bristles in proximal and 6 in distal group; ventral margin with 3 bristles in both proximal and distal groups; claws and bristles of end joint missing; medial surfaces of basale and 2nd endopodite joint with short spines forming clusters.

Maxilla (Figure 162g): Limb reduced; plumose bristle of coxale unusually long and broad; exopodite small with usual 3 spinous bristles.

Fifth limb (Figure 162h): Usual type for genus. Exopodite: outer lobe of 3rd joint with 2 stout plumose bristles, inner lobe with 3 bristles; 4th plus 5th joints with 6 bristles.

Sixth limb (Figure 162i): Epipodial appendage with 4 hirsute bristles; 1st endite with 3 bristles, 1 short medial, 2 terminal (1 long, 1 short); 2nd endite with 4 bristles, 1 medial, 2 terminal; 3rd endite with 9 bristles, 1 medial, 8 terminal; 4th endite with 10 bristles, 1 medial, 9 terminal; 4th endite very slightly narrower than 3rd; end joint with 26 to 29 bristles; lateral surfaces of endites 2 to 4, and medial and lateral surfaces of end joint hirsute.

Seventh limb (Figure 162j): Each limb with 25 or 26 bristles, 5 in distal group (2 ventral, 3 dorsal) and 20 or 21 in proximal group (7 or 8 ven-

tral, 12 or 13 dorsal); each bristle with 3 to 5 bells and distal marginal spines; end comb with 10 teeth plus longer middle tooth; margins of teeth obscure, but seem spined; 8 short pegs on dorsal side opposite comb (pegs arranged in circle with longest peg in middle).

Furca: Each lamella with 9 claws, otherwise similar to that of female.

Eyes and rod-shaped organ (Figure 162k,l): Lateral eye large with about 42 ommatidia and black pigment between them; medial eye similar to that of female; rod-shaped organ elongate, 2-jointed with tip drawn out in slender spine.

Upper lip (Figure 162k): Lip similar to that of female except without hairs.

Posterior margin: Similar to that of female.

Copulatory organ (Figure 162m,n): Organ very small with 2 lobes, shorter lobe with 3 bristles; longer lobe with 2 bristles on end joint.

Parasites: None.

DESCRIPTION OF JUVENILE, USNM 138034.—Seventh limb: see Figure 163.

SEXUAL DIMORPHISM.—In addition to usual difference in shape, male carapace does not have abundant short stout hairs present on female. Lateral surface of basale of mandible bears only 5 or 6 bristles compared to 7 to 9 on female's mandible. End joint of the 6th limb bears 26 to 29 bristles compared to 42 bristles on 6th limb of female. Dorsal margin of terminus of 7th limb bears only 8 pegs compared to 11 on 7th limb of female.

COMPARISONS.—The carapace outline and details of the caudal process of the new species resemble *Philomedes lilljeborgi* (G. O. Sars, 1865), (see Skogsberg, 1920:402 for detailed description of *P. lilljeborgi*). The 7th limbs differ in that those of *P. lilljeborgi* bear 10 to 12 bristles, whereas, the 7th limbs of *P. subantarctica* have 25 to 28 bristles. The pegs on the dorsal margin of the terminus of the 7th limbs also differ in their distribution—those on *P. lilljeborgi* form 2 rows, whereas, those on *P. subantarctica* form a circle with 1 central peg. The 6th limb of the female *P. subantarctica* bears about 42 bristles on the end joint compared to 28–33 for *P. lilljeborgi*. The large number of bristles (8 or 9 on female; 7 or 8 on male) on the 1st joint of the endopodite of the 2nd antenna of *P. subantarctica* may also be significant because no more than 6 have been described on this joint of *P. lilljeborgi*.

Poulsen (1962:346) identified a male ostracod as *Philomedes lilljeborgi* (Sars). The high number of bristles (27–30) on the 7th limb and the low number of bristles (3) on the dorsal margin of the basale of the mandible on that specimen suggest that it is not conspecific with *P. lilljeborgi*. Poulsen's specimen differs from *P. subantarctica* in having fewer bristles on the 1st joint of the endopodite of the 2nd antenna, a separation between the distal 2 bristles of the 2nd joint of the endopodite, and more bristles on the dorsal margin and lateral surface of the basale of the mandible.

DISTRIBUTION.—This species was collected east of Argentina in both Subantarctic and Subantarctic-to-35°S regions at depths of 129 to 1976 m (Figure 132).

40. *Philomedes minys*, new species

FIGURES 164–167

HOLOTYPE.—USNM 128290, gravid ♀, length 1.16 mm. Valves and some appendages in alcohol, remaining appendages on slide.

TYPE-LOCALITY.—*Eltanin* Cruise 6, station 453.

ETYMOLOGY.—The specific name is derived from the Greek “minys” [= little, small, short] and refers to the small size of the carapace.

ADDITIONAL SPECIMENS.—USNM 137378, 1 gravid ♀; USNM 137379, adult ♀. Both specimens from *Vema* Cruise 15, station V-15-102.

DIAGNOSIS.—Posterior of carapace truncate; length 1.13–1.26 mm.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: 1st endopodial joint with 6 bristles, 2nd with 2.

Mandible: Dorsal margin of basale with 3 bristles.

Seventh limb: Each limb with 13 or 14 bristles; 1 large and 2 or 3 shorter pegs present opposite comb.

Furca: Each lamella with 10 claws.

Lateral eye: With 2 or 3 ommatidia.

DESCRIPTION OF FEMALE (Figures 164–167).—Carapace with prominent rostrum and broad incisur; posterior truncate without projecting caudal process, posteroventral corner rounded; anterior and inferior corners of rostrum angular, margin between corners fairly linear; minute protuberance

present on anterior margin near inferior corner of rostrum (Figures 164; 165a,c-g; 166).

Ornamentation: Carapace smooth with minute pores; bristles present along margins and scattered on lateral surface (Figure 166).

Infold (Figure 165e-g): Infold broad, especially along anterior and posteroventral parts of shell; infold on rostrum with 14 spinous bristles forming row parallel to anterior margin of rostrum; 3 bristles present along lower margin of rostrum; 1 small bare bristle present below inner end of incisur; anteroventral part of infold with about 10 striae, and with 5 bristles parallel to and near anteroventral edge of valve; no bristles present along middle part of ventral infold; posteroventral and posterior infold with about 30 bristles present along raised list (bristles along posterior part of list longer than those along posteroventral part); 2 or 3 small bristles present along inner edge of valve at posteroventral corner.

Selvage: Lamellar prolongation with marginal fringe present along anterior and ventral margins; prolongation with typical segmentation along rostrum and incisur; lamellar prolongation separated at inner end of incisur (not continuous).

Size (Figure 131): USNM 128290: length 1.16 mm, height 0.79 mm; USNM 137378, length 1.26 mm, height 0.82 mm; USNM 137379, length 1.13 mm, height 0.79 mm.

First antenna: 1st joint extremely spinous with long spines forming clusters on medial and lateral surfaces and along ventral and dorsal margins; 2nd joints also spinous and with 3 bristles, 1 ventral, 1 dorsal, 1 lateral, all with wreaths of long proximal spines and short distal spines; 3rd joint with

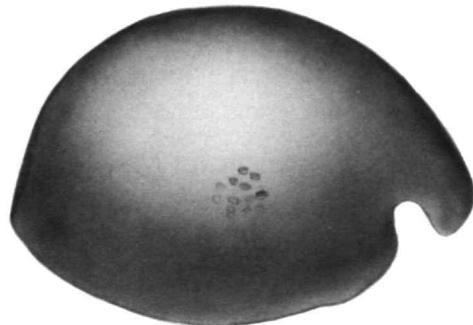


FIGURE 164.—*Philomedes minys*, female, USNM 137379, complete specimen, length 1.13 mm.



FIGURE 165.—*Philomedes minys*, female, USNM 137378, length 1.26 mm, carapace: *a*, complete specimen showing outline of eggs, lateral view; *b*, left lateral eye, anterior to left. Female, USNM 128290, length 1.16 mm, carapace: *c*, sketch of central muscle scars on left valve, lateral view; *d*, complete specimen, lateral view; *e*, anterior of right valve, medial view; *f*, caudal process of left valve, medial view; *g*, caudal process of right valve, medial view. Right 2nd antenna: *h*, part of bristle on 2nd exopodial joint, medial view; *i*, endopodite with part of protopodite and 1st exopodial joint, medial view. Right maxilla: *j*, complete limb (not under cover slip, bristles not shown). Fifth limb: *k*, distal end of part of left limb, anterior view; *l*, distal end of part of right limb, anterior view. Sixth limb: *m*, lateral view of limb (not all bristles shown). Seventh limb: *n*, tip of limb; *o*, tip of limb opposite that shown in "*n*." Furca: *p*, right lamella; *q*, detail of claw 1 shown in "*p*." Anterior: *r*, anterior process and upper lip; *s*, right lateral eye with protistan attached, medial eye and rod-shaped organ, anterior process. Posterior: *t*, lateral view showing proximal bristle on left and right lamella of furca and γ -sclerite. Protistan: *u*, segmented filament attached to 2nd antenna. (Same magnification in microns: *b,j,p,r,s,t,u*; *e,f*; *i,m*; *h,l,n,o*.)

3 bristles with short marginal spines, 1 ventral, 2 dorsal, and with clusters of short spines on medial surface; 4th joint with 4 ventral and 1 dorsal bristle, all with 1 or more long proximal spines and short distal spines; sensory bristle of 5th joint with about 4 proximal and 4 terminal filaments; 6th joint with short spinous medial bristle. Seventh joint: a-bristle short spinous; b-bristle slightly shorter than sensory bristle of 5th joint and with 1 filament near middle and 4 terminal; c-bristle with 4 or 5 proximal and 4 distal filaments. Eighth joint: d- and e-bristles long, bare; f-bristle with

4 proximal and 4 terminal filaments; g-bristle with about 3 proximal and 3 or 4 terminal filaments.

Second antenna of holotype: Protopodite bare. Endopodite 2-jointed: 1st joint with 6 bare bristles, 5 medial, 1 lateral; 2nd joint with 2 bristles, 1 ventral with long proximal and short distal marginal spines, 1 terminal recurved, bare. Exopodite: 1st joint with short medial spine; bristle on 2nd joint reaching considerably beyond 9th joint, bare or with 2 or 3 ventral spines proximal to middle; 9th joint with 7 bristles, 3 long, 1 medium, 3 short; joints 2 to 8 with short spines forming row along

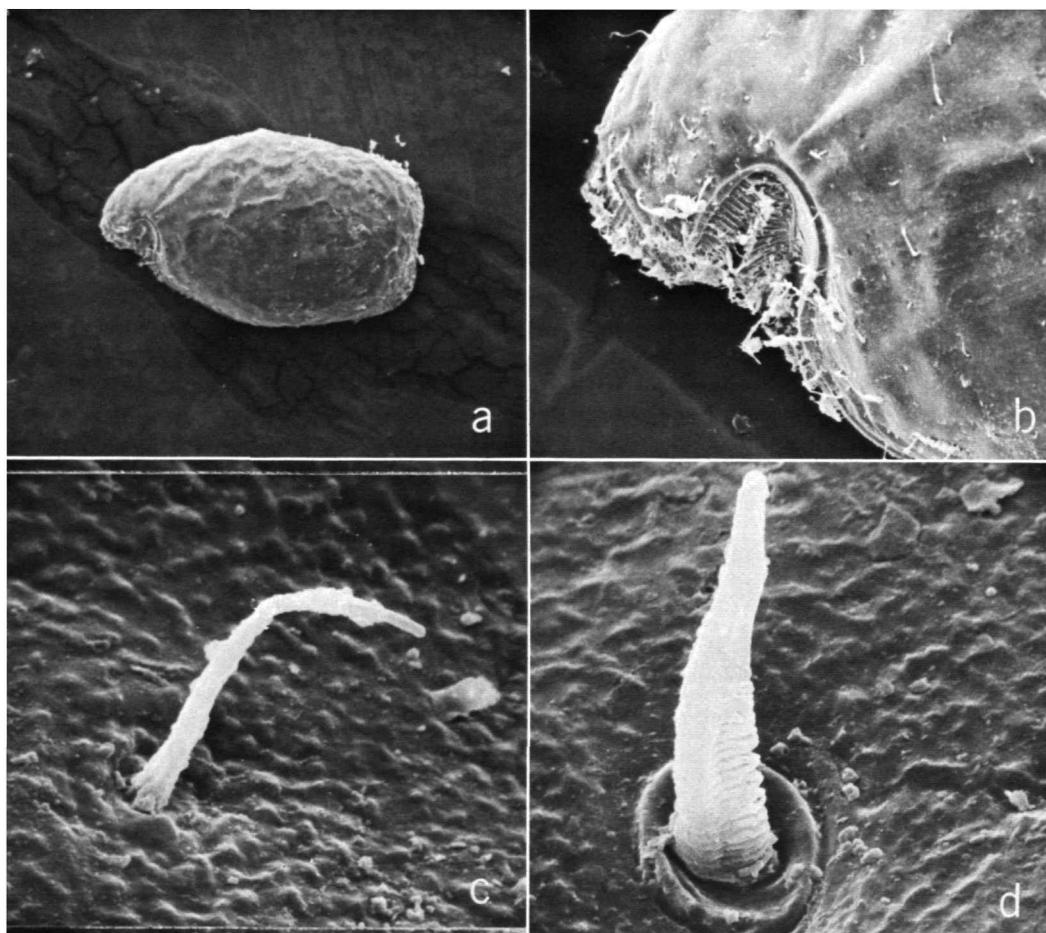


FIGURE 166.—*Philomedes minys*, female, USNM 137378, left valve, lateral view; a, complete valve, $\times 47$; b, anterior, $\times 185$; c, surface bristle, $\times 4750$; d, surface bristle and rimmed pore, $\times 4750$.

distal margin; 3 short bristles of 9th joint with short marginal spines; remaining bristles of 9th joint and bristles of joints 6 to 8 with natatory hairs; bristles of joints 3-5 bare or with 2 or 3 marginal spines near middle of ventral margin.

Second antenna of USNM 137378: Right limb similar to limbs of holotype (Figure 165h,i). Left limb with long bristles on 6th joint with natatory hairs and long bristles of joints 7 to 9 broken.

Mandible: Coxale endite large, spinous, pectinate with bifurcate tip; minute bristle present at base of endite on right limb of holotype, not observed on left limb. Basale: medial surface spinous and with 6 short bristles (3 stout pectinate and 2 slender spinous proximal, 1 spinous closer to middle of joint); lateral surface with 5 short spinous bristles forming row near ventral margin; ventral margin with 2 medium spinous distal bristles; dorsal margin with 3 bristles: 1 medium, bare, distal to middle, 2 terminal (1 long spinous, 1 medium bare). Exopodite about three-fourths length of dorsal margin of 1st endopodite joint; inner bristle with long proximal and short distal spines; outer shorter bristle with faint short marginal spines. Endopodite: 1st joint with 4 spinous ventral bristles; medial surface of 1st and 2nd joints with short spines forming few clusters; dorsal margin of 2nd joint with spinous bristles forming 2 groups, proximal group with 3 bristles, distal group with 6; ventral margin also with spinous bristles forming 2 groups, proximal group with 3 bristles, distal group with 4; end joint with 3 claws and 4 bristles, medial claw with few minute teeth near middle.

Maxilla (Figure 165j): Coxale bristle short, stout, plumose. Exopodite with short bare proximal bristle and 2 long terminal bristles, both with long proximal and short distal spines. Distal margin of basale with 3 long bristles. Endopodite: anterior margin of 1st joint with long hairs and 1 spinous α -bristle; posterior margin with 5 terminal β -bristles, bare or with short marginal spines; end joint with 11 bristles, some clawlike. Endite I broad, with 9 terminal bristles; endite II narrower than endite I, with about 7 bristles; endite III narrow but longer than endites I and II, with about 11 distal bristles and 1 short spinous proximal bristle on dorsal margin.

Fifth limb (Figure 165k-m): Epipodial appendage with 43 bristles; 3 endites present typical for

genus. Endopodite: anterior margin of 1st joint with 2 bristles near middle and 1 on outer margin; triangular tooth in front of main tooth fairly small with small proximal node; main tooth consisting of 4 teeth (distal tooth large with stout secondary teeth, proximal tooth small with 2 or 3 minute secondary teeth); short bare bristle present proximal to 4th tooth of 1st joint. Posterior bristles and curved inner margin of 2nd endopodite joint not clearly visible in mounted limbs of holotype. Third joint with 3 bristles on inner lobe and 2 on outer lobe. Fourth and 5th joints fused, with 7 spinous bristles.

Sixth limb: 3 short spinous bristles present in place of epipodial appendage; 1st endite with 3 spinous bristles, 2 medial, 1 terminal (1 of the medial bristles could be considered terminal); 2nd endite with 4 spinous bristles, 1 medial, 3 terminal; 3rd and 4th endites each with 8 spinous bristles, 1 medial, 7 terminal; end joint prolonged posteriorly and with 16 spinous and hirsute bristles; lateral and medial surfaces of end joint hirsute.

Seventh limb (Figure 165n,o): 8 or 9 bristles in proximal group (4 ventral, 4 or 5 dorsal); 5 bristles in distal group (2 ventral, 3 dorsal); each bristle with 3 to 6 bells; terminal comb with 10 alate teeth; 1 large and 2 (possibly also 3) small pegs opposite comb.

Furca (Figure 165p,q): Each lamella with 10 claws, each claw decreasing in length posteriorly along lamella; claw 1 with teeth forming medial and lateral row; teeth in lateral row larger near middle of claw (small and large teeth do not alternate); clump of long medial hairs present near base of claw 1; spines present along anterior margin of lamellae.

Eyes and rod-shaped organ (Figure 165r,s): Lateral eyes small pigmented with 2 or 3 ommatidia; medial eye pigmented, about twice diameter of lateral eye; rod-shaped organ elongate, 1-jointed, slightly broadening proximal to middle, tip rounded.

Upper lip (Figures 165r, 167): Lip hirsute, spines not observed; unpaired rounded process present between lip and medial eye.

Eggs: USNM 128290 with 11 eggs in marsupium; USNM 127378 with 4 eggs.

Parasites: Ciliated ?Peritrichida attached to several appendages. Unidentified organism consisting of string of about 5 globular segments also at-

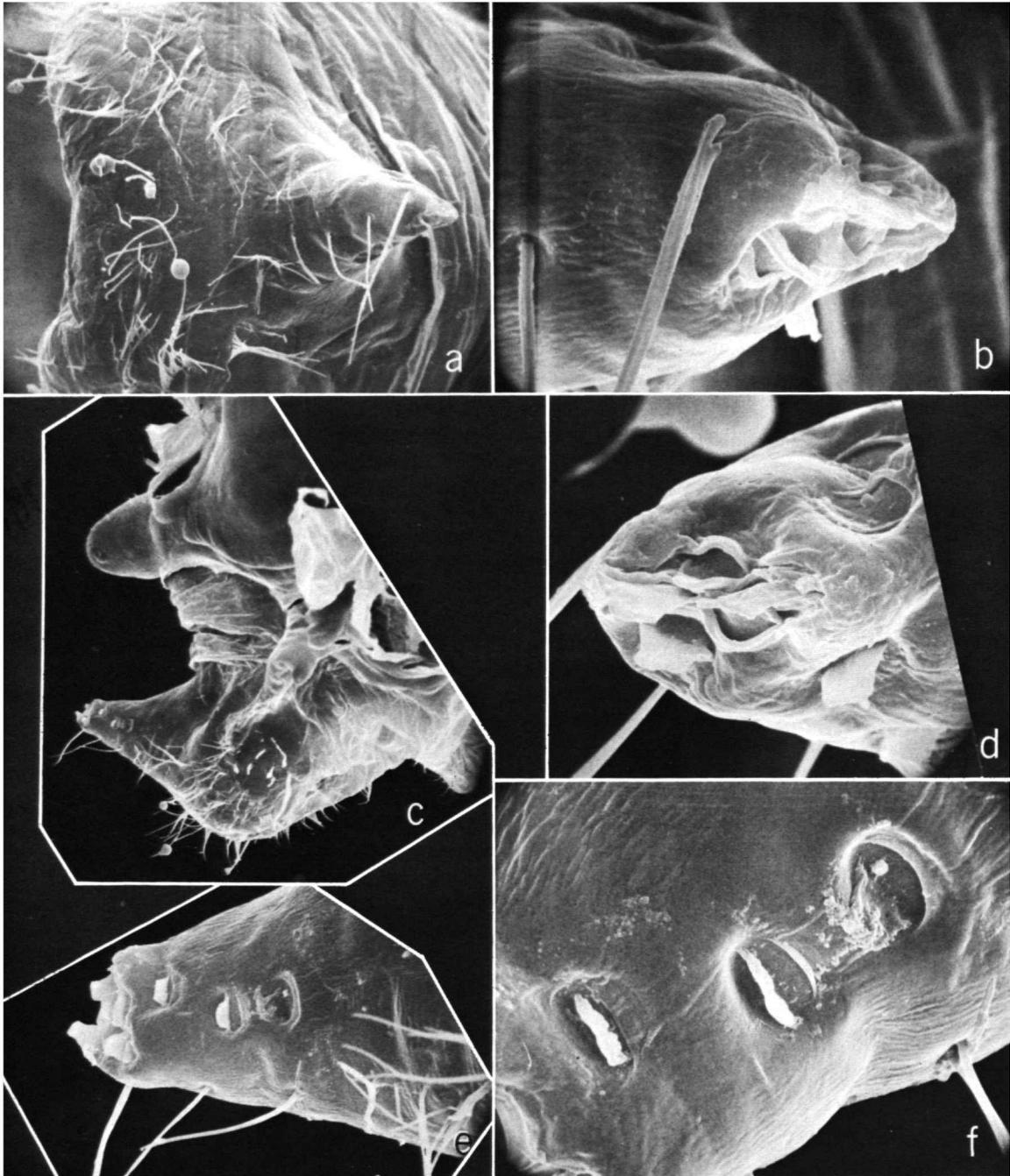


FIGURE 167.—*Philomedes minys*, female, USNM 137378, upper lip: *a*, ventral view, anterior to right, $\times 950$; *b*, detail of tip, ventral view shown in "*a*," $\times 4750$; *c*, lateral view, anterior to left, $\times 450$; *d*, anterior view of tip of lip shown in "*c*," $\times 4500$ (ventral end to left); *e*, detail of anterior tip shown in "*c*," $\times 1200$; *f*, detail of openings shown in "*e*," $\times 4500$.

tached to many appendages. Segmented filaments attached to limbs of USNM 137378 in addition to strings of elongate and globular segments similar to those on USNM 128290 (Figure 165*s,u*).

COMPARISONS.—The new species *P. minys* is extremely small—the unique gravid female being only 1.13–1.26 mm long. It differs in many ways from *Philomedes eugeniae* Skogsberg, 1920; e.g., the posterodorsal corner of the carapace is more rounded, the 7th limb has fewer proximal bristles and more terminal pegs, and the 2nd joint of the endopodite of the 2nd antenna has fewer bristles. The carapace resembles that of *I. walleni*, described herein, but the frontal organ is elongate, typical of those in other members of the genus *Philomedes*.

DISTRIBUTION.—This species was collected only in the Magellanic subregion of Subantarctica at depths of 31 to 108 m (Figure 132).

41. *Philomedes ramus*, new species

FIGURES 168–170

HOLOTYPE.—USNM 135047, adult ♀, length 3.21 mm. Appendages on slide, some in alcohol; 1 valve in alcohol, other gold-plated on slide.

TYPE-LOCALITY.—*Vema* Cruise 17, station 17-V-8.

ETYMOLOGY.—The specific name is derived from the Greek “*ramus*” [= branch] and refers to the bifurcate tips of some of the terminal pegs on the 7th limbs.

MATERIAL.—Holotype.

DIAGNOSIS.—Posterior with small caudal process; length about 3.21 mm; surface with abundant short hairs (bristles).

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: 1st endopodial joint with 6 bristles, 2nd with 2.

Mandible: Dorsal margin of basale with 3 bristles.

Seventh limb: Each limb with about 20 bristles; terminus with 1 short slightly curved inner peg and 3 longer pegs with bifurcate tips.

Furca: Each lamella with 11 claws.

Lateral eye: Small, hirsute, with 2 faint ommatidia.

DESCRIPTION OF ADULT FEMALE (Figures 168–170).—Carapace with prominent rostrum and broad

incisur; posterior with small caudal process; anterior and inferior corners of rostrum angular, margin between corners linear; minute protuberance present on inferior corner of rostrum (Figures 168, 169*a-e*, 170).

Ornamentation: Carapace with abundant short stout bristles and scattered longer bristles on lateral surfaces and along margins (Figures 169*f*, 170).

Infold (Figure 169*c-e*): Infold on rostrum with 18 plumose bristles parallel to posterior and ventral valve margins, and 3 bare bristles along ventral margin; 1 small bare bristle present below inner end of incisur; anteroventral part of infold with about 10 striae, and with 15 spinous bristles along list; no bristles present along middle part of ventral infold; posteroventral and posterior infold with about 56 bristles along inner margin in groups of 1 to 4 bristles (bristles along inner margin of posterior infold quite long); infold of caudal process with crescent-shaped depression (4 to 8 small bristles present along inner margin of depression, 2 bristles along outer margin near valve edge).

Selvage: Lamellar prolongation with marginal fringe present along anterior and ventral margins; prolongation with typical segmentation along rostrum and incisur; prolongation discontinuous at inner end of incisur; long bristles with bases near middle of lamellar prolongation present on prolongation along anteroventral margin of valve.

Size (Figure 131): USNM 135034, length 3.21 mm, height 2.32 mm.

First antenna: 1st joint with faint spines forming clusters along ventral margin; 2nd joint with spines forming clusters along dorsal margin and on medial surface, and 3 bristles, 1 ventral, 1 dor-

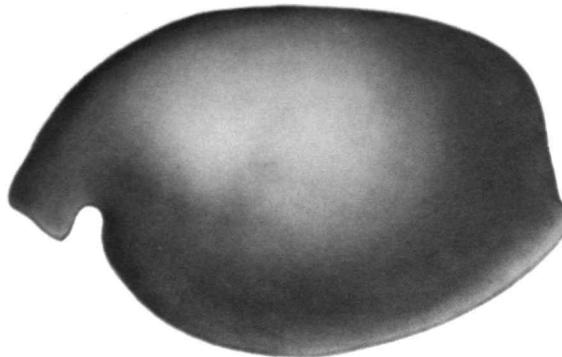


FIGURE 168.—*Philomedes ramus*, female, USNM 135047, complete specimen, length 3.21 mm.



FIGURE 169.—*Philomedes ramus*, female, USNM 135047, length 3.21 mm, carapace: *a*, complete specimen, lateral view; *b*, sketch of central muscle scars on right valve, lateral view; *c*, anterior of right valve, medial view (lamellar prolongation not shown); *d*, caudal process on right valve, medial view; *e*, posterior infold above caudal process, medial view; *f*, detail of exterior surface bristles near middle of right valve. Appendages: *g*, basale, exopodite and 1st endopodial joint of left mandible, lateral view; *h*, distal part of 1st and 2nd exopodial joints of left 5th limb, anterior view; *i*, same, posterior view; *j*, endopodite of right 2nd antenna, medial view; *k*, left 6th limb, lateral view (not all bristles shown); *l*, tip of 7th limb; *m*, furca; *n*, anterior showing medial eye and rod-shaped organ, anterior process, upper lip; *o*, right lateral eye and postero-dorsal corner of protopodite of right 2nd antenna. (Same magnification in microns: *c,k,m,n; e-h,j,o*.)

sal, 1 lateral, all with long proximal and short distal spines; 3rd joint with 3 bristles, 1 ventral, 2 dorsal; 4th joint with 5 bristles, 1 dorsal, 4 ventral; sensory bristle of 5th joint with 5 proximal and 4 terminal filaments; 6th joint with short medial bristle with long spines near middle and short spines distally. Seventh joint: a-bristle about twice length of bristle of 6th joint and with long proximal and short distal spines; b-bristle slightly shorter than sensory bristle and with 1 proximal and 3 terminal filaments; c-bristle with 5 proximal and 3 terminal filaments. Eighth joint: bare d- and e-bristles about same length as b-bristle; f- and g-bristles with about 4 proximal and 4 terminal filaments.

Second antenna (Figure 169f): Protopodite bare. Endopodite 2-jointed: 1st joint with 6 bare bristles, 5 proximal, 1 distal; 2nd joint with 2 bristles, 1 ventral with wreaths of long spines, 1 terminal recurved, bare. Exopodite: 1st joint with short medial spine; bare bristle on 2nd joint reaching considerably past 9th joint; bristles of joints 3 to 5 bare, complete; bristles of 6th to 8th joints and long bristles of 9th joint broken; small basal spines present on joints 2 to 8; short spines forming row present on distal margins of joints 3 to 8; 9th joint with 7 bristles, all except 2 short bristles broken (longest of short bristles with long marginal hairs).

Mandible (Figure 169g): Coxale endite large, pectinate, with bifurcate tip; minute bristle present near base of endite. Basale: medial surface with 5 proximal bristles (3 pectinate, 2 spinous) and 1 spinous bristle nearer to middle; lateral surface with 5 short spinous bristles forming row near ventral margin (proximal of these could be considered to be on ventral margin); ventral margin with 3 spinous distal bristles; dorsal margin with 3 bristles, 1 distal to middle, 2 terminal, all with long spines near middle and short spines distally. Exopodite about three-fourths length of dorsal margin of 1st endopodite joint, both with long spines near middle and short spines distally (outer bristle about three-fourths length of inner bristle). Endopodite: 1st joint with 4 ventral bristles and few terminal spines on dorsal margin; 2nd joint with spines forming clusters on medial and lateral surfaces; dorsal margin with spinous bristles forming roughly 2 groups, each with about 5 bristles (1 short spinous triaenid lateral bristle present between groups); ventral margin with 2 distal

groups of bristles, each with 3 spinous bristles; end joint with 4 spinous bristles and 3 claws, medial claw with faint medial and lateral teeth along proximal part of concave margin.

Maxilla: 1st endite broad with 9 bristles; 2nd endite about three-fourths width of 1st endite and slightly longer, with 5 bristles; 3rd endite about same width as 2nd endite but twice its length, with 10 bristles. Coxale bristle stout plumose. Basale with 3 long bristles on distal margin. Endopodite: anterior margin of 1st joint spinous and with 1 spinous α -bristle; posterior margin with 5 terminal spinous β -bristles; end joint with 4 a-bristles, 3 clawlike b- and d-bristles with few marginal teeth, and additional bristles. Short exopodite with 3 bristles, 2 long and 1 short.

Fifth limb (Figure 169h,i): Epipodial appendage with 55 bristles; 3 endites present, 1st with 5 bristles; 2nd endite with about 6, 3rd with about 9. Endopodite (part of appendage obscure in mount): main tooth of 1st joint with 4 teeth, distal of these much stronger than others; process anterior to large tooth of main tooth rounded with secondary protuberance; spinous bristle present proximal to smallest of main teeth; 1 stout bristle present near outer corner of 1st joint; posterior side with usual 4 bristles; only 1 bristle present near middle of anterior distal margin; inner margin of large quadrate tooth of 2nd joint with 2 serrated teeth, each on individual process; 3rd joint with 3 spinous bristles on inner lobe and 2 on outer lobe; 4th + 5th joints with about 6 spinous bristles.

Sixth limb (Figure 169k): 4 short spinous bristles present in place of epipodial appendage; 1st endite with 3 spinous bristles, 2 short medial, 1 long terminal; 2nd endite with 4 spinous bristles, 1 medial, 3 terminal; 3rd endite with 10 spinous bristles, 1 medial, 9 terminal; 4th endite with 9 or 10 spinous bristles, 1 medial, 8 or 9 terminal; end joint prolonged posteriorly and with 33 spinous and hirsute bristles; lateral and medial surfaces of end joint hirsute; lateral surfaces of endites 2 to 4 with long spines forming clusters.

Seventh limb (Figure 169l): Each limb with total of 20 bristles, 5 in terminal group (3 dorsal, 2 ventral), remaining bristles scattered (8 or 9 dorsal, 6 or 7 ventral); each bristle with 3 to 5 bells; terminal comb with 14 or 15 alate teeth; terminus opposite comb with 1 short slightly curved inner peg and 3 longer pegs with bifurcate tips.

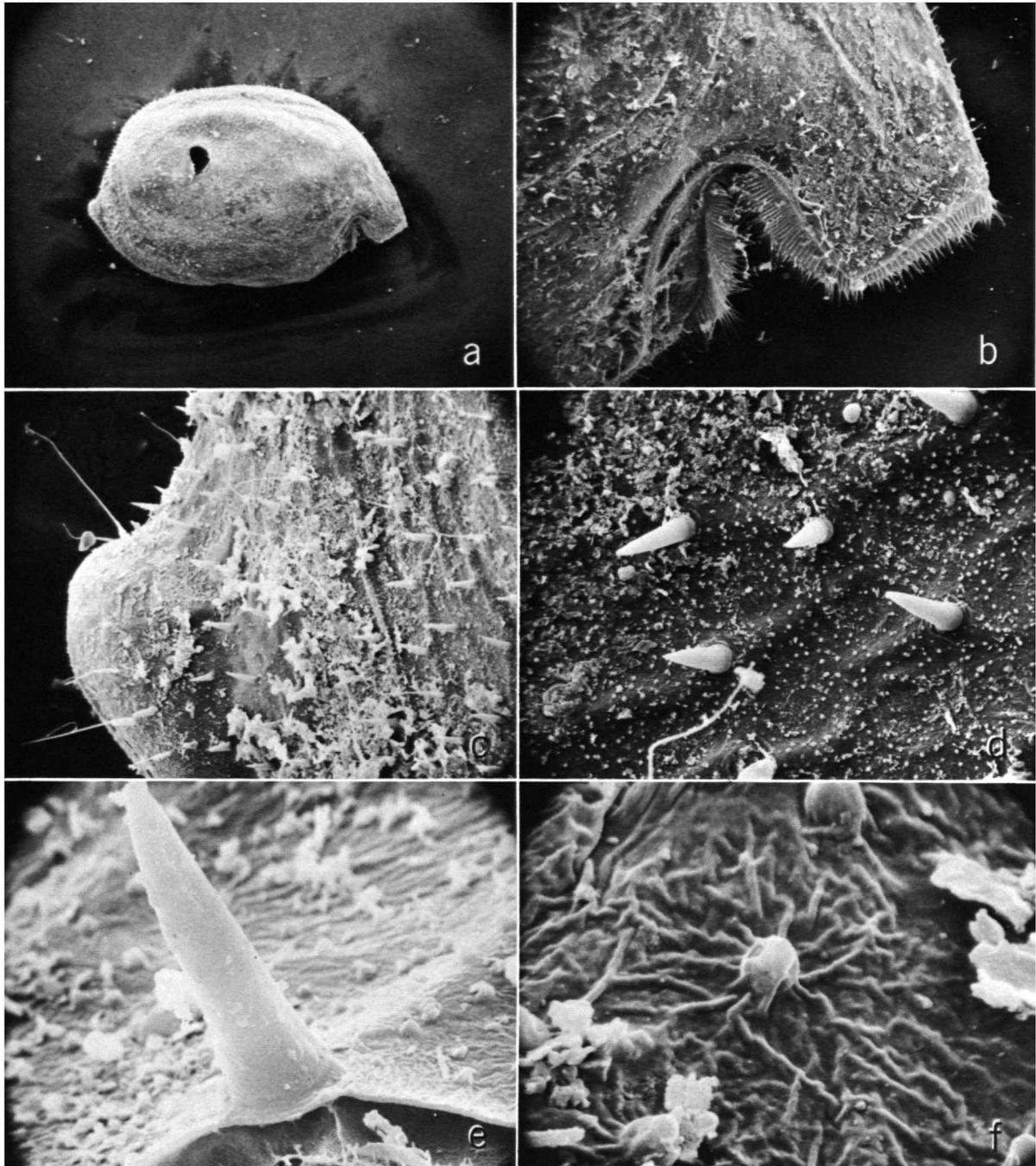


FIGURE 170.—*Philomedes ramus*, female, USNM 135047: *a*, right valve, $\times 20$; *b*, rostrum, $\times 100$; *c*, caudal process, $\times 200$; *d*, carapace in middorsal area, $\times 720$; *e*, bristle at edge of hole in shell, $\times 3000$; *f*, pustules, $\times 10,250$.

Furca (Figure 169m): Each lamella with 11 claws decreasing in length posteriorly along lamella; claw 1 with teeth forming medial and lateral row; clump of long medial hairs present on claw 1 near base; hairs present at bases of claws and following claws.

Eyes and rod-shaped organ (Figure 169n,o): Lateral eyes small, faint, with clusters of long hairs; medial eye pigmented, more than twice diameter of lateral eye. Rod-shaped organ elongated, 1-jointed with rounded tip.

Upper lip (Figure 169n): Lip hirsute with minute spines on anterior tip; unpaired process present between lip and medial eye.

Posterior: Rounded with hairs forming clusters along ventral part.

Epizoa: Stemmed cuplike protists abundant on body and appendages.

COMPARISONS.—The new species, *P. ramus*, differs from known species in having bifurcate tips on some of the terminal pegs of the 7th limb. The carapace is about 0.5 mm longer than species of *Philomedes* previously described herein.

DISTRIBUTION.—This species was collected at only one locality in the Subantarctic-to-35° region west of Chile at a depth of 3219 m (Figure 135).

42. *Philomedes lofthousae*, new species

FIGURES 171-177

Philomedes assimilis Brady [part].—Lofthouse, 1967:143.

HOLOTYPE.—Gravid ♀, specimen 1 herein, length 2.38 mm, F.20.53, collection of British Museum (Natural History).

TYPE-LOCALITY.—*Discovery* Cruise 1, station 58, in Hydrography Channel, a short distance southeast of Green Island, Kerguelen; water depth 50 m.

ETYMOLOGY.—This species is named after Patricia D. Lofthouse.

PARATYPES.—2 gravid ♀♀, 2 juveniles in alcohol, 1 complete freeze-dried specimen on slide. Two slides containing specimen dissected by P. Lofthouse. All specimens in collection of British Museum (Natural History). The specimen dissected by Lofthouse is from Residue 166, *Discovery* station 15, Kerguelen; other paratypes are from same sample as holotype.

Through Mr. David C. Lee, I received on loan from the South Australian Museum the following

specimens which had been identified by Lofthouse (1967:143) as *Philomedes assimilis*:

1. A vial with the label, "Res. 197, *Philomedes assimilis*" and 1 gravid ♀ and 1 juvenile of *P. lofthousae*. This sample is from *Discovery* station 53.

2. A vial with the label, "DRS, 23-11-29, St. 15, 55 m" and 3 specimens of *P. lofthousae*. This sample is from *Discovery* station 15.

3. A vial with the label, "Res. 199 A" and 1 N-1 ♂ of *P. lofthousae*. This sample is from *Discovery* station 58.

4. A vial with the label, "DRL 22/12/30, St. 58, 50 m, Jar 2" and 5 gravid ♀♀, 1 adult ♀ without eggs, and 6 juveniles of *P. lofthousae*. This sample is from *Discovery* station 58.

Through Dr. K. McKenzie and Miss Rosemary L. Sayers of the British Museum (Natural History), I received the following material from the vicinity of the Kerguelen Islands, which had been identified as *Philomedes assimilis* Brady by Lofthouse (1967:143):

1. A vial containing the label, "*Philomedes assimilis* Brady, Sta. 58, Kerguelen, 22.2.30. BANZARE, 1966. F. 20.53" and 6 specimens of *P. lofthousae*, including 3 gravid females. This sample is from *Discovery* station 58.

2. Two slides, each bearing the label, "*Philomedes assimilis* ♀, B.A.N.Z.A.R.E. Res. 166—Kerguelen, 1966. F.20.51." One of the slides bears 2 valves, the other slide bears appendages and eggs. The specimen is a gravid ♀ of *P. lofthousae*. This sample is from *Discovery* station 15.

NEW COLLECTIONS.—I received the following

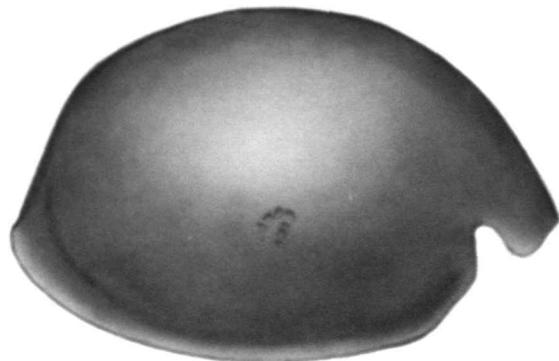


FIGURE 171.—*Philomedes lofthousae*, female, complete specimen, length 2.38 mm.



FIGURE 172.—*Philomedes lofthousae*, female, specimen number 1, length 2.38 mm, carapace: *a*, complete specimen, lateral view; *b*, anterior showing right lateral eye, 1st and 2nd joint of right 1st antenna, medial eye and rod-shaped organ, anterior process, upper lip. Female from residue 166, station 15, length of right valve, 2.37 mm, right valve, medial view: *c*, anterior; *d*, caudal process. Appendages: *e*, left 1st antenna, medial view; *f*, endopodite of right 2nd antenna, medial view; *g*, basale of left mandible, lateral view; *h*, right maxilla, medial view (not all bristles shown); *i*, tip of right 5th limb, anterior view; *j*, tip of left 5th limb, posterior view; *k*, tip of 7th limb (not all comb teeth shown); *l*, right lamella of furca; *m*, brushlike organ and genitals on right side. (Same magnification in microns: *b, l*; *c-h*.)

specimens from Dr. P. M. Arnaud collected by him in the vicinity of the Kerguelen Islands: 3 gravid ♀ plus 12 juveniles (USNM 139853) and 1 gravid ♀ and 2 juveniles returned to Dr. Arnaud, all from station Ker-D74; 1 juvenile ♂ (USNM 141101) from station Ker-D40.

DIAGNOSIS.—Posterior of carapace truncate; length 2.25–2.65 mm; surface with scattered bristles.

First antenna: 2nd joint with 5 or 6 bristles: 2 ventral (rarely 3), 2 dorsal, 1 or 2 lateral.

Second antenna: 1st endopodial joint with 6 bristles, 2nd with 4.

Mandible: Dorsal margin of basale with 6 bristles.

Seventh limb: Each limb with 30 or 31 bristles; 2 pegs present opposite comb.

Furca: Each lamella with 10 or 11 claws.

Lateral eye: Small with 2 or 3 ommatidia.

DESCRIPTION OF FEMALE (Figures 171–176).—Carapace with prominent rostrum with minute protuberance on rounded interior corner, broad incisur, and truncate posterior (Figures 171; 172a,c,d; 173).

Ornamentation: Carapace smooth with scattered single bristles on lateral surface and more closely spaced bristles along margin of rostrum and ventral margin (Figure 173e,f).

Infold (Figure 172c,d): Infold broad along anterior and posterior of shell, narrower along ventral margin; infold on rostrum with 29 or 30 bristles, mostly branching; minute bristle present on infold posterior to incisur; anteroventral part of infold with about 15 striae and 19 to 22 spinous bristles forming row; posteroventral and posterior infold with about 137 bristles along raised list (bristles longer than usually present in this region); 7 to 10 bristles forming row present between list and posterior edge of caudal process; about 5 short bristles present inside posterior edge of caudal process.

Selvage (Figure 173): Lamellar prolongation with marginal fringe present along anterior, ventral, and posterior margins; prolongation with typical segmentation present along rostrum and incisur; long bristles present on prolongation below incisur.

Size (Figure 131): Mounted specimen under cover slip, Residue 166, station 15: valve length 2.37 mm, height 1.68 mm, left valve, length only 2.43 mm. Gravid ♀ ♀, Residue 192, station 105:

specimen 1, length 2.38 mm, height 1.60 mm; specimen 2, length 2.65 mm, height 1.75 mm; specimen 3 (not dissected) length 2.25 mm, height 1.65 mm. Adult ♀, station 15, length 2.42 mm, height 1.73 mm. Gravid ♀, station 58, length 2.39 mm, height 1.62 mm. USNM 139853, length 2.34 mm, height 1.65 mm.

First antenna (Figures 172a,e; 174e): 1st joint with spines forming clusters along ventral margin and on lateral and medial surfaces; 2nd joint spinous, with 5 or 6 bristles, 2 ventral (rarely 3), 2 dorsal, 1 or 2 lateral; 3rd joint with 3 bristles, 2 dorsal, 1 ventral; 1 cluster of spines observed near terminal margin on medial surface; 4th joint with 5 spinous bristles, 4 ventral, 1 dorsal; surface of joint without spines; 5th joint with spines forming clusters on distal lateral surface; sensory bristle of 5th joint with 5 marginal filaments and tip consisting of 4 or 5 filaments; medial bristle of 6th joint about half length of sensory bristle of 5th joint and with short marginal spines except for 1 long proximal spine. Seventh joint: a-bristle spinous, about two-thirds length of sensory bristle; b-bristle with 1 proximal and 4 terminal filaments; c-bristle with about 2 proximal and 4 terminal bristles. Eighth joint: d and e-bristles bare, about same length as sensory bristle; f-bristle with about 3 proximal and 5 terminal filaments; g-bristle with 4 proximal and 4 terminal bristles. The distribution of bristles on the 2nd joint of 1st antenna of 4 specimens is tabulated below:

Specimen	Left limb			Right limb		
	dorsal	ventral	lateral	dorsal	ventral	lateral
Res. 192-1, station 105	2	2	1	2	2	1
Res. 192-2, station 105	2	3	1	2	2	1
Res. 166, station 15	2	2	2	2	2	2
USNM 139853	2	2	2	2	3	2

Second antenna (Figure 172f): Protopodite with abundant long hairs on dorsal margin and lateral surface near dorsal margin; short spines forming clusters present along ventral margin and on medial surface. Endopodite 2-jointed: 1st joint with 6 bristles, 5 proximal, 1 distal; 2nd joint with 1 long proximal bristle with long proximal and short distal marginal spines, 2 short distal bristles with short marginal spines, and 1 long recurved bare terminal filament. Exopodite: 1st

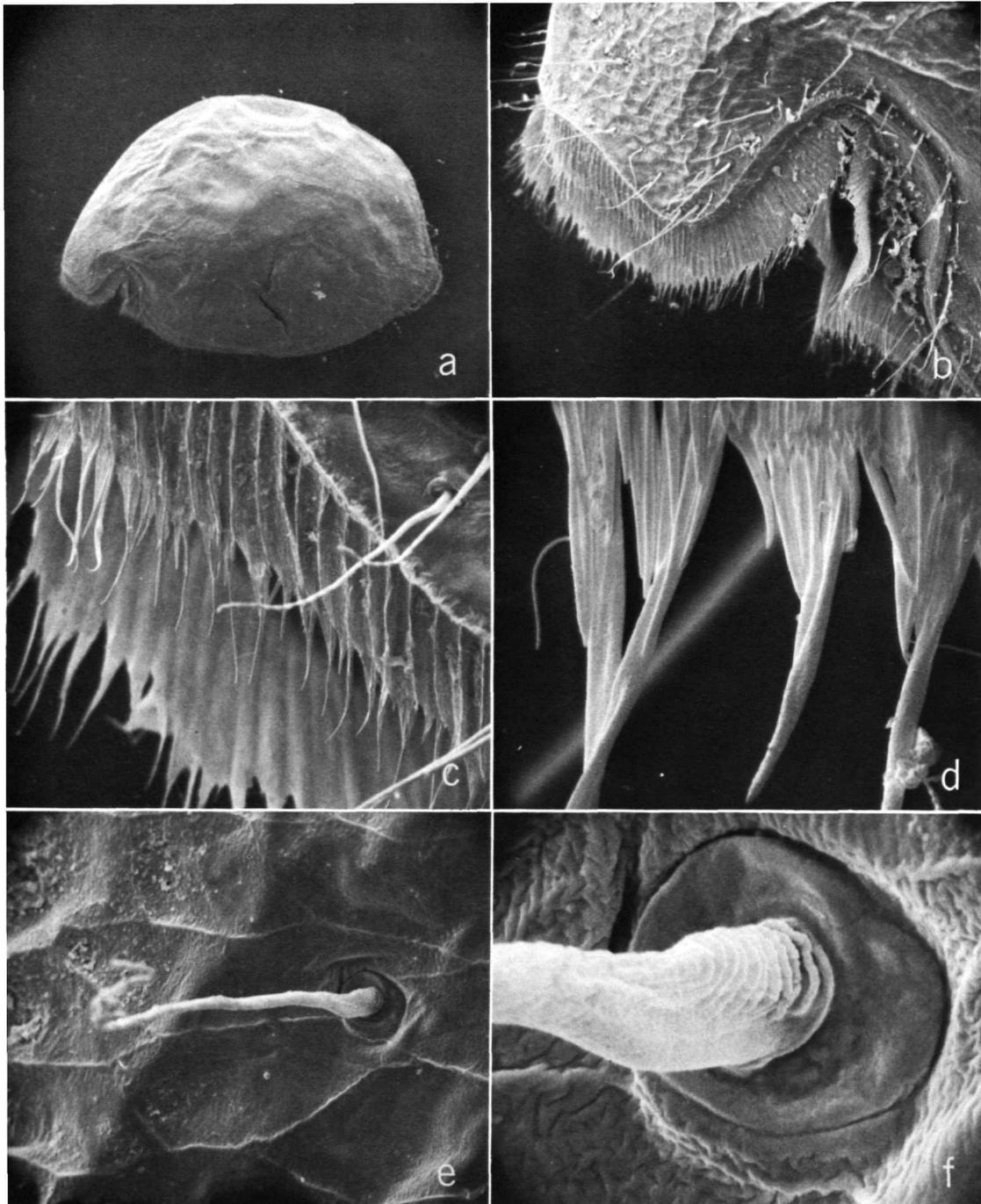


FIGURE 173.—*Philomedes lofthousae*, female, USNM 139853: *a*, carapace, $\times 35$; *b*, detail of rostrum, $\times 175$; *c*, lamellar prolongation of selvage on rostrum (outer row on right valve), $\times 750$; *d*, margin of lamellar prolongation shown in "*c*," $\times 4500$; *e*, shell surface and bristle, $\times 1500$; *f*, base of bristle shown in "*e*," $\times 7500$.

joint with short medial bristle; bristle of 2nd joint reaching past 9th joint and with 11 spines near middle; bristles on joints 3 to 5 with ventral spines and no natatory hairs; bristles on joints 5 to 8 with natatory hairs, some bristles broken; 9th joint with 6 or 7 bristles; distal margins of joints 2 to 8 with combs of short spines; faint spines forming clusters present on medial surface of joint 2; small basal spines present on joints 2 to 6.

Mandible (Figure 172g): Coxale with spines forming clusters on surface; endite spinous, pectinate, with bifurcate tip, small bristle present near base. Basale: medial side with 6 short proximal bristles, 3 stout pectinate, 3 slender spinous; lateral side with 5 short spinous bristles near ventral margin (proximal of these with base on ventral margin); ventral margin with 3 spinous distal bristles; dorsal margin with 4 long spinous bristles, 1 near middle, 1 distal to middle (this bristle absent on right limb of 1 of 3 specimens examined), and 2 terminal; lateral and medial surfaces of joint with numerous spines forming clusters. Exopodite three-fourths length of dorsal margin of 1st endopodite joint, with 2 terminal bristles, inner bristle slightly longer, both with short marginal spines. Endopodite: 1st joint with 4 spinous ventral bristles and few minute terminal spines at dorsal corner; medial and lateral surfaces of 2nd joint with spines forming clusters; dorsal margin with 3 spinous bristles in 2 groups, proximal with 3 bristles, distal group with 6; ventral margin with 2 groups of spinous bristles, each with 3 bristles; end joint with 3 claws and 4 spinous bristles, all claws with teeth along middle of ventral margin.

Maxilla (Figure 172h): 1st endite with 10 spinous bristles; 2nd endite with about 6 bristles; 3rd endite with about 8 bristles; 1st endite about twice width of 2nd and 3rd; 3rd endite about twice length of 1st and 2nd; coxale with stout plumose bristle; exopodite with 1 short proximal and 2 long terminal bristles. Basale: distal margin with short bristle on anterior corner and long spinous bristle on medial posterior corner. Endopodite: anterior margin of 1st joint with 1 spinous α -bristle, and 5 β -bristles, joint hirsute; end joint obscure but with 4 pectinate clawlike bristles and bare and spinous bristles.

Fifth limb (Figure 172i,j): Epipodial appendage with 55 bristles; 3 endites present. Endopodite: anterior side of 1st joint with 2 bristles near mid-

dle of distal margin and 1 short stout spinous bristle with broad base near outer edge; protuberance in front of main tooth bilobate; main tooth consisting of 3 pectinate teeth followed by smooth peg and 1 spinous bristle; large triangular tooth of 2nd joint with 1 large and 1 small node on inner margin; posterior side of joint with usual group of 3 bristles (bristles encrusted on specimen examined), 1 c-bristle, and possibly 1 spinous bristle near outer corner of large tooth (not seen clearly); inner lobe of 3rd joint with 3 spinous bristles, outer lobe with 2; 4th plus 5th joints hirsute with 6 spinous bristles.

Sixth limb: 3 or 4 spinous bristles present in place of epipodial appendage; 1st joint with 3 spinous bristles, 1 long terminal, 2 short medial; 2nd endite with 4 spinous bristles, 3 long terminal, 1 short medial; 3rd endite with 10 spinous bristles, 9 long terminal, 1 short medial; 4th endite with 9 spinous bristles, 8 terminal, 1 medial; end joint with 25 spinous bristles; limb hirsute.

Seventh limb (Figures 172k, 174f, 175a-c): limb with 30 or 31 bristles, 5 in distal group (3 plus 2), 25 or 26 in proximal group, each bristle with 4 to 9 bells, some bristles with a few marginal spines distally; terminal comb with 13 alate teeth; 2 pegs with suaged tips present opposite comb.

Furca (Figures 172l, 175e,f): Each lamella with 10 or 11 claws decreasing in length and stoutness posteriorly along lamella; hairs present medially at base of claws and following last claw.

Eyes and rod-shaped organ (Figures 172b, 174a-d, 176a,b): Lateral eyes small with 2 or 3 ommatidia. Medial eye large, pigmented. Rod-shaped organ elongate, 1-jointed with rounded tip.

Upper lip (Figures 172b, 176): Lip hirsute ventrally with about 4 spines on anterior tip.

Brushlike organ (Figure 172m): Organ consisting of about 6 minute bristles.

Anterior (Figures 172b, 174a-d, 176b): Single large triangular anterior process present above lip.

Parasites: Cuplike stalked protists abundant on appendages; crinkled filaments and clusters of ovoid protists also present. Cuplike protists were also attached to larvae inside the brood chamber of specimen 2 from Residue 192.

Eggs: Specimen from Residue 166, 17 eggs; specimen 1 from station 58, 17 eggs; specimen from station 58 (from collection in South Australian Museum), 12 eggs; USNM 139853, 11 eggs.

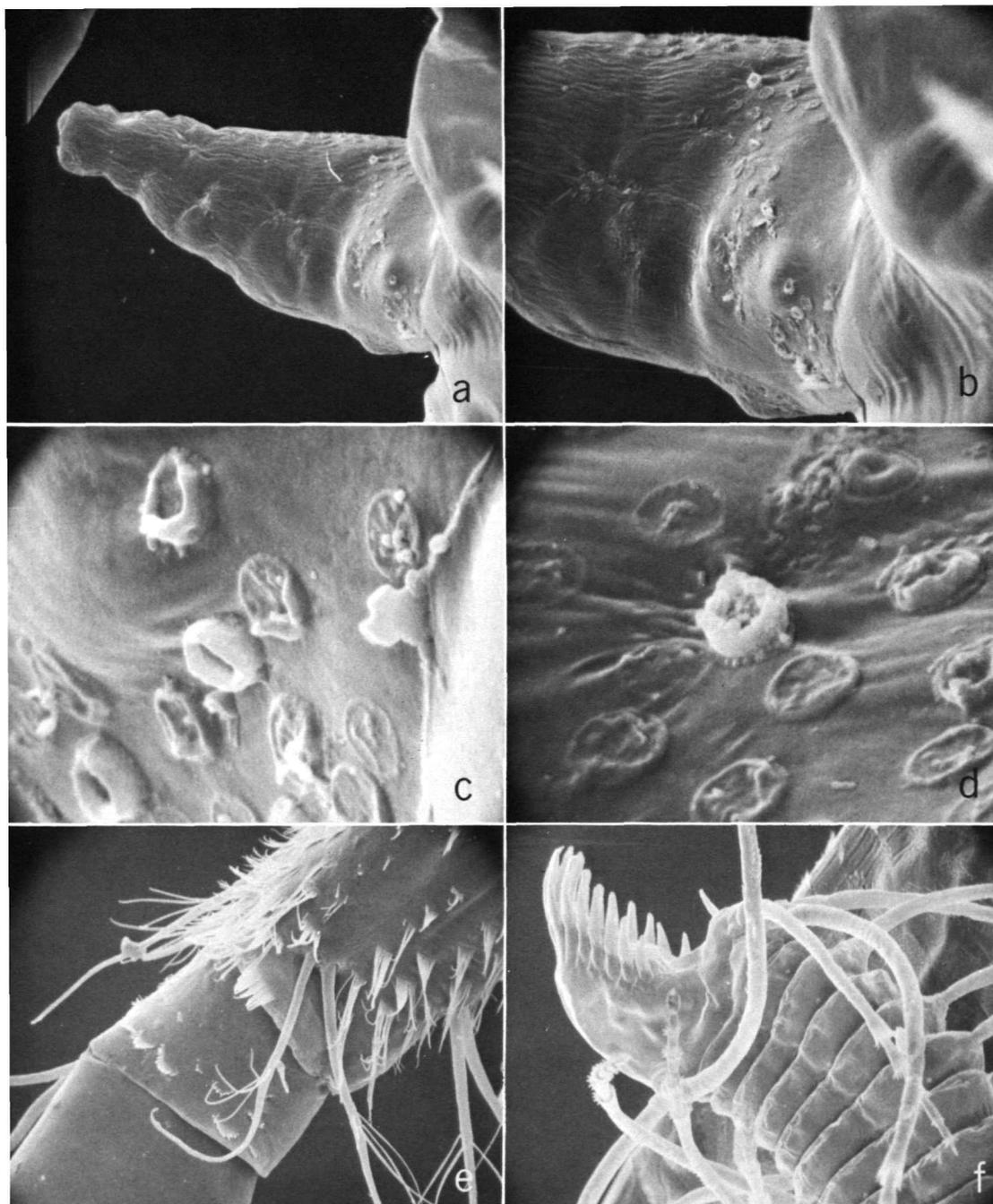


FIGURE 174.—*Philomedes lofthousae*, female, USNM 139853: *a*, anterior process, $\times 1000$; *b*, proximal part of anterior process, $\times 1700$; *c*, object on lower part of anterior process, $\times 10,000$; *d*, object on upper part of anterior process, $\times 10,000$; *e*, left 1st antenna, joints 2-4 lateral view, $\times 500$; *f*, tip of right 7th limb, $\times 500$.

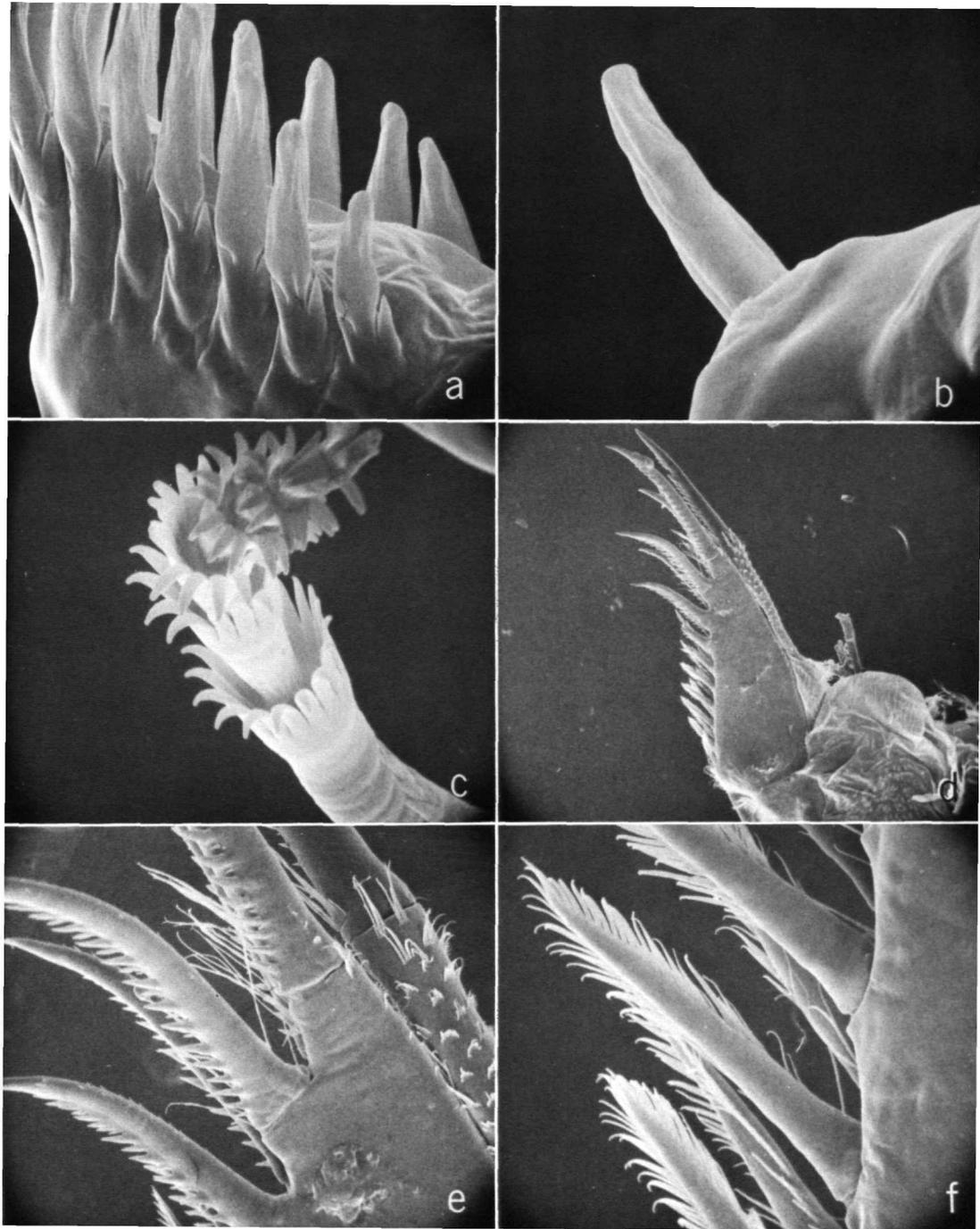


FIGURE 175.—*Philomedes lothousae*, female, USNM 139853: *a*, comb of 7th limb shown in Figure 174*f*, $\times 200$; *b*, peg of 7th limb shown in Figure 174*f*, $\times 5000$; *c*, bristle of 7th limb shown in Figure 174*f*, $\times 3500$; *d*, furca, $\times 90$; *e*, anterior claws of furca shown in "*d*," $\times 360$; *f*, posterior claws of furca shown in "*d*," $\times 900$.

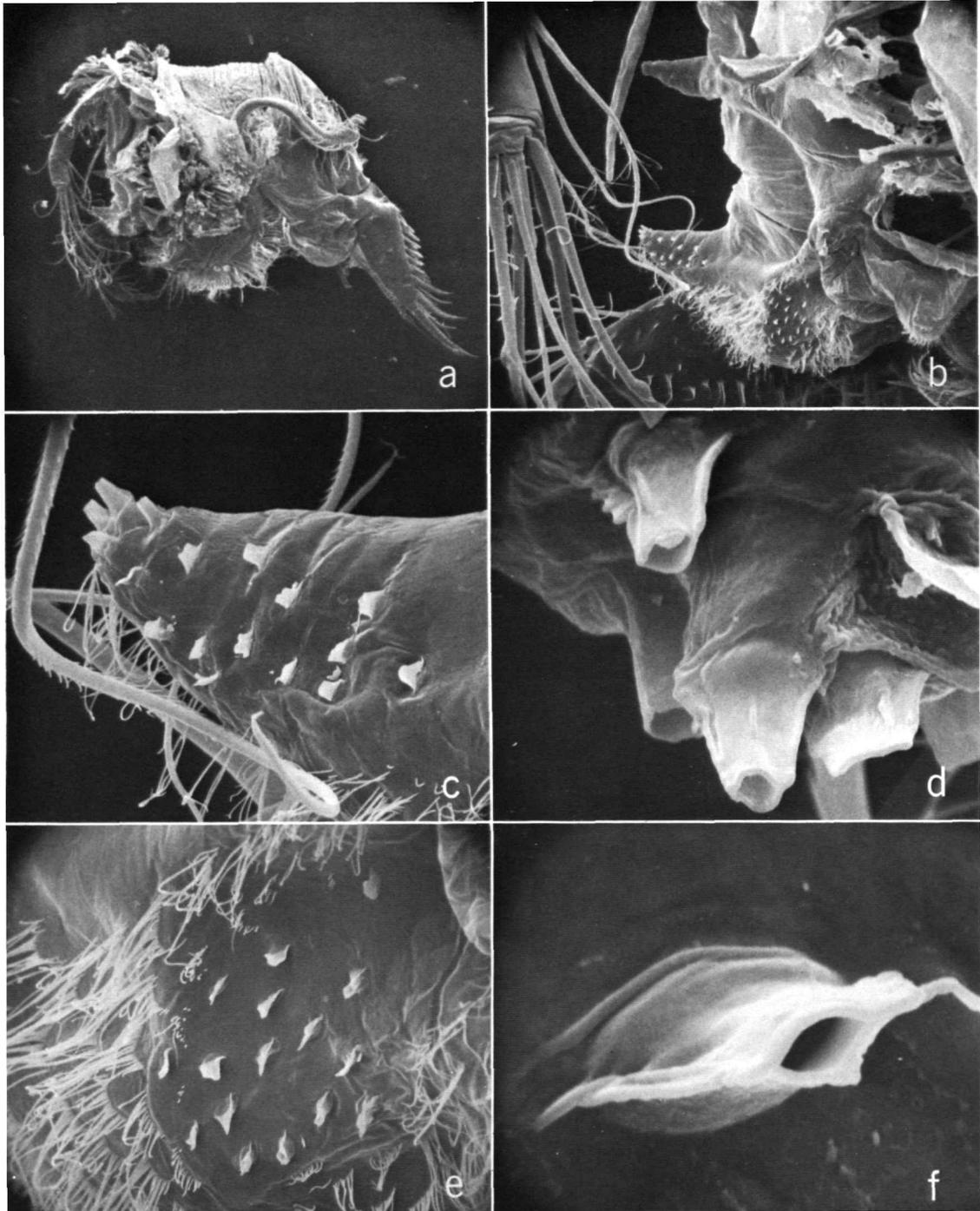


FIGURE 176.—*Philomedes lothousae*, female, USNM 139853: *a*, specimen with carapace and some appendages removed, $\times 43$; *b*, detail of "*a*" showing upper lip and anterior process, $\times 2000$; *c*, anterior part of upper lip in "*b*," $\times 1000$; *d*, tip of upper lip (anterior toward bottom of picture), $\times 5000$; *e*, posterior glandular field of lip, shown in "*b*," $\times 1000$; *f*, detail of opening in "*e*," $\times 10,000$.

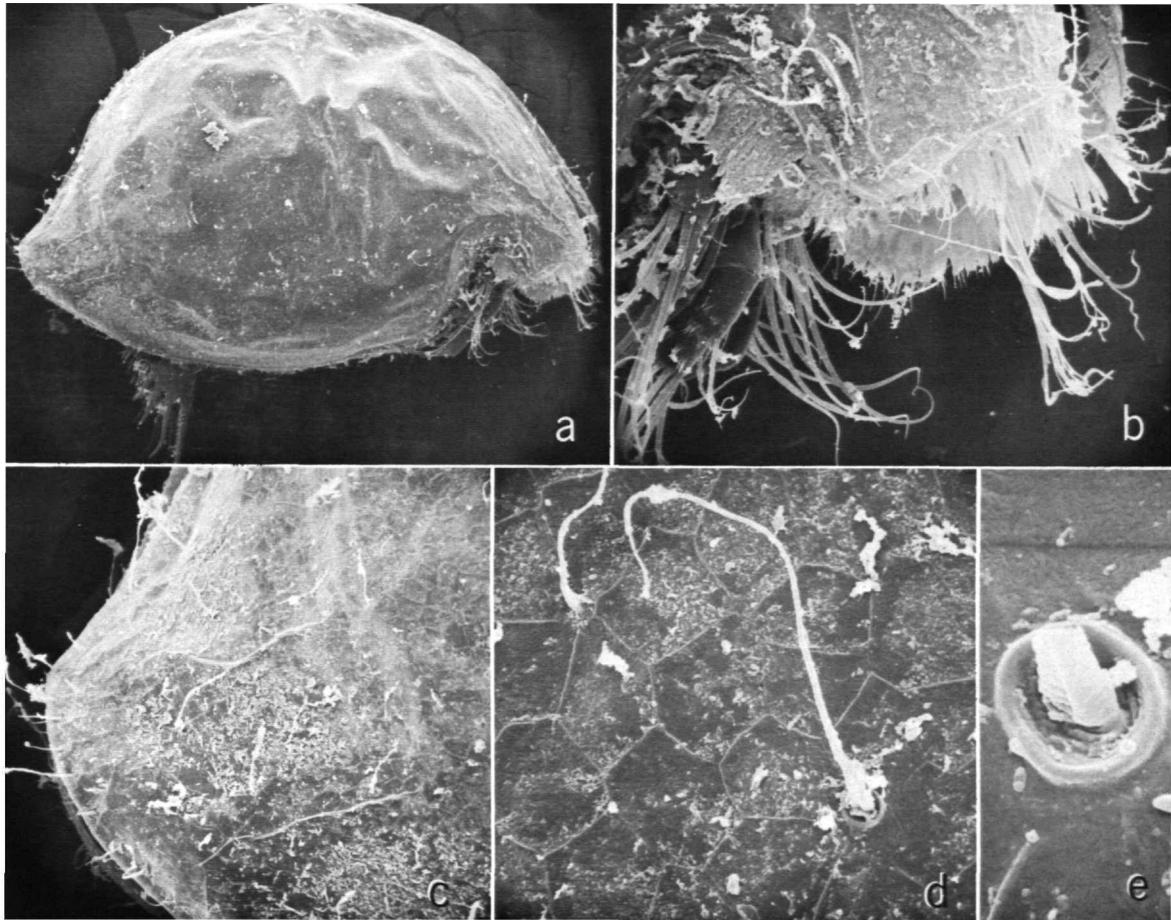


FIGURE 177.—*Philomedes lofthousae*, juvenile from residue 192 in British Museum (Natural History): a, complete specimen, $\times 50$; b, anterior, $\times 200$; c, posterior, $\times 200$; d, surface reticulations and bristle, $\times 1000$; e, detail of pore (bristle broken), $\times 5000$.

Gut content: Juvenile female (USNM 139853) with copepod fragments in its gut; fragments consisting entirely of exoskeletons.

DESCRIPTION OF N-1 ♂.—Carapace size: USNM 141101, length 1.75 mm, height 1.14 mm.

DESCRIPTION OF JUVENILE FROM RESIDUE 192.—Carapace: See Figure 177.

COMPARISONS.—The presence of 2 ventral bristles, 2 dorsal bristles, and 1 or 2 lateral bristles on the 2nd joint of the 1st antenna distinguishes this species from those previously described.

DISTRIBUTION.—This species was collected only in the Kerguelen subregion of Subantarctica at depths of 25 to 55 m (Figure 135).

43. *Philomedes cubitum*, new species

FIGURES 178, 179

HOLOTYPE.—USNM 138656, adult ♀ without eggs, length 1.40 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Hero* Cruise 69-5, station 48.

ETYMOLOGY.—The specific name is derived from the Latin "cubitum" [= elbow] and refers to the right angle formed by the selvage in the postero-ventral corner of each valve.

PARATYPES.—USNM 138660, juvenile ♀, length 0.95 mm, height 0.65 mm; USNM 138662, N-1 ♂;

USNM 138663, 1 adult ♀; USNM 138665, 20 juveniles, all from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 138669, 1 N-1 ♂ + 4 juveniles, all from *Hero* Cruise 69-5, station 50.

DIAGNOSIS.—Posterior with ventral corner only slightly more angular than dorsal corner and with very slight flattening of posterior margin; selvage forming right angle in posteroventral part of each valve; length about 1.40 mm.

First antenna: 2nd joint with 3 bristles, 1 ventral, 1 dorsal, 1 lateral.

Second antenna: 1st endopodial joint with 6 bristles, 2nd with 2.

Mandible: Dorsal margin of basale with 3 bristles.

Seventh limb: Each limb with about 22 bristles; 4 pegs (1 longer than others) present opposite comb.

Furca: Each lamella with 5 stout claws followed by 5 weaker claws.

Lateral eye: Small with 2 ommatidia.

DESCRIPTION OF ADULT FEMALE. (Figures 178, 179a-k).—Carapace with prominent rostrum with anterior and inferior corners rounded and small protuberance at lower end; posterior margin with ventral corner only slightly more angular than dorsal corner and with very slight flattening of posterior edge, otherwise appearing evenly rounded (Figures 178, 179a-d).

Ornamentation: Carapace smooth but with minute pores visible under high magnification; short and long hairs scattered over surface, more abundant on rostrum and along anteroventral margin.

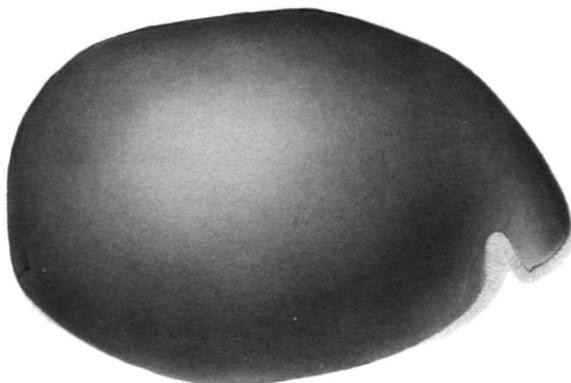


FIGURE 178.—*Philomedes cubitum*, female, USNM 138663, complete specimen, length 1.39 mm.

Infold (Figure 179b-d): Infold broad along anterior, ventral, and posteroventral margin; infold on rostrum with about 21 bristles; 1 small bristle present on infold posterior to incisur; anteroventral part striate with about 9 short bristles; infold along ventral margin bare; ridge paralleling inner margin of posteroventral and posterior infold with about 25 bristles in groups of 1 to 3 bristles; selvage forming right angle on posteroventral infold of both valves (selvage farther from posterior edge on right valve); 1 or 2 small bristles present on posteroventral infold anterior to right angle of selvage; 1 or 2 bristles present on posterior corner of right angle of selvage on both valves.

Selvage: Selvage unusual in having right angle in posteroventral part of each valve. Lamellar prolongation fringed, broadly striate in area of rostrum and incisur; anteroventral prolongation striate and with long hairs on lateral side.

Size (Figure 131): USNM 138656, length 1.40 mm, height 1.02 mm; USNM 138663, length 1.39 mm, height 1.11 mm.

First antenna: 1st and 2nd joints with spines along dorsal and ventral margins and lateral and medial surfaces; 2nd joint with 3 spinous bristles, 1 ventral, 1 dorsal, 1 lateral; 3rd joint with 3 terminal bristles with short marginal spines, 1 ventral, 2 dorsal, and minute teeth forming row near middle of medial and lateral surfaces; 4th joint with 6 spinous bristles, 4 ventral, 2 dorsal; sensory bristle of 5th joint with 5 short proximal filaments and 3 longer terminal filaments not including stem; medial bristle of 6th joint with long proximal and short distal spines. Seventh joint: a-bristle spinous, slightly longer than bristle of 6th joint; b-bristle with 1 proximal and 3 distal filaments excluding tip; c-bristle with 5 short proximal filaments and 4 terminal filaments excluding stem. Eighth joint: d- and e-bristles bare; f-bristle with 4 short proximal filaments and 4 terminal filaments excluding tip; g-bristle with 3 or 4 proximal filaments and 4 terminal filaments excluding tip; filaments on all bristles bare except for spine at tip.

Second antenna (Figure 179e): Protopodite bare. Endopodite 2-jointed: 1st joint with 5 proximal and 1 distal bristle; 2nd joint with 1 long ventral bristle with wreaths of long spines and 1 long recurved terminal bristle. Exopodite: 1st joint with small distomedial spine; bristles of joints 6 to 8

with natatory hairs; bristles of joints 6 to 8 and 4 long bristles of 9th joint broken on holotype; middle of ventral margins of bristles of joints 2 to 5 with stout teeth; joints 2 to 8 with stout basal spine and short spines forming row; joint 9 with 7 bristles (4 long broken bristles with natatory hairs on remaining part, 3 short with short marginal spines).

Mandible (Figure 179f): Coxale with spines forming groups on medial surface; coxale endite spinous with bifurcate tip and small bristle near base. Basale: dorsal margin with 3 bristles, 1 near middle with short faint marginal spines, 2 terminal (longer of these with long proximal spines, shorter bristle bare); medial surface with 6 short proximal bristles, 3 stout pectinate, 3 slender with

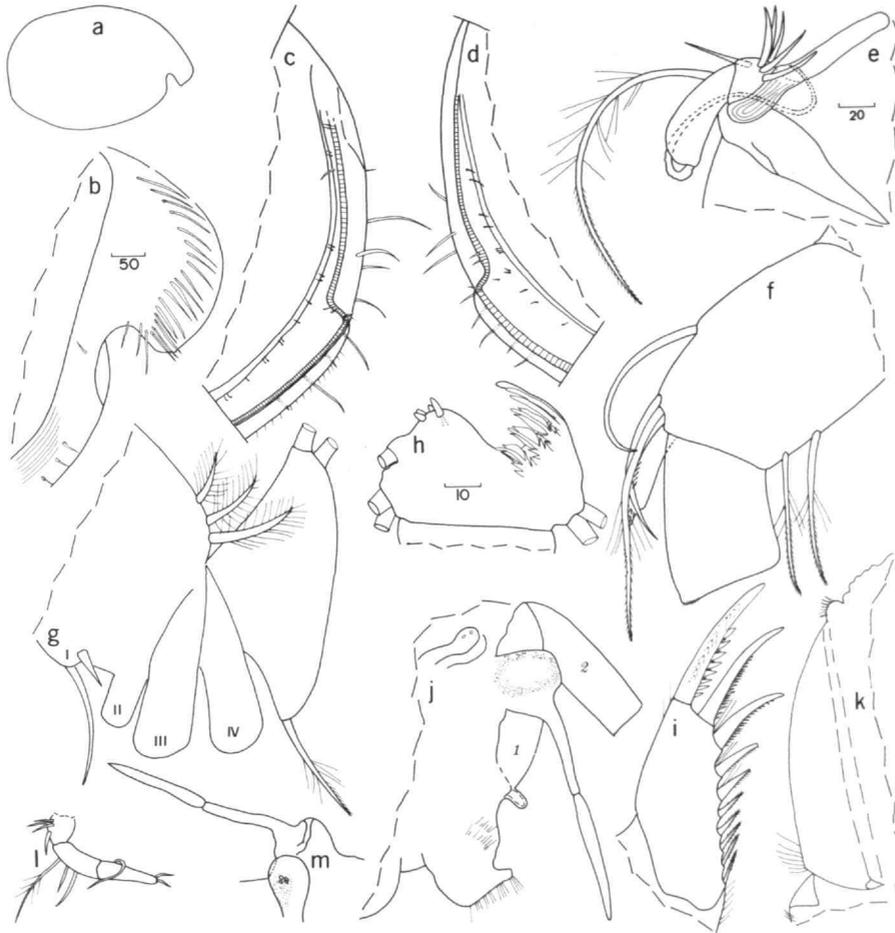


FIGURE 179.—*Philomedes cubitum*, female, USNM 138663, length 1.39 mm: a, complete carapace, lateral view. Female, USNM 138656, length 1.40 mm: b, anterior of left valve, medial view; c, posterior of right valve, medial view; d, posterior of left valve, medial view; e, endopodite and part of protopodite of right 2nd antenna, medial view; f, basale, exopodite and 1st endopodial joint of right mandible, medial view (not all bristles shown); g, left 6th limb, medial view (not all bristles shown); h, tip of 7th limb; i, right furcal lamella; j, anterior showing right lateral eye, 1st and 2nd joints of left 1st antenna, medial eye and rod-shaped organ, anterior process and upper lip; k, posterior. N-1 male, USNM 138662, length 1.23 mm: l, endopodite of left 2nd antenna, lateral view; m, left lateral eye, medial eye and rod-shaped organ. (Same magnification in microns: b-d, i-m; e-g.)

long spines; ventral margin with 2 bristles with long proximal and short distal spines; lateral surface with 5 bristles oriented venteriad; medial and lateral surface of basale with spines forming clusters. Exopodite with hirsute tip reaching halfway up dorsal margin of 1st endopodite joint and with 2 bristles (inner longer bristle with long proximal and short distal spines, outer shorter bristle with short marginal spines or bare). Endopodite: ventral margin of 1st joint with 4 spinous bristles; dorsal margin with short spines forming row on distal corner; dorsal margin of 2nd joint with 3 bristles in proximal group and 5 in distal group; distal ventral margin with 3 spinous bristles in both proximal and distal groups; proximal medial surface of 2nd joint with long and short spines forming rows; end joint with 4 bristles and 3 stout claws with teeth along middle of ventral margin.

Maxilla: Endite I with 10 bristles, endite II with 7 bristles, endite III with 1 proximal and about 9 distal bristles. Coxale with stout plumose bristle. Exopodite short with 3 bristles: proximal bristle short with short marginal spines; 1 terminal bristle with short marginal spines, other with wreaths of long spines. Distal margin of basale with 3 long bristles. Endopodite: 1st joint with single α -bristle with wreaths of long spines and 4 β -bristles; end joint with 4 α -bristles, 3 clawlike pectinate bristles and several bare and spinous bristles.

Fifth limb: Epipodial appendage with 49 bristles. Exopodite 1st joint: triangular protuberance in front of main tooth with proximal node; main tooth with 3 pectinate teeth and short proximal tooth either smooth or with few teeth; 1 spinous bristle proximal to smooth tooth. Exopodite 2nd joint: large triangular tooth with 2 nodes on medial margin; lateral corner with 2 short spinous bristles; posterior side with usual stout bristle and group of 3 bristles distal to it. Exopodite 3rd joint: medial lobe with 3 spinous bristles, outer lobe with 2 spinous bristles. Fourth and 5th joints fused and with 6 spinous bristles.

Sixth limb (Figure 179g): Epipodial appendage with 3 or 4 hirsute bristles; 1st endite with 2 spinous bristles, 1 medial short, 1 terminal longer; 2nd endite with 4 spinous bristles, 1 medial, 3 terminal; 3rd endite with 9 spinous bristles, 1 medial, 8 terminal; 4th endite with 9 spinous bristles, 1 medial, 8 terminal; end joint with 20 bristles

(about 7 medial, remainder ventral or slightly lateral); medial and lateral surfaces of end joint and lateral surfaces of endites 1 to 4 hirsute; posterior end of end joint projecting posteriorly.

Seventh limb (Figure 179h): Each limb with 22 bristles, 5 in distal group (3 dorsal, 2 ventral) and 17 proximal (10 dorsal, 7 ventral); each bristle with 3 to 7 bells and distal marginal spines; end comb with 11 alate teeth with 2 basal teeth on each side; 4 short pegs (1 of these longer than others) on dorsal side opposite comb.

Furca (Figure 179i): Each lamella with 5 stout claws followed by 5 weaker claws; claw 1 with stout teeth along concave margin and along medial surface; tips of main claws rounded; hairs present at bases of claws and following last claw.

Eyes and rod-shaped organ (Figure 179j): Lateral eye minute with 2 small ommatidia; medial eye large, bare, pigmented; rod-shaped organ elongate, 2 jointed, with rounded tip.

Upper lip (Figure 179j): Lip hirsute; single elongate process present between lip and medial eye.

Posterior: Posterior margin hirsute above furca and in posterodorsal area.

Parasites: USNM 138656 with cuplike stalked protists attached to many appendages.

Gut content: Gut of USNM 138656 with polychaete spines, probably of family Syllidae according to M. Pettibone (pers. comm., 1971).

DESCRIPTION OF N-1 MALE (Figure 179l,m).—Carapace similar in shape to adult female, except posterior slightly truncate. Size: USNM 138662, length 1.23 mm, height 0.93 mm; USNM 138669, length 1.24 mm, height 0.84.

Second antenna (Figure 179l): Endopodite 3-jointed: 1st joint with 4 bristles; 2nd joint elongate with 3 ventral bristles; 3rd joint elongate with 1 long proximal bristle and 2 short terminal bristles.

Seventh limb: Well developed.

Lateral eye (Figure 179m): Small with 2 minute ommatidia; diameter of eye about twice that of lateral eye on adult female.

Medial eye and rod-shaped organ (Figure 179m): Similar to those on adult female.

COMPARISON.—This new species, *P. cubitum*, is only slightly larger than *P. minys* and the appendages of both species are very similar. The posterior margin of the carapace of the adult

female of *P. minys*, however, is distinctly truncate, and its posterior selvage does not have the right-angled bend present in the selvage of *P. cubitum*. Juveniles of *P. cubitum*, having a slightly truncate posterior, resemble the carapace of *P. minys*, but *P. cubitum* can be identified by the right-angled bend in the posterior selvage. The right-angled bend of the selvage on the posteroventral corner of the carapace of *P. cubitum* has not been reported in other species of *Philomedes*.

DISTRIBUTION.—This species was collected only at two stations in the Magellanic subregion of the Subantarctic region at depths of 21 to 28 m (Figure 132).

Philomedes Species Indeterminate

MATERIAL.—USNM 125850, 1 juvenile ♂, length 1.64 mm, height 1.28 mm; USNM 125851, 1 juvenile, length 1.05 mm, height 0.73 mm; USNM 125852, 1 juvenile; USNM 125864, 1 juvenile, length 1.13 mm, height 0.71 mm; USNM 125865, 1 juvenile, length 1.26 mm, height 0.10 mm; USNM 127252, 1 juvenile ♂, length 1.45 mm, height 1.11 mm; USNM 127253, 1 juvenile; USNM 127498, 3 juveniles; USNM 136178, 1 adult ♂, length 2.27 mm, height 1.28 mm; *Discovery* Cruise 1, station 61 (residue 92), 1 juvenile; USNM 138153, 1 juvenile, length 2.72 mm, height 1.95 mm; USNM 138155, 1 juvenile, length 1.50 mm, height 1.02 mm; USNM 138658, 235 juveniles; USNM 138666, 1 juvenile, length 1.01 mm, height 0.68 mm, + 8 juveniles; USNM 139100, 1 juvenile; USNM 139146, 1 juvenile; USNM 125495, 1 juvenile.

USNM 125850–125852 from Deep Freeze II, *Glacier* station 19; USNM 125864 from Deep Freeze III, *Glacier* station B1–8j; USNM 125865 from Deep Freeze II, *Glacier* station 22; USNM 127252 from IWSOE, *Glacier* Cruise 2, station 0010; USNM 127253 from IWSOE, *Glacier* 2, station 0006; USNM 127498 from Deep Freeze I, *Edisto* stations 5, 6, 8 combined; USNM 136178 from *Octans* station AM; USNM 138153 from *Vema* Cruise 14, station V–14–32; USNM 138155 from Deep Freeze IV, *Staten Island* station S.I.4; USNM 138658 from *Hero* Cruise 69–5, station 48; USNM 138666 from *Hero* Cruise 69–5, station 49; USNM 139100 from *Hero* Cruise 69–5, station 53;

USNM 139146 from *Hero* Cruise 71–2, station 665; USNM 125495 from *Staten Island* station 37/63.

DISTRIBUTION.—The distribution of *Philomedes* species indeterminate is shown in Figure 135.

Euphilomedes Poulsen, 1962

TYPE-SPECIES.—*Euphilomedes nodosa* Poulsen, 1962, by subsequent designation (Kornicker, 1967a).

This genus is represented by two species in the study area: *E. agilis* (Thomson, 1879) and *E. ferox* Poulsen, 1962. Both species belong in the *agilis*-group of Poulsen (1962:361).

DIAGNOSIS OF *agilis*-GROUP.—Carapace without ornamentation other than punctae, with shallow incisure, and without caudal process.

Second antenna: Endopodite of male 3-jointed, reflexed. Endopodite of female (N–1 stage) known only for *E. ferox*: 2-jointed with small 2nd joint bearing 2 bristles. Exopodite: 9th joint with 4 to 6 bristles.

Mandible: Dorsal margin of 2nd endopodite of mandible with bristles forming 3 groups. End joint with not more than 2 claws.

Rod-shaped organ: Organ unsegmented, broadening in middle and tapering distally.

Furca: Claws 1, 2, and 4 primary; claw 3 and claws posterior to claw 4 secondary.

REMARKS.—The fifth limb of females and juvenile males have been described in the *agilis*-group on *E. ferox* (N–1 ♀) and *E. agilis* (N–1 ♂). Both differ considerably from the 5th limbs of other members of the Philomedinae in having 2 well-developed teeth on the inner curvature of the large tooth on the 2nd exopodite joint. As noted by Poulsen (1962:393) a special genus might be warranted. One of the species referred by Poulsen (1962) to the *agilis*-group, *E. bradyi*, is known only from adult males. Therefore, it is not known whether the fifth limbs of the female of that species are unusual. I think it possible that some or all species in the *agilis*-group might eventually be referred to *Pleoschisma* Brady, 1890, if the female of the type-species of that genus, *P. moroides* (Brady, 1890), should prove to have well-developed teeth on the inner margin of the large tooth on the 2nd joint of the 5th limb.

DISTRIBUTION.—The genus *Euphilomedes* is

widely distributed. Its northern limit is about 63°N. The northern limit of members of the *agilis*-group is about 20°N. The genus is represented in the study area only in the vicinity of Australia and New Zealand, the southernmost limit of the range

is 45°50'S (Figure 127). Members of the genus have been mostly collected in shallow water. Males are often collected in surface plankton tows. In the present study area the depth range is intertidal to about 100 m.

Key to Species

(Includes only species south of 35°S)

FEMALES AND JUVENILE MALES

- Exopodite of 5th limb with 2 large fanglike teeth on 1st joint and 2 prongs on proximal tooth of 2nd joint.....44. *E. ferox*
 Exopodite of 5th limb with 1 large fanglike tooth on 1st joint and 3 prongs on proximal tooth of 2nd joint.....45. *E. agilis*

44. *Euphilomedes ferox* Poulsen, 1962

Euphilomedes ferox Poulsen, 1962:391, figs. 171, 172.

HOLOTYPE.—Late larval stage female, length 2.0 mm, unique specimen.

TYPE-LOCALITY.—Tasman Strait Australia, 37° 05'S, 150°05'E, 70–100 m.

MATERIAL EXAMINED.—None.

DIAGNOSIS OF LATE LARVAL FEMALE.—Carapace oval in lateral view with very slight incisure, length 2.00 mm, height 1.64 mm, surface with small punctae.

Second antenna: 2nd endopodite joint very small and with 2 terminal bristles.

Mandible: Dorsal margin of 2nd endopodite joint with 3 groups of bristles; end joint with 2 claws.

Fifth limb: Inner margin of large tooth of 2nd exopodite joint with 2 very large fanglike teeth, proximal of these with 1 marginal tooth, distal with 3 marginal teeth.

Furca: 8 claws on lamella (?juvenile character); claw 3 secondary and about two-thirds length of claw 4.

Seventh limb: Each limb with 23 bristles; terminal comb with 15 teeth; 2 pegs present opposite comb, outer peg much shorter than inner peg.

DISTRIBUTION.—Known only from type-locality (Figure 185).

REMARKS.—The exopodite of the 5th limb of *E. ferox* differs from that of the N-1 male of *E. agilis* described herein in having 3 teeth instead of only 1 on the 1st joint, and only 2 prongs in-

stead of 3 on the proximal tooth of the 2nd joint. The 7th limb of *E. ferox* has more bristles than on the 7th limb of *E. agilis*.

45. *Euphilomedes agilis* (Thomson)

FIGURES 180–184

Philomedes agilis Thomson, 1879:257, figs. C, 3a-e; D, 1a-g.—Brady, 1897:90, pl. 16: figs. 13–16; 1898 [listed].—Müller, 1912:25 [key], 28.—Thomson and Anderton, 1921:117 [listed].

Euphilomedes agilis (Thomson).—Poulsen, 1962:388, fig. 170 [?].—Eager, 1971:55 [listed].

HOLOTYPE.—Not designated.

SYNTYPE-LOCALITY.—Rock pools on Taieri Beach, New Zealand.

MATERIAL.—USNM 128283, 1 adult male, USNM 128280, 1 N-1 male; both collected on *Eltanin* Cruise 20, station 91, New Zealand.

REMARKS.—The description given by Thomson (1879) is in insufficient detail to be able to recognize the species. Brady (1897) gave a supplementary description of the species based on specimens sent to him by Thomson. According to Brady (p. 91) these were also from rock pools on Taieri Beach. It is not possible from the supplementary description to be certain that Brady is dealing with the same species described by Thomson. For example, Brady described (p. 91) and illustrated (pl. 16: fig. 15) a 7th limb without pegs on the terminal margin opposite the comb, whereas, the 7th limb illustrated by Thomson (fig. C-3c) has at least 1 peg opposite the comb. If it is assumed



FIGURE 180.—*Euphilomedes agilis*, male, USNM 128283, length 1.97 mm, carapace: *a*, complete specimen, lateral view; *b*, same, dorsal view; *c*, detail on lateral surface of right valve; *d*, detail of dorsal margin shown in "*b*," anterior to right; *e*, posterior infold on right valve, medial view; *f*, anterior of right valve, medial view. Appendages: *g*, spines along distal margin of 2nd joint of exopodite of left 2nd antenna, lateral view; *h*, middle part of dorsal margin of 2nd endopodial joint of right mandible, medial view; *i*, coxale endite and proximal ventral margin of right mandible, medial view; *j*, maxilla; *k*, 6th limb (not all bristles shown); *l*, tip of 7th limb; *m*, distal part of right lamella of furca (marginal teeth not shown); *n*, claws 1 and 2 of left lamella of furca, medial view; *o*, medial eye and rod-shaped organ; *p*, left copulatory limb; *q*, tip of right copulatory limb, dorsal view. (Same magnification in microns: *d-f*; *k,m-q*; *g-i*.)

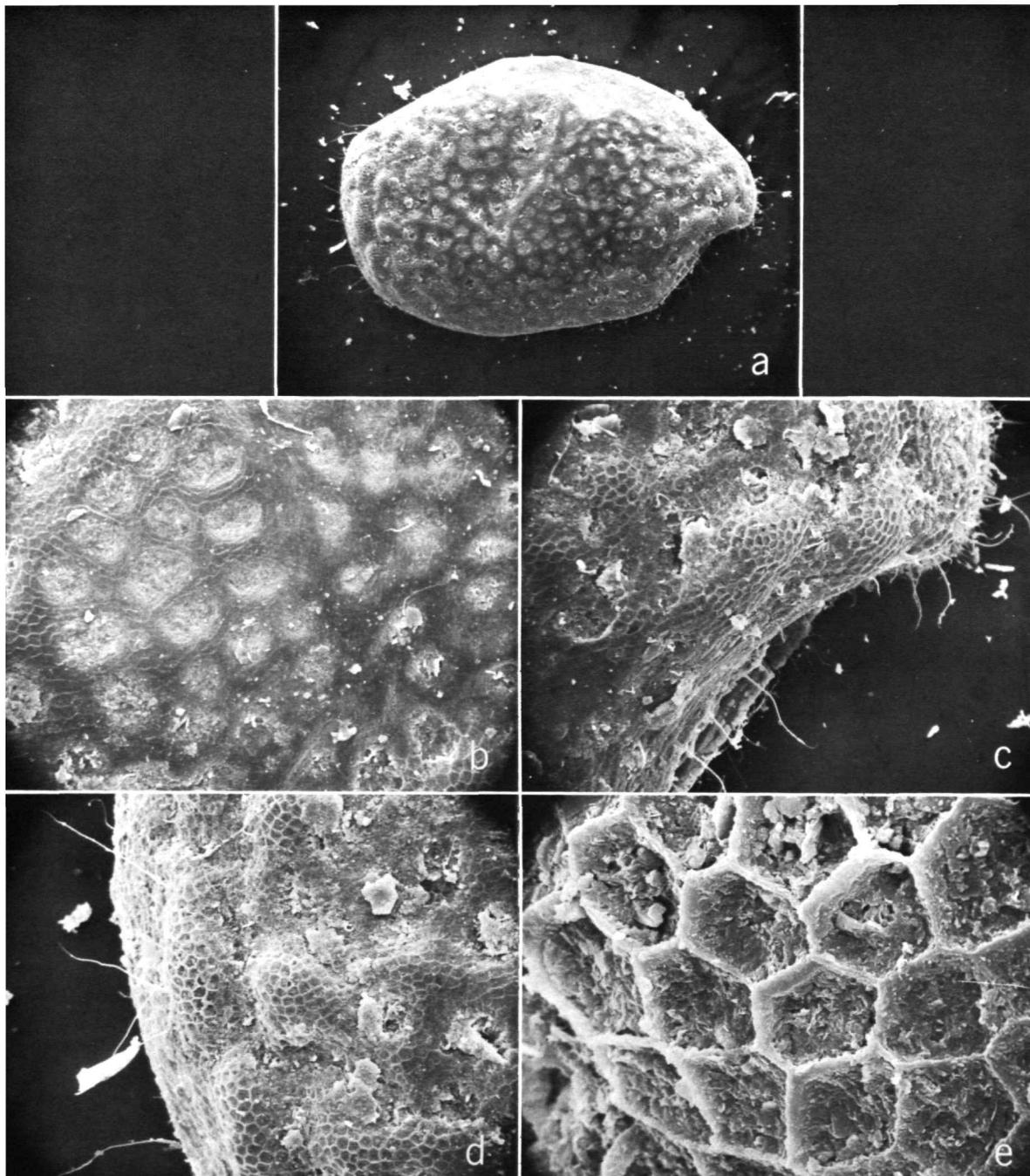


FIGURE 181.—*Euphilomedes agilis*, male, USNM 128283: *a*, right valve, $\times 49$; *b*, detail near center, $\times 194$; *c*, rostral area, $\times 194$; *d*, posteroventral margin, $\times 194$; *e*, surface of a node on posterior part of valve, $\times 1940$.

that the specimens described by Brady are conspecific with those described by Thomson, the combined descriptions remain inadequate for identifying the species. I have been unable to locate either Thomson's or Brady's specimens.

Poulsen (1962:388) identified an adult male collected in Noumea Harbor, New Caledonia, as *E. agilis* (Thomson). The specimen is only 1.60 mm long compared to 1.9 mm for the specimen measured by Brady (1897:91). The inadequacy of both the original description of *E. agilis* by Thomson (1879) and the later supplementary description of the male by Brady (1897) does not permit inclusion of Poulsen's specimen in the species with a high degree of certainty.

The inadequacy of the original description also prevents inclusion of the present two specimens in *E. agilis* with a high degree of certainty. In addition, the endopodites of the 2nd antennae are missing on the adult male in the present collection. The carapace of the adult male from station 91 differs from the adult male from New Caledonia described by Poulsen (1962) by being longer (1.97 mm compared to 1.60 mm) and in not having a group of 4 or 5 bristles at the end of the list in the posterodorsal part of the infold. In addition, many bristles on the endopodite of the maxilla and the exopodite of the 5th limb that bear marginal spines on the present male are bare on the specimen described by Poulsen. The brief diagnosis of the species presented herein is based both on the specimen from station 91 and that described by Brady.

DIAGNOSIS OF ADULT MALE.—Carapace elongate with prominent rostrum and shallow incisur, length 1.9 mm to 1.97 mm.

Mandible: Dorsal margin of 2nd endopodite joint with 3 groups of bristles; end joint with 2 claws.

Furca: 9 claws on lamella; claw 3 secondary and about three-fourths length of claw 4.

Seventh limb: Each limb with 14–17 bristles; terminal comb with 15 alate teeth; 2 subequal pegs on dorsal margin opposite comb.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figures 180, 181).—Carapace elongate with prominent rostrum and shallow incisur; posterior rounded without caudal process; anterior and inferior corners of rostrum rounded (Figures 180a-f, 181).

Ornamentation: Small lateral bulge present covering part of incisur (Figure 181c); posterior part of each valve undulate with vague ridges and protuberances (Figure 181a,d); surface coarsely pitted; interprismatic septa of cuticular prisms distinctly visible with transmitted light; long hairs present on lateral surface, more abundant anteriorly and posteriorly. (Small vertical sulcus observed near middle of valve prior to removal of animal but not after.)

Infold (Figure 180e,f): Broad behind rostrum of left valve with 10 long spinous bristles forming row parallel to anterior margin of rostrum, and 2 small bristles near inner end of small incisur; infold behind right valve with 18 spinous bristles (including 6 forming row along anterodorsal part of valve) and pair of small bristles near inner end of incisur; anteroventral infold with about 11 bristles; ventral infold bare; posteroventral infold extending from point on ventral margin about two-thirds distance from anterior end of rostrum to point on posterior margin about three-fourths distance from ventral margin with about 80 small bristles, some forming clumps of 2 or 3 bristles.

Selvage: Broad, double selvage with fringed margin present along anterior, ventral, and posterior margins; selvage continuous across incisur; numerous spines present on lateral surface of outer half.

Size: USNM 128283, length 1.97 mm, height 1.19 mm.

First antenna: Medial surface of 1st joint with spines forming clusters in row along middle and near ventral margin; 2nd joint with spines forming clusters on medial and lateral surfaces and 3 spinous bristles, 1 ventral, 1 dorsal, 1 lateral; 3rd joint short (dorsal margin about three-fourths joint height) and with 2 spinous bristles, 1 ventral, 1 dorsal; 4th joint with about 6 clusters of spines along dorsal margin and 2 along ventral margin, and 5 spinous bristles, 1 dorsal, 4 ventral (smallest of ventral bristles with only few short spines); sensory bristle of minute 5th joint with numerous filaments on broad proximal part (over 50) and 6 distal filaments including tip; 6th joint with spines forming clusters along dorsal margin, and spinous medial bristle at distal dorsal corner (bristle with few long proximal and numerous short distal spines). Seventh and 8th joints: a-bristle about same length as bristle of 6th joint and with short

marginal spines; b-bristle with 2 proximal and 5 distal filaments including tip; c- and f-bristles extremely long and with 13 or 14 marginal filaments; d- and e-bristles bare; g-bristle with 3 proximal and 4 distal filaments including tip.

Description of left 2nd antenna (right limb and endopodite of left limb missing from specimen): Protopodite bare. Exopodite: 1st joint with several short spines along ventral margin and short distal medial bristle; bristle of 2nd joint about length of 3rd joint and with numerous spines along ventral margin; bristles of joints 3 to 8 and 4 long bristles of 9th joint with long natatory hairs; 2 short dorsal bristles of 9th joint also with marginal hairs; 3rd joint about twice length of 2nd joint; 3rd to 8th joints with small basal spine; joints 2 to 8 with spines along distal lateral margins, some with bifurcate tips (Figure 180g).

Mandible (Figure 180h,i): Coxale endite small, bifurcate, with small bristle near base. Basale: medial surface with 3 small proximal bristles and 1 closer to middle, all near ventral margin and with short marginal spines; ventral margin with 6 bristles with long proximal and short distal spines; lateral surface with 1 long bristle (near middle of ventral margin) with long proximal and short distal spines; dorsal margin with 1 long bristle distal to middle and 2 long terminal bristles, all with long proximal and short distal spines. Exopodite reaching about middle of dorsal margin of 1st endopodite joint and with long proximal bristle with long proximal and short distal spines, and short distal bristle with short spines. Endopodite: 1st joint with spines forming clusters on lateral and medial surfaces; ventral margin with 3 bristles, 2 long with long proximal and short distal spines, 1 shorter with short marginal spines; 2nd joint with spines forming clusters on medial and lateral surfaces and ventral and dorsal margins; dorsal margin with 3 groups of bristles, proximal group with 2 bristles with short marginal spines, middle group with 4 bristles (1 long with short marginal spines, 1 long with long proximal and short distal spines, 2 short pectinate), distal group with 1 long bristle with short marginal spines; ventral margin with distal pair of short bristles with short marginal spines; lateral surface with 3 short spinous bristles in distoventral corner; end joint with short medial and long lateral claw, both with mi-

nute ventral teeth, and 4 bristles, all shorter than long claw.

Maxilla (Figure 180j): Limb small, slender with 3 small endites. Coxale with stout plumose bristle and fringes of long hairs. Basale with 3 hirsute bristles. Exopodite with 3 hirsute bristles, 2 long, stout, 1 slender and about half length of stout bristles. Endopodite: 1st joint with 1 spinous α -bristle and 3 β -bristles, 1 or 2 with marginal spines; end joint with about 9 bristles, mostly bare; both joints of endopodite with clusters of long hairs.

Fifth limb: Epipodial appendage with 64 to 70 bristles. Endite I with 4 bare bristles; endite II with 5 bristles, bare or with short spines; endite III with 11 bristles, 1 with fairly long spines, other bare. Exopodite: 1st joint with 1 proximal and 5 terminal bristles and 1 flat tooth; 2nd joint with 3 stout spinous bristles, 1 short bristle, and 2 flat teeth plus 1 small tooth; inner lobe of 3rd joint with 3 bristles, proximal bristle with long proximal spines, 2 terminal bristles with few short marginal spines; outer lobe of 3rd joint with 2 long stout plumose bristles; 4th plus 5th joints with 1 long stout bristle with long proximal and short distal spines, and 5 bristles of various lengths, all with short marginal spines; 4th and 5th joints hirsute.

Sixth limb (Figure 180k): 3 plumose bristles in place of epipodial appendage; 1st endite with 3 bristles, 2 plumose, 1 bare; 2nd endite with 4 bristles; 3rd and 4th endites with 7 bristles; 1st endite small protuberance, 2nd endite also small but larger than 1st, 3rd endite more than twice size of 2nd, 4th endite larger than 3rd; end joint with 24 or 25 bristles and prolonged posteriorly; endites 3 and 4 and end joint with surface spines forming clusters.

Seventh limb (Figure 180l): One limb with 17 bristles, 12 proximal (6 ventral, 6 dorsal) and 5 terminal (2 ventral, 3 dorsal); other limb with 14 bristles, 9 proximal (4 ventral, 5 dorsal) and 5 terminal (2 ventral, 3 dorsal); each bristle with 4 to 8 bells and distal marginal spines; terminal comb with 15 alate teeth; 2 pegs of differing length present on dorsal margin opposite comb.

Furca (Figure 180m,n): Each lamella with 9 claws; claws 1, 2, and 4 stout, primary; claws 3, 5 to 9, small secondary; each claw separated from lamella by a suture; claws 1, 2, 4 with teeth form-



FIGURE 182.—*Euphilomedes agilis*, N-1 male, USNM 128280, length 2.06 mm, carapace: *a*, complete specimen, lateral view; *b*, anterior of left valve, medial view; *c*, posterior margin of right valve, medial view; *d*, anterior of right valve, medial view; *e*, detail of anterodorsal margin of left valve; *f*, detail of ventral margin of left valve, lateral view. Left 2nd antenna: *g*, tip of bristle on 9th joint, medial view; *h*, endopodite and proximal part of protopodite (note attached protistan). Right mandible: *i*, coxale, basale, exopodite, 1st and 2nd exopodial joints (not all bristles shown). Left mandible: *j*, middle of dorsal margin of 2nd endopodial joint; *k*, coxale endite, medial view. Right maxilla: *l*, complete limb, medial view (not all bristles shown). Left maxilla: *m*, complete limb, lateral view (not all bristles shown); *n*, tip of endopodite, lateral view; *o*, *p*, *q*, endites I, III, and II, lateral view; *r*, exopodite, lateral view. Protistans: *s*, protistans on posteroventral margin of right valve, medial view; *t*, detail of protistan shown in "h." (Same magnification in microns: *b*, *d*, *h*, *i*, *l*, *m*, *s*; *c*, *e*, *f*; *n*–*q*; *g*, *j*, *k*, *t*.)

length as sensory bristle; all bristles on joints 2-4, and 6 with proximal wreaths of long spines and short distal spines.

Second antenna (Figure 182g,h): Protopodite with few hairs along dorsal margin. Endopodite 3-jointed: 1st joint with 5 or 6 bristles, 4 or 5 short, 1 long; 2nd joint with 3 ventral bristles; 3rd joint with 1 dorsal bristle and 2 short terminal spines. Exopodite: 1st joint with short distal medial spine; bristle of 2nd joint with 17 to 20 ventral spines and minute distal spines near spearlike tip;

bristles of joints 2 to 8 with short spines along middle of ventral margin and minute ventral spines at tip; 9th joint with 6 bristles, 2 short with short slender marginal spines, 4 stout with armature similar to that on bristles of previous joints; natatory hairs absent from all bristles; all bristles shorter than exopodite; joints 3 to 8 with basal spines; joints 2 to 8 with rather long spines along distal margins.

Mandible (Figure 182i-k): Coxale endite large, bifurcate, with few spines and small bristle at base.



FIGURE 183.—*Euphilomedes agilis*, N-1 male, USNM 128280, 5th limb: a, part of inner distal end of left limb, posterior view; b, part of inner distal end of right limb, anterior view; c, end joints of right limb, anterior view. Sixth limb: d, left limb, lateral view (not all bristles shown). Seventh limb: e, tip. Furca: f, right lamella (marginal teeth not shown); g, left lamella. Anterior: h, medial eye and rod-shaped organ, medial view; i, medial eye and rod-shaped organ with attached protists, and anterior process; j, right lateral eye, medial eye and rod-shaped organ, dorsal view; k, left lateral eye. Posterior: l, left lateral view showing hairs and muscles. (Same magnification in microns: a-c; d,f-l.)

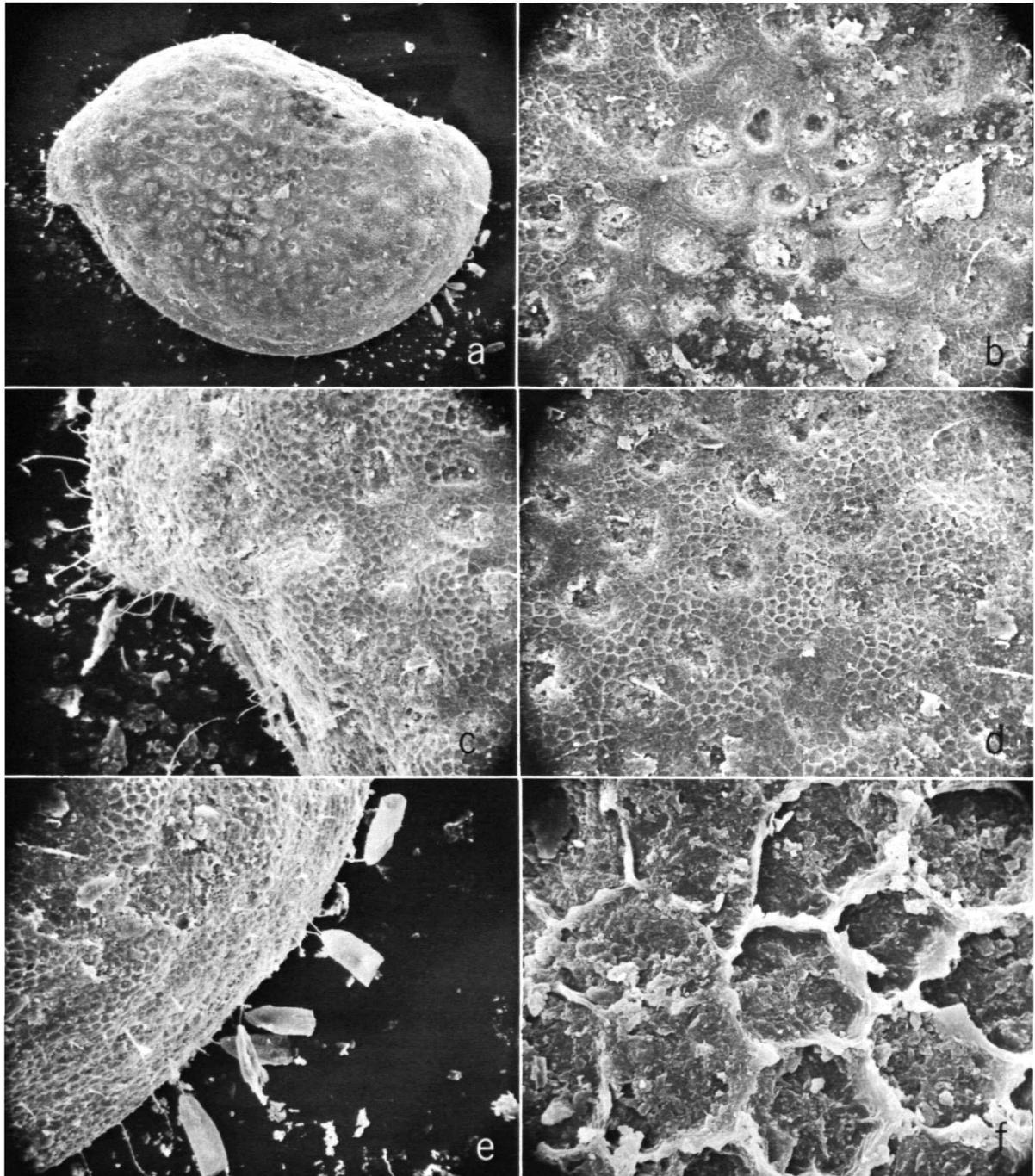


FIGURE 184.—*Euphilomedes agilis*, N-1 male, USNM 128280: *a*, left valve, $\times 49$; *b*, detail near center, $\times 194$; *c*, anterior, $\times 194$; *d*, posterior nodes, $\times 194$; *e*, posteroventral margin showing protists, $\times 194$; *f*, detail of surface on a posterior node, $\times 1940$.

Basale: medial surface spinous and with 1 minute and 3 small proximal bristles and 1 closer to middle, all near ventral margin; ventral margin with 2 long distal bristles with long proximal and short distal spines; lateral surface spinous and with 4 short bristles (bare or with short marginal spines) with bases quite close to or on ventral margin; dorsal margin with 1 long bristle distal to middle and 2 terminal bristles, all with long proximal and short distal spines. Exopodite reaching about middle of dorsal margin of 1st endopodite joint and with long proximal and short distal bristle. Endopodite: 1st joint with spines forming clusters on medial surfaces; ventral margin with 3 bristles, 2 long with long proximal and short distal spines, 1 short bare; 2nd joint with spines forming clusters along ventral and dorsal margins and on medial surfaces; dorsal margin with 3 groups of bristles, proximal group with 2 bristles with short spines, middle group with 3 bristles (2 long with long proximal and short distal spines, 1 short triaenid cleaning bristle with long marginal spines), distal group with 1 long bristle with long proximal and short distal spines; ventral margin with distal pair of short bristles with short marginal spines; lateral surface with 3 short spinous bristles in distoventral corner; end joint with short medial and long lateral claw (both with minute ventral teeth) and 4 bristles, all shorter than long claw.

Maxilla (Figure 182l-r): Limb short, stout with 3 endites: endite I with 9 bristles, 2 long slender with short marginal spines, 3 short slender with short marginal spines, 4 short stout pectinate with 2 to 5 teeth; endite II with 6 or 7 bristles, 2 medial slender with short marginal spines, 2 or 3 lateral slender with short marginal spines, 2 short stout pectinate with 3 teeth; endite III with 5 bristles, 2 slender lateral (1 fairly long, 1 short, both with short marginal spines), 3 short medial with short marginal spines, 1 short stout without teeth but with short stout marginal spines. Precoxale with fringe of hairs along dorsal margin. Coxale with stout plumose bristle and fringe of hairs along dorsal margin. Basale with 3 spinous bristles along distal margin. Exopodite short with 3 bristles, proximal bristle short with short marginal spines, inner bristle long stout without rings on proximal half and with short marginal spines and rings on distal half. Endopodite: 1st joint hirsute with 1

α - and 3 β -bristles, all with short marginal spines; 2nd joint with 2 slender a-bristles with short marginal spines, 3 short c-bristles with short marginal spines, and total of 4 b- and d-bristles with 2 to 4 stout marginal teeth.

Fifth limb (Figure 183a-c): Epipodial appendage with 63 bristles. Endite I with 3 short bristles and small tooth; endite II with 3 spinous bristles and 1 short pectinate bristle with only faint annulae; endite III with about 12 bristles, 4 bare, or with few spines, forming row along distoanterior margin, 1 spinous on distoanterior margin, and about 6 terminal consisting of 5 spinous and 1 short pectinate. Exopodite: 1st joint with single large curved tooth with 4 secondary teeth along concave margin; anterior with 6 bristles (bare or with few spines) forming row along distal margin, 5 near inner margin, 1 near outer margin; posterior surface with a small bare bristle near inner margin (base of small bristle is between 1st and 2nd joints, not possible to discern with certainty that it is not on 2nd joint); 2nd joint terminating in long recurved-tooth with 2 large teeth along concave margin, 1 of these trifid, the other quadrifid; the quadrifid tooth with base located somewhat posteriorly of inner margin of the long recurved tooth; posterior surface with 3 spinous bristles (these bristles are close to 3 bristles on inner lobe of 3rd joint and difficult to distinguish from them); inner lobe of 3rd joint with 3 bristles, 2 long, 1 short; outer lobe of 3rd joint with 2 plumose bristles; 4th plus 5th joints hirsute, with 5 or 6 spinous bristles.

Sixth limb (Figure 183d): 3 plumose bristles in place of epipodial appendage; 1st endite with 3 bristles, 2 medial plumose, 1 terminal spinous; 2nd endite with 1 medial plumose bristle and 3 terminal spinous bristles; 3rd and 4th endites with 1 plumose medial bristle and 6 spinous terminal bristles; each endite larger than preceding one; end joint hirsute with 21 to 23 plumose and spinous bristles and prolonged posteriorly.

Seventh limb: One limb with 12 bristles, 7 proximal (3 ventral, 4 dorsal) and 5 terminal (2 ventral, 3 dorsal); other limb with 11 bristles, 6 proximal (3 ventral, 3 dorsal); each bristle with 2 to 5 bells and distal marginal spines; terminal comb with 12 or 13 alate teeth (arrangement of teeth not symmetrical, with 4 or 5 on one side of middle

tooth and 7 on other); 2 pegs present on dorsal margin opposite comb, outer peg smaller than inner one.

Furca (Figure 183f,g): Each lamella with 10 claws: claws 1, 2, 4 stout primary, claws 3, 5 to 10 secondary; each claw separated from lamellae by a suture; claws 1, 2, 4 with teeth forming lateral

and medial row along posterior margins and few spines along anterior margins; claw 2 shorter than claw 1; claw 4 about half length of claw 2; claw 3 about three-fourths length of claw 4; claw 5 more slender and about same length or shorter than claw 6 (juvenile character?); remaining claws decrease slightly in length posteriorly; medial hairs present

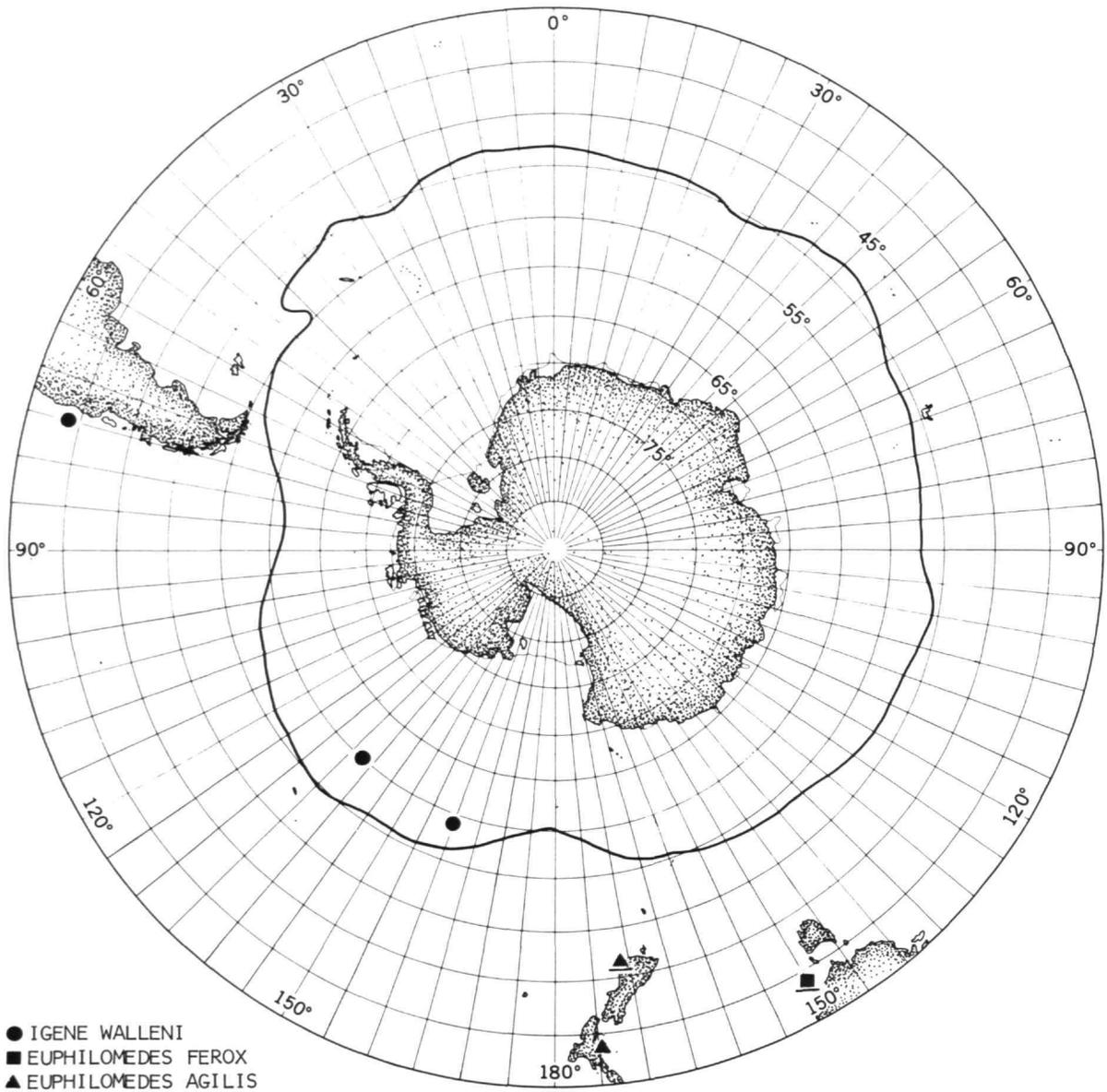


FIGURE 185.—Distribution map of *Euphilomedes agilis*, *E. ferox*, *Igene walleni*.

along lamellae at bases of claw and on primary claws near their bases; small spines present along anterior margin of lamellae; medial surfaces of lamellae with hairs forming clusters on ventral half.

Rod-shaped organ and eyes (Figure 183h-k): Rod-shaped organ elongate, unsegmented, broadening near middle and tapering distally, with minute

hair at tip; medial eye and lateral eye pigmented and about same size.

Posterior and copulatory limb: Posterior dorsal to furca with clusters of long hairs (Figure 183l). Copulatory limb not observed.

Parasites: Many appendages with organisms attached consisting of crinkled bifurcate stem with brown ovoid processes on tips (Figure 182h,t). Mi-

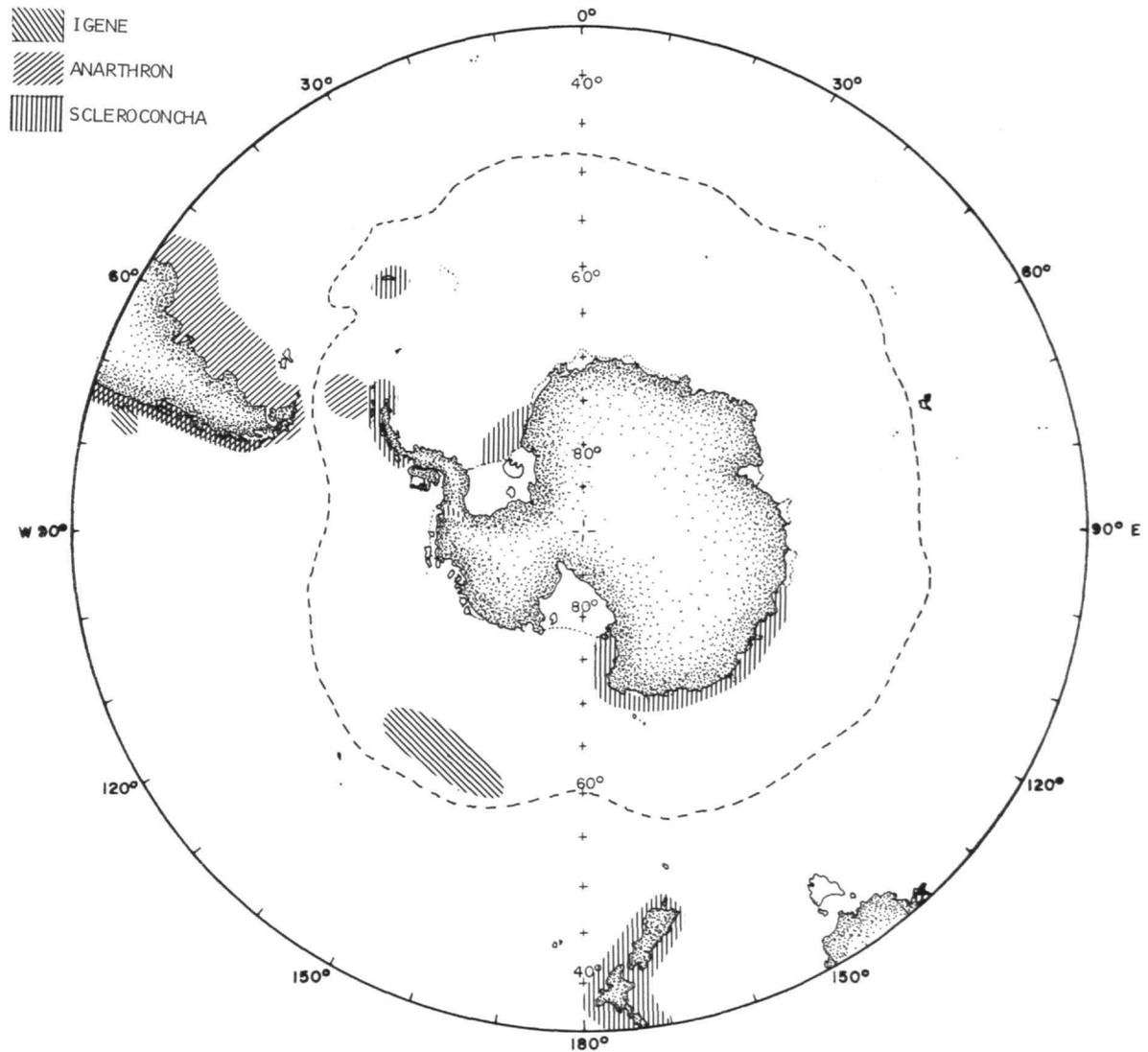


FIGURE 186.—Distribution map of *Igene*, *Anarthron*, and *Scleroconcha*.

nute segmented filaments also present, but not abundant. Ciliate protistans (Order: Peritrichida) attached to lateral surface of posteroventral margin of each valve (Figure 184e).

DISTRIBUTION.—Rock pools on Taieri Beach, near Dunedin, southeast coast, South Island, New Zealand, and Otago Harbour (surface), New Zealand (New Zealand localities, about 46°S, 171°E). A specimen which I consider questionably identified was reported by Poulsen (1962) from the surface in Noumea Bay, New Caledonia (about lat. 22°21'E). Two specimens which I also consider questionable are described herein from the intertidal area of the west coast of North Island, New Zealand (about 36° 51'S, 174°45'E) (Figure 185).

REMARKS.—The outline of the proximal large fanglike tooth of the 1st exopodite joint combined with the proximal bifid tooth on the 2nd exopodite joint of the 5th limb of *E. ferox* illustrated by Poulsen (1962:394, fig. 172b) is similar to the outline of the proximal trifid tooth on the 2nd joint of *E. agilis*.

Scleroconcha Skogsberg, 1920

TYPE-SPECIES.—*Philomedes (Scleroconcha) appelloefi* Skogsberg, 1920.

This genus is represented in the study area by seven species; *Scleroconcha arcuata*, *S. flexilis*, *S.*

wolffi, and *S. sculpta* are in the vicinity of New Zealand, *S. appelloefi* lives in the vicinity of South Georgia, *S. gallardoi* is confined to the waters immediately surrounding the Antarctic continent, and *S. frons* lives along the Pacific coast of Chile.

DIAGNOSIS OF GENUS.—Carapace with horizontal ribs.

First and second antenna, maxilla, mandible, fifth and sixth limbs: Similar to those on species of *Philomedes*.

Seventh limb: Each limb with 10 to 23 bristles; margins of teeth of terminal comb smooth, alate, or with short or long teeth; 1 or 2 pegs present opposite comb.

Furca: Claw 3 of furca more slender and on some species, shorter than claw 4.

Lateral eye: Females without eyes or with small eyes with 2 or 3 ommatidia; males usually with large eyes.

Medial eye and rod-shaped organ: Medial eye similar to that on *Philomedes*. Rod-shaped organ elongate with about 10–17 sutures on proximal and middle part; tip of organ tapering to fine point; marginal hairs present.

DISTRIBUTION.—This genus is widespread. The northernmost point at which it has been collected is in the vicinity of Vancouver Island, Canada, about 50°N. Its southernmost range is in the Weddell Sea, 77°54'12"S (Figure 186). The depth range is intertidal to about 1226 m.

Key to Species

(Includes only species present south of 35°S)

1. Carapace longer than 3.2 mm.....	2
Carapace shorter than 3.0 mm.....	3
2. Comb teeth on 7th limb smooth.....	49. <i>S. gallardoi</i>
Comb teeth on 7th limb with marginal serrations.....	4
3. Carapace with branching bristles on lateral surface.....	48. <i>S. flexilis</i>
Carapace with unbranching bristles on lateral surface.....	5
4. Comb teeth on 7th limb with 1 to 3 short weak marginal teeth.....	46. <i>S. appelloefi</i>
Comb teeth on 7th limb with about 4 extremely long marginal teeth.....	51. <i>S. frons*</i>
5. Carapace with 2 lateral midribs.....	6
Carapace without 2 lateral midribs.....	52. <i>S. wolffi</i>
6. Furca of adult male with 10 claws.....	50. <i>S. sculpta</i>
Furca of adult male with 12 claws.....	47. <i>S. arcuata</i>

* It is assumed in this key that adults of this species have carapaces longer than 3.2 mm, but adults are unknown. Length range of N-1 males is 2.23–2.98 mm.

46. *Scleroconcha appelloefi* Skogsberg

FIGURES 187, 188

Philomedes (*Scleroconcha*) *appelloefi* Skogsberg, 1920:366, 367, 380, 419, figs. 77–83.

Streptoleberis appelloefi (Skogsberg).—Sylvester-Bradley, 1961: 400, fig. 422–1.

Scleroconcha appelloefi (Skogsberg).—Poulsen, 1962:395 [Key].
Scleroconcha appelloefi (Skogsberg).—Kornicker, 1971:197, fig. 19.

HOLOTYPE.—Swedish State Museum (Riksmuseum), Stockholm (see Skogsberg, 1920:428).

TYPE-LOCALITY.—South Georgia, S.A.E. station 22, off May Bay, 54°17'S, 36°28'W depth 75 m, bottom of clay with scattered algae, bottom temperature –0.25°C.

MATERIAL.—USNM 128859, gravid ♀; USNM 128860, 6 specimens (1 gravid ♀, length 3.43 mm + 1 adult ♀ not dissected, length 3.53 mm + 2 juveniles). All specimens from *Vema* Cruise 14, station V–14–21.

DIAGNOSIS OF FEMALE.—Carapace reticulate with a rib along the ventral and dorsal margins, a rib lying just within the anteroventral valve margin and present only on anterior half of valve; a middle rib extending full length of valve and lying dorsal to central muscle attachments; a lower rib extending almost full length of valve and lying below central muscle attachments. Surface of valves with scattered undivided bristles. Carapace length 3.3 to 3.6 mm.

Seventh limb: Each limb with 10–12 bristles, 4–6 proximal, 6 distal; terminal comb consisting of 7 or 8 teeth bearing 1 to 3 weak marginal teeth;

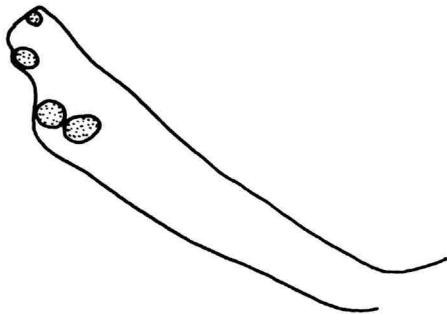


FIGURE 187.—*Scleroconcha appelloefi*, female, USNM 128859, length 3.46 mm, left lateral eye.

single peg similar to comb tooth present opposite comb near middle of tip of limb.

Furca: Each lamella with 13–15 claws.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 187, 188).—Size (Figure 189): USNM 128859, length 3.46 mm, height 2.35 mm; USNM 128860, 2 specimens, length 3.43 mm, height 2.34 mm, and length 3.53 mm, height 2.31 mm.

Lateral eye: Small with 4 ommatidia (Figure 187).

Eggs: USNM 128859, 128860, with 25 eggs.

DISTRIBUTION.—This species is known with certainty only from the South Georgia district at depths of 75–250 m (Figure 190).

47. *Scleroconcha arcuata* Poulsen

FIGURES 191–193

Scleroconcha arcuata Poulsen, 1962:398, figs. 174, 175.

Streptoleberis arcuata (Poulsen).—Eagar, 1971:61 [listed].

HOLOTYPE.—Gravid ♀, unique specimen.

TYPE-LOCALITY.—Cook Strait, New Zealand, depth 146 m, *Galathea* station 577 (Poulsen, 1962: 398).

MATERIAL.—USNM 128849, 1 adult ♀ without eggs; USNM 128848, 1 adult ♂; USNM 128850, 2 adult ♀ ♀ without eggs plus 2 juveniles.

Specimens from the *Vema* Cruise 18, station V–18–113, are from the type-locality, Cook Strait, at a depth (117 m) only slightly less than at the type-locality (146 m). An adult female from station V–18–113 was dissected and a supplementary description, primarily concerning differences between the specimen and that described by Poulsen, is presented herein. The adult male is described for the first time.

In a vial from the Brady collection at the Universitets Zoologiske Museum, Copenhagen, labeled *Philomedes flexilis* Brady (see "Material" section of *Scleroconcha flexilis* for further details on sample) 2 specimens of *S. arcuata* and 77 specimens of *S. flexilis* were identified in a subsample of 79 specimens of *Scleroconcha*. This material was from Lyttelton Harbor, 1–5 fathoms.

DIAGNOSIS OF FEMALE.—Carapace with 2 lateral midribs; surface hairs unbranched; carapace length 2.63–2.83 mm.

Seventh limb: Each limb with 10 bristles, 4

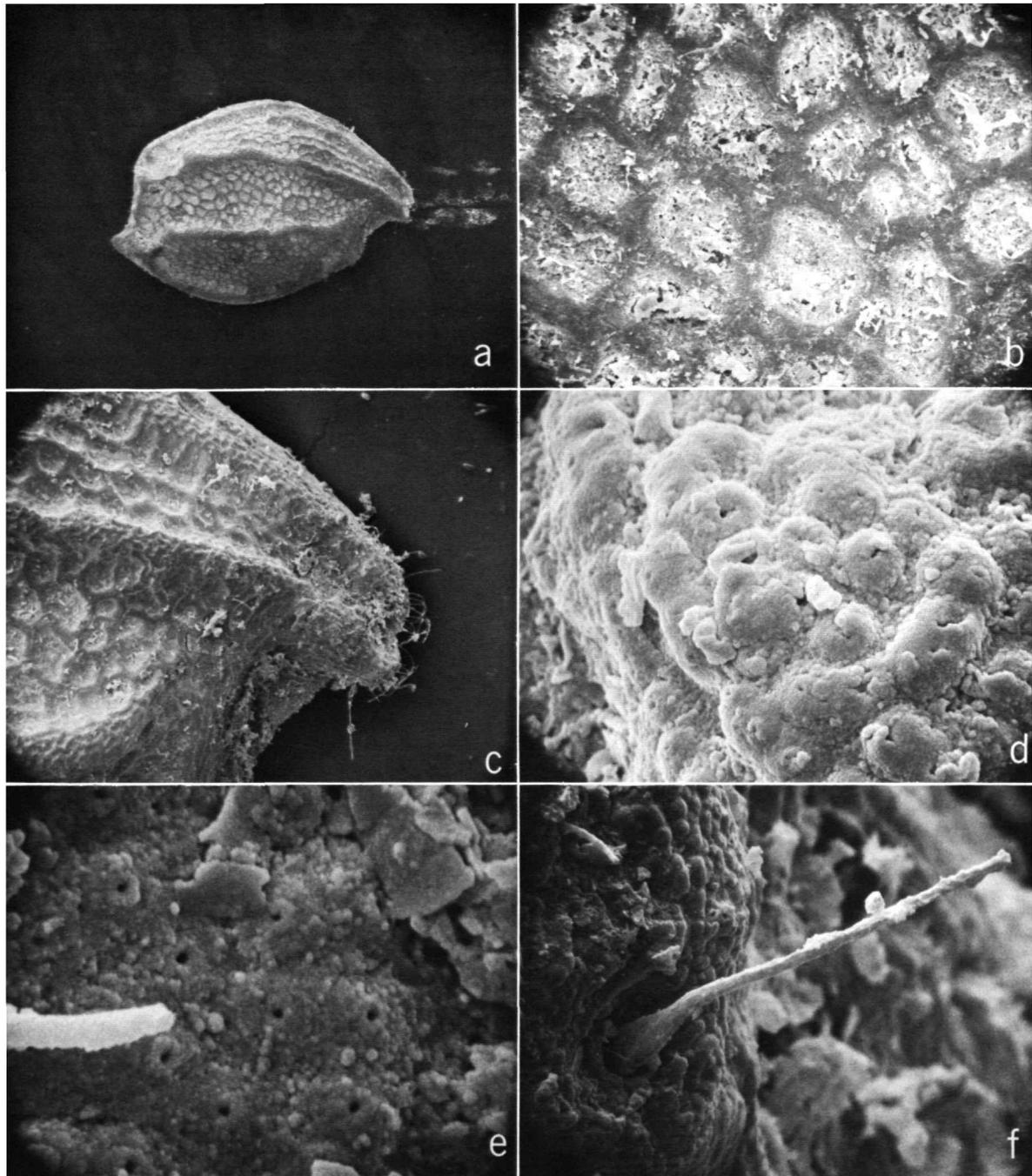


FIGURE 188.—*Scleroconcha appelloefi*, female, USNM 128860: *a*, right valve, *b*, surface near middle of "*a*," $\times 200$; *c*, anterior, $\times 70$; *d*, node on posterior end of upper midrib, $\times 5000$; *e*, surface pores near middle, $\times 10,500$; *f*, bristle near anterior part of valve, $\times 1400$.

proximal, 6 distal; terminal comb with 15–17 alate teeth; 1 or 2 pegs present opposite comb.

Furca: Each lamella with 13 or 14 claws.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 191, 192).—Surface reticulations small; 2 lateral midribs present, but they have less relief than those on *S. appelloefi*, *S. gallardoi*, and *S. frons* (Figures 191a,d; 192).

Infold (Figure 191b,c): Infold on rostrum with 13 or 14 single bristles (only 10 medial bristles on infold of rostrum in original description); small bristle present below inner end of broad incisur followed by space and then 11 short spinous bristles forming row on anteroventral infold parallel to valve edge (no bristles described below incisur in original description).

Size (Figure 189): USNM 128849, length 2.79

mm, height 1.81 mm; USNM 128850, 2 adult ♀♀ without eggs, length 2.83 mm, height 1.94 mm, and length 2.81 mm, height 1.92 mm. Copenhagen specimen from Lyttelton Harbor, N.Z., gravid ♀, length 2.63 mm, height 1.80 mm.

First antenna (Figure 191e,f): 1st joint with short spines forming clusters on lateral surface near dorsal margin and near middle of medial surface (1st joint bare in original description); 4th joint with 2 dorsal and 3 ventral spinous bristles.

Second antenna: Endopodite 2-jointed: 1st joint with 6 bristles, 5 proximal and medial, 1 distal and lateral (1st joint with 5 bristles in original description, 3 proximal and medial, 2 distal and lateral); Exopodite: bristle on 2nd joint of left limb only of USNM 128849 with 6 slender spines near middle of ventral margin.

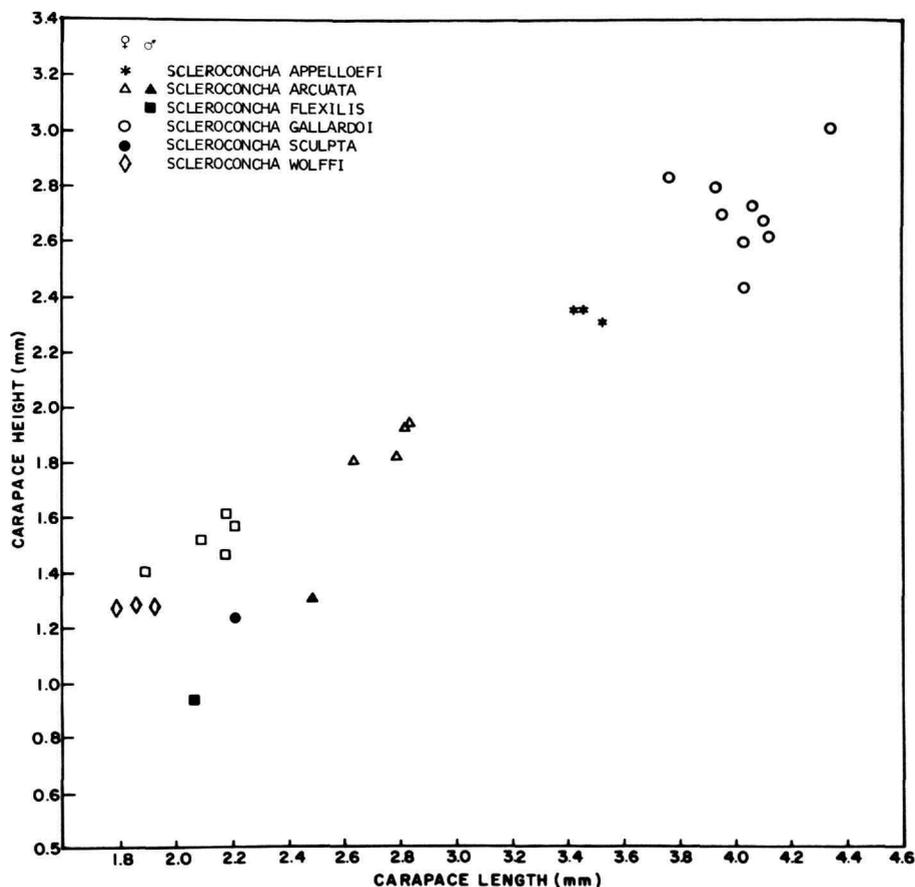


FIGURE 189.—Carapace graph of species of *Scleroconcha*.

Mandible: Coxale endite with small spinous bristle at base. Basale: medial surface spinous and with 6 bristles near ventral margin, 5 proximal, 1 near middle (5 proximal bristles consisting of 3 pectinate and 2 spinous bristles); lateral surface with 5 bristles near ventral margin; ventral margin with 2 distal bristles; dorsal margin with 1 long spinous bristle distal to middle and 2 terminal; lateral, ventral, and dorsal bristles with long proximal and short distal spines. End joint of endopodite: only 3 bristles observed; ventral margin of 2 large claws with small teeth along proximal part (4 bristles and bare claws in original description).

Fifth limb: Single posterior bristle on 2nd exopodite joint with long proximal and short distal

spines (long proximal spines absent on this bristle in original description).

Sixth limb: 4 bristles present in place of epipodial appendage; endite I with 3 bristles; endite II with 4 bristles; endite III with 9 bristles; endite IV with 8 or 9 bristles; end joint with 38 or 39 bristles (about 45 bristles in original description).

Seventh limb (Figure 191g): Each bristle with 3 to 10 bells (up to 5 bells on each bristle in original description); terminal comb with 15 to 17 teeth; each tooth with proximal pair of alate processes and 2 or 3 short faint spines; single peg present opposite comb (2 pegs present in original description).

Furca: Left lamella with 13 claws, 14 on right.

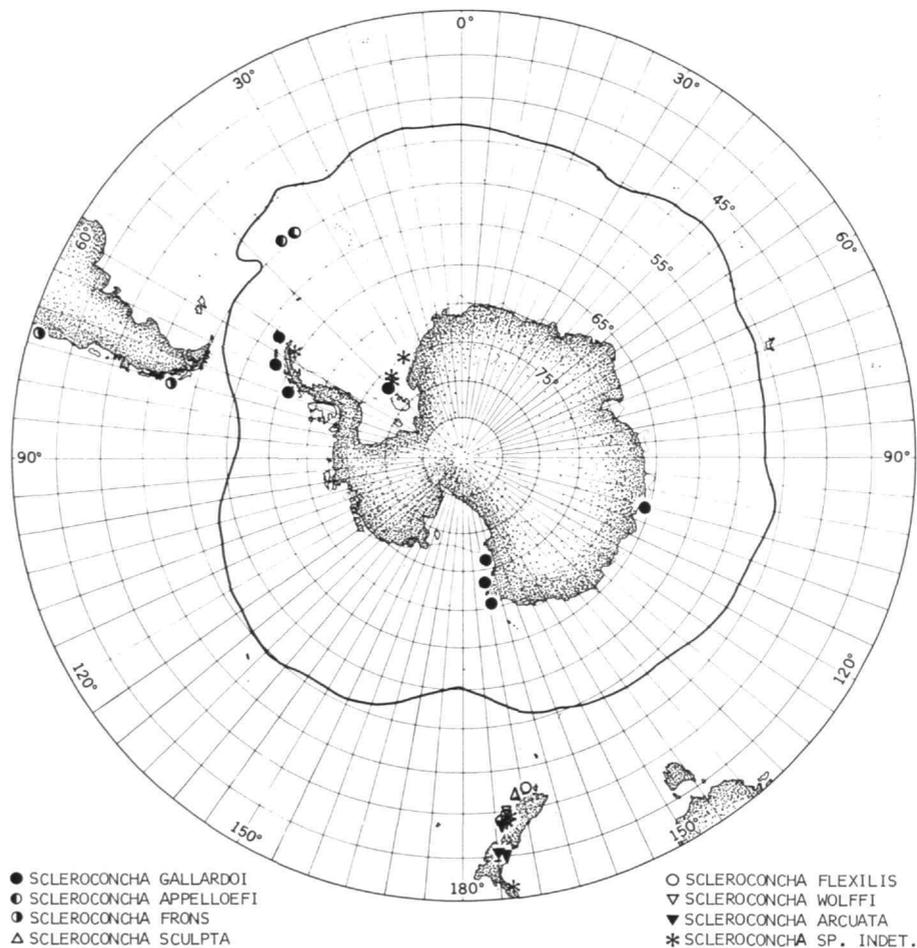


FIGURE 190.—Distribution map of species of *Scleroconcha*.

Lateral eyes (Figure 191j): Small with 2 or 3 ommatidia.

Upper lip, rod-shaped organ: Lip hirsute with large rounded process between it and medial eye (Figure 191h). Rod-shaped organ segmented.

Posterior (Figure 191i): Long hairs present along lower part posterior to furcal lamellae.

Eggs: Copenhagen specimen from Lyttelton Harbor, 28 eggs.

DESCRIPTION OF ADULT MALE (Figure 193).—Carapace more elongate than female, shell thin, flexible, smooth with 3 longitudinal ridges barely

perceptible; reticulations apparent around valve margins; posterior caudal process similar in shape to that on female valve; incisur more open than that on female; lateral flap present on rostrum of each valve; ventral part of each flap thickening to form wedge-shaped process similar to that on female but not projecting anteriorly past lamellar prolongation; wedge-shaped process below incisur similar to that on female (Figure 193a-e).

Infold (Figure 193c,d): Rostral infold with 13 bristles; small bristle present at inner corner of incisur; anteroventral infold with 8 spinous bristles.



FIGURE 191.—*Scleroconcha arcuata*, female, USNM 128849, length 2.79 mm, carapace: a, complete specimen, lateral view. Right valve: b, caudal process, medial view; c, rostrum, medial view; d, detail of hairs and pits, lateral view. Endopodite of second antenna: e, left limb, medial view; f, right limb, medial view. Seventh limb: g, tip. Anterior: h, anterior process and upper lip, anterior view. Posterior: i, lower part showing posterior claw on right lamella of furca. Lateral eye: j, right eye, anterior toward right. (Same magnification in microns: b,d-f; c,h-j.)

gles; distribution of bristles on infold of caudal process similar to those on female.

Size (Figure 189): USNM 128848, length 2.49 mm, height 1.30 mm.

First antenna: 1st joint with spines forming clusters on medial surface near dorsal margin; 2nd, 3rd, 4th joints with spines forming clusters on medial and lateral surfaces; 2nd joint with 3 bristles with long proximal spines, 1 ventral, 1 dorsal, 1 lateral; 3rd joint with 1 ventral and 2 dorsal bristles; 4th joint short, with 3 ventral and 2 dorsal bristles; 5th joint triangular, inset ventrally between 4th and 6th joints; sensory bristle with abundant filaments on broadened proximal part and 5 short distal filaments including tip; 6th joint

with distomedial bristle with short marginal spines; lateral surface of 6th joint with clusters of short spines on distal part. Seventh joint: a-bristle about same length as bristle of 6th joint, also with short marginal spines; b-bristle stout with 5 proximal and 4 distal filaments including tip; c-bristle extremely long and with 12 short marginal filaments. Eighth joint: d- and e-bristles bare, about same length as b-bristle; f-bristle about same length as c-bristle and with 14 marginal filaments; g-bristle stout with 3 proximal and 4 distal filaments including tip.

Second antenna (Figure 193f-h): Endopodite: 1st joint with 6 bristles, 5 proximal and medial, 1 distal and lateral; 2nd joint elongate with 3 bristles

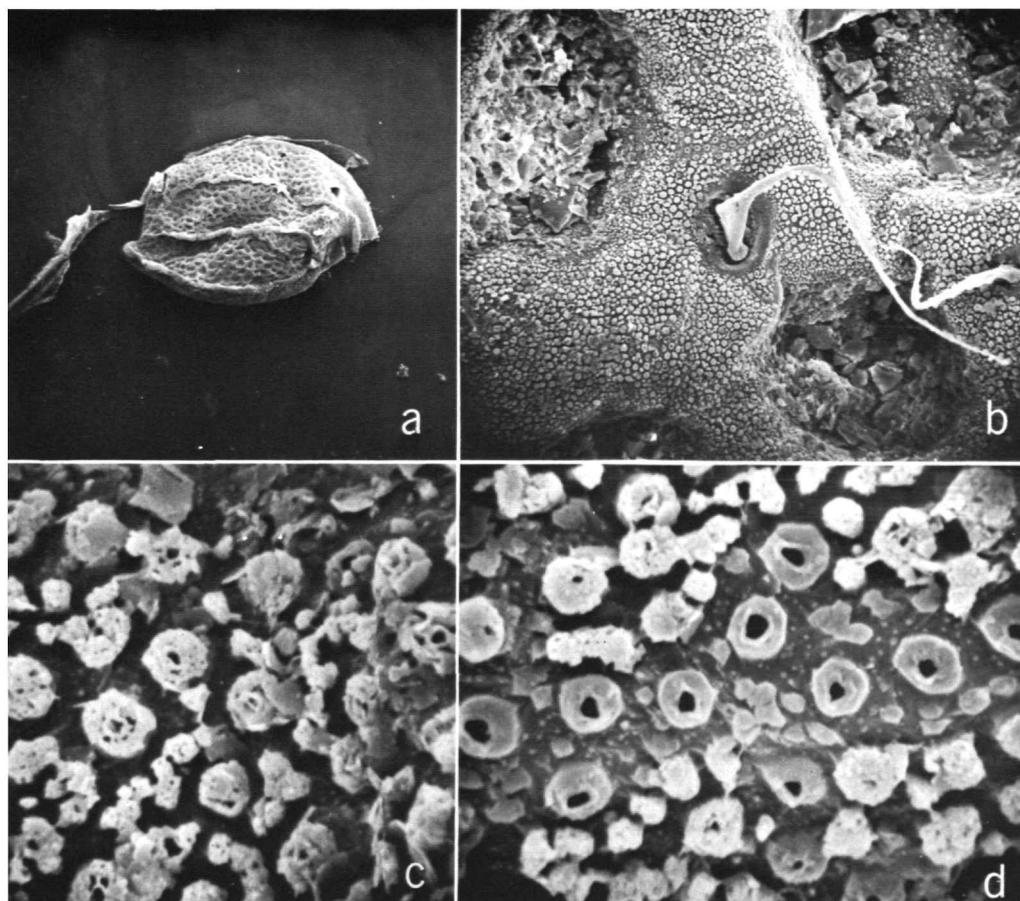


FIGURE 192.—*Scleroconcha arcuata*, female, USNM 128849: *a*, right valve, lateral view, $\times 100$; *b*, detail of bristles and pores, $\times 1000$; *c,d*, detail of pustules, $\times 10,000$.



FIGURE 193.—*Scleroconcha arcuata*, male, USNM 128848, length 2.49 mm, carapace: *a*, complete specimen, lateral view; *b*, tip of rostrum on right valve, lateral view; *c*, caudal process on left valve, medial view; *d*, anterior of right valve, medial view; *e*, central muscle scars on right valve, lateral view. Second antenna: *f*, endopodite on right limb, medial view; *g*, tip of endopodite on left limb, lateral view; *h*, basal spines on exopodial joints 7 and 8 of left limb, lateral view. Fifth limb: *i*, bristles on exopodial joints 1 and 2 on right limb, anterior view; *j*, right limb, anterior view (not all bristles shown). Sixth limb: *k*, right limb, lateral view (not all bristles shown). Seventh limb: *l*, tip. Furca and copulatory organ: *m*, left lamella, lateral view; copulatory organ stippled. Anterior: *n*, right lateral eye, joints 1 and 2 of right limb of 1st antenna, medial eye, rod-shaped organ, upper lip. (Same magnification in microns: *b,c,f,k; d,em,n*.)

near middle of ventral margin, and 1 subterminal; 3rd joint elongate, reflexed, with 12 or 13 teeth along inner margin, 2 short subterminal bristles, and terminal ridges. Exopodite: 1st joint with small medial spine on distal margin; bristle of 2nd joint bare, reaching 9th joint; 3rd joint elongate; bristles of joints 3 to 8 with natatory hairs; and without spines; 9th joint with 6 bristles, 4 long with natatory hairs; 2 short with long slender spines; joints 2 to 8 with short spines forming row along distal margin; joints 3 to 8 with slender basal spines.

Mandible: Coxale endite consisting of 2 distinct spines. Basale: medial surface with 6 bristles near ventral margin, 5 proximal, 1 near middle (5 proximal bristles consisting of 3 pectinate and 2 spinous bristles); ventral margin with 7 bristles (some of these with bases on lateral side); dorsal margin with 1 long spinous bristle distal to middle and 2 terminal; medial surface of joint with clusters of spines. Exopodite reaching past middle of dorsal margin of 1st endopodite joint, with 2 spinous terminal bristles. Endopodite: 1st joint with 5 ventral bristles and spines forming clusters on medial surface; dorsal margin of 2nd endopodite joint with 2 groups of bristles, 3 bristles in proximal group, 5 or 6 bristles in distal group; 1 short slender bristle with short marginal spines present on medial side between the 2 groups; ventral margin of joint with 2 distal groups of bristles, each with 3 bristles; medial surface and ventral margin of joint with spines forming clusters; end joint with 3 claws and 4 bristles, all claws with faint minute teeth.

Maxilla: Limb weak and reduced; 1st endopodite joint with 1 α - and 4 β -bristles.

Fifth limb (Figure 193i,j): Epipodial appendage with 56 bristles; 1st endite with 6 bristles, 4 long, 2 short; 2nd endite with 6 long bristles; 3rd endite with 11 bristles. Exopodite: 1st joint with 2 broad flat teeth and 5 bristles terminally, and 1 proximal bristle; 2nd joint with 1 long flat tooth and 3 bristles terminally, and 1 bristle proximally; inner lobe of 3rd joint with 3 spinous bristles, outer lobe with 2 plumose bristles; 4th + 5th joints with 6 spinous bristles; long hairs abundant on all exopodite joints. (It is possible that 2 proximal bristles noted above as being on the 1st and 2nd exopodite joints may actually be on the 3rd endite and 1st exopodite joint, respectively.)

Sixth limb (Figure 193k): 3 short plumose bristles present in place of epipodial appendage; endite I with 3 bristles; endite II with 4 bristles; endites III and IV each with 9 bristles; end joint with 30 or 31 bristles.

Seventh limb (Figure 193l): Each limb with 8 bristles, 4 terminal (2 on each side), 4 proximal (2 on each side); each bristle with 3 to 6 bells and distal marginal spines; terminal comb with 10 or 11 teeth; each tooth with alate process and 2 or 3 short spines along inner side; single bare peg present opposite comb.

Furca (Figure 193m): Each lamella with 12 claws; claw 3 weaker than claw 4 and about two-thirds its length; hairs present at bases of claws and following claws; each claw with teeth along posterior margin.

Eyes (Figure 193n): Lateral eyes large pigmented with about 23 ommatidia; medial eye about same size as lateral eye.

Rod-shaped organ (Figure 193n): Segmented in middle part; tip pointed with few hairs.

Upper lip (Figure 193n): Lip with minute processes at tip and hairs along posterior part.

Copulatory organ (Figure 193m): Organ extremely small, indistinct.

Posterior: Hairs present along ventral and dorsal parts of posterior.

REMARKS.—The females from Cook Strait examined herein differ from the female described by Poulsen (1962:38) primarily in having only 1 peg opposite the terminal comb on the 7th limb, but also in having a small lateral eye and only 38 or 39 bristles on the end joint of the 6th limb. Two specimens, a gravid female and a juvenile, from Lyttelton Harbor (Brady collection) have been referred to *S. arcuata*. They differ from the female described by Poulsen (1962) in having a small lateral eye, only 1 peg opposite the comb on the 7th limb and also in having the lateral projection on the rostrum reaching only to about the middle of the lamellar prolongation. I consider it likely that further study will reveal that I have included more than 1 species in *S. arcuata*; some of the specimens will probably have to be referred to *S. sculpta* Brady, when that species becomes better known; it is also possible that *S. arcuata* and *S. sculpta* are conspecific.

DISTRIBUTION.—This species has been collected

only in the vicinity of New Zealand at depths of 6 to 146 m (Figure 190).

48. *Scleroconcha flexilis* (Brady, 1898)

FIGURES 194-196

Philomedes flexilis Brady, 1898:435, pl. 44: figs. 1-14; pl. 45: figs. 15, 16 [part].

Philomedes flexilis Brady.—Müller, 1912:29.

Philomedes (Scleroconcha) flexilis Brady.—Skogsberg, 1920: 380.

Scleroconcha flexilis (Brady).—Poulsen, 1962:396, fig. 173.

Streptoleberis flexilis (Brady).—Eagar, 1971:61 [listed].

LECTOTYPE.—Gravid ♀ selected herein, Universitets Zoologiske Museum, Copenhagen, Denmark.

TYPE-LOCALITY.—Lyttelton Harbor, New Zealand, collected by dredge.

OTHER LOCALITIES.—Halfmoon Bay, Stewart Island, New Zealand; Akaroa Harbor, New Zealand.

MATERIAL.—Through Dr. K. G. McKenzie, I received some of Brady's material in the collections of the Hancock Museum, Newcastle-on-Tyne:

1. One thick slide containing two complete undissected specimens and labeled, "*Philomedes flexilis* Brady (types), Lyttelton Harbor, N.Z." Cracks in the mounting medium prevent clear view of the specimens and no information was derived from these specimens.

2. Two slides containing a dissected ♂ and ♀ from Akaroa Harbor and labeled "*Philomedes flexilis* n. sp., type, Akaroa Harbor, N.Z., 6 fathoms, H. Suter, 8/97." The specimens are in poor condition and could not be clearly seen.

3. One dry specimen is noted as having been from a broken vial labeled, "*Philomedes flexilis* Brady, Lyttelton Harbour, N.Z." I softened this specimen and confirmed the identification by the presence of divided hairs on the carapace and returned it to Dr. McKenzie in alcohol.

4. One vial of unsorted material containing a label indicating that it was from Lyttelton Harbor. The descriptions of males and females herein are based on specimens from the unsorted vial. The two adult males in the sample were not dissected; descriptions of appendages are based on appendages projecting from carapace.

Through Dr. Torben Wolff, I received on loan from the Universitets Zoologiske Museum, Copenhagen, Denmark, the following material:

1. Two specimens identified by Dr. Erik M. Poulsen (1965:396) as *S. flexilis*. The vial with the specimens contains two labels: "Zoologisk Museum, Kobenhavn; Loc. Lyttelton Harbour, New Zealand, 1-5 fv., Datum: 1-9-1897, Legit: H. Suter, Ostracoder, Journal. 18/1-1954" and "*Scleroconcha flexilis* (Br.) ZM. Lyttelton Harbour, New Zealand, 2-10 m, 1-9-1897, E.M. Poulsen det." The vial contains one whole and one dissected specimen.

2. One dissected specimen from Halfmoon Bay, Stewart Island, N. Z., which also had been identified by Dr. Poulsen as *S. flexilis*. The vial contains two labels: "*Scleroconcha flexilis* (Br.), Halfmoon Bay, Stewart Isl., New Zealand, 19-11-1914, Mortensen Esq. E.M.P. det." and "Ostracod, Halfmoon Bay, Stewart Isl. 5-7 Fv. Sand, Skrabe, 19.XI. 1914, Dr. Th. Mortensen Esq."

3. A vial containing two labels: "TYPE," and "*Philomedes flexilis* Brady, orig. spec., Lyttelton Harb., 1-5 fm." In addition to about 229 specimens belonging to the genus *Scleroconcha*, in the vial were several specimens of *Cymbicopia hanseni* and *C. hispida*, which were removed and returned in separate vials to Copenhagen. Seventy-nine specimens of *Scleroconcha* were randomly selected (some bias for larger specimens) from the original 229. The bristles on the lateral surfaces of the carapaces were examined, and 77 with branched bristles were assigned to *Scleroconcha flexilis*. Two specimens with unbranched bristles were identified as *S. arcuata* Poulsen, 1962. At the request of Dr. Wolff, a lectotype of *S. flexilis* was selected; this and 71 paralectotypes were returned to Copenhagen with the unseparated specimens. Five paralectotypes were retained at the National Museum of Natural History, USNM 135043.

4. A vial with two labels: "Type," and "*Philomedes flexilis* Brady, orig. spec., Akaroa Harbour, 6 fm, H. Suter, 8/97." This vial contained six specimens of *S. flexilis* and 40 specimens described herein as a new species, *Scleroconcha wolffi*.

DIAGNOSIS OF FEMALE.—Each valve with 4 longitudinal ribs, 2 near middle, 1 along ventral margin, 1 along anterior half of dorsal margin; middle ribs on some specimens subdivided into 3 elongate nodes; lateral antieriad projection on rostrum extending just to, or barely beyond, anterior margin of rostrum; surface of valves with large pits; surface hairs commonly with 2 to 5 branches emanating



FIGURE 194.—*Scleroconcha flexilis*, female, B505, specimen X, length 2.21 mm, carapace: *a*, complete specimen showing lateral ribs; *b*, same, dorsal view; *c*, same, outline from left; *d*, detail of hairs and pits near middle of right valve, lateral view; *e*, anterior of right valve, lateral view; *f*, caudal process on left valve, medial view. Right 1st antenna; *g*, g-bristle on 8th joint, lateral view. Right 2nd antenna: *h*, endopodite, medial view. Mandible: *i*, end joint on right limb, lateral view; *j*, coxale and basale on right limb, lateral view; *k*, coxale endite on left limb, medial view. Maxilla: *l*, end joint of right limb, medial view (not all bristles shown); *m*, left limb, medial view (not all bristles shown); *n*, right limb, medial view (not all bristles or marginal spines on them shown); *o*, left limb, medial view (not under cover slip); *p*, left limb under cover slip (not all bristles shown). (Same magnification in microns: *e,j,m,o,p; f,h,k*.)

from single stem; length of carapace 1.89 mm to 2.21 mm.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb with 11–13 alate teeth; 1 smooth peg present opposite comb.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 194–196).—Carapace oval with broad rostrum and incisur and small caudal process (Figures 194a–f, 196).

Ornamentation: Each valve with 4 longitudinal ridges, 2 near middle, 1 along ventral margin, 1 along anterior half of dorsal margin; ridges generally prominent; middle ridges on some specimens subdivided into 3 elongate nodes. Lateral anterior projection on rostrum extending just to, or barely beyond, anterior margin of rostrum; tip of projection located ventral to middle of rostrum, some specimens with 2nd projection dorsal to middle of rostrum; latter projection not reaching past anterior margin of rostrum; on many specimens both projections coalescing, partly divided by depression; small anterior projection also present below incisur. Surface of each valve with ovoid depressions or pits separated by rather broad areas between pits; surface of both pits and area between pits with small pustules, each with small central pore; small pustules also present on surface of ridges (Figure 196).

Carapace hairs: Hairs present on ridges, on anterior projections and on areas between pits, but not within pits; most common hair consisting of single stem with 2 to 5 branches; hair pore through which hair passes as much as 5 times diameter of pustules on carapace; branching hairs varying in size; single hairs rare, branching hairs abundant on surface (Figures 194d, 196b–d).

Infold (Figure 194f): Infold on rostrum with 14 bristles; small bristle present below inner end of broad incisur followed by space and then 12 spinous bristles on anteroventral infold; anteroventral infold with about 10 striations, ventral infold bare; posteroventral and posterior list with numerous minute bristles in groups of 1 to 5 bristles; ridge with 4 bristles present between posterior list and outer edge of valve, upper bristle longer than others; 1 bristle present between ridge and posterior valve edge; several bristles forming row ventral to ridge.

Selvage: Striate lamella prolongation with short fringe present; lamellar prolongation discontinu-

ous in area of incisur; long hairs with bases proximal to edge of prolongation present on prolongation ventral to incisur.

Size of gravid females (Figure 189): Lyttelton Harbor: specimen X, length 2.21 mm, height 1.56 mm; specimen Y, length 2.18 mm, height 1.46 mm; specimen Z, length 2.09 mm, height 1.52 mm. Lectotype, length 2.18 mm, height 1.61 mm. Akaroa harbor: gravid ♀, length 1.89 mm, height 1.40 mm.

First antenna: Lateral surface of 1st joint with about 10 clusters of short spines near distal dorsal margin; 2nd joint with short spines forming clusters on lateral and medial surfaces, longer spines and hairs forming clusters along ventral and dorsal margins, and usual 3 bristles, 1 lateral, 1 ventral, 1 dorsal; 3rd joint with 3 clusters of spines on lateral surface near distal margin, faint spines along ventral and dorsal margins, 2 dorsal and 1 ventral bristle; 4th joint with 2 dorsal and 4 ventral bristles and spines forming clusters on lateral surface and ventral and dorsal margins; sensory bristle of 5th joint with about 7 proximal and 5 distal filaments; medial bristle of 6th joint with long proximal and short distal spines. Seventh joint: a-bristle about same length as bristle of 6th joint and with long proximal and short distal spines; b-bristle with about 2 proximal and 4 distal filaments; c-bristle with 6 proximal and 4 distal filaments. Eighth joint: d- and e-bristles long, bare; f-bristle with about 4 proximal and 5 distal filaments; g-bristle with about 6 proximal and 5 distal filaments; minute protuberances present along distal ventral margin of f- and g-bristles near distal filaments (Figure 194g).

Second antenna (Figure 194h): Endopodite 2-jointed: 1st joint short with 5 bristles; 2nd joint elongate with 1 long stout spinous proximal bristle and 1 short recurved terminal bristle. Exopodite: bristles of joints 2 and 4 bare, bristles of remaining joints with natatory hairs (some bristles of 9th joint missing on limb examined).

Mandible (Figure 194i–k): Coxale with minute bristle present near base of bifurcate spinous endite. Basale: medial side with 6 bristles, 1 near middle with long proximal and short distal spines, 5 proximal (3 coarsely pectinate, 2 spinous); lateral surface with 5 bristles forming row parallel to ventral margin; ventral margin with 2 distal bristles; dorsal margin with 3 long stout distal bristles;

lateral and medial surfaces spinous. Endopodite: 1st joint with spines forming clusters on medial surface and 4 ventral bristles; 2nd joint with spines forming clusters on medial surface and proximal part of dorsal margin; end joint with 4 bristles and 3 claws (all claws pectinate proximally; dorsal claw half length of longest claw). In other characters mandible same as described by Poulsen

(1962:396). (The three specimens examined all have only 2 bristles in the proximal group of the ventral margin of the 2nd endopodite joint.)

Maxilla (Figure 194*l-p*): 1st endite with 10 spinous and pectinate bristles; 2nd endite with about 7 spinous and pectinate bristles; 3rd endite with about 10 spinous and pectinate bristles; 1st endite broader than 2nd and 3rd endites; 3rd endite much

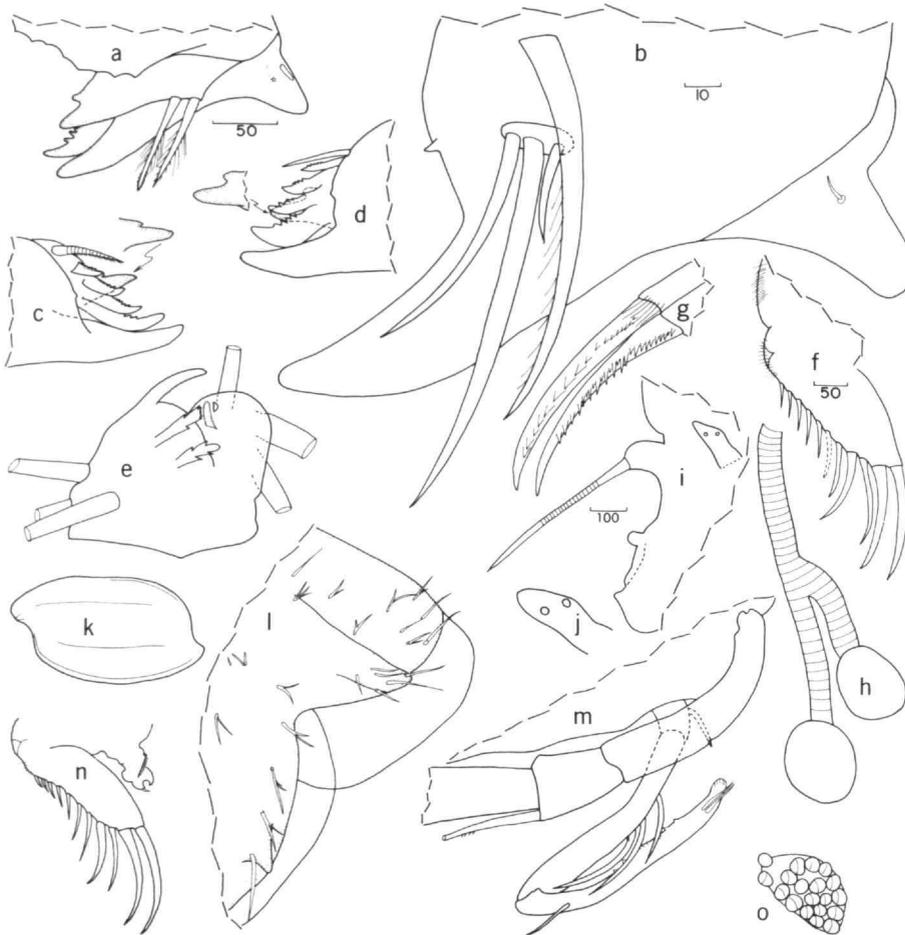


FIGURE 195.—*Scleroconcha flexilis*, female, B505, specimen X, 5th limb: *a*, tip of left limb, anterior view; *b*, tip of right limb, posterior view; *c*, tip of left limb, posterior view; *d*, tip of right limb, posterior view. Seventh limb: *e*, tip. Furca: *f*, right lamella; *g*, claw 1 on both left and right lamella (claw on right lamella to left). Protistan: *h*, protistan on endopodite of 2nd antenna. Female, B505, specimen Z, length 2.09 mm: *i*, anterior showing left lateral eye, medial eye and rod-shaped organ, anterior process and upper lip; *j*, detail of lateral eye shown in "i." Male, B505, specimen 2, length 2.04 mm, carapace: *k*, complete specimen, lateral view; *l*, anterior of right valve, lateral view. Right 2nd antenna: *m*, endopodite part of protopodite and exopodite, lateral view. Furca and copulatory organ: *n*, right lamella and organ. Right lateral eye: *o*, eye as seen through shell, anterior to right. (Same magnification in microns: *a,c,d*; *b,e,h*; *f,g,j,m,o*; *i,n*.)

longer than 1st and 2nd endites. Endopodite: 1st joint with 5 b-bristles; 1 b-bristle, and 2 d-bristles of end joint with small marginal teeth. Limb otherwise similar to that described by Poulsen (1962:396).

Fifth limb (Figure 195a-d): Epipodial appendage with 52 bristles. Exopodite: inner margin of large tooth of 2nd joint with small tooth (Figure 195b); posterior side of outer distal corner of large tooth of 2nd joint with minute bristle; bristles in group of 3 on posterior side of 2nd joint bare. Main tooth and bristles on joints 2 to 5 similar to those on limb described and figured by Poulsen (1962).

Sixth limb: Endite I with 1 terminal and 2 unequal medial bristles; endite II with 3 terminal and 1 medial bristles; endites III and IV with 7 or 8 terminal and 1 medial bristles; end joint with 28-30 bristles; 3 or 4 bristles present in place of epipodial appendage; medial and lateral surfaces of end joint with abundant long hairs. Shape of limb similar to that figured by Poulsen (1962:387, fig. 173g).

Seventh limb (Figure 195e): Each limb with 10 bristles, 4 in proximal group (2 + 2) and 6 in terminal group (3 + 3); each bristle with 3 to 7 bells and marginal spines; terminal comb with 11 to 13 alate teeth; 1 smooth peg present opposite comb.

Furca (Figure 195f,g): Each lamella with 10 to 12 claws; claw 3 more slender and slightly longer than claw 4; claws 5 to 10 or 12 decreasing in length posteriorly along lamella. The number of claws on the furcae of 3 specimens is as follows:

Specimen	Left lamella	Right lamella
Specimen X	11	11
Specimen Y	10	11
Specimen Z	12	11

Rod-shaped organ (Figure 195i): Elongate with about 18 segments at middle, tip pointed (examined only under low magnification).

Eyes (Figure 195i): Lateral eye elongate with 2 undivided ommatidia, about same length but only about three-fourths diameter of medial eye. (Sleeve of lateral eye transparent and easily overlooked; ommatidia orange and quite visible although small.)

Epizoa: Specimen X with numerous branching ball-tipped organisms attached to appendages (Figure 195h).

Parasites: Numerous coiled encysted nematodes were observed within body of four specimens. A few uncoiled nematodes were also observed between the carapace and body of one specimen which also contained encysted nematodes.

Eggs: Specimen X, 30; specimen Y, 6 (some eggs probably escaped from carapace into vial); specimen Z, 16.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figures 195k-o).—Carapace slightly shorter than female and not as high; incisur more open than that of female; ornamentation similar to that of female but horizontal ribs subdued; divided hairs present on surface of carapace but less abundant than on female. Carapace size (Figure 189): 3 specimens, length 2.04 mm, height 1.16 mm; length 2.00 mm, height 1.14 mm; length 2.06 mm, height 0.94 mm.

Second antenna: Endopodite normal for genus (Figure 195m).

Furca: 3rd claw more slender and slightly shorter or about same length as 4th claw; 11 claws observed on right lamella of specimen examined (Figure 195n); distribution of claws similar to those on furca of female.

Lateral eye: Well developed (Figure 195o).

Copulatory organ: Normal (Figure 195n).

SUPPLEMENTARY DESCRIPTION OF CARAPACES OF SPECIMENS IDENTIFIED AS *S. flexilis* BY POULSEN (1962:396) (2 specimens from Lyttelton Harbor, 1 specimen from Halfmoon Bay).—Lateral surfaces of each valve with numerous branched bristles.

REMARKS.—Brady (1898:436) states, "On the inner surface of the rostrum lies a convoluted 'shell-gland' which seem to communicate with a nipple-like tubular prominence opening near the margin of the shell (fig. 14)." The convolutions observed by Brady are probably nematodes which infest many specimens of *S. flexilis* in the collection from Lyttelton Harbor.

I am inclined to believe that the specimen of *S. flexilis* from Lyttelton Harbor described by Poulsen (1962:396) is a juvenile female because of the lack of natatory hairs on bristles of the second antenna and the small size of the carapace. This may account for the presence of only 3 bristles on the 4th joint of the 1st antenna and fewer bristles on the basale of the mandible of the specimen described by Poulsen compared to the adult female described herein. The maxilla illustrated by Poul-

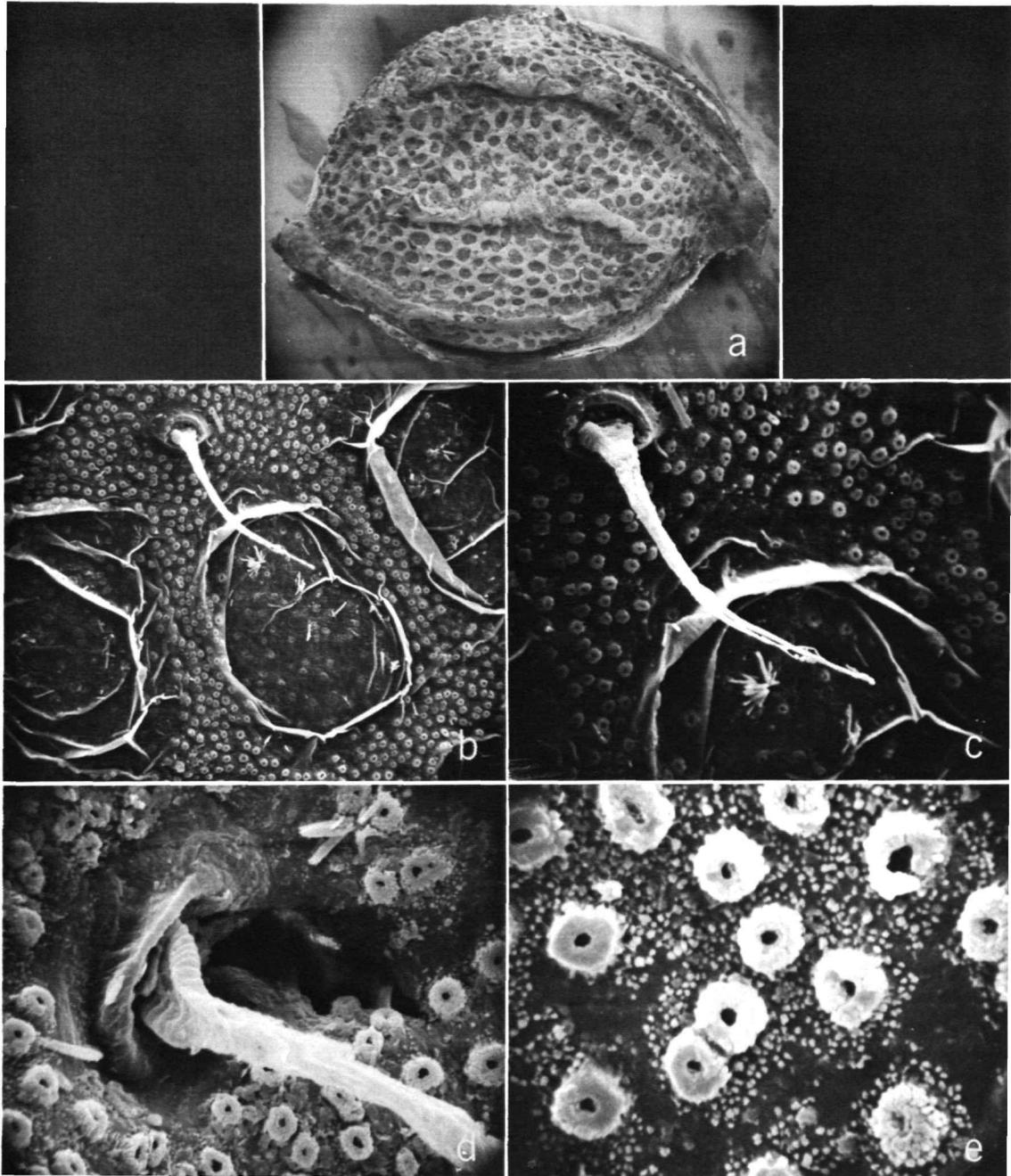


FIGURE 196.—*Scleroconcha flexilis*, female: *a*, right valve, $\times 36$; *b*, detail of surface, $\times 1000$; *c*, detail of "b," $\times 1600$; *d*, detail of pore, $\times 5250$; *e*, detail of pustules, $\times 10,000$.

sen (p. 397, fig. 173e) has endites of equal length, whereas the 3rd endite was much longer than the others on the specimens I examined. The peg opposite the terminal comb of the 7th limb appears longer on the limb illustrated by Poulsen (p. 397, fig. 173h) than the peg on the specimens I studied. The terminal joint of endopodite on the 2nd antenna is more elongate on the specimens I examined, but possibly this is the result of Poulsen's specimen being younger, or of variability within the species.

Brady (1898:436) states concerning the lateral eyes of the female, "Eyes usually wanting, but sometimes well developed, deeply pigmented and distinctly visible through the shell (fig. 11)." Two of the three adult female specimens I examined have small lateral eyes with 2 minute ommatidia. Brady probably included immature males, which have large eyes, in with females. Probably, all females have small lateral eyes, but on some specimens they are difficult to see, such as on one of the specimens I examined and also probably those examined by Poulsen (1962:398) who reported no lateral eyes.

DISTRIBUTION.—This species has been collected only from the vicinity of New Zealand at depths of 6 to 26 m (Figure 190).

REMARKS CONCERNING A SECOND SPECIES OF *Scleroconcha* IN LYTTTELTON HARBOR.—All specimens of *Scleroconcha* in the sample I examined, with one exception, have numerous divided hairs on the carapace. The exception has only single hairs; for this reason, I believe that it is probably not conspecific with *S. flexilis*. The horizontal ridges on its carapace are quite subdued, but not more so than on some specimens of *S. flexilis*. Both lamellae of the caudal furca on the odd specimen have 12 claws. The remaining appendages, including the lateral eyes, are similar to those of *S. flexilis*. Carapace length of the specimen, an adult ♀ without eggs is 1.92 mm, height 1.31 mm. The lateral process on each side of the rostrum does not project beyond the lamellar prolongation as on *S. arcuata* Poulsen. It is possible that the specimen belongs to *S. sculpta* of which the ♀ is unknown, or is merely an aberrant *S. flexilis*. The specimen has been labeled "*Scleroconcha* type B from broken bottle B505" and returned to the British Museum (Natural History). In the present paper I consider the specimen as *Scleroconcha* species indeterminate.

49. *Scleroconcha gallardoi* Kornicker

FIGURES 197-204

Scleroconcha gallardoi Kornicker, 1971:194, fig. 18.

HOLOTYPE.—USNM 125397, gravid ♀.

TYPE-LOCALITY.—Off Greenwich Island, 62° 29.1'S, 59°41.0'W, 39 m, sandy mud bottom.

MATERIAL.—USNM 125838, 2 adult ♀♀ + 9 juveniles; USNM 125853, 1 gravid ♀; USNM 125960, 1 juvenile ♀, length 3.67 mm, height 2.16 mm; USNM 127259, 1 juvenile ♀, length 3.25 mm, height 1.95 mm; USNM 127260, 6 juveniles; USNM 127286, 1 N-1 ♀, length 3.59 mm, height 2.27 mm; USNM 127287, 1 N-1 ♀, length 3.52 mm, height 2.10 mm; USNM 127288, 3 juveniles; USNM 127470, gravid ♀; USNM 127471, 2 gravid ♀♀ + 1 adult ♀ + 28 juveniles; USNM 127500, 1 juvenile, length 3.22 mm, height 1.97 mm; USNM 138018, 1 specimen, length 3.77 mm, height 2.76 mm, + 2 juveniles (none dissected); USNM 138161, 1 gravid ♀.

USNM 125838 from *Eastwind* station 004 A; USNM 125853 from Deep Freeze II, *USS Glacier*, station 19; USNM 125860 from Deep Freeze III, *Atha*, station 28; USNM 127259, 127260 from IWSOE, USCGC *Glacier*, station 0009; USNM 127286-127288 from *Eltanin* Cruise 6, station 412; USNM 127470, 127471 from *Hero* Cruise 691, station 7; USNM 127500 from Deep Freeze I, *Edisto*, stations 5, 6, 8, combined; USNM 138018 from *Hero* Cruise 70-2, station 448; USNM 136161, from *Yelcho* station 70-39.

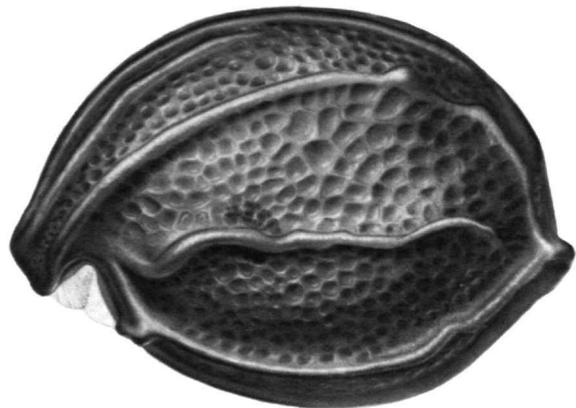


FIGURE 197.—*Scleroconcha gallardoi*, female, length about 3.7 mm.

In addition, the following specimens collected by the Chilean Antarctic Expeditions were identified and returned to the Instituto Central de Biología, Concepción, Chile: XXIV *Yelcho* station 70-39, 2 gravid ♀♀, 2 adult ♀♀, 4 juveniles; XXIII *Hero* station 69-04, 1 N-1 ♂, length 2.98 mm, height 2.03 mm, 4 juveniles; XXIV, *Yelcho* station 70-30, 1 juvenile; XXIV, *Yelcho* station 7-35; XXIII, *Hero* station 69-2 (2), 1 juvenile ♀, length 3.52 mm, height 2.40 mm; XXIII, *Hero* station 69-46, 1 juvenile; XXII, *Yelcho* station 57, 1 adult ♀ without eggs, length 3.76 mm, height 2.85 mm.

DIAGNOSIS OF FEMALE.—Carapace similar in shape and ornamentation to *S. appelloefi*, carapace length 3.76 to 4.35 mm.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb consisting of 9 to 17 teeth with smooth margins; 1 peg (rarely 2) with smooth margin present opposite comb near middle of tip of limb.

Furca: Each lamella with 16 claws.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figures 197, 198*a*, 199-204).—Carapace size (Figure 189): USNM 125838, length 4.11 mm, height 2.69 mm; USNM 125853, length 4.35 mm, height 3.02 mm; USNM 127470, length 3.94 mm, height 2.80 mm; USNM 138161, length 4.04 mm, height 2.60 mm; specimen from *Yelcho* station 57, length 3.76 mm, height 2.85 mm.

Seventh limb: See Figures 204*d-f*.

Upper lip and anterior process: See Figures 203, 204*a,b*.

Rod-shaped organ: See Figure 204*d*.

Eggs: USNM 125853, 29 eggs; USNM 127470, 32 eggs; USNM 138161, 30 eggs.

Parasites: USNM 127286 (N-1 female) with 1 female choniostomatid and 9 ovisacs; USNM 127287 (N-1 female) with 1 choniostomatid female and 2 copepodites. USNM 125399 and other specimens with filaments (Figure 200*a,b*).

SUPPLEMENTARY DESCRIPTION OF N-1 MALE (USNM 125441, paratype) (Figure 198*b,c*).—Dimensions of carapace given by Kornicker (1971: 196).

Second antenna (Figure 198*b*): Endopodite: 1st joint with 5 short bristles; 2nd joint elongate with 1 long proximal bristle with wreaths of long marginal spines, and 10-12 short distal ventral bristles with short marginal spines; 3rd joint with 1 long bare dorsal bristle and 2 short terminal bristles (Kornicker, 1971:196, incorrectly reported fewer bristles on the 1st and 2nd joints).

Lateral eye: Well developed with about 12 scattered ommatidia (Figure 198*c*).

DISTRIBUTION.—This species has been collected only in the Continental subregion of the Antarctic at depths of 33 to 1180 m (Figure 190).

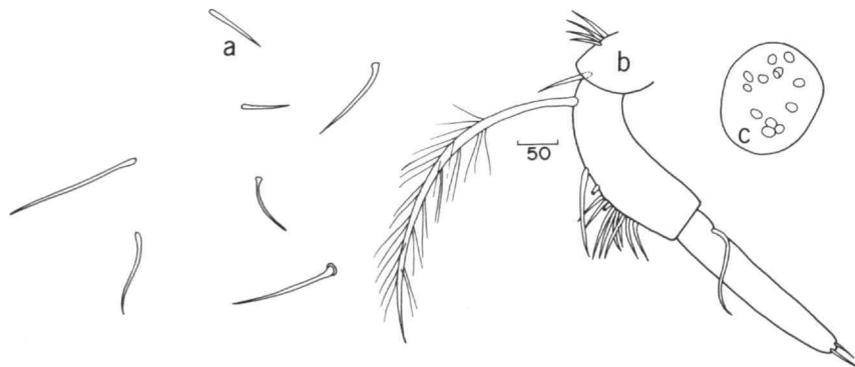


FIGURE 198.—*Scleroconcha gallardoi*, female, USNM 127470, length 3.94 mm: *a*, detail of bristles on right valve, lateral view. N-1 male, USNM 125411, length 3.02 mm: *b*, endopodite on left 2nd antenna, lateral view; *c*, left lateral eye, anterior to left. (Same magnification in microns: *a,b,c*.)

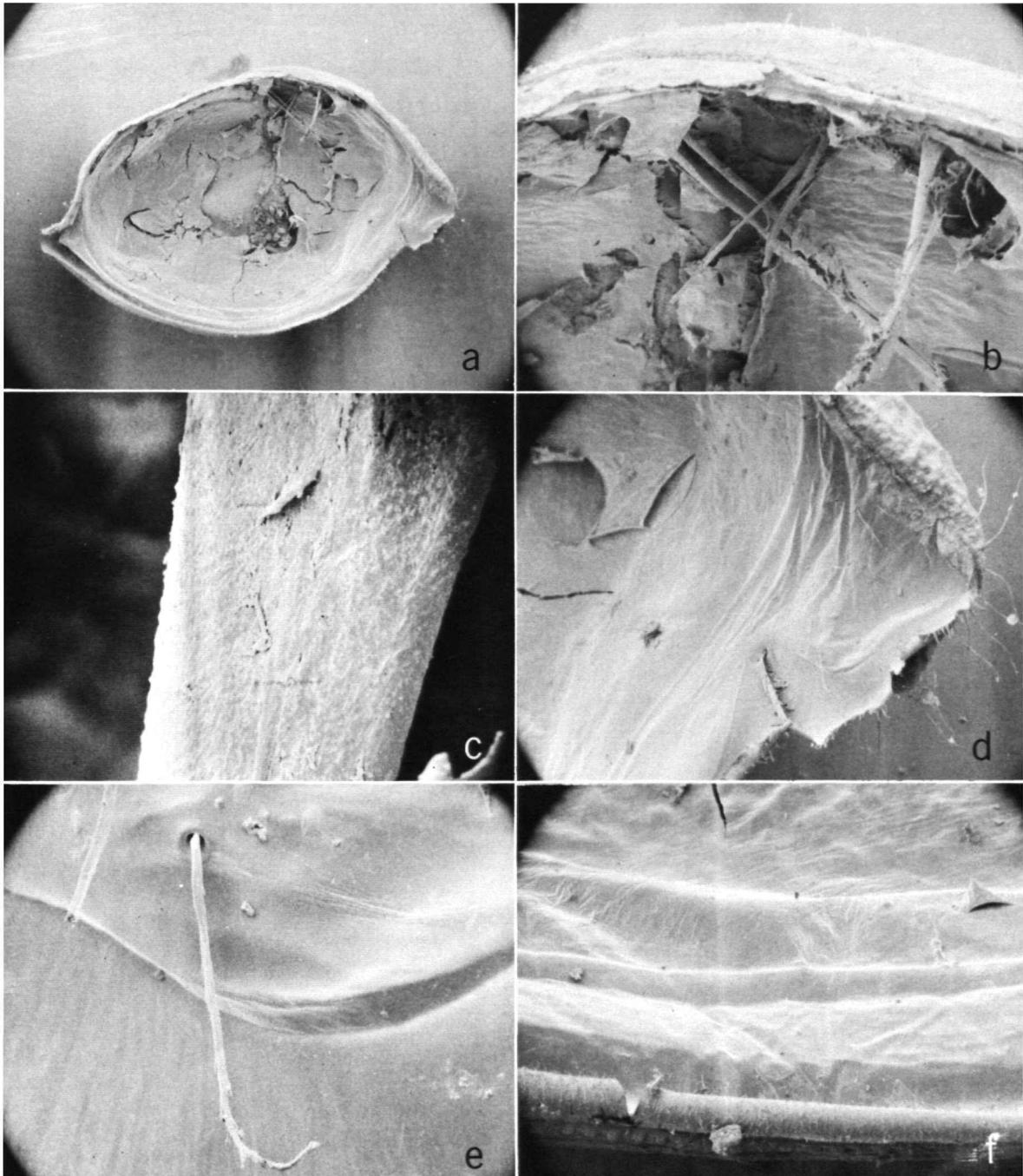


FIGURE 199.—*Scleroconcha gallardoi*, female, USNM 125399, left valve, medial view: *a*, complete valve, $\times 20$; *b*, detail of "*a*" showing dorsal muscles (anterior set of muscles is on right valve), $\times 100$; *c*, detail of anterior muscle, $\times 1800$; *d*, rostrum, $\times 80$; *e*, detail of lower rostral bristle in "*c*," $\times 620$; *f*, detail of ventral margin in "*a*" (lamellar prolongation of selvage folded upward), $\times 200$.

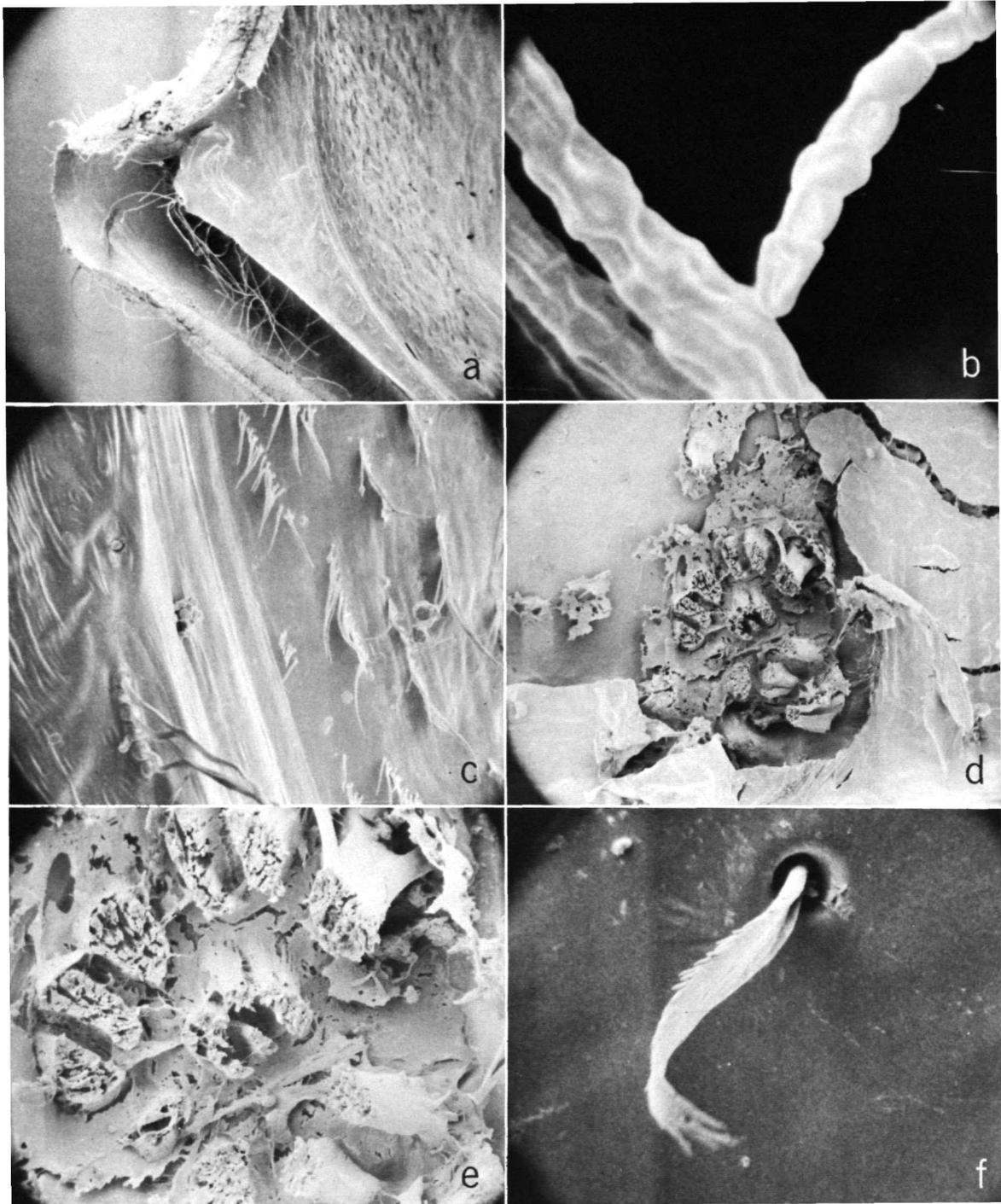


FIGURE 200.—*Scleroconcha gallardoi*, female, USNM 125399, left valve, medial view: *a*, detail of Figure 199*a* showing caudal process, $\times 125$ (numerous filaments in pocket of process are ectoparasites); *b*, detail of “*a*” showing ectoparasites, $\times 6600$; *c*, detail of “*a*” showing spines on vestment anterior to caudal process (row of 5 bristles to lower left are on infold), $\times 1000$; *d*, detail of Figure 199*a* showing central muscle scars, $\times 100$; *e*, detail of “*d*,” $\times 250$; *f*, bristle on anteroventral infold, about $\times 1200$.

50. *Scleroconcha sculpta* (Brady)

FIGURE 205

Philomedes sculpta Brady, 1898:434, pl. 44: figs. 15–20.—
Müller, 1912:26 [key], 29.—Thomson and Anderton, 1921:
117.

Philomedes (Scleroconcha) sculpta Brady.—Skogsberg, 1920:
380.

Scleroconcha sculpta (Brady).—Poulsen, 1962:395.

Streptoleberis sculpta (Brady).—Eagar, 1971:61 [listed]

HOLOTYPE.—Not designated.

TYPE-LOCALITY.—Otago Harbor, New Zealand,
collected in surface net, males only.

MATERIAL.—Dr. K. G. McKenzie provided a dried specimen of *Philomedes sculpta* Brady from the Brady collection at the Hancock Museum. As the specimen was useless in its dried condition, I immersed it in a solution of Aerosol-OT (commercial preparation) for several days. I did not dissect the specimen but was able to determine that the carapace does not have divided hairs as on the male of *S. flexilis*. I also was able to examine part of the furca projecting from the partly open valves and found it essentially as illustrated by Brady (1897, pl. 44: fig. 19). The valves became

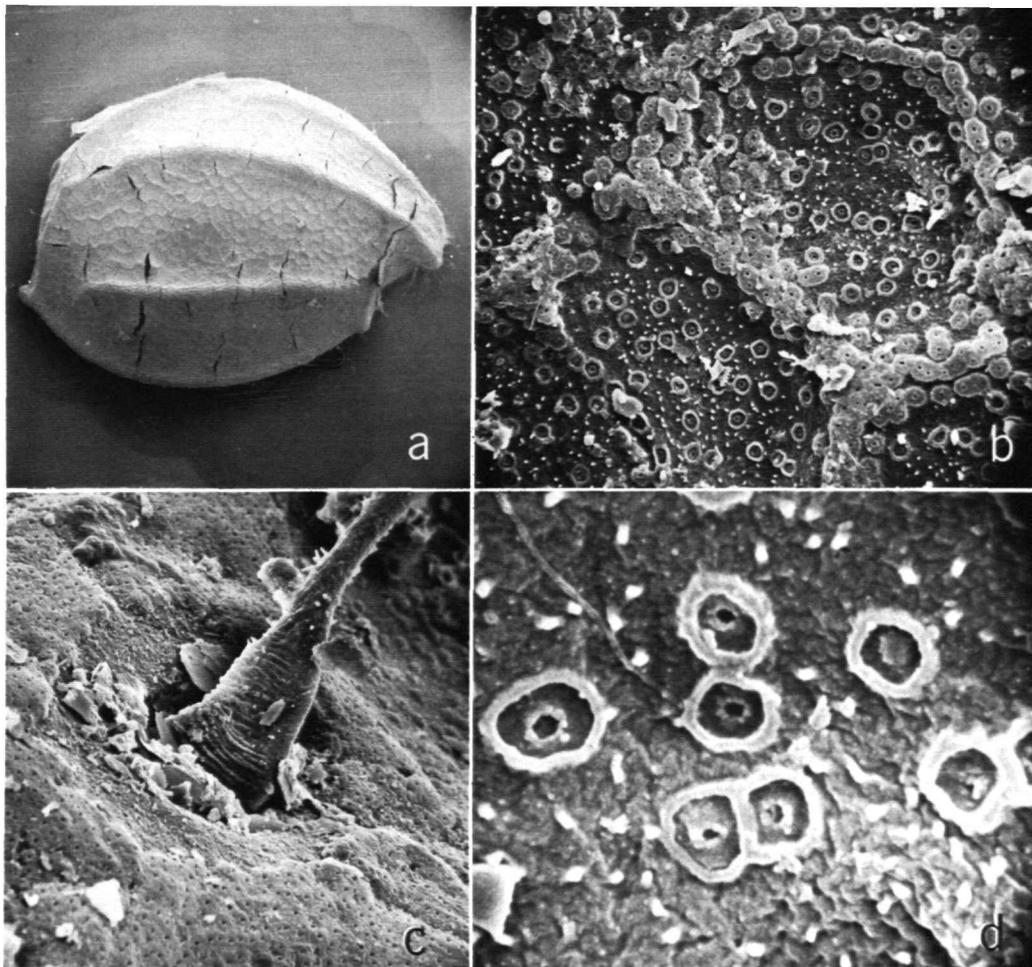


FIGURE 201.—*Scleroconcha gallardoii*, female, USNM 127470, right valve, lateral view: *a*, complete valve, $\times 20$; *b*, detail of reticulations, $\times 2000$; *c*, bristle in dorsal region, $\times 2000$; *d*, broken pustules in "b," $\times 10,000$. Reduction, 15%.

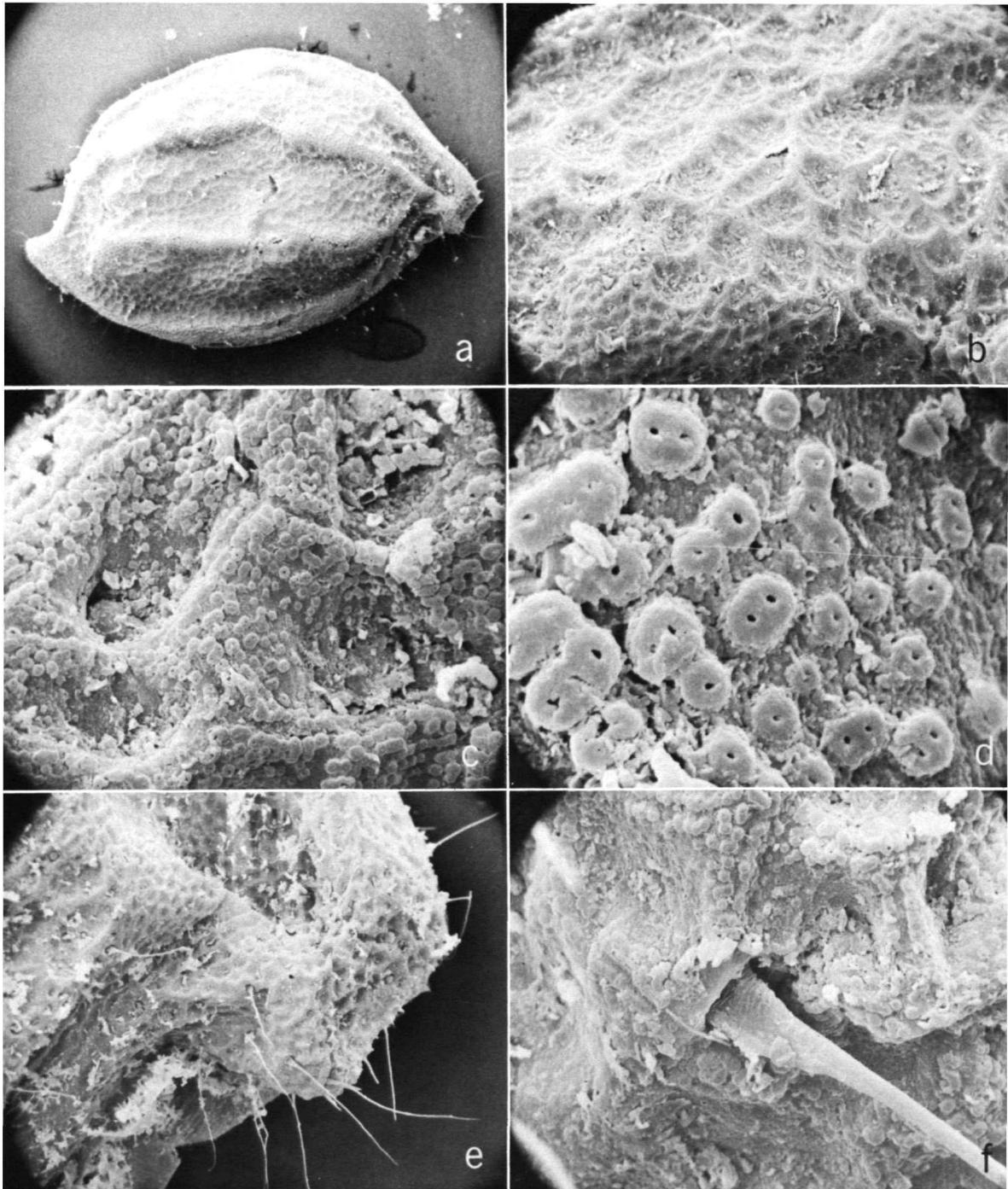


FIGURE 202.—*Scleroconcha gallardoi*, female, USNM 138161, right valve, lateral view: *a*, complete valve, $\times 24$; *b*, detail of "a" from area between upper rib and posterodorsal margin, $\times 120$; *c*, detail of "b," $\times 1200$; *d*, detail of "c," $\times 6000$; *e*, rostrum and incisur, $\times 120$; *f*, detail of bristle on "e," $\times 1200$.

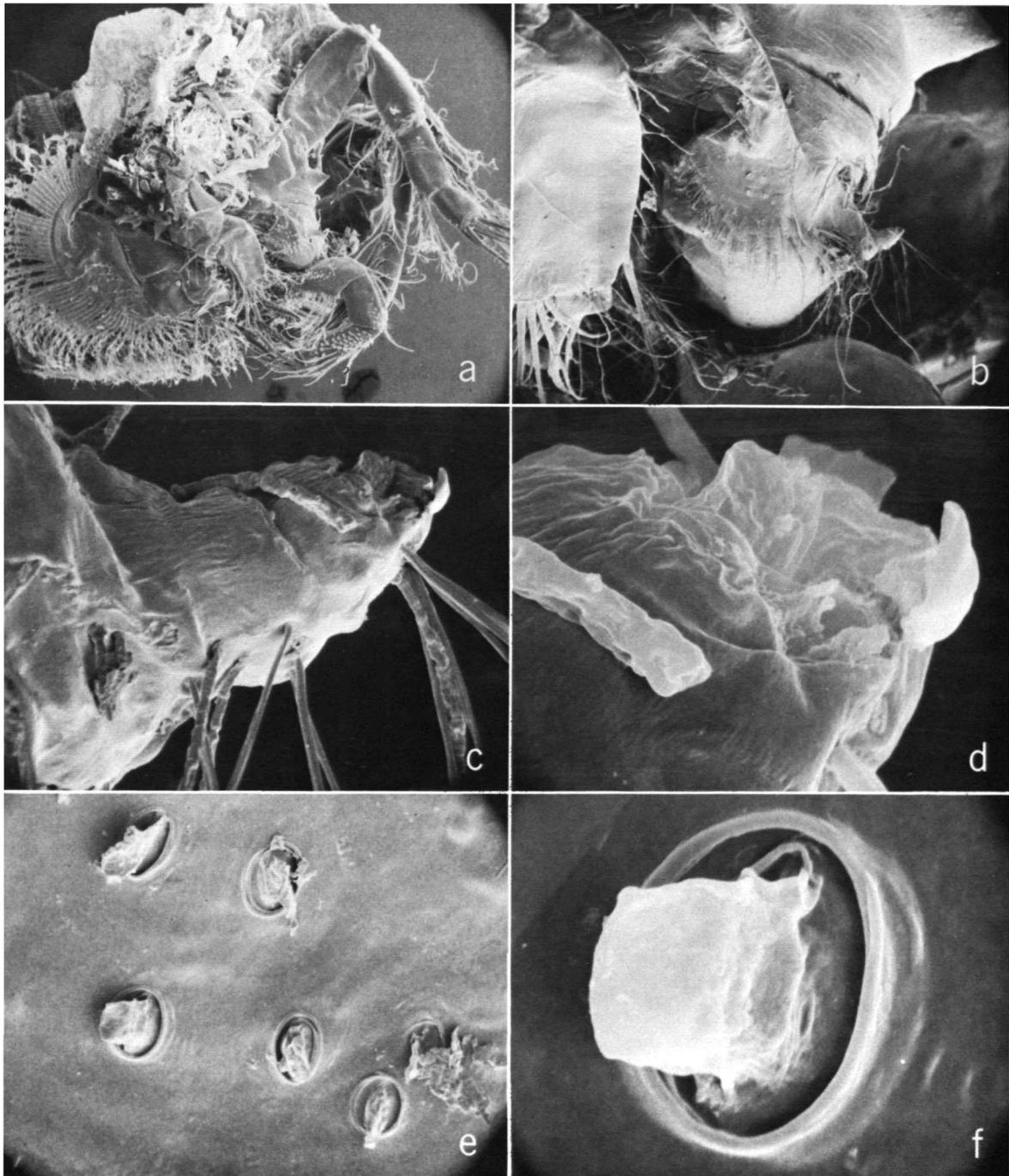


FIGURE 203.—*Scleroconcha gallardoi*, female, USNM 138161: *a*, right lateral view of body with right 2nd antenna, mandible and 7th limb removed, $\times 40$; *b*, detail showing upper lip and anterior process above lip, $\times 150$; *c*, detail of anterior of upper lip in “*b*,” $\times 1500$; *d*, detail of tip of lip in “*c*,” $\times 5000$; *e*, detail of glandular opening on side of upper lip in “*b*,” $\times 1500$; *f*, detail of “*e*” showing glandular openings, $\times 7500$.

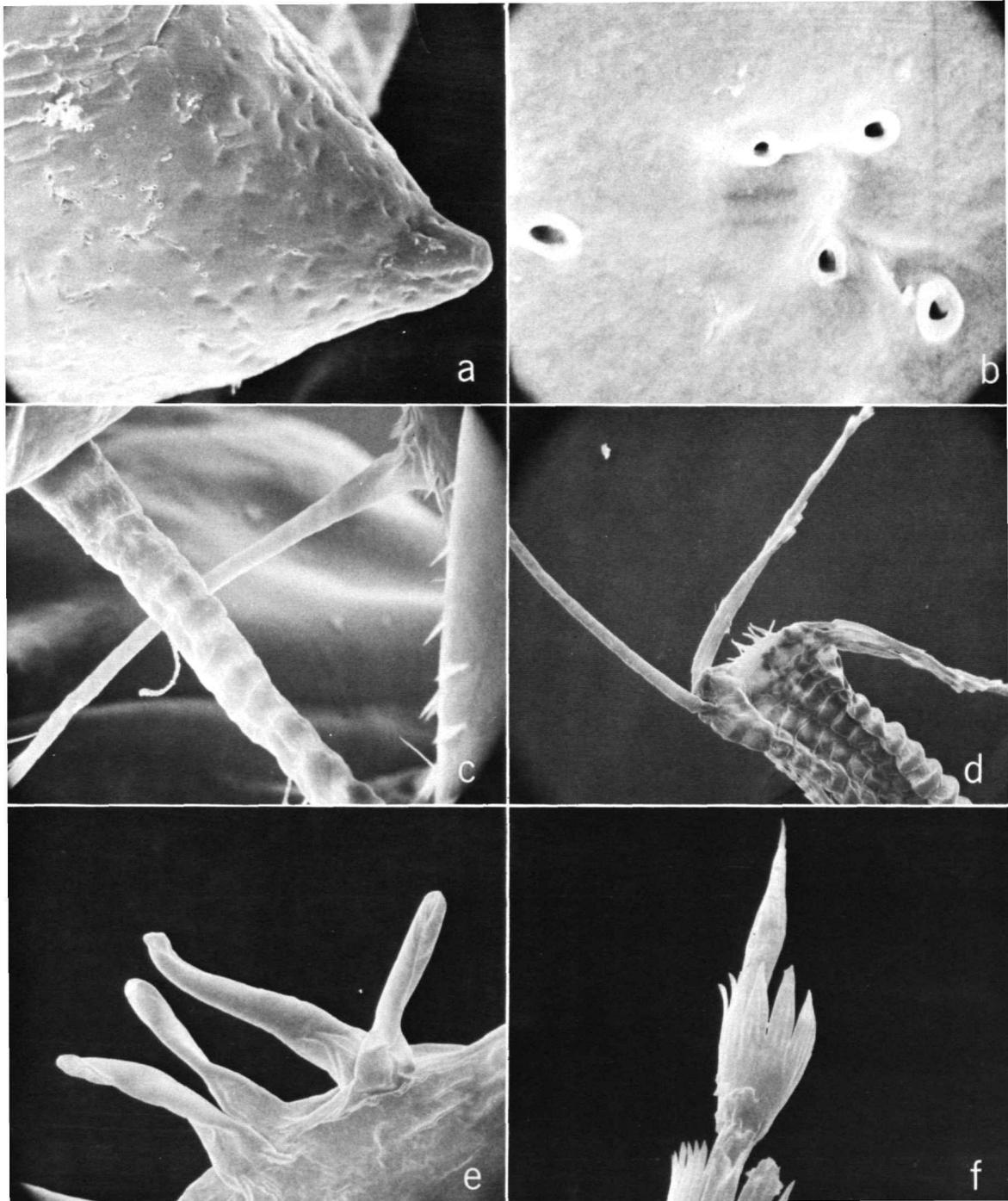


FIGURE 204.—*Scleroconcha gallardoi*, female, USNM 138161: *a*, detail of Figure 203*b* showing anterior process $\times 100$; *b*, detail of "a" showing pores, $\times 10,000$; *c*, detail of Figure 203*a* showing proximal part of rod-shaped organ, $\times 400$; *d*, tip of 7th limb, $\times 200$; *e*, detail of "d" showing terminal pegs, $\times 2400$; *f*, tip of bristle on 7th limb, $\times 3000$.

sufficiently translucent to verify that the rod-shaped organ of the specimen is divided into many joints in the middle part. Thus, it is possible to refer the species to the genus *Scleeroconcha* as suggested by Skogsberg (1920:380). The specimen was returned in alcohol to Dr. McKenzie.

DIAGNOSIS.—Surface of carapace with unbranched hairs; length about 2.2–2.6 mm; 2 midribs present.

Furca: Each lamella with 10 claws; 3rd claw about two-thirds length of 4th claw.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figure 205).—Shape and ornamentation essentially similar to male of *S. flexilis*, but with only single hairs on carapace. Carapace length 2.21 mm, height 1.22 mm (Figure 189). Length of preserved specimen is smaller than the 2.6 mm given by Brady (1898:435).[~]

Furca: 3rd claw about two-thirds length of 4th claw and about same diameter as 5th claw; claws following 4th claw decrease gradually in size posteriorly on lamella.

Lateral eye: Large, similar to eye of male *S. flexilis*.

REMARKS.—Until this species is better known, I consider it a *species inquirenda*. Skogsberg (1920:380) stated, "It does not seem to me impossible that *Ph. sculpta* and *Ph. flexilis* are male and female of the same species." My observation that the carapace of the former species bears single hairs, whereas that of the latter bears branching hairs makes that possibility unlikely.

DISTRIBUTION.—Known only from the type-

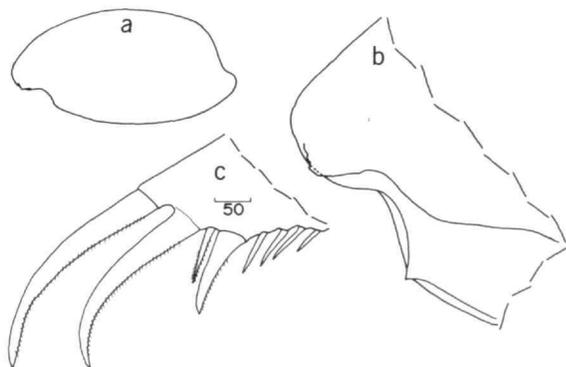


FIGURE 205.—*Scleroconcha sculpta*, male, length 2.21 mm, carapace: a, complete specimen, lateral outline; b, detail of anterior shown in "a"; c, tip of left furcal lamella.

51. *Scleroconcha frons*, new species

FIGURES 206–210

HOLOTYPE.—USNM 128503, N-1 ♂, length 2.98 mm. Some appendages on slides, remaining appendages and carapace in alcohol.

TYPE-LOCALITY.—*Eltanin* Cruise 5, station 216.

ETYMOLOGY.—The specific name, derived from the Latin "frons" [= leafy branch], refers to the spiny leaflike teeth in the comb of the 7th limb.

PARATYPES.—USNM 128504, N-1 ♂; USNM 128505, N-1 ♂. Both specimens from *Eltanin* Cruise 5, station 208.

DIAGNOSIS (based on N-1 males).—Shape and ornamentation of carapace similar to that of *S. appelloefi* and *S. gallardoi*; length of N-1 male 2.23 to 2.98 mm.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb with 7 or 8 teeth, each tooth with about 4 extremely long lateral spines along each side; 1 peg with single pair of spines present opposite comb.

Lateral eye: Large, about same size as medial eye, but pigment or ommatidia not observed.

DESCRIPTION OF N-1 MALE (Figures 206–210).—Shape and ornamentation similar to *Scleroconcha appelloefi* (Skogsberg) (see Skogsberg, 1920:420, fig. 77) and *Scleroconcha gallardoi* Kornicker (Figures 206, 207a-e, 208l, 209, 210).

Infold (Figure 207b,d,e): Infold on rostrum with 14–17 bristles, mostly with spines; small bristle present below inner end of broad incisur followed

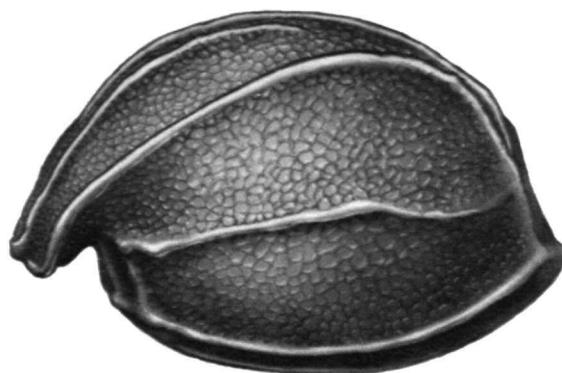


FIGURE 206.—*Scleroconcha frons*, N-1 male, USNM 128503, left valve, length 2.98 mm.

forming row on list of anteroventral infold parallel to valve edge; anteroventral infold with about 12 striations; ventral infold bare; posteroventral and

posterior list with numerous bristles in groups of up to 6 bristles; ridge with 8 or 9 bristles present between posterior list and outer edge of valve,



FIGURE 207.—*Scleroconcha frons*, N-1 male, USNM 128503, length 2.98 mm, carapace: a, complete specimen, lateral outline. Left valve: b, anterior, medial view; c, same, lateral view; d, caudal process, medial view. Right valve: e, caudal process, medial view. Appendages: f, endopodite of right 2nd antenna, medial view; g, tip of right 5th limb, posterior view; h, tip of left 5th limb, anterior view; i, tip of right mandible, medial view; j, basale, exopodite, and 1st endopodial joint of right mandible, medial view. (Same magnification: g,h; b,d-f,i,j.)

upper bristle longer than others; 1 bristle present between ridge and posterior valve edge; several bristles present between ridge and list.

Selvae (Figure 210): Striate lamellar prolongation with short fringe present; lamellar prolongation discontinuous in area of incisur (in this location on holotype, the upper lamellar prolongation is lateral to lower prolongation on right valve, but medial to lower prolongation on left valve).

Size: USNM 128503, length 2.98 mm, height 2.04 mm; USNM 128504, length 2.23 mm, height 1.32 mm; USNM 128505, length only about 2.18 mm.

First antenna: Lateral surface of 1st joint with spines forming clusters near dorsal margin; 2nd joint spinous and with 3 bristles, 1 ventral, 1 dorsal, 1 lateral, all with long proximal and short distal spines; 3rd joint spinous and with 3 bristles, 1 ventral, 2 dorsal, all with long proximal and short distal spines; 4th joint spinous and with 5 bristles, 3 ventral, 2 dorsal, all with long proximal and short distal spines; sensory bristle of 5th joint spinous, with 6 proximal and 4 terminal filaments including tip of stem; medial bristle of 6th joint with long proximal and short distal spines.

Seventh joint: a-bristle similar to bristle on 6th joint but longer; b-bristle with 1 proximal and 4 distal filaments, including tip; c-bristle with 7 proximal and 5 distal filaments, including tip of stem. Eighth joint: d- and e-bristles long, bare, about same length as c-bristle; f-bristle stout, with 5 proximal and 4 distal filaments including stem; g-bristle with 5 proximal and 5 distal filaments including tip of stem.

Second antenna (Figure 207f): Protopodite bare. Endopodite 3-jointed: 1st joint with 5 bare bristles, 4 proximal and 1 distal, distal bristle longer than proximal bristles; 2nd joint elongate with 3 ventral bristles, all with long proximal and short distal spines, proximal bristle about 3 times longer than 2 distal bristles; 3rd joint with 1 bare proximal bristle (bristle fairly long on holotype, but short on paratype) and 2 short spinous terminal bristles. Exopodite: 1st joint with 1 small medial spine on distal margin; joints 2 to 8 with minute spines forming row along distal margin; small basal spine present at base of bristle on joints 4 to 7; bristles of joints 2-8 bare except for 2 or 3 short spines at tip; 9th joint with 6 bristles, most with short marginal spines.

Mandible (Figures 207i,j; 208a): Coxale endite

with small spinous bristle at base. Basale: medial surface spinous and with 6 bristles near ventral margin, 5 proximal, 1 near middle (5 proximal bristles consisting of 3 pectinate and 2 spinous bristles); lateral surface with 3 spinous bristles near ventral margin (proximal of 3 practically on margin); ventral margin with 3 distal bristles, all with long proximal and short distal spines; dorsal margin with 3 or 4 bristles, 1 or 2 distal to middle, 2 terminal, all with long proximal and short distal spines. Exopodite about three-fourths length of dorsal margin of 1st endopodite joint, hirsute near tip and with 2 bristles, both with long proximal and short distal spines (inner proximal bristle longer than outer distal bristle). Endopodite: 1st joint with spines forming clusters on medial surface and 4 ventral bristles, all with long proximal and short distal spines; medial surface and margins of 2nd endopodite joint with spines forming clusters; ventral margin with bristles forming 2 distal groups, of these, proximal group with 4 bristles, terminal group with 3, all bristles with short marginal spines; dorsal margin with bristles forming 2 groups just proximal to middle of margin, proximal group with 4 bristles (1 with long proximal and short distal spines, 3 with short spines), distal group with 5 bristles, all with long proximal and short distal spines; 1 short pectinate bristle present on medial side of joint near dorsal margin between the 2 groups of bristles; end joint with 3 claws and about 3 bristles, all claws with teeth along middle part of concave margin (dorsal claw shorter than others but reaching past middle of longest claw).

Maxilla (Figure 208b-d): 1st endite with 11 distal bristles; 2nd endite with 6 distal bristles, 3rd endite with about 8 distal bristles; coxale with 1 stout plumose dorsal bristle; basale with 1 short proximal bristle with few short marginal spines present near suture of 3rd endite, and 3 distal bristles, 1 short bare, 2 long with wreaths of long spines and short distal spines; exopodite with 3 bristles, proximal bristle short with short marginal spines, terminal bristles long with long wreaths of spines plus short distal spines. Endopodite: 1st joint with 1 α -bristle with long proximal and short distal spines and 4 spinous β -bristles; end joint with 3 spinous α -bristles; 1 of the β - and 2 of the δ -bristles clawlike, pectinate.

Fifth limb (Figures 207g,h; 208e): Epipodial ap-



FIGURE 208.—*Scleroconcha frons*, N-1 male, USNM 128503, right mandible: *a*, coxale endite and proximal part of basale, medial view. Maxilla: *b*, right limb, lateral view (not all bristles shown); *c*, part of left limb (not all bristles shown); *d*, tip of left maxilla, lateral view. Fifth limb: *e*, outer lobe of 3rd joint and joints 4 and 5 of exopodite of left 5th limb, anterior view. Sixth limb: *f*, left limb, medial view (not all bristles shown). Seventh limb: *g*, tip. Furca: *h*, right lamella (not under cover slip). Anterior: *i*, detail of right lateral eye shown in "*j*"; *j*, right lateral eye, medial eye and rod-shaped organ, anterior process, and upper lip. Posterior: *k*, hairs along posterior margin, anterior to right. N-1 male, USNM 128505, length 2.18 mm, carapace: *l*, detail of ornamentation and bristles on surface of left valve between horizontal ribs and just anterior to valve middle. (Same magnification in microns: *b,c,e,f,i,l; h,j,k*.)

pendage with 57 to 61 bristles; endite I with 6 spinous bristles, anterior and posterior of these quite short, others long; endite II with 6 long spinous bristles; endite III with 9 or 10 spinous bristles. Exopodite: anterior side of 1st joint with 2 spinous bristles near triangular anterior tooth of main tooth and 1 short spinous bristle closer to outer margin (on Figure 207*h*, part of 1st joint is folded so that short bristle appears proximal to 2 longer bristles); main tooth of 1st joint consisting of 4 constituent teeth, all pectinate; anterior part of main tooth triangular; 1 bristle with stout marginal spines present proximal to teeth of main tooth; anterior side of 2nd joint with small d-bristle with few spines on anterior projection near outer corner of large quadrate tooth; posterior side with usually groups of 3 a- and b-bristles, all with spines, and long spinous c-bristle proximal to a- and b-bristles; margin of inner curvature of large tooth of 2nd joint with 1 small pointed node; outer lobe of 3rd joint with 1 or 2 spinous bristles, inner lobe with 3; 4th + 5th joint hirsute and with 6 spinous bristles.

Sixth limb (Figure 208*f*): 3 bristles present in place of epipodial appendage; endite I with 3 spinous bristles, 2 medial, 1 terminal; endite II with 4 spinous bristles, 1 medial, 3 terminal; endites III and IV each with 9 spinous bristles, 1 medial, 8 terminal; end joint moderately prolonged posteriorly and with 26–28 spinous and plumose bristles; endites and end joint with clusters of long hairs on medial and lateral surfaces.

Seventh limb (Figure 208*g*): Each limb with 10 bristles, 4 proximal (2 on each side) and 6 distal (3 on each side); all bristles spindle shaped (a juvenile character) and with 1 to 3 bells; bristles with distal marginal spines; terminal comb with 7 or 8 teeth, each tooth with about 4 extremely long lateral spines along each side; 1 peg with single pair of spines present opposite comb.

Furca (Figure 208*h*): Holotype with 12 claws on right lamella, 13 on left; claw 3 about same length as 4th but about half its width; claw 5 with teeth forming lateral and medial row; claws 2 to 4 with teeth forming row along posterior margin and with few teeth along anterior margin; remaining smaller claws mostly with slender spines along both anterior and posterior margins; hairs present at base of claws and on lamella following claws; marginal spines more equally distributed on anterior and

posterior sides of claws on posteriorly placed claws.

Rod-shaped organ (Figure 208*j*): Elongate with about 13 segments at middle; tip rounded with minute hairs; small hairs present along margins.

Eyes (Figure 208*i,j*): Medial and lateral eyes about same size; neither black pigment nor ommatidia observed in lateral eyes of holotype; 4 weakly defined ommatidia observed in lateral eyes of USNM 128504.

Upper lip (Figure 208*j*): Lip hirsute with anterior projection; large rounded single process present between upper lip and medial eye.

Posterior (Figure 208*k*): Hairs present forming clusters on upper and lower parts.

Copulatory organ: Organ not evident. Brushlike bristles not observed.

REMARKS.—The paratypes from *Eltanin* station 208 may have been dried at one time because their carapaces were considerably distorted. They were restored with the help of a chemical (Aerosol-OT). These paratypes have smaller carapaces than the holotype. Other differences between the paratypes and holotype occur in the length of the proximal bristle on the 3rd joint of the endopodite of the 2nd antenna, which extends beyond the end of the joint on the holotype, but is quite short on the paratypes; also, the dorsal margin of the mandibular basale bears 4 bristles on the holotype but only 3 on the paratypes. The anteroventral infold of the carapace bears a row with 19 bristles on the holotype, but only about half this number on the paratypes. These differences have been interpreted as the result of individual variation. The 7th limbs and the distribution of bristles on the 2nd joint of the endopodites of the 2nd antennae are similar on the holotype and paratypes. The maxillae, 5th and 6th limbs of the paratypes were not examined in detail. Most claws of the furcae on the paratypes are missing.

COMPARISONS.—The comb teeth on the 7th limb of the new species bear long marginal spines. The comb teeth of *S. appelloefi* Skogsberg, 1920, *S. flexilis* (Brady, 1898) (in Poulsen, 1962), and *S. arcuata* Poulsen, 1962, have short spines, and *S. gallardoi* Kornicker, 1970, has no spines. The endopodites of the 2nd antennae of the N-1 ♂ of *S. appelloefi* (Skogsberg, 1920:421, fig. 78–7) and *S. trituberculatus* (Lucas, 1931:4, fig. 1D) have been described. The 2nd joint of both species bears 1 long proximal bristle and a group of shorter

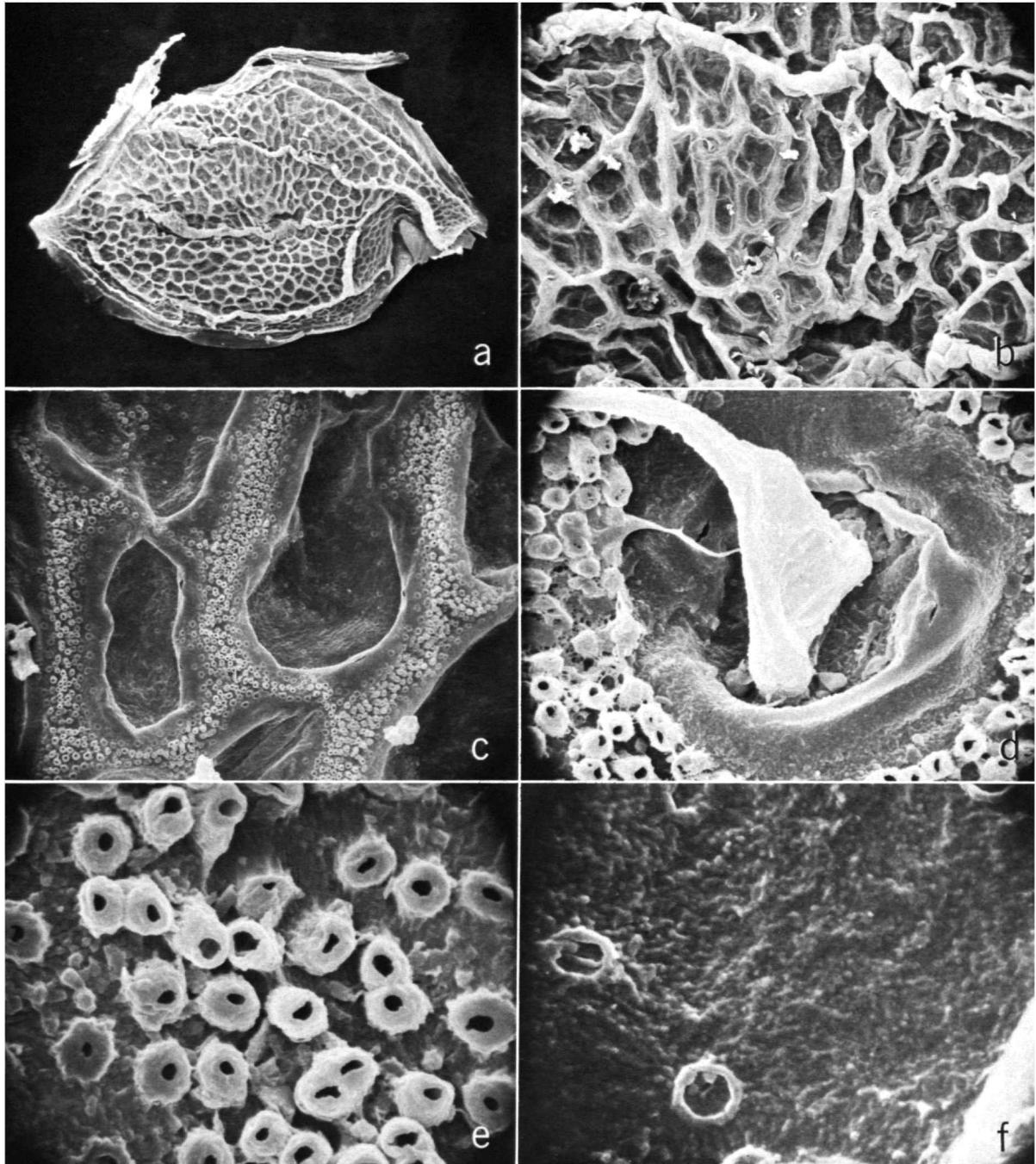


FIGURE 209.—*Scleroconcha frons*, N-1 male, USNM 128504: *a*, right valve, $\times 50$; *b*, detail of surface, $\times 200$; *c*, detail of "*b*," $\times 1000$; *d*, base of bristle, $\times 5000$; *e*, detail of middle vertical ridge on "*c*," $\times 10,000$; *f*, depression in "*c*," $\times 10,000$. Reduced to $74\frac{1}{2}\%$.

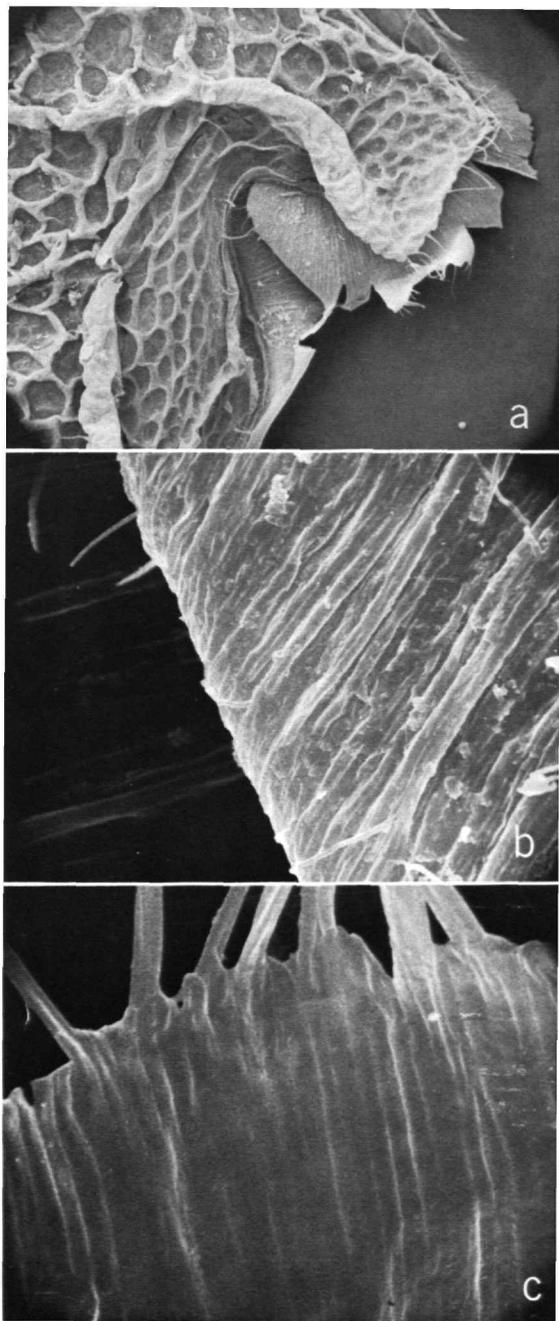


FIGURE 210.—*Scleroconcha frons*, N-1 male, USNM 128504, right valve: *a*, detail of rostrum, $\times 62.5$; *b*, detail of lamellar prolongation along upper margin of incisur, $\times 4625$; *c*, up-turned part of lamellar prolongation near inferior margin of incisur, $\times 4625$. Reduction, 25½%.

bristles on the distal half of the joint; *S. appelloefi* has 5 bristles in this group and *S. trituberculatus* has 3. The new species also bears a long proximal bristle on the 2nd joint, but does not have the small distal bristles; instead, it has 2 rather stout bristles in the middle of the ventral margin. The furca on the N-1 juvenile δ of *S. trituberculatus* (Lucas, p. 411, fig. 1C) bears 16 claws compared to 12 or 13 on the furca of *S. frons*.

DISTRIBUTION.—This species has been collected at only two stations west of Chile in the Subantarctic and Subantarctic-to-35°S regions at depths of 957 to 1226 m (Figure 190).

52. *Scleroconcha wolffi*, new species

FIGURES 211-213

Philomedes flexilis Brady, 1898 [part].

HOLOTYPE.—Adult ♀ in collection of Universitets Zoologiske Museum, Copenhagen, Denmark, carapace length 1.87 mm.

TYPE-LOCALITY.—Akaroa Harbor, New Zealand.

ETYMOLOGY.—The species is named after Dr. Torben Wolff.

PARATYPES.—USNM 135044, gravid ♀ ; USNM 135045, 2 specimens; Universitets Zoologiske Museum, 36 specimens. Paratypes from same sample as holotype.

MATERIAL.—Through Dr. Torben Wolff, I received on loan from the Universitets Zoologiske Museum, Copenhagen, Denmark, a vial with two labels: "Type" and "*Philomedes flexilis* Brady, orig. spec. Akaroa Harbour, 6 fm., H Suter, 8/97."



FIGURE 211.—*Scleroconcha wolffi*, female, USNM 135044, left valve, length 1.80 mm.

This vial contained 6 specimens that I identified as *S. flexilis* and 40 specimens that I refer to a new species, *S. wolffi*.

In the collection I received from Dr. McKenzie of the British Museum (Natural History) were two slides marked as follows: "♂ *Philomedes flex-*

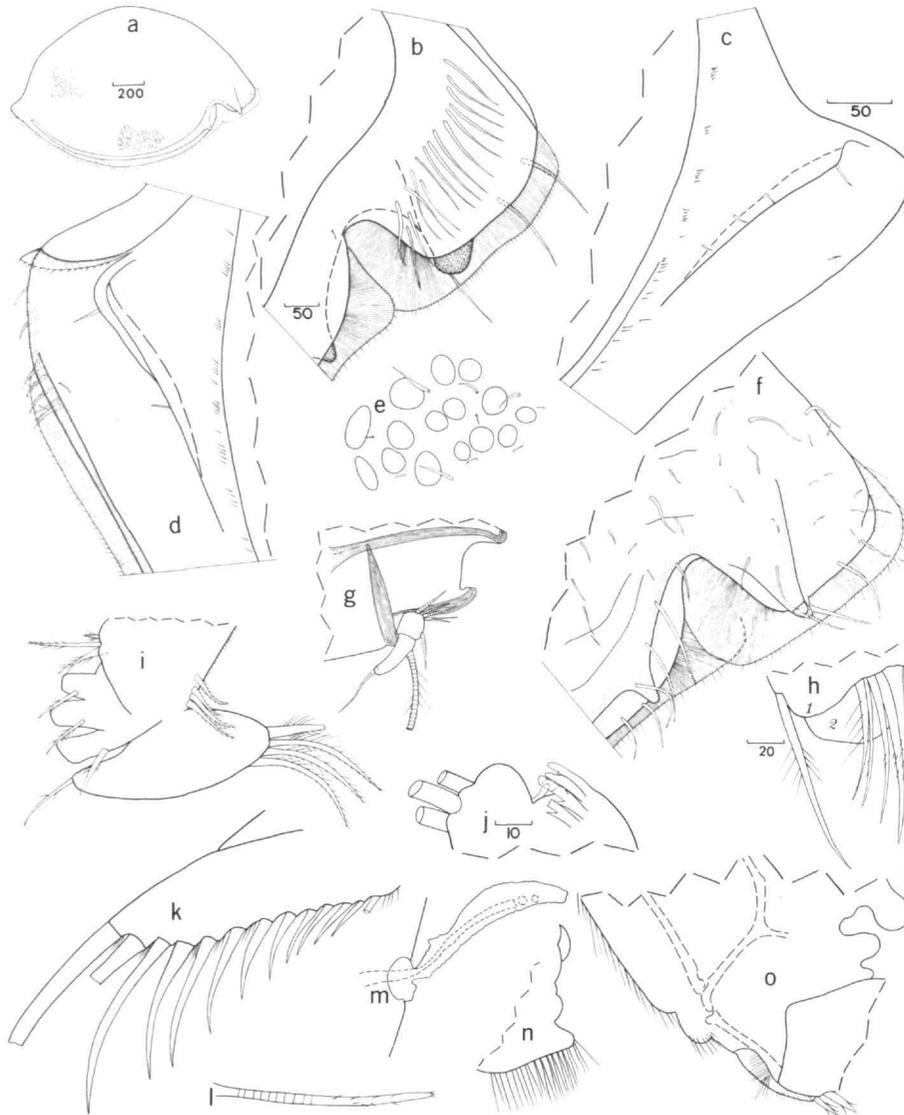


FIGURE 212.—*Scleroconcha wolffi*, female, holotype, length 1.87 mm, carapace: *a*, complete specimen, lateral view; *b*, anterior of left valve, medial view; *c*, caudal process of right valve, medial view; *d*, caudal process of left valve, medial view; *e*, detail of ornamentation and hairs near middle of right valve; *f*, anterior of right valve, lateral view. Appendages: *g*, endopodite and part of protopodite of left 2nd antenna, medial view; *h*, bristles on 1st endopodial joint of maxilla, lateral view; *i*, right 6th limb (not all bristles shown); *j*, tip of 7th limb; *k*, left lamella of furca; *l*, rod-shaped organ; *m*, right lateral eye; *n*, upper lip; *o*, posterior with posterior 2 claws on right lamella of furca. (Same magnification in microns: *b,e,g,i,k,l,n,o*; *c,d,m*.)

ilis Brady n. sp., type, Akaroa Harbour, N. Z. 6 fathoms water, 8/97" and "♀ *Philomedes flexilis* n. sp. types, Akaroa Harbour, N. Z. 6 fathoms water." The slides are in poor conditions, but many single hairs are visible on the compressed carapace on the slide bearing the ♂. The absence of divided hairs leads me to believe that this specimen probably is *S. wolffi*. The carapace is absent on the slide bearing the ♀, and I consider this specimen as *Scleroconcha* species indeterminate herein.

REMARKS.—Brady (1898:436) in his description of *P. flexilis* states, "The specimens from which the description is drawn up were taken numerously by the dredge in depths of 1–5 fathoms in Lyttelton Harbour. Others which I refer to the same species occurred in a dredging from 6 fathoms in Akaroa Harbour. These, however, differ slightly from the types in having generally an almost smooth shell with little or no trace of ribs, though in not a few specimens the ribs are quite apparent, and are in character like those of the types." My examination of the specimens from Akaroa Harbor revealed that two species are present: *S. flexilis*, with 4 strongly developed longitudinal ridges and branching bristles on the carapace, and a species I have described herein as *S. wolffi*, which has only a ventral ridge and bears only single bristles on the carapace.

DIAGNOSIS OF FEMALE.—Carapace with prominent longitudinal ridge present only along ventral margin; lateral protuberance or rostrum not extending anteriorly beyond lamellar prolongation of selvage; hairs on carapace unbranched; carapace length 1.80–1.94 mm.

Seventh limb: Similar to that on *S. flexilis* except 10 teeth in comb.

Furca: Each lamella with 13 claws.

DESCRIPTION OF FEMALE (Figures 211–213).—Carapace with broad rostrum and small caudal process (Figures 211, 212a–f, 213).

Ornamentation (Figures 211, 212f, 213): Each valve with ridge slightly within and parallel to ventral margin. Lateral antieriad projection on rostrum reaching past middle of lamellar prolongation of selvage; tip of projection located ventral to middle of rostrum; small antieriad projection also present below incisur. Surface of each valve with numerous pits.

Carapace hairs: All hairs on carapace single (Figure 212e).

Infold (Figure 212b–e): Infold on rostrum with 16 bristles; small bristle present below inner end of broad incisur followed by space, then 9 spinous bristles on anteroventral infold; ventral infold bare; posteroventral list and posterior list with numerous minute bristles in groups of 1 to 5 bristles; ridge with 2–4 bristles present between posterior list and outer edge of valve; 1 bristle present between ridge and posterior valve edge.

Selvage: Striate lamella prolongation with short fringe discontinuous in area of incisur; long lateral hairs with bases proximal to outer edge of incisur present on prolongation ventral to incisur.

Size of carapace (Figure 189): USNM 135044, gravid ♀, length 1.80 mm, height 1.27 mm; holotype length 1.87 mm, height 1.28 mm; paratype, adult ♀, length 1.94 mm, height 1.28 mm.

First antenna: 1st joint with clusters of spines on medial and lateral surfaces; 2nd joint with usual 3 bristles, 1 lateral, 1 ventral, 1 dorsal, all with long proximal and short distal spines; 2nd joint also with spines forming clusters on lateral and medial surfaces and along ventral and dorsal margins; 3rd joint short, with 3 bristles, 2 dorsal and 1 ventral, all with long proximal and short distal spines; 3rd joint also with cluster of terminal spines on ventral margin and few spines on dorsal margin; 4th joint with 2 dorsal and 3 ventral bristles, and spines along ventral and dorsal margins; sensory bristle of 5th joint with 7 proximal and 3 or more distal filaments; medial bristle of minute 6th joint with long proximal and short distal spines. Seventh and 8th joints similar to that of *S. flexilis* described herein.

Second antenna (Figure 212g): Endopodite 2-jointed: 1st joint with 5 proximal and 1 distal bristle; 2nd joint with long spinous proximal and shorter bare terminal bristle. Exopodite: 1st joint with slender medial spine on terminal margin; 2nd to 9th joints with short spines forming row along terminal margins; joints 2 to 8 with slender basal spine (spine on joint 7 about half length of joint 8); bristles on joints 2 to 4 bare, bristles on joints 5 to 8 with natatory hairs; 9th joint with 7 bristles, shortest bristle with short marginal spines, remaining bristles with natatory hairs.

Mandible: 2nd endopodite joint: Ventral margin with 3 bristles in both proximal and distal groups; dorsal margin with 3 bristles in proximal group, 6 in distal group, and 1 short pectinate

bristle on medial surface between both groups. Limb otherwise similar to that of *S. flexilis* described herein.

Maxilla (Figure 212h) and *fifth limb*: Same as those described herein from *S. flexilis*.

Sixth limb (Figure 212i): Endite I with 3 bristles; endite II with 1 medial and 3 terminal bristles; endites III and IV with 1 medial and 7 terminal bristles; end joint with 32 bristles; 4 bristles present in place of epipodial appendage; surfaces of limb hirsute.

Seventh limb (Figure 212j): Similar to that described herein for *S. flexilis*, but only 10 teeth observed in comb.

Furca (Figure 212k): Each lamella with 13 claws decreasing in length posteriorly along lamella; claw 3 more slender than claw 4, claw 3 equal in length or longer than claw 4; hairs present near medial bases of claws and following claws; teeth present along concave margins of claws.

Lateral eyes (Figure 212m): Slender elongate eyes present.

Medial eye and rod-shaped organ (Figure 212l): Medial eye normal; rod-shaped with about 10 sutures.

Upper lip: Lip hirsute with rounded projection between it and medial eye (Figure 212n).

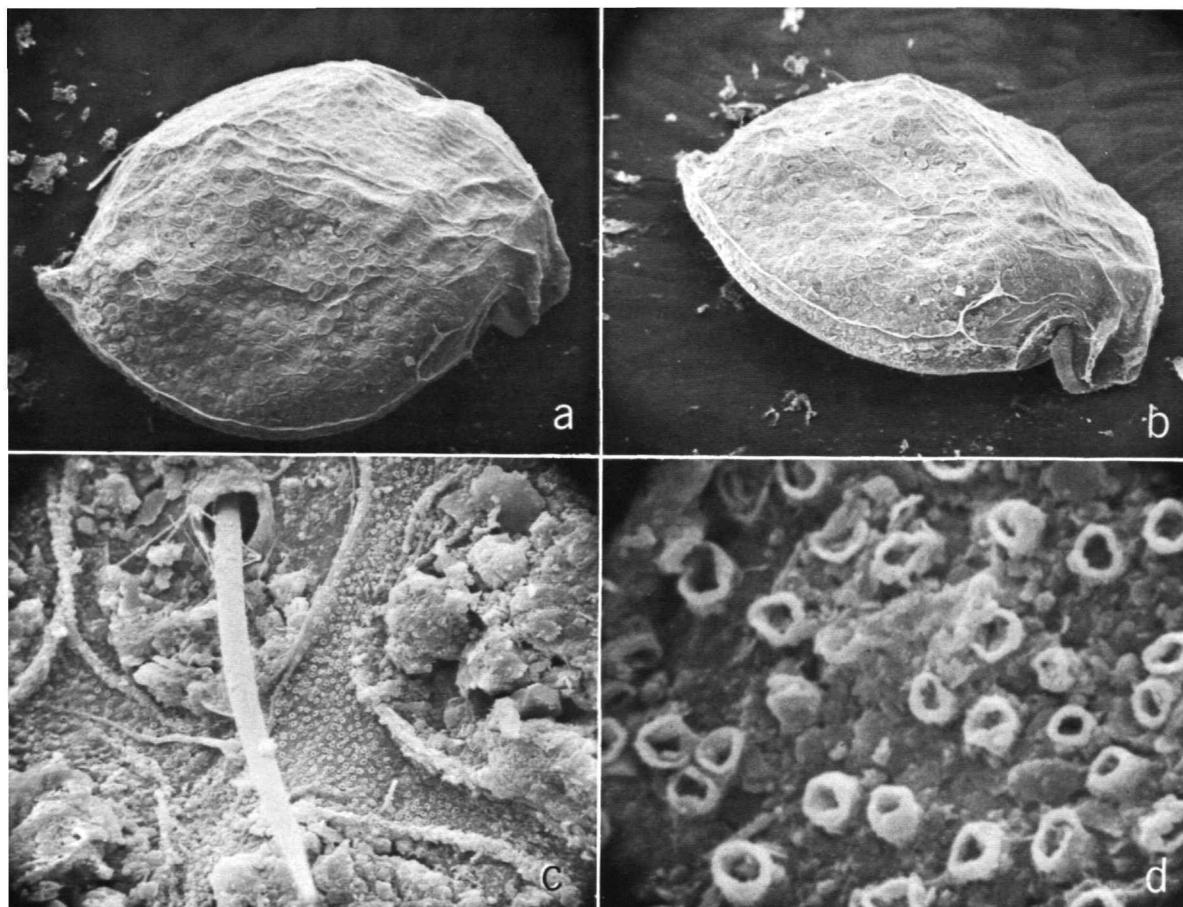


FIGURE 213.—*Scleroconcha wolffi*, female, USNM 135044, Akaroa Harbor: a, right valve, $\times 56$; b, oblique view showing ventral rib, $\times 56$; c, detail in middle of posterior part of carapace, $\times 1125$; d, detail of area between large depressions in "c," $\times 11,250$.

Posterior: Posterior with long hairs or spines (Figure 212o).

Eggs: Paratype USNM 135044 with 12 eggs in brood chamber.

COMPARISONS.—This new species differs from previously described species of *Scleroconcha* in bearing only a ventral longitudinal ridge on each valve of the carapace. Several previously described

species bear weakly developed lateral ridges, but none have a smooth carapace like that of *S. wolffi*. As previously mentioned, the hairs on the carapace of *S. wolffi* are single, not branching as on *S. flexilis*. The lateral protuberance on the rostrum of *S. wolffi* does not extend beyond the lamellar prolongation of the selvage as on *S. arcuata*. (On the specimen of *S. wolffi*, which was freeze-



FIGURE 214.—*Scleroconcha* species indeterminate, female, USNM 128282, length 1.65 mm, carapace: a, complete specimen, lateral view; b, detail of ornamentation and hairs on left valve near middle; c, anterior of left valve, lateral view; d, caudal process of left valve, medial view; e, anterior of left valve, medial view. Left 2nd antenna: f, exopodial joints 6–9, lateral view; g, endopodite, medial view. Right 2nd antenna: h, endopodite, lateral view; i, medial eye and rod-shaped organ. Nematodes: j, specimen in unrolled position; k, specimen in coiled encysted position. (Same magnification in microns: b,d; c,e,i-k; f,g,h.)

dried and observed with a scanning electron microscope (Figure 244a), thin ridges or wrinkles appear in the areas occupied by lateral ridges in other species.)

DISTRIBUTION.—Known only from the type-locality (Figure 190).

Scleroconcha Species Indeterminate

MATERIAL.—USNM 127254, 1 juvenile from IWSOE, *Glacier* Cruise 2, station 0006, anchor dredge; USNM 126261, 1 juvenile from IWSOE, *Glacier* Cruise 2, station 0008, anchor dredge; USNM 127262, 1 juvenile, length 1.61 mm, height 0.95 mm, + 1 juvenile, both from IWSOE, *Glacier* Cruise 2, station 0002, anchor dredge; USNM 127481, 1 juvenile from *Hero* Cruise 69-1, station 12-B; USNM 137477, 1 N-1 ♂, *Eltanin* Cruise 47, station 5056 (generic identification questionable because of missing rod-shaped organ); USNM 128282, 1 ♀, length 1.65 mm, height 1.03 mm (specimen infested by nematodes) from *Eltanin* Cruise 20, station 91.

In addition, the following specimens borrowed from the Brady collection in the British Museum (Natural History) are considered to be *Scleroconcha* species indeterminate: 1 ♂ and 1 ♀ on slides from Akaroa Harbor, N. Z. (these specimens had been identified by Brady as *Philomedes flexilis*); 1 adult ♀, length 1.92 mm, height 1.31 mm, from Lyttelton Harbor, N. Z.

Because of the nematodes parasitizing USNM 128282, parts of the specimen have been illustrated (Figure 214).

DISTRIBUTION.—The distribution of *Scleroconcha* species indeterminate is shown in Figure 190.

Anarthron, new genus

TYPE-SPECIES.—*Anarthron dithrix*, described herein.

ETYMOLOGY.—The generic name “Anarthron” is derived from the Greek “an” [= not, without] and “arthron” [= joint] in reference to the absence of numerous distinct joints on the rod-shaped organ. Gender: neuter.

This new genus contains five species: *A. reticulata* (Hartmann, 1965); *A. chilensis* (Hartmann, 1965); *A. pholion*, new species; *A. dithrix*, new species, and *A. evexum*, new species. The new genus appears to belong between *Scleroconcha* and *Philomedes*—the shell resembles the former genus and the rod-shaped organ the latter.

DIAGNOSIS.—Carapace of female with 3 or 4 horizontal ridges; ridges stout on *A. chilensis*, *A. evexum*, and *A. dithrix* but weak on *A. reticulata* and *A. pholion*. Infold of rostrum with row of 7 to 11 bristles and several shorter bristles near outer edge; anteroventral infold striate and with about 15 short spinous bristles; infold of caudal process with short ridge bearing 1 bristle, and 2nd bristle near posterior edge of process; list of posteroventral and posterior infold with numerous small bristles forming groups with 1 to 6 bristles. Carapace of male with ridges subdued or absent.

First and second antenna, maxilla, mandible, fifth and sixth limbs: Similar to those of *Scleroconcha*.

Seventh limb: Limb of female with 4 proximal and 6 distal bristles; tip of limb opposite comb bare on known species; male with 4 or 5 proximal and 6 distal bristles.

Furca: Each lamella with 9 to 13 claws; *A. reticu-*

Key to Species

ADULT FEMALES

- | | |
|--|--------------------------|
| 1. Furca with 4 stout claws followed by 8 or 9 shorter, weaker claws..... | 53. <i>A. reticulata</i> |
| Furca with 3 stout claws followed by 6 to 10 shorter, weaker claws..... | 2 |
| 2. Mandible with 2 midbristles on dorsal margin of basale..... | 57. <i>A. evexum</i> |
| Mandible with 1 midbristle on dorsal margin of mandible..... | 3 |
| 3. Carapace with 2 midribs extending onto anterior half of lateral surface..... | 4 |
| Carapace with 2 midribs not extending onto anterior half of lateral surface..... | 56. <i>A. pholion</i> |
| 4. Posterior end of upper midrib forming stout vertical rib; carapace length 1.98–2.34 mm..... | 55. <i>A. dithrix</i> |
| Posterior end of upper midrib with subdued vertical rib or without vertical rib; carapace length 1.70–1.98 mm..... | 54. <i>A. chilensis</i> |

lata with 4 stout claws followed by 8 or 9 shorter and weaker claws on female and 6 or 7 on male; remaining species, *A. chilensis*, *A. dithrix*, *A. pholion*, *A. evexum*, with 3 stout claws followed by 6 to 10 shorter and weaker claws. On *A. reticulata*, 3rd claw slightly more slender than 4th.

Lateral eye: Females with small lateral eyes with 2 or 3 ommatidia. Males with well-developed lateral eyes with 18–20 ommatidia.

Medial eye and rod-shaped organ: Medial eye similar to that on *Scleroconcha*. Rod-shaped organ elongate with crinkles or 2 sutures near middle; some species with additional faint incipient sutures; tip of organ rounded or tapering to fine point.

DISTRIBUTION.—In the study area this genus was collected along the Atlantic and Pacific coasts of South America and in the Drake Passage (Figure 186). Its depth range is from 71 to 1173 m.

53. *Anarthron reticulata* (Hartmann)

FIGURES 215–219, 221

Philomedes (*Scleroconcha*) *reticulata* Hartmann, 1965:311, figs. 8–11.

HOLOTYPE.—According to Hartmann (1965:311) "*Holotypus zergliedert*."

TYPE-LOCALITY.—Station 108, 40°53.5'S, 73°58.5'W, 136 m, by Cabo Quedal, Chile (from Hartmann, 1965:312).

MATERIAL.—Through Dr. Gerd Hartmann, I received from the Hamburg Zoological Museum two vials, K 27 284, K 27 281. Both numbers are listed as paratypes by Hartmann.

Vial number K 27 284 contained 1 specimen without carapace, 1 specimen without carapace and furca, 1 pair of articulated valves without animal, 2 disarticulated left and 2 disarticulated right valves, 1 complete adult female without eggs, 3 smaller complete specimens, several appendages (2 furcae, 1 exopodite of 2nd antenna, 1 7th limb), and several loose eggs. Vial number K 27 281 contained 3 complete males, 4 disarticulated valves of males and many male appendages.

In the present study one of the females without a carapace in vial K 27 284 was dissected and mounted. Most of the figures and the description of appendages are based on that specimen. As the specimen did not have a furca, this was drawn

from a different specimen. The description and figures of the carapace are based on the disarticulated valves. The description and figures of the male are based on both loose appendages in vial K 27 281 and on a complete specimen which I partly dissected.

Hartmann (1965:315) reported 4 females from station 96, 2 females from station 106, 3 females and 1 male from station 108.

NEW COLLECTIONS.—USNM 137681, 1 gravid ♀ with 9 eggs, length 1.84 mm, height 1.23 mm, + 1 juvenile ♂, both from *Eltanin* Cruise 21, station 194.

DIAGNOSIS OF FEMALE.—Carapace surface with large reticulations and 3 horizontal ribs, 1 above central muscle attachment area, 1 just below area, and 1 just within ventral margin of valve; carapace length 1.67 to 1.84 mm.

Mandible: Dorsal margin of basale with 3 bristles, 1 distal to middle, 2 terminal.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal.

Furca: Each lamella with 12 or 13 claws, 4 long claws followed by 8 or 9 short claws.

Rod-shaped organ: Tip pointed.

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 215–219).—Surface with large reticulations (Figure 217*b*, also Hartmann, 1965:312, fig. 8) and scattered surface hairs; each valve with 3 faint horizontal ribs, 1 above the central muscle scar area, 1 just below the scar area, and 1 just within the ventral margin of shell; triangular process on rostrum just reaching to or slightly beyond edge of shell; small swelling present on posteroventral part of shell (Figures 215*a-d*, 217).

Infold (Figure 215*b,c*): Infold on rostrum with 9 bristles, some with spines; small bristle present below inner end of broad incisur followed by space and then about 7 short spinous bristles forming row on anteroventral infold; ventral infold bare; posteroventral and posterior list with numerous bristles in groups of 1 to 4 or 5 bristles; ridge with only 1 bristle present between posterior list and outer edge of valve; 1 bristle present near valve edge between ridge and posterior valve margin.

Selvage: Striate lamellar prolongation with short fringe discontinuous in area of incisur.

Size (Figure 220): Complete specimen, length 1.77 mm, height 1.14 mm; disarticulated left valve, length 1.73 mm, height 1.04 mm; disarticulated

right valve, length 1.71 mm, height 1.07 mm; disarticulated left valve 1.68 mm, height 1.06 mm; disarticulated right valve, length 1.67 mm, height 1.02 mm. USNM 137681, length 1.84 mm, height 1.23 mm.

First antenna: 1st joint with short spines forming clusters on lateral surface near dorsal margin and long hairs on medial surface; 2nd joint spinous and with 3 bristles, 1 ventral, 1 dorsal, 1 lateral, all with long proximal and short distal spines; 3rd joint with few spines and with 3 bristles, 1 ventral with short marginal spines, 2 dorsal

(1 with short marginal spines, 1 with few long proximal spines plus short distal spines); 4th joint with spines along ventral and dorsal margins and 5 spinous bristles, 4 ventral, 1 dorsal; spines forming row present along distal lateral margin of 5th joint; sensory bristle of 5th joint with 6 proximal and 5 distal filaments; medial bristle of 6th joint with long proximal and short distal spines. Seventh joint: a-bristle similar to bristle on 6th joint but slightly longer; b-bristle with 4 proximal and 4 distal filaments including tip; c-bristle with 6 proximal and 5 distal filaments including tip.

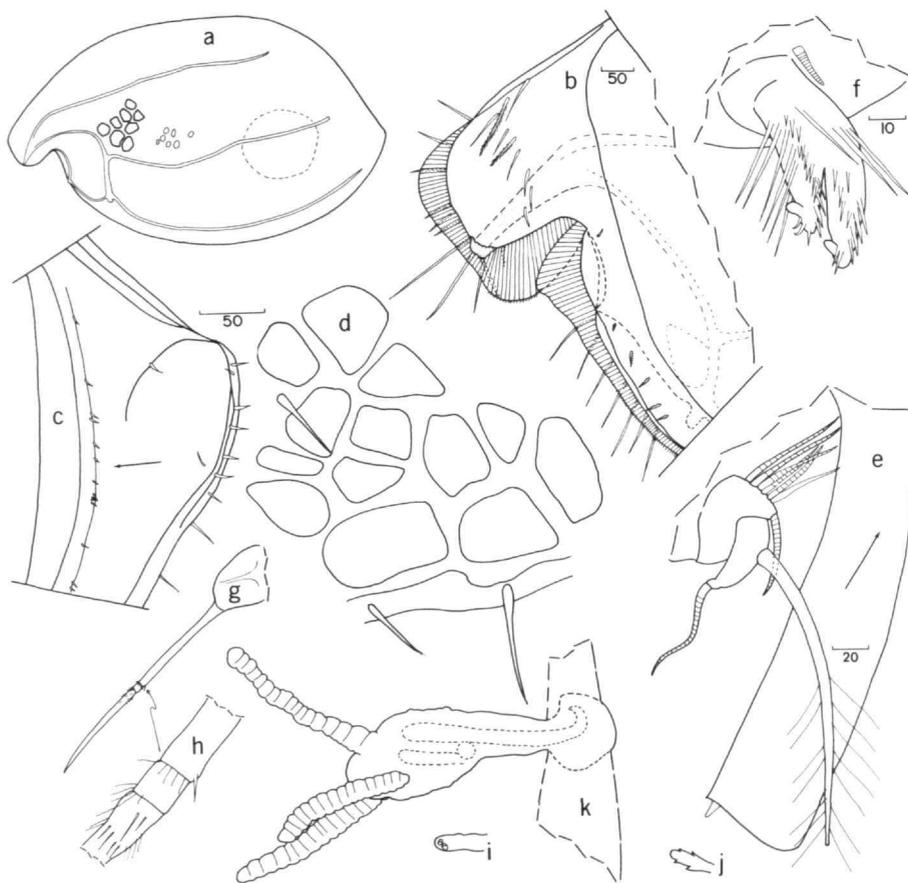


FIGURE 215.—*Anarthron reticulata*, female, K 27 284: a, left valve, length 1.73 mm, lateral view; b, anterior of right valve, length of valve 1.71 mm, medial view; c, caudal process of right valve, medial view; d, ornamentation and hairs on surface of left valve, anterior to left. Appendages: e, endopodite and 1st exopodial joint of left 2nd antenna; f, coxale endite of left mandible, medial view; g, medial eye and rod-shaped organ; h, detail of rod-shaped organ shown in "g"; i, lateral eye; j, detail of tooth in comb on 7th limb; k, protistan on postero-dorsal margin of left valve. (Same magnification in microns: b,g-i; c,d,k.)

Eighth joint: d- and e-bristles long bare; f-bristle with 4 proximal and 4 distal filaments including stem; g-bristle with about 2 proximal and 4 distal bristles.

Second antenna (Figure 215e): Protopodite bare. Endopodite 3-jointed: 1st joint with 6 bare bristles, 5 proximal, 1 distal; 2nd joint with 1 long stout spinous ventral bristle and 1 bare terminal bristle. Exopodite: distal margins of joints 2 to 8 with short and long spines forming row; 1st joint with 1 small medial spine on terminal margin; several minute basal spines present at base of bris-

gles on joints 2-4; single basal spine present on joints 5-8; 9th joint with 7 bristles; bristle of 2nd joint with short spines along middle part of ventral margin; bristles on joints 2 and 3 bare, remaining bristles with natatory hairs.

Mandible (Figure 215f): Coxale endite with small bristle at base; bifurcate tip of endite with small rounded teeth laterally. Basale: medial surface spinous and with 5 bristles near ventral margin, 4 proximal, 1 near middle (2 or 3 proximal bristles pectinate); lateral surface with 5 spinous bristles near ventral margin: ventral margin with

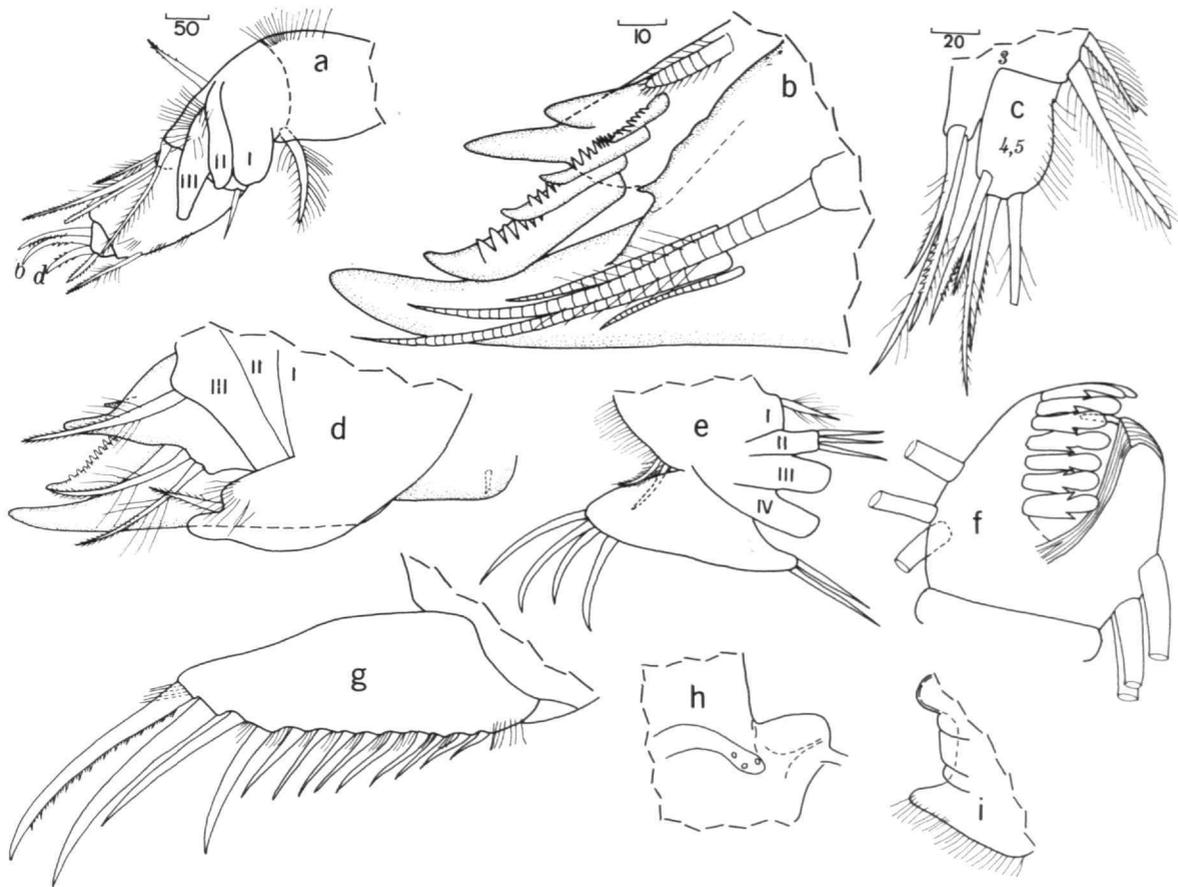


FIGURE 216.—*Anarthron reticulata*, female, K 27 284, maxilla: a, left limb, medial view of endopodite, lateral view of coxale and basale. Right 5th limb: b, tip of limb, posterior view; c, exopodial joints 3-5, posterior view. Left 5th limb: d, distal end, anterior view. Right 6th limb: e, lateral view (not all bristles shown). Seventh limb: f, tip. Furca: g, left lamella. Anterior: h, lateral eye, medial eye and proximal end of rod-shaped organ; i, upper lip. (Same magnification in microns: a,e,g-i; b,f; c,d.)

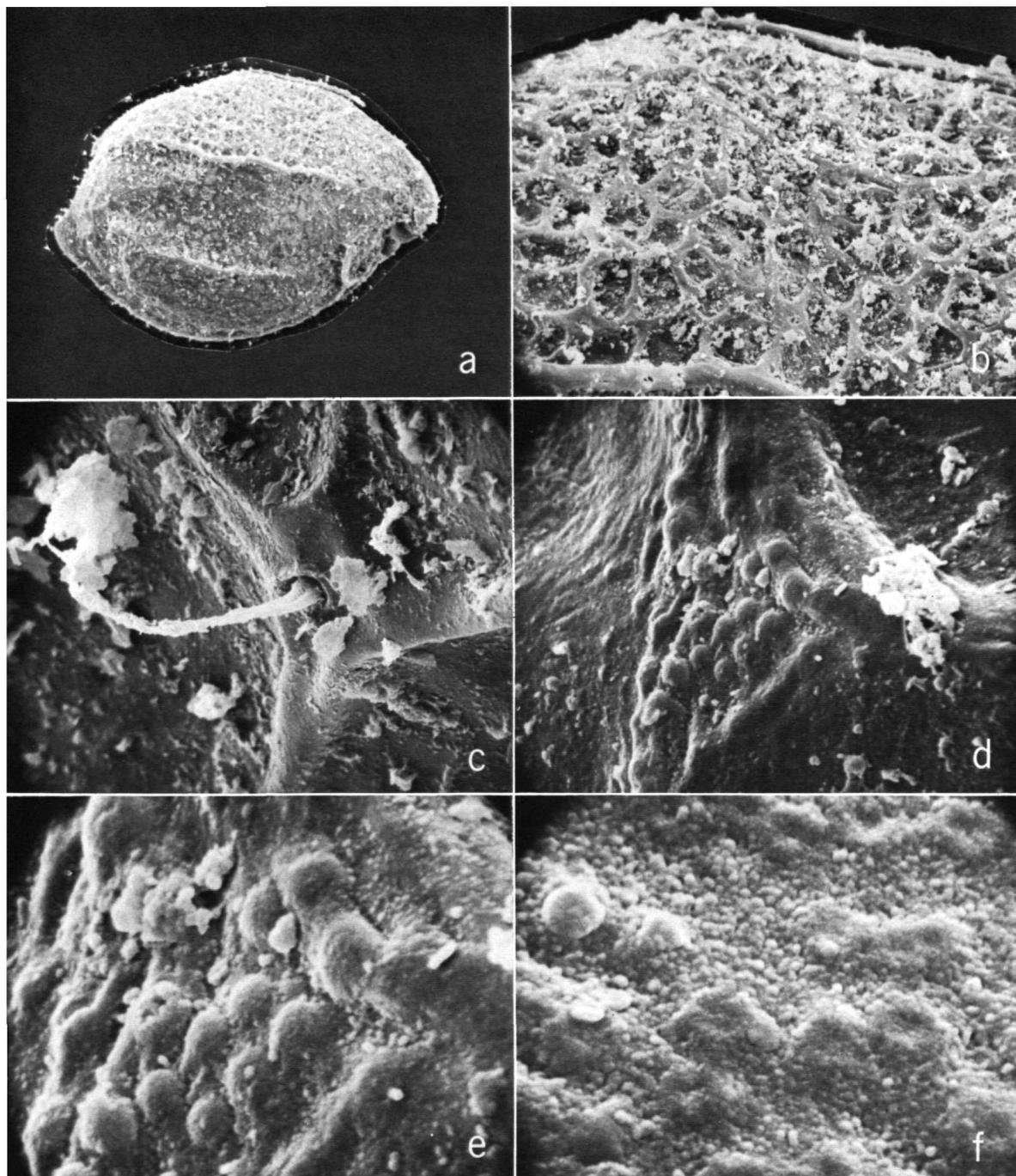


FIGURE 217.—*Anarthron reticulata*, female, USNM 137681, right valve, lateral view: *a*, complete valve, $\times 50$; *b*, detail of reticulations near middle of dorsal margin, $\times 200$; *c*, bristle on valve, $\times 2000$; *d*, surface ornamentation on caudal process, $\times 10,000$; *e*, detail of "d," $\times 20,000$; *f*, surface microstructure on upper horizontal rib, $\times 20,000$.

2 distal bristles; dorsal margin with 3 bristles, 1 distal to middle, 2 terminal, all with long proximal and short distal spines. Exopodite about 70 percent length of dorsal margin of 1st endopodite joint, hirsute near tip and with 2 bristles, both with long proximal and short distal spines. Endopodite: 1st joint with spines forming clusters on medial surface and 4 ventral bristles, all with long proximal and short distal spines; medial surface and margins of 2nd joint with spines forming clusters; ventral margin with bristles forming 2 distal groups, of these, proximal group with 2 bristles (1 with short marginal spines, 1 with long proximal and short distal spines) and distal group with 3 bristles with

short marginal spines; dorsal margin with bristles forming 2 groups proximal to middle of margin (bristles missing in proximal group), 6 bristles in distal group; 1 short pectinate bristle present on medial side of joint between the 2 groups of bristles; end joint with 3 claws and about 3 bristles, all claws with teeth along middle part of concave margin (dorsal claw shorter than others, reaching middle of longest claw).

Maxilla (Figure 216a): 1st endite with 7 distal bristles; 2nd endite with 6 distal bristles; 3rd endite with 8 distal bristles and long proximal hairs; coxale with 1 stout plumose bristle (in Figure 216a coxale and basale twisted so that plumose

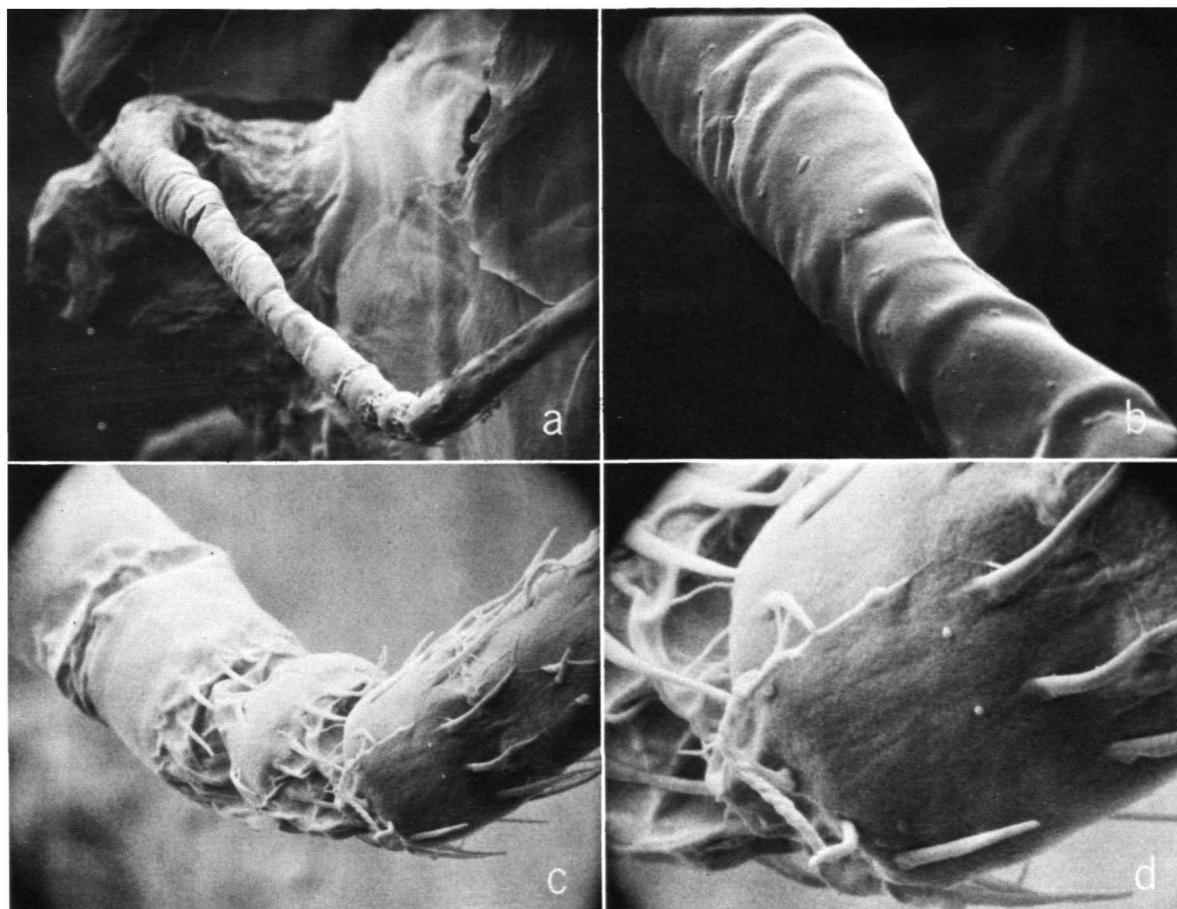


FIGURE 218.—*Anarthron reticulata*, female, USNM 137681, rod-shaped organ: a, rod-shaped organ attached to medial eye (specimen oriented with ventral side toward top of figure), $\times 720$; b, section near middle of proximal half in "a," $\times 2800$; c, middle section of organ, $\times 2800$; d, detail of "c," $\times 7200$.

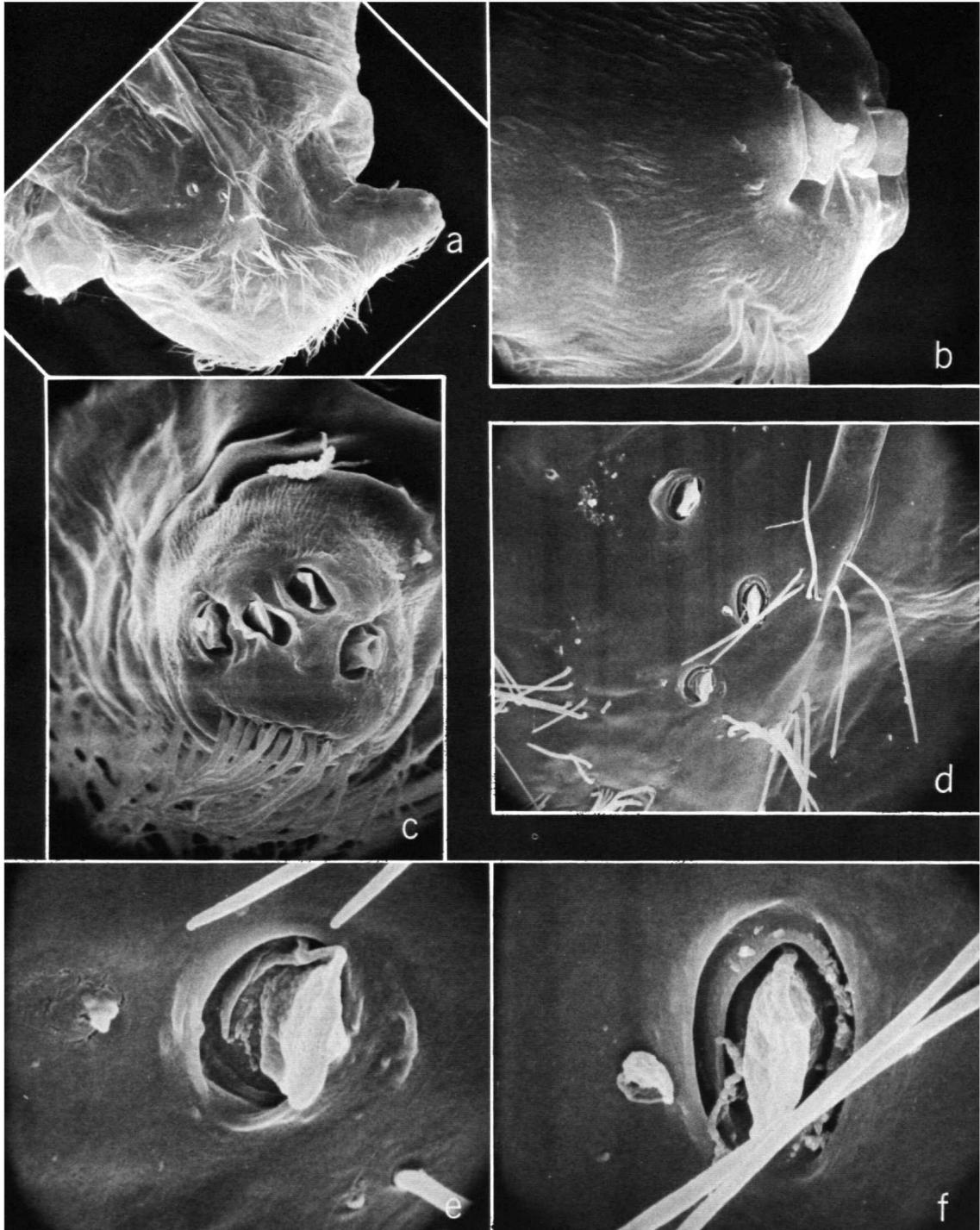
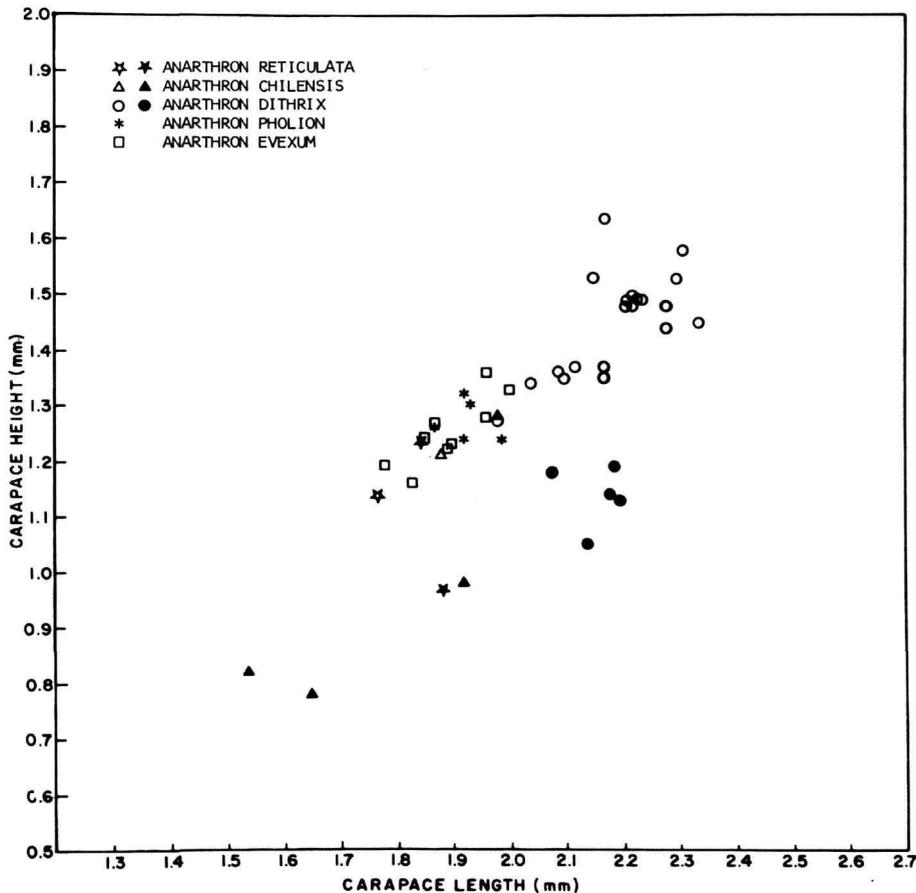


FIGURE 219.—*Anarthron reticulata*, female, USNM 137681, upper lip: *a*, right lateral view of lip, $\times 5000$; *b*, detail of anterior tip of "a," $\times 5000$; *c*, anterior view of anterior tip of lip, $\times 3000$; *d*, detail of proximal lateral group of three glandular openings shown in "a," $\times 2000$; *e, f*, detail of two glandular openings shown in "d," $\times 10,000$. Reduction, 25%.

bristle appears ventral); basale with 1 short proximal bristle with few short marginal spines near proximal end of 3rd endite; distal margin of basale with 1 short anterior bristle and 1 long spinous posterior bristle (3rd bristle usually present not observed, but possibly obscure). Exopodite small with 3 bristles: proximal bristle short with long proximal and short distal spines; middle terminal bristle long with long proximal and short terminal spines; inner terminal bristle long with short marginal spines. Endopodite: 1st joint with 1 α -bristle with long proximal and short distal spines and 3 β -bristles; end joint with 3 a-bristles; 1 of the b- and 2 of the d-bristles clawlike, pectinate.

Fifth limb (Figure 216b-d): Epipodial appendage with 51 bristles; endite I with 5 spinous bristles; endite II with 7 or 8 spinous bristles; endite

III with 9 or 10 spinous bristles. Exopodite: anterior side of 1st joint with 2 spinous bristles near middle of distal margin; 1 short spinous bristle present on lobe near outer side of 1st joint (position of base of lobe not clear but seems to be from same joint as 1st endite); main tooth of 1st joint consisting of 4 teeth, all pectinate; 1 spinous bristle present proximal to teeth of main tooth; triangular protuberance almost as long as distal tooth of main tooth and with 2nd smaller triangular protuberance on proximal margin; anterior side of 2nd joint with small d-bristle on anterior projection near outer corner of large quadrate tooth; posterior side with total of 3 a- and b-bristles and 1 long spinous c-bristle; margin of inner curvature of large tooth of 2nd joint with 1 small pointed node and 2 undulations proximal to it; outer lobe of



3rd joint with 2 hirsute bristles, proximal bristle about half length of other; inner lobe with 3 spinous and pectinate bristles; fused 4th and 5th joints hirsute and with about 5 spinous bristles.

Sixth limb (Figure 216e): 3 hirsute bristles present in place of epipodial appendage; endite I with 1 stout spinous terminal bristle; endite II with 3 spinous terminal bristles; endite III with 8 bristles, 1 medial, 7 terminal; endite IV with 7 spinous bristles, 1 medial, 6 terminal; end joint prolonged posteriorly and with 20 to 25 spinous and hirsute bristles; endites II-IV and end joint with clusters of long hairs on medial and lateral surfaces. (Endites observed only on right limb, endites of left limb fragmented; presence of only 1 bristle on endite I needs verification on additional specimens.)

Seventh limb (Figures 215j, 216f): Each limb with 10 bristles, 4 proximal (2 on each side) and 6 distal (3 on each side); each bristle with 3 to 6 bells and distal marginal spines; terminal comb with 14 alate teeth; tip of jaw opposite comb bare.

Furca (Figure 216g): Each lamella with 12 or 13 claws; claw 3 slightly longer and narrower than claw 4; claw 5 about two-thirds length of claw 4; claws arranged in 2 groups consisting of long claws (claws 1 to 4) and short claws (claws 5 to 12 or 13); each claw with marginal teeth along concave margin and hairs near base.

Rod-shaped organ (Figures 216h, 218): Elongate with 2 or 3 distinct sutures near middle; distal half of organ with minute surface hairs and spines; tip drawn out to fine point and with several small hairs.

Eyes (Figures 215g,i; 216h): Lateral eye elongate with 2 or 3 small ommatidia; medial eye pigmented.

Upper lip (Figures 216i, 219): Lip hirsute with anterior projection without spines; rounded single process present between upper lip and medial eye.

Posterior: Short spines along dorsal part.

Eggs: USNM 137681 with 9 eggs in marsupium.

Epizoa: 1 small organism present on posterior margin of 1 valve of K 27 284 (Figure 215k).

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figure 221).—Carapace slightly longer than that of female; reticulations smaller than those on female and without horizontal ridges; hairs scattered on valve surface; broad lamellar prolongation of selvage similar to that on female (Figure 221a,b). Size: length 1.88 mm, height 0.96 mm (Figure 220).

Second antenna: Endopodite 3-jointed: 1st joint short with 6 short bristles, 5 proximal, 1 distal; 2nd joint elongate with 3 spinous ventral bristles; 3rd joint reflexed with 1 proximal and 2 subterminal bristles and with numerous small pustules on surface (Figure 221c).

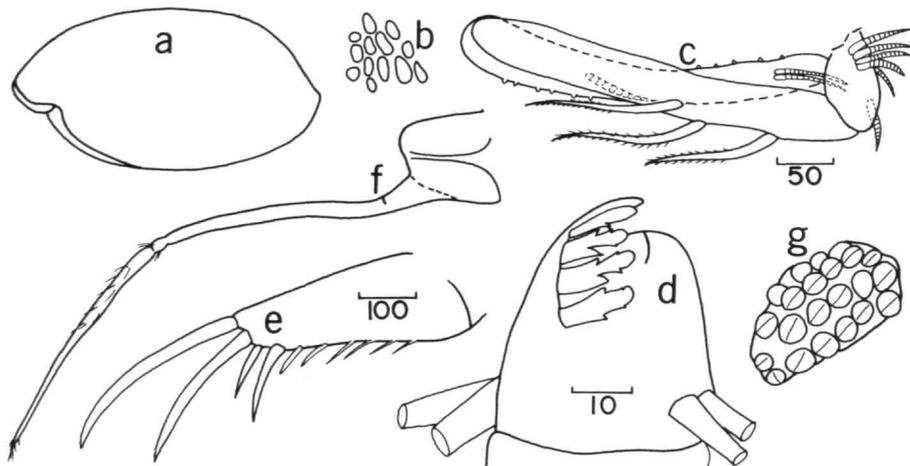


FIGURE 221.—*Anarthron reticulata*, male, K 27 281, length 1.90 mm, carapace: a, complete specimen, lateral view; b, detail of pits on surface of left valve in area anterior to middle. Appendages: c, endopodite of 2nd antenna (loose in vial); d, tip of 7th limb; e, lamella of furca; f, medial eye and rod-shaped organ; g, left lateral eye. (Same magnification in microns: b,e; c,f.)

Seventh limb: Each limb with 8 to 10 bristles, 4 to 6 proximal (2 or 3 on each side), 4 distal (2 on each side); terminal comb with 10 alate teeth; no peg observed on jaw opposite comb (Figure 221d).

Furca: Each limb with 10 or 11 claws; claw 3

shorter and more slender than claw 4; claw 5 to 10 or 11 much shorter than claws 1 to 4 (Figure 221e).

Rod-shaped organ (Figure 221f): Elongate with pointed tip; 1 suture present near middle; small surface spines present on distal half of organ.

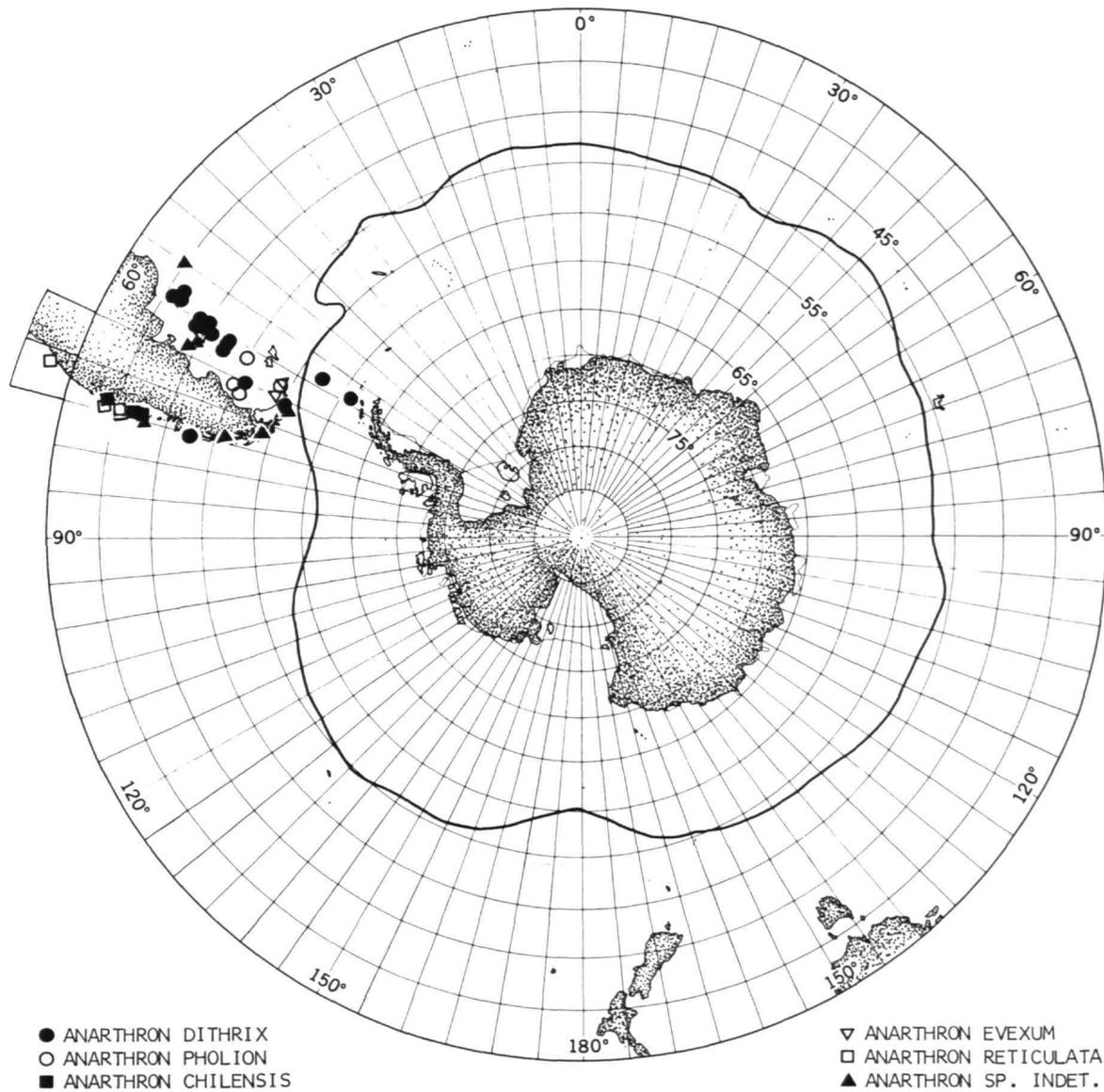


FIGURE 222.—Distribution map of species of *Anarthron*.

Eyes: Medial eye pigmented (Figure 221f); lateral eye well developed, larger than medial eye, with about 20 ommatidia (Figure 221g).

Epizoa: 1 small organism present on 1 valve beneath incisur.

DISTRIBUTION.—This species was collected only in the Subantarctic-to-35°S region west of Chile (33°03'S to 40°53'S) at depths of 139 to 260 m (Figure 222).

54. *Anarthron chilensis* (Hartmann)

FIGURES 223, 224

Philomedes (*Scleroconcha*) *chilensis* Hartmann, 1965:307, fig. 1-7.

HOLOTYPE.—According to Hartmann (1965:307) "*Holotypus zergliedert*."

PARATYPES.—Hamburg Zoological Museum K 27 280.

TYPE-LOCALITY.—Hartmann station 110, 42° 16.5'S, 74°22'W, near Chiloë.

MATERIAL.—Through Dr. Gerd Hartmann, I received one vial, K 27 280, from the Hamburg Zoological Museum. The label in the vial is as follows: "*Philomedes chilensis* n. sp. Mar Chile I Station 110 ♀ Typus zergliedert; ♂ zergliedert." The vial contained 2 ♀ left valves, 2 ♀ right valves, 1 adult ♂ left valve, 1 adult ♂ right valve, 2 complete specimens (length 1.74 mm, height 1.14 mm; length 1.23 mm, height 0.74 mm); 1 almost complete ♀ without valves, ♀ and adult ♂ appendages. The posterior part of one of the partly dissected females contained a fairly large single egg, indicating it is an adult ♀. The descriptions of valves and appendages which follow are based on the dissected specimens with the exception of the lateral and medial eyes and rod-shaped organ, which are based on the partly dissected ♀ without valves. The vial also contained 1 isopod (*Cryptoniscus*) and 2 choniostomatid copepods.

NEW COLLECTIONS.—USNM 136086, 1 gravid ♀; USNM 136087, 1 adult ♂; USNM 136088, 1 adult ♀ without eggs + 2 adult ♂♂; all specimens from *Vema* Cruise 17, station V-17-12.

DIAGNOSIS OF FEMALE.—Carapace surface with large pits and 4 longitudinal ribs extending full length of valve; small swelling present on posteroventral part of valve; surface with scattered un-

branched hairs; posterior end of upper midrib with subdued vertical rib or without vertical rib; carapace length 1.70–1.98 mm.

Mandible: Dorsal margin of basale with 3 bristles, 1 distal to middle, 2 terminal.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb with about 14 alate teeth, tip of limb opposite comb bare.

Furca: Each lamella with 10 claws, 3 long claws followed by 7 short claws.

Rod-shaped organ: Tip tapering to fine point.

SUPPLEMENTARY DESCRIPTION OF PARATYPES (Figures 223, 224).—Surface of female carapace with large rounded pits and 4 horizontal ridges (Figure 224) as illustrated by Hartmann (1965:308, fig. 1); small swelling present on posteroventral part of shell (Figure 223a). Male carapace differing from that of female in shape and ornamentation: surface with small pits and without longitudinal ridges. Both sexes with single hairs with broad bases scattered over valve surface.

Infold: Infold of female with 7 to 10 bristles forming row on rostrum, 5 shorter bristles paralleling anterior margin of rostrum, 1 short bristle near incisur (Figure 223c), 10–13 spinous bristles along anteroventral margin, anteroventral infold striate; caudal process with 1 short bristle on dorsal ridge, 1 short bristle near posterior edge of valve, and numerous minute bristles near inner margin of infold (Figure 223b). Infold of male carapace with 8 bristles forming row on rostrum, 5 shorter bristles paralleling anterior margin of rostrum, 1 short bristle near inner margin of broad incisur (Figure 223l), 4 to 8 short spinous bristles along anteroventral margin, and bristles on caudal process similar to those on female (Figure 223m).

Selvage: Striate lamellar prolongation with short fringe discontinuous in area of incisur.

Size of female carapace (Figure 220): Hartmann (1965:311) gave length as 1.7–1.8 mm, height as 1.1–1.2 mm. My remeasurements of his material are as follows: left valves, length 1.75 mm, height 1.15 mm; length 1.74 mm, height 1.14 mm. Right valves, length only, 1.75 mm and 1.70 mm. New collections: USNM 136086, length 1.88 mm, height 1.21 mm; USNM 136088, length 1.98 mm, height 1.28 mm.

Size of male carapace (Figure 220): Hartmann (1965:311) gave length as 2.2 mm, height as 1.3 mm. My remeasurements of his material are as fol-

lows: 2 right valves, length only, 1.89 mm and 1.98 mm. New collections: USNM 136087, length 1.92 mm, height 0.98 mm; USNM 136088 (2 specimens), length 1.54 mm, height 0.82 mm and length 1.65 mm, height 0.78 mm.

First antenna of female: 1st joint with spines along ventral margin; 2nd joint with spines along

ventral, dorsal, and lateral distal margins, and 3 bristles, 1 ventral, 1 dorsal, 1 lateral, all with long proximal spines; 3rd joint short with 1 ventral and 2 dorsal spinous bristles and with few short spines along dorsal margin; 4th joint with spines along ventral and dorsal margins and 6 spinous bristles, 4 ventral, 2 dorsal; 5th joint with few spines along

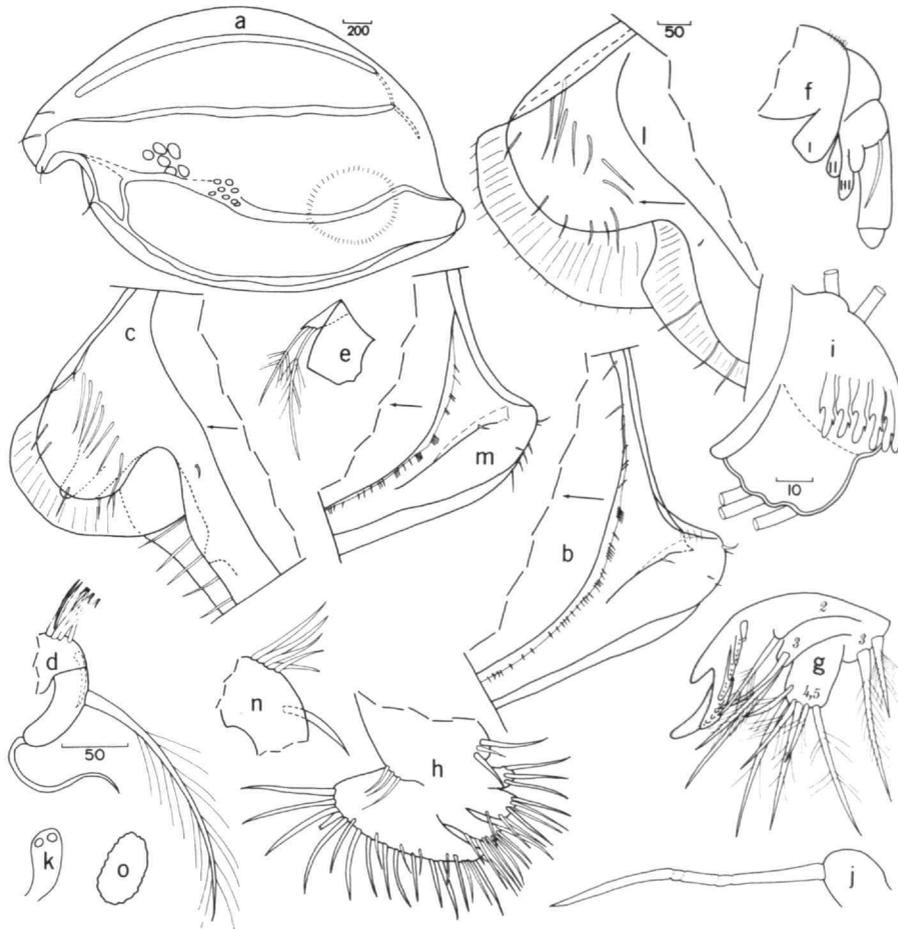


FIGURE 223.—*Anarthron chilensis*, female, K 27 280, length 1.68 mm, carapace: *a*, left valve, lateral view (small swelling in posteroventral part of valve outlined); *b*, caudal process on right valve, medial view; *c*, anterior of right valve, medial view. Appendages: *d*, endopodite of right 2nd antenna, medial view; *e*, exopodite and 1st endopodite joint (without bristles) on right mandible, medial view; *f*, right maxilla lateral view (not under cover slip; not all bristles shown); *g*, tip of right 5th limb, posterior view; *h*, left 6th limb, medial view; *i*, tip of 7th limb; *j*, right lateral eye; *k*, medial eye and rod-shaped organ. Male, K 27 280, length about 1.98 mm, right valve: *l*, anterior, medial view; *m*, caudal process, medial view. Right 2nd antenna: *n*, 1st joint of endopodite, medial view. Male, USNM 136087, length 1.92 mm: *o*, outline of right lateral eye. (Same magnification in microns: *b,c,e,f,h,j-m,o; d,g,n*.)

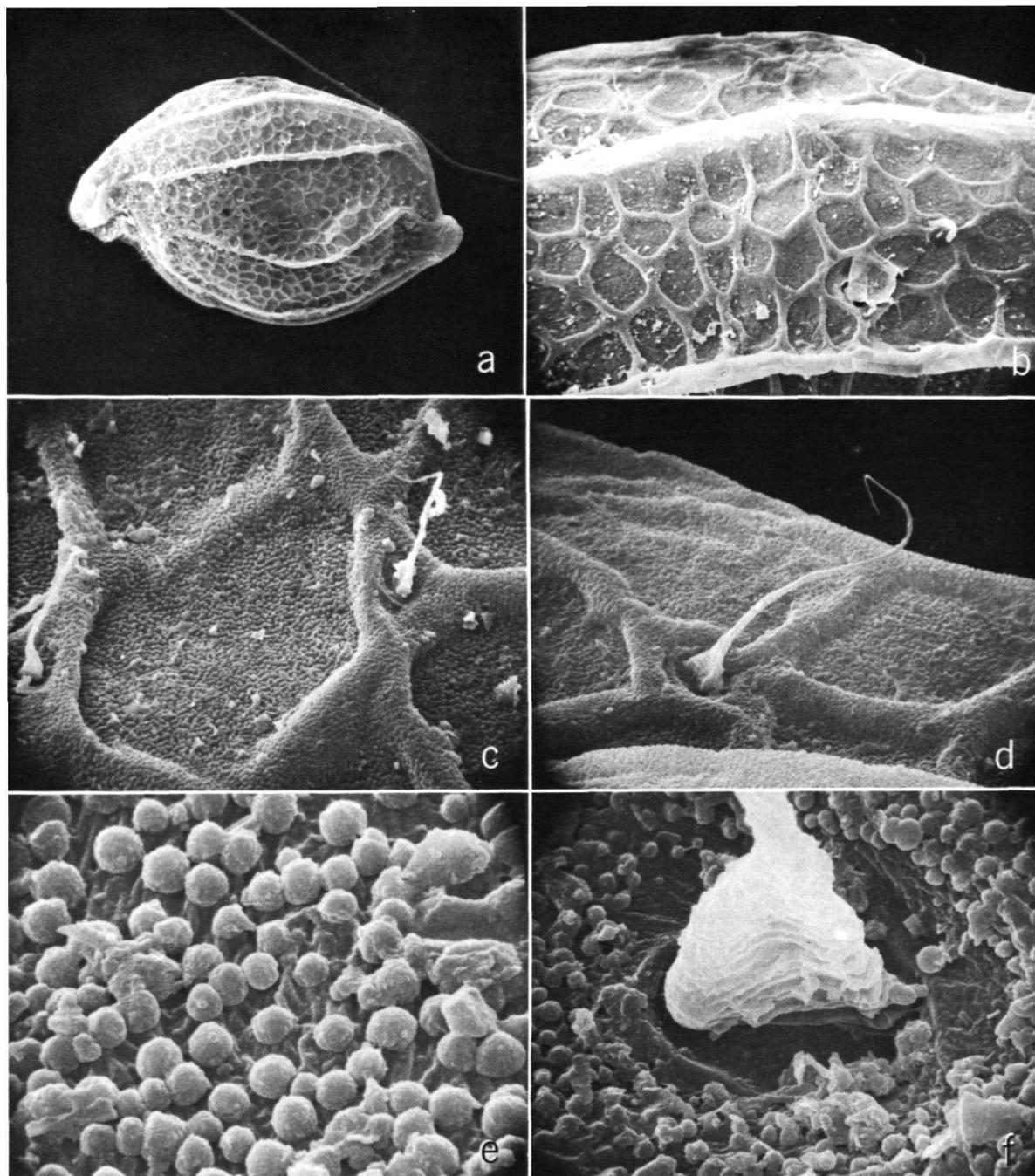


FIGURE 224.—*Anarthron chilensis*, female, K 22 280: *a*, left valve, lateral view, $\times 50$; *b*, detail near dorsal margin, $\times 200$; *c*, detail of "*b*," $\times 1000$; *d*, detail upper right in "*b*," $\times 1000$; *e*, detail near center of "*c*," $\times 10,000$; *f*, detail of hair pore, $\times 10,000$.

dorsal margin; sensory bristle of 5th joint with about 5 proximal and 5 distal short filaments; medial bristle of 6th joint with long proximal spines. Seventh joint: a-bristle similar to medial bristle of 6th joint but slightly longer; b-bristle about twice length of medial bristle of 6th joint and with about 4 proximal and 3 distal short filaments including tip; c-bristle with 5 proximal and 3 distal filaments including tip. Eighth joint: d- and e-bristles bare, about same length as c-bristle, fused together at base; f-bristle with 5 proximal and about 4 distal short filaments including tip; g-bristle with about 4 proximal and 3 distal filaments.

First antenna of male: 1st joint bare; 2nd joint elongate with few spines along slightly undulate dorsal margin and 2 bristles, 1 dorsal, 1 lateral near dorsal margin, both with long proximal spines; 3rd joint short with few spines on dorsal margin and 2 bristles, both dorsal; 4th joint with 2 dorsal and 2 to 4 ventral bristles; broad proximal part of sensory bristle of 5th joint with numerous filaments; slender distal part of sensory bristle with about 3 short filaments; medial bristle of 6th joint located near dorsal margin of joint and with long proximal spines. Seventh joint: a-bristle bare, shorter than medial bristle of 6th joint; b-bristle about twice length of a-bristle and with 3 proximal and about 3 distal filaments, base of b-bristle slightly bulbous; c-bristle long with about 13 filaments including stem tip of which distal part is missing (tip dentate along 1 edge). Eighth joint: d- and e-bristles bare, about same length as b-bristle; f-bristle long with about 11 filaments including stem tip of which distal part is missing (tip dentate along 1 edge); g-bristle slightly longer than b-bristle and with 2 proximal and about 3 distal filaments.

Second antenna of female (Figure 223d): Protopodite bare. Endopodite 2-jointed: 1st joint with 6 bare bristles, 5 proximal, 1 distal; 2nd joint with 1 long stout spinous ventral bristle and 1 slender bare terminal bristle. Exopodite: proximal part of bristle on 2nd joint with several faint hairs or spines; bristles of joints 3 and 4 bare; bristles of joints 5 to 8 with natatory hairs; 9th joint with 7 bristles, most with natatory hairs; distal margins of joints 3 to 8 with short spines forming row; joints 4 to 8 with short slender basal spines.

Second antenna of male (Figure 223n): Protopo-

dite bare. Endopodite 3-jointed: 1st joint with 6 bristles, 5 short bare proximal, 1 distal; 2nd joint elongate with 3 ventral bristles; 3rd joint elongate, reflexed on 2nd joint, with 1 ventral and 2 short terminal bristles; ventral and dorsal margins of 3rd joint dentate, tip with small ridges. Exopodite with elongate 2nd and 3rd joints normal for family.

Mandible of female (Figure 223e): Stout bifurcate spinous coxale endite present. Basale: medial surface spinous and with 6 bristles near ventral margin, 5 proximal, 1 near middle (3 proximal bristles pectinate); lateral surface with 5 spinous bristles with bases almost on ventral margin; ventral margin with 2 or 3 spinous distal bristles; dorsal margin with 3 spinous bristles, 1 distal to middle, 2 terminal. Exopodite about 75 percent length of dorsal margin of 1st endopodite joint, hirsute near tip and with 2 bristles, both with long proximal spines. Endopodite: 1st joint with 4 spinous ventral bristles; ventral margin of 2nd joint with bristles forming 2 distal groups, of these, proximal group with 2 and distal group with 3 bristles; dorsal margin with bristles forming 2 groups proximal to middle of margin, 3 bristles in proximal group, 5 bristles in distal group, 1 short pectinate bristle present between 2 groups of bristles; end joint with 3 claws and 4 bristles, dorsal claw about half length and medial claw about three-fourths length of lateral claw, dorsal and medial claws dentate proximally along ventral margin.

Maxilla of female: Typical for genus (Figure 223f).

Fifth limb of female (Figure 223g): Typical for genus; however, relative lengths of 3 bristles in group on posterior side of 2nd joint could not be determined on specimen examined. Outer plumose bristle on the outer lobe of 3rd joint only about half length of inner plumose bristle. Epipodial appendage with about 50 bristles.

Sixth limb (Figure 223h): 2 or 3 hirsute bristles present in place of epipodial appendage; endites I and II each with 3 spinous bristles; endites III and IV each with 7 or 8 spinous bristles, 1 medial, 6 or 7 terminal; end joint prolonged posteriorly and with 22 spinous and hirsute bristles, limb hirsute. (Four loose 6th limbs were in the vial, 2 lefts and 2 rights; one of the right limbs bears 2 spinous epipodial bristles, the others bear 3.)

Seventh limb of female (Figure 223i): Limb with 10 bristles, 4 proximal (2 on each side) and 6 distal (3 on each side); each bristle with 2 to 5 bells and distal marginal spines; terminal comb with about 14 alate teeth; tip of limb opposite comb bare.

Seventh limb of male: Similar to that of female but with only 4 bristles in distal group, 2 on each side.

Furca of female: Each lamella with 10 claws consisting of long stout claws (claws 1 to 3) and short claws (claws 4 to 10). All claws in each group decreasing in length posteriorly along lamella; width of bases of claws 1 to 3 about same; all claws with teeth along posterior margins and with medial hairs on lamella near base; claws 1 and 2 with hairs forming medial row near base and with both stout and slender marginal teeth. Furca essentially same as illustrated by Hartmann (1965:310, fig. 7) except claw 2 not more slender than claw 3.

Furca of male: Similar to that of female except with only 6 short claws following 3 long claws and only slender teeth present along posterior margins of claws 1 and 2.

Rod-shaped organ of female: Organ 1-jointed but with crinkles in middle and proximal parts; tip tapering to fine point (Figure 223k).

Eyes: Medial eye normal for genus (Figure 223k). Lateral eyes of female small with 2 ommatidia (Figure 223j). (Lateral eye of adult ♂, USNM 136087, well developed with about 18 ommatidia—Figure 223o.)

Parasites: The vial from the Hamburg Museum containing type specimens of *A. chilensis* also contained 1 isopod and 2 choniostomatid copepods (1 ♀, 1 copepodite). It is assumed herein that these minute specimens originally were within the shells of the ostracods.

Eggs: USNM 136086 with 6 eggs.

DISTRIBUTION.—This species was collected only in the Subantarctic-to-35°S region west of Chile (39°59'S to 43°30'S) at shelf depths (100–112 m) (Figure 222).

55. *Anarthron dithrix*, new species

FIGURES 225–230

Scleroconcha sp. Kornicker, 1969:131, figs. 11, 12, pl. 7.

HOLOTYPE.—USNM 128858, 1 adult ♀, length

2.31 mm. Appendages on slides; valves and some appendages in alcohol.

TYPE-LOCALITY.—*Vema* Cruise 18, station V-18-16.

ETYMOLOGY.—The specific name is derived from the Greek “di” [= two] and “thrix” [= hair] in reference to the 2 bristles in place of the epipodial appendage on the 6th limb.

Paratypes: USNM 128288, 1 juvenile N-1 ♂; USNM 128289, 1 juvenile ♀; USNM 128695, 1 gravid ♀; USNM 128841, 2 gravid ♀♀, not dissected; USNM 128697, 31 gravid ♀♀, 2 adult ♀♀ without eggs (not dissected); USNM 128698, 1 adult ♀; USNM 128696, 151 juveniles; USNM 128842 (Hulings 201), 1 gravid ♀; USNM 128843 (Hulings 208), 1 ♀; USNM 128844 (Hulings 207), 2 specimens; USNM 128852, 1 gravid ♀; USNM 128855, 6 gravid ♀♀, 2 adult ♀♀ without eggs, 2 juveniles, none dissected; USNM 135037, 1 adult ♀.

ADDITIONAL SPECIMENS.—USNM 136930, 1 adult ♀; USNM 136931, 8 adult ♀♀ without eggs + 46 juveniles; USNM 136932, 1 adult ♂; USNM 136933, 3 adult ♂♂ (not dissected); USNM 137483, 2 adult ♀♀ without eggs + 2 adult ♂♂; USNM 136935, 1 gravid ♀; USNM 136937, 1 gravid ♀ (not dissected); USNM 136936, 3 gravid ♀♀ + 38 adult ♀♀ without eggs and juveniles; USNM 137476, 1 adult ♂ (carapace only); USNM 136938, 1 gravid ♀; USNM 136941, 1 gravid ♀; USNM 136944, 95 gravid ♀♀; USNM 136945, 95 gravid ♀♀; USNM 136946, 54 adult ♀♀ without eggs in marsupia; USNM 137032, 42 gravid ♀♀ + 8 adult ♀♀ without eggs + 14 juveniles; USNM

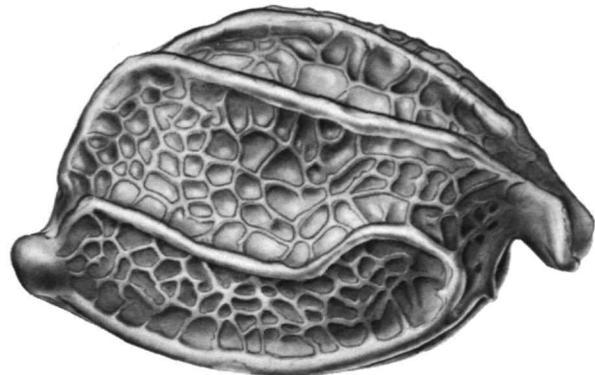


FIGURE 225.—*Anarthron dithrix*, female, USNM 128858, right valve, with large reticulations, length 2.31 mm.

137034, 1 adult ♀; USNM 137033, 4 gravid ♀♀ + 3 juveniles; USNM 137035, 5 juveniles + 4 gravid ♀♀; USNM 137036, 1 adult ♀ with unextruded eggs; USNM 137482, 1 gravid ♀; USNM 137037, 1 adult ♀; USNM 137038, 11 adult ♀♀ without eggs + 1 juvenile; USNM 137039, 1 gravid ♀ + 1 adult ♀ without eggs; USNM 137041, 1 adult ♂ with torn carapace; USNM 137042, 4 adult ♂♂ (not dissected); USNM 137043, 1 gravid ♀; USNM 137044, 1 gravid ♀ + 1 juvenile; USNM 137047, 1 adult ♀ without eggs; USNM 137048, 1 adult ♀ with unextruded eggs; USNM 137049, 1 juvenile ♂, length 1.55 mm, height 1.00 mm; USNM 137056, 1 adult ♀ with distorted shell, length only 2.24 mm; USNM 138036, 1 N-1 ♂; USNM 138037, 9 juveniles.

USNM 128288, 128289 from *Eltanin* Cruise 6, station 344; USNM 128695-128699, 128841-128844 from *Vema* Cruise 17, station V-17-75; USNM 128852, 128855 from *Vema* Cruise 17, station V-17-97; USNM 135037 from same sample as holotype; 136930-136933, 137483 from *Vema* Cruise 17, station V-17-14; USNM 136935-136937, 137476, 137041, 137042 from *Vema* Cruise 14, station V-14-5; USNM 136938, 136941, 136944-136946 from *Vema* Cruise 17, station V-17-89A; USNM 137032 from *Vema* Cruise 17, V-17-74; USNM 137033 from *Vema* Cruise 17, station V-17-88; USNM 137035, 137036, 137482 from *Vema* Cruise 17, station V-17-90; USNM 137037, 137038 from *Vema* Cruise 18, station V-18-13; USNM 137039 from *Vema* Cruise 17, station V-17-89 (same locality as V-17-89A); USNM 137043 from *Vema* Cruise 17,

station V-17-77; USNM 137044 from *Vema* Cruise 14, station V-14-6; USNM 137047 from *Vema* Cruise 15, station V-15-102; USNM 137048 from *Vema* Cruise 14, station V-14-16; USNM 137049 from *Vema* Cruise 17, station V-17-47; USNM 137056 from *Vema* Cruise 18, station V-18-18; USNM 138036, 138037 from *Eltanin* Cruise 6, station 363 (locality uncertain).

DIAGNOSIS OF FEMALE.—Carapace ornamentation similar to that on *S. chilensis* except posterior end of upper midrib forms a stout vertical rib absent or subdued on *S. chilensis*; carapace length 1.98 to 2.34 mm.

Mandible: Dorsal margin of basale with 3 bristles, 1 distal to middle, 2 terminal.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb with 15 alate teeth; no peg present opposite comb.

Furca: Each lamella with 10-12 claws, 3 long claws followed by 7-9 short claws.

Rod-shaped organ: Tip drawn out to fine point.

DESCRIPTION OF FEMALE (Figures 225-228).—Surface reticulate with large pits and scattered single surface hairs; each valve with 4 distinct horizontal ribs (Figures 225, 226, 227a, 228); posterior ends of both middle ribs bending downward at right angles; anterior end of lower midrib S-shaped on most specimens just anterior to central muscle attachments; posteroventral area without bulge. Included in this species are forms with both large and small reticulations (Figures 225, 226).

Infold: Infold on rostrum with about 11 bristles forming row and several shorter bristles near outer edge (Figure 227b); small bristle present below inner margin of incisur; anteroventral margin with striations and about 15 short bristles; posteroventral and posterior list with numerous groups of 1 to 6 bristles; ridge with only 1 bristle present between posterior list and outer edge of valve; 1 bristle present near valve edge between ridge and posterior valve margin (Figure 227c).

Selvae: Striate lamellar prolongation with short fringe discontinuous in area of incisur.

Size (Figure 220): USNM 128699, gravid ♀, length 2.16 mm, height 1.42 mm; USNM 128841, 2 gravid ♀♀, length 2.23 mm, height 1.49 mm, length 2.17 mm, height 1.64 mm; USNM 128852, gravid ♀, length 2.15 mm, height 1.53 mm; USNM 128858, length 2.31 mm, height 1.58 mm; USNM 135037, length 2.20 mm, height 1.48 mm; USNM

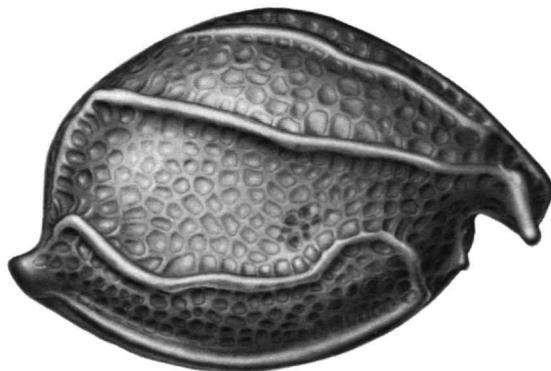


FIGURE 226.—*Anarthron dithrix*, female, USNM 135037, right valve, with small reticulations, length 2.20 mm.

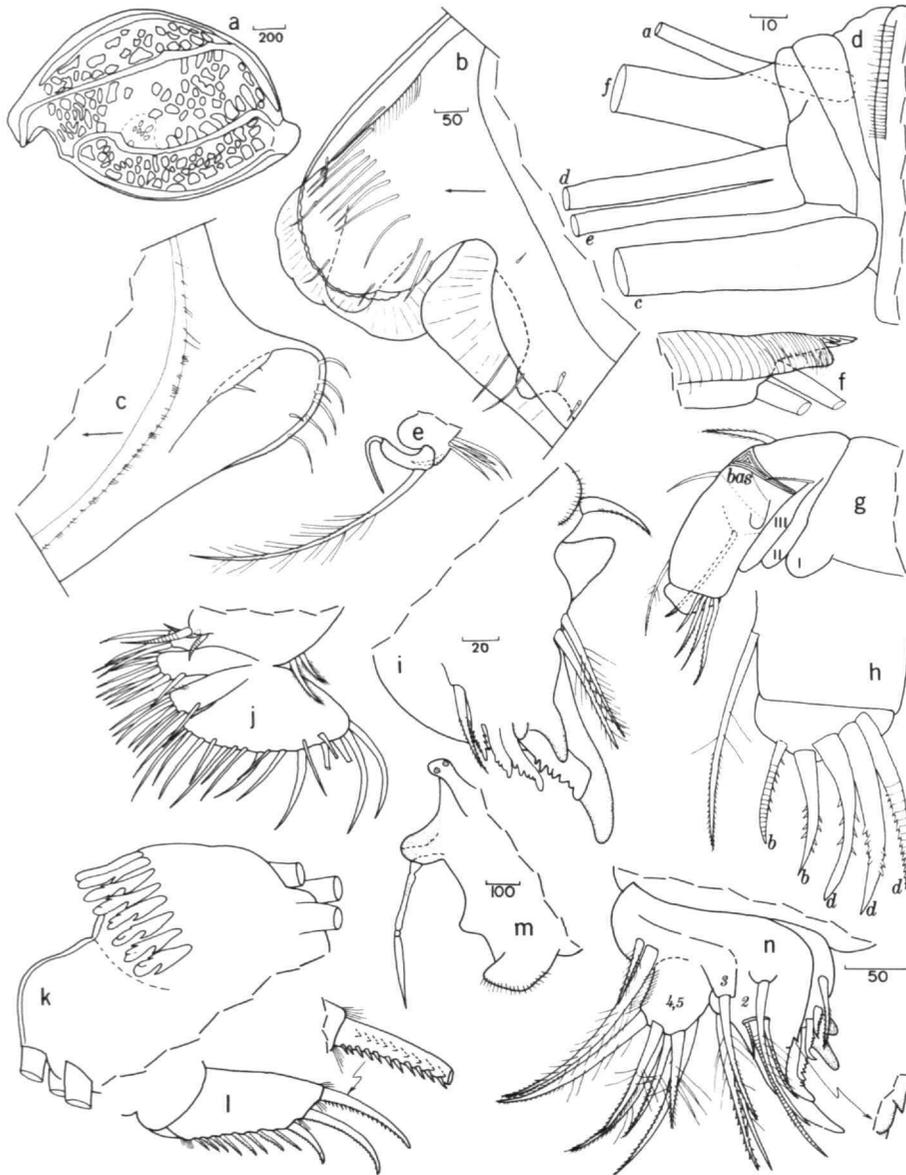


FIGURE 227.—*Anarthron dithrix*, female, USNM 128858, length 2.31 mm, carapace: *a*, complete specimen, lateral view. Right valve: *b*, anterior, medial view; *c*, caudal process, medial view. Appendages: *d*, tip of left 1st antenna, lateral view; *e*, endopodite of left 2nd antenna, medial view; *f*, tip of exopodite of left mandible, medial view; *g*, left maxilla, lateral view (not all bristles shown); *h*, tip of left maxilla shown in “*g*,” lateral view (not all bristles shown); *i*, tip of left 5th limb, anterior view; *j*, right 6th limb (marginal spines not shown on all bristles); *k*, tip of 7th limb; *l*, right lamella of furca; *m*, anterior showing left lateral eye and rod-shaped organ, anterior process, and upper lip. Female, USNM 128699, length 2.09 mm: *n*, tip of left 5th limb, posterior view. (Same magnification in microns: *b,c,e,g,j,l; d,f,k*.)

136930, length 2.22 mm, height 1.50 mm; USNM
 136935, length 2.21 mm, height 1.49 mm; USNM
 136937, length 2.10 mm, height 1.35 mm; USNM
 136838, length 2.24 mm, height 1.49 mm; USNM
 136941, length 2.04 mm, height 1.34 mm; USNM
 136944, length 2.30 mm, height 1.53 mm; USNM
 137032, length 1.98 mm, height 1.27 mm; USNM
 137034, length 2.22 mm, height 1.48 mm; USNM
 137033, length 2.12 mm, height 1.37 mm; USNM
 137035, length 2.17 mm, height 1.37 mm; USNM
 137036, length 2.28 mm, height 1.48 mm; USNM
 137047, length 2.28 mm, height 1.44 mm; USNM
 137048, length 2.34 mm, height 1.45 mm.

First antenna (Figure 227d): 1st joint with few spines on medial surface; 2nd joint with spines along dorsal margin and lateral distal margin, and 3 bristles, 1 ventral, 1 lateral, 1 dorsal, all with long proximal and short distal spines; 3rd joint short with 1 ventral and 2 dorsal bristles, all with short marginal spines; few faint spines present along dorsal margin of joint; 4th joint with spines along dorsal and ventral margins and 6 spinous bristles, 4 ventral, 2 dorsal; sensory bristle of 5th joint with 6 proximal and 5 distal filaments including tip; lateral surface of joint with short spines forming row along terminal margin; medial bristles of 6th joint with short marginal spines. Seventh joint: a-bristle with 1 or 2 long proximal spines and short distal spines, bristle longer than medial bristle of 6th joint; b-bristle about twice length of medial bristle of 6th joint and with 2 proximal and 4 distal filaments including tip; c-bristle with 6 proximal and 3 distal filaments. Eighth joint: d- and e-bristles bare, about same length as c-bristle, fused proximally; f-bristles with 5 proximal and 4 or more distal filaments; g-bristle with 4 proximal and 5 distal filaments including tip.

Second antenna (Figure 227e): Protopodite bare. Endopodite 2-jointed: 1st joint with 6 bare bristles, 5 proximal, 1 distal; 2nd joint with 1 long stout spinous ventral bristle and 1 slender bare curved terminal bristle. Exopodite: 1st joint with small terminal medial spine; bristles of 2nd and 3rd joint with proximal spines along ventral margin; bristle on 4th joint bare; bristles on joints 5 to 8 with natatory hairs; 9th joint with 7 bristles, most with natatory hairs; distal margins of joints 2 to 3 with short spines forming row; joints 3 or 4 to 8 with small basal spines.

Mandible (Figure 227f): Coxale endite stout spinous with minute bristle near base. Basale: medial surface spinous and with 6 bristles near ventral margin, 5 proximal, 1 near middle (3 proximal bristles pectinate); lateral surface with 5 spinous bristles with bases on or near ventral margin; ventral margin with 3 spinous distal bristles; dorsal margin with 3 spinous bristles, 1 distal to middle, 2 terminal. Exopodite about 87 percent length of dorsal margin of 1st endopodite joint, hirsute near pronged tip and with 2 bristles, inner bristle with long proximal and short distal spines, outer shorter bristle with few short spines. Endopodite: 1st joint with 4 spinous ventral bristles; ventral margin of 2nd joint with bristles forming 2 distal groups, of these, proximal groups with 2 and distal group with 3 bristles; dorsal margin with bristles forming 2 groups proximal to middle of margin, 3 bristles in proximal group, 5 in distal group, 1 short pectinate bristle present between the 2 groups of bristles; end joint with 3 claws and 4 bristles, dorsal claw about half length of long lateral claw, medial claw about three-fourths length of lateral claw; claws dentate proximally along ventral margins.

Maxilla (Figure 227g,h): 1st endite with 10 distal bristles; 2nd endite with 5 or 6 distal bristles; 3rd endite with 1 proximal bristle and about 8 distal bristles; coxale with 1 stout plumose bristle; distal margin of basale with 3 bristles, anterior bristle shorter than others. Endopodite: 1st joint with 1 α -bristle with long proximal and short distal spines and 4 β -bristles; end joint with 3 a-bristles, 2 b-bristles, 2 spinous c-bristles and 3 d-bristles (2 with stout marginal spines). Exopodite small with 3 bristles: proximal bristle short with short marginal spines; middle terminal bristle long with long proximal and short distal spines; inner terminal bristle long with short marginal spines.

Fifth limb (Figure 227i): Epipodial appendage with 53 bristles. Three endites present: 1st endite with 5 bristles, 2nd endite with 6, 3rd endite with 7. Exopodite: anterior side of 1st joint with 2 spinous bristles near middle of distal margin and 1 short spinous bristle on small outer lobe; main tooth of 1st joint consisting of 4 pectinate teeth; 1 spinous bristle present proximal to main tooth; triangular protuberance, anterior to distal tooth of main tooth, with small protuberance on proximal margin; posterior side 2nd joint with 3 a- and b-

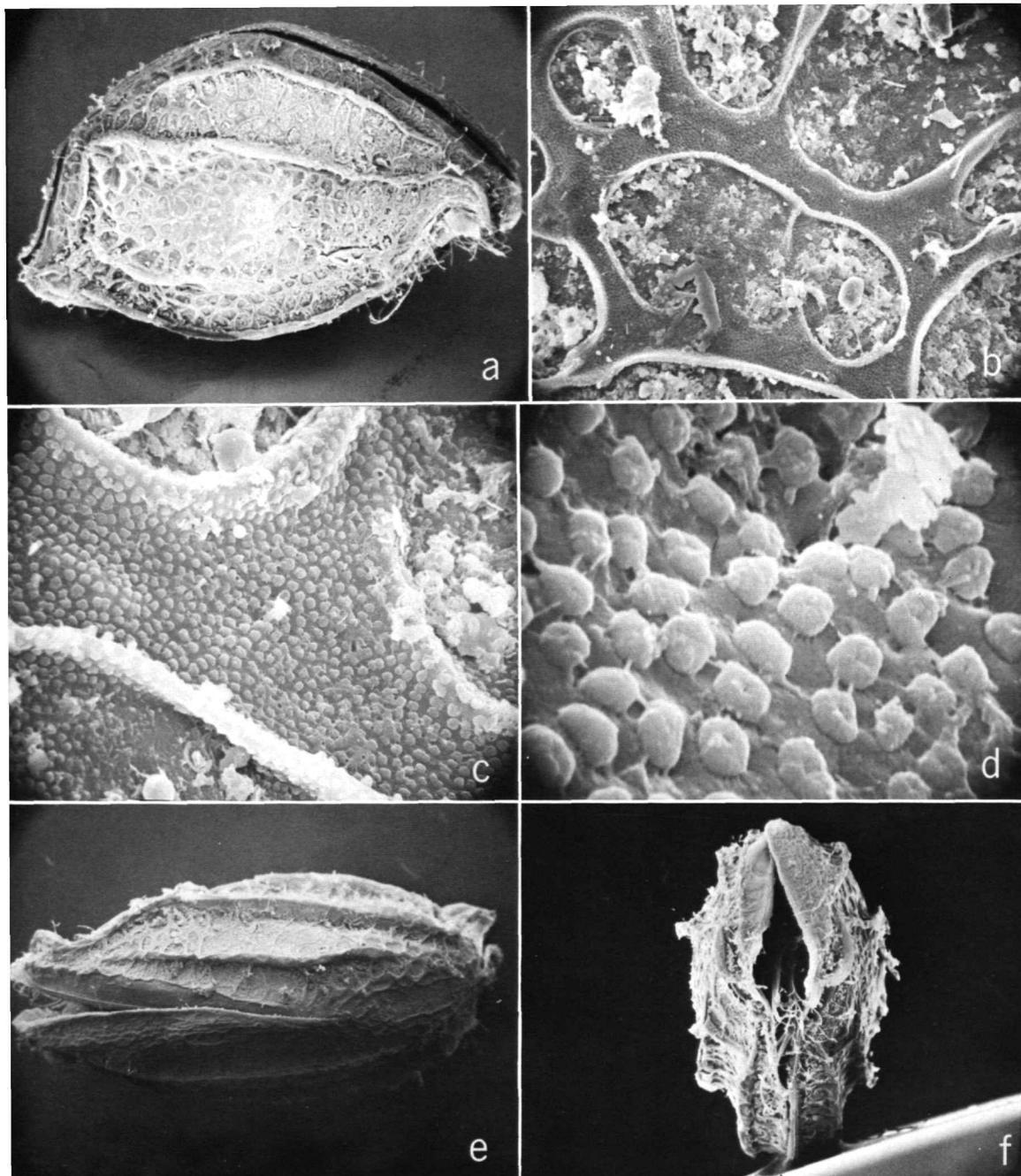


FIGURE 228.—*Anarthron dithrix*, female, USNM 128697, complete specimen: *a*, lateral view, $\times 50$; *b*, detail near dorsal margin, $\times 562$; *c*, detail dorsal to elongate pore in "*b*," $\times 2000$; *d*, detail of pustules in "*c*," $\times 11,250$; *e, f*, dorsal and anterior views, $\times 50$.

bristles and long spinous c-bristle, outer a-bristle less than half length of inner a-bristle; margin of inner curvature of large tooth of 2nd joint with small pointed node; outer lobe of 3rd joint with 2 bristles with long proximal and short distal spines, outer bristle about half length of inner bristle; inner lobe of 3rd joint with 3 spinous or pectinate bristles; 4th + 5th joints hirsute and with 6 spinous bristles.

Sixth limb (Figure 227j): 2 hirsute bristles present in place of epipodial appendage; endite I with 2 or 3 spinous bristles; endite II with 3 spinous bristles; endite III with 8 spinous bristles; endite IV with 7 spinous bristles; end joint hirsute, prolonged posteriorly and with 18 or 19 spinous bristles

Seventh limb (Figure 227k): Each limb with 10 bristles, 4 proximal (2 on each side) and 6 distal (3 on each side) (rarely 11 bristles, 5 proximal, 6 distal); each bristle with 4 to 6 bells and distal marginal spines; terminal comb with 15 alate teeth; no peg present opposite comb.

Furca (Figure 227l): Each lamella with 10 to 12 claws; claws arranged in 2 groups consisting of stout primary claws (claws 1 to 3) and short secondary claws (claws 4 to 11 or 12); claw 1 with

teeth forming 2 rows, 1 lateral, 1 medial; claws 2 and 3 with teeth forming single row along posterior margin; remaining claws with minute teeth forming row along concave margin; hairs present on lamella following claws and at bases of main claws.

Rod-shaped organ (Figure 227m): Elongate with 2 sutures and wrinkles near middle; proximal part with faint incipient sutures; tip drawn out to fine point and with terminal hair.

Eyes (Figure 227m): Lateral eye elongate with 2 ommatidia; medial eye pigmented.

Anterior process and upper lip: See Figure 227m.

Number of eggs in marsupium: USNM 128695, 15; USNM 128852, 8; USNM 136935, 9; USNM 136938, 7; USNM 136941, 5; USNM 136944, 4; USNM 137032, 14; USNM 137033, 6; USNM 137035, 9.

Parasites: Strings of segmented filaments and stalked cuplike protists on many specimens. USNM 128698 with 1 choniostomatid ♀; and 2 ovisacs; USNM 137034 with 1 choniostomatid ♀ + 2 pupae; USNM 137037 with 1 choniostomatid ♀ + 5 ovisacs.

Gut content: USNM 128852 with a few polychaete spines of the family Sabellidae (Pettibone, pers. comm., 1972). According to Dr. Pettibone,

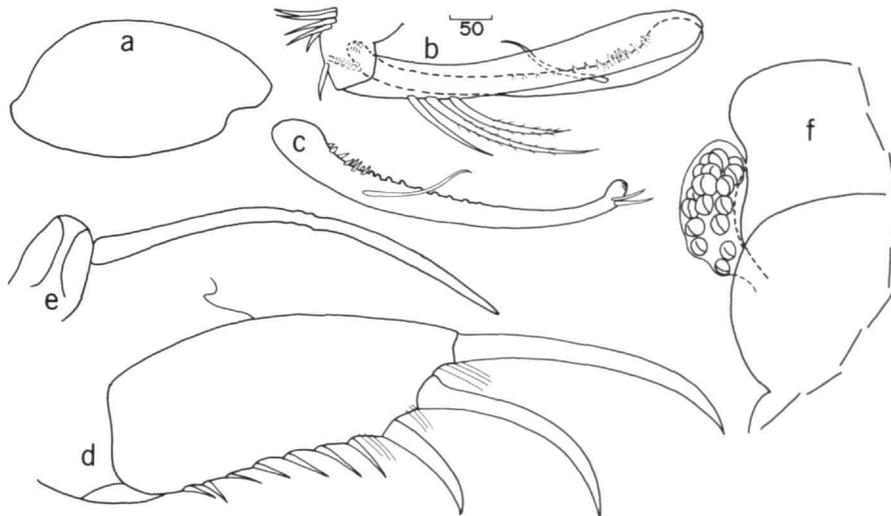


FIGURE 229.—*Anarthron dithrix*, male, USNM 136932, length 2.20 mm, carapace: a, complete specimen, lateral view. Appendages: b, endopodite of right 2nd antenna, medial view; c, 3rd joint of endopodite shown in "b," lateral view; d, right lamella of furca; e, medial eye and rod-shaped organ; f, right lateral eye and posterodorsal corner of protopodite of right 2nd antenna, anterior to right. (Same magnification in microns: b-f.)

the spines are from that part of the worm inside the tube, and not from the part that extends into the water above the sediment. The small size of the spines suggests that the diameter of the tube could not be large enough for the ostracode to

have crawled into it. Considerable particulate matter also present.

DESCRIPTION OF ADULT MALE (Figure 229).—Carapace about same length as that of female but not as high (Figure 229a); reticulations smaller

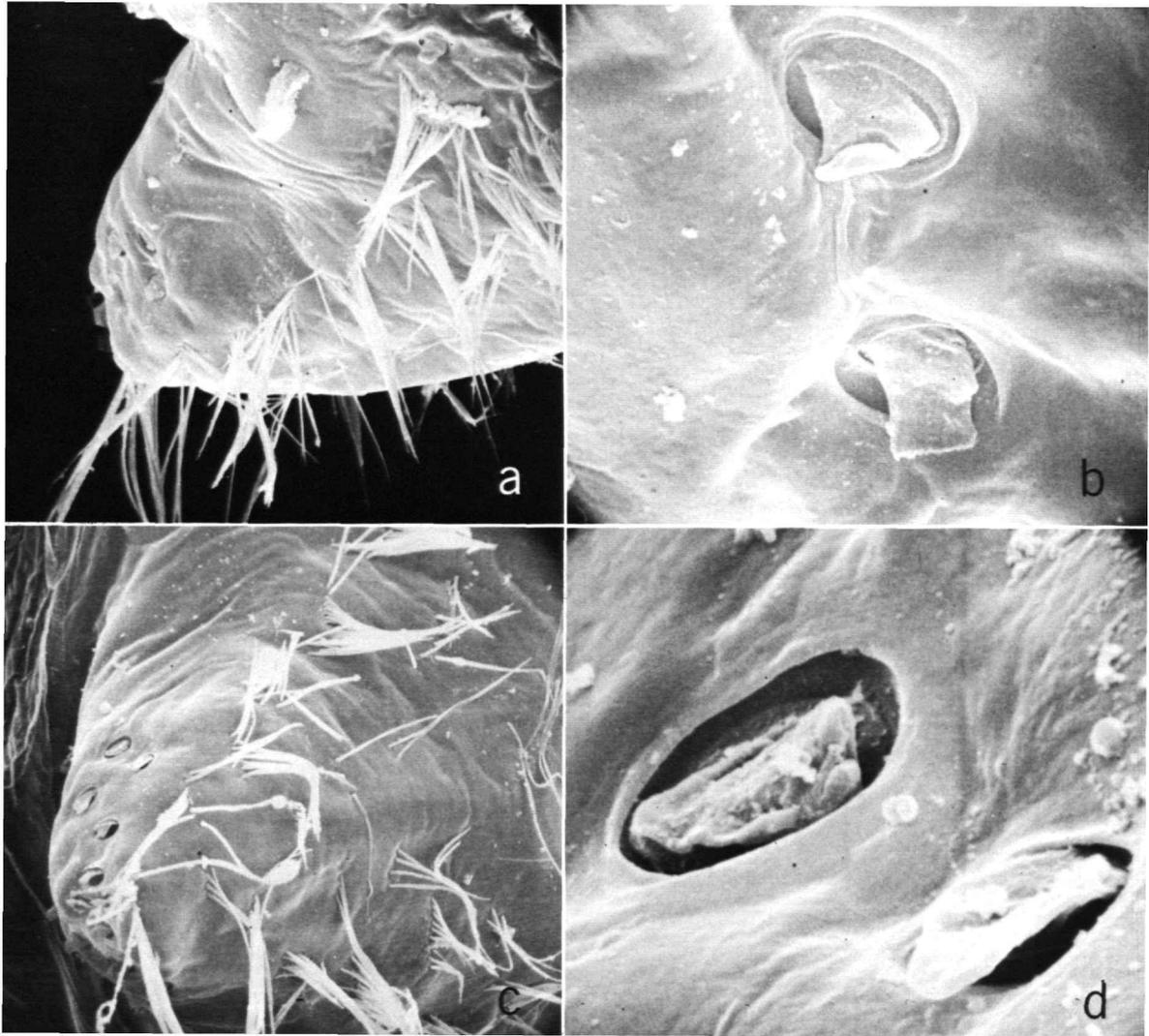


FIGURE 230.—*Anarthron dithrix*, N-1 male, USNM 138036, upper lip: *a*, lateral view, anterior to left, $\times 940$; *b*, detail of two openings in proximal field shown in "a," $\times 4700$; *c*, anterior ventral view of lip, anterior toward left, $\times 1000$; *d*, detail of two openings in "c," $\times 10,000$. Reduction, 10%.

than on female carapace, ridges visible but subdued; surface with single scattered hairs. Size (Figure 220): USNM 136932, length 2.20 mm, height 1.13 mm; USNM 136933, 3 specimens (not dissected), length 2.18 mm, height 1.14 mm, length 2.19 mm, height 1.19 mm, length 2.08 mm, height 1.18 mm; USNM 137041, shell torn, length 2.03 mm, height 1.10 mm; USNM 137042, length 2.14 mm, height 1.05 mm.

Second antenna (Figure 229*b,c*): Endopodite 3-jointed: 1st joint short with 6 short bristles, 5 proximal, 1 distal; 2nd joint elongate with 3 spinous ventral bristles; 3rd joint reflexed with 1 proximal and 2 subterminal bristles and with numerous rather long teeth on surface.

Seventh limb: Each limb with 8 or 9 bristles, 4 or 5 proximal (2 + 2 or 3), 4 distal (2 + 2), each bristle with 4 to 6 bells; terminal comb with 12 alate teeth; no peg opposite comb.

Furca: Each limb with 10 or 11 claws: claws 1 to 3 stout, claws 4 to 10 or 11 slender, short (Figure 229*d*).

Rod-shaped organ (Figure 229*e*): Organ elongate with pointed tip; wrinkles present near middle.

Eyes: Medial eye pigmented; lateral eye well developed, slightly larger than medial eye, with about 18 ommatidia (Figure 229*f*).

DESCRIPTION OF N-1 MALE (USNM 138036).—Carapace size: length 1.99 mm, height 1.29 mm.

Upper lip: See Figure 230.

COMPARISONS.—This new species is closely related to *Anarthron chilensis* (Hartmann, 1965). The carapace of *A. dithrix* is larger than that of *A. chilensis* and the posterior end of the upper midrib forms a stout vertical rib, whereas, this part of the rib is either missing or quite subdued on *A. chilensis*. Differences in appendages between the two species are small; e.g., the outer bristle on the exopodite of the mandible of *A. chilensis* bears wreaths of long proximal bristles which are missing on *A. dithrix*; the 6th limbs on those specimens of *A. dithrix* examined have 2 bristles in place of the epipodial appendages, whereas, three out of four 6th limbs of *A. chilensis* examined have 3 bristles in place of the epipodial appendage. The ventral margins of the 1st and 2nd joints of the 1st antennae of *A. dithrix* are bare, whereas, these margins on *A. chilensis* have spines forming clusters.

DISTRIBUTION.—This species was collected only in the American Quadrant in Antarctic, Subantarctic, and Subantarctic-to-35°S regions (41°27'S to 62°54'S) at depths of 71 to 1173 m, but mostly at shelf depths (Figure 222).

56. *Anarthron pholion*, new species

FIGURES 231, 232

HOLOTYPE.—USNM 128956, 1 gravid ♀, some appendages on slides, others in alcohol; right valve in alcohol, left valve gold-plated dry.

TYPE-LOCALITY.—*Vema* Cruise 16, station V-16-37.

ETYMOLOGY.—The specific name is derived from the Greek "pholion" [= small hole] in reference to the small pits covering the surface of the carapace.

PARATYPES.—USNM 128957, 1 gravid ♀, not dissected; USNM 128958, 4 juveniles, not dissected. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 137457, 1 adult ♀ (not dissected) from same sample as holotype; USNM 137045, 1 gravid ♀ from *Vema* Cruise 15, station V-15-93; USNM 137052, 1 juvenile from *Vema* Cruise 16, station V-16-39; USNM 137053, 1 adult ♀ without eggs from *Vema* Cruise 15, station V-15-110.

DIAGNOSIS OF FEMALE.—Carapace with small punctations, which on some specimens decrease in size anteriorly; horizontal ridges faint, and both midribs absent on anterior part of shell; carapace length 1.87 to 1.93 mm. Appendages similar to those on *A. dithrix*.

DESCRIPTION OF FEMALE.—Carapace strongly calcified and with numerous small punctations which on some specimens decrease in size anteriorly on carapace (Figures 231, 232); horizontal ridges faint, and both midridges absent on anterior part of shell; single hairs scattered over valve surface.

Infold and selvage: Same as on *A. dithrix*.

Size (Figure 220): USNM 128956, length 1.92 mm, height 1.24 mm; USNM 128957, length 1.93 mm, height 1.32 mm; USNM 137045, length 1.93 mm, height 1.30 mm; USNM 137053, length 1.87 mm, height 1.26 mm.

Appendages: Same as those on *A. dithrix* with following exceptions: ventral margins of 1st joint of 1st antenna with few clusters of short spines;

bristles on exopodite of mandible of some specimens without long spines.

Eyes: Same as those on *A. dithrix*.

Eggs: USNM 128956 with 4 eggs in marsupium; USNM 137045 with 17 eggs.

REMARKS CONCERNING SPECIMEN FROM V-15-110.—An adult ♀ from this station has a rounded tip on the frontal organ and long proximal spines on both bristles on the exopodite of the mandible, in other respects the specimen conforms with *A. pholion*.

COMPARISONS.—This new species is closely related to *A. dithrix* and *A. chilensis*. The carapace of *A. pholion* differs from both species in having smaller punctae on the carapace and, on some specimens, the size of the punctae are much smaller on the anterior half of the shell than they are on the posterior half. Specimens of *A. pholion* in the collection are more strongly calcified than those of both *A. dithrix* and *A. chilensis*, but this could vary. The 2 midridges are not present on the anterior part of the shell of *A. pholion* but are present on the other two species. The size of the carapace of *A. pholion* is intermediate between those of *A. chilensis* and *A. dithrix*. *Anarthron pholion* also differs from *A. dithrix* in having a few spines along the ventral margin of the 1st joint of the 1st antenna.

DISTRIBUTION.—This species was collected only in the Subantarctic region east of Argentina (50°17'S to 54°10'S) at depths of 82 to 284 m (Figure 222).

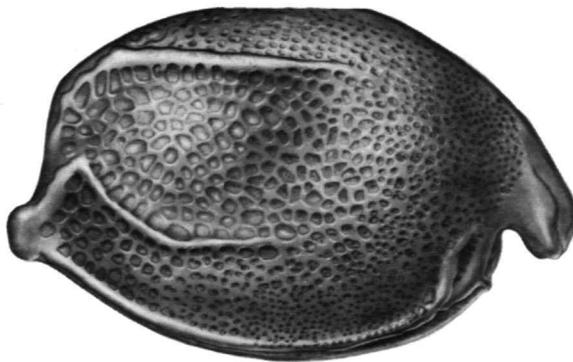


FIGURE 231.—*Anarthron pholion*, female, USNM 128956, length 1.92 mm, right valve, lateral view showing ribs and small anterior and large posterior punctae.

57. *Anarthron evexum*, new species

FIGURES 233-235

HOLOTYPE.—USNM 136939, gravid ♀, length 1.78 mm, some appendages and valves in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Vema* Cruise 17, station V-17-89A.

ETYMOLOGY.—The specific name is derived from the Latin "evexus" [= rounded at top] in reference to the more-or-less rounded tip of the rod-shaped organ.

PARATYPES.—USNM 136940, 136942, 136943, 136947, 136948; 5 gravid ♀♀. USNM 137031, 24 gravid ♀♀. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 137054, 1 adult ♀ without eggs; USNM 137055, 1 adult ♀ without eggs, both from *Vema* Cruise 15, station V-15-110. USNM 137050, 1 adult ♀ with unextruded eggs; USNM 137475 (shell only), both from *Vema* Cruise 15, station V-15-106.

DIAGNOSIS OF FEMALE.—Carapace ornamentation similar to that on *A. dithrix*; carapace length 1.78 to 2.00 mm.

Mandible: Dorsal margin of basale with 4 bristles, 2 near middle, 2 terminal.

Seventh limb: Each limb with 10 bristles, 4 proximal, 6 distal; terminal comb with 14 alate teeth; no peg opposite comb.

Furca: Each lamella with 11-13 claws, 3 long claws followed by 8-10 short claws.

Rod-shaped organ: Tip rounded.

DESCRIPTION OF ADULT FEMALE.—Surface reticulate with large pits and scattered single surface hairs (Figures 233, 234a, 235); each valve with 4 distinct horizontal ribs similar to those on *A. dithrix*.

Infold (Figure 234b,c): Infold on rostrum with 15 bristles; small bristle present on infold below inner margin of incisur; anteroventral margin with about 18 short bristles; posteroventral and posterior list with numerous groups of 1 to 4 bristles; ridge with only 1 bristle present between posterior list and outer edge of valve; 1 bristle present near valve edge between ridge and posterior shell margin.

Selvage: Striate lamellar prolongation with short fringe discontinuous in area of incisur.

Size (Figure 220): USNM 136939, gravid ♀,

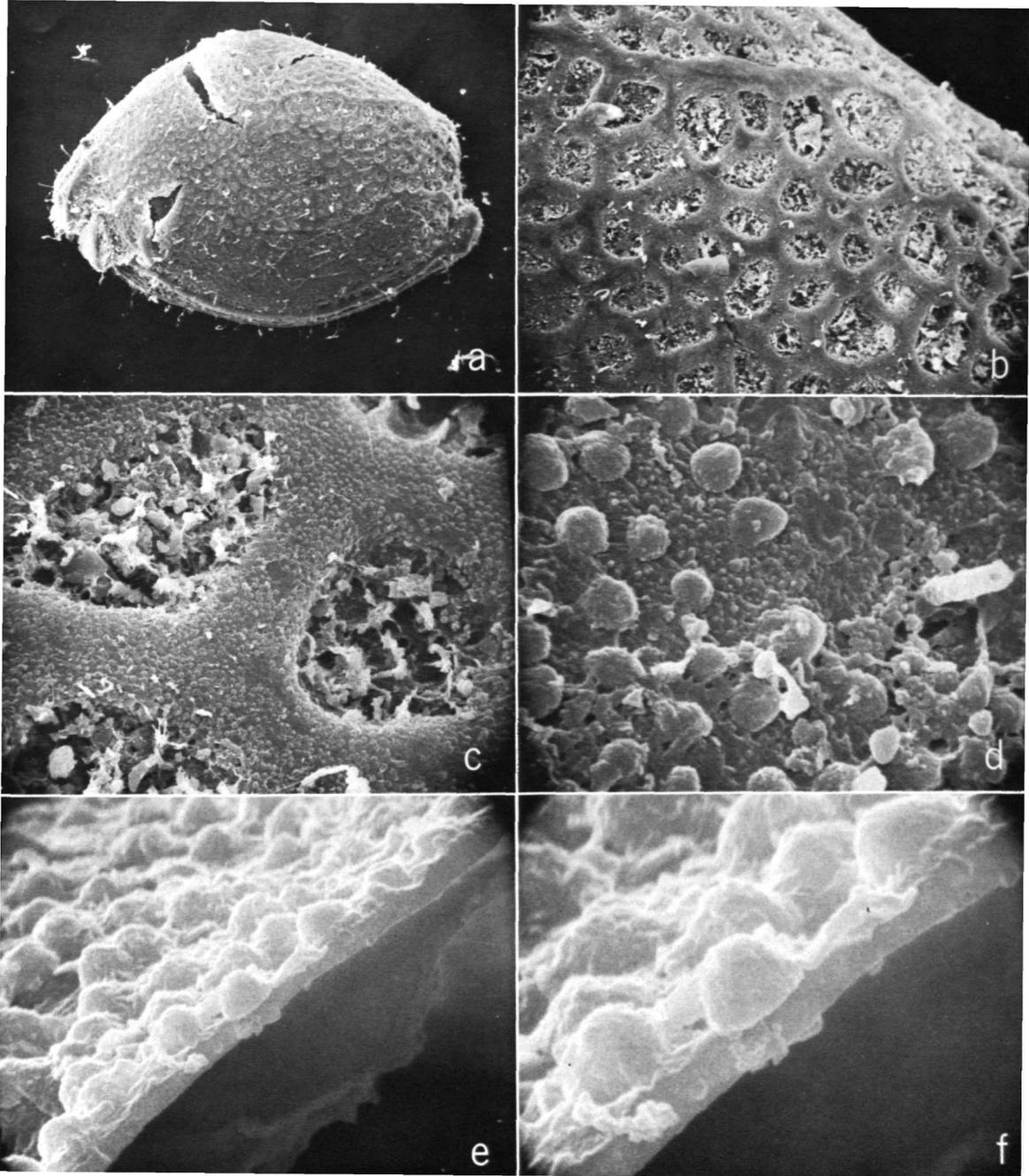


FIGURE 232.—*Anarthron pholion*, female, USNM 128956, left valve: *a*, lateral view, $\times 50$; *b*, detail near posterodorsal margin, $\times 200$; *c*, detail of pits in "*b*," $\times 1000$; *d*, detail near middle of "*c*," $\times 10,000$; *e*, detail at edge of crevice near dorsal margin of shell, $\times 10,000$; *f*, detail of "*e*," $\times 18,750$.

length 1.78 mm, height 1.19 mm; USNM 136940, gravid ♀, length 1.87 mm, height 1.27 mm; USNM 136942, gravid ♀, length 1.85 mm, height 1.24 mm; USNM 136943, gravid ♀, length 1.83 mm, height 1.16 mm; USNM 136947, gravid ♀, length 1.83 mm, height 1.16 mm; USNM 136947, gravid ♀, length 1.89 mm, height 1.22 mm; USNM 136948, gravid ♀, length 1.96 mm, height 1.28 mm; USNM 137054, length 1.90 mm, height 1.23 mm; USNM 137055, length 2.00 mm, height 1.33 mm; USNM 137050, length 1.96 mm, height 1.36 mm.

First antenna: 1st joint with spines along ventral margin and on medial surface; 2nd joint with spines along dorsal and ventral margins and on lateral surface, and with 3 bristles, 1 ventral, 1 dorsal, 1 lateral (ventral and dorsal bristles with long proximal and short distal spines, lateral bristle with only short marginal spines); 3rd joint short with short spines along dorsal margin, and 1 ventral and 2 dorsal bristles, all with short marginal spines; 4th joint with spines along ventral and dorsal margins, and 6 spinous bristles, 4 ventral, 2 dorsal; sensory bristle of 5th joint with 6 proximal and 5 distal filaments including tip; medial bristle of 6th joint with 1 proximal wreath of long spines and short distal spines. Seventh joint: a-bristle similar to bristle on 6th joint; b-bristle slightly shorter than long bristles of 8th joint, with 2 proximal and 3 terminal filaments including tip; c-bristle long with 6 proximal and 3 or more terminal filaments. Eighth joint: d- and e-bristles bare, about same length as c-bristle; f-bristle long with 5 proximal and 3 or more terminal

filaments; g-bristle long with 4 proximal and 5 distal filaments including tip.

Second antenna (Figure 234d): Protopodite with minute spines (not visible at low magnification) forming clusters on dorsal half of anterior part of medial surface. Endopodite 2-jointed: 1st joint with 6 bare bristles, 5 proximal, 1 distal; 2nd joint with 1 long spinous ventral bristle and 1 slender terminal bristle. Exopodite: 1st joint with short terminal medial spine with short marginal spines; bristles of 2nd and 3rd joints with proximal spines along ventral margin; bristle on 4th joint bare; bristles of joints 5 to 8 with natatory hairs; 9th joint with 7 bristles, smallest of these with short marginal spines, next with long proximal and short distal spines, remaining bristles with natatory hairs; distal margins of joints 2 to 8 with short spines forming row, additional cluster present near middle of 2nd joint; joints 3 to 8 with small basal spines.

Mandible (Figure 234e,f): Coxale endite stout, bifurcate, with minute bristle near base. Basale: medial surfaces spinous with 6 bristles near ventral margin, 5 proximal, 1 near middle (3 proximal bristles pectinate); lateral surface spinous with 5 spinous bristles with bases near ventral margin; ventral margin with 3 spinous distal bristles; dorsal margin with 4 spinous bristles, 2 forming group near middle, 2 terminal (both terminal bristles and distal bristle in middle group with long proximal and short distal marginal spines, proximal bristle in middle group with only short marginal spines). Exopodite about three-fourths length of dorsal margin of 1st endopodite joint; end of exopodite hirsute and with stout spine having pronged tip; inner bristle with long proximal and short distal spines, outer bristle with short spines. Endopodite: 1st joint with 4 spinous ventral bristles; medial surface with spines forming clusters; ventral margin of 2nd joint with bristles forming 2 distal groups, of these, proximal group with 2 and distal group with 3 spinous bristles; dorsal margin with bristles forming 2 groups proximal to middle of margin, 3 bristles in proximal group, 5 or 6 in distal group; 1 short pectinate medial bristle present between 2 groups of bristles; medial surface with spines forming clusters; spines also present along ventral margin proximal to bristles; end joint with 3 claws and 4 bristles; dorsal claw about half length of medial claw; lateral claw

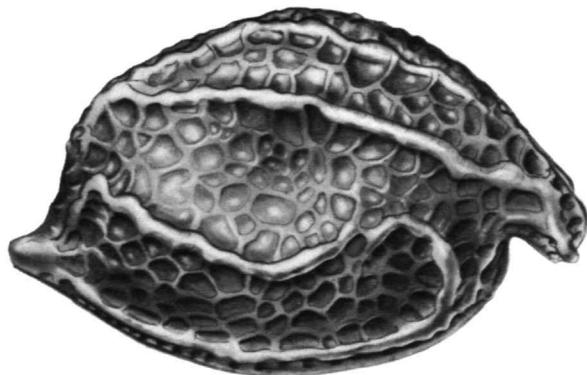


FIGURE 233.—*Anarthron evexum*, female, USNM 136939, right valve, length 1.78 mm.

longer than medial claw (lateral claw broken near tip on holotype); claws dentate along proximal ventral margin.

Maxilla: 1st endite with 9 spinous and pectinate terminal bristles; 2nd endite with 6 distal bristles; 3rd endite with 1 proximal and about 7 distal bristles; coxale with 1 stout plumose bristle; distal margin of basale with 3 bristles, anterior bristle shorter than others. Endopodite: 1st joint hirsute, with 1 α -bristle with long proximal and short distal spines and 3 β -bristles; end joint with 3 α -bristles, 2 β -bristles, γ -bristles obscure on holotype, 3 δ -bristles similar to those on *A. dithrix* (2 with stout marginal spines, 3rd ringed and with

slender spines). Exopodite small with 3 bristles: proximal bristle short bare; middle terminal bristle long with long proximal and short distal spines; inner terminal bristle long with short marginal spines.

Fifth limb: Epipodial appendage with 52 bristles. Three endites present: 1st endite with 7 bristles, 2nd endite with 6, 3rd endite with 7. Exopodite: anterior margin of 1st joint with 2 spinous bristles near middle of distal margin and 1 short stout spinous bristle on small outer lobe; anterior surface of joint hirsute, and cluster of spines present on small outer lobe; main tooth consisting of 4 pectinate teeth; 1 spinous bristle present proximal

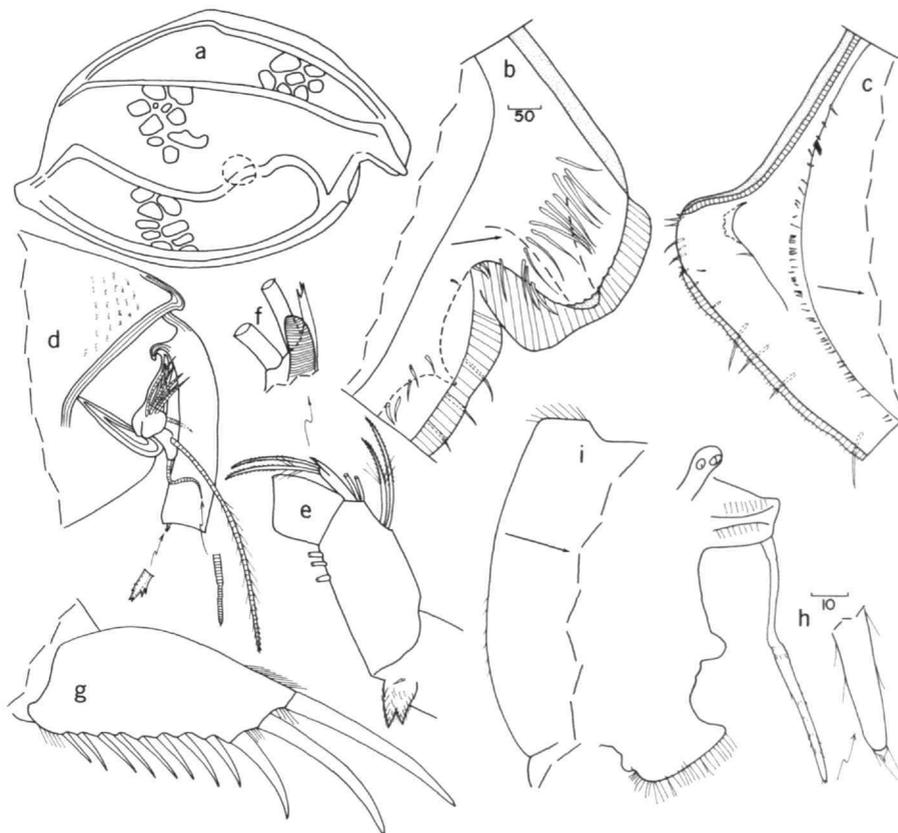


FIGURE 234.—*Anarthron evexum*, female, USNM 136939, length 1.78 mm, carapace: a, right valve, lateral view; b, anterior of left valve, medial view; c, posterior of left valve, medial view. Appendages: d, endopodite and parts of podopodite and exopodite of left 2nd antenna, medial view; e, part of right mandible, medial view (all bristles not shown); f, detail of tip of exopodite shown in "e"; g, right lamella of furca; h, anterior showing right lateral eye, medial eye and rod-shaped organ, anterior process, and upper lip; i, posterior showing hirsute dorsum. (Same magnification in microns: b-g; i.)

to main tooth; triangular protuberance, anterior to main tooth, with small protuberance on proximal margin; posterior side of 2nd joint with total of 3 a- and b- bristles, and 1 long spinous c-bristle; margin of inner curvature of large tooth of 2nd joint with small indistinct node; outer lobe of 3rd joint with 2 spinous bristles, outer bristle less than half length of inner bristle; inner lobe of joint with 3 spinous or pectinate bristles; fused 4th and 5th joints hirsute and with 6 spinous bristles. (Morphology of 5th limb quite similar to that of *A. dithrix*.)

Sixth limb: 2 hirsute bristles present in place of epipodial appendage; endite I with 3 spinous bris-

les; endite II with 3 spinous bristles; endite III with 8 spinous bristles; endite IV with 7 spinous bristles; end joint prolonged posteriorly and with 19–21 spinous and plumose bristles; endites II to IV and end joint hirsute.

Seventh limb: Each limb with 10 bristles, 4 proximal (2 on each side) and 6 distal (3 on each side); each bristle with 3 to 6 bells and distal marginal spines; terminal comb with 14 alate teeth; no peg opposite comb.

Furca (Figure 234g): Each lamella with 11 to 13 claws; claws arranged in 2 groups consisting of stout primary claws (claws 1 to 3) and short secondary claws (claws 4 to 11, 12, or 13) (holotype

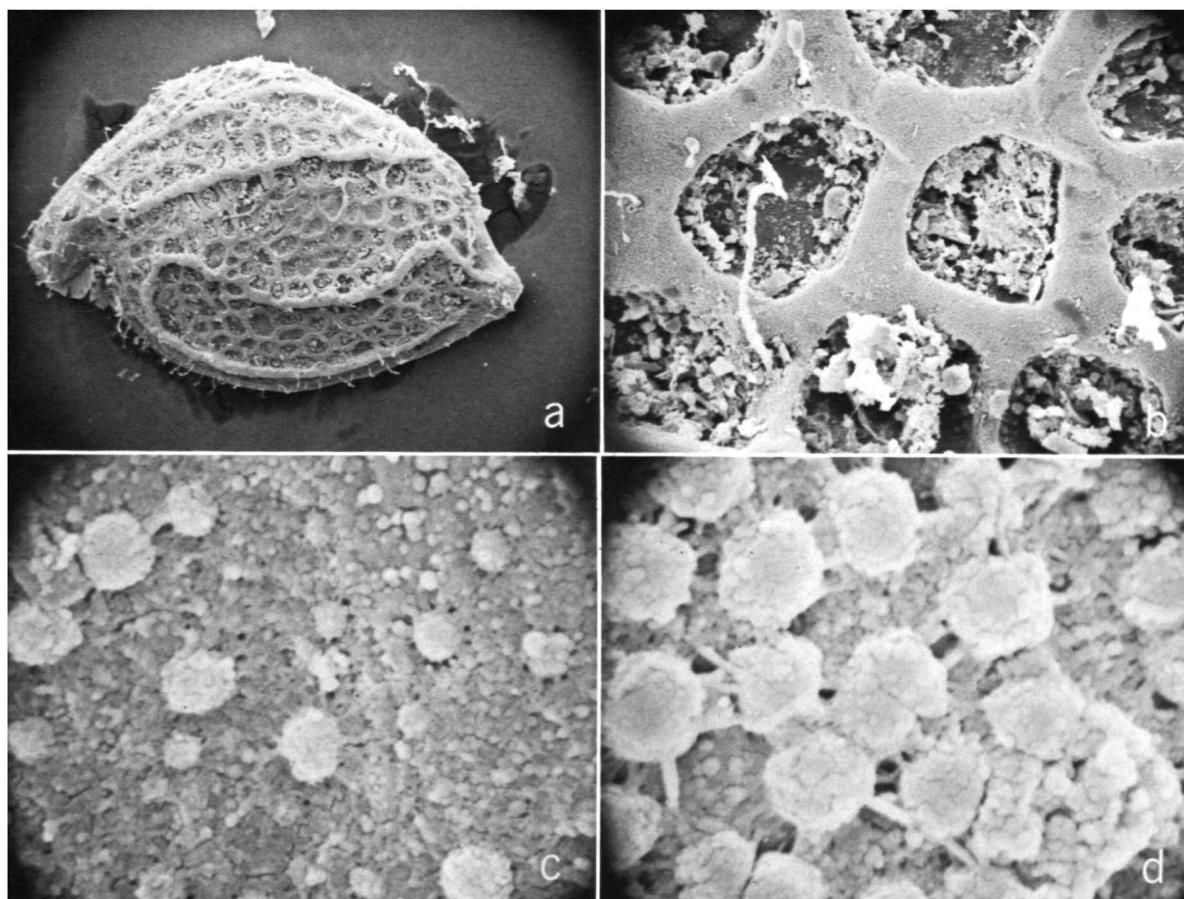


FIGURE 235.—*Anarthron vexum*, female, USNM 136939, left valve: *a*, lateral view, $\times 55$; *b*, detail of pits in lower middle part of valve, $\times 560$; *c*, pustules in pit of "*b*," $\times 23,000$; *d*, pustules on rib between pits in "*b*," $\times 23,000$.

with 8 secondary claws on right lamella and 10 on left); claw 1 with teeth forming 2 rows, 1 lateral, 1 medial; claws 2 and 3 with teeth forming single row along posterior margin; both large and small teeth present in each row; secondary claws with minute teeth along posterior margin and hairs along anterior margin; hairs present on lamella following claws and at bases of main claws; spines present along anterior margin of lamellae.

Rod-shaped organ (Figure 234h): Elongate with 2 indistinct sutures in broad middle part and tapering gradually to more-or-less rounded tip (under high magnification minute pointed process and hairs visible on tip); short surface hairs present on distal half.

Eyes (Figure 234h): Lateral eye small with 2 ommatidia; medial eye pigmented, bare.

Eggs: USNM 136939, 7 eggs; USNM 136940, 3 eggs; USNM 136942, 2 eggs; USNM 136943, 3 eggs; USNM 136947, 10 eggs; USNM 136948, 8 eggs.

COMPARISONS.—This new species very closely resembles *A. dithrix*, a species which also occurs at the type-locality of *E. evexum*. The range of carapace length of *A. evexum* (6 ♀ ♀) is 1.78 mm–1.96 mm; the range of carapace length of *A. dithrix* (11 ♀ ♀) is 1.98–2.31 mm. The carapace of *A. evexum* is similar in size to that of *A. chilensis* and also *A. pholion*. *Anarthron evexum* differs from all previously described species in the genus by having 2 midbristles on the dorsal margin of the mandible. The distal half of the rod-shaped organs of previously described species in the genus taper at a fairly constant angle and terminate in a slender tip; whereas, the distal half of the rod-shaped organ of *A. evexum* tapers very slightly and terminates in a more-or-less rounded tip (under high magnification, a transparent pointed process is visible on the rounded tip). The new species also differs from *A. dithrix* in having numerous spines along the ventral margin of the 1st and 2nd joints of the 1st antenna.

DISTRIBUTION.—This species was collected east of Argentina in both Subantarctic and Subantarctic-to-35°S regions (45°00'S to 54°10'S) at depths of 79 to 284 m (Figure 222).

Anarthron Species Indeterminate

MATERIAL.—USNM 136949, 344 specimens including adult ♀ ♀ without eggs of *A. evexum* and

juveniles of both that species and *A. dithrix*; USNM 137065, 1 juvenile; USNM 137046, 1 juvenile; USNM 137057, 1 juvenile ♂, length 1.37 mm, height 0.87 mm; USNM 137058, adult ♂, length 1.45 mm, height 0.92 mm (this specimen could be a *Philomedes*. The mandibles are very unusual, lacking an exopodite and having short bristles where long bristles are expected. I am inclined to believe that the mandibles are aberrant). USNM 138657, 1 juvenile ♀, length 1.29 mm, height 0.96 mm, + 2 juveniles; USNM 139101, 1 juvenile ♀, length 1.45 mm, height 0.91 mm, + 2 juveniles.

USNM 136949, 137065 from *Vema* Cruise 17, station V-17-89A; USNM 137046 from same cruise, station V-17-92; USNM 137046 from same cruise, station V-17-48; USNM 137058 from same cruise, station V-17-10; USNM 137057 from *Vema* Cruise 15, station V-15-131; USNM 138657 from *Hero* Cruise 69-5, station 48; USNM 139101 from *Hero* Cruise 69-5, station 57.

DISTRIBUTION.—The distribution of *Anarthron* species indeterminate is shown on Figure 222.

Igene, new genus

TYPE-SPECIES.—*Igene walleni*.

ETYMOLOGY.—The genus is named after I. Eugene Wallen. Gender: masculine.

This new genus is monotypic.

DIAGNOSIS OF GENUS.—Carapace without ribs.

Second antenna: Endopodite of female 2-jointed.

Maxilla: With 3 distinct endites.

Fifth limb: 2nd exopodite joint with large quadrate tooth.

Sixth limb: End joint with relatively few bristles.

Seventh limb: Absent on male.

Furca: No secondary claws between primary claws.

Rod-shaped organ: Short, conical.

COMPARISONS.—This new genus is based mainly on the short, conical rod-shaped organ. It is found in no other genera of the Philomedidae. *Tetragonondon rhabdion* (Kornicker, 1970a:36) has a short rod-shaped organ, but it is cylindrical.

DISTRIBUTION.—The type-species was collected in the Pacific Quadrant within the Antarctic Convergence at depths of from 3386 to 3817 m and off the Pacific coast of Chile at a depth of 4303 m. The

northernmost locality is at 37°57'S, 75°08'W; the southernmost locality is at 59°57'S, 136°39'W (Figure 186).

58. *Igene walleni*, new species

FIGURES 236-240

HOLOTYPE.—USNM 125834, gravid ♀, length 1.27 mm. Valves and some appendages in alcohol, remaining appendages on slides.

TYPE-LOCALITY.—*Eltanin* Cruise 14, station 1248, Pacific Quadrangle, Antarctica.

PARATYPES.—USNM 125835, adult ♀; USNM 125836, N-1 ♂, both from same station as holotype. USNM 127517, adult ♀ from *Eltanin* Cruise 14, station 1209.

ADDITIONAL SPECIMENS.—USNM 128962, gravid ♀; USNM 128963, adult ♀ (not dissected) + 7 gravid ♀♀ + 28 adults and juveniles; USNM 139288, adult ♂; USNM 139289, N-1 ♂; USNM 128962, all from *Vema* Cruise 17, station V-17-6.

DIAGNOSIS.—Same as for genus.

DESCRIPTION OF FEMALE (Figures 236-239a-d).—Carapace oval in lateral view with prominent rostrum and broad incisur (Figures 236, 237a-g, 239a,b,e); posterior rounded without caudal process; anterior and inferior corners of rostrum only slightly rounded, margin between corners straight; minute protuberance present on anterior margin near inferior corner of rostrum.

Infold (Figure 237c,e-g): Infold broad along anterior and posterior parts of shell, narrow ven-

trally; infold on rostrum with 3 spinous bristles forming row along dorsal margin and 7 spinous bristles forming row parallel to anteroventral margin; 3 bare bristles present along lower margin of rostrum; 1 small bare bristle present on infold posterior to incisur; anteroventral part of infold with 8 or 9 striae, but without bristles; no bristles present along ventral infold; posteroventral and posterior infold with about 11 small bristles along raised list; about 15 bristles forming row anterior to list.

Marginal pore canals: Numerous canals present along anterior, ventral, and posterior margins of each valve leading to minute bristles along valve edge and to longer bristles on outer surfaces of valve near edge.

Selvage (Figure 237d): Lamellar prolongation with marginal fringe present along anterior, ventral, and posterior margins; prolongation with typical segmentation along rostrum and incisur; wide prolongation below incisur with long bristles appearing to have bases near inner margin of outer surface of prolongation, but these probably spring from valve edge.

Ornamentation: Carapace smooth with bristles along anterior, ventral, and posterior margins and sparse on lateral surface.

Size: USNM 125834, gravid ♀, length 1.27 mm, height 0.88 mm; USNM 125835, adult ♀, length 1.35 mm, height 0.97 mm; USNM 127517, length 1.44 mm, height 1.04 mm; USNM 128962, gravid ♀, length 1.39 mm, height 1.18 mm; USNM 128963, adult ♀, length 1.40 mm, height 1.10 mm.

First antenna (Figure 237h): 1st joint with few spines forming clusters on medial surface; 2nd joint with 2 bare bristles, 1 dorsal, 1 lateral, and numerous spines; 3rd joint quite short, with 3 bristles: 1 ventral with short marginal spines, 2 dorsal with few spines or bare; 4th joint with spines forming clusters and with 4 spinous bristles, 3 ventral, 1 dorsal; 5th joint with numerous spines along dorsal margin, few along ventral margin, and spines forming rows on lateral surface; sensory bristle of 5th joint with 3 proximal and 3 terminal filaments; 6th joint short with 1 short, spinous medial bristle; 7th joint with a-, b-, and c-bristles: a-bristle short, spinous; b-bristle about two-thirds length of sensory bristle, with 1 proximal and 3 or 4 terminal filaments, c-bristle same length as sensory bristle and with filaments; 8th joint with d-, e-, f-, and

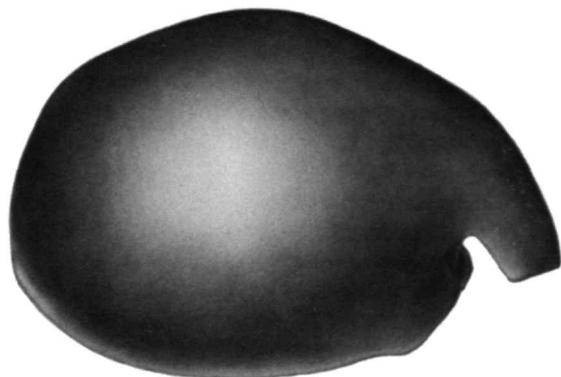


FIGURE 236.—*Igene walleni*, female, USNM 128963, complete specimen, length 1.40 mm.



FIGURE 237.—*Igene walleni*, female, USNM 125834, length 1.27 mm, carapace: *a*, complete specimen, lateral view; *b*, anterior of left valve, lateral view; *c*, anterior of right valve, medial view; *d*, lamellar prolongation ventral to incisor on right valve, medial view; *e*, anterior of left valve, medial view; *f*, posterior of left valve, medial view; *g*, posteroventral margin on right valve, medial view. Right 1st antenna: *h*, complete limb, medial view (*c-g* bristles not shown). Left 2nd antenna: *i*, endopodite and parts of protopodite and exopodite, medial view; *j*, joints 2-9 of exopodite, medial view (bristles on joints 3-8 not shown). Left mandible: *k*, complete limb, lateral view (spines on medial surface not shown). Left maxilla: *l*, complete limb, lateral view of endopodite (not all bristle shown); *m*, tip of left maxilla, medial view (not all bristles shown). (Same magnification in microns: *b*, *h-j*; *c-g*, *k, l*.)

g-bristles: d- and e-bristles bare, about same length as sensory bristle; f- and g-bristles also about same length as sensory bristle but with proximal and distal filaments.

Second antenna (Figures 237i,j; 239f): Protopodite bare. Endopodite 2-jointed: 1st joint with 4 bare bristles; 2nd joint with 1 spinous, subterminal bristle (this bristle near middle of ventral margin on USNM 128962). Exopodite: 1st joint with short medial spine; bristles on joints 2 to 8 bare; 9th joint with 6 bristles, 2 long, 1 medium, 3 short; medium and long bristles of 9th joint with few short marginal spines near middle; joints 2 to 8 with short spines forming row along distal margins.

Mandible (Figure 237k): Coxale endite large, spinous, pectinate, with bifurcate tip; short bristle present near base of endite. Basale: medial surface with 5 short proximal bristles near ventral margin, 2 stout pectinate, 3 slender, spinous; lateral surface with 4 short, spinous bristles forming row near ventral margin; ventral margin with 2 medium, spinous, distal bristles; dorsal margin with 3 long, spinous bristles, 1 distal to middle and 2 terminal. Exopodite about two-thirds length of dorsal margin of 1st endopodite joint, with 2 terminal bristles, inner spinous bristle longer than outer bare bristle. Endopodite: 1st joint with 3 spinous ventral bristles, and few terminal spines at dorsal corner; medial surface of 2nd joint with spines forming clusters; dorsal margin with spinous bristles in 2 groups, proximal group with 3 bristles, distal group with 6; ventral margin with spinous bristles in 2 groups, proximal group with 2 bristles, distal group 3; end joint with 3 claws and 3 spinous bristles, medial claw with few minute teeth near middle of ventral margin.

Maxilla (Figure 237l): Anterior margins of precoxale and coxale with transparent flap fringed with slender hairs; coxale bristle short, stout, plumose; exopodite with short proximal bristle and 2 long terminal bristles, all with marginal spines; distal margin of basale with 2 long bristles visible. Endopodite: anterior margin of 1st joint with long hairs and 1 spinous α -bristle; dorsal margin with 4 terminal β -bristles, bare or with few marginal spines.

Fifth limb (Figure 238a-c): Epipodial appendage with about 42 bristles; 3 endites present. Exopodite: anterior margin of 1st joint with 2 bristles near middle and 1 on outer corner; triangular

tooth of 1st joint in front of main tooth extremely large; 2 small nodes present near middle margin of triangular tooth; main tooth of 1st joint consisting of 4 teeth: 1st tooth large with stout secondary teeth, 4th small with few secondary teeth; short spinous bristle present proximal to 4th tooth of 1st joint. Large curving tooth of 2nd exopodite joint with 2 small nodes present near middle of inner margin; posterior side of joint with usual 4 bristles, proximal bristles with short marginal spines, others bare. Third joint with 5 spinous bristles, 3 on inner lobe, 2 on outer lobe. Fourth + 5th joints hirsute with 5 spinous bristles.

Sixth limb (Figure 238d,e): 1st endite with 2 spinous bristles, 1 long, 1 short; 2nd endite with 3 spinous bristles; 3rd endite with 5 spinous bristles; 4th endite with 4 spinous bristles. End joint with 6 to 8 spinous bristles, posterior 3 or 4 plumose, remaining bristles spinous. Spinous bristle present in place of epipodial appendage; both surfaces of limb with long hairs forming clusters.

Seventh limb (Figure 238f,h): 4 to 6 bristles in proximal group, 2 or 3 on each side; 5 bristles in distal group, 3 + 2; each bristle with 2-6 bells; terminal comb with few (4 or 5) spinous teeth; single spinous peg surrounded by numerous long spines present opposite comb.

Brushlike organ (Figure 238m): Consisting of about 7 minute bristles dorsal to genitalia.

Furca (Figure 238i,m): Each lamella with 9 claws; claw 1 and claw 2 same length, or claw 2 slightly shorter than claw 1; remaining claws decreasing in length posteriorly on lamella; anterior claws with lateral and medial teeth forming rows along posterior margins; lateral row of teeth on 1st claw with small teeth between larger ones; hairs present medially at bases of claws and following last claw.

Eyes and rod-shaped organ: Lateral eyes absent. Medial eye pigmented and seemingly continuous with short, conical rod-shaped organ (Figures 238j,k; 239c,d,g).

Upper lip: Lip hirsute with several spines at tip; unpaired rounded anterior process present between lip and bases of 1st antennae (Figures 238k, 239c).

Eggs: USNM 125834 with 3 eggs in marsupium; USNM 128962 with 5 eggs; USNM 128963 with 6.

Parasites: USNM 125835 with 1 ♀ isopod with about 50 eggs.

DESCRIPTION OF ADULT MALE (Figure 240a-k).—Carapace more elongate than that of adult female, and with fewer bristles on the infold of the

rostrum (Figures 240a,b). Size: length 1.30 mm, height 0.74 mm.

First antenna (Figure 240c,d): 1st joint bare

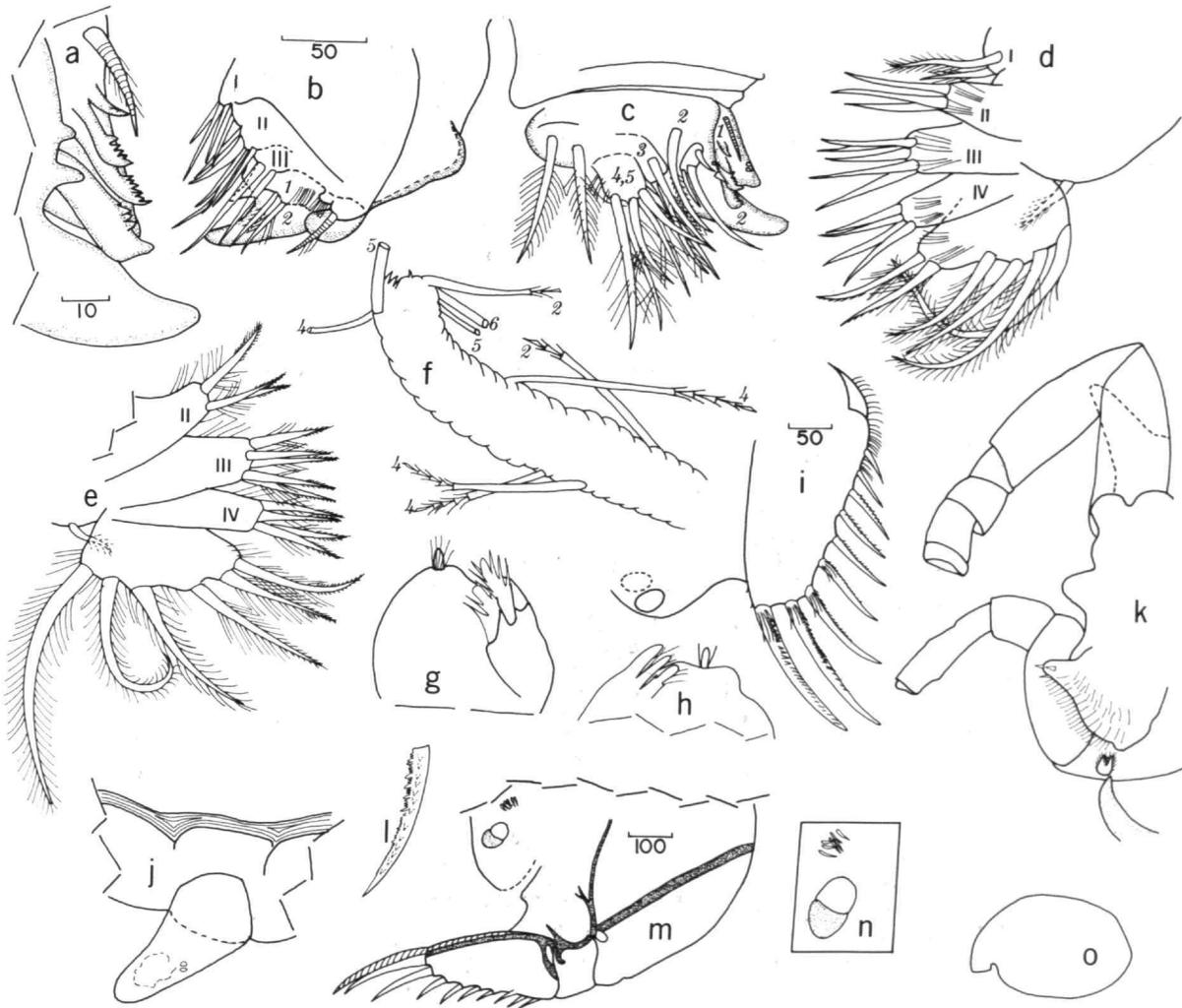


FIGURE 238.—*Igene walleni*, female, USNM 125834, left 5th limb: a, tip, posterior view; b, tip, anterior view; c, distal part, posterior view. Sixth limb: d, left limb, lateral view (marginal spines not shown on all bristles); e, right limb, lateral view. Seventh limb: f, left limb (numbers next to bristles indicate number of bells); g, tip of right limb; h, tip of left limb. Furca: i, left lamella and genitals. Anterior: j, combined medial eye and rod-shaped organ; k, profile showing left 1st antenna, medial eye and rod-shaped organ, anterior process, and upper lip, right mandible, tip of 2nd joint of 5th limb (stippled). Female, USNM 125835, length 1.35 mm, furca: l, claw I on right lamella, lateral view. Female, USNM 127517, length 1.44 mm, posterior section: m, furca (right lamella cross-hatched), left genitalia and brushlike organ; n, detail of genitalia and brushlike organ shown in "m." Female, USNM 128963, length 1.40 mm, carapace: o, complete carapace with body removed. (Same magnification in microns: a,g,h; b-f,j; i,k,l,n.)

(medial surface not observed); 2nd joint spinous with 1 dorsal and 1 lateral bristle; 3rd joint short with 3 bristles; 1 ventral, 2 dorsal; 4th joint spinous with 4 bristles, 3 ventral, 1 dorsal; 5th joint small, bearing sensory bristle with broad filamentous base and slender distal part bearing several filaments (tip broken on both limbs of USNM 139288); 6th joint spinous with 1 dorsal bristle. Seventh joint: a-bristle with marginal spines and slightly longer than bristle on 6th joint; b-bristle with 4 marginal filaments excluding tip, and only slightly longer and stouter than a-bristle; c-bristle not reflexed, about same length as stem and with 9 marginal filaments excluding tip, some filaments with few marginal teeth. Eighth joint: d- and e-bristles bare, about twice length of b-bristle; f-bristle about twice length of b-bristle and with 7 marginal filaments excluding tip; g-bristle almost

as long as c-bristle and with about 6 marginal filaments excluding tip.

Second antenna (Figure 240e): Protopodite triangular, bare. Endopodite 3-jointed: 1st joint short with 4 bristles; 2nd joint elongate with 3 ventral bristles near middle; 3rd joint reflexed, with 2 bristles near ridged tip. Exopodite: 2nd joint about four-fifths length of 3rd joint; 1st joint with short medial spine; bristle on 2nd joint with few marginal spines or hairs; bristles on joints 3–9 with natatory hairs; 9th joint with 5 bristles, 3 long, 2 short; joints 2 to 8 with short spines forming row along distal margin.

Mandible (Figure 240f): Coxale endite reduced (small bristle near base may be present, but not seen with certainty). Basale: medial surface with 4 short proximal bristles (none pectinate) and 1 slightly longer bristle near middle; 4 or 5 long

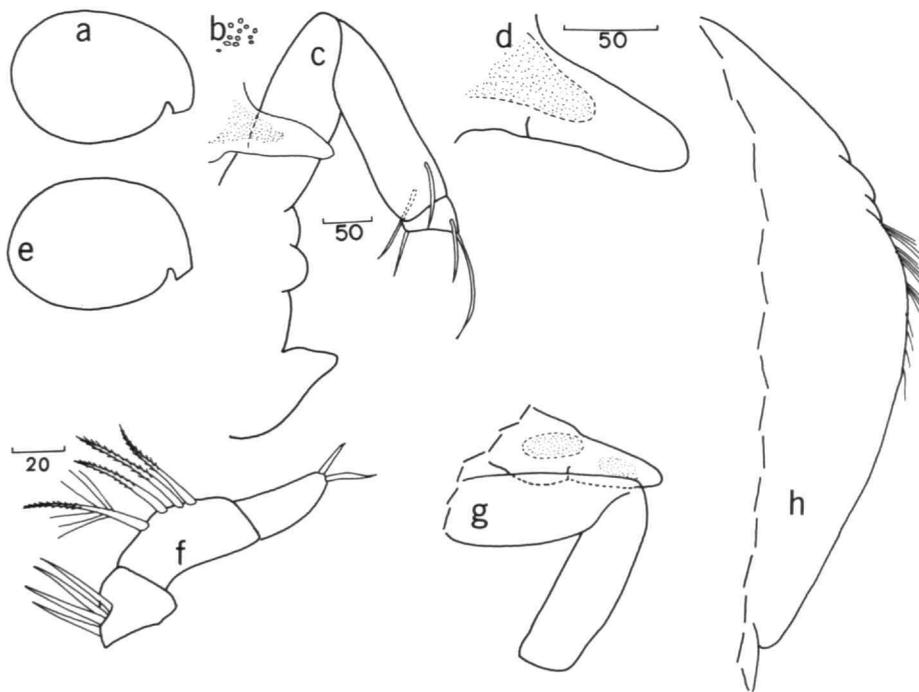


FIGURE 239.—*Igene walleni*, female, USNM 125835, length 1.35 mm, carapace: a, complete specimen, lateral view; b, sketch of central muscle scars on left valve, lateral view. Body: c, anterior showing part of left 1st antenna, medial eye and rod-shaped organ, anterior process, and upper lip; d, detail of medial eye and rod-shaped organ shown in "c." N-1 male, USNM 125836, length 1.42 mm, carapace: e, complete specimen, lateral view. Appendages: f, endopodite of left 2nd antenna, medial view; g, part of right 1st antenna, medial eye and rod-shaped organ; h, posterior, anterior to left. (Same magnification in microns: c,g.)

spinous bristles present near or on ventral margin; dorsal margin with 3 bristles, 1 distal to middle, 2 subterminal; lateral and medial surfaces with spines and long hairs. Exopodite and 1st endopodite joint

similar to those on adult female. Dorsal margin of 2nd endopodite joint with bristles forming 2 groups, proximal group with 2 bristles, distal group with 6; ventral margin with bristles forming 2



FIGURE 240.—*Igene walleni*, male, USNM 139288, length 130 mm, carapace: *a*, complete specimen, lateral view; *b*, anterior of left valve, medial view. Appendages: *c*, left 1st antenna, medial view; *d*, detail of tip of 1st antenna shown in "c"; *e*, endopodite and parts of protopodite and exopodite right 2nd antenna, medial view; *f*, coxale and basale of left mandible, lateral view; *g*, tip of 5th limb; *h*, right lamella of furca; *i*, anterior showing proximal eye and rod-shaped organ, anterior process, and upper lip; *j*, copulatory organs, ventral view, anterior toward bottom; *k*, detail of tip of copulatory organ. N-1 male, USNM 139289, length 1.09 mm, carapace: *l*, complete specimen, lateral view; *m*, sketch of central muscle scars on right valve, lateral view. (Same magnification in microns: *b,c,e,h-j*; *d,g,k*.)

groups, subterminal group with 2 bristles, terminal group with 3; medial surface and ventral margin with spines forming clusters. End joint similar to that on adult female, small dorsal claw with spines along ventral margin.

Maxilla: Limb reduced; endopodite with only 3 6-bristles; bristles of end joint spinous, none pectinate, otherwise limb similar to that on adult female.

Fifth limb (Figure 240g): Limb reduced. Epipodial appendage with 38 bristles; 1st endite with about 5 spinous bristles; 2nd endite with about 4 spinous bristles; 3rd endite with about 7 spinous bristles. Exopodite: 1st and 2nd joints each with 1 large flat tooth and 2 or 3 smaller teeth and bristles; 3rd joint with 3 spinous bristles on inner lobe and 2 stout plumose bristles on outer lobe; 4th plus 5th joints with 5 spinous bristles.

Sixth limb: Slightly smaller than same limb on adult female; 1st endite with 3 bristles; 2nd endite with 2 to 4 bristles; 3rd endite with 5 or 6 bristles; 4th endite with 4 bristles; end joint with 5 or 6 bristles.

Seventh limb: Absent.

Furca (Figure 240h): Each lamella with 8 claws, claws decreasing in length posteriorly along lamella; claws 1 to 4 with lateral and medial teeth forming rows along posterior margins; no large medial tooth present near middle of claw 1; spines present along part of anterior margin of each claw and following claws.

Eyes and rod-shaped organ (Figure 240i): Lateral eyes absent. Medial eye and rod-shaped organ similar to those on adult female.

Copulatory organ (Figure 240j,k): Clasping organ elongate, with terminal lobes and hook-shaped process; several short bristles on lobes.

DESCRIPTION OF N-1 MALE (USNM 125836).—Carapace similar in shape to that of adult female. Size: length 1.35 mm, height 0.93 mm.

First antenna, mandible, maxilla, fifth and sixth limbs: Similar to those on adult female.

Second antenna: Protopodite and exopodite similar to those on adult female. Endopodite 3-jointed: 1st joint with 4 bristles; 2nd joint with 4 spinous bristles (proximal of these with long spines near middle); 3rd joint with 2 short terminal bristles.

Seventh limb: None present.

Rod-shaped organ: Similar to that on adult female.

Furca: Each lamella with 7 claws, otherwise similar to that on adult female.

Posterior: Slender spines present forming clusters near middle.

Lateral eyes: Absent.

Copulatory limb: Not developed.

REMARKS.—The carapace of this specimen is slightly larger than that of an adult male described herein from a different station. The 1st antenna and 5th limb were normal for an N-1 instar in the Philomedidae, indicating that the large size of the carapace is not caused by a delay in sexual maturity, as suggested by Kornicker (in Bowman and Kornicker, 1967) for large juvenile males of *Parasterope pollex* Kornicker, 1967. The 2nd joint of the endopodite of the 2nd antenna of the N-1 male bears 4 ventral bristles, whereas, the adult male bears only 3 bristles in that position. I tentatively attribute the above differences to variability within the species.

DESCRIPTION OF N-1 MALE (USNM 139289).—Carapace similar to N-1 male USNM 125836 except smaller (Figure 240l,m): Size: length 1.09 mm, height 0.72 mm.

First antenna, mandible, maxilla, fifth and sixth limbs, furca: Not examined in detail but similar to those on USNM 125836.

Second antenna: Protopodite and exopodite similar to those on USNM 125836. Endopodite also similar except for having only 3 bristles each on the 1st and 2nd joints.

Seventh limb and lateral eyes: Absent.

Rod-shaped organ and medial eye: Same as those on USNM 125836.

REMARKS.—This specimen is considered an N-1 instar, because it is the proper size relative to the adult male described herein from the same station, and because of the development of the endopodite of the 2nd antenna. The smaller size of the carapace compared to N-1 male USNM 125836 from a different station is tentatively attributed to intra-specific variability.

DISTRIBUTION.—This species has been collected in Antarctic and Subantarctic-to-35°S regions (38°S to 60°S) at abyssal depths (3702–4303 m) (Figure 185).

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