Ostracoda (Myodocopina) of the SE Australian Continental Slope, Part 3

LOUIS S. KORNICKER
and
GARY C.B. POORE

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY · NUMBER 573

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SMITHSONIAN INSTITUTION PRESS
Washington, D.C.
1996

ABSTRACT

Kornicker, Louis S., and Gary C.B. Poore. Ostracoda (Myodocopina) of the SE Australian Continental Slope, Part 3. *Smithsonian Contributions to Zoology*, number 573, 186 pages, 102 figures, 17 tables, 1996.—Thirty-four species (31 new and one left in open nomenclature) of benthic Myodocopina in 16 genera (one new) collected at depths of 204–2900 m on the SE Australian continental slope under the auspices of the Museum of Victoria and Victorian Institute of Marine Sciences, Australia, are described and illustrated. Including species in Parts 1–3, six are parasitized by Isopoda and 12 by Copepoda, and a few specimens have foraminiferans and bryozoans attached to the outer side of the carapaces. The relationship between eye development and water depth in the Myodocopina is discussed; in the collection from Australia about 72% of the species at bathyal depths (201–2000 m) and 25% at abyssal depths (2001+ m) have lateral eyes. Predators are more abundant in the upper part of the bathyal zone (201–500 m) than in deeper waters. Diversity is higher on the Australian slope than in other geographic areas where diversity is known, and it is highest in the upper part of the bathyal zone.

OFFICIAL PUBLICATION DATE is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, *Smithsonian Year*. SERIES COVER DESIGN: The coral *Montastrea cavernosa* (Linnaeus).

Library of Congress Cataloging-in-Publication Data
(Revised for vol. 3)
Kornicker, Louis S., 1919– .
Ostracoda (Myodocopina) of the SE Australian Continental Slope.
(Smithsonian contributions to zoology ; no. 553, Pt. 3: also by Gary C. B. Poore.
Includes bibliographical references.
1. Myodocopida—Australia, Southeastern. 2. Myodocopida—Australia, Southeastern—Classification. I. Poore, Gary C. B. II. Title. III. Series.
QL1.S54 no. 553 591 s 595.3'3 93-38048 [QL444.085]

♾ The paper used in this publication meets the minimum requirements of the American National Standard for Permanence of Paper for Printed Library Materials Z39.48—1984.

Contents

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Introduction

Parts 1 (Kornicker, 1994) and 2 (Kornicker, 1995) reported on 55 species of Ostracoda in the suborder Myodocopina collected on the SE Australian continental slope in the Tasman Sea between Nowra, near Sydney, New South Wales (35°S), in the north, and the central eastern coast of Tasmania (42°S), in the south. Part 3 reports on 34 more species in the Cypridinidae and Cylindroleberididae and completes the study (Appendix 1). Kornicker (1992b:233) also has reported on a single species of Halocyprida (Thaumatocyprididae) from the same region. The locality of previous studies of SE Australia and a list of Myodocopina were presented in Kornicker (1975a, figs. 3, 30); and DeDeckker and Jones (1978).

Taxonomic descriptions are solely the work of the senior author and the classification analysis of distributions (Figures 1, 2) is solely that of the junior author.

STATIONS.—The sedimentology and hydrology of the area, as far as they are known, were summarized by Poore et al. (1994). These authors also detailed the field and laboratory sampling methods used to obtain the material for taxonomic study and presented an analysis of the diversity and distribution of the rich fauna of Crustacea Isopoda. The stations sampled were on four short transects perpendicular to the shore: Slopes 1–18 and Slopes 50–64 off Nowra, southern New South Wales (NSW); Slopes 19–22 off Eden, southern NSW; Slopes 23–41 and Slopes 65–72 off eastern Victoria in Bass Strait; and Slopes 42–49 and Slopes 73–85 off Freycinet Peninsula, eastern Tasmania. Localities of those stations from which ostracodes have been identified are listed in Appendices 1 and 2.

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SAMPLING.—A three-quarter size WHOI epibenthic sled (opening 600 mm) with 1-mm-mesh net was used for most samples. The sediment retained was washed through a 200 µm sieve on board ship with sea-water. The same procedure was used for sediment accidentally captured by a 5-m otter trawl (Slope-5) and an Isaac-Kidd midwater trawl that hit the seafloor (Slope-85). Not all samples taken in the course of the two cruises have been processed for ostracodes. All specimens of the Philomedidae and Rutidermatidae were identified and removed from samples; except for the sample from Slope 40 in which sarsiellids and cylindroleberids are abundant, most specimens of Sarsiellidae and Cylindroleberididae were identified and removed from samples; relatively few specimens of Cypridinidae (especially those of the genera *Metavargula* and *Paradoloria*) were removed from samples in which they were abundant; many juveniles that could not be identified readily with certainty have been excluded from the study. Almost all descriptions are based on ovigerous females.

DISPOSITION OF SPECIMENS.—All holotypes have been deposited in the Museum of Victoria. Some paratypes have been deposited at the National Museum of Natural History, Smithsonian Institution; these have been assigned USNM catalog numbers. All other identified specimens, as well as unidentified specimens, have been returned to the Museum of Victoria. Most holotypes have been placed in vials of alcohol.

ABBREVIATIONS.—In the figures, Arabic numerals indicate limbs 1–7, as well as individual joints of each limb (the location of the numeral indicating whether a limb or joint is indicated). Roman numerals indicate the endites. Arrows on illustrations indicate anterior of specimen.

The following abbreviations are used in illustrations and legends.

am	central adductor muscle attachments
ant	antenna

ap	anterior process
av	anterior view
bas	basale
Bo	Bellonci organ
co	copulatory organ
cx	coxale
dv	dorsal view
end	endopodite
epip	epipodite
ex	exopodite
fu	furca
go	genital organ
gird	girdle
hrt	heart
im	inner margin of infold
iv	inside view
le	lateral eye
ll	lower lip
lp	lamellar prolongation of selvage
lv	lateral view
me	medial eye
mnd	mandible
mv	medial view
nabs	not all bristles shown
ov	outside view
p	parasite
precx	precoxale
prot	protopodite
pv	posterior view
sens	sensory bristle of 5th joint of 1st antenna
t	testis
ul	upper lip
vv	ventral view
Y-scl	Y-sclerite

CLASSIFICATION ANALYSIS.—The matrix of stations by species was treated to classification analysis using the programs in the PATN package (Belbin, 1993). The number of stations containing ostracodes was reduced from 30 to 22 by omitting all with only one species (those whose similarities could not be calculated). The Kulcynski dissimilarity measure was chosen because it neglects uninformative cojoint absences (only 8.5% of all possible cells in the reduced matrix were filled) and because it has proved effective with data on isopods from the same stations. Presence/absence data were used in preference to quantitative data because our counts were not indicative of density. UPGMA sorting strategy was used with $\beta = -0.25$. The same method was used to classify stations and species. A two-way table of stations by species, rearranged into the classes determined by the classifications, was generated and manipulated by reallocating some species. Poore et al. (1994) have provided more justification for the method chosen.

ACKNOWLEDGMENTS.—This project is part of a wide-ranging exploration of the continental slope of south-eastern Australia by the Museum of Victoria and has been supported by grants from the Australian Marine Science and Technologies Grants Scheme, an Australian Research Council grant, and by the Victorian Institute of Marine Sciences. We thank all for their assistance. We are grateful to the ORV *Franklin* Steering Committee and to CSIRO Marine Laboratories, Hobart, for the provision of ship-time and to the master and crew of the vessel for help on board. Many thanks also to our colleagues in the field: Martin Gomon, Jean Just, Laurie Hammond, C.C. Lu, Tim Stranks, and Robin Wilson. We are especially grateful to Jean Just who patiently sorted all the ostracodes from the samples and to Brian Cohen who carried out the PATN analysis.

We are grateful to several people who assisted in preparation of this paper: The final drawings were inked by either Jack Schroeder, Jack Schroeder Associates, Molly Ryan, Smithsonian Institution, or Melanie Coburn (volunteer); Elizabeth Harrison-Nelson prepared the "Literature Cited" section, cataloged specimens, and helped in many other tasks. We thank V.G. Chavtur and K.G. McKenzie for criticizing the manuscript. We also thank Jack Korytowski, Smithsonian Institution Press, for editing and preparing the manuscript.

Vertical and Geographical Distribution

Throughout this discussion stations are referred to by a prefix denoting transect and suffix indicating depth in meters.

Of the 89 species identified from 30 stations about half (44) occurred at only one station, a further quarter (23) occurred at two stations, and the remaining 22 were found at no more than seven stations. This sort of species-frequency distribution is similar to that discovered for the Isopoda by Poore et al. (1994) where 334 species were reported from 46 stations from the same region.

The results of the classification of 22 stations and 89 species can best be interpreted in terms of six station-groups, A–F (Figure 1), and nine species-groups, 1–9. The intersection of the normal (station) and reordered inverse (species) classifications is presented as a two-way table (Table 1). The primary divisions of stations and of species is on depth, i.e., between stations and species from shallow environments (200–800 m, station-groups A–C, species-groups 1–5); those from intermediate depths (800–1000 m, station-group D, species-group 7); and those from deep environments (1000–2900 m, station-groups E–F, species-groups 8–9). Species-group 6 consisted of species from a wide depth range. Divisions between transects were secondary. The differentiation on the basis of depth is clearly illustrated in Figure 2 where the station-groups are superimposed on latitudinal and depth axes and the groups delimited by contours.

Station-group A was composed of four stations from depths

TABLE 1.—Two-way table of stations, reordered into six station-groups (A to F) by species of myodocopid ostracodes, grouped into nine species-groups. The relation- ships between the stations are shown in Figure 1. The headings (Transect, Depth) in this table are to be read vertically, e.g., the first vertical heading is NSW-204. (NSW = New South Wales, off Nowra; TAS = Tasmania, off Freycinet Peninsula; EDEN = New South Wales, off Eden; BS = Bass Strait, off eastern Victoria; * = species presence.)

	Station-groups:	A . B . C . D . E . F
Stations:	Transect:	.NTEE.EBNT.BTT.BBB.TBBBB.NNB.
		.SADD.DSSA.SAA.SSS.ASSSS.SSS.
		.WSEE.E WS. SS. .S .WW .
		. NN.N . . . . ..
	Depth:	. . . . 1.11111. 22..
		.2423.5445.678.890.25288.929.
		.0026.2020.020.030.60745.950.
		.4003.0090.000.000.40700.600.
Species-group 1		
Pleoschisma pseudoferox		.* . . . . . .
Chelicopia triplex		.* . . . . . .
Dantya tryx		.* . . . . . .
Nealella lux		.* . . . . . .
Parasarsiella poorei		.* . . . . . .
Metaschisma nex		.* . . . . . .
Leuroleberis mackenziei		.* . . . . . .
Harbansus vatrax		.* . . . . . .
Spinacopia crux		.* . . . . . .
Spinacopia trox		.* . . . . . .
Species-group 2		
Scleraner trifax		.****. . . . . .
Pleoschisma pnyx		.* **.* . . . . .
Asteropterygion magnum		.* **. . . . . .
Pterocypridina appendix		. **. . . . . .
Synasterope solox		. **. . . . . .
Pleoschisma mindax		. * . . . . . .
Euphilomedes ernyx		. * . . . . . .
Rheina relax		. * . . . . . .

TABLE 1.—Continued.

Stations:	Station-groups: / Transect: / Depth:	A . B . C . D . E . F .NTEE.EBNT.BTT.BBB.TBBBB.NNB. .SADD.DSSA.SAA.SSS.ASSSS.SSS. .WSEE.E WS. SS. .S .WW . . NN.N . . . . 1.11111. 22.. .2423.5445.678.890.25288.929. .0026.2020.020.030.60745.950. .4003.0090.000.000.40700.600.
Species-group 3		
Vargula vertex		. *. . . . . .
Harbansus vortex		. *. . . . . .
Spinacopia illex		. *. . . . . .
Cymbicopia climax		. *. . . . . .
Alphasarsiella anax		. *. . . . . .
Skogsbergia tenax		. *. . . . . .
Domromeus merx		. *. . . . . .
Species-group 4		
Vargula trifax		.* *. ** . . . . .
Chelicopia pertinex		.* *. * . . . . .
Spinacopia sandix		.* *. . . . . .
Eusarsiella fallomagna		.* . ** . . . . .
Harbansus felix		.* . * . . . . .
Archasterope efficax		.** . * . . . . .
Eusarsiella edax		. *.*** . . . . .
Cymbicopia cervix		. *. * . . . . .
Neomuelleriella nex		. *. * . . . . .
Parasterope physinx		. *. * . . . . .
Vargula vix		. . * . . . . .
Harbansus tenax		. . * . . . . .
Spinacopia syrinx		. . * . . . . .
Alphasarsiella altrix		. . * . . . . .
Skogsbergia vivax		. . * . . . . .

TABLE 1.—Continued.

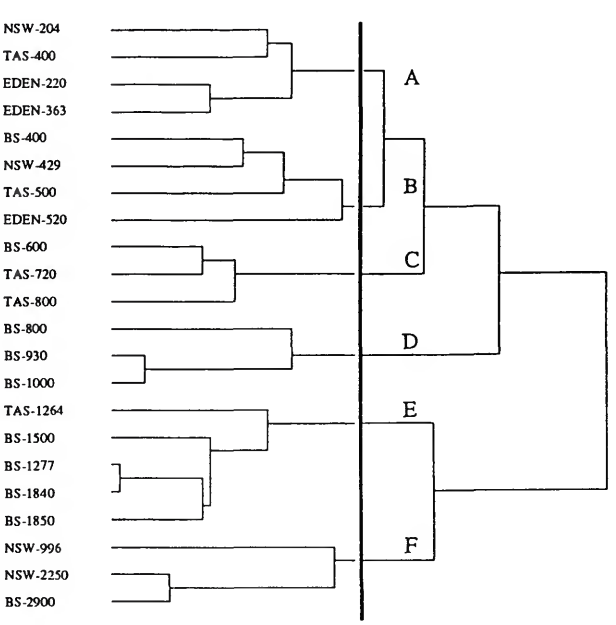
	Station-groups:	A . B . C . D . E . F
Stations:	Transect:	.NTEE.EBNT.BTT.BBB.TBBBB.NNB.
		.SADD.DSSA.SAA.SSS.ASSSS.SSS.
		.WSEE.E WS. SS. .S .WW .
		. NN.N . . . . ..
	Depth:	. . . . 1.11111. 22..
		.2423.5445.678.890.25288.929.
		.0026.2020.020.030.60745.950.
		.4003.0090.000.000.40700.600.
Species-group 5		
Eusarsiella bex		. .* * . * . . . .
Metavargula apex		. . * . * . . . .
Metavargula currax		. . . * . . . .
Paradoloria pugnax		. . . * . . . .
Philomedes fortax		. . . * . . . .
Vargula stranx		. . .** . . . .
Xenoleberis bex		. . .* . . . .
Scleroconcha solox		. . * .***. .* . .
Species-group 6		
Eusarsiella iayx		. * *. ***. * . . . .
Parasterope whatleyi		. . *. . . . .
Vargula rapax		. * . . . . . .
Pterocypridina pax		. . * . . . . .
Paradoloria sp. A		. . . * . . . .
Neomuelleriella klomax		. .* . . . . .
Cypridinodes wyvillethomsoni		.* .* . . . . .
Pterocypridina tressleri		. .* . *. . . .
Vargula dentata		. . . .* . .* .
Philomedes thorax		. . . .* . . .
Archasterope altrix		. . . .* . . .
Philomedes pseudolofthousae		. . . . . * . * .
Isocypridina fallax		. . . . . . * .
Paradoloria fax		. * . . . . * . ** .
Xandarasterope storthynx		. . . . . . ** .

TABLE 1.—Continued.

Stations:	Station-groups: / Transect: / Depth:	A . B . C . D . E . F
		.NTEE.EBNT.BTT.BBB.TBBBB.NNB.
		.SADD.DSSA.SAA.SSS.ASSSS.SSS.
		.WSEE.E WS. SS. .S .WW .
		. NN.N . . . . ..
		. . . . 1.11111. 22..
		.2423.5445.678.890.25288.929.
		.0026.2020.020.030.60745.950.
		.4003.0090.000.000.40700.600.
Species-group 7		
Pseudodoloria plax		. . * . . *. . .
Metavargula spadix		. . . . *.* . .
Homasterope trebax		. . . .***. . .
Vargula fugax		. . . . *. .* .
Philomedes ptyx		. . . . *. * . .
Azygocypridina lowryi		.* . . . *. . .
Vargula hex		. . *. . **. . .
Parasterope lux		. . . . *. . .
Metavargula calix		. . . . *. . .
Archasterope verax		. . . .* *.* . .
Metavargula procax		. . . . **. . .
Paradoloria mordax		. . . . *. . .
Species-group 8		
Philomedes sphynx		. . . . . *. .
Spinacopia rex		. . . . *.***** . .
Bathyleberis babax		. . . . .** . .
Skogsbergiella senex		. . . . . * **. .
Xandarasterope trux		. . . . . *** . .
Parasterope sequax		. . . . . ** . .
Paradoloria tryx		. . . . . ** . .
Vargula matrix		. . . . . ** . .

TABLE 1.—Continued.

	Station-groups:	A . B . C . D . E . F
Stations:	Transect:	.NTEE.EBNT.BTT.BBB.TBBBB.NNB.
		.SADD.DSSA.SAA.SSS.ASSSS.SSS.
		.WSEE.E WS. SS. .S .WW .
		. NN.N . . . . ..
	Depth:	. . . . 1.11111. 22..
		.2423.5445.678.890.25288.929.
		.0026.2020.020.030.60745.950.
		.4003.0090.000.000.40700.600.
Species-group 9		
Vargula psydrax		. . * . . .* ***.** .
Harbansus hapax		. . * . . . .* .
Archasterope apex		. . . . . .* .
Pseudophilomedes fornix		. . . . . .* .
Macroasteropteron mindax		. . . . . .* .
Igene illex		. . . . . .* .



less than 400 m. All shared the presence of *Scleraner trifax*, and three shared *Pleoschisma pnyx* and *Asteropterygion magnum*. Species-groups 1–3 were confined to this station-group (with one minor exception) and some from species-group 4 were shared with some stations of station-group B. Few species from other groups occurred here. Species-group 1 (10 species of which six were sarsiellids) occurred only at NSW-204 (Slope 1); species of species-groups 2 and 3 (15 species) were variously confined to stations in group A. Station EDEN-363 (Slope 22) was notable for having seven species found nowhere else (species-group 3).

Station-group B covered marginally deeper waters than station-group A (400–520 m); it was distinguished by the absence of 25 species found only in station-group A (mostly from species-groups 1–3) and the exclusive presence of five species in species-group 4. *Eusarsiella* species were well represented at station-group B.

FIGURE 1.—Classification of 22 benthic samples from the slope of SE Australia achieved using the PATN program using presence/absence data on 89 species of myodocopid ostracodes. The 6 station-groups, A to F, are labeled.

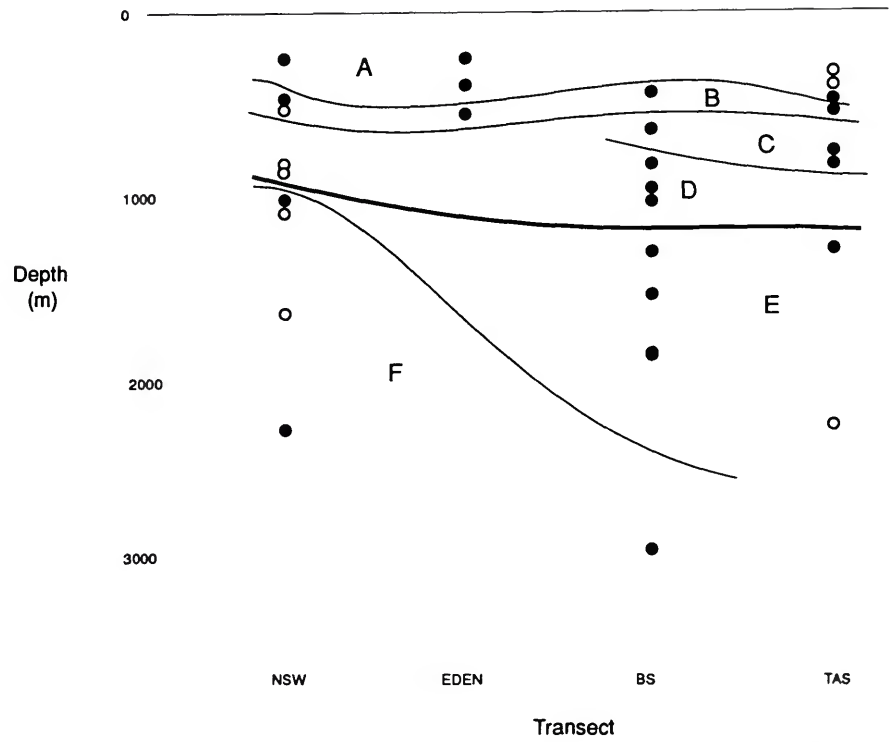


FIGURE 2.—Two-dimensional representation of the depth and latitudinal position of the 30 benthic stations from the slope of SE Australia. The 22 stations used in the classification are solid circles; open circles are stations with 1 species only and were not used in the classification. The contours indicate the similarities to the 6 station-groups, A to F, obtained from the classification and whose relationships are shown in Figure 1.

Station-group C included three stations from the two southern transects in the depth range 600–800 m, and it shared the presence of only *Scleroconcha solox*. Species-group 5 (eight species, mostly cypridinids) were largely confined to station-group C; but two occurred at NSW-429 (Slope 56) and one at NSW-429 and EDEN-520 (Slope 19). Of this group, station TAS-720 (Slope 46) was the richest in species.

Station-group D was composed of three stations on the Bass Strait transect at BS-800 (Slope 34), BS-930 (Slope 33), and BS1000 (Slope 32) that shared only *Homasterope trebax*. Twelve species (eight cypridinids) of species-group 7 occurred at station BS-1000 (Slope 32), and were variously distributed elsewhere. Only three species occurred at shallower locations, *Azygocypridina lowryi* being anomalous in also being taken at NSW-204 (Slope 1). Four species of species-group 7 were found also at deeper stations.

Five stations between 1264 and 1850 m, four from Bass Strait and one from Tasmania, comprised station-group E. Species-group 8 (eight species) and *Vargula psydrax* from species-group 9 were characteristic. *Spinacopia rex* was shared by all stations.

The deepest stations from the NSW and BS transects, NSW-996 (Slope 53), NSW-2250 (Slope 17), and BS-2900 (Slope 66), comprised station-group F. Five of 12 species present here were shared with stations from similar depths on more southerly transects: *Vargula dentata, V. fugax, V. psydrax, Paradoloria fax,* and *Philomedes pseudolofthousae*. Species in species-group 6 were at the deeper stations, and those in species-group 9 tended to be confined to around 1000 m depth.

There were real differences between depths and between transects but, because sampling was uneven and was less successful at greater depths, this conclusion should be treated cautiously. However, it can be said that numbers of species per sample was much higher at shallower depths, attaining 21 species in station NSW-204 (Slope-1) (Table 2). There is a clear change in composition of ostracode species with increasing depth as well as a decrease in the number of species (Tables 3, 4). The Rutidermatidae, which are predators (Kornicker, 1975:38), and the Cyclasteropinae, which are scavengers and filter feeders, are represented only in the upper part of the bathyal zone (200–500 m) (Table 3). The Sarsiellidae, predators, are diverse (20 species) in the upper part of the bathyal zone, are represented by five species between depths of 500 and 1000 m, but have only one species below this (Table 3). The Cypridininae, which contain predators, scaven-

TABLE 2.—Number of species of Myodocopina in each sample of Australian collection at discrete depths (* = trawl, other samples collected with WHOI epibenthic sled).

Slope number	Depth (m)			
	Bathyal			Abyssal
	201–500	501–1000	1001–2000	2001–3000
1	21	-	-	-
2	-	1	-	-
5*	-	1	-	-
6	-	1	-	-
7	-	-	1	-
17	-	-	-	3
19	-	6	-	-
21	9	-	-	-
22	20	-	-	-
25	-	-	4	-
27	-	-	6	-
32	-	13	-	-
33	-	3	-	-
34	-	5	-	-
39	-	3	-	-
40	16	-	-	-
45	-	2	-	-
46	-	9	-	-
47	3	-	-	-
48	1	-	-	-
49	2	-	-	-
53	-	8	-	-
55	-	-	1	-
56	10	-	-	-
66	-	-	-	4
67	-	-	6	-
69	-	-	8	-
81	-	-	6	-
82	-	-	1	-
85*	1	-	-	-
Total sled samples	9	11	8	2
Avg. no. species per sled sample	10.3	5.1	4.1	3.5
Range of no. of species	1–21	1–13	1–8	2–4
Max. no. species per sled sample	21	13	8	4

gers, and detritus feeders, and the Philomedidae, which are detritus feeders, are more diverse in the upper half of the bathyal zone (200–1000 m) than deeper (Table 3). The Cylindroleberidinae, scavengers and filter feeders, are fairly uniformly distributed with depth, and the Asteropteroninae, filter feeders, are represented only in the bathyal zone (Table 3).

Only two samples with benthic Myodocopina were collected at abyssal depths (greater than 2000 m), and they contained only members of the Cypridinidae (3 species), Philomedinae (1 species), and Cylindroleberidinae (1 species) (Table 3). Only 48 species have been reported previously from abyssal depths (Kornicker, 1989, table 4; 1992a, table 1). The five additional species in the Australian collection are *Isocypridina fallax, Paradoloria fax, Vargula psydrax, Philomedes pseudolofthousae*, and *Xandarasterope storthynx*. *Xandarasterope* is a new genus known only from bathyal and abyssal depths.

The most noticeable differences between transects were at the most shallow depths (less than 500 m) and at the deepest (more than 1000 m). The spread of stations at intermediate depths was too uneven to draw similar conclusions for the upper bathyal region. There was a suite of 30 species (of 42 present) at shallow-water stations on the two most northerly transects (species-groups 1–3 in Table 1) whose distributions did not extend further south. The converse, southern species not extending north, was not so frequent. This supports the view that the fauna of the upper slope off NSW differs from that of the upper slope off Bass Strait and Tasmania.

Two samples, NSW-204 (Slope 1) with 21 species and EDEN-363 (Slope 22) with 20 species, have many more species than previously reported in individual samples from any other area (Kornicker, 1977, fig. 3; 1989, table 1) (Table 2). Station BS-400 (Slope 40) also possessed a rich ostracode fauna (16 species, most in species-group 4 in Table 1). Station BS-400 (Slope 40) is notable also for an exceptionally rich fauna of aplacophoran molluscs (Scheltema, 1990) and of isopod crustaceans (Poore et al., 1994).

In deep water the transects were less well differentiated, mostly because the numbers of stations and species were fewer. A small group of species (five in species-group 7 and two in species-group 6) was found exclusively on the deeper Bass Strait transect. One station from deep water (BS-1000, Slope 32), with 13 species, was richer in species than any at similar depths on the NSW or Tasmania transects, although the numbers of samples was too low to test for significance. A similar phenomenon was found with the Isopoda: there were more species at depth in Bass Strait than elsewhere.

Overall, the south-eastern Australian slope has more than four times the number of species reported by Kornicker (1975; 1977, table 1) from bathyal depths in the Antarctic and Subantarctic regions (Table 5).

The numbers of species reported from various depths in different geographical areas (Table 6) support the conclusion that the Myodocopina of the south-eastern Australian slope are highly rich in species compared to other areas. Similar conclusions were reached for aplacophoran molluscs (Scheltema, 1991) and isopod crustaceans (Poore and Wilson, 1993; Poore et al., 1994) and are suspected for amphipod crustaceans.

The dominance of coarse, poorly sorted biogenic substrates that are spatially complex on the southern coast of Australia, in contrast to the better-sorted, glacially and terrestrially derived sediments of the continental slopes of other continents, may in part provide some explanation for the high diversity of myodocopid ostracodes and other small invertebrates. The ostracodes were collected on many different substrates (Table 7).

Parasites and Epizoa

Choniostomatid copepods (Family Choniostomatidae) and cryptoniscid isopods (Family Cyproniscidae) parasitize

TABLE 3.—Number of species in families and subfamilies at discrete depths in Australian collection.

Taxon	Depth (m)				
	Bathyal			Abyssal	
	201–500	501–1000	1001–2000	2001–3000	All depths
CYPRIDINIDAE	16	18	6	3	30
CYPRIDININAE	15	17	6	2	28
AZYGOCYPRIDININAE	1	1	0	1	2
PHILOMEDIDAE	10	7	4	1	17
PHILOMEDINAE	5	6	4	1	11
PSEUDOPHILOMEDINAE	5	1	0	0	6
RUTIDERMATIDAE	2	0	0	0	2
SARSIELLIDAE	20	5	1	0	21
SARSIELLINAE	18	5	1	0	19
DANTYINAE	2	0	0	0	2
CYLINDROLEBERIDIDAE	7	7	5	1	19
CYLINDROLEBERIDINAE	5	6	5	1	16
CYCLASTEROPINAE	1	0	0	0	1
ASTEROPTERONINAE	1	1	0	0	2
Total species	55	37	16	5	89

Myodocopina (Kornicker, 1975:52, 1989:12; Bradford, 1975, 1980:142; Strömberg, 1983:87). Copepods have been reported parasitizing all five families of Myodocopina, but isopods are not yet known from the Sarsiellidae and Rutidermatidae. On the Australian slope, 12 species were observed to be parasitized by copepods and six species by isopods (Table 8). This differs from the proportions found in the Bay of Biscay and vicinity where three species were parasitized by copepods and four by isopods (Kornicker, 1989, table 6), but it is similar to that reported from southern oceans (Antarctica to 35°S) where 17 species were parasitized by copepods and five by isopods (Kornicker, 1975:52). Bowman and Kornicker (1967:5) suggested that the 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, and that the presence of the copepod inhibits the production of eggs by the ostracode. The evidence for the latter part of the hypothesis was the sparsity of copepods in ovigerous females of *Parasterope pollex* Kornicker, 1967, in Cape Cod Bay, Massachusetts (Table 9). The relative sparsity of copepods in ovigerous myodocopids collected in southern oceans (Antarctica to 35°S) supported the hypothesis (Kornicker, 1975:56) (Table 9). The presence on the Australian slope of copepods in 10 adult nonovigerous female myodocopids and in only one ovigerous female also supports the hypothesis (Table 9).

A foraminiferan is present on the outside of the carapace of one specimen of *Eusarsiella bex*, and bryozoans are present on one specimen of *Eusarsiella fallomagna* and one specimen of *Parasarsiella poorei* (Kornicker, 1994). A foraminiferan was reported previously by Baker (1977:43) attached to the carapace of *Eusarsiella pseudospinosa* (Baker, 1977) from off southern California.

A parasitic nematode was present in an adult female *Xandarasterope storthynx*. Kornicker (1975:57) reported four species parasitized by nematodes off New Zealand and South Africa.

Relationship between Eye Development and Water Depth

The relationship between development of lateral eyes and water depth has been discussed by Kornicker (1975:42, 1989:9, 1992a:4). In the collection from Australia, lateral eyes are possessed by about 72% of the species at bathyal depths (201–2000 m) and one of four (25%) at abyssal depths (2001+ m) (Appendix 3). The changes with depth of the percentage of species with lateral eyes differ among the Cypridinini, Cylindroleberidinae, Sarsiellidae, and Philomedidae (Table 10), so that the percent of eye-bearing species in a community depends to a large extent on its familial composition.

Kornicker (1992a, fig. 2) presented a curve showing the approximate relationship between myodocopid species with lateral eyes at different depths worldwide. That curve, modified by inclusion of the Australian data, is presented in Figure 3. The main modifications in the curve by inclusion of the Australian data are that the percentage of species with lateral eyes changes from 50% to 58% at a depth of 750 m, and from

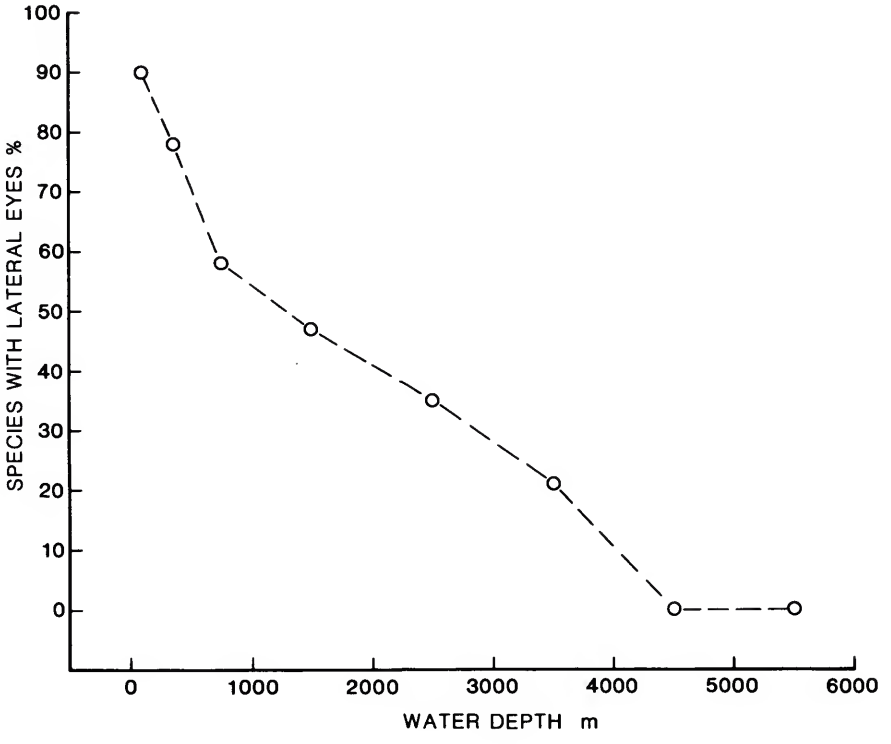


FIGURE 3.—Relationship between percentage of myodocopid species and lateral eyes at discrete depths, worldwide.

44% to 47% at a depth of 1500 m (Table 11).

The known maximum depth of eye-bearing species varies with taxon (Kornicker, 1992a:6): The maximum depths for the Cypridinini (3775 m) and Philomedidae (3480 m) are well below the maximum depth (2900 m) of the samples from Australia. The previously known maximum depth of eye-bearing species of the Cylindroleberidinae is 1212 m (Kornicker, 1992a:6); *Parasterope sequax,* which has lateral eyes, was collected on the Australian slope at a depth of 1500 m, thus increasing the known maximum depth of members of the subfamily with lateral eyes. The previously known maximum depth of eye-bearing species of the Sarsiellidae is 650 m (Kornicker, 1992a:6); *Eusarsiella bex,* which has lateral eyes, was collected on the Australian slope at a depth of 720 m, thus increasing the known maximum depth of members of the family with lateral eyes.

Kornicker (1992a, appendix 2) listed the number of ommatidia in the lateral eyes of 342 species, of which 77 are without lateral eyes in one or both sexes. The Australian collection adds 22 bathyal and three abyssal species without lateral eyes in one or both sexes. Kornicker (1992a, table 7) listed the number of species at discrete depths without lateral eyes; the distribution after inclusion of Australian species is shown in Table 12 (in the table a single species may appear in several depth intervals).

Of the 342 species listed by Kornicker (1992a, appendix 2), 10 have lateral eyes without ommatidia or with poorly defined ommatidia in one or both sexes (female *Vargula sekiguchii* (male with ommatidia), female *Empoulsenia monothrix* (male unknown), male and female *Parasterope sohni,* male *Scleroconcha frons* (female unknown), female *Philomedes brenda* (male with ommatidia), female *P. lilljeborgii* (male with 27 ommatidia), female *P. pentathrix* (male with 20 ommatidia), male and female *Harbansus schornikovi,* female *H. ferox* (male unknown), and female *Pseudophilomedes angulatus* (male with ommatidia)). Poorly developed lateral eyes are numerous (16 species) in the Australian slope material (Appendix 3; Table 13). A few have pigment, but most are without pigment; many contain small "cells," but a few are without cells. In some eyes the decision as to whether or not the cells are poorly developed ommatidia is subjective. Doubtless, eyes without well-developed ommatidia have poorer seeing ability than

TABLE 4.—Distribution of species with depth (X = a single sample) (includes only species in Part 3 discussed herein).

Taxon	Depth (m)			
	Bathyal			Abyssal
	201–500	501–1000	1001–2000	2001–3000
CYPRIDINIDAE				
Azygocypridina lowryi	X	XX		
Cypridinodes wyvillethomsoni	X	X		
Isocypridina fallax				X
Metavargula apex	X	X		
M. calix		X		
M. currax		X		
M. procax		X	X	
M. spadix		X	X	
Paradoloria fax	X		XX	XX
P. mordax		X		
P. pugnax		X		
P. tryx			XX	
P. species A		X		
Pterocypridina appendix	XX			
P. pax	X			
P. tressleri		XX		
Rheina relax	XX*			
Skogsbergia tenax	X			
S. vivax	X			
CYLINDROLEBERIDIDAE				
Archasterope altrix		X		
A. apex	X			
A. efficax	XXX			
A. verax			XX	X
Bathyleberis babax			XX	
Domromeus merx	X			
Homasterope trebax		XXX		
Parasterope lux		X		
P. physinx	XX			
P. sequax			XX	
P. whatleyi		X		
Skogsbergiella senex			XXX	
Synasterope solox	XX			
Xandarasterope storthynx				XX
X. trux			XXXX	

* Bottom depth 124–478 m, but specimens may be from water column above bottom (collected in 3-m Isaac-Kidd midwater trawl that hit bottom).

TABLE 5.—Comparison of number of species of Myodocopina reported at bathyal depths (201–2000 m) in selected geographic areas.

Geographic area	Number of species	Source
Antarctic region	21	Kornicker (1977, table 1)
Subantarctic region	19	Kornicker (1977, table 1)
Subantarctic boundary to latitude of 35°S*	17	Kornicker (1977, table 1)
SE Australia 35°–42°S	87	Herein

* Data do not include bathyal samples from Australia.

TABLE 6.—Comparison of number of species of Myodocopina at various depths from selected geographical areas, arranged in order of increasing diversity. (Areas selected are those from which numerous samples have been collected.)

Geographic area, depth	Number of species	Source
Cape Cod Bay, Mass. USA, shallow shelf (6.4–44.5 m)	2	Kornicker (1974a:1)
Beaufort Sea, shelf and bathyal	4	Kornicker (1988:3)
Sweden (Skagerrak and adjacent areas), shelf	5	Kornicker (1987:876)
Nova Scotia, Atlantic Ocean, shelf	9	Kornicker (1986, table 5)
Gulf of Naples, shelf	12	Kornicker (1974b:2)
Antarctic region, abyssal	13	Kornicker (1977, table 1)
Bay of Biscay, abyssal	16	Kornicker (1989:9)
Antarctic region, shelf	17	Kornicker (1977, table 1)
Anarctic region, bathyal	21	Kornicker (1977, table 1)
Southern California, shelf	25	Baker (1974, 1975)
Japan and adjacent coasts, mostly shelf	25	Cohen (1989:328)
Bahamas, shallow shelf	21	Kornicker (1958)
West Africa (Spanish Sahara and Mauritania), mainly shelf	36	Kornicker and Caraion (1974, 1977, 1978)
Carolinian Province, Atlantic coast, North America, shelf	36	Kornicker (1986, table 5)
Gulf of Mexico, shelf	48	Kornicker (1986, table 5)
Belize barrier reef, shallow shelf	51	Cohen (1989:328)
SE Australia, bathyal + 2 abyssal	89	Herein

TABLE 7.—Substrates of samples from Australia collected with the WHOI epibenthic sled listed in decreasing order of number of species in sample.

Number of species (Slope number)	Depth zone (m)	Substrate
21 (1)	201–500	coarse shell
20 (22)	201–500	coarse shell
16 (40)	201–500	coarse sand, shell, mud, and sponges
13 (32)	501–1000	clayey shell, coarse biogenic sand
10 (56)	201–500	muddy coarse shell
9 (21)	201–500	muddy shell
9 (46)	501–1000	coarse shelly sand
8 (53)	501–1000	mud, fine sand, and shell
8 (69)	1001–2000	sandy mud, fine shell
7 (19)	501–1000	coarse grey shell
7 (27)	1001–2000	compacted clay
7 (67)	1001–2000	fine mud with coral
6 (81)	1001–2000	gravel, partly biogenic sandy mud
5 (34)	501–1000	coarse sand, shell
4 (25)	1001–2000	muddy sandstone
4 (66)	2001–3000	compacted clay
4 (48)	201–500	coarse shell
3 (47)	201–500	coarse shell
3 (33)	501–1000	rocks, clay with biogenic sand
3 (39)	501–1000	coarse sand
3 (45)	501–1000	coarse shelly sand
1 (2)	501–1000	biogenic shell, bryozoans
1 (6)	501–1000	shell with crinoids
1 (7)	1001–2000	shell
1 (55)	1001–2000	compacted muddy clay
1 (82)	1001–2000	biogenic rubble

those with well-developed ommatidia; it is possible that eyes with pigment are more light sensitive than those without pigment.

Poulsen (1965:470) noted that in the Cylindroleberidinae the number of ommatidia in lateral eyes tends to decrease with increase in water depth as well as with decrease in size of specimen. Kornicker (1992a, tables 5, 6, figs. 3, 4) showed that in known Myodocopina (with the exception of male Philomedidae), the average number of ommatidia in lateral eyes decreases with depth. Similar trends occur in Australian Myodocopina, but the rates of decrease are greater in the Cypridinini and lesser in the Cylindroleberidinae (Table 14).

In the collection from Australia, the number of bathyal species having eyes with well-developed ommatidia decreases with depth, whereas the number of species having eyes with or without "cells" increases (Table 9, Figure 4). The percentage increase of species having eyes with "cells" is similar to that of species without lateral eyes (Table 9, Figure 4). (In Figure 4, trend lines are not drawn connecting bathyal and abyssal percentages because of the small number of species collected at abyssal depths.) At abyssal depths, the percentage of species having lateral eyes without ommatidia should decrease because eventually almost all benthic Myodocopina are blind, but too few samples were obtained at abyssal depths in the present collection to demonstrate this. It seems likely that those species having lateral eyes without well-developed ommatidia are in the process of losing their eyes, but it is possible that such eyes have some advantage at bathyal depths.

TABLE 8.—Ostracodes in Australian collection parasitized by Isopoda or Copepoda (+ = present, - = absent).

Taxon, Sex, Station, Depth	Parasite	
	Isopoda	Copepoda
CYPRIDINIDAE		
Metavargula procax		
Adult female, Slope 32, 1000 m	-	+
Pterocypridina appendix		
Adult male, Slope 21, 220 m	-	+
Rheina relax		
Adult female, Slope 85, 124–478 m	-	+
Ovigerous female, Slope 85, 124–478 m	+	-
Vargula fugax		
Adult male, Slope 53, 996 m	+	-
Vargula hex		
Adult female, Slope 32, 1000 m	-	+
Vargula matrix		
Adult female, Slope 69, 1840 m	+	-
Vargula psydrax		
Adult female, Slope 69, 1840 m	+	-
Vargula trifax		
Adult female, Slope 1, 204 m	-	+
PHILOMEDIDAE		
Euphilomedes ernyx		
Adult female, Slope 21, 220 m	+	-
SARSIELLIDAE		
Chelicopia pertinex		
Adult female, Slope 1, 204 m	-	+
Adult female, Slope 22, 363 m	-	+
Eusarsiella bex		
Ovigerous female, Slope 46, 720 m	-	+
Eusarsiella iayx		
Adult female, Slope 48, 400 m	-	+
Neomuelleriella nex		
Adult female, Slope 22, 363 m	-	+
Spinacopia trox		
Adult female, Slope 1, 204 m	-	+
CYLINDROLEBERIDIDAE		
Archasterope verax		
Adult female, Slope 81, 1264 m	+	-
Parasterope whatleyi		
2 Adult females, Slope 53, 996 m	-	+
Xandarasterope trux		
A–1 male, Slope 27, 1500 m	-	+
Adult male, Slope 69, 1840 m	-	+

TABLE 9.—Comparison of the number of ostracodes (arranged by sex and stage of development) parasitized by choniostomatids in 3 geographic areas.

Ostracode sex and stage	New England Coast*	Antarctica to 35°S†	SE Australian Slope
Adult females without eggs	22	15	10
Ovigerous females	1	2	1
Adult males	2	2	2
Total adults	25	19	13
Juvenile females	0	3	0
Juvenile males	1	3	1
Juveniles, sex unknown	0	3	0
Total juveniles	1	9	1

* From Bowman and Kornicker (1967); Kornicker, 1975, table 9)
†From Kornicker (1975, table 9)

The percentage of species with lateral eyes at discrete depths may vary in distant geographic locales; examples are given in Table 15. Cape Cod Bay, at depths of 6.4–44.5 m, contains only two species of Myodocopina, one with lateral eyes and one without (Kornicker, 1974a). The Beaufort Sea contains only four species of Myodocopina at shelf and bathyal depths, all with lateral eyes (Kornicker, 1988). In other locales having more species (Enewetak Atoll, Mozambique Channel, West Africa, and the northern Gulf of Mexico) at shelf depths (0–200 m), 94%–100% of the species have lateral eyes. At depths of 201–1000 m off Australia and West Africa, 77%–78% of the species have lateral eyes, whereas only 40% of species possess lateral eyes at this depth range in the Mozambique Channel. Excluding areas known from only a few samples (marked with * in Table 10), 45%–53% of species at depths of 1001–2000 m have lateral eyes (Bay of Biscay, SE Australia).

Probably only those species having no lateral eyes in both males and females should be termed "blind," although the medial eye could have some light sensitivity. Many species having females without lateral eyes have males with lateral eyes. Because adult males are generally less abundant than adult females, the male is unknown for many species. Known species having no lateral eyes in both males and females are listed in Table 16 (the Cyclasteropinae, Asteropteroninae, and Rutidermatidae, which are collected mostly at shelf depths, and the Azygocypridininae, which have hirsute flap-like processes in place of the lateral eye, are not included in the table). It is evident from the table that blind species are mostly found in deep water (6 species at 0–200 m; 17 species at 201–2000 m; and 13 species at 2000+ m).

Suborder MYODOCOPINA Sars, 1866

The Myodocopina include five families, all represented in the study area.

CYPRIDINIDAE Baird, 1850

The Cypridinidae include two subfamilies, Cypridininae and Azygocypridininae; both are represented in the study area.

CYPRIDININAE Baird, 1850

The Cypridininae include two tribes, Gigantocypridinini (pelagic) and Cypridinini (benthic and pelagic), only the latter tribe is represented in the collection.

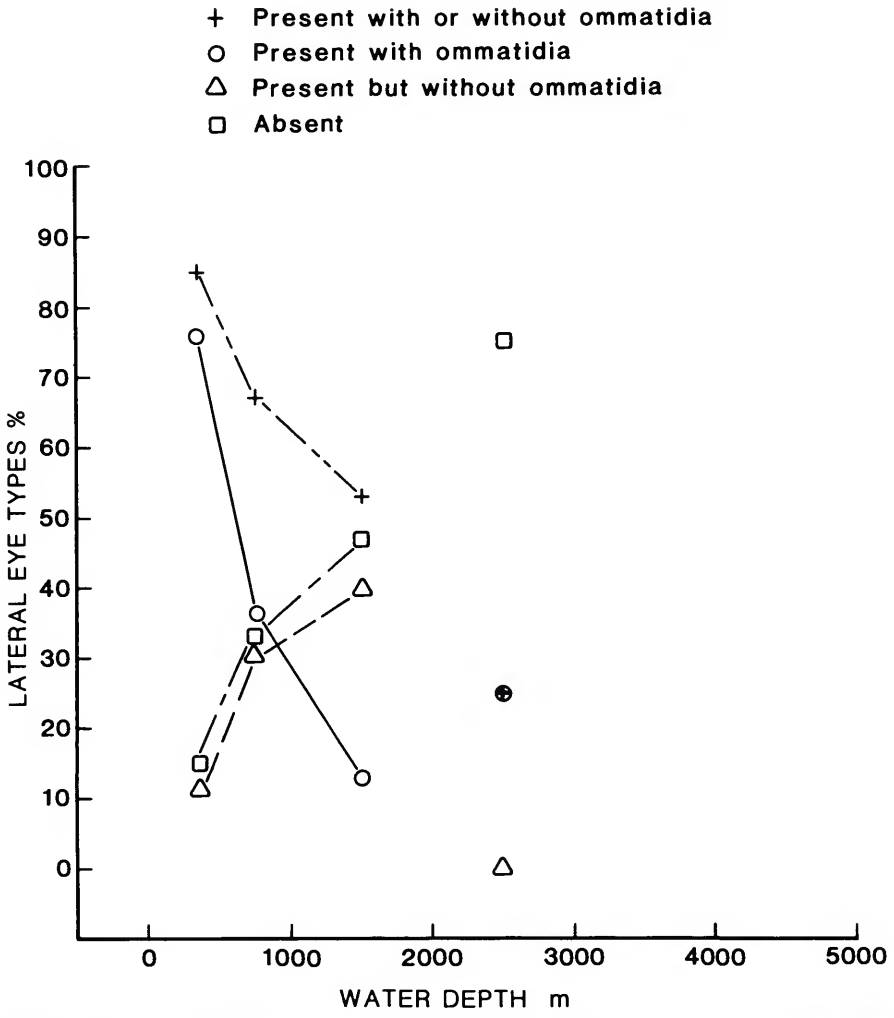


FIGURE 4.—Relationship between percentage of myodocopid species and types of lateral eyes at discrete depths, SE Australia. (Superimposed plus and circle indicate both symbols present at location.)

TABLE 10.—Percentage of species with lateral eyes of Cypridinini, Cylindroleberidinae, Sarsiellidae, Philomedidae, and Myodocopina at discrete depths (includes only species in collection from Australia). (Numbers in parentheses = total number of species in each depth zone including those with eyes. Males and females are treated separately only in the Philomedidae; data from Appendix 3).

Depth (m)	Cypridinini	Cylindroleberedinae	Sarsiellidae	Philomedidae		Myodocopina*
				Male	Female	
Bathyal						
201-500	87(15)	75(4)	89(18)	100(3)	73(11)	83
501-1000	86(14)	50(6)	60(5)	100(3)	50(8)	67
1001-2000	80(5)	20(5)	0(1)	100(2)	75(4)	53
Abyssal						
2001-3000	0(2)	0(1)	0(0)	100(1)	100(1)	25

* Does not include male Philomedidae, Azygocypridininae, Rutidermatidae, Cyclasteropinae, and Asteropteroninae. Percentages were obtained by adding together the number of species at each depth interval and then determining the percentage of species with lateral eyes.

TABLE 11.—Percentage of species (worldwide) with lateral eyes at discrete depths (m) of Cypridinini, Cylindroleberidinae, Sarsiellidae, Philomedidae, and Myodocopina (nd = no data). Males and females are treated separately only in the Philomedidae (data from Kornicker, 1992a, table 6; Appendix 3 herein).

Depth (m)	Cypridinini	Cylindroleberidinae	Sarsiellidae	Philomedidae		Myodocopina*
				Male	Female	
Shelf						
0–200	100	87	100	97	69	90
Bathyal						
201–500	89	76	85	93	69	78
501–1000	78	44	54	92	48	58
1001–2000	72	27	20	78	41	47
Abyssal						
2001–3000	63	0	0	67	40	35
3001–4000	25	0	0	33	50	21
4001–5000	0	0	0	0	0	0
5001–6000	0	nd	nd	nd	nd	0

* Does not include male Philomedidae, Azygocypridininae, Gigantocypridinini, species of *Macrocypridina*, Rutidermatidae, Cyclasteropinae, and Asteropteroninae. Percentages were obtained by adding together the number of species at each depth interval and then determining the percentage of species with lateral eyes.

TABLE 12.—Number of known species (worldwide) without lateral eyes at discrete depths within the Cypridinini, Cylindroleberidinae, Sarsiellidae, and Philomedidae (nd = no data; males and females are treated separately only in the Philomedidae; data from Kornicker, 1992a, table 7; Appendix 3 herein; *indicates depths at which present collection was obtained; parentheses = number of species previously known (from Kornicker, 1992a, table 7).

Depth (m)	Cypridinini	Cylindroleberidinae	Sarsiellidae	Philomedidae	
				Male	Female
Shelf					
0–200	0(0)	9(9)	1(1)	1(1)	15(15)
Bathyal					
201–500*	4(2)	10(8)	4(2)	1(1)	10(7)
501–1000*	4(3)	9(6)	5(3)	1(1)	12(8)
1001–2000*	6(4)	8(4)	4(3)	2(2)	10(9)
Abyssal					
2001–3000*	3(1)	6(5)	1(1)	2(2)	3(3)
3001–4000	3(3)	3(3)	3(3)	1(1)	2(2)
4001–5000	3(3)	4(4)	2(2)	1(1)	1(1)
5001–6000	1(1)	nd	nd	nd	nd

TABLE 13.—Depth distribution of species of Cypridinini, Cylindroleberidinae, Sarsiellidae, Philomedidae, and Myodocopina with lateral eyes having different development (includes only species in collection from Australia). (A = lateral eye with ommatidia; B = lateral eye without ommatidia; C = lateral eye absent; Number = number of species; Percent = percent of species. Data from Appendix 3.)

Depth (m)	Cypridinini			Cylindroleberidinae			Sarsiellidae			Philomedidae (Female)			Myodocopina*		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Bathyal															
201–500															
Number	11	2	1	3	0	1	16	0	1	5	2	3	35	4	7
Percent	79	15	7	75	0	25	89	0	11	50	20	30	76	9	15
501–1000															
Number	5	7	2	3	0	3	3	0	2	1	3	4	12	10	11
Percent	35	50	14	50	0	50	60	0	40	13	37	50	36	30	33
1001–2000															
Number	1	3	1	0	1	4	0	0	1	1	2	1	2	6	7
Percent	20	60	20	0	20	80	0	0	100	25	50	25	13	40	47
Abyssal															
2001–3000															
Number	0	0	2	0	0	1	0	0	0	1	0	3			
Percent	0	0	100	0	0	100	0	0	0	100	0	0	25	0	75

* Does not include male Philomedidae, Azygocypridininae, Rutidermatidae, Cyclasteropinae, and Asteropteroninae.

TABLE 14.—Distribution of the number of ommatidia in lateral eyes by water depth for species of Cypridinini, Cylindroleberidinae, Sarsiellidae, and Philomedidae, excluding species without lateral eyes (includes only species in collection from Australia). (nsw = no species with lateral eyes at given depth interval; ns = no species with or without lateral eyes at given depth interval. Males and females are treated separately only in the Philomedidae; data from Appendix 3.)

Depth (m)	Cypridinini Avg. number of ommatidia	Cylindroleberidinae Avg. number of ommatidia	Sarsiellidae Avg. number of ommatidia	Philomedidae Avg. number of ommatidia	
				Male	Female
Bathyal					
201-500	16	18	4.4	21	3.3
501-1000	6	14	5.3	29	1.3
1001-2000	2	0	nsw	33	0.5
Abyssal					
2001-3000	nsw	nsw	ns	many	2.0

TABLE 15.—Percentage of species with lateral eyes at discrete depths at selected geographically distant localities. (Values in parentheses = total number of species including those with eyes. Does not include Azygocypridininae, Gigantocypridinini, all species of *Macrocypridina*, Rutidermatidae, Cyclasteropinae, and Asteropteroninae. Percentages were based on females if eyes of males and females differ; percentages obtained by adding together the number of species at each depth interval at each locality and then determining the percentage of species with lateral eyes; * = very few samples.)

Locality	Depth (m)					
	Shelf		Bathyal		Abyssal	
	0-200	201-1000	1001-2000	2001-3000	3001-4000	4001-5000
Bay of Biscay[1]	100(1)*	nd	45(11)	38(13)	14(7)	0(4)
Australia[2]	nd	77(70)	53(15)	25(4)*	nd	nd
Mozambique Channel[3]	100(19)	40(8)	0(1)*	nd	nd	nd
Beaufort Sea[4]	100(4)	100(2)	100(1)*	nd	nd	nd
Enewetak Atoll[5]	100(12)	nd	nd	nd	nd	nd
West Africa[6]	94(17)	78(18)	33(3)*	nd	nd	nd
Cape Cod Bay (6.4-44.5 m)[7]	50(2)	nd	nd	nd	nd	nd
Gulf of Mexico[8]	97(34)	nd	33(3)*	nd	nd	nd

[1] Kornicker (1989)
[2] Herein
[3] Kornicker (1992a)
[4] Kornicker (1988)
[5] Kornicker (1991)
[6] Kornicker and Caraion (1974, 1977, 1978)
[7] Kornicker (1974)
[8] Kornicker (1968, 1984a,b, 1986a,b)

TABLE 16.—Known depth range of selected species of Cypridinini, Philomedidae, and Cylindroleberidinae (worldwide) having no lateral eyes in both males and females.

Taxon	Depth (m)	Source
CYPRIDINIDAE		
CYPRIDININI		
Hadacypridina bruuni	5340–6000	Kornicker (1992a, appendix 2)
Metavargula hex	4203–4240	Kornicker (1992a, appendix 2)
Metavargula quintuplex	1845–3742	Kornicker (1992a, appendix 2)
Paradoloria fax	220, 1096–1900	Herein
Rheina prex	4125–4825	Kornicker (1992a, appendix 2)
Vargula dentata	429–1978	Kornicker (1992a, appendix 2)
Vargula psydrax	429–2250	Herein
PHILOMEDIDAE		
PHILOMEDINAE		
Igene walleni	3702–4303	Kornicker (1992a, appendix 2)
PSEUDOPHILOMEDINAE		
Harbansus boweni	42–196	Kornicker (1992a, appendix 2)
Tetragonodon ctenorynchus	636–2995	Kornicker (1992a, appendix 2)
Tetragonodon pellax	1980–2006	Kornicker (1992a, appendix 2)
SARSIELLIDAE		
SARSIELLINAE		
Spinacopia antarctica	216	Kornicker (1992a, appendix 2)
Spinacopia mastix	3035	Kornicker (1992a, appendix 2)
Spinacopia octo	3495–4758	Kornicker (1992a, appendix 2)
Spinacopia sandersi	1144	Kornicker (1992a, appendix 2)
Spinacopia variabilis	135–1475	Kornicker (1992a, appendix 2)
Spinacopia rex	1000–1850	Herein
CYLINDROLEBERIDIDAE		
CYLINDROLEBERININAE		
Archasterope bulla	279	Kornicker (1992a, appendix 2)
Archasterope verax	800–1264	Herein
Parasterope antyx	1560	Kornicker (1992a, appendix 2)
Parasterope whatleyi	996	Herein
Synasterope arnaudi	50	Kornicker (1992a, appendix 2)
Synasterope brachythrix	78–425	Kornicker (1992a, appendix 2)
Synasterope cushmani	11–36	Kornicker (1992a, appendix 2)
Synasterope dimorpha	112–2563	Kornicker (1992a, appendix 2)
Synasterope hirpex	5125–4715	Kornicker (1992a, appendix 2)
Synasterope mystax	2747–4006	Kornicker (1992a, appendix 2)
Xandarasterope trux	1277–1840	Herein

CYPRIDININI Baird, 1850

The Cypridinini are represented in the collection by eight genera: *Cypridinodes, Paradoloria, Pseudodoloria* (new genus in Kornicker, 1994), *Metavargula, Pterocypridina, Rheina, Skogsbergia,* and *Vargula,* but only *Cypridinodes, Paradoloria, Pterocypridina, Metavargula, Rheina,* and *Skogsbergia* are described herein.

Metavargula Kornicker, 1970

TYPE SPECIES.—*Metavargula ampla* Kornicker, 1970:3.

COMPOSITION.—Five species (all new) are known from the vicinity of Australia: *M. spadix, M. calix, M. apex, M. currax,* and *M. procax.* When the variability of each species becomes better known, it is likely that some will be synonomized, but for the present it is expedient to separate them. Because discrimination of the species is based in part on adult characters, juveniles (and also some undissected adults) in the collection have been referred to *Metavargula* species indeterminate. Selected characters of the five species are compared in Table 17, and carapace lengths are shown in Figure 5.

DISTRIBUTION.—Genus circumglobal, especially in deep water; the southernmost record is in the Weddell Sea and the northernmost record is west of the Bay of Biscay. Known depth range is 117–4240 m (Kornicker, 1989:28).

Key to Species of *Metavargula* in Vicinity of Australia

(Adult females)

1. Carapace shorter than 4.25 mm; 6th limb with 2 or 3 epipodial bristles; 7th limb with 15–29 bristles 2
   Carapace longer than 4.75 mm; 6th limb with 6 or 7 epipodial bristles; 7th limb with 33–37 bristles 4
2. Height of carapace 62% of length; 2nd endopodial joint of mandible with 2 unpaired ventral bristles; 7th limb with 15 comb teeth . . . . . ***M. procax,*** new species
   Height of carapace 52%–56% of length; 2nd endopodial joint of mandible with 1 unpaired ventral bristle; 7th limb with 4–9 comb teeth 3
3. Carapace longer than 3.40 mm; 2nd endopodial joint of maxilla with 3 c-bristles; 7th limb with 24–29 bristles . . . . . ***M. spadix,*** new species
   Carapace shorter than 3.20 mm; 2nd endopodial joint of maxilla with 2 c-bristles; 7th limb with 15–17 bristles . . . . . ***M. apex,*** new species
4. 2nd endopodial joint of mandible with 1 unpaired ventral bristle; 2nd endopodial joint of maxilla with 3 c-bristles; 7th limb with 16 comb teeth . . . . . ***M. calix,*** new species
   2nd endopodial joint of mandible with 2 unpaired ventral bristles; 2nd endopodial joint of maxilla with 4 c-bristles; 7th limb with 9–11 comb teeth . . . . . ***M. currax,*** new species

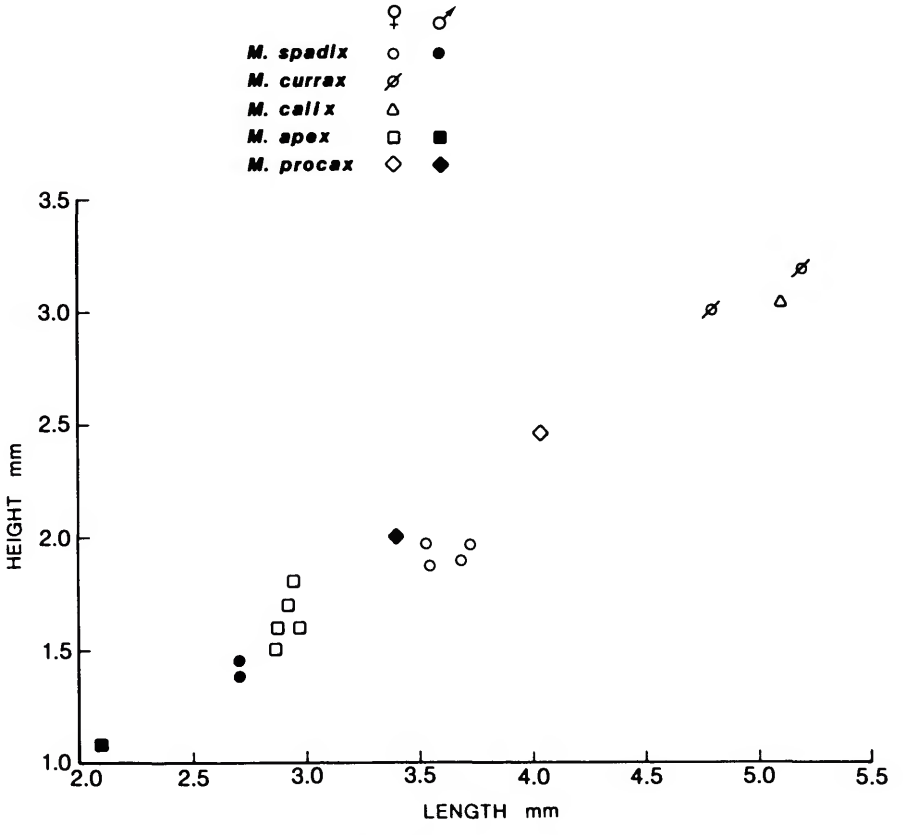


FIGURE 5.—Relationship of adult carapace length and height in new species of *Metavargula* described herein.

TABLE 17.—Comparison of selected characteristics of adult females of new species of *Metavargula* described herein.

Character	*spadix*	*calix*	*apex*	*currax*	*procax*
Carapace length mm (avg.)	3.61	5.12	2.90	5.00	4.04
Height as % length (avg.)	53	60	55	62	62
Mandible, number of unpaired ventral bristles on 2nd endopodial joint	1	1	1	2	2
Maxilla, c-bristles	3	3	2	4	2
Sixth limb, epipodial bristles	3	6	3	6–7	3
Seventh limb, bristles	24–29	33–36	15–17	33–37	25–28
Comb teeth	6–9	16	4–6	9–11	15

Metavargula spadix Kornicker, new species

FIGURES 6–9

Metavargula species B, Kornicker, 1994, fig. 109j, 110gg.

ETYMOLOGY.—From the Latin and Greek *spadix* (palm branch).

HOLOTYPE.—NMV J35990, undissected ovigerous female in alcohol.

TYPE LOCALITY.—Slope 81, 42°00.25'S, 148°43.55'E, Tasmania, 48 km ENE of Cape Tourville; depth 1264 m.

PARATYPES.—Slope 32: USNM 193852, ovigerous female on slide and in alcohol. Slope 81: NMV J35991, 14 undissected specimens (including ovigerous females and juveniles) in alcohol; USNM 194001, 1 ovigerous female on slide and in alcohol; USNM 194002, 1 adult male on slide and in alcohol; NMV J35992, 1 undissected adult male in alcohol.

DISTRIBUTION.—Slope 32, 1000 m. Slope 81, 1264 m.

DESCRIPTION OF ADULT FEMALE (Figures 6–8).—Carapace elongate with small incisur and long upsweeping narrow caudal process dorsal to valve midheight (Figure 6*a*).

Infold: Narrow list with anterior end at about midheight of anteroventral margin continues along ventral infold to point about 2/3 valve length, then broadens to form flange along posteroventral infold and infold of caudal process (flange broadest along anterior edge of caudal process) (Figure 6*b–d*). Rostral infold with 16–18 bristles (mostly divided) in row along anterior and ventral margins, 1 divided bristle at midwidth, and 1 pair of divided bristles near inner end of incisur (Figure 6*e*). Anteroventral and anterior half of ventral infold with 1 minute bristle near inner end of incisur followed by 1 or 2 longer bristles (Figure 6*e*), then about 28 short bristles with bases along narrow list. Ventral infold between valve midlength and anterior end of flange with 7 bristles along list. Ventral infold also with about 23 small bristles present between list and inner margin of infold (6 near caudal process shown in Figure 6*c*). Posterior edge of flange of posteroventral infold and infold of caudal process with 15–25 minute bristles. Posterior edge of flange anterior to caudal process with 14–20 minute pore openings (dorsal 15 of USNM 193852 shown in Figure 6*d*); pore openings exit on minute low processes on USNM 194001, low processes absent on USNM 193852; about 7 or 8 of the 15–20 minute bristles along edge of flange occur in pore area. Canals leading to pores and bristles along edge of flange visible through flange (Figure 6*d*); canals leading to pores broader than those leading to bristles and some appear to be double; anterior margin of dorsal end of flange with slight bulge with 1 or 2 minute bristles near anterior edge (Figure 6*d*). Ventral infold just anterior to caudal process with 8 small bristles near outer edge (5 of these shown in Figure 6*c*).

Selvage: Selvage along anterior edge of rostrum with narrow lamellar prolongation with smooth outer edge; lamellar prolongation along ventral edge of incisur broad, narrowly striate, with smooth outer edge; lamellar prolongation along ventral margin narrow with smooth outer edge; lamellar prolongation not observed in vicinity of caudal process.

Carapace Size (length, height in mm): Slope 81: NMV J35990 (holotype), 3.7, 1.9, height 51% of length; USNM 193852, 3.73, 1.98; height 53% of length; unnumbered specimen, 3.55, 1.84, height 52% of length; USNM 194001, 3.55, 1.96, height 55% of length. Length range 3.55–3.73; height range 1.84–1.98.

First Antenna: 1st and 2nd joints bare. 3rd joint with dorsal bristle at proximal 1/3 and ventral bristle subterminal (Figure 6*f*). 4th joint with 2 spinous bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 10 long bare filaments (distal 2 shorter and slenderer) and bifurcate tip. Medial bristle of 6th joint short, spinous. 7th joint: a-bristle about 1/3 longer than bristle of 6th joint, with few indistinct spines; b-bristle about twice length of a-bristle, with 4 slender filaments (some with spines); c-bristle long, with 7 slender filaments (some with few spines) and bifurcate tip. 8th joint: d- and e-bristles about 1/4–1/3 longer than b-bristle, bare with blunt tips; f-bristle about 2/3 length of c-bristle, with 8 filaments (some with spines) and bifurcate tip; g-bristle same length, with 9 filaments (some with spines) and bifurcate tip.

Second Antenna: Protopodite with small distal medial bristle. Endopodite 2-jointed (Figure 6*g*): 1st joint with 3 proximal bristles (1 long, 2 short) and 1 long distal bristle; 2nd joint with long terminal filament about 2 1/2 times length of distal bristle of 1st joint. Exopodite: 1st joint with minute spines along concave edge; bristle of 2nd joint reaching just past 9th joint, with 25–33 closely spaced ventral spines (proximal 3 or 4 hair-like, indistinct) and no dorsal spines

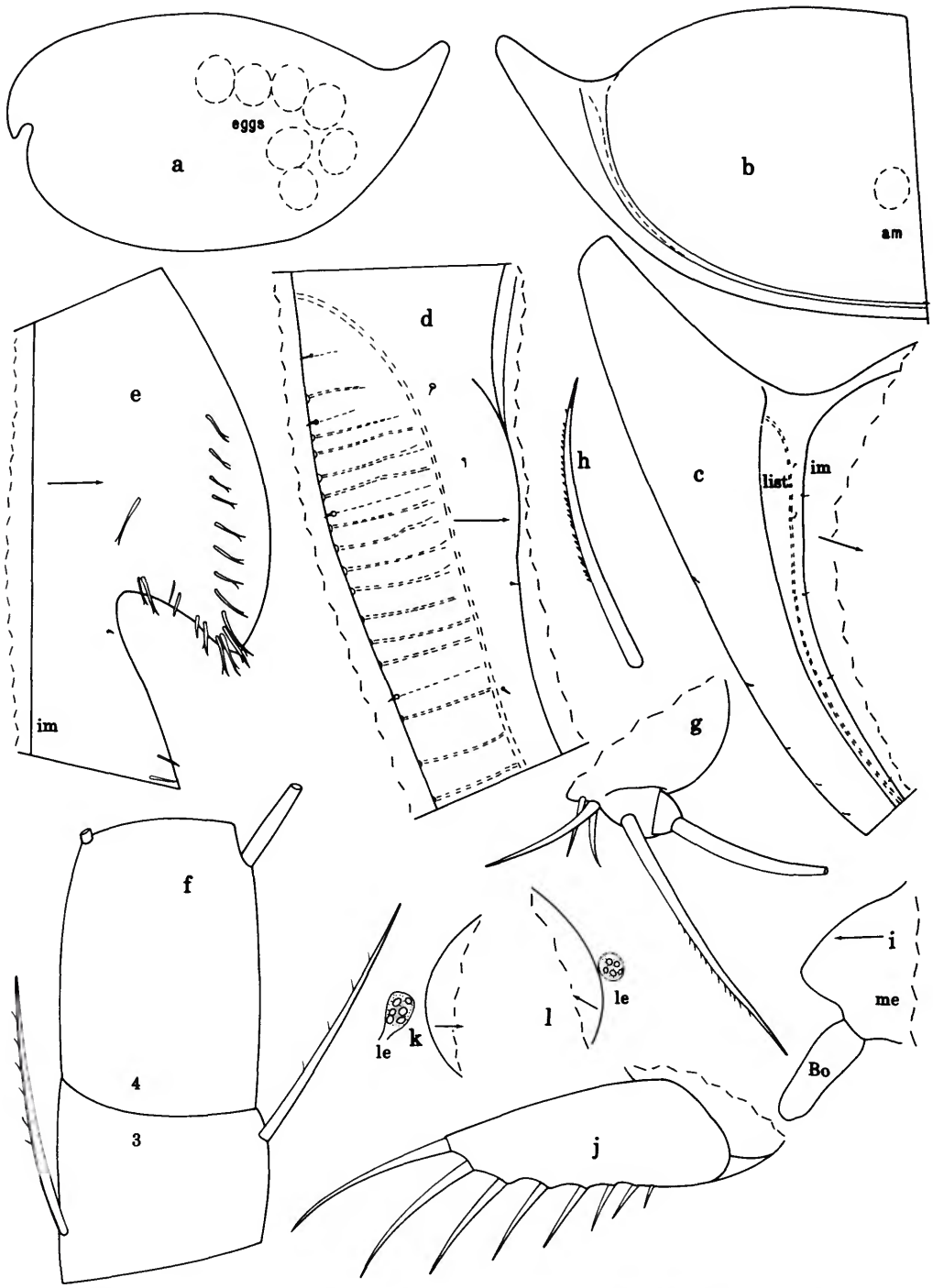
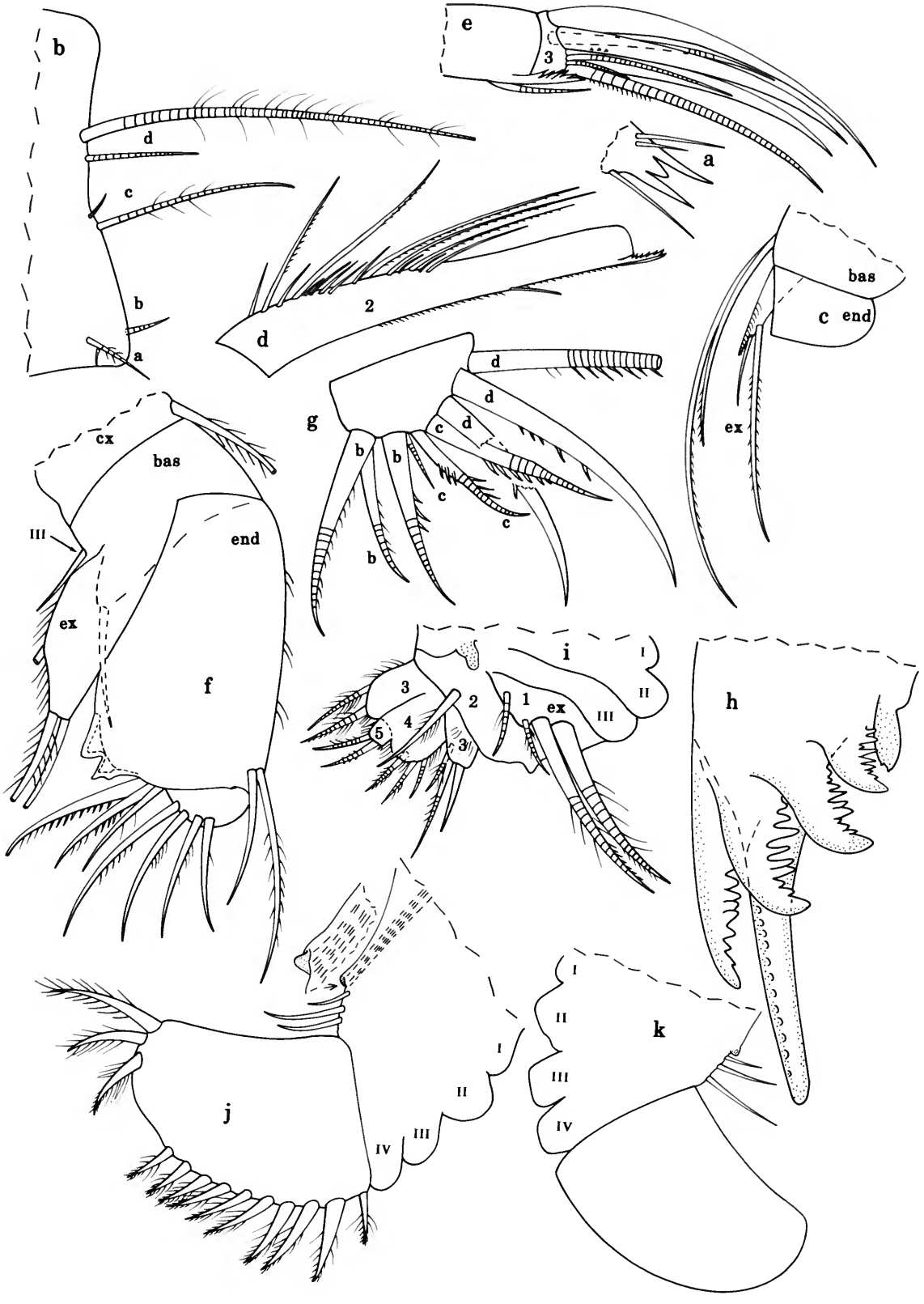


FIGURE 6.—*Metavargula spadix* Kornicker, new species, ovigerous female, paratype, USNM 193852: *a*, complete specimen, length 3.73 mm; *b*, posterior half left valve, iv; *c*, detail from *b* (bristles and pores of flange not shown); *d*, detail of dorsal end of infold shown in *c*; *e*, anterior left valve, iv; *f*, joints 3 and 4 left 1st antenna, ventral edge on right, mv; *g*, endopodite right 2nd antenna, mv; *h*, bristle 2nd joint exopodite right 2nd antenna, lv; *i*, medial eye and Bellonci organ, lv; *j*, left lamella furca, lv; *k,l*, right and left lateral eyes, respectively, adjacent to posterior ends of exopodites of 2nd antennae, lv.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(Figure 6*h*); bristles of joints 3–8 and 3 long bristles of 9th joint with natatory hairs, no spines; short dorsal bristle of 9th joint with long stiff spines (could be considered natatory hairs); joints 3–8 with basal spines longer on distal joints; basal spine of 8th joint about 1 1/4 times length of 9th joint; lateral spine of 9th joint about 3/4 length of joint; joints 2–8 with minute spines along distal edges.

Mandible: Coxale endite with 2 stout terminal spines with indistinct pointed peg between them (terminal spines broader but not longer than many proximal spines) (Figure 7*a*); small ringed bristle at base of endite. Basale: Ventral margin with 2 a-bristles (1 small), 1 b-bristle, 2 c-bristles (longest with long proximal hairs), and 2 d-bristles (Figure 7*b*); dorsal margin with 1 bare bristle distal to midlength and 2 terminal bristles with short spines. Tip of exopodite spinous, reaching past distal end of dorsal margin of 1st endopodial joint, with 2 subterminal bristles (proximal almost 3 times length of distal) (Figure 7*c*). 1st endopodial joint with 4 ventral bristles (1 minute, 1 short with indistinct short spines, 1 long with long spines, and 1 long with short spines (left limb of USNM 193852 aberrant in having 5th minute bristle)). 2nd endopodial joint: Ventral margin spinous, with single slender ringed distal bristle and terminal paired bristles (medial broad unringed, with 6 stout dorsal spines; lateral slender ringed, slightly longer) (Figure 7*d*); dorsal margin with 15–17 bristles (5 long spinous, 2 spinous medium length, 8–10 short (most with spines)) proximal to midlength. 3rd endopodial joint with 3 claws (dorsal claw slightly longer, bare; others with few indistinct proximal ventral teeth) and 4 bristles (long ventral bristle with proximal ventral spines, but proximal part not unusually stout) (Figure 7*e*).

Maxilla: Coxale with plumose dorsal bristle (Figure 7*f*). Endite I with 9 spinous bristles; endite II with 6 spinous and pectinate bristles; endite III with short bare proximal bristle near base of exopodite (Figure 7*f*) and 5 distal spinous bristles. Basale with long ventral bristle and short medial bristle at midwidth of distal margin (not shown). Exopodite large with fairly long hirsute proximal bristle and 2 terminal bristles (inner with long proximal hairs, other bare). 1st endopodial joint with dorsal spines, with bilobed well-developed cutting tooth, 2 slender alpha-bristles (outer with long hairs, inner bare), and 3 beta-bristles (inner small with few minute spines, others longer with stout spines). 2nd endopodial joint with 4 a-bristles (anterior bare or with few spines, others with spines) (Figure 7*f*), 3 pectinate b-bristles, 3 c-bristles (anterior small bare or with 1 spine, others stout with 3 or more teeth), and 3 d-bristles (posterior ringed pectinate, others unringed claw-like with few teeth) (Figure 7*g*).

Fifth Limb: Epipodite with 55–57 plumose bristles. Protopodite with short anterior tooth (Figure 7*i*). Endite I fragmented; endite II with about 5 spinous bristles; endite III with 1 minute anterior bare bristle (could be on endite II) and 7 spinous and pectinate bristles. 1st exopodial joint: Main tooth with elongate proximal tooth with 2 minute spines at tip and 5 pectinate teeth (in Figure 7*h* distal (longest) 5th tooth folded under on limb compressed under cover slip); bristle with long proximal spines present proximal to elongate tooth; anterior side with 3 bristles in row (inner small) and 1 bristle closer to protopodial tooth (Figure 7*i*). 2nd exopodial joint with 4 pectinate a-bristles ringed distally, 4 similar b′-bristles, 4 similar but longer b″-bristles, 1 short posterior c-bristle with long proximal hairs, and 1 similar but longer anterior d-bristle. Inner lobe of 3rd exopodial joint with proximal ringed bristle with long proximal hairs and 2 terminal bristles (outer unringed bare or with 1 small spine, inner ringed with few short spines); outer lobe of 3rd joint with 2 ringed bristles (outer bristle with long hairs, inner bristle with either long or short spines). 4th joint separated from 5th by weak suture on posterior side; 4th joint with 3 or 4 ringed bristles (bare or with short spines); 5th joint with 2 ringed bristles with short spines; very small node with small spines on inner corner of 5th joint. 3rd to 5th joints hirsute.

Sixth Limb (Figure 7*j,k*): With 3 bare epipodial bristles; small sclerotized boss proximal to epipodial bristles forms base for attachment of muscles. Endite I with 2 or 3 short spinous medial bristles and 1 long spinous terminal bristle; endite II with 3 short medial bristles and 2 or 3 spinous terminal bristles; endite III with 3 spinous terminal bristles (middle bristle short); endite IV about same width or slightly narrower than endite III and slightly longer, with 3 spinous terminal bristles (middle bristle short). End joint with 8–11 bristles with long proximal and short distal spines, then space and 3 bristles (anterior with long proximal and short distal spines, others plumose). Limb hirsute (hairs and endite bristles not shown).

Seventh Limb: USNM 193852: One limb with 29 bristles (terminal group with 11 bristles on comb side and 8 on peg side; proximal group with 4 bristles on comb side and 6 on peg side); other limb with 28 bristles (terminal group with 11 bristles on comb side and 9 on peg side; proximal group with 3 bristles on comb side and 5 on peg side). Each bristle with up to 6 bells. Comb with 6–9 slender ringed spinous teeth with recurved slightly bulbous tips; single slender elongate peg opposite comb (Figure 8*a*). USNM 194001: One limb with 25 bristles (terminal group with 8 bristles on comb side and 7 on peg side; proximal group with 4 bristles on comb side and 6 on peg side); other limb with 24 bristles (terminal group with 8 bristles on comb side and 7 on peg side; proximal group with 4 bristles on comb side and 5 on peg side). Comb with 6 teeth opposite single peg.

FIGURE 7 (left).—*Metavargula spadix* Kornicker, new species, ovigerous female, paratype, USNM 193852: *a*, tip coxale endite left mandible, mv; *b*, ventral edge basale right mandible, mv; *c*, terminal dorsal bristles of basale, exopodite, and 1st endopodial joint (bristles not shown) of right mandible, mv; *d*, 2nd endopodial joint left mandible, mv; *e*, tip left mandible, mv; *f*, right maxilla (only 1 bristle of endite III shown), lv; *g*, 2nd endopodial joint left maxilla (a-bristles not shown), lv; *h*, main tooth 1st exopodial joint left 5th limb, pv; *i*, left 5th limb (endite bristles and main tooth not shown), av; *j*, left 6th limb (endite bristles and surface hairs not shown), mv; *k*, right 6th limb (only epipodial bristles shown), mv.

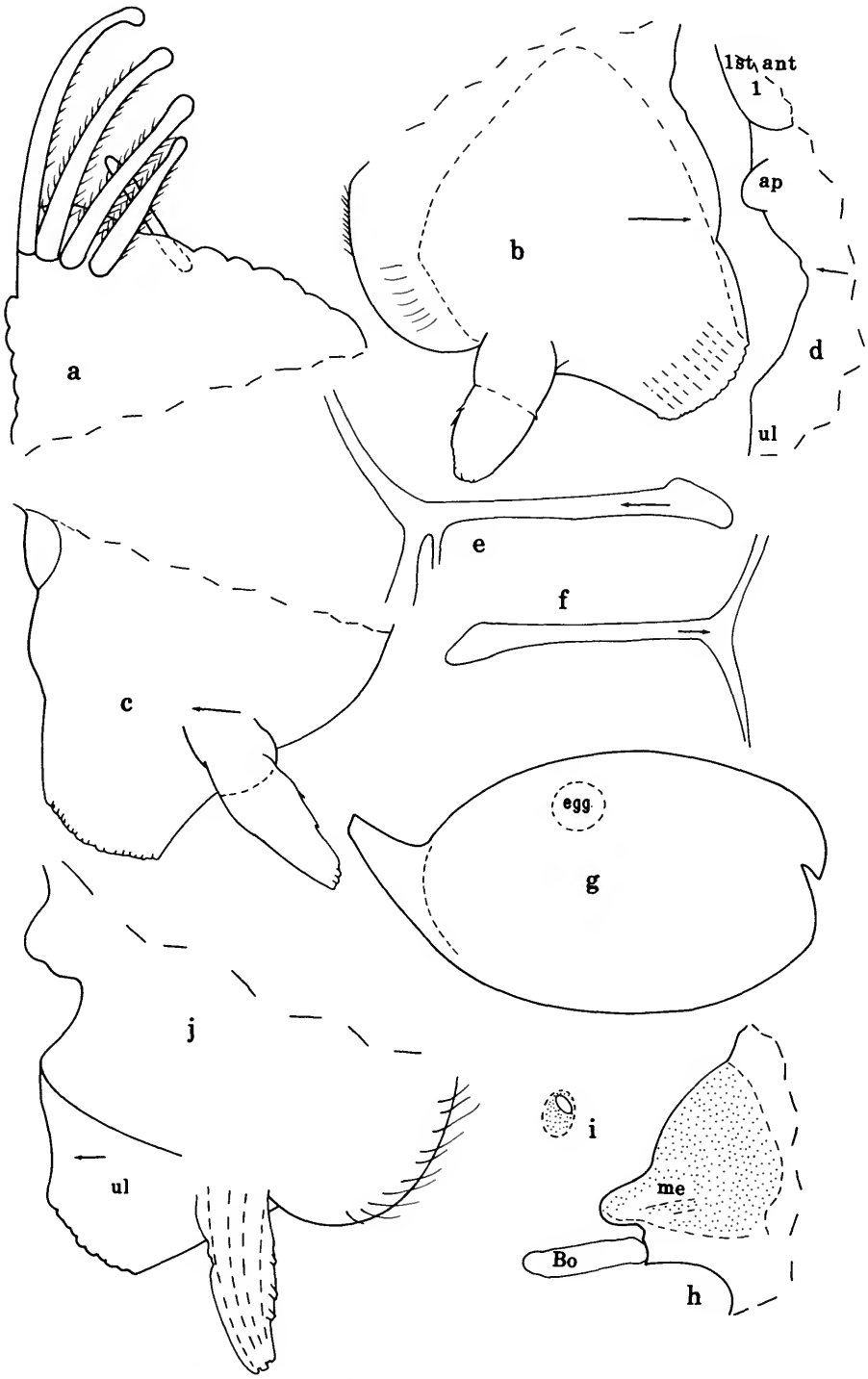


FIGURE 8.—*Metavargula spadix* Kornicker, new species, ovigerous female, paratype, USNM 193852: *a*, tip 7th limb (not all comb teeth shown); *b,c*, upper lip from right side and left side, respectively; *d*, part anterior of body; *e,f*, left and right Y-sclerites, respectively, lv. Ovigerous female, paratype, USNM 194001: *g*, complete specimen, length 3.55 mm; *h*, medial eye and Bellonci organ (area of brown pigment stippled); *i*, right lateral eye (area of reddish brown pigment stippled); *j*, upper lip from left side.

Furca (Figure 6*j*): Each lamella with 8 articulated claws decreasing in length and width posteriorly; each claw with teeth of similar length along posterior edge; claw 1 with medial teeth (distal teeth stouter); right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figures 6*i*, 8*h*): Cylindrical with rounded tip.

Eyes: Medial eye well developed, light amber colored (Figures 6*i*, 8*h*). Lateral eye small with 1–6 small cells and reddish brown pigment (Figures 6*k,l*, 8*i*); eye generally visible through shell.

Upper Lip (Figure 8*c,j*): Anterior undivided part with small terminal glandular processes; long tusks with fairly straight posterior edge and few small glandular openings. Right tusk of USNM 193852 may be aberrant, being shorter than left tusk and having internal horizontal sclerite at about midlength (Figure 8*b*).

Genitalia: Oval with attached spermatophore on each side of body anterior to base of furca.

Anterior of Body (Figure 8*d*): With rounded anterior process.

Posterior of Body: Evenly rounded, bare.

Y-*Sclerite*: Typical for family (Figure 8*f*). Left sclerite of USNM 193852 aberrant in having 2 ventral branches (Figure 8*e*).

Eggs: USNM 193852 with 16 eggs in single cluster in marsupium (7 shown in Figure 6*a*). Length of eggs 0.35–0.45 mm. USNM 194001 with 16 eggs in marsupium; lengths of 3 eggs 0.38 mm, 0.40 mm, 0.46 mm.

DESCRIPTION OF ADULT MALE (Figure 9).—Carapace smaller than that of female but with a similar shape (Figure 9*a*).

Infold: Rostral infold with 13 or 14 bristles (some divided) in row along anterior and ventral margins, 1 divided bristle at midwidth, 1 pair of divided bristles near inner end of incisur, and 1 short bristle set back from incisur. Anteroventral and anterior half of ventral infold with 1 short bristle near inner end of incisur and 1 longer bristle near outer edge of valve, then about 13 short bristles along list; about 8 bristles present along list anterior to broad posteroventral list anterior to caudal process; posterior edge of flange of broad list anterior to caudal process with 12–14 pore openings emerging on small processes; 6–11 minute bristles present just proximal to posterior edge of flange (3–6 of the minute bristles in vicinity of pore openings); several minute bristles scattered on infold of narrow caudal process.

Selvage: Similar to that of adult female.

Carapace Size (length, height in mm): Slope 81: USNM 194002, 2.70, 1.39, height 51% of length; NMV J35992, 2.71, 1.46, height 54% of length.

First Antenna (Figure 9*b*): Joints 1–4 similar to those of adult female. Sensory bristle of 5th joint with 7 proximal broad flat filaments followed by 2 slender filaments and bifurcate tip (not all filaments shown). 6th joint with short medial bristle. 7th joint: a-bristle about 1/4 longer than bristle of 6th joint; b-bristle about 3 times length of a-bristle, with 4 filaments (stout proximal filament with bulbous proximal part followed by large sucker and small protuberance (only proximal filament shown); 2nd filament slender with small spine and 2 small suckers; 3rd filament slender with small spine and 2 small suckers; 4th filament slender bare) and undivided tip; c-bristle about 4 times length of b-bristle, with 8 filaments (proximal filament similar to that of b-bristle but with larger sucker, followed by 2 slender filaments each with small spine and 2 small suckers, then 1 slender filament with 3 small proximal spines, and 4 slender bare filaments (only proximal filament shown)) and bifurcate tip. 8th joint: d- and e-bristles slightly longer than b-bristle, bare, with blunt tips; f-bristle about 3 times length of b-bristle, with 8 filaments, some with spines, and bifurcate tip; g-bristle about same length as c-bristle, with 8 filaments, some with spines, and bifurcate tip.

Second Antenna: Protopodite and endopodite similar to those of adult female. Exopodite: Basal spines on joints 4–8; spine of 8th joint same length as 9th joint; lateral spine of 9th joint bifurcate, about 1/2 length of joint; exopodite otherwise similar to that of adult female.

Mandible: Coxale endite with 2 terminal spines closely spaced and without peg between them. 2nd endopodial joint: Medial bristle of terminal pair on ventral margin with 10 spines; dorsal margin with 14 bristles (5 long, 2 medium, 7 short). Limb otherwise similar to that of adult female.

Maxilla: Endite I with 10 bristles. 2nd endopodial joint (USNM 194002): Left limb with 3 c-bristles, right limb with 2. Limb otherwise similar to that of adult female.

Fifth Limb: Epipodial bristles not counted. Endite I with 6 spinous bristles; endite II with 5 spinous bristles; endite III with 1 small anterior bristle (could be on endite II) and 6 longer spinous bristles. 4th exopodial joint with 2 bristles with short spines. Right limb of USNM 194002 with row of 3 anterior bristles on 2nd exopodial joint but without 4th bristle close to protopodial tooth (4th bristle present on left limb). Limb otherwise similar to that of adult female.

Sixth Limb: With 2 or 3 epipodial bristles. Endites similar to those of adult female. End joint with 7 or 8 bristles with long proximal and short distal spines, then space and 3 bristles (anterior with long proximal and short distal spines, others plumose). Limb hirsute.

Seventh Limb: USNM 194002: One limb with 19 bristles (terminal group with 7 bristles on comb side and 6 on peg side; proximal group with 2 bristles on comb side and 4 on peg side); other limb with 18 bristles (terminal group with 7 bristles on comb side and 6 on peg side; proximal group with 2 bristles on comb side and 3 on peg side). Each bristle with up to 6 bells. Comb with 3 slender ringed spinous teeth with recurved slightly bulbous tips; single slender peg opposite comb.

Furca, Bellonci Organ (Figure 9*c,d*), *and Upper Lip* (Figure 9*e*): Similar to those of adult female.

Eyes (Figure 9*c,d*): Similar to those of adult female.

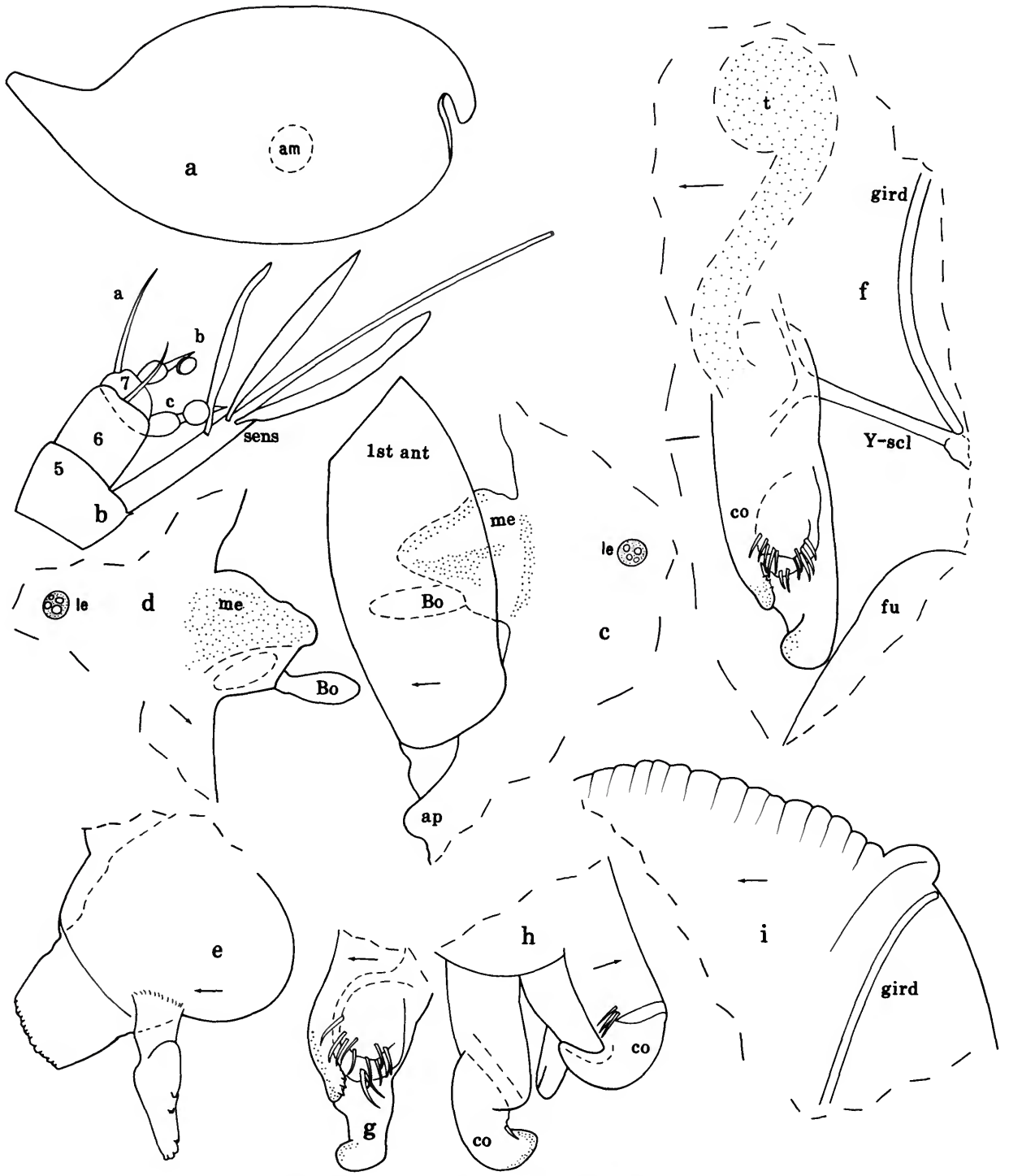


FIGURE 9.—*Metavargula spadix* Kornicker, new species, adult male, paratype, USNM 194002: *a*, complete specimen, length 2.70 mm; *b*, distal left 1st antenna (not all filaments of sensory bristle of 5th joint shown; only proximal filaments of b- and c-bristles shown; no bristles of 7th joint shown), mv; *c*, dorsal part anterior of body (pigment area stippled); *d*, right lateral eye, medial eye, and Bellonci organ (pigment area stippled); *e*, upper lip; *f*, part posterior of body; *g*, tip copulatory limb; *h*, tips copulatory limbs (nabs); *i*, posterodorsal corner of body.

Lateral eye of USNM 194002 with 4 small cells and brown pigment.

Genitalia (Figure 9*f–h*): Each copulatory limb with 3 lobes (finger-like lobe with 3 small teeth; shortest lobe with numerous bristles; longest lobe with stout recurved terminal process).

Anterior of Body (Figure 9*c*) *and* Y-*Sclerite* (Figure 9*f*): Similar to those of adult female.

Posterior of Body (Figure 9*i*): Dorsal part of body anterior to dorsal end of girdle with about 20 narrow crenulations (not all shown).

COMPARISONS.—The 2nd endopodial joint of the mandible of *M. spadix* differs from that of previously described species in having 3 instead of 4 distal ventral bristles (1 single + 1 pair) (Figure 7*d*). The posterior edge of the list on the infold of the caudal process of the female is either smooth or has processes less produced than on previously described species.

Metavargula calix Kornicker, new species

FIGURE 10

Metavargula species A, Kornicker, 1994, fig. 110ff.

ETYMOLOGY.—From the Latin *calix* (cup).

HOLOTYPE.—NMV J37160, adult female on slide and in alcohol.

TYPE LOCALITY.—Slope 32, 38°21.90′S, 149°20.00′E, Victoria, S of Point Hicks; depth 1000 m.

PARATYPES.—None.

DISTRIBUTION.—Slope 32, 1000 m.

DESCRIPTION OF ADULT FEMALE (Figure 10).—Carapace oval with small incisur and upsweeping caudal process (Figure 10*a*).

Infold: Narrow list with anterior end at about midheight of anteroventral margin continues along ventral infold to point about 2/3 valve length then broadens to form flange along posteroventral infold and infold of caudal process (Figure 10*b–e*). Rostral infold with 18 bristles (mostly divided) in row along anterior and ventral margins, 1 long and 2 short divided bristles at midwidth, 1 small bristle proximal to inner end of incisur, and 1 pair of bristles at inner end of incisur. Anteroventral infold with 4 long divided bristles near valve edge (Figure 10*b*). Anteroventral and ventral infolds with small bristles along list, between list and valve edge, and between list and inner margin of infold. Broad flange of list anterior to caudal process similar to that of *M. spadix* except pores along posterior edge exit on small processes (Figure 10*d,e*).

Selvage: Similar to that of *M. spadix*.

Carapace Size (length, height in mm): NMV J37160 (holotype), 5.12, 3.09; height 60% of length.

First Antenna: Joints 1–6 similar to those of *M. spadix*. 7th joint: a-bristle almost twice length of bristle of 6th joint, with few spines; b-bristle about 1/3 longer than a-bristle, with 4 slender filaments, some with spines; c-bristle long with 7 filaments (some with spines) and probably bifurcate tip (tip missing on both limbs of holotype). 8th joint: d-and e-bristles longer than b-bristle, bare with blunt tips; f-bristle shorter than c-bristle, with 9 marginal filaments (some with spines) and bifurcate tip; g-bristle about same length as c-bristle, with 9 marginal filaments (some with spines) and bifurcate tip.

Second Antenna: Protopodite and endopodite similar to those of *M. spadix* (Figure 10*f*). Exopodite: Bristle of 2nd joint reaching 9th joint, with 3 or 4 minute proximal hair-like dorsal spines and about 40 ventral spines (proximal 2 or 3 hair-like) (Figure 10*g*); bristles of joints 3–9 and spines of joints 1–9 similar to those of *M. spadix*.

Mandible: Coxale, basale, exopodite, and 1st and 3rd endopodial joints similar to those of *M. spadix*. 2nd and 3rd endopodial joints missing on right limb of holotype. 2nd endopodial joint (left limb of holotype): 3 bristles of ventral margin (1 single, 2 paired) similar to those of *M. spadix;* dorsal margin with 21 bristles (5 long spinous bristles, 3 medium length, and 13 short spinous medial).

Maxilla (Figure 10*h,i*): Protopodite with plumose dorsal bristle. Endite I with 11 spinous bristles; endite II obscured; endite III obscured, but with 1 proximal and about 5 distal bristles. Basale with ventral bristle reaching past distal end of 1st endopodial joint. Exopodite and 1st endopodial joint similar to those of *M. spadix* except inner beta-bristle bare. 2nd endopodial joint similar to that of *M. spadix* except smallest c-bristle with few spines.

Fifth Limb: Epipodial appendage with 62 plumose bristles. Protopodial tooth and 1st and 2nd exopodial joints similar to those of *M. spadix*, except proximal triangular tooth of main tooth without spines. 3rd exopodial joint similar to that of *M. spadix* except outer unringed bristle of inner lobe with few spines, and both bristles of outer lobe of both limbs with long proximal hairs. 4th exopodial joint with 4 bristles (bare or with short spines). 5th exopodial joint fused to 4th, with 2 bristles (bare or with short spines); very small spinous process at corner near 4th joint.

Sixth Limb (Figure 10*j*): With 6 bare epipodial bristles; small sclerotized boss on posterior edge lateral to proximal bristle. Endite I with 2 or 3 medial bristles and 1 long terminal bristle; endite II with 4 medial bristles and 2 long terminal bristles; endites III and IV each with 3 terminal bristles (middle bristle shorter). End joint with 15 bristles with long proximal and short distal spines (2 near anterior smaller), then space and 3 bristles (anterior with long proximal and short distal spines, others plumose). Limb hirsute. (Not all bristles shown.)

Seventh Limb: Holotype: One limb with 33 bristles (terminal group with 10 bristles on comb side and 9 on peg side; proximal group with 6 bristles on comb side and 8 on peg side); other limb with 36 bristles (terminal group with 10 bristles on comb side and 11 on peg side; proximal group with 6 bristles on comb side and 9 on peg side). Each bristle with up to 7 bells. Comb with 16 slender ringed spinous teeth with recurved slightly bulbous tips. Single ringed spinous peg with slightly bulbous tip opposite comb (Figure 10*k*). Spines of comb teeth and peg visible only at high magnification (×100

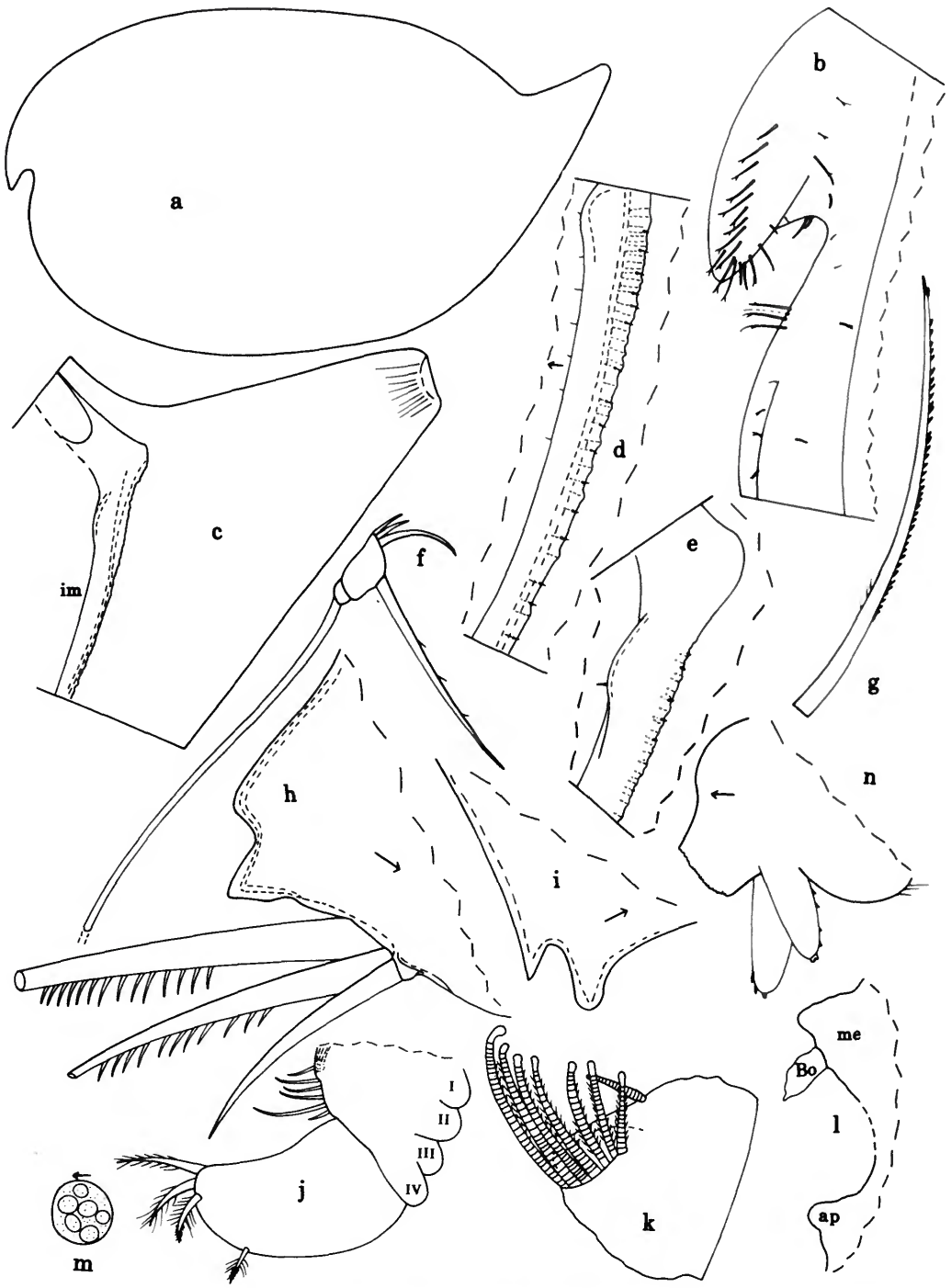


FIGURE 10.—*Metavargula calix* Kornicker, new species, adult female, holotype, NMV J37160: *a*, complete specimen, length 5.12 mm; *b*, anterior right valve, iv; *c*, caudal process right valve, iv; *d*, detail from *c*; *e*, detail from dorsal end of *d*; *f*, endopodite right 2nd antenna, mv; *g*, bristle 2nd joint exopodite left 2nd antenna, mv; *h*, cutting tooth and beta-bristles 1st endopodial joint right maxilla, lv; *i*, cutting tooth 1st endopodial joint left maxilla, mv; *j*, left 6th limb (nabs), mv; *k*, tip 7th limb (not all comb teeth shown); *l*, medial eye, Bellonci organ, and anterior process; *m*, left lateral eye (area of reddish brown pigment stippled); *n*, upper lip showing both left and right tusks.

objective, ×15 ocular).

Furca: Similar to that of *M. spadix.*

Bellonci Organ (Figure 10*l*): Cylindrical with small process at tip.

Eyes: Medial eye well developed, light amber color (Figure 10*l*). Lateral eye small with 5 or 6 minute cells and reddish brown pigment (Figure 10*m*); eye generally visible through shell.

Upper Lip (Figure 10*n*): Similar to that of *M. spadix.*

Genitalia: Oval on each side of body anterior to base of furca.

Anterior of Body (Figure 10*l*): With small rounded anterior process.

Posterior of Body: Evenly rounded, bare.

Y-*Sclerite:* Typical for family, with 1 ventral and 1 dorsal branch.

COMPARISONS.—The carapace of *M. calix* differs from that of *M. spadix* in being larger (length 5.12 mm compared to 3.73 mm) and in having stouter processes along the posterior edge of the flange of the broad list anterior to the caudal process; the appendages differ in having 6 rather than 3 epipodial bristles on the 6th limb and 15 rather than 6–9 teeth in the comb of the 7th limb. *Metavargula calix* differs from *M. adinothrix* Kornicker, 1975:131, in having 2 rather than 3 cusps on the cutting tooth of the maxilla, 5 rather than 6 pectinate teeth on the main tooth of the 5th limb, 6 rather than 10 epipodial bristles on the 6th limb, and 33–36 rather than 51 bristles on the 7th limb.

Metavargula apex Kornicker, new species

FIGURES 11, 12

Metavargula species D, Kornicker, 1994, fig. 110jj-ll.

ETYMOLOGY.—From the Latin *apex* (tip, top).

HOLOTYPE.—NMV J35987, undissected adult female.

TYPE LOCALITY.—Slope 56, 34°55.79'S, 151°08.06'E, New South Wales, 44 km E of Nowra; depth 429 m.

PARATYPES.—Slope 46: USNM 193854, 1 ovigerous female on slide and in alcohol. Slope 56: USNM 193950, 1 adult male on slide and in alcohol; USNM 193951, 1 adult female on slide and in alcohol; NMV J37159, 2 ovigerous females plus 3 juveniles in alcohol.

DISTRIBUTION.—Slope 46, 720 m. Slope 56, 429 m.

DESCRIPTION OF ADULT FEMALE (Figures 11, 12*a–c*).—Carapace oval with small incisur and upsweeping caudal process (Figure 11*a*). Outer surface of shell with weakly developed scallops in posterior part (Figure 11*b*).

Infold: Narrow list with anterior end at about midheight of anteroventral margin continues along ventral margin to point about $^2/_3$ valve length, then broadens to form flange along posteroventral infold and infold of caudal process (flange broadest along anterior edge of caudal process). Rostral infold with 12 bristles (mostly divided) in row along anterior and ventral margins, 1 long divided bristle at midwidth, 0 or 1 small bristle at midheight near inner margin of infold, 1 small bristle proximal to inner end of incisur, and 1 pair of bristles near inner end of incisur (in Figure 11*c* some bristles represented by sockets). Anteroventral and anterior half of ventral infold with 14 bristles (all except anterior 2 with base along narrow list; anterior 3 bristles of left valve shown in Figure 11*c*). Ventral infold between valve midlength and anterior end of flange with about 7 bristles along list and 4 bristles along inner margin. Posterior edge of posteroventral infold and infold of caudal process with about 10 minute bristles (not shown). Posterior edge of flange anterior to caudal process with 16–18 minute pore openings, each on small process (Figure 11*d*); anterior edge of flange with 3 small bristles and narrow bulge near dorsal end (Figure 11*d*). Ventral infold just anterior to caudal process with 1 small bristle near outer edge.

Selvage: Similar to that of *M. spadix.*

Carapace Size (length, height in mm): Slope 46: USNM 193854, 2.97, 1.64, height 55% of length. Slope 56: USNM 193951, 2.84, 1.52, height 54% of length; NMV J37159 (both specimens), 2.91, 1.57, height 54% of length; 2.94, 1.58, height 54% of length (specimen 1); NMV J35987 (holotype), length 2.85, 1.61, height 56% of length. Length range 2.84–2.97; height range 1.52–1.61.

First Antenna: Joints 1–6 similar to those of *M. spadix.* 7th joint: a-bristle about $^1/_3$ longer than bristle of 6th joint; b-bristle about $^1/_3$ longer than a-bristle, with 4 marginal filaments, some with spines; c-bristle long with 8 marginal filaments (some with spines) and bifurcate tip. 8th joint: d-and e-bristles about $^1/_4$ longer than b-bristle, bare with blunt tips; f-bristle about $^2/_3$ length of c-bristle, with 7 marginal filaments (some with spines) and bifurcate tip; g-bristle same length as c-bristle, with 9 marginal filaments (some with spines) and bifurcate tip.

Second Antenna: Similar to that of *M. spadix.*

Mandible: Coxale similar to that of *M. spadix.* Basale of right limb but not of left limb of USNM 193854 and both limbs of USNM 193951 with small c-bristle proximal rather than distal to long bristle (basale otherwise similar to that of *M. spadix*). Exopodite just reaching past distal end of dorsal margin of 1st endopodial joint, slightly shorter than that of *M. spadix* (Figure 11*e*). 1st, 2nd, and 3rd endopodial joints similar to those of *M. spadix,* except 7 dorsal spines on broad medial bristle of terminal pair on ventral margin of 2nd joint of USNM 193854 (Figure 11*f*).

Maxilla: Endite bristles not counted (obscured on USNM 193854) but appearing similar to those of *M. spadix.* Protopodite, basale, and exopodite similar to those of *M. spadix.* 1st endopodial joint: Cutting tooth with 2 (rarely 1) triangular cusps (Figure 11*g,h*); alpha- and beta-bristles similar to those of *M. spadix* except no spines observed on inner beta-bristle. 2nd endopodial joint: 2 posterior a-bristles spinous, next bare or with few proximal spines, and anterior bristle bare; 3 b- and 3 d-bristles similar to those of *M. spadix;* 2 c-bristles ringed pectinate (3rd small bare anterior bristle

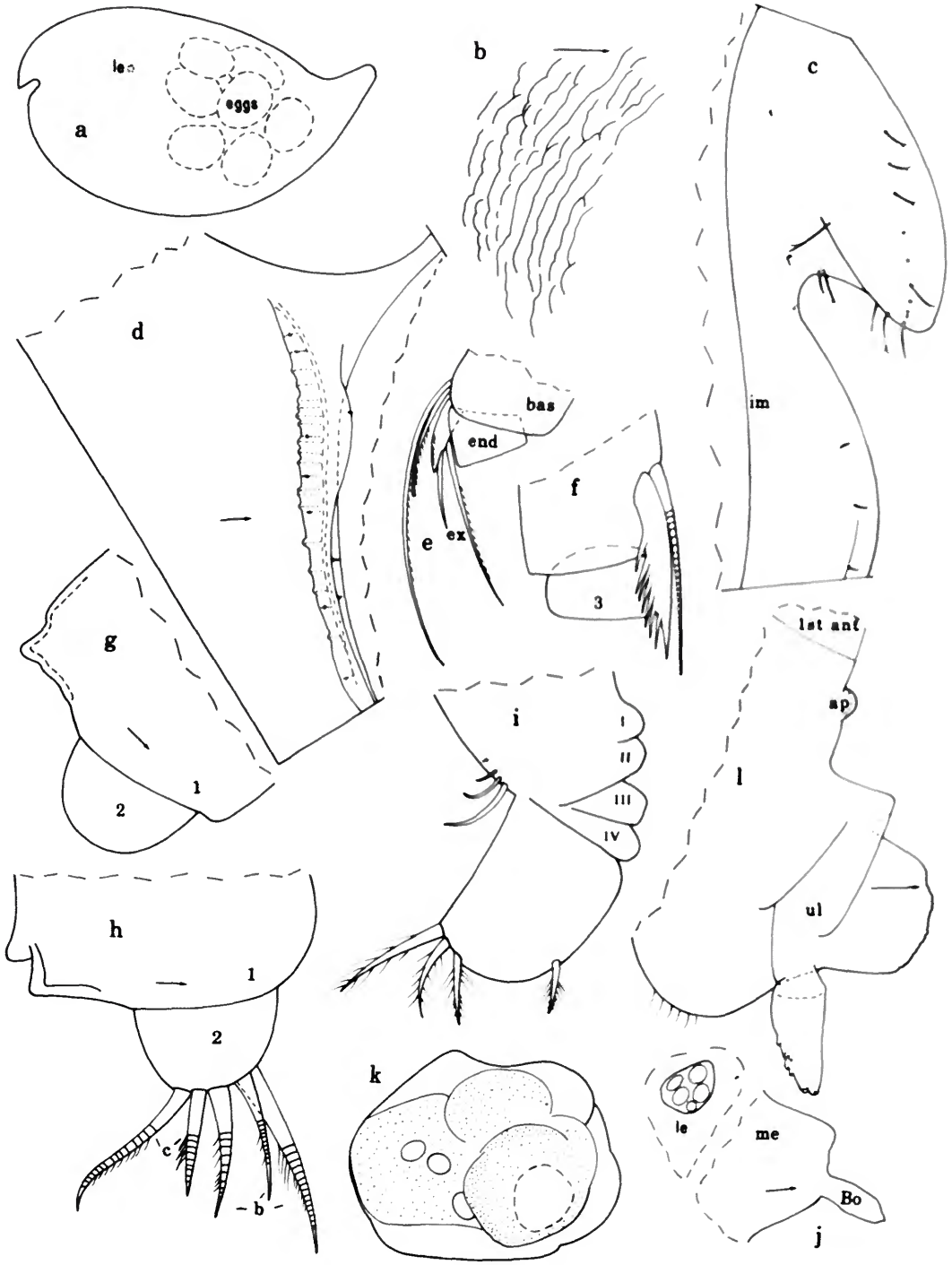


FIGURE 11.—*Metavargula apex* Kornicker, new species, ovigerous female, paratype, USNM 193854: *a*, complete specimen, length 2.97 mm, ov; *b*, surface ornamentation on caudal process right valve, ov; *c*, anterior left valve, iv; *d*, part caudal process left valve, iv; *e*, part right mandible (nabs), mv; *f*, part left mandible (nabs), mv; *g*, distal part right maxilla (nabs), lv; *h*, distal part left maxilla (nabs), mv; *i*, left 6th limb (nabs), mv; *j*, right lateral eye, medial eye, and Bellonci organ, lv; *k*, left lateral eye, lv; *l*, anterior of body from right side.

present on *M. spadix* absent).

Fifth Limb: Epipodite with 60 bristles. Protopodite with short anterior tooth. Endite I with 5 spinous bristles (proximal anterior bristle small); endite II with 5 spinous bristles (proximal anterior bristle small); endite III with 6 spinous bristles. 1st and 2nd exopodial joints similar to those of *M. spadix* except proximal triangular tooth of main tooth may have a minute spine at tip (visible only at high magnification (×100 objective, ×15 ocular)). 3rd exopodial joint similar to that of *M. spadix* except inner bristle of outer lobe with short spines and outer bristle of inner lobe may be bare or have 2 minute spines. 4th and 5th exopodial joints similar to those of *M. spadix* except 4th joint with only 2 bristles, both with short spines.

Sixth Limb (Figure 11*i*): With 3 bare epipodial bristles. Endite I with 2 short medial bristles and 1 long terminal bristle; endite II with 3 short medial bristles and 2 long terminal bristles; endite III with 3 terminal bristles (middle bristle shorter); endite IV with 3 terminal bristles (middle bristle shorter). End joint with 6 or 7 bristles with long proximal and short distal spines (anterior bristle shorter and may be without long spines) followed by space and 3 bristles (anterior of these with long proximal and short distal spines, others plumose). (Not all bristles shown.)

Seventh Limb: USNM 193854: One limb with 16 bristles (terminal group with 6 bristles on comb side and 7 (2 fused in proximal 1/3) on peg side; proximal group with 1 bristle on comb side and 2 on peg side). Other limb with 15 bristles (terminal group with 6 bristles on comb side and 5 on peg side; proximal group with 2 bristles on comb side and 2 on peg side). Each bristle with up to 6 bells. Comb with 4–6 slender spinous ringed teeth with slightly bulbous tips; single slender elongate peg (with slightly bulbous tip) opposite comb. USNM 193951: One limb with 17 bristles (terminal group with 5 bristles on each side; proximal group with 2 bristles on comb side and 5 on peg side). Other limb also with 17 bristles (terminal group with 6 bristles on comb side and 5 on peg side; proximal group with 2 bristles on comb side and 4 on peg side). Each bristle with up to 6 bells. Comb with 6 teeth opposite single peg.

Furca: Similar to that of *M. spadix*.

Bellonci Organ (Figures 11*j*, 12*a*): Cylindrical with minute pointed process at tip.

Eyes: Medial eye well developed, either with brown pigment in area indicated by stippling in Figure 11*j* (USNM 193854), or light amber colored (USNM 193951). Lateral eye of USNM 194854 small with reddish brown pigment obscuring internal structures (pigment appears in 3 poorly defined oval areas containing a total of 4 or 5 small amber cells) (Figure 11*j*,*k*). Lateral eye of USNM 193951 small and containing 2 or 3 oval brown areas (Figure 12*b*).

Upper Lip (Figures 11*l*, 12*c*): Each tusk with small glandular processes projecting from posterior edge and 2 terminal glandular processes.

Genitalia: USNM 193954 with attached spermatophore.

Anterior (Figures 11*l*, 12*a*) *and Posterior of Body:* Similar to those of *M. spadix*.

Y-*Sclerite:* Typical for subfamily.

Eggs: Slope 46: USNM 193854 with 9 eggs (with shells developed) in marsupium (7 shown in Figure 11*a*); length of typical egg 0.53 mm. Slope 56: NMV J37159, 1 specimen with 7 eggs in marsupium (typical length 0.35 mm), and 1 specimen with 5 eggs in marsupium (typical length 0.33 mm).

DESCRIPTION OF ADULT MALE (Figure 12*d*–*k*).—Carapace similar in shape to that of adult female but smaller (Figure 12*d*).

Infold: Posterior edge of flange anterior to caudal process with about 14 small projecting processes. Bristles of infold not counted.

Carapace Size (length, height in mm): USNM 193950, 2.08, 1.08, height 52% of length.

First Antenna (Figure 12*e*): 1st and 2nd joints bare. 3rd joint with terminal ventral bristle and dorsal bristle at 1/4 length of dorsal margin; 4th joint with 2 terminal bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint about 5 times length of a-bristle of 7th joint and stouter proximal to marginal filaments, with 8 proximal broad paddle-like filaments, 2 distal slender bare filaments, and bifurcate tip. Medial bristle of 6th joint close to dorsal margin, bare. 7th joint: a-bristle about 1 1/2 times length of bristle of 6th joint, bare; b-bristle about 3 times length of a-bristle, with 4 filaments (proximal filament stout with bulbous proximal part followed by large sucker and small protuberance; 2nd filament slender with small spine and 2 small suckers; 3rd filament slender with 2 or 3 small suckers; 4th filament short slender bare) and undivided tip; c-bristle about 4 times length of b-bristle, with 8 marginal filaments (proximal filament similar to that of proximal filament of b-bristle but with larger sucker, followed by 2 slender filaments each with 2 small suckers, then 5 slender filaments, each with single marginal spine) and bifurcate tip. 8th joint: d- and e-bristles slightly longer than b-bristle, bare with blunt tips; f-bristle about 3 1/2 times length of b-bristle, with 8 spinous filaments and bifurcate tip; g-bristle same length as c-bristle, with 8 slender spinous filaments and bifurcate tip.

Second Antenna: Protopodite with small swelling at midlength of dorsal margin (also present on protopodite of adult female) and with minute medial distal bristle (Figure 12*f*). Limb similar to that of adult female.

Mandible: Short c-bristle of basale distal to long c-bristle. Dorsal margin of 2nd endopodial joint with only 6 short bristles in addition to 5 long bristles. Limb otherwise similar to that of adult female.

Maxilla: Cutting tooth of 1st endopodial joint bifurcate. Limb similar to that of adult female including having only 2 c-bristles.

Fifth Limb: Proximal tooth of main tooth with or without terminal spine. Outer bristle of inner lobe of 3rd exopodial joint with few spines. Limb otherwise similar to that of adult female.

Sixth Limb: With 2 or 3 epipodial bristles. Endite II with 2 short medial bristles and 1 long terminal bristle; endites I, III, and IV similar to those of adult female. End joint of left limb of

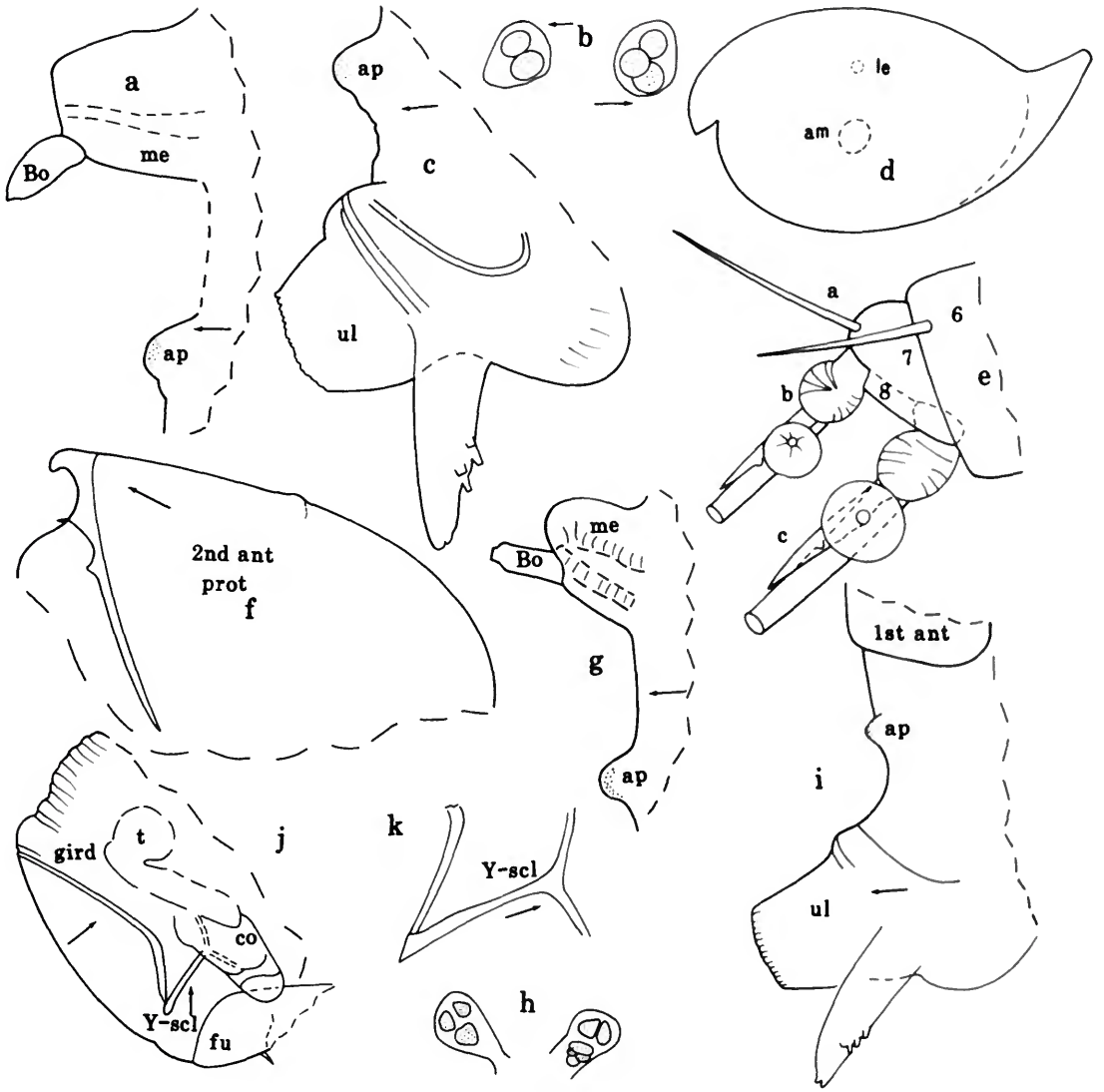


FIGURE 12.—*Metavargula apex* Kornicker, new species, adult female, paratype, USNM 193951: *a*, medial eye and Bellonci organ; *b*, left and right lateral eyes, lv; *c*, upper lip and anterior process, lv. Adult male, paratype, USNM 193950: *d*, complete specimen, length 2.08 mm, ov; *e*, distal part right 1st antenna (nabs), mv; *f*, part protopodite right 2nd antenna, mv; *g*, medial eye and Bellonci organ, lv; *h*, right and left lateral eyes, lv; *i*, upper lip, lv; *j*, posterior of body from right side, lv; *k*, right Y-sclerite, lv.

USNM 193950 with 8 anterior bristles with long proximal and short distal spines followed by space and 3 bristles (anterior of these with long proximal and short distal spines, others plumose); right limb of USNM 193950 differs in having only 6 bristles in anterior group including 1 near anterior end with only short spines. 6th limb of male otherwise similar to that of adult female.

Seventh Limb: USNM 193950, each limb with 13 bristles (10 bristles (4 or 5 on comb side, 5 or 6 on peg side) in terminal group and 3 in proximal group (1 on comb side, 2 on peg side)); each bristle with up to 6 bells. Comb with 4 ringed teeth with slightly bulbous tips; single slender elongate peg (with slightly bulbous tip) opposite comb.

Furca: Similar to that of adult female.

Bellonci Organ (Figure 12*g*): Cylindrical with blunt tip.

Eyes: Medial eye well developed, with light amber color (Figure 12*g*). Lateral eye small with brown pigment in 3 amber colored areas (Figure 12*h*).

Upper Lip (Figure 12*i*): Similar to that of adult female.

Genitalia (Figure 12*j*): Elongate copulatory organ on each

side of body anterior to furca.

Anterior of Body (Figure 12*g,i*): Similar to that of adult female.

Posterior of Body (Figure 12*j*): Dorsal part of body anterior to dorsal end of girdle with about 27 narrow crenulations (not all shown).

Y-*Sclerite* (Figure 12*j,k*): Similar to that of adult female.

COMPARISONS.—The carapace of *M. apex* differs from that of *M. spadix* in having stouter processes along the posterior edge of the flange of the infold anterior to the caudal process; the edge is usually smooth on *M. spadix*. The 7th limb of the female *M. apex* bears 15–17 bristles compared to 24–29 on *M. spadix*. The length of the female *M. calix* is 5.12 mm, much larger than that of *M. apex*, and the 6th limb bears 6 epipodial bristles compared to 3 on *M. apex*. The maxilla of *M. apex* has 2 c-bristles compared to 3 on both *M. spadix* and *M. calix*.

Metavargula currax Kornicker, new species

FIGURE 13

Metavargula species C, Kornicker, 1994, fig. 10hh,ii.

ETYMOLOGY.—From the Latin *currax* (swift).

HOLOTYPE.—NMV J35988, ovigerous female.

TYPE LOCALITY.—Slope 46, 42°00.20′S, 148°37.70′E, Tasmania, off Freycinet Peninsula; depth 720 m.

PARATYPE.—USNM 193857, ovigerous female on slide and in alcohol, in collection of the Museum of Victoria.

DISTRIBUTION.—Slope 46, 720 m.

DESCRIPTION OF ADULT FEMALE.—Carapace similar in shape to that of *M. calix* (Figure 13*a*).

Infold: In general, similar to that of *M. calix* except anteroventral infold with 2 or 3 long bristles rather than 4 (Figure 13*b*), and bulge at dorsal end of anterior edge of flange of caudal process broader (Figure 13*c*).

Selvage: Similar to that of *M. calix*.

Carapace Size (length, height in mm): NMV J35988 (holotype), 4.8, 3.0; height 62% of length. USNM 193857, 5.2, 3.2; height 62% of length.

First and Second Antennae: Similar to those of *M. calix*.

Mandible: Coxale, basale, exopodite, and 1st and 3rd endopodial joints similar to those of *M. calix*. 2nd endopodial joint: Ventral margin differs from that of *M. calix* in having 2 single distal bristles and 1 pair of terminal bristles (medial slightly shorter but broader than lateral, with 7 spines along inner margin); dorsal margin with 17 or 18 bristles (5 long spinous, 2 or 3 medium length, and 10 short spinous medial).

Maxilla: Endite bristles not counted but appearing similar to those of *M. spadix*. Basale similar to that of *M. calix*. Exopodite similar to that of *M. calix* except both terminal bristles with long proximal hairs. 1st endopodial joint with alpha- and beta-bristles similar to those of *M. calix;* cutting tooth bilobed (Figure 13*d*). 2nd endopodial joint with 4 a-bristles (2 anterior bare or with few spines, 2 posterior spinous), 3 pectinate b-bristles, 4 c-bristles (inner small bare, others stout pectinate) (Figure 13*e*), and 3 pectinate d-bristles (only outer bristle ringed). Main difference between maxillae of *M. currax* and *M. calix* is presence of 4 c-bristles on former and 3 on latter.

Fifth Limb: Protopodite and 1st and 2nd exopodial joints similar to those of *M. calix* (c- and d-bristles shown in Figure 13*f,g*). 3rd exopodial joint: Inner lobe with 1 proximal bristle with long proximal hairs and 2 or 3 terminal bristles (both limbs of holotype and 1 of USNM 193857 with 3 terminal bristles); outer lobe with 2 ringed bristles with long proximal hairs. 4th exopodial joint with 4 bristles (bare or with short marginal spines). 5th joint not separated from 4th by suture, with 2 bristles with short marginal spines; small spined process on corner near 4th joint. 3rd–5th joints hirsute.

Sixth Limb: With 6 or 7 epipodial bristles; sclerotized boss proximal to bristles well developed on right limb of holotype (Figure 13*h*), smaller on left limb. Endite I with 3 short medial bristles and 1 long terminal bristle; endite II with 3 or 4 medial and 2 terminal bristles; endites III and IV each with 3 terminal bristles (middle bristle shorter). End joint with 12 or 13 bristles with long proximal and short distal spines (except 1 small lateral bristle near anterior may have only short spines), then space and 3 bristles (anterior with long proximal and short distal spines, others plumose). Limb hirsute.

Seventh Limb: Holotype: One limb with 34 bristles (terminal group with 11 bristles on comb side and 9 on peg side; proximal group with 7 bristles on comb side and 7 on peg side). Other limb with 34 bristles (terminal group with 11 bristles on comb side and 9 on peg side; proximal group with 5 bristles on comb side and 9 on peg side). Each bristle with up to 8 bells. Comb with 9 or 10 slender ringed spinous teeth with recurved slightly bulbous tips. Single ringed peg with slightly bulbous tip opposite comb. USNM 193857: One limb with 33 bristles (terminal group with 11 bristles on comb side and 10 on peg side; proximal group with 5 bristles on comb side and 7 on peg side); other limb with 37 bristles (terminal group with 11 bristles on comb side and 10 on peg side; proximal group with 7 bristles on comb side and 9 on peg side). Each bristle with up to 7 bells. Comb with 10 or 11 spinous teeth opposite single peg with indistinct spines.

Furca: Similar to that of *M. spadix*.

Bellonci Organ (Figure 13*i*): Cylindrical with small process at tip.

Eyes: Medial eye well developed, with brown pigmentation along center line (Figure 13*i*). Lateral eye with brown pigment and about 3 indistinct ovals (ommatidia?) (Figure 13*i*).

Upper Lip (Figure 13*j*): Tusks with low lateral projection along distal $^2/_3$ bearing numerous small glandular openings.

Genitalia: Oval bearing round spermatophore on each side of body anterior to furca.

Anterior and Posterior of Body: Similar to those of *M. calix*.

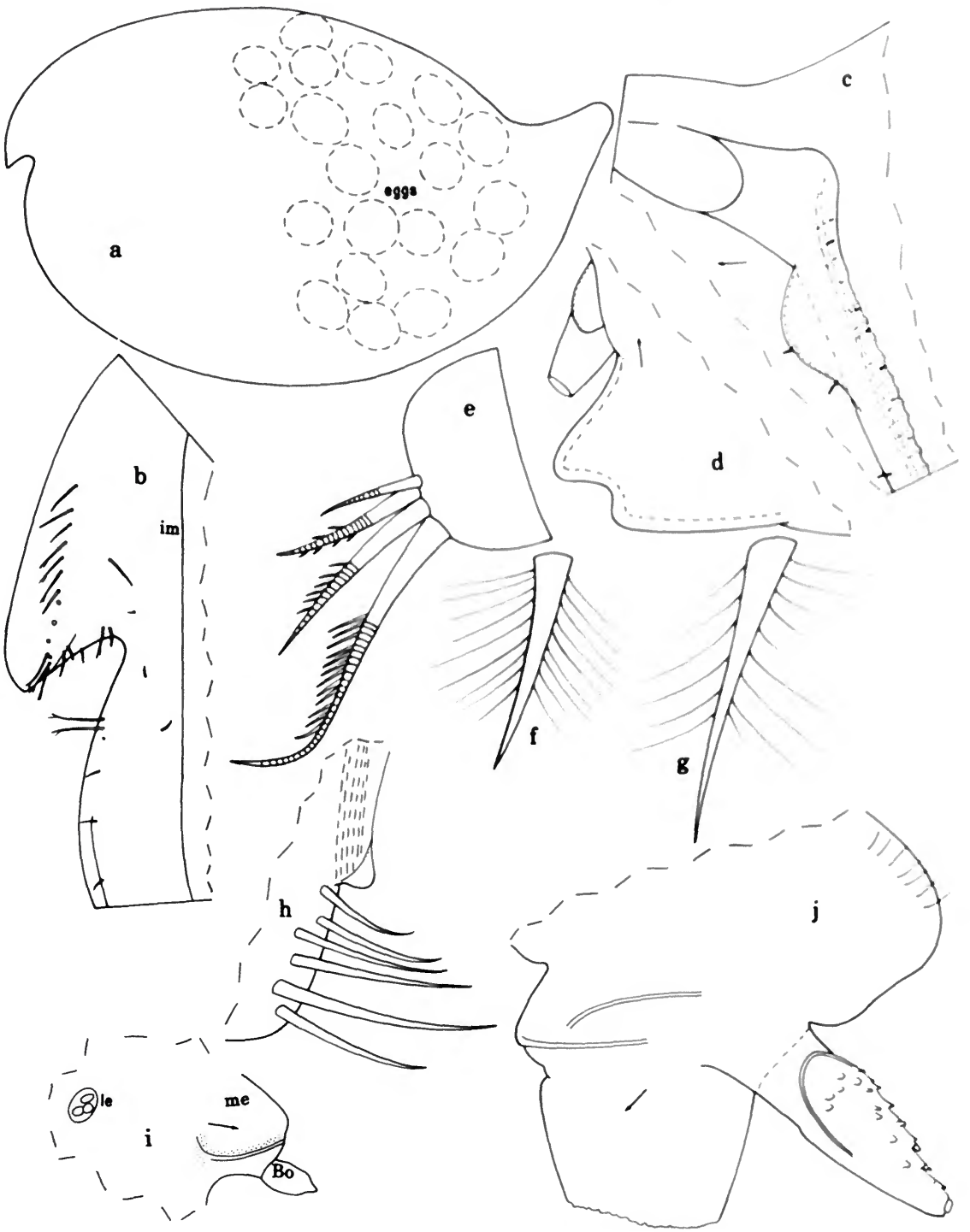


FIGURE 13.—*Metavargula currax* Kornicker, new species, ovigerous female, holotype, NMV J35988: *a*, complete specimen, length 4.8 mm; *b*, anterior right valve, iv; *c*, dorsal end of list of caudal process left valve, iv; *d*, cutting tooth and stump of beta-bristle 1st endopodial joint right maxilla, mv; *e*, c-bristles 2nd endopodial joint right maxilla, mv; *f,g*, c- and d-bristles, respectively, left 5th limb, av; *h*, epipodial bristles right 6th limb, mv; *i*, right lateral eye, medial eye, and Bellonci organ, lv; *j*, upper lip, lv.

Y-*Sclerite:* Typical for subfamily.

Eggs: Holotype with 42 eggs in marsupium (not all shown in Figure 13*a*); length of typical egg 0.52 mm. USNM 193857 with 32 eggs in marsupium; length of typical egg 0.52 mm.

COMPARISONS.—*Metavargula currax* differs from *M. calix* mainly in having 2 single bristles rather than 1 on the ventral margin of the 2nd endopodial joint of the mandible. The comb of the 7th limb of *M. currax* bears 9–11 teeth compared to 15 teeth on *M. calix*, and the maxilla bears 4 c-bristles compared to 3 on *M. calix*.

Metavargula procax Kornicker, new species

FIGURES 14, 15

Metavargula species E, Kornicker, 1994, fig. 110 mm,nn.

ETYMOLOGY.—From the Latin *procax* (bold, forward, impudent).

HOLOTYPE.—NMV J35989, adult female on slide and in alcohol.

TYPE LOCALITY.—Slope 32, 38°21.90'S, 149°20.00'E, Victoria, S of Point Hicks; depth 1000 m.

PARATYPES.—None.

NONTYPES.—Slope 33: USNM 193855, adult male. Because of uncertainty whether male goes with female, the male is not designated paratype.

DISTRIBUTION.—Slope 32, 1000 m. Slope 33, 930 m.

DESCRIPTION OF ADULT FEMALE (Figure 14).—Carapace similar to that of *M. currax* (Figure 14*a–c*).

Carapace Size (length, height in mm): NMV J35989 (holotype), 4.04, 2.49; height 62% of length.

First and Second Antennae: Similar to those of *M. calix*.

Mandible: Coxale, basale, exopodite, and 1st and 3rd endopodial joints similar to those of *M. calix*. 2nd endopodial joint: Ventral margin with 2 single distal bristles and 2 paired terminal bristles (medial about same length as lateral but broader and with about 5 stout dorsal spines).

Maxilla: Endite bristles not counted. Protopodite, basale, exopodite, and 1st endopodial joint (tooth shown in Figure 14*d*) similar to that of *M. calix*. 2nd endopodial joint similar to that of *M. calix* except with only 2 c-bristles (both stout, pectinate; small bristle not present).

Fifth Limb: Epipodial bristles not counted. Protopodial tooth and 1st, 2nd, 4th, and 5th exopodial joints similar to those of *M. calix*. 3rd exopodial joint differs from *M. calix* in having only outer bristle of outer lobe with long hairs, but only left limb observed.

Sixth Limb: With 3 bare epipodial bristles; small sclerotized boss on margin just proximal to bristles. Endite I with 2 bristles (1 medial, 1 terminal); endite II with 3 or 4 medial and 2 terminal bristles; endite III with 2 or 3 terminal bristles; endite IV with 3 terminal bristles (middle bristle shorter). End joint with 9 bristles with long proximal and short distal spines (1 bristle near anterior shorter, lateral), then space and 3 bristles (anterior with long proximal and short distal spines, others plumose). Limb hirsute. Right limb of holotype aberrant in having only 2 bristles following space on end joint (1 with spines, 1 plumose).

Seventh Limb: One limb with 28 bristles (terminal group with 8 bristles on comb side and 8 on peg side; proximal group with 5 bristles on comb side and 7 on peg side); other limb with 25 bristles (terminal group with 6 bristles on comb side and 6 on peg side; proximal group with 5 bristles on comb side and 8 on peg side). Each bristle with up to 6 bells. Comb with 15 slender ringed spinous teeth with recurved slightly bulbous tips. Single ringed spinous peg with slightly bulbous tip opposite comb.

Furca, Bellonci Organ, Eyes (Figure 14*e*), *Upper Lip* (Figure 14*f*), *Genitalia, Anterior and Posterior of Body, and* Y-*Sclerite:* Similar to those of *M. currax*.

Parasites: Holotype with female choniostomatid in marsupium.

DESCRIPTION OF PRESUMED ADULT MALE (Figure 15).—Carapace similar to that of adult female but smaller (Figure 15*a*), and without bulge near dorsal end of anterior edge of flange of caudal process.

Infold: Posterior edge of flange at anterior edge of caudal process with numerous canals leading to pores at the tips of small processes as on adult female.

Carapace Size (length, height in mm): Slope 33: USNM 193855, 3.38, 2.03; height 60% of length.

First Antenna (Figure 15*b*): 1st and 2nd joints bare. 3rd joint with dorsal bristle at midlength and ventral bristle subterminal. 4th joint with 2 terminal bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint 3 times length of a-bristle of 7th joint, with part proximal to marginal filaments stouter, and 8 proximal broad paddle-like filaments, 2 slender bare distal filaments (each with terminal papilla), and bifurcate tip. Medial bristle of 6th joint close to dorsal margin, bare. 7th joint: a-bristle almost twice length of bristle of 6th joint, spinous; b-bristle about $2^1/_2$ times length of a-bristle, with 4 filaments (proximal filament stout with bulbous proximal part followed by large sucker and small protuberance; 2nd and 3rd filaments slender, each with 1 small sucker; 4th filament slender bare) and bifurcate tip; c-bristle 3 times length of b-bristle, with 8 filaments (proximal filament similar to stout proximal filament of b-bristle but with larger sucker, followed by 2 slender filaments each with single small sucker, then 5 slender bare filaments) and bifurcate tip. 8th joint: d- and e-bristles slightly shorter than b-bristle, bare with blunt tips; f-bristle about $2^1/_2$ times length of b-bristle, with 8 spinous filaments and bifurcate tip; g-bristle same length as c-bristle, with 8 spinous filaments and bifurcate tip.

Second Antenna: Protopodite and endopodite similar to those of adult female. Exopodite: Bristle of 2nd joint reaching well past 9th joint, with 2 small proximal dorsal spines and about 30 ventral spines (proximal 1 or 2 smaller than others; last spine stouter than others); bristles of joints 3–9 similar to those of adult female *M. calix;* joints 3–8 with basal spines longer on distal joints; basal spine of 8th joint slightly shorter

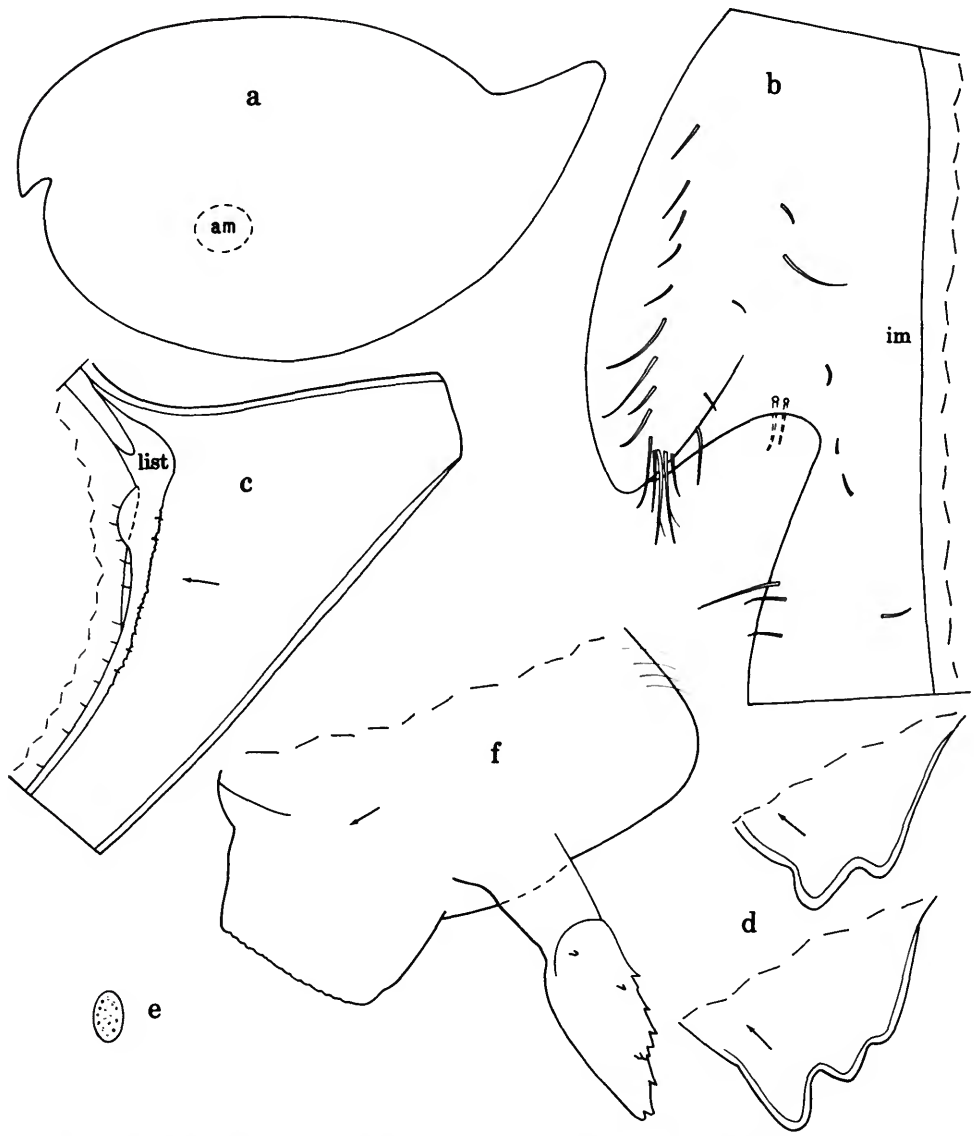


FIGURE 14.—*Metavargula procax* Kornicker, new species, ovigerous female, holotype, NMV J35989: *a*, complete specimen, length 4.04 mm, ov; *b*, anterior right valve, iv; *c*, posterior right valve, iv; *d*, cutting teeth of left (lv) and right (mv) maxillae; *e*, right lateral eye; *f*, upper lip, lv.

than length of 9th joint; lateral spine of 9th joint about 1/3 length of joint.

Mandible: Coxale, basale, and 1st and 3rd endopodial joints similar to those of adult female. 2nd endopodial joint: ventral margin spinous, with 2 single bare ringed bristles followed by terminal paired bristles (medial broad unringed with about 7 dorsal spines; lateral slender bare ringed, and slightly longer); dorsal margin with 15–20 bristles (4 or 5 long spinous, 2 or 3 medium, 9–12 short, most with spines) proximal to midlength.

Maxilla (Figure 15*c*): Precoxale with fringed dorsal flare. Coxale with hirsute dorsal bristle. Endite I with 11 spinous bristles; endite II with 5 spinous bristles; endite III with 1 proximal and 5 terminal bristles (proximal bristle could be interpreted to be on basale). Basale with small medial bristle at midwidth and 1 long ventral bristle. Exopodite similar to that of

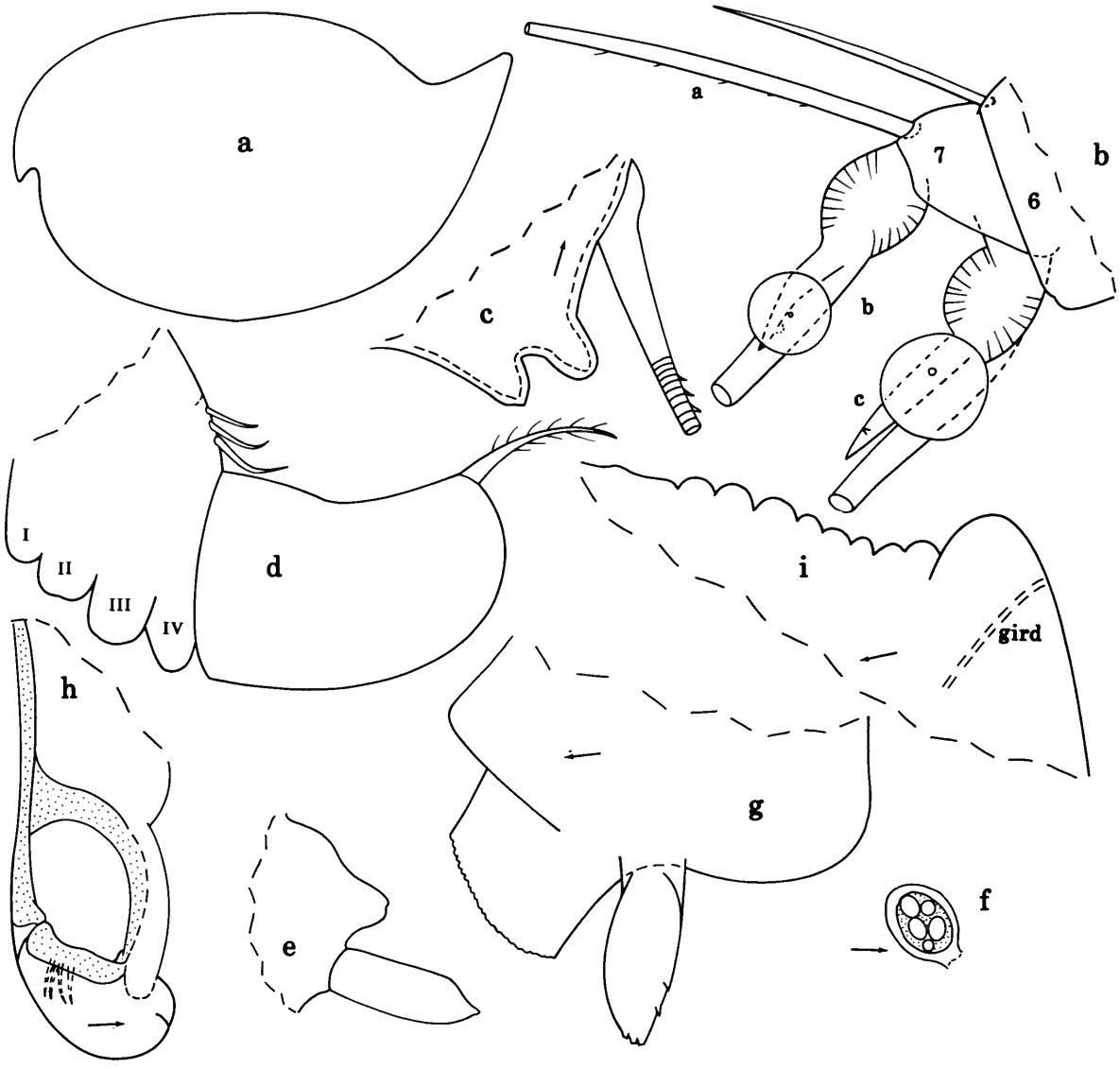


FIGURE 15.—*Metvargula procax* Kornicker, new species, adult male, nontype, USNM 193855: *a*, complete specimen, length 3.38 mm, ov; *b*, distal left 1st antenna (nabs), lv; *c*, cutting tooth and outer beta-bristle left maxilla, mv; *d*, right 6th limb (nabs), mv; *e*, medial eye and Bellonci organ, lv; *f*, right lateral eye, lv; *g*, upper lip, lv; *h*, left copulatory organ; *i*, posterodorsal part of body, lv.

adult female. 1st endopodial joint with dorsal spines, bilobed cutting tooth (Figure 15*c*), 2 alpha-bristles (outer with long hairs, inner with short hairs) and 3 beta-bristles similar to those of adult female. 2nd endopodial joint similar to that of adult female except spines not observed on 2 anterior a-bristles and with 3 rather than 2 c-bristles (inner (anterior) c-bristle with few spines on 1 limb and bare on other).

Fifth Limb: Epipodite with 66 bristles. Protopodial tooth small. Endite I with 7 spinous bristles; endite II with 5 stout spinous bristles and 1 minute anterior bristle; endite III with 7 spinous and pectinate bristles. 1st exopodial joint: Main tooth with proximal bare triangular tooth and 5 pectinate teeth; bristle with long proximal spines proximal to triangular tooth; anterior side with 3 bristles in row (inner small with long proximal hairs, others with long proximal spines and distal teeth) and 1 (with long proximal hairs) closer to protopodial tooth. 2nd and

inner lobe of 3rd exopodial joints similar to those of adult female. Both bristles of outer lobe of 3rd joint with long proximal hairs on right limb of USNM 193855 and long proximal hairs on only outer bristle of left limb (short spines on inner bristle). 4th exopodial joint with 4 bristles (bare or with short spines). 5th exopodial joint not separated from 4th by suture, with well-developed spinous node on inner corner; limb otherwise similar to that of adult female.

Sixth Limb (Figure 14*d*): With 2 or 3 bare epipodial bristles; small sclerotized boss proximal to epipodial bristles forms base for muscle attachments. Endite I with 3 short spinous medial bristles and 1 long spinous terminal bristle; endite II with 1 (aberrant?) or 3 short spinous medial bristles and 3 spinous terminal bristles; endite III with 3 spinous terminal bristles (middle bristle shorter); endite IV with 3 spinous terminal bristles. End joint with 14 or 15 long marginal bristles (1 of these near anterior end may be smaller and lateral); space present between 11 or 12 anterior bristles and 3 posterior bristles (posterior 2 plumose, others with long proximal and short distal spines). Limb hirsute.

Seventh Limb: USNM 193855: One limb with 20 bristles (terminal group with 8 bristles on comb side and 6 on peg side; proximal group with 3 bristles on each side); other limb with 19 bristles (terminal group with 6 bristles on comb side and 5 on peg side; proximal group with 4 bristles on each side). Each bristle with up to 6 bells. Comb with 8 or 9 slender spinous teeth with recurved slightly spinous tips; single slender elongate peg opposite comb.

Furca: Similar to that of adult female.

Bellonci Organ (Figure 15*e*): Cylindrical with small pointed process at tip.

Eyes: Medial eye well developed, light amber color (Figure 15*e*). Lateral eye small with 5 cells (ommatidia?) and brownish red pigment (Figure 15*f*). Eye generally visible through shell.

Upper Lip: Similar to that of adult female.

Genitalia (Figure 15*h*): Elongate copulatory organ on each side of body anterior to furca.

Anterior of Body: With small rounded anterior process between upper lip and medial eye just ventral to base of 1st antennae.

Posterior of Body (Figure 15*i*): Posterodorsal margin undulate with 8 or 9 low nodes in lateral view. (Prominent node just dorsal to dorsal end of girdle in Figure 15*i* is an artifact caused by collapse of body.)

Y-*Sclerite:* Typical for subfamily.

COMPARISONS.—*Metavargula procax* differs from *M. currax* in having 2 or 3 rather than 6 or 7 epipodial bristles on the 6th limb, and it differs from *M. calix* in having 2 single bristles rather than 1 on the ventral margin of the 2nd endopodial joint of the mandible.

Paradoloria Hanai, 1974

TYPE SPECIES.—*Cypridina dorsoserrata* Müller, 1908 (subsequent designation, Hanai, 1974).

COMPOSITION.—Six species of *Paradoloria* are known from the vicinity of Australia: *Paradoloria australis* Poulsen, 1962:154, and 4 new species, *P. mordax, P. pugnax, P. tryx,* and *P. fax,* and 1 species left in open nomenclature as *Paradoloria* species A. (The genera *Paradoloria* and *Doloria* differ mainly in a male character (endopodite of 2nd antenna) so that several species referred to *Doloria* or *Paradoloria,* but known only from the female, may eventually be transferred when the male becomes known. Adult males are known for the five named species in the vicinity of Australia, and the A–2 male is known for *Paradoloria* species A.)

DISTRIBUTION.—*Paradoloria* is widespread between latitudes of about 40°N and 40°S (Poulsen, 1962, fig. 75) and at depths of 0–1350 m. (Poulsen (1962:154) gives 1350 m as the depth at which *P. australis* was collected; however, Bruun (1959:44) gives 1340–1320 m as the depth for *Galathea* sta 554 (Great Australian Bight), the station at which the species was collected.)

Key to Species of *Paradoloria* in Vicinity of Australia

(Adults except *Paradoloria* species A)

1. Lateral eye large with more than 20 ommatidia . . . . . ***P.*** species A
   Lateral eye small with fewer than 10 ommatidia 2
2. Furcal claw 4 shorter and narrower than claw 5 3
   Furcal claw 4 not shorter and narrower than claw 5 4
3. Main tooth of 5th limb with 5 pectinate teeth . . . . . ***P. fax,*** new species
   Main tooth of 5th limb with 6 pectinate teeth . . . . . ***P. australis***
4. Carapace longer than 4 mm . . . . . ***P. tryx,*** new species
   Carapace shorter than 3.7 mm 5
5. Lateral eye small but with brown pigment visible through shell; main tooth of 5th limb with 5 pectinate teeth . . . . . ***P. pugnax,*** new species
   Lateral eye small, not visible through shell; main tooth of 5th limb with 6 pectinate teeth . . . . . ***P. mordax,*** new species

Paradoloria mordax Kornicker, new species

FIGURES 16–20, 24*a*

Paradoloria species B, Kornicker, 1994, figs. 109a, 110r,s.

ETYMOLOGY.—From the Latin *mordax* (biting, corroding, pungent).

HOLOTYPE.—NMV J35999, adult male in alcohol.

TYPE LOCALITY.—Slope 32, 38°21.90′S, 149°20.00′E, Victoria, S of Point Hicks; depth 1000 m.

PARATYPES.—Slope 32: USNM 193848, 193849, 2 adult females on slides and in alcohol; USNM 193851, 1 adult male on slide and in alcohol; NMV J36000, 4 adult males and 4 ovigerous females in alcohol.

DISTRIBUTION.—Slope 32, 1000 m.

DESCRIPTION OF ADULT MALE (Figures 16–18, 24*a*).—Carapace oval in lateral view with narrow projecting caudal process (Figure 16*a*). Anterior margin and especially tip of rostrum projecting laterally past valve edge (Figure 16*b*).

Infold: Rostral infold with 34 bristles (mostly divided) plus paired bristles (anterior divided, posterior undivided shorter but stouter) dorsal to inner end of incisur and 1 short bristle dorsal and proximal to incisur (Figure 16*b;* 3 bristles in figure represented by empty sockets). Anteroventral infold with short divided bristle ventral and posterior to incisur and near inner margin of infold (Figure 16*b*). Anteroventral and anterior half of ventral infold with 48 divided bristles in row (all except anterior 7 along list) (8 anterior bristles shown in Figure 16*b*). Posterior half of ventral infold with 3 or 4 widely separated bristles along list. Narrow list with anterior end at 7th anteroventral bristle (Figure 16*b*) extends along ventral margin and broadens along infold anterior to caudal process (Figure 16*c,d*). Broad list of caudal process with fairly smooth posterior edge and 11–17 small bristles on flat medial surface. Dorsal end of list of caudal process of left valve terminates in sclerotized knob (stippled in Figure 16*d*). Right valve dorsal to list with sclerotized bar (stippled in Figure 16*c*). Right valve only with 1 bristle at midwidth of infold near ventral end of broad list of caudal process (Figure 16*c*).

Selvage: Selvage along anterior edge of rostrum with fairly broad lamellar prolongation with smooth outer margin. Broad indistinctly striate lamellar prolongation with smooth outer margin along dorsal edge of incisur. Short narrow lamellar prolongation along inner end of incisur. Broad indistinctly striate lamellar prolongation with smooth outer edge along ventral edge of incisur. Narrow lamellar prolongation with smooth outer edge along ventral valve margin. Lamellar prolongation absent along posterior edge of caudal process and may be absent along valve edge dorsal to caudal process.

Carapace Size (length, height in mm): Slope 32: NMV J35999 (holotype), 2.66, 2.16; USNM 193851, 2.63, 2.02; NMV J36000, 2.78, 2.01; 2.70, 1.95; 2.66, 1.92; 2.91, 2.15. Length range 2.63–2.91; height range 1.92–2.16; height to length ratio range 72%–81%.

First Antenna (Figures 16*e–g,* 18*d*): 1st joint bare. 2nd joint spinous. 3rd joint short with 2 spinous bristles (dorsal bristle with base at 1/3 joint length measured from proximal edge; ventral bristle subterminal (Figure 16*e*)), both reaching past midlength of 4th joint. 4th joint with 2 spinous terminal bristles (1 dorsal, 1 ventral longer, just reaching 5th joint). Sensory bristle of 5th joint with 12 long bare filaments and bifurcate tip. 6th joint with short spinous medial bristle. 7th joint (Figure 16*f*): a-bristle about 1 1/2 times longer than bristle of 6th joint, spinous; b-bristle about 5 times length of a-bristle, with 5 filaments (proximal filament short stout with stout round proximal part followed by large sucker and 2 small nodes; next filament slender with 4 distal minute suckers in row; next filament slender with 3 or 4 distal minute suckers in row; next 2 filaments short slender bare); c-bristle about 3 times length of b-bristle, with 8 filaments (proximal filament similar to proximal filament of b-bristle but with larger sucker; next filament slender with 3 or 4 distal minute suckers (Figure 16*g;* only 2 shown); next filament slender bare; next filament slender with 3 or 4 distal minute suckers; next 5 filaments slender bare) and bifurcate tip. 8th joint: d- and e-bristles slightly shorter than b-bristle, bare with blunt tips; f-bristle oriented dorsally, about twice length of b-bristle, with 9 short filaments (most with spines) and bifurcate tip; g-bristle slightly longer than f-bristle, with 10 short filaments (most with spines) and bifurcate tip. Large antennal gland posterior to antennae (Figure 18*d*). Stems of small suckers on b- and c-bristles with numerous minute papillae perpendicular to stem.

Second Antenna: Protopodite with slender distal medial bristle (Figure 16*h*). Endopodite elongate 3-jointed (Figure 16*h*): 1st joint with 4 proximal bristles (1 long, 3 short) and 1 distal bristle about same length as long proximal bristle; 2nd joint bare; 3rd joint with long terminal filament. Exopodite: bristle of 2nd joint reaching 9th joint, with abundant (about 30) slender ventral spines and less numerous dorsal spines (20 on right limb of USNM 193851, fewer on left limb) mostly slenderer than ventral spines; bristles of joints 3–8 and 4 bristles of joint 9 with natatory hairs but no spines (dorsal bristle of 9th joint short); joints 3–8 with basal spines increasing in length on distal joints (spine of 8th joint about 1 1/4 times length of 9th joint); 9th joint with lateral spine more than twice length of joint (Figure 16*i*); joints 2–6 with row of minute spines on distal dorsal corner.

Mandible: Coxale endite well developed, spinous, with 2 stout spines at tip with peg between them (Figure 17*a*). Basale with 3 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles (Figure 17*b*); dorsal margin with 1 bristle distal to midlength and 2 terminal; medial surface with spines near distal dorsal corner. Exopodite same length as dorsal margin of 1st endopodial joint, with spinous terminal projection and 2 subterminal ventral bristles (distal less than half length of proximal). 1st endopodial joint with 4 ventral bristles (1 minute, 1 short, 1 long with long spines, 1 long with short spines). 2nd endopodial joint (Figure 17*c*): Ventral margin

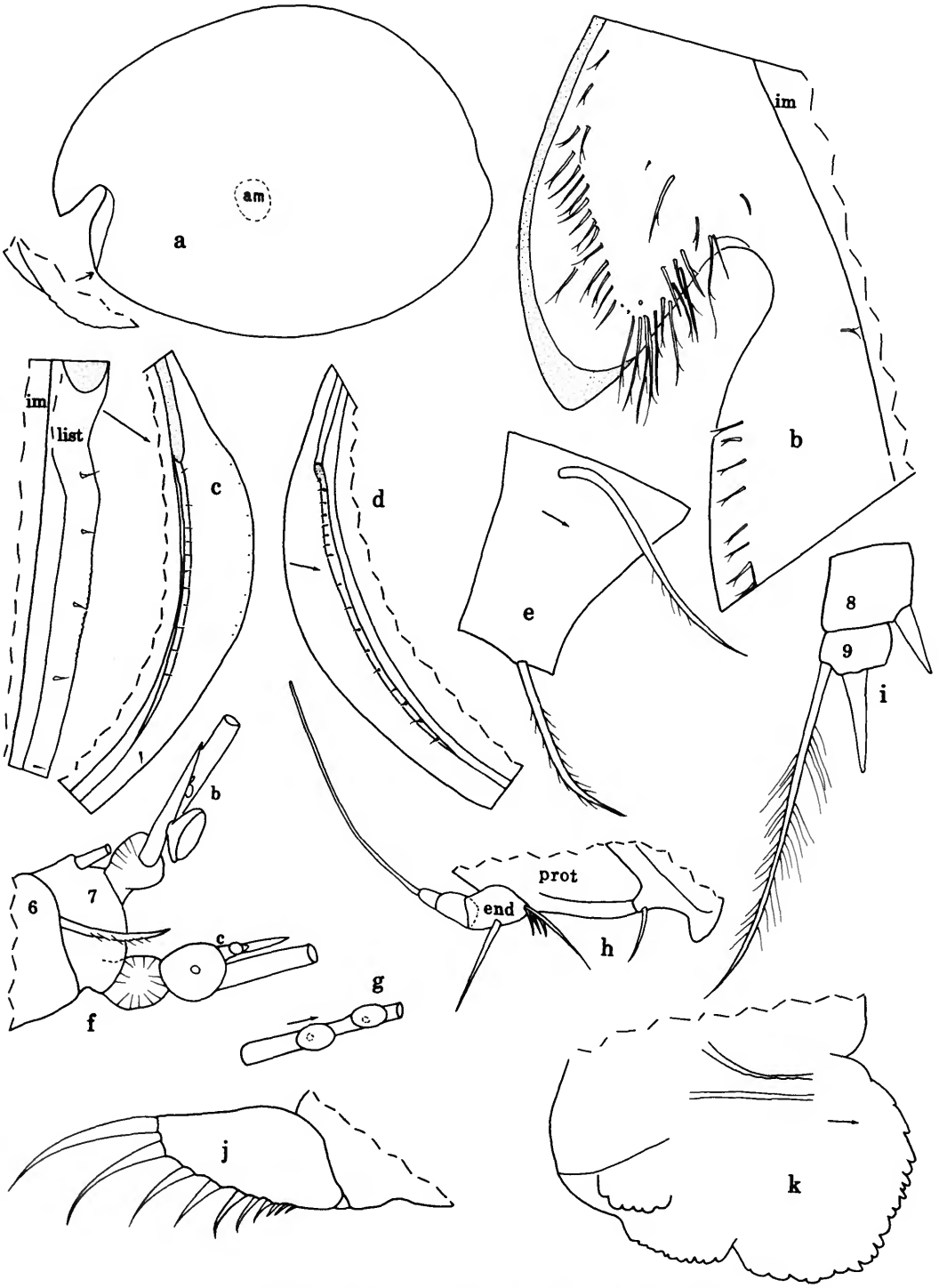


FIGURE 16.—*Paradoloria mordax* Kornicker, new species, adult male, paratype, USNM 193851: *a*, complete specimen, length 2.63 mm, ov; *b,c*, anterior and posterior, respectively, right valve, iv; *d*, posterior left valve, iv; *e*, 3rd joint left 1st antenna, mv; *f*, distal left 1st antenna (nabs), mv; *g*, two small suckers of 2nd filament c-bristle left 1st antenna, mv; *h*, part protopodite and endopodite left 2nd antenna, mv; *i*, joints 8 and 9 left 2nd antenna (nabs), mv; *j*, left lamella furca, lv; *k*, upper lip, lv.

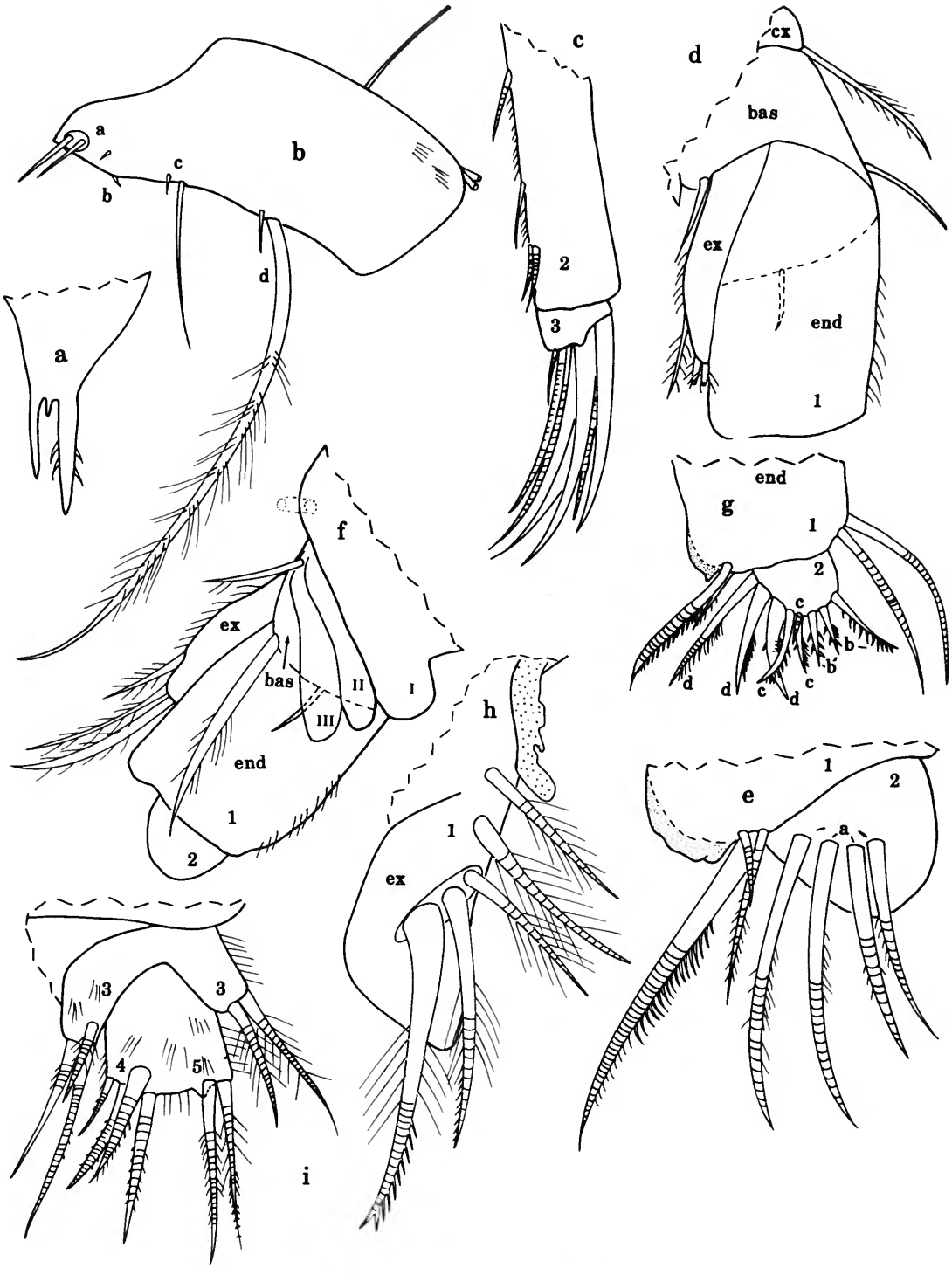


FIGURE 17.—*Paradoloria mordax* Kornicker, new species, adult male, paratype, USNM 193851: *a*, tip coxale endite right mandible, mv; *b*, basale left mandible, mv; *c*, distal left mandible, mv; *d*, part right maxilla (nabs), lv; *e*, tip right maxilla (nabs), lv; *f*, part left maxilla (nabs), mv; *g*, tip left maxilla (nabs), mv; *h*, part left 5th limb (nabs), av; *i*, exopodial joints 3–5 right 5th limb, pv.

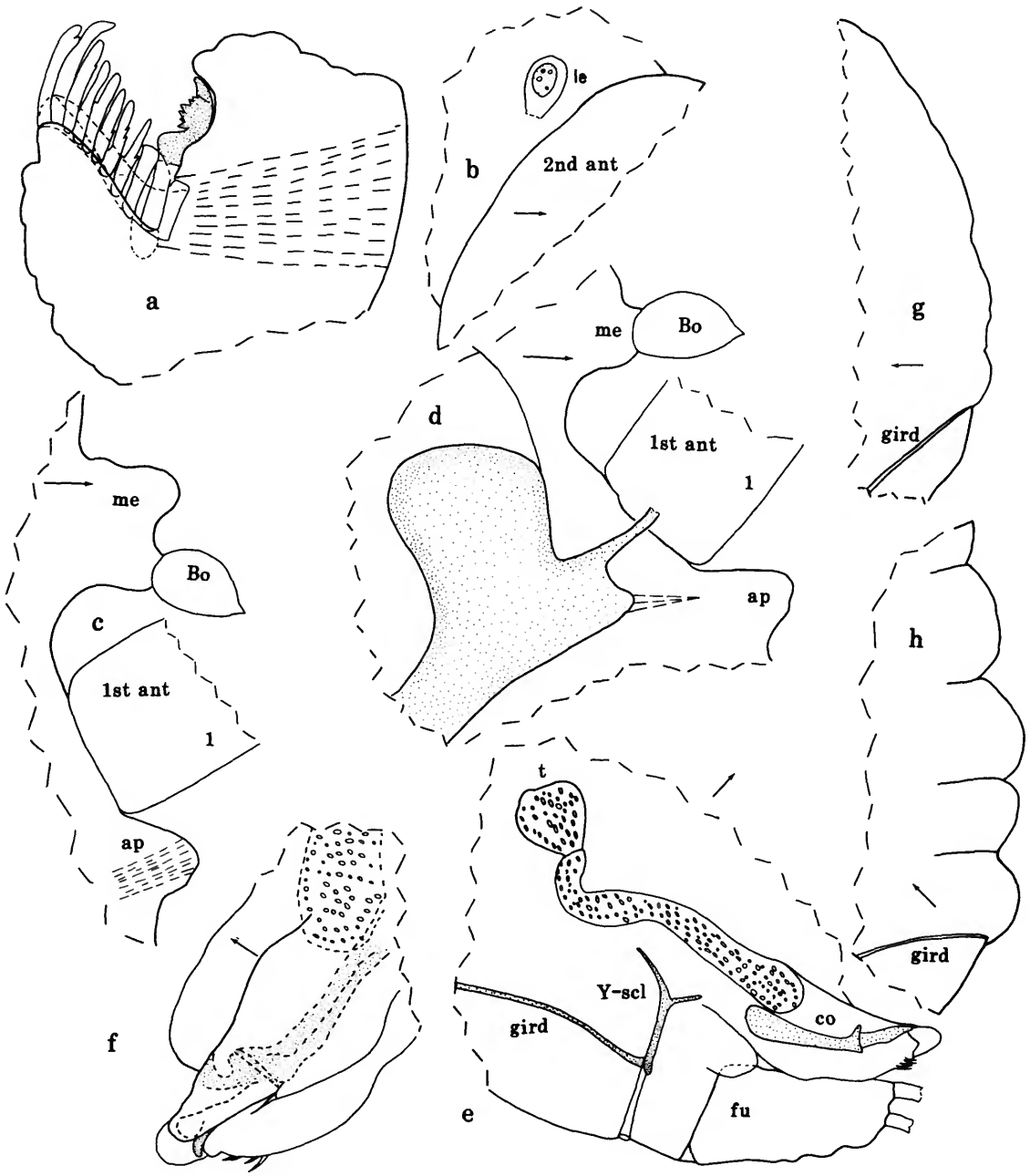


FIGURE 18.—*Paradoloria mordax* Kornicker, new species, adult male, paratype, USNM 193851: *a*, tip of 7th limb (nabs), lv; *b*, right lateral eye and proximal edge of protopodite right 2nd antenna, lv; *c*, dorsal part anterior of body, lv; *d*, similar to *c* showing antennal gland (stippled); *e*, posterior of body; *f*, left copulatory apparatus, lv; *g*, posterior of body dorsal to girdle, lv. Adult male, unnumbered specimen: *h*, posterior of body dorsal to girdle, lv.

spinous, with 4 distal ringed bristles (2 single, 2 distal paired similar in length and width) (right limb of USNM 193851 aberrant in having 4 single bristles and no paired bristles); dorsal margin with 24 bristles (14 short spinous medial, 3 medium length, 7 long) proximal to midlength (not shown). 3rd endopodial joint with 3 stout claws (with few small indistinct

proximal ventral teeth, not shown) and 4 ringed bristles (no bristles with broad proximal part) (Figure 17*c*).

Maxilla: Coxale with long, stout, plumose, dorsal bristle (Figure 17*d*). Endite I with 12 spinous bristles; endite II with 8 spinous and pectinate bristles (including 1 minute bristle); endite III with 7 spinous and pectinate distal bristles, and 1 short proximal lateral bristle near base of exopodite (Figure 17*d*). Basale with 1 long distal medial ventral bristle with long spines (Figure 17*f*), 1 short bare dorsal bristle (Figure 17*d*), and 1 short bare medial bristle at midwidth of distal margin. Exopodite well developed, hirsute, with 3 bristles, all with long hairs. 1st endopodial joint with dorsal spines, undulate or triangular cutting tooth, 2 long bare ringed alpha-bristles, and 2 or 3 beta-bristles (outer pectinate, others shorter, ringed, either bare or with few indistinct spines) (Figure 17*g,e*). 2nd endopodial joint with 4 slender ringed a-bristles with short spines (Figure 17*e*), 3 pectinate b-bristles, 3 c-bristles (2 longer pectinate, 1 shorter ringed bare), and 3 pectinate d-bristles (Figure 17*g*).

Fifth Limb: Protopodite with long slender undulate tooth (Figure 17*h*). Endite I with 6 or 7 spinous bristles; endite II with 5 spinous bristles; endite III with 6 spinous and pectinate bristles. 1st exopodial joint: Main tooth with proximal triangular tooth and 6 pectinate teeth; bristle with long proximal spines proximal to triangular tooth; anterior side with 3 bristles in row with long proximal hairs (longest also pectinate distally) and 1 or 2 bristles (with long proximal hairs) closer to protopodial tooth (Figure 17*h*). 2nd exopodial joint with 4 cuspate unringed a-bristles, 3 pectinate ringed b′-bristles, 4 long pectinate ringed b″-bristles, 1 posterior c-bristle with long proximal hairs, and 1 long anterior d-bristle with long proximal hairs. 3rd exopodial joint (Figure 17*i*): Inner lobe with proximal bristle with long proximal hairs and 2 longer terminal bristles with few short spines (outer bristle unringed in distal $^2/_3$); outer lobe with 2 bristles with long proximal hairs. 4th exopodial joint with 3 or 4 bristles with short spines. 5th exopodial joint fused to 4th except for minute break in sclerite along posterior edge (Figure 17*i*), with 2 bristles (outer with long proximal hairs and short distal spines; inner with short spines); small sclerotized node (without spines) at distal end of muscle terminating on 5th joint (node better developed on right limb of USNM 193851 (Figure 17*i*) than on left). Exopodial joints 3–5 hirsute.

Sixth Limb: With 4 bare epipodial bristles (distal 2 fairly long, more than half length of dorsal edge of end joint). Endite I with 1 or 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite II with 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite III with 4 or 5 spinous bristles; endite IV with 5 or 6 spinous bristles. End joint with 18–20 bristles (posterior 3 or 4 bristles about same length as many other marginal bristles but with long hairs to tip; most other bristles with long hairs except for small spines near tip, but 4–6 bristles (mostly short) with only short spines); lateral surface with fairly stiff spines along distal edge and few rows of short proximal spines; medial surface hirsute; all bristles of end joint closely spaced.

Seventh Limb: One limb of USNM 193851 with 41 bristles (distal group with 11 bristles on comb side and 11 on jaw side; proximal group with 8 bristles on comb side and 11 on jaw side); other limb with 39 bristles (distal group with 13 bristles on comb side and 10 on jaw side; proximal group with 7 bristles on comb side and 9 on jaw side). Bristles with up to 6 distal bells. Comb with about 22 teeth (3 short flat-tipped teeth on each side of longer teeth with rounded tips) (Figure 18*a*). Jaw with stout tooth with fan on each side with about 7 small teeth (Figure 18*a*).

Furca (Figure 16*j*): Each lamella with 10 claws, all articulated; claw 3 about same width or very slightly narrower than claw 4; all claws with slender teeth along posterior edge (not shown); claw 1 with row of medial teeth with distal 10–14 teeth stout; anterior edge of lamellae with few indistinct spines. Right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figure 18*c,d*): Lemon shape, with pointed process at tip.

Eyes: Lateral eye minute, indistinct, with light amber-colored area containing about 4 minute cells (not ommatidia) (Figure 18*b*) (eyes not visible through shell, and with shell removed eyes are so small and indistinct that they easily could be overlooked). Medial eye well developed, with light amber-colored areas (Figure 18*c,d*).

Upper Lip (Figure 16*k*): Unpaired anterior part with large glandular processes (several slightly larger processes present in anteroventral curvature when lip viewed laterally). Posterior paired part separated by deep groove. Small lobe with about 5 glandular openings present on each side proximal and posterior to divided part.

Genitalia (Figures 18*e,f*, 24*a*): Well-developed lobes with few small bristles on each side of body; 1 lobe with terminal hook.

Anterior of Body (Figure 18*c,d*): Rounded anterior process between medial eye and upper lip and just ventral to base of 1st antenna.

Posterior of Body: Undulate dorsal to posterior end of girdle (Figure 18*h*), but less uneven in lateral view on some specimens than on others (Figure 18*g*).

Y-*Sclerite* (Figure 24*a*): Typical for family.

DESCRIPTION OF ADULT FEMALE (Figures 19, 20).—Carapace similar in shape to that of adult male but larger (Figures 19*a,e* 20*a*).

Carapace Size (length, height in mm): Slope 32: USNM 193848, 3.5, 2.8; USNM 193849, 3.15, 2.28; NMV J36000, 3.11, 2.34; 3.13, 2.44; 3.29, 2.51; 3.16, 2.39. Length range: 3.11–3.5; height range 2.28–2.8; height to length ratio range 72%–80%.

First Antenna: Joints 1–6 similar to those of adult male (Figures 19*b,e*, 20*b*). 7th joint: a-bristle similar to that of adult male; b-bristle about twice length of a-bristle, with 5 short marginal filaments; c-bristle about 3 times length of b-bristle,

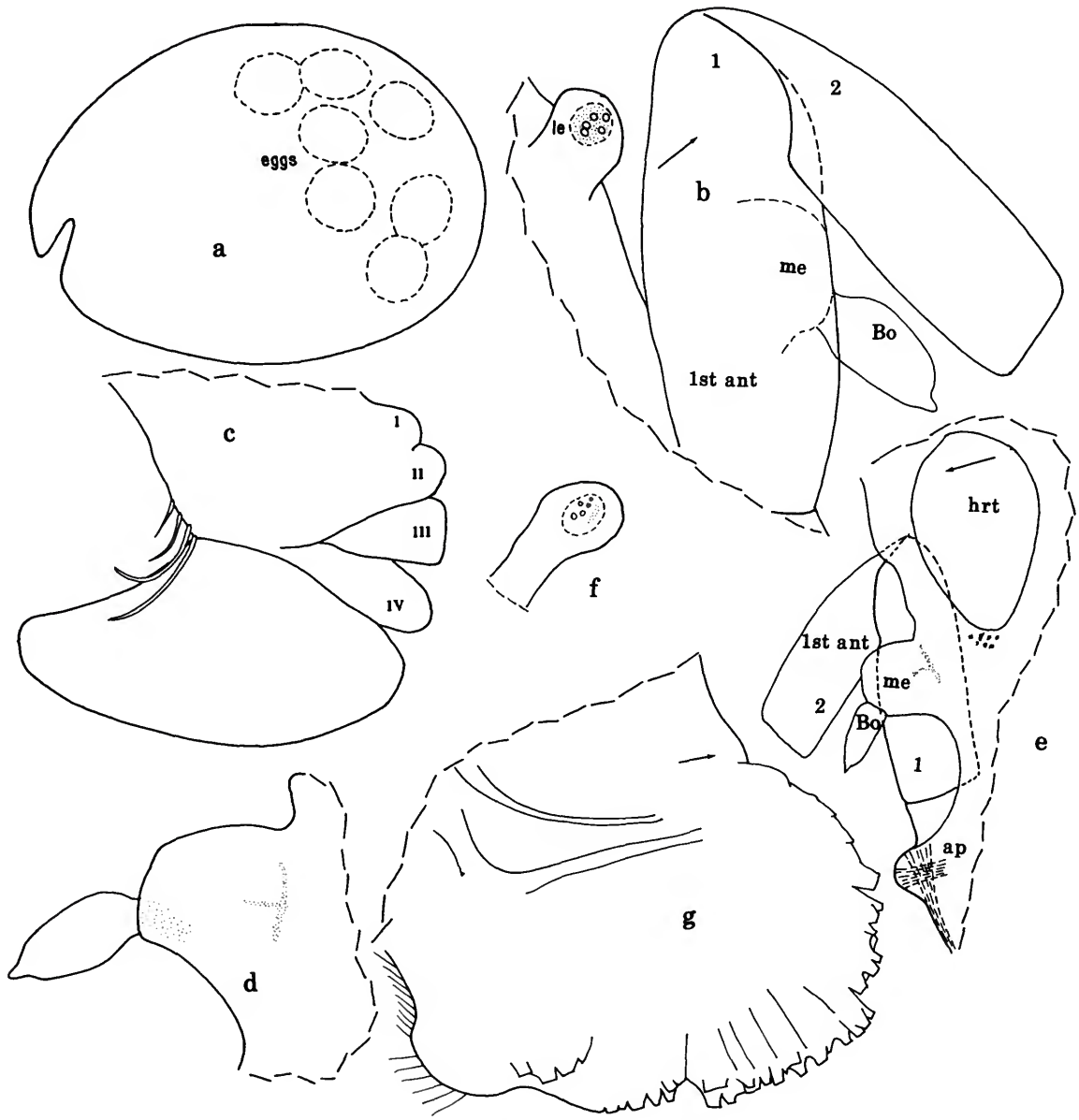


FIGURE 19.—*Paradoloria mordax* Kornicker, new species, ovigerous female, paratype, USNM 193848: *a*, complete specimen, length 3.5 mm, ov; *b*, dorsal part anterior of body, lv; *c*, left 6th limb (nabs), mv; *d*, medial eye and Bellonci organ (pigment area stippled), lv; *e*, dorsal part anterior of body, lv; *f*, left lateral eye, lv; *g*, upper lip, lv.

with 9 marginal filaments (some with spines) and bifurcate tip. 8th joint: d- and e-bristles about same length as b-bristle, bare with blunt tips; f-bristle slightly shorter than c-bristle, with 9 marginal filaments (some with spines) and bifurcate tip; g-bristle about same length as c-bristle, with 9 marginal filaments (some with spines) and bifurcate tip. Antennal gland similar to that of adult male.

Second Antenna: Similar to that of adult male.

Mandible: Similar to that of adult male, but some variability noted: Exopodite of USNM 193849 longer than dorsal margin of 1st endopodial joint; basale of left limb of USNM 193849 with additional fairly long bristle between c-and d-bristles and with only 1 a-bristle; basale of right limb of USNM 193849 without b-bristle and with only 1 a-bristle; right limb of USNM 193848 with additional single bristle (total: 3 single plus 1 pair) on ventral margin of 2nd endopodial joint.

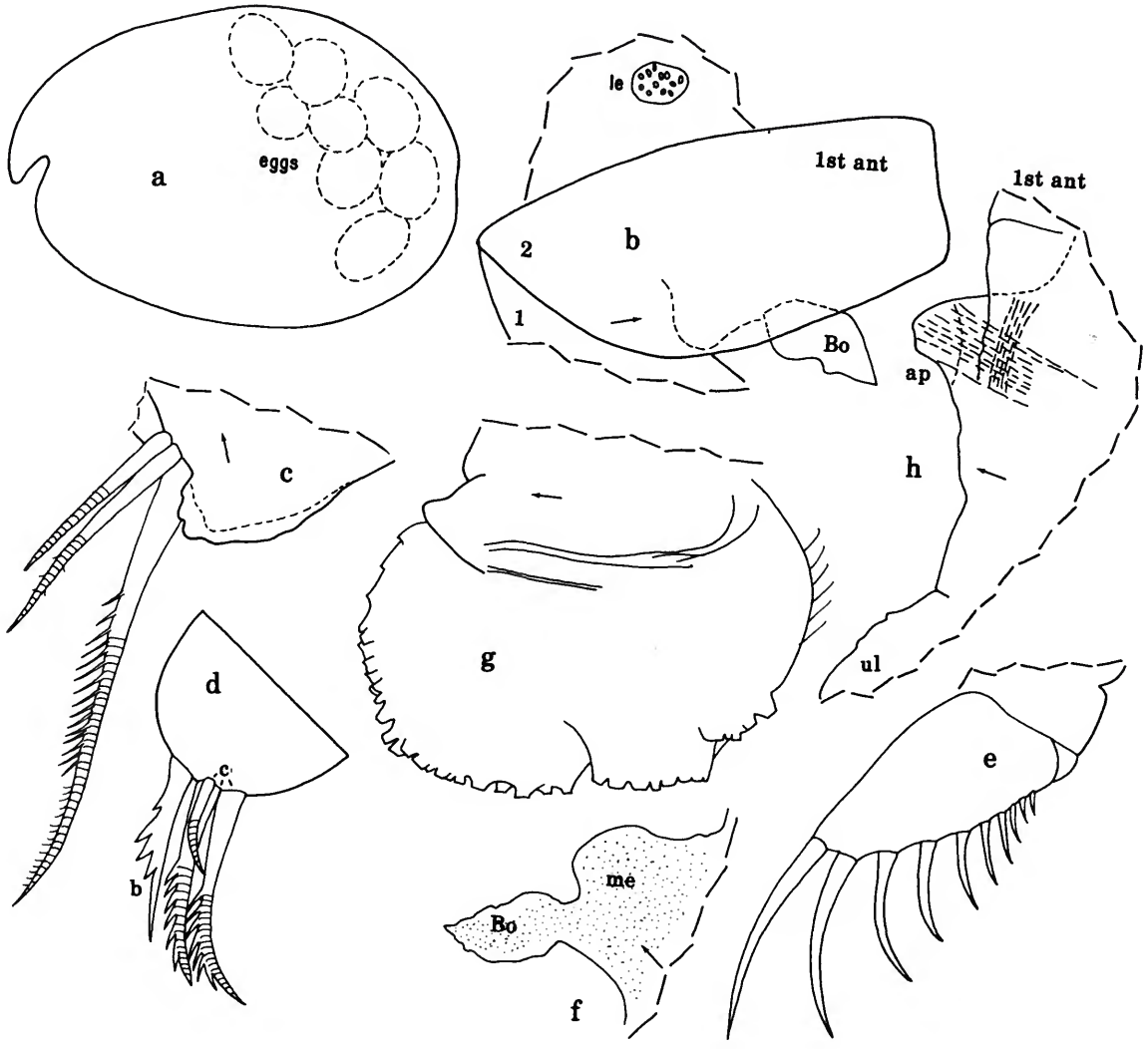


FIGURE 20.—*Paradoloria mordax* Kornicker, new species, ovigerous female, paratype, USNM 193849: *a*, complete specimen, length 3.15 mm; *b*, dorsal part anterior of body, lv; *c*, cutting tooth and beta-bristles 1st endopodial joint left maxilla, lv; *d*, 2nd endopodial joint right maxilla (nabs), mv; *e*, left lamella furca, lv; *f*, medial eye and Bellonci organ, lv; *g*, upper lip, lv; *h*, middle part anterior of body, lv.

The differences in numbers of bristles on the females are interpreted to be aberrancies. The differences in lengths of exopodites are attributed to intraspecific variability.

Maxilla: Protopodite, endites, basale, exopodite, and 2nd endopodial joint (Figure 20*d*) similar to those of adult male. 1st endopodial joint with undulate cutting tooth and 3 beta-bristles (Figure 20*c*), otherwise similar to that of adult male.

Fifth Limb: Endite I with 8 spinous bristles. Anterior side of 1st exopodial joint: USNM 193849 with 3 bristles in row and 2 bristles closer to protopodial tooth; USNM 193848 with 3 bristles in row and 1 bristle closer to protopodial tooth. 4th exopodial joint with 4 or 5 bristles. Limb otherwise similar to that of adult male.

Sixth Limb (Figure 19*c*): Endite I with 2 short medial bristles and 2 long terminal bristles; endite II with 2 or 3 short medial bristles (outer of 3 shorter) and 2 longer terminal bristles; endite III with 5 or 6 bristles; endite IV with 6 or 7 spinous bristles. End joint with 25–27 bristles. Limb otherwise similar to that of adult male.

Seventh Limb: USNM 193849 (one limb) with 45 bristles (terminal group with 15 bristles on comb side and 11 on jaw side; proximal group with 8 bristles on comb side and 11 on jaw side). USNM 193848: One limb with 45 bristles (terminal group with 15 bristles on comb side and 8 on jaw side;

proximal group with 11 bristles on comb side and 11 on jaw side); other limb with 49 bristles (terminal group with 15 bristles on comb side and 11 on jaw side; proximal group with 10 bristles on comb side and 13 on jaw side). Bristles with up to 6 bells. Comb with about 20 teeth (4 or 5 short stout flat-tipped teeth on each side of slender longer teeth with rounded tips). Jaw similar to that of adult male.

Furca (Figure 20*e*): Claw 3 about same width as claw 4; furca otherwise similar to that of adult male.

Bellonci Organ (Figures 19*b,d,e,* 20*b,f*): Similar to that of adult male but slightly more elongate.

Eyes: Lateral eye small indistinct like that of adult male and with minute cells (eye of USNM 193848 with fewer cells than that of USNM 193849) (Figures 19*b,f,* 20*b*). Medial eye similar to that of adult male but USNM 193848 with T-shaped area of brown pigment (Figures 19*b,d,e,* 20*f*).

Upper Lip (Figure 19*g*), *Anterior of Body* (Figures 19*b,e,* 20*b,h*), *and Y-Sclerite:* Similar to those of adult male.

Genitalia: Small oval area on each side of body anterior to base of furca.

Posterior of Body: Smoothly rounded.

Heart (Figure 19*e*): Well developed.

Eggs: USNM 193848 with 16 eggs in marsupium (some shown in Figure 19*a*); length of typical egg 0.59 mm. USNM 193849 with 13 eggs in marsupium (some shown in Figure 20*a*); length of typical egg 0.57 mm.

COMPARISONS.—The new species, *P. mordax,* is close to *P. australis* Poulsen, 1962:154, which was described from a unique adult male collected in the same vicinity as *P. mordax.* The furca of *P. australis* has the 4th claw narrower and shorter than the 5th claw, whereas the 4th claw is stouter and longer than the 5th on *P. mordax.* The furcae of eleven specimens (males and females) of *P. mordax* were examined and none have a narrow 4th claw. The species differ in additional characters; for example, the 1st exopodial joint of the 5th limb of *P. australis* has 3 anterior bristles compared to 4 or 5 on *P. mordax,* the a-bristles of the maxilla are bare on *P. australis* and spinous on *P. mordax;* also, on the 2nd antenna the basal spines on the distal exopodial joints are longer on *P. mordax,* and the 1st endopodial joint bears 2 short proximal bristles on *P. australis* and 3 on *P. mordax.* According to Poulsen (1962:156), lateral eyes are absent on *P. australis.* They are present on *P. mordax* but are so small that they easily could be overlooked. The length of the single male *P. australis* is 2.3 mm, whereas the length range of male *P. mordax* is 2.63–2.91 mm (N = 6). The 3rd joint of the endopodite of the 2nd antenna is better developed in *P. mordax* than it is in either *P. lippa* Kornicker (1989:14) or *P. magna* Kornicker (1989:20). Three species of *Doloria* (*D. septenaria* Kornicker (1975:114), *D. isaacsi* Kornicker (1975:118), *D. mawsoni* Kornicker (1975:122)) are known only from females and, therefore, could eventually be referred to *Paradoloria* if males do not have the endopodite of the 2nd antenna developed as a clasper; all differ from *P. mordax* in having well-developed lateral eyes.

Paradoloria pugnax Kornicker, new species

FIGURES 21–23, 24*b*

Paradoloria species C, Kornicker, 1994, fig. 110u,v.

ETYMOLOGY.—From the Latin *pugnax* (combative, contentious).

HOLOTYPE.—NMV J36001, adult male in alcohol and on slide.

TYPE LOCALITY.—Slope 46, 42°00.20′S, 148°37.70′E, Tasmania, off Freycinet Peninsula; depth 720 m.

PARATYPES.—Slope 46: USNM 193897, ovigerous female in alcohol and on slide.

DISTRIBUTION.—Slope 46, 720 m.

DESCRIPTION OF ADULT MALE (Figures 21, 22, 24*b*).—Carapace similar in shape to that of *P. mordax* but smaller (Figure 21*a*).

Infold: Rostral infold with about 11 bristles (mostly divided) plus paired bristles dorsal to inner end of incisur and 1 bristle proximal and dorsal to inner end of incisur (Figure 21*b,c*). Anteroventral infold with short bristle near ventral corner of inner end of incisur and 1 near inner margin of infold. Anteroventral infold and anterior 1/4 of ventral infold with 33 closely spaced bristles (all except anterior 2 bristles along list); posterior 3/4 of ventral margin with 10 widely spaced bristles along list. Narrow list (with anterior end at 3rd anteroventral bristle) extends along ventral margin and broadens along infold anterior to caudal process. Broad list of caudal process with numerous minute processes along posterior edge and about 12 minute bristles on flat medial surface. Dorsal end of list of caudal process of left valve terminates in sclerotized knob. Right valve dorsal to list with sclerotized bar. Left valve only with 1 bristle at midwidth of infold near ventral end of broad list of caudal process. (In general, caudal process similar to that of *P. mordax.*)

Carapace Size (length, height in mm): NMV J36001 (holotype), 2.54, 1.79, height 70.5% of length.

First Antenna: 1st joint bare. 2nd joint with minute ventral and dorsal spines. 3rd joint short with 2 spinous bristles (dorsal bristle with base at 1/3 joint length and reaching midlength of 4th joint, ventral bristle terminal or slightly subterminal and reaching past midlength of 4th joint). 4th joint with 2 spinous bristles (1 ventral, 1 dorsal, both reaching just past distal margin of 5th joint). Sensory bristle of 5th joint with 7 stout filaments followed by 2 slender filaments and bifurcate tip. 6th joint with short medial bristle. 7th joint: a-bristle spinous; b-bristle with 5 filaments (proximal filament short stout with stout round proximal part followed by large sucker and 2 nodes; next filament slender with 3 small suckers in row; next filament slender with 4 small suckers in row; next 2 filaments slender bare); c-bristle with 7 or 8 filaments (proximal filament similar to that of b-bristle but with larger sucker; next filament slender with 3 small suckers in row; next filament slender bare; next filament slender with 3–5 small suckers in row; next 4 or

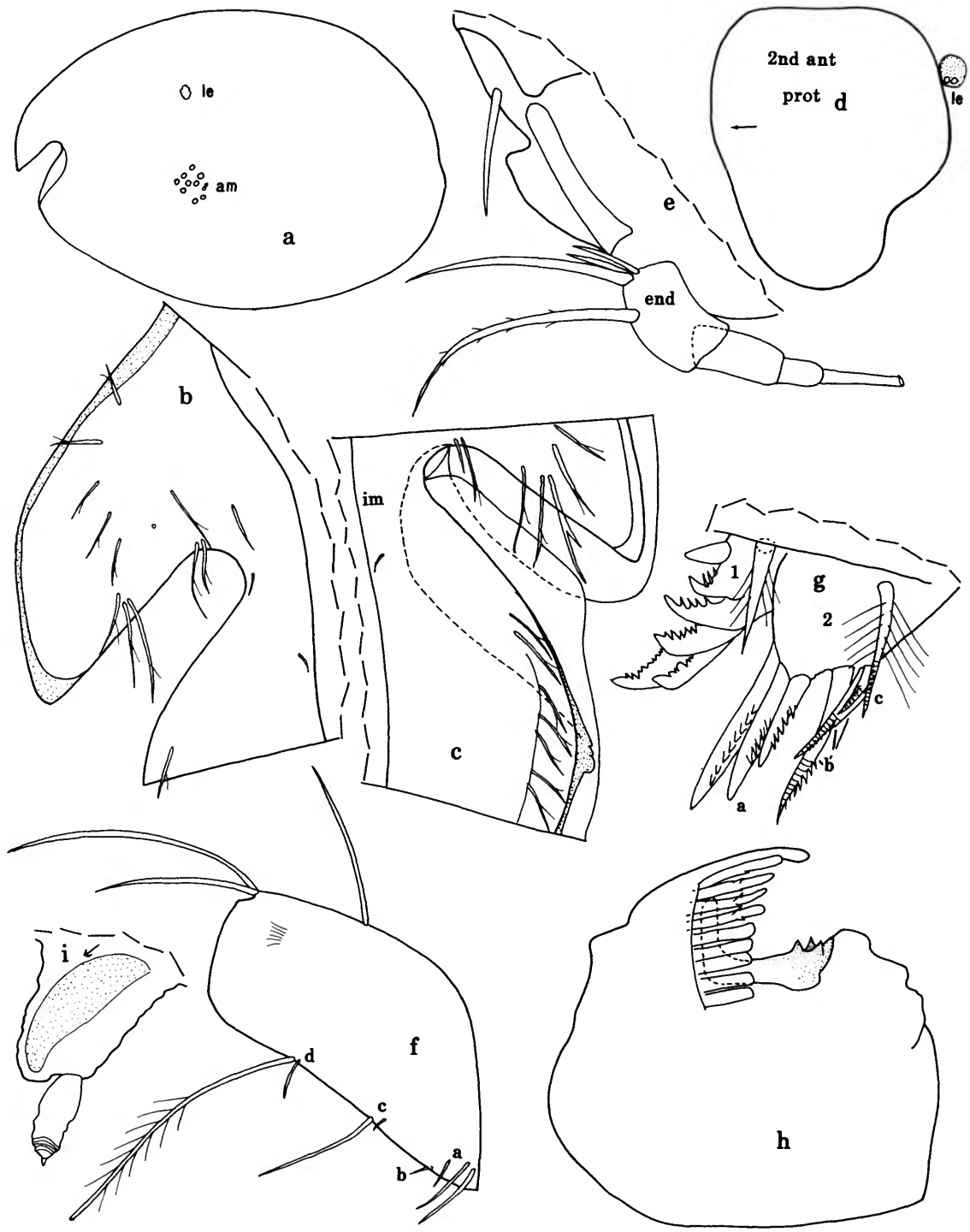


FIGURE 21.—*Paradoloria pugnax* Kornicker, new species, adult male, holotype, NMV J36001: *a*, complete specimen, length 2.54 mm, ov; *b,c*, anterior ends right and left valves, respectively, iv; *d*, left lateral eye and protopodite left 2nd antenna, lv; *e*, part protopodite and endopodite right 2nd antenna, mv; *f*, basale right mandible, mv; *g*, part 1st and 2nd exopodial joints right mandible (nabs), pv; *h*, tip 7th limb (nabs), lv; *i*, medial eye and Bellonci organ (pigment area stippled), lv.

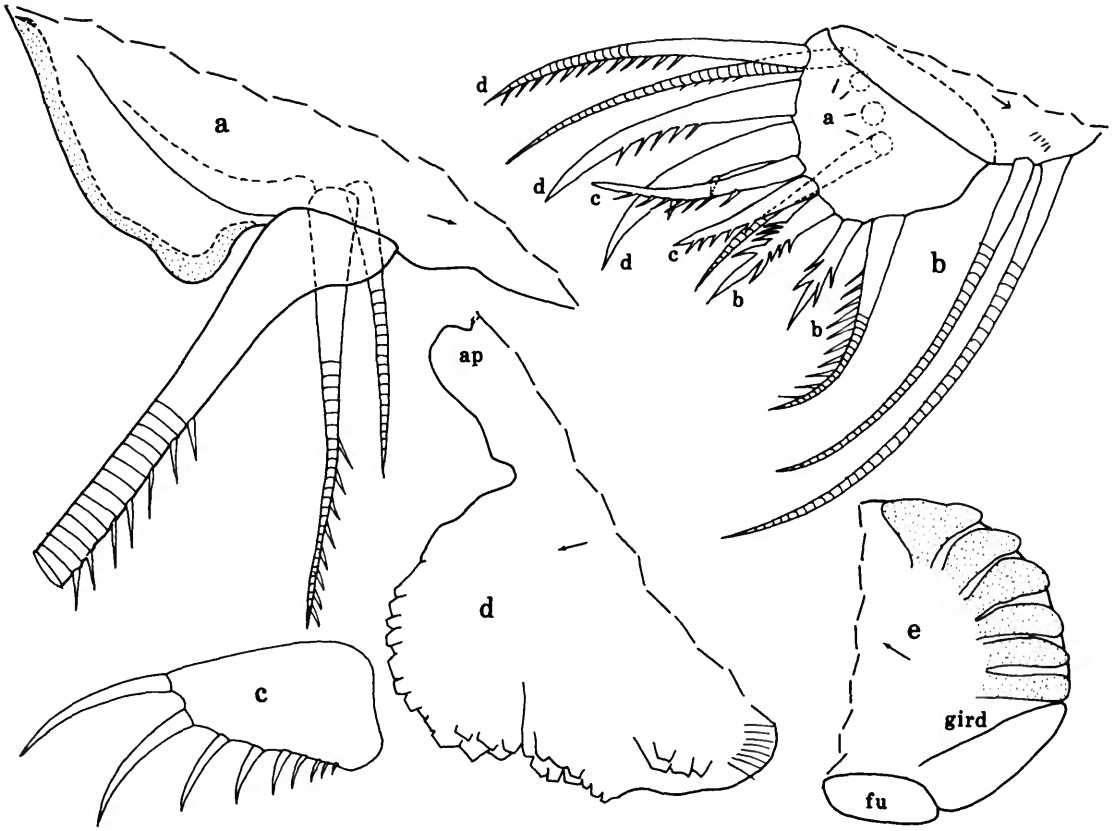


FIGURE 22.—*Paradoloria pugnax* Kornicker, new species, adult male, holotype, NMV J36001: *a*, cutting tooth and beta-bristles 1st endopodial joint left maxilla, mv; *b*, distal left maxilla (a-bristles partly dashed), mv; *c*, left lamella furca, lv; *d*, upper lip, lv; *e*, left side posterior of body, lv.

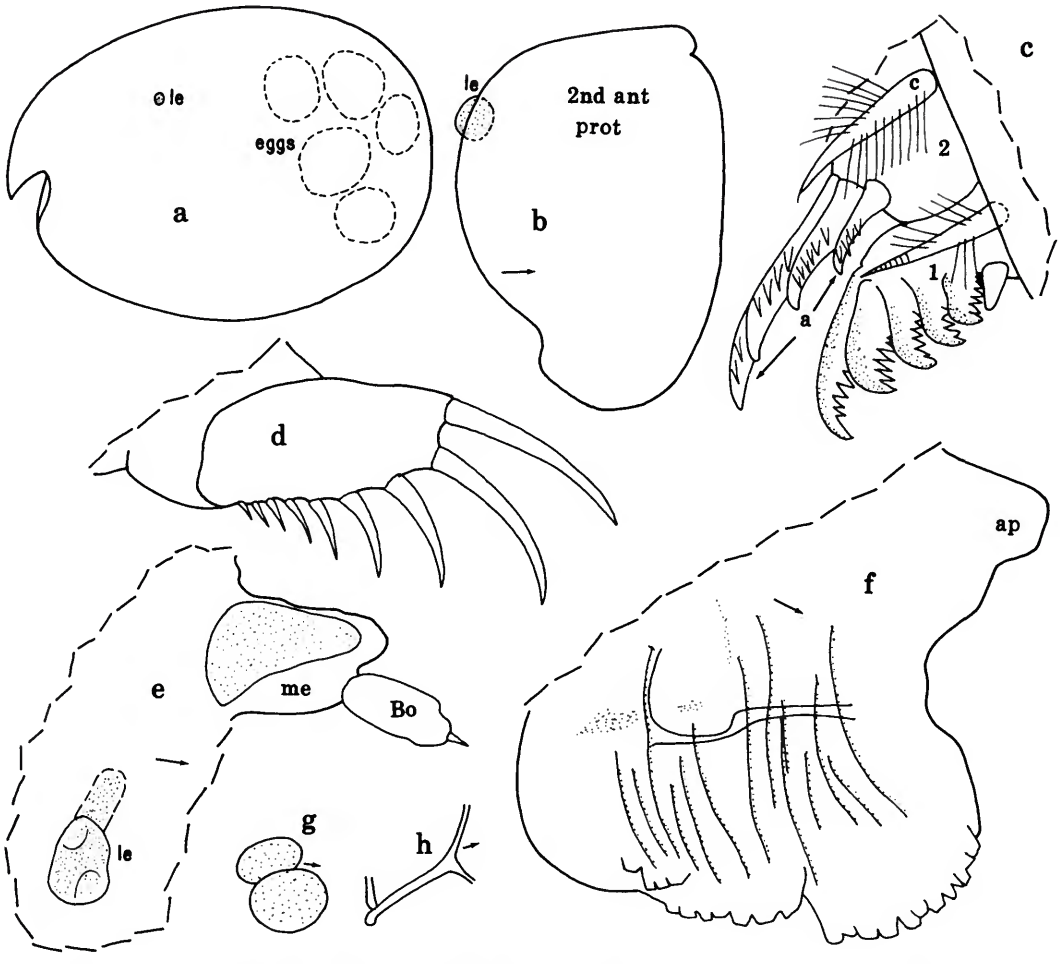
5 filaments bare) and bifurcate tip. 8th joint: d- and e-bristles long bare with blunt tips; f-bristle long (tip broken off on both limbs of holotype, 7 spinous filaments on remaining part); g-bristle long with 8 filaments with spines and with bifurcate tip.

Second Antenna: Protopodite with medial bristle (Figure 21*d*,*e*). Endopodite elongate, 3-jointed (Figure 21*e*): 1st joint with 3 proximal bristles (1 long, 2 short) and 1 spinous distal bristle slightly longer than long proximal bristle; 2nd joint bare; 3rd joint with long terminal filament. Exopodite: Bristle of 2nd joint reaching 9th joint (ventral margin with 2 or 3 hair-like proximal spines followed by about 20 fairly stout spines; dorsal margin with indistinct hair-like spines); bristles of joints 3–8 and 4 bristles of 9th joint with natatory hairs, no spines; joints 3–8 with basal spines increasing in length on distal joints (spine of 8th joint about $1\frac{1}{3}$ length of 9th joint); 9th joint with lateral spine more than twice length of joint; joints 2–8 with row of spines on distal dorsal corner.

Mandible (Figure 21*f*): Limb similar to that of male *P. mordax* with following differences: Distal bristle of exopodite slightly longer than $\frac{1}{2}$ length of proximal bristle; dorsal margin of 2nd endopodial joint with 17 bristles (7 or 8 short spinous, 2 medium length, 7 or 8 long (2 shorter than others)).

Maxilla: Coxale endite with long stout plumose dorsal bristle. Endite bristles not carefully counted but approximately same as those of *P. mordax*. Bristles of basale similar to those of *P. mordax*. Exopodite similar to that of *P. mordax* except only proximal and middle bristle with long hairs. 1st endopodial joint with undulating cutting tooth, 2 long bare ringed alpha-bristles (Figure 22*b*), and 3 beta-bristles (2 longest pectinate, other bare) (Figure 22*a*). 2nd endopodial joint with 4 slender ringed a-bristles with few proximal spines, 3 pectinate b-bristles, 2 pectinate c-bristles, and 3 pectinate d-bristles (Figure 22*b*).

Fifth Limb: Endite bristles not carefully counted but about same number as on *P. mordax*. Anterior bristles of 1st exopodial joint similar to those of *P. mordax*. Main tooth with proximal smooth triangular tooth and 5 pectinate teeth (Figure 21*g*); bristle (with long proximal spines) proximal to triangular tooth. 2nd exopodial joint with 3 cuspate unringed a-bristles, 3 pectinate ringed b′-bristles, 4 long pectinate ringed b″-bristles (not shown), 1 posterior c-bristle with long proximal hairs, and



FIGURES 23.—*Paradoloria pugnax* Kornicker, new species, ovigerous female, paratype, USNM 193897: *a*, complete specimen, length 2.88 mm, ov; *b*, right lateral eye and protopodite right 2nd antenna, lv; *c*, part 1st and 2nd exopodial joints left 5th limb (nabs), pv; *d*, right lamella furca, lv; *e*, right lateral eye, medial eye, and Bellonci organ (pigment areas stippled), lv; *f*, upper lip, lv; *g*, right genitalia and attached spermatophore, lv; *h*, right Y-sclerite, lv.

1 long anterior d-bristle with long proximal hairs. 3rd exopodial joint: Inner lobe with proximal bristle with long proximal hairs and 2 longer terminal bristles (outer bristle bare or with few spines and unringed in distal $^2/_3$; inner bristle ringed, with few proximal spines); outer lobe with 2 bristles with long proximal hairs and short distal spines. 4th and 5th joints fused; 4th joint with 3 ringed bristles with short spines; small 5th joint with 2 bristles (outer bristle with long proximal hairs and short distal spines; inner bristle with short spines); small sclerotized node (without spines) at inner corner of joint (at distal end of muscle terminating on 5th joint). Exopodial joints 3–5 hirsute.

Sixth Limb: With 3 bare epipodial bristles. Endite I with 2 short spinous medial bristles and 2 or 3 longer spinous terminal bristles; endite II with 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite III with 1 fairly long spinous distal medial bristle and 4 spinous terminal bristles; endite IV with 1 fairly long spinous distal medial bristle and 6 additional spinous bristles (5 terminal, 1 small lateral adjacent to base of medial bristle). End joint with 18 bristles (posterior 2 bristles longer but not wider at base than most, and with long hairs to tip; remaining bristles (except for 4 short bristles with only short spines) with long proximal hairs and small spines near tip); all bristles of end joint closely spaced; lateral surface with fairly stiff spines along distal edge and few rows of small proximal spines; medial surface hirsute.

Seventh Limb: One limb of holotype with 36 bristles (distal group with 11 bristles on comb side and 12 on jaw side; proximal group with 6 bristles on comb side and 7 on jaw side); other limb with 35 bristles (distal group with 12 bristles on comb side and 11 on jaw side; proximal group with 5 bristles on comb side and 7 on jaw side). Bristles with up to 7 bells.

Comb with about 18 teeth (5 short flat-tipped teeth on each side of 8 longer teeth with rounded tips) (Figure 21*h*). Jaw with fan bearing 4 teeth (Figure 21*h*).

Furca (Figure 22*c*): Each lamella with 9 articulated claws decreasing in length and width posteriorly along lamella; claw 3 about same width at base as claw 4 but longer; claw 4 stouter and longer than claw 5; all claws with slender teeth along posterior edge (not shown); claw 1 with row of medial teeth with distal 10 teeth stouter than others; anterior edge of lamellae with few minute indistinct spines (not shown); right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figure 21*i*): Cylindrical but somewhat barrel-shape, with pointed process at tip.

Eyes: Lateral eye small but with brown pigment and 2 small clear cells (Figure 21*a,d*); pigment of eyes visible through shell. Medial eye well developed with dark brown pigment in dorsal half (Figure 21*i*).

Upper Lip (Figure 22*d*): Unpaired anterior part with large glandular openings. Posterior paired part separated by deep groove. Small lobe with 4 glandular openings present on each side proximal and posterior to divided part.

Copulatory Organ (Figure 24*b*): Smaller than that of *P. mordax;* no bristles observed.

Anterior of Body (Figure 22*d*): With rounded anterior process.

Posterior of Body (Figure 22*e*): With 6 ridges appearing white in reflected light and amber in transmitted light; ridges defined by translucent groove between each pair; each ridge continuous across posterior margin of body.

Y-*Sclerite* (Figure 24*b*): Typical for family.

DESCRIPTION OF ADULT FEMALE (Figure 23).—Carapace similar in shape to that of adult male except larger (Figure 23*a*).

Infold: Rostral infold similar to that of adult male in having relatively few bristles. USNM 193897 with 11 bristles on left valve and 14 on right valve in addition to paired bristles and single bristle near inner end of incisur. In general, remaining part of infold similar to that of adult male but bristles not counted.

Carapace Size (length, height in mm): USNM 193897, 2.88, 2.09, height 72.5% of length.

First Antenna: Joints 1–6 and a-bristle of 7th joint similar to those of adult male. 7th joint: b-bristle about $2^1/_3$ times length of a-bristle, with 4 spinous marginal filaments; c-bristle about 3 times length of b-bristle, with 8 marginal filaments (some with spines) and bifurcate tip. 8th joint: d- and e-bristles about same length as b-bristle, bare with blunt tips; f-bristle slightly shorter than c-bristle, with about 8 marginal filaments (some with spines) and bifurcate tip; g-bristle same length as c-bristle, with about 8 marginal filaments and bifurcate tip.

Second Antenna (Figure 23*b*): Bristle of 2nd exopodial joint with about 25 ventral spines and few proximal dorsal hair-like spines. Limb otherwise similar to that of adult male.

Mandible: Basale of USNM 193897 differs from that of adult male in having smaller of the 2 d-bristles about midway between c-bristles and long d-bristle (aberrancy?). Limb otherwise similar to that of adult male.

Maxilla: Exopodite differs from that of adult male in having all 3 bristles with long hairs. Middle beta-bristle of 1st endopodial joint differs from that of adult male in having few weak spines, not pectinate as on male. Limb otherwise similar to that of adult male.

Fifth Limb: Endite bristles not counted. Protopodial tooth and 1st exopodial joint similar to that of adult male (Figure 23*c*). 2nd exopodial joint differs from that of adult male in having 4 cuspate unringed a-bristles. Exopodial joints 3–5 similar to those of adult male except a weak suture separates 4th and 5th joints, and on left limb of USNM 193897 both bristles of 5th joint with long proximal spines.

Sixth Limb: With 3 bare epipodial bristles. Endites I and II each with 2 short medial bristles and 2 longer terminal bristles; endite III with 1 fairly long, distal, medial bristle and 4 terminal bristles; endite IV with 1 fairly long, distal, medial bristle and 5 or 6 additional bristles (5 terminal, 0 or 1 distolateral, adjacent to medial bristle). End joint with 19 bristles of similar type to those of adult male. Short space between posterior 3 bristles and those anterior to them on left limb of USNM 193897 but less so on right limb. Spinosity of bristles and end joint similar to that of adult male.

Seventh Limb: One limb of USNM 193897 with 34 bristles (distal group with 11 bristles on comb side and 10 on jaw side; proximal group with 6 bristles on comb side and 7 on jaw side); other limb with 36 bristles (distal group with 12 bristles on comb side and 10 on jaw side; proximal group with 6 bristles on comb side and 8 on jaw side). Bristles with up to 6 bells. Comb with 18–20 teeth (4 or 5 short flat-tipped teeth on each side of 10 longer teeth with rounded tips). Jaw with fan bearing 4 teeth.

Furca (Figure 23*d*) *and Bellonci Organ* (Figure 23*e*): Similar to those of adult male.

Eyes (Figure 23*a,b,e*): Medial and lateral eyes similar to those of adult male, except 2 clear cells not observed in lateral eye.

Upper Lip (Figure 23*f*): With brown vertical pigment lines not observed on adult male, otherwise similar to that of adult male.

Genitalia (Figure 23*g*): Small oval area on each side of body anterior to furca, with attached spermatophore.

Anterior of Body (Figure 23*e,f*) *and* Y-*Sclerite* (Figure 23*h*): Similar to those of adult male.

Posterior of Body: Smoothly rounded.

Eggs: USNM 193897 with 10 eggs in marsupium (5 eggs shown in Figure 23*a*); length of typical egg 0.52 mm.

COMPARISONS.—In present material *P. pugnax* is easily separated from *P. mordax* by the brown pigment of the lateral eye that is visible through the shell (the pigment might fade in time). *Paradoloria australis* is without lateral eyes. The 5th limb of *P. pugnax* differs from those of *P. mordax* and *P. australis* in having 5 pectinate teeth rather than 6 in the main

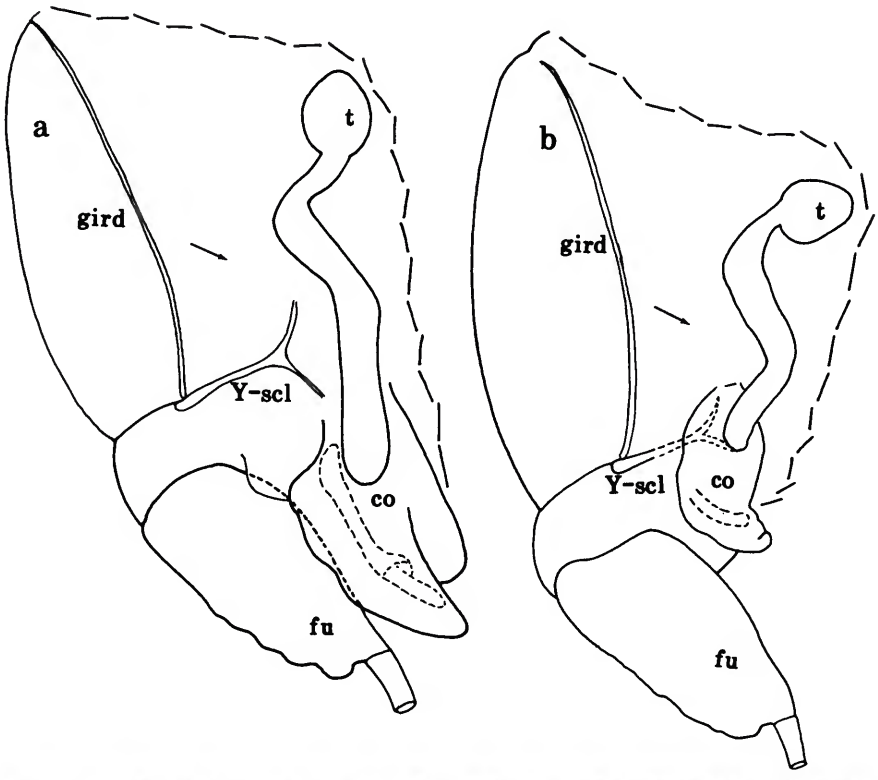


FIGURE 24.—Relative sizes of copulatory limbs of adult males (drawn at same magnification): *a*, *Paradoloria mordax* Kornicker, new species, paratype, USNM 193851; b, *Paradoloria pugnax* Kornicker, new species, holotype, NMV J36001.

tooth. The 4th furcal claw of *P. pugnax* is not thinner than the 5th as in *P. australis*. Both the male and female *P. pugnax* studied have 9 furcal claws and 4 bristles on the 1st endopodial joint of the 2nd antenna, compared to 10 furcal claws and 5 bristles in *P. mordax*, but the variability of these characters is not known. The copulatory organ of *P. mordax* is larger than that of *P. pugnax* (Figure 24*a*,*b*).

Paradoloria tryx Kornicker, new species

FIGURES 25-28

Paradoloria species D, Kornicker, 1994, fig. 110w.

ETYMOLOGY.—From the Greek *tryx* (new wine).

HOLOTYPE.—NMV J36002, undissected adult female in alcohol.

TYPE LOCALITY.—Slope 67, Victoria, 67 km S of Point Hicks, 38°23.95′S, 149°17.02′E; depth 1277 m.

PARATYPES.—Slope 67: USNM 194006, ovigerous female on slide and in alcohol. Slope 69: USNM 193949, adult male on 2 slides and in alcohol.

DISTRIBUTION.—Slope 67, 1277 m. Slope 69, 1840 m.

DESCRIPTION OF ADULT MALE (Figures 25-27).—Carapace oval in lateral view with evenly rounded posterior margin (Figure 25*a*). Anterior margin and especially tip of rostrum projecting laterally past valve edge (Figure 25*d*).

Infold: Rostral infold of left valve with 18 long bristles (1 of these posterior to others) and 13 short bristles in addition to paired bristles at inner end of incisur and 1 short bristle inward from incisur (Figure 25*d*); rostral infold of right valve with 5 additional long bristles near dorsal edge. Anteroventral infold with short bristle ventral and posterior to incisur and near inner margin of infold (observed only on right valve and not shown on illustrated left valve). Anteroventral and anterior half of ventral infold with 62 bristles, all except 9 anterior bristles along list (10 anterior bristles shown in Figure 25*d*). Posterior half of ventral infold with 24 bristles along list. Narrow list along anterior end of ventral infold gradually broadens posteriorly. List close to outer margin of infold at anterior end and close to inner margin on broad infold at posteroventral corner of valve, which represents the caudal process (Figure 25*b*). Broad list of caudal process with fairly smooth posterior edge except for minute protuberances at distal ends of pores (pores shown as lines perpendicular to edge in Figure 25*c*); 20–30 small bristles on flat medial surface of list. Row of 17

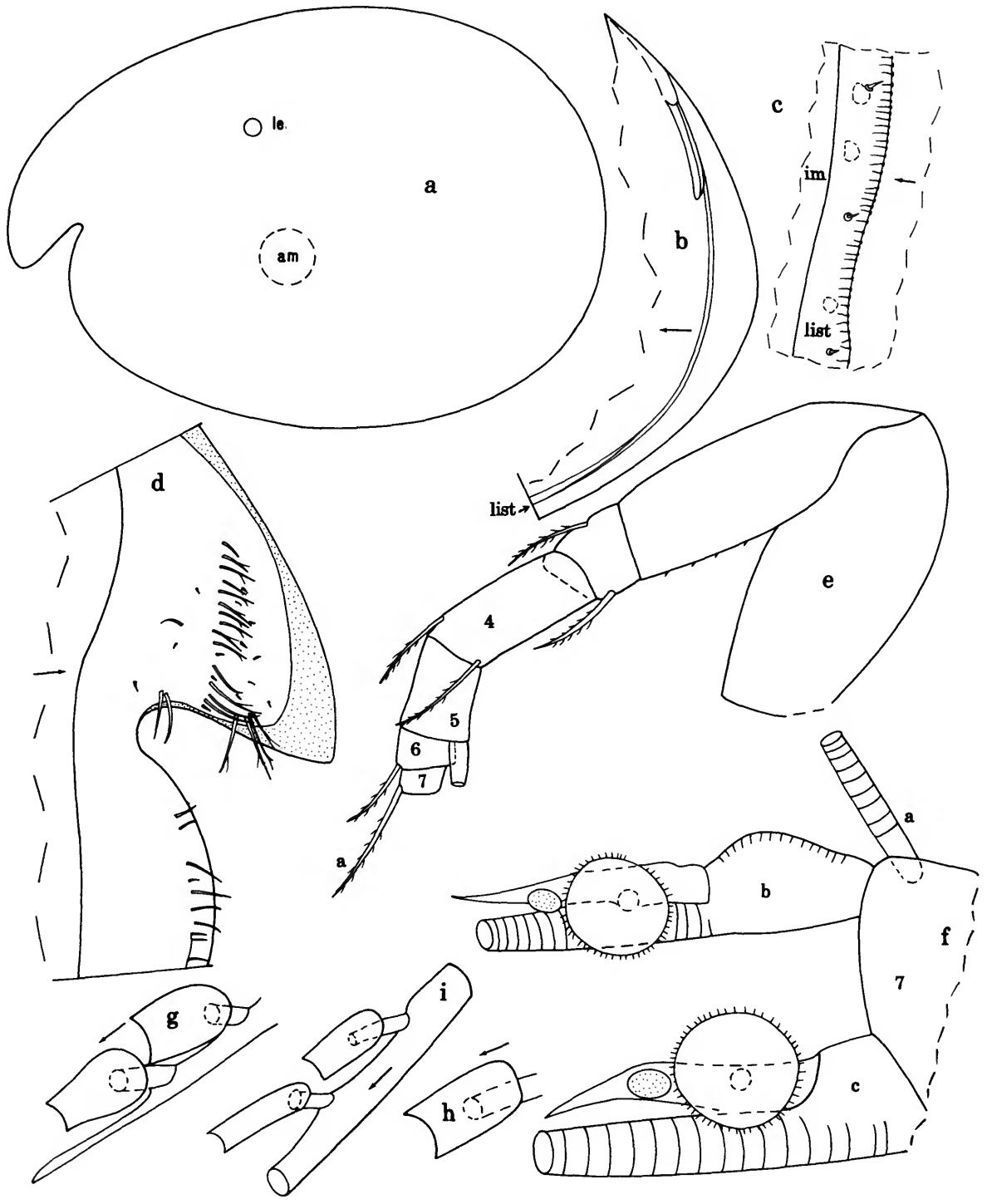


FIGURE 25.—*Paradoloria tryx* Kornicker, new species, adult male, paratype, USNM 193949: *a*, complete specimen, length 4.6 mm, ov; *b*, posterior right valve (nabs), iv; *c*, detail of list of caudal process near midheight in *b*; *d*, anterior left valve, iv; *e*, right 1st antenna (nabs), mv; *f*, proximal parts of bristles of 7th joint right 1st antenna, mv. Small suckers on b- and c-bristles right 1st antenna, mv: *g*, part 2nd filament b-bristle; *h*, part 2nd filament c-bristle; *i*, part 3rd filament c-bristle.

fairly evenly spaced minute bristles present just within outer margin of infold of caudal process. Left valve only with 2 bristles near midwidth at ventral end of broad list of caudal process.

Selvage: Selvage along anterior edge of rostrum with fairly broad lamellar prolongation with smooth outer margin. Broad indistinctly striate lamellar prolongation with smooth outer margin along dorsal edge of incisur. Short narrow lamellar prolongation along inner end of incisur. Broad indistinctly striate lamellar prolongation with smooth outer edge along ventral edge of incisur. Narrow lamellar prolongation with smooth outer edge along ventral valve margin. Lamellar prolongation absent along posterior edge of caudal process, and not observed along posterior valve edge dorsal to caudal process. (Posterior end of lamellar prolongation along ventral edge of valve indicates location of ventral end of caudal process.)

Carapace Size (length, height in mm): Slope 69: USNM 193949, 4.6, 3.3, height 72% of length.

First Antenna (Figure 25*e–i*): 1st joint bare. 2nd joint with few minute spines along ventral margin. 3rd joint with 2 spinous bristles (dorsal bristle with base at joint midlength; ventral bristle subterminal). 4th joint with 2 spinous bristles (dorsal bristle subterminal, ventral bristle terminal). Sensory bristle of 5th joint with 9 stout proximal filaments followed by 3 narrower and shorter distal filaments, and bifurcate tip. 6th joint with short spinous terminal medial bristle in dorsal corner. 7th joint (Figure 25*e,f*): a-bristle about twice length of bristle of 6th joint, spinous; b-bristle with 5 filaments (proximal filament short stout with stout round proximal part followed by large sucker with marginal fringe and small distal node; next filament slender with 4 small suckers, next filament slender with proximal tooth and 3 small suckers, next 2 filaments bare (tip of bristle missing)); c-bristle with stout proximal filament with large sucker, followed by slender filament with 3 small suckers, then 1 short bare filament, 1 slender filament with 4 small suckers, about 6 slender filaments (some with a small spine), and bifurcate tip; small suckers on filaments of b- and c-bristles elongate with concave distal tip (Figure 25*g–i*) (previously described suckers on other cypridinids are round, oval, or pointed). 8th joint: d- and e-bristles bare with blunt tips; f- and g-bristles each with 9 filaments (most with marginal spines) and bifurcate tip.

Second Antenna: Protopodite with slender spinous distal medial bristle (Figure 26*a*). Endopodite elongate, 3-jointed (Figure 26*a*): 1st joint with 4 proximal bristles (1 long with indistinct spines, 3 short bare) and 1 distal spinous bristle longer than proximal bristles; 2nd joint long bare; short 3rd joint with long terminal filament. Exopodite: Bristle of 2nd joint reaching just past 9th joint, with abundant slender ventral spines (about 45) and a few proximal hair-like dorsal spines; bristles of joints 3–8 and 4 bristles of 9th joint with natatory hairs, no spines (dorsal bristle of 9th joint short); joints 3–8 with basal spines increasing in length on distal joints (spine of 8th joint about 1 1/2 times length of 9th joint); lateral spine of 9th joint about same length as spine of 8th joint; joints 2–8 with row of minute spines along distal edges; joints 2–4 with row of minute spines at midlength.

Mandible: Coxale endite spinous, with 2 fairly short, widely separated, stout, terminal spines with small peg between them (Figure 26*b*); small ringed bristle near base of endite. Basale (Figure 26*c*): Ventral margin with 3 a-bristles (1 unringed bare, 2 ringed spinous), 1 lateral ringed b-bristle with few spines, 2 ringed c-bristles (proximal minute, distal long spinous), and 2 closely spaced ringed spinous d-bristles; dorsal margin with 3 ringed spinous bristles (1 distal to midlength, 2 terminal); medial surface with few distal spines. Exopodite with spinous tip reaching past distal end of 1st endopodial joint and 2 ringed spinous subterminal ventral bristles (distal 1/2–2/3 length of proximal) (Figure 26*c*). 1st endopodial joint with 4 ringed ventral bristles (1 minute, 1 medium and 1 long, both with short spines, and 1 long with short proximal and distal spines and long spines in middle part) (Figure 26*c*). 2nd endopodial joint: ventral margin with short spines and distal spine-like bristles (1 single spinous proximal, 2 paired bare distal); dorsal margin with about 28 bristles proximal to midlength (8 long, 2 medium distal, and about 18 short (most medial and some with slender anterior spines)). 3rd endopodial joint with 3 stout claws and 4 ringed bristles (no bristles with broad proximal part) (Figure 26*d*).

Maxilla: Coxale with fringe of dorsal hairs and stout dorsal bristle with long proximal and short distal spines (Figure 26*f*). Endite I with 10 spinous bristles, some with knife-like or triaenid tips (Figure 26*e*); endite II with 7 spinous bristles, some with knife-like or triaenid tips; endite III with 6 or 7 spinous and pectinate distal bristles, and 1 short bare proximal lateral bristle near base of exopodite (bristle could be interpreted to be on basale) (Figure 26*e,g*). Basale with 3 bristles (1 long ventral, 1 long dorsal with long spines, and 1 shorter medial (with indistinct short spines) at midwidth) (Figure 26*f,g*). Exopodite well developed, hirsute, with 3 bristles, all with long hairs (Figure 26*g*). 1st endopodial joint with 2 long ringed alpha-bristles (outer with abundant short marginal spines, inner with very few short spines), 3 beta-bristles (outer long pectinate, middle short with short spines, inner short bare), rows of long medial hairs and short spines, and undulate cutting tooth (Figure 26*f*). 2nd endopodial joint with 4 slender ringed a-bristles with few proximal spines, 3 pectinate b-bristles, 3 c-bristles (2 outer pectinate, inner shorter ringed and either bare or with few marginal spines), and 3 pectinate d-bristles (only outer ringed) (Figure 26*f,g*).

Fifth Limb (Figure 27*a,b*): Protopodite with long narrow tooth (Figure 27*a*). Endite I with 8 spinous bristles; endite II with 6 bristles (1 minute anterior bare, others spinous); endite III with 7 spinous and pectinate bristles. 1st exopodial joint: main tooth with proximal triangular tooth and 6 pectinate teeth (Figure 27*b*); bristle with long proximal spines proximal to triangular tooth; anterior side of joint with row of 3 bristles with long proximal hairs (longest also pectinate distally) and 1 bristle (with very long proximal hairs) closer to protopodial

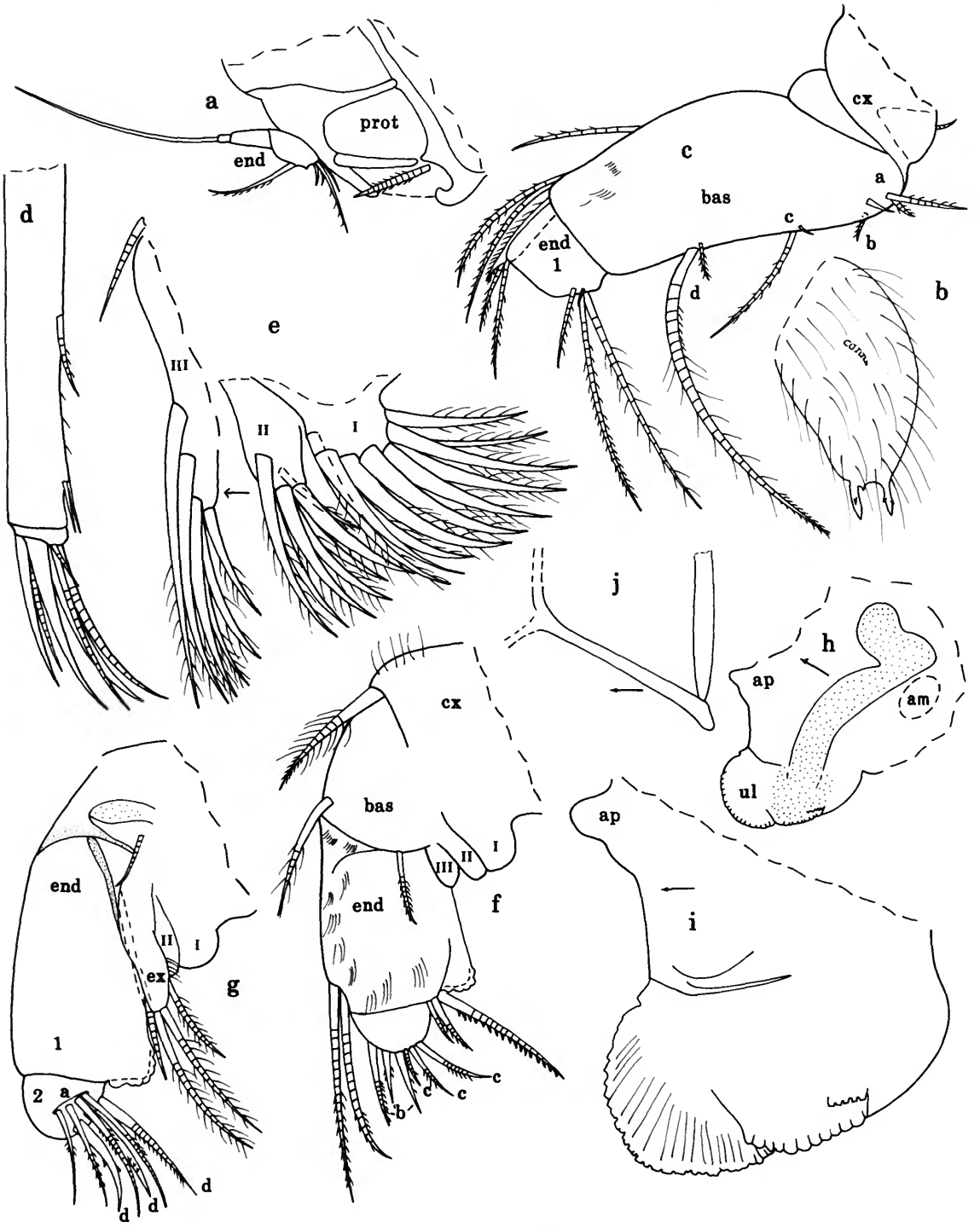


FIGURE 26.—*Paradoloria tryx* Kornicker, new species, adult male, paratype, USNM 193949: *a*, part protopodite and endopodite left 2nd antenna, mv; *b*, coxale endite left mandible, mv; *c*, proximal right mandible, mv; *d*, distal right mandible, mv; *e*, endites left maxilla, lv; *f*, right maxilla, exopodite not shown (nabs), mv; *g*, left maxilla (nabs), lv; *h*, upper lip (lip gland stippled), location of adductor muscles (dashed circle), lv; *i*, upper lip, lv; *j*, left Y-sclerite, lv.

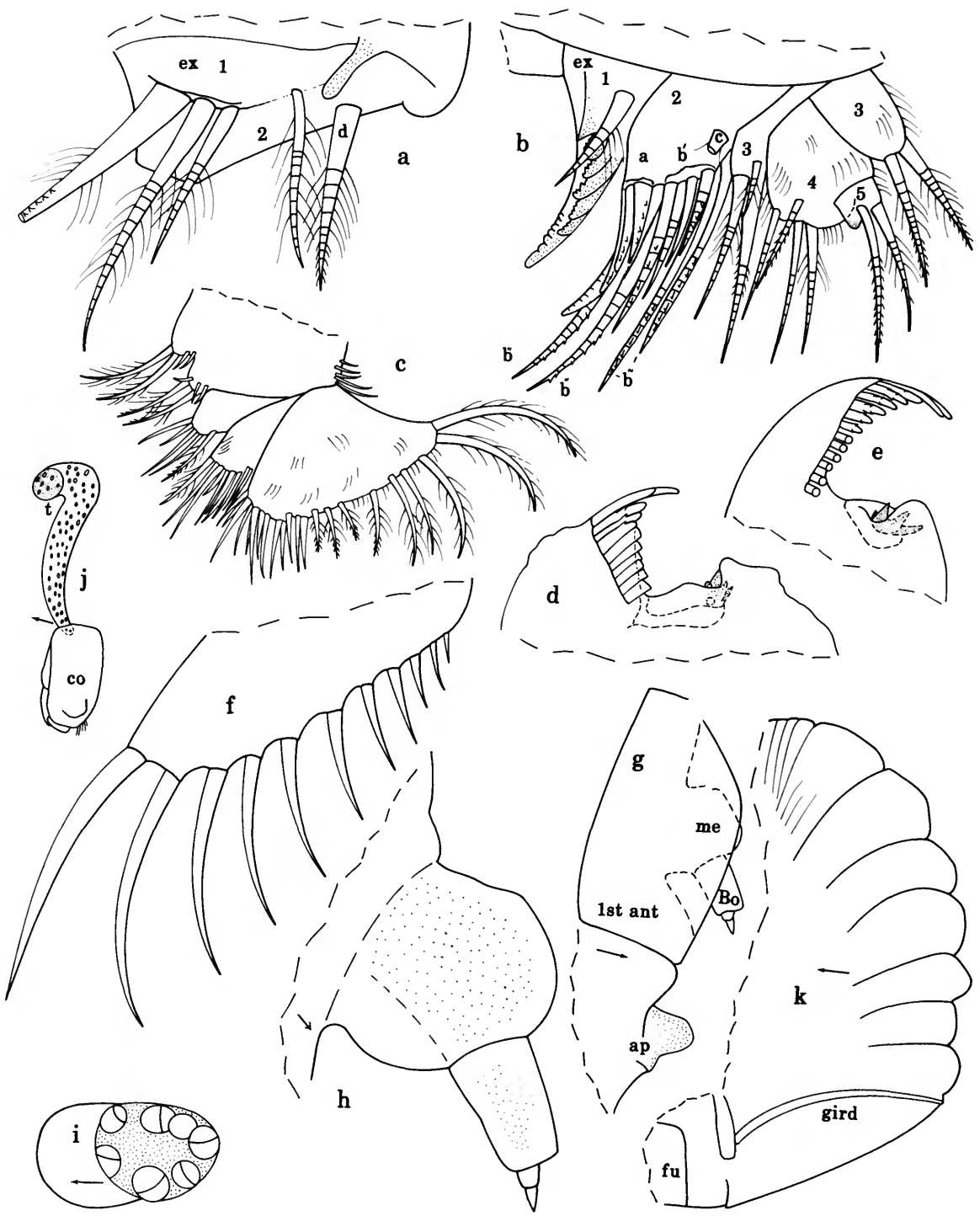


FIGURE 27.—*Paradoloria tryx* Kornicker, new species, adult male, paratype, USNM 193949: *a*, part left 5th limb (nabs), av; *b*, part right 5th limb (nabs), pv; *c*, right 6th limb, mv; *d,e*, tips of 7th limbs (nabs), lv; *f*, part left lamella furca, lv; *g*, dorsal part anterior of body, lv; *h*, medial eye and Bellonci organ, lv; *i*, left lateral eye; *j*, left copulatory apparatus; *k*, posterior of body, lv.

tooth (Figure 27*a*). 2nd exopodial joint with 4 cuspate unringed a-bristles, 4 pectinate ringed b′-bristles, 4 long pectinate ringed b″-bristles, and 1 posterior c-bristle and long anterior d-bristle, both with long proximal hairs and short distal spines. 3rd exopodial joint with 2 hirsute lobes (Figure 27*b*): Inner lobe with ringed proximal bristle with long proximal hairs and 2 longer ringed terminal bristles (outer with long proximal hairs, inner with few short spines); outer lobe with 2 terminal bristles with long proximal hairs and short distal spines. 4th exopodial joint hirsute, with 4 bristles (2 bare, 1 with short spines, 1 with long proximal hairs). 5th exopodial joint separated from 4th joint by suture, with 2 bristles (1 with short spines, other with long proximal hairs and few distal short spines); inner distal corner of joint with very low sclerotized node.

Sixth Limb (Figure 27*c*): With 5 bare epipodial bristles. Endite I with 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite II with 3 short spinous medial bristles and 2 longer spinous terminal bristles; endite III with 5–8 spinous bristles; endite IV with 9 or 10 spinous bristles. End joint with 22 or 23 spinous bristles (posterior 5 bristles longer than others and with long hairs to tip, but hairs on 2 posterior bristles finer; remaining bristles either with long proximal and shorter distal spines or with only short spines); medial surface hirsute; lateral side with stiff spines along ventral margin. Not all spines shown on bristles of illustrated limb.

Seventh Limb: One limb of USNM 193949 with 71 bristles (distal group with 21 bristles on comb side and 14 on opposite side; proximal group with 16 bristles on comb side and 20 on opposite side); other limb with 69 bristles (distal group with 20 bristles on comb side and 12 on opposite side; proximal group with 17 bristles on comb side and 20 on opposite side). Bristles with up to 6 bells. Comb with 24 or 25 teeth (5 or 6 flat-tipped teeth on each side of 13 or 14 longer teeth with rounded tips) (Figure 27*d,e*). Side opposite comb with 4 (3 stout, 1 minute) sclerotized teeth in depression.

Furca (Figure 27*f*): Each lamella with 11 claws, all articulated; claws decrease in length posteriorly along lamella; claw 4 about same width as claw 5; all claws with slender teeth along posterior edge; claw 1 with row of medial teeth with distal teeth stouter; anterior edge of claws 1–5 with minute indistinct spines; lamella following posterior claw with small spines. Right lamella anterior to left by width of base of claw 1. Teeth and spines of claws not shown in illustrated lamella.

Bellonci Organ (Figure 27*g,h*): Tapering slightly distally, with pointed process at tip.

Eyes: Lateral eye small, with about 7 divided ommatidia and black pigment between ommatidia (Figures 25*a*, 27*i*). Medial eye larger than lateral eye, amber color (Figure 27*g,h*).

Upper Lip (Figure 26*h,i*): Unpaired anterior part with broadly convex outline in lateral view and numerous glandular openings; posterior of paired part with indistinct row of glandular openings dorsal to openings of ventral edge. Large tubular internal glandular process on each side leading into paired posterior part of lip (Figure 26*h*).

Genitalia (Figure 27*j*): Fairly large copulatory organ on each side of body anterior to furca (not studied in detail).

Anterior of Body (Figures 26*h,i*, 27*g*): Rounded anterior process between medial eye and upper lip.

Posterior of Body (Figure 27*k*): With 7 well-defined segments dorsal to dorsal end of girdle.

Y-*Sclerite* (Figure 26*j*): Ventral branch weakly developed, transparent; remaining sclerite amber color.

DESCRIPTION OF ADULT FEMALE (Figure 28).—Carapace similar in shape to that of adult male (Figure 28*a*).

Infold: Not examined.

Carapace Size (length, height in mm): Slope 67: NMV J36002 (holotype), 4.5, 3.0, height 66% of length; USNM 194006, 4.8, 3.2, height 67% of length. Length range 4.5–4.8; height range 3.0–3.2.

First Antenna (Figure 28*c*): 1st joint bare. 2nd joint with few minute ventral spines; 3rd joint with 2 spinous bristles (dorsal at 1/4 length of joint; ventral subterminal). 4th joint with 2 spinous terminal bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 8 or 9 stout proximal filaments followed by 3 slender filaments and bifurcate tip. 6th joint with short spinous medial bristle in dorsal corner. 7th joint: a-bristle about 1/3 longer than bristle of 6th joint, with short spines; b-bristle about twice length of a-bristle, with 5 marginal filaments, some with spines; c-bristle almost twice length of bristle of 5th joint and 3 times length of b-bristle, with 9 marginal filaments (some pectinate) and bifurcate tip. 8th joint: d- and e-bristles same length as b-bristle, bare with blunt tips; f-bristle slightly shorter than c-bristle, with 9 filaments (some pectinate) and bifurcate tip; g-bristle same length as c-bristle, with 10 filaments (some pectinate) and bifurcate tip.

Second Antenna: Similar to that of adult male.

Mandible: Coxale endite similar to that of adult male. Except for the unringed a-bristle bearing a few spines, and the left limb of USNM 194006 (but not right limb) having c-bristles separated by broader space, basale similar to that of adult male. Exopodite and 1st endopodial joint similar to those of adult male. 2nd endopodial joint: Ventral margin with 4 pointed bristles (proximal single with few spines, next single bare, 2 distal paired bare); bristles of dorsal margin appearing similar to those of adult male, but not counted. 3rd endopodial joint similar to that of adult male.

Maxilla: Endite bristles not counted. Except for dorsal bristle being bare, basale similar to that of adult male. Coxale, exopodite, and endopodite similar to those of adult male.

Fifth Limb: Endite bristles not counted. Protopodial tooth, and 1st and 2nd exopodial joints similar to those of adult male. 3rd exopodial joint: Inner lobe with proximal bristle and 2 terminal bristles, all with long proximal hairs; outer lobe with 2 bristles (1 with long proximal and short distal spines, other with only short spines). 4th exopodial joint with 5 bristles (2 with short spines, 2 with long proximal hairs, and 1 bare). 5th exopodial joint similar to that of adult male.

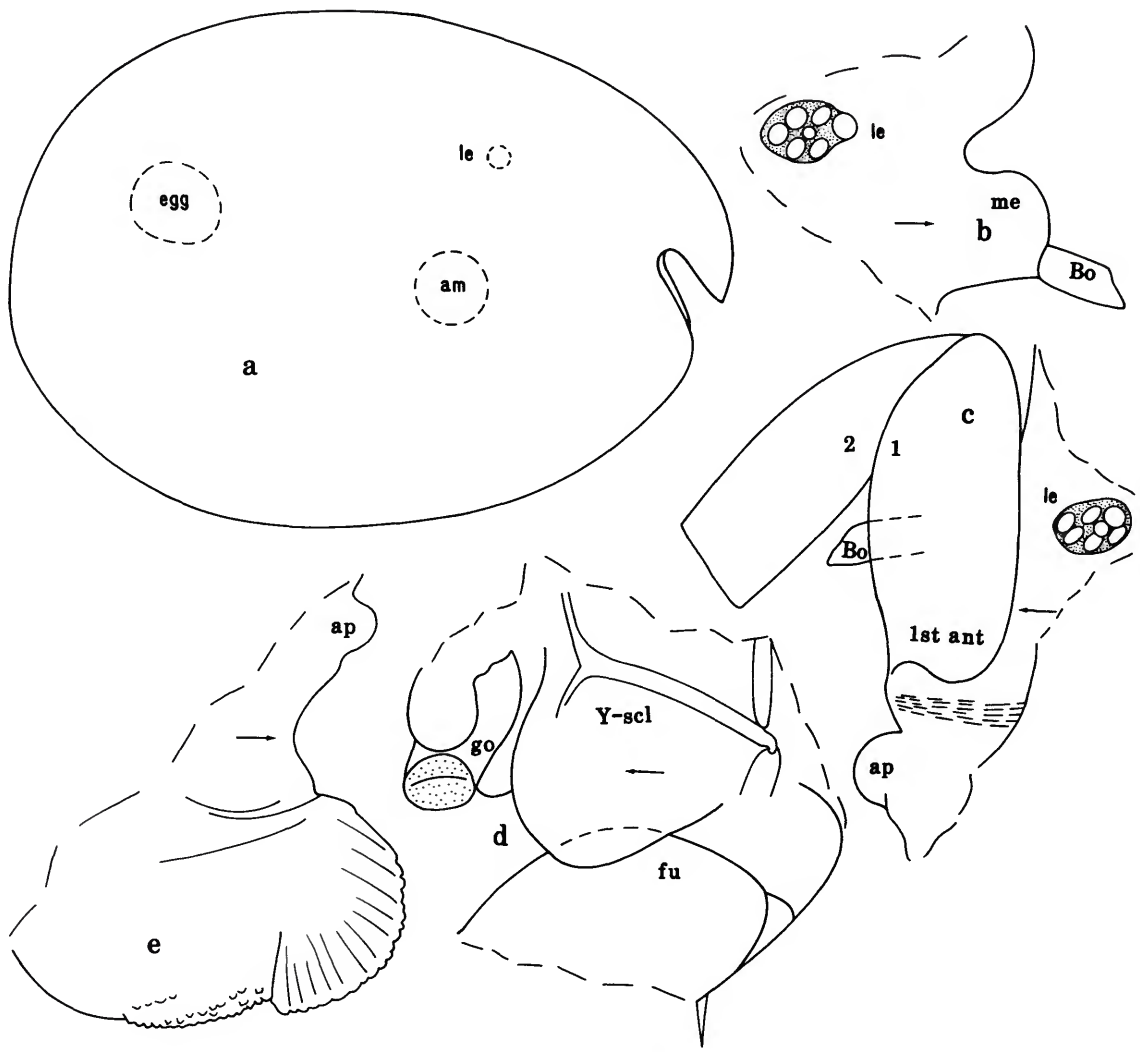


FIGURE 28.—*Paradoloria tryx* Kornicker, new species, ovigerous female, paratype, USNM 194006: *a*, complete specimen, length 4.8 mm, ov; *b*, right lateral eye, medial eye, and Bellonci organ, lv; *c*, dorsal part posterior of body, lv; *d*, part posterior of body, lv; *e*, upper lip, lv.

Sixth Limb: With 4 or 5 bare epipodial bristles. Endites I and II each with 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite III with 4 or 5 spinous terminal bristles; endite IV with 7 or 8 spinous terminal bristles. End joint with 20–22 bristles (posterior 3 or 4 with long hairs to tip; others with either long proximal hairs and short distal spines, or only short spines).

Seventh Limb: One limb of USNM 194006 with 71 bristles (distal group with 17 bristles on comb side and 14 on opposite side; proximal group with 19 bristles on comb side and 21 on opposite side); other limb also with 71 bristles (distal group with 20 bristles on comb side and 15 on opposite side; proximal group with 17 bristles on comb side and 19 on opposite side). Bristles with up to 7 bells. Comb with 21–23 teeth (6 or 7 flat-tipped teeth on each side of 9 longer teeth with rounded tips). Side opposite comb with 2 bifurcate teeth (4 cusps) similar to those of adult male.

Furca: Similar to that of adult male.

Bellonci Organ (Figure 28*b*,*c*): Cylindrical with pointed tip.

Eyes: Lateral eye small with 7 ommatidia and black pigment between ommatidia (Figure 28*a*–*c*). Medial eye larger than lateral eye, with light amber color (Figure 28*b*).

Upper Lip (Figure 28*e*): Similar to that of adult male.

Genitalia (Figure 28*d*): Round process on each side of body anterior to furca.

Anterior of Body (Figure 28*c,e*): With anterior process similar to that of adult male.

Posterior of Body: Bare, evenly rounded, without lobes present on adult male.

Y-*Sclerite* (Figure 28*d*): With well-developed amber-colored ventral branch.

Eggs: USNM 194006 with 6 eggs in marsupium (1 shown in Figure 28*a*); length of 1 egg 0.71 mm.

COMPARISONS.—The male *P. tryx* is much larger than males of *P. mordax, P. pugnax,* and *P. australis* (length of *tryx* 4.6 mm, of *mordax* 2.63–2.91 mm, of *pugnax* 2.54 mm, of *australis* 2.3 mm). The 7th limb of *tryx* has about 70 bristles, whereas *mordax, pugnax,* and *australis* have 34–45. *Paradoloria tryx* is easily separated from *mordax, pugnax,* and *australis* by its small black lateral eye with 7 ommatidia; the lateral eye is minute and unpigmented on *mordax,* has no ommatidia (male with 2 cells) and brown pigment on *pugnax,* and is absent on *australis*. The ventral margin of the 2nd endopodial joint of the mandible of the single adult male *tryx* bears 3 bristles compared to 4 on the other species, but the adult female *tryx* (holotype and USNM 194006) bears 4, and the variability of this character for *tryx* is unknown.

Paradoloria fax Kornicker, new species

FIGURES 29–32

Paradoloria species E, Kornicker, 1994, fig. 110x,y.

ETYMOLOGY.—From the Latin *fax* (torch, firebrand).

HOLOTYPE.—NMV J37162, undissected ovigerous female in alcohol.

TYPE LOCALITY.—Slope 66, 38°40.29'S, 149°18.06'E, Victoria, 96 km S of Point Hicks; depth 2900 m.

PARATYPES.—Slope 7: NMV J37161, 1 A–1 male on slide and in alcohol. Slope 17: NMV J35993, 1 partly dissected ovigerous female in alcohol; NMV J35994, 1 adult female (with unextruded large eggs) in alcohol; NMV J35995, 1 juvenile (with right valve missing) in alcohol. Slope 21: NMV J35996, 1 partly dissected adult female without eggs in alcohol. Slope 27: NMV J35997, 2 ovigerous females (1 partly dissected, 1 undissected) in alcohol. Slope 66: USNM 193952, 1 ovigerous female on slide and in alcohol; USNM 193953, 1 adult male on slide and in alcohol; USNM 193955, 1 ovigerous female in alcohol (body removed from shell); NMV J35998, 1 adult male, 8 undissected adult females and juveniles in alcohol.

DISTRIBUTION.—Slope 7, 1096 m. Slope 17, 2250 m. Slope 21, 220 m. Slope 27, 1500 m. Slope 66, 2900 m. Known depth range 220–2900 m.

DESCRIPTION OF ADULT MALE (Figures 29, 30).—Carapace oval in lateral view with very narrow projecting caudal process (Figure 29*a*). Tip of rostrum projecting laterally past valve edge (Figure 29*b*); anteroventral corner projecting laterally past valve edge and with 2 or 3 minute teeth (Figure 29*a,b*). Anterior edge of valve ventral to incisur with 2 or 3 small bristles (Figure 29*b*).

Infold: Rostral infold with about 36 bristles (about 16 long double bristles in row along anterior and ventral margins of rostrum, and about 20 shorter bristles (either single or branched at tip) posterior to long double bristles) plus paired bristles (anterior longer and double) dorsal to inner end of incisur (not all shown in Figure 29*b*). Anteroventral infold including anterior $^1/_3$ of ventral infold with row of about 35 double bristles (all except anterior 2 along narrow list) parallel to valve edge (10 of the double bristles shown in Figure 29*b*); posterior $^2/_3$ of ventral infold (to point where list broadens) with about 13 long single bristles (some appearing to flare distally) along narrow list. Anteroventral infold also with about 10 short bristles (single or branched at tip) between list and inner margin of infold (9 of these shown in Figure 29*b*). Posterior end of ventral infold of left valve (in vicinity of boundary between narrow and broad list) with 3 bristles (either single or divided at tip) between list and valve edge. Narrow list extends along ventral margin and broadens along infold anterior to caudal process. Broad list of caudal process with small processes (bearing pore canals) along posterior edge and with 16 minute bristles on flat medial surface (7 of these shown in Figure 29*c*). Dorsal end of list of caudal process of left valve terminates in sclerotized knob. Right valve dorsal to list of caudal process with sclerotized bar. About 15 pores present just within valve edge posterior to broad list of caudal process (8 of these shown in Figure 29*c*).

Selvage: Similar to that of *P. mordax.*

Carapace Size (length, height in mm): USNM 193953, 2.33, 1.71, height 73% of length.

First Antenna (Figure 29*d,e*): 1st joint bare. 2nd joint spinous. 3rd joint with 2 spinous bristles (dorsal bristle with base at $^1/_3$ joint length measured from proximal edge; ventral bristle subterminal), both reaching past midlength of 4th joint. 4th joint with 2 spinous terminal bristles (ventral longer, reaching 7th joint; dorsal reaching 5th joint). Sensory bristle of 5th joint with 10 long proximal filaments (proximal 3 with few indistinct minute proximal spines) and bifurcate tip. 6th joint with short spinous medial bristle near dorsal margin. 7th joint (Figure 29*d*): a-bristle about twice length of bristle of 6th joint, spinous; b-bristle about twice length of a-bristle, with 4 filaments (proximal filament short stout with stout round proximal part followed by large sucker and small node; next 2 filaments short slender, each with 3 small suckers in row; next filament short slender bare); c-bristle about 3 times length of b-bristle, with 8 filaments (proximal filament short stout with stout round proximal part followed by large sucker and small node; next filament short slender with 3 small suckers in row; next filament slender with 3 small suckers; next filament slender with 2 small suckers; next 5 filaments slender, each with minute proximal spine) and bifurcate tip. All small suckers of filaments of b- and c-bristles tapering to point distally (Figure 29*e*). 8th joint: d- and e-bristles longer than

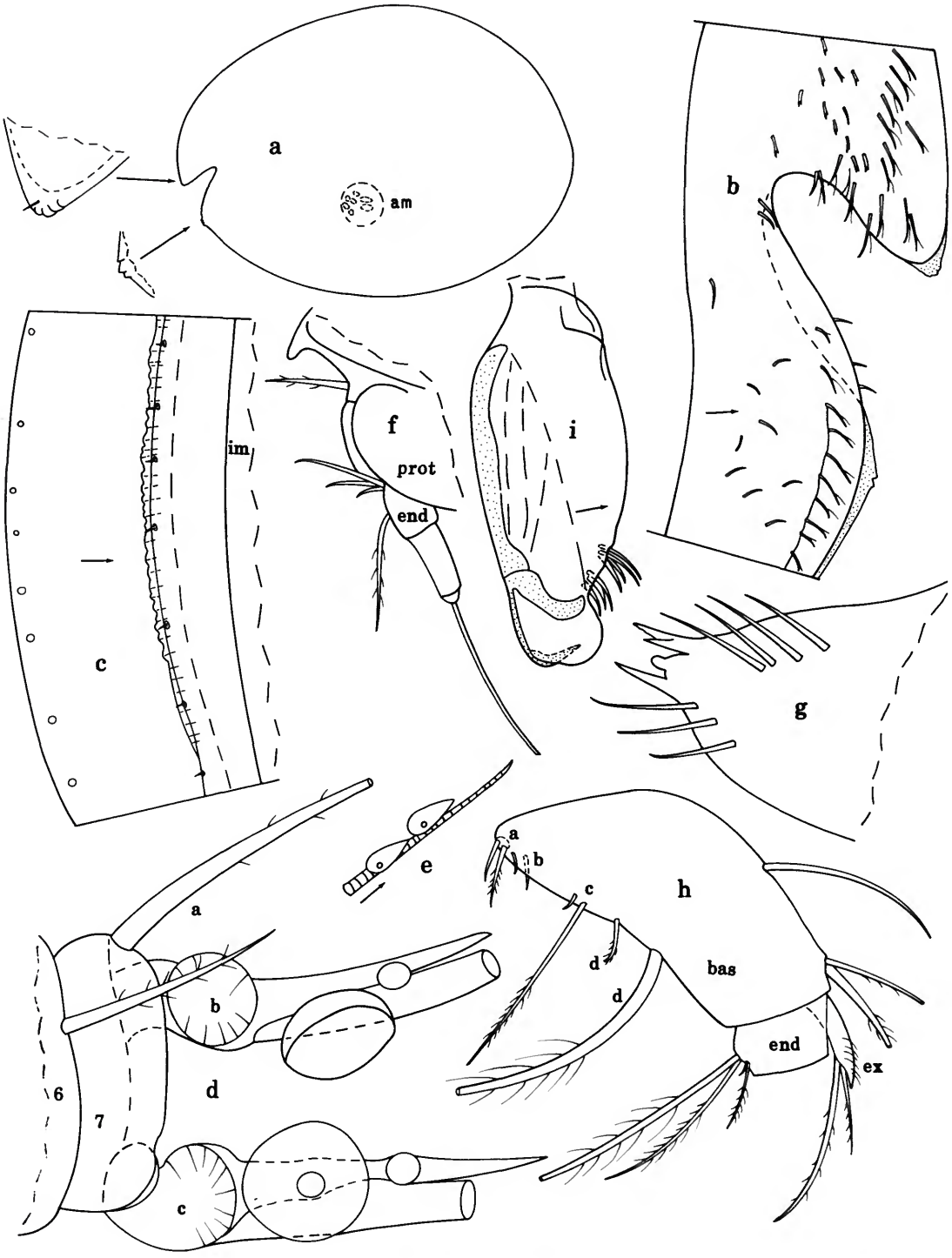


FIGURE 29.—*Paradoloria fax* Kornicker, new species, adult male, paratype, USNM 193953: *a*, complete specimen, length 2.33 mm; *b,c*, anterior and posterior, respectively, left valve, iv; *d*, distal part left 1st antenna (nabs), mv; *e*, two small suckers 2nd filament c-bristle left 1st antenna; *f*, part protopodite and endopodite right 2nd antenna, mv; *g*, distal end coxale endite left mandible, mv; *h*, part left mandible, mv; *i*, right copulatory limb, lv.

FIGURE 30.—*Paradoloria fax* Kornicker, new species, adult male, paratype, USNM 193953: *a*, part right 5th limb, av; *b*, main tooth left 5th limb, pv; *c*, left 6th limb (nabs), mv; *d*, tip 7th limb (nabs), lv; *e*, right lamella furca, lv; *f*, dorsal part anterior of body, lv; *g,h*, dorsal part anterior of body (Bellonci organ and area of medial eye stippled); *i,j*, left and right views, respectively, upper lip; *k*, posterior of body, lv.

b-bristle, bare with rounded tips with minute terminal process; f-bristle more than twice length of b-bristle, with 7 or 8 filaments (with small spines) and bifurcate tip; g-bristle longer than f-bristle, with 8 marginal filaments (with small spines) and bifurcate tip.

Second Antenna: Protopodite with fairly long distal medial bristle with few spines (Figure 29*f*). Endopodite 3-jointed (Figure 29*f*): 1st joint with 3 proximal bristles (1 long, 2 short) and 1 distal spinous bristle about same length as long proximal bristle; 2nd joint bare; 3rd joint with long terminal filament. Exopodite: Bristle of 2nd joint reaching well past 9th joint, with abundant (about 28) slender ventral spines and abundant slenderer dorsal spines; bristles of joints 3–8 and 4 bristles of joint 9 with natatory hairs but no spines (dorsal bristle of 9th joint short); joints 4–8 (possible also joint 3) with basal spines increasing in length on distal joints (spine of 8th joint about same length as 9th joint); 9th joint with lateral spine about 3/4 length of joint; joints 2–8 with row of minute spines on distal dorsal corner.

Mandible: Coxale endite well developed, spinous, with 2 stout spines at tip and small peg between them (Figure 29*g*). Basale with 3 or 4 a-bristles, 1 b-bristle, 2 c-bristles, and 2 d-bristles (longest with long proximal and short distal spines) (Figure 29*h*); dorsal margin with 1 bristle just distal to midlength and 2 terminal bristles; medial surface without spines. Exopodite about 1 1/2 times length of dorsal margin of 1st endopodial joint, with spinous terminal projection and 2 subterminal bristles (distal about half length of proximal) (Figure 29*h*). 1st endopodial joint with 4 ventral bristles (1 minute bare, 1 short and 1 long with short spines, 1 very long with long proximal and short distal spines). 2nd endopodial joint narrow at midlength: Ventral margin spinous, with 3 or 4 distal ringed bristles (USNM 193953: Left limb with 3 bristles (proximal single, 2 distal paired similar in length and width); right limb with 4 bristles (proximal 2 single, distal 2 paired similar in length and width)); dorsal margin with about 22 bristles (12 short spinous (mostly medial), 3 medium length, 7 long) proximal to midlength. 3rd endopodial joint with 3 stout bare claws and 4 ringed bristles (none with broad proximal part).

Maxilla: Coxale with stout dorsal bristle (bristle broken off near base on both limbs of USNM 195953). Basale with 1 short bare dorsal bristle at midlength, 1 short bare distal medial bristle at midwidth, and 1 or 2 long, spinous, distal, ventral bristles. Exopodite well developed, with 3 bristles (proximal and middle bristle with long hairs, other with widely separated short hairs). 1st endopodial joint with dorsal spines, undulate cutting tooth, 2 long ringed alpha-bristles with few indistinct spines, and 2 beta-bristles (outer pectinate, inner shorter spinous). 2nd endopodial joint with 4 slender ringed a-bristles with few spines, 3 pectinate b-bristles, 2 ringed pectinate c-bristles, and 3 pectinate d-bristles (outer ringed, inner 2 unringed claw-like). Endite bristles obscured and not counted.

Fifth Limb: Protopodite with undulate tooth (Figure 30*a*). 1st exopodial joint: Main tooth with smooth proximal tooth (with minute terminal spine) and 5 pectinate teeth (Figure 30*b*); bristle with long proximal spines proximal to smooth tooth; anterior side with row of 3 bristles with long proximal hairs (longest also pectinate distally) and 1 bristle (with long proximal hairs) close to protopodial tooth (Figure 30*a*). 2nd exopodial joint with 4 cuspate unringed a-bristles, 6 or 7 pectinate ringed b′- plus b″-bristles, 1 posterior c-bristle with long proximal hairs and short distal spines, and 1 anterior d-bristle with long proximal hairs. 3rd exopodial joint: Inner lobe with proximal bristle with long proximal hairs and 2 longer terminal bristles with few short spines (outer bristle unringed); outer lobe with 2 bristles with long proximal hairs. 4th exopodial joint with 3 bristles with short spines. 5th exopodial joint separated from 4th by indistinct suture, with 2 bristles with short spines. Exopodial joints 3–5 hirsute. Endite bristles not counted.

Sixth Limb (Figure 30*c*): With 3 or 4 bare epipodial bristles (distal fairly long, about 3/4 length of dorsal margin of end joint). Endite I with 1 short spinous medial bristle and 2 longer spinous terminal bristles; endite II with 2 short spinous medial bristles and 2 longer spinous terminal bristles; endite III with 1 long spinous medial bristle and 3 spinous terminal bristles; endite IV with 1 long spinous medial bristle and 4 or 5 spinous terminal bristles. End joint with 19 or 20 bristles (2 posterior with long hairs; 2–4 short anterior and slightly lateral with short spines; 1–3 towards anterior end on margin with short spines, remainder on margin with long proximal hairs and short distal spines); lateral surface with stiff spines along distal edge; medial surface hirsute; all bristles of end joint closely spaced.

Seventh Limb: One limb of USNM 193953 with 37 bristles (distal group with 13 bristles on comb side and 8 on jaw side; proximal group with 8 bristles on each side). Bristles with up to 7 bells. Comb with about 21 teeth (4 or 5 short flat-tipped teeth on each side of longer teeth with rounded tips) (Figure 30*d*). Jaw with stout tooth (with large inner and outer cusps) with fan on each side with 4 small teeth (Figure 30*d*).

Furca (Figure 30*e*): Each lamella with 10 claws, all articulated; claw 4 shorter and slenderer than claw 5; claw 5 about same width at base as claw 3, but shorter; each claw with slender teeth of similar size along posterior edge (not shown); claw 1 with row of medial teeth with teeth of distal half stouter than those in proximal half; right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figure 30*g,h*): With uneven margin and tapered tip.

Eyes: Lateral eye either minute (light amber color with indistinct cells (Figure 30*f*)) or absent (it is possible that the "eye" observed in USNM 193953 is a cluster of cells unrelated to an eye; therefore, I have questioned the illustration of the lateral eyes in Figure 30*f*). Medial eye absent but represented by light amber-colored area proximal

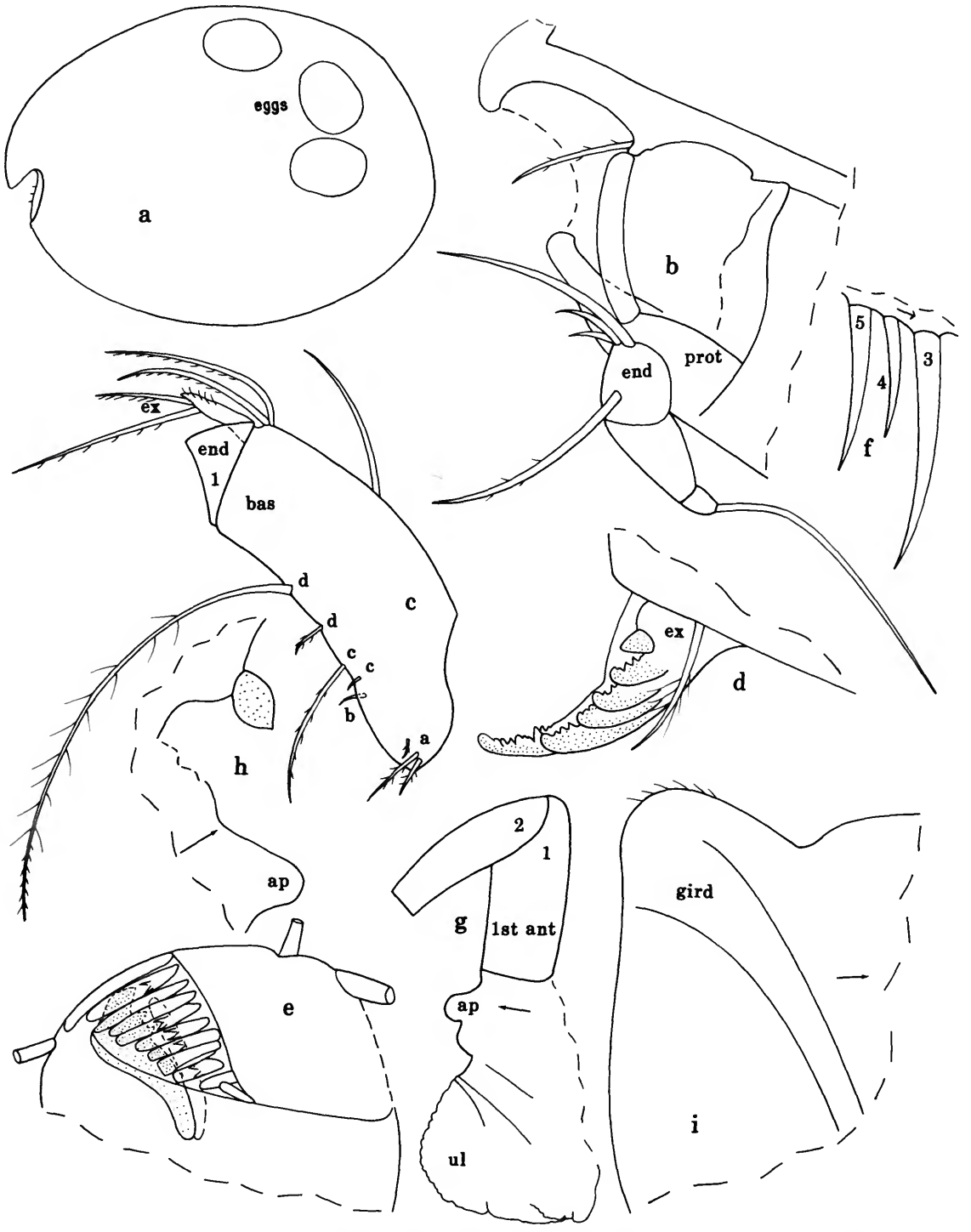


FIGURE 31.—*Paradoloria fax* Kornicker, new species, ovigerous female, paratype, USNM 193952: *a*, complete specimen, length 2.56 mm, ov; *b*, part protopodite and endopodite, right 2nd antenna, mv; *c*, part right mandible, mv; *d*, main tooth left 5th limb, pv; *e*, tip 7th limb (nabs), lv; *f*, claws 3–5 right lamella furca, lv; *g*, anterior of body, lv; *h*, dorsal part of anterior of body (1st antennae removed), lv; *i*, posterodorsal part of body, lv.

to Bellonci Organ (Figure 30*g,h*).

Upper Lip (Figure 30*i,j*): Unpaired anterior part and paired posterior part bearing glandular processes; small indistinct lobe with few glandular openings present near posterior end of divided part and slightly proximal to its ventral edge.

Genitalia (Figure 29*i*): Copulatory limb on each side of body anterior to furca lobate with several minute distal bristles, and with sclerotized pointed process on 1 lobe.

Anterior of Body (Figure 30*g,i*): Rounded anterior process between 1st antennae and upper lip.

Posterior of Body (Figure 30*k*): Posterodorsal corner near dorsal end of girdle with low node bearing small spines; dorsal margin anterior to node fairly straight but with few weak lateral sutures suggesting segments.

Y-*Sclerite* (Figure 30*k*): Typical for family.

DESCRIPTION OF ADULT FEMALE (Figure 31).—Carapace similar in shape to that of adult male except posterior margin more evenly rounded on some specimens (Figure 31*a*); anterior margin ventral to incisur with 3 small bristles; 2–4 minute teeth at anteroventral corner.

Infold and Selvage: Not examined.

Carapace Size (length, height in mm): Slope 17: NMV J35993, ovigerous female, 2.47, 1.76, height 71% of length; NMV J35994, female with unextruded large eggs, 2.45, 1.79, height 73% of length. Slope 21: NMV J35996, partly dissected adult female without eggs, 2.37, 1.76, height 74% of length. Slope 27: NMV J35997, partly dissected ovigerous female, 2.50, 1.80, height 72% of length. Slope 66: NMV J37162 (holotype), 2.69, 1.93, height 72% of length; USNM 193952, 2.56, 1.90, height 74% of length; USNM 193955, 2.77, 2.06, height 74% of length. Length range 2.37–2.77; height range 1.76–2.06.

First Antenna: Joints 1–4 and 6 similar to those of adult male. Sensory bristle of 5th joint with 9 long proximal filaments and bifurcate tip. 7th joint: a-bristle less than twice length of bristle of 6th joint, spinous; b-bristle slightly longer than twice length of a-bristle, with 4 slender spinous marginal filaments; c-bristle about 3 times length of b-bristle, with 8 slender marginal filaments (some with spines) and bifurcate tip. 8th joint: d- and e-bristles almost twice length of b-bristle, bare with rounded tips each with minute terminal process; f-bristle slightly shorter than c-bristle, with 4 fairly long spinous marginal filaments and bifurcate tip; g-bristle about same length as c-bristle, with 7 marginal filaments (most with spines) and bifurcate tip.

Second Antenna (Figure 31*b*): Similar to that of adult male.

Mandible: Coxale endite and 1st and 3rd endopodial joints similar to those of adult male. Basale (Figure 31*c*): Ventral margin of USNM 193952 with 3 a-bristles on each limb, 1 b-bristle on right limb (closer to c-bristle than on adult male), no b-bristle on left limb, 2 c-bristles on each limb, 2 d-bristles on right limb, and only 1 long d-bristle on left limb; ventral margin of left limb of specimen from Slope 21 with 3 a-bristles, 1 b-bristle near a-bristles, 1 c-bristle, and 2 d-bristles (right limb not examined); bristles of dorsal margin similar to those of adult male; medial surface of joint with few distal spines near dorsal margin. Exopodite shorter than that of adult male (Figure 31*c*). 2nd endopodial joint narrow at midlength: Ventral margin of left limb of USNM 193952 with 2 distal single bristles; ventral margin of right limb of USNM 193952 with 2 pairs of distal bristles; ventral margin of left limb of specimen from Slope 21 with 2 distal single bristles followed by 2 paired bristles (right limb not examined); bristles of dorsal margin not counted but appearing similar to those of adult male.

Maxilla: Endite bristles not counted. Coxale with stout plumose dorsal bristle. Basale with bare dorsal bristle at midlength, short bare distal medial bristle near midwidth, and 1 long spinous ventral bristle. Exopodite and 1st endopodial joint similar to those of adult male, except specimen from Slope 21 with 3 beta-bristles on left limb (right limb not examined). 2nd endopodial joint differs from that of adult male in having additional c-bristle (smaller than others, with few spines, close to inner b-bristle).

Fifth Limb: Endites not counted. protopodial tooth similar to that of adult male. Proximal smooth tooth of main tooth without terminal spine (Figure 31*d*), otherwise main tooth and bristles of 1st exopodial joint similar to those of adult male. 2nd–4th exopodial joints similar to those of adult male. 5th exopodial joint with small bare sclerotized node (to which muscle is attached) near 4th joint; bristles similar to those of adult male.

Sixth Limb: With 3 epipodial bristles of lengths similar to those of adult male. Endite I with 1 short spinous medial bristle and 2 longer spinous terminal bristles; endite II with 2 short spinous medial bristles and 3 spinous terminal bristles (middle bristle small); endite III with 1 long spinous medial bristle and 4 or 5 spinous terminal bristles (1 of these small); endite IV with 1 long spinous medial bristle and 5 or 6 spinous terminal bristles (1 or 2 of these small). End joint similar in shape and spinosity to that of adult male; with 20 bristles similar to those of adult male.

Seventh Limb: One limb of USNM 193952 with 32 bristles (distal group with 11 bristles on comb side and 8 on jaw side; proximal group with 6 bristles on comb side, 7 on jaw side). Bristles with up to 7 bells. Comb with about 21 teeth (4 short flat-tipped teeth on each side of about 13 longer teeth with rounded tips). Jaw opposite comb obscured on USNM 193952 but, in general, similar to that of adult male. Comb of USNM 193952 pulled down over jaw (Figure 31*e*), whereas comb of adult male USNM 193953 is open (Figure 30*d*).

Furca (Figure 31*f*): USNM 193952 with 9 claws on left lamella and 10 on right; specimen from Slope 21 with 10 claws on each lamella; distribution of claws and armature of claws similar to those of adult male.

Bellonci Organ (Figure 31*h*): Lemon shape.

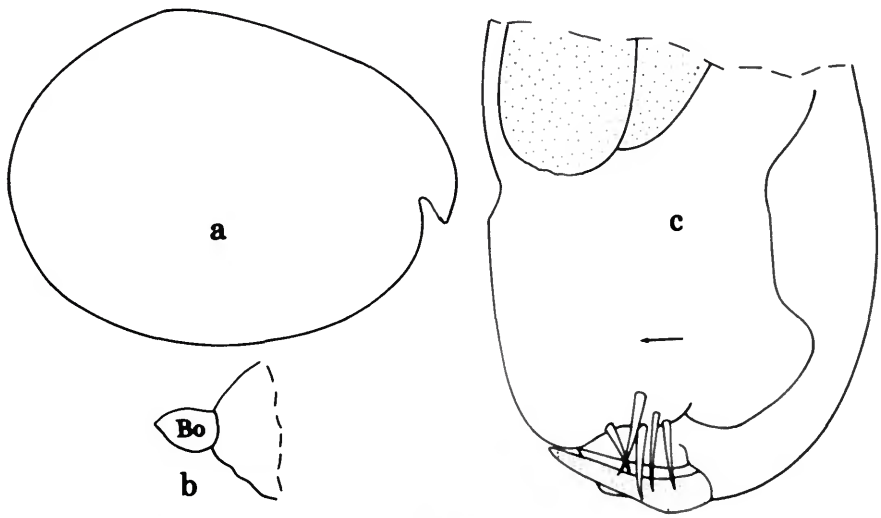


FIGURE 32.—*Paradoloria fax* Kornicker, new species, paratype, A–1 male, paratype, NMV J37161: *a*, complete specimen, length 2.17 mm; *b*, Bellonci organ and area of medial eye; *c*, distal end of copulatory limb, lv.

Eyes: Lateral eye absent. Medial eye represented by slight bulge with light amber color proximal to Bellonci organ (Figure 31*h*).

Upper Lip (Figure 31*g*), *and Anterior of Body* (Figure 31*g,h*): Similar to those of adult male (anterior process may be slightly larger in female).

Genitalia: Oval with attached spermatophore on each side of body anterior to furca.

Posterior of Body (Figure 31*i*): Without weak lateral sutures present on adult male, otherwise similar.

Y-*Sclerite:* Similar to that of adult male.

Eggs: Slope 17: NMV J35993, 1 specimen with 10 eggs in marsupium; length of 1 egg 0.47 mm. Slope 27: NMV J35997, 1 specimen with 9 eggs in marsupium, lengths of 2 eggs, 0.43 mm, 0.46 mm. Slope 66: USNM 193952 with 10 eggs in marsupium (3 shown within carapace in Figure 31*a*); lengths of 5 eggs (mm): 0.38, 0.40, 0.42, 0.43, 0.46; average 0.42 mm. USNM 193955 with 1 egg in marsupium (length 0.36 mm) and 12 unextruded eggs (5 on 1 side, 7 on other); length of 1 unextruded egg 0.36 mm. Holotype with 8 eggs in marsupium; length of 1 egg measured through shell 0.50 mm.

DESCRIPTION OF A–1 MALE (Figure 32).—Carapace similar in shape to that of adult male (Figure 32*a*).

Infold: Not examined.

Carapace Size (length, height in mm): Slope 7: NMV J37161, 2.17, 1.57, height 72% length.

First and Second Antennae: Similar to those of adult female.

Mandible: Similar to that of adult male with following exceptions: Basale with 3 a-bristles on each limb; exopodite about $1^1/_3$ length of dorsal margin of 1st endopodial joint and with distal bristle about $^3/_4$ length of proximal bristle; 2nd endopodial joint with 2 or 4 distal ventral bristles (left limb with 2 single followed by 2 paired; right limb with only 2 paired (aberrant?)) and about 14–18 dorsal bristles (left limb with 4 short medial, 1 medium, and 9 long; right limb with 8 short medial, 2 medium, and 8 long)).

Maxilla: Coxale with spinous dorsal bristle. Basale with 1 short bristle on dorsal margin, 1 short medial bristle close to dorsal margin, and 1 long ventral bristle. Exopodite and 2nd endopodial joint similar to those of adult male. 1st endopodial joint with 2 long ringed alpha-bristles with few indistinct spines and 2 or 3 beta-bristles (outer long pectinate, adjacent bristle short spinous, inner bristle when present short, bare or with few spines); cutting tooth and spination similar to those of adult male. Endite I with 11 bristles; bristles of endites II and III not counted.

Fifth Limb: 1st exopodial tooth similar to that of adult male (with 5 pectinate teeth); 2nd–5th exopodial joints similar to those of adult male except 4th joint with 4 bristles. Endite bristles not counted.

Sixth Limb: With 4 epipodial bristles (distal about $^1/_2$ length of dorsal margin of end joint). Endite I with 1 or 2 short medial and 2 longer terminal bristles; endite II with 2 short medial and 3 terminal bristles (2 long, 1 short with base medial to others); endite III with 1 medial and 4–6 terminal bristles; endite IV with 1 medial and 6 terminal bristles; all endite bristles spinous. End joint with 21 or 22 bristles (2 posterior with long hairs; 5–7 with short spines; 12–15 with long proximal hairs and short distal spines).

Seventh Limb: One limb of specimen from Slope 7 with 30 bristles (distal group with 11 bristles on comb side and 8 bristles on jaw side; proximal group with 4 bristles on comb side and 7 bristles on jaw side); each bristle with up to 5 bells; long bristles cylindrical, shorter bristles slightly tapered. Comb with about 17 teeth (3 short flat-tipped teeth on each side of

longer teeth with rounded tips); middle tooth longer and with recurved tip. Jaw similar to that of adult male.

Furca, Bellonci Organ (Figure 32*b*), *Upper Lip, Anterior of Body, and Y-Sclerite:* Similar to those of adult male.

Eyes: Lateral eye minute with 4 small cells (observed only on left side). Medial eye small without pigment (Figure 32*b*).

Genitalia (Figure 32*c*): Fairly well-developed lobes with terminal bristles and stout sclerotized spine.

Posterior of Body: Evenly rounded, bare.

REMARKS.—It is of interest that the A–1 male has the same number (5) of pectinate teeth in the main tooth of the 5th limb as does the adult. Most species of Cypridinidae have 6 pectinate teeth on the adult with 1 tooth added in each instar. It is possible that the A–1 male is misidentified and should be referred to *P. australis*, which has 6 pectinate teeth in the main tooth of the 5th limb.

COMPARISONS.—The furca of *P. fax* differs from those of *P. mordax, P. pugnax,* and *P. tryx* in having the 4th claw weaker and shorter than the 5th. The furca of *P. fax* is similar to that of *P. australis* Poulsen, 1962, known only from an adult male. The main difference between the two species is that the 5th limb of the adult *P. fax* has 5 rather than 6 pectinate teeth on the main tooth of the 1st exopodial joint. The lateral eye is absent on some specimens and is so small on others that it can not be certain that it is not a cluster of cells unrelated to the lateral eye.

Paradoloria species A

FIGURE 33

MATERIAL.—One A–2 instar (instar IV) (sex unknown) on slide and in alcohol; unnumbered specimen in the National Museum of Victoria.

DISTRIBUTION.—Slope 46, 42°00.20′S, 148°37.70′E, Tasmania, off Freycinet Peninsula; depth 720 m.

DESCRIPTION OF A–2 INSTAR (INSTAR IV) (Figure 33).—Carapace oval in lateral view with evenly rounded posterior margin (Figure 33*a*). Tip of rostrum projecting laterally past valve edge. Edge of anteroventral corner of valve with slight projection.

Infold and Selvage: Not examined.

Carapace Size (length, height in mm): 1.97, 1.31, height 66% of length.

First Antenna: 1st joint bare. 2nd joint with abundant ventral, dorsal, medial, and lateral spines. 3rd and 4th joints each with 2 bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 5 stout proximal filaments followed by 3 narrower and shorter distal filaments and bifurcate tip. 6th joint with medial bristle about same length as combined lengths of 5th and 6th joints. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle more than twice length of a-bristle, with 3 short marginal filaments; c-bristle longer than sensory bristle of 5th joint, with 6 short marginal filaments and bifurcate tip. 8th joint: d- and e-bristles bare with blunt tips; f-bristle with tip missing, but bristle probably similar in length to c-bristle, with 6 filaments (some with minute spines) on remaining part; g-bristle with tip missing, but bristle longer than c-bristle, with 6 short filaments (most with spines) on remaining part.

Second Antenna: Protopodite with short distal medial bristle (Figure 33*b*). Endopodite elongate, 3-jointed (Figure 33*b*): 1st joint with 3 bristles (2 proximal, 1 distal); 2nd joint long bare; 3rd joint shorter than 2nd, with long terminal filament. Exopodite: Bristle of 2nd joint just reaching past 9th joint, with about 20 slender ventral spines; bristles of joints 3–8 with natatory hairs, no spines; 9th joint with 4 bristles (2 long and 1 medium with natatory hairs, 1 (dorsal) short bare); joints 3–8 with basal spines increasing in length on distal joints (spine of 8th joint almost twice length of 9th joint); lateral spine of 9th joint slightly shorter than basal spine of 8th joint; joints 2–6 with minute spines along distal edge.

Mandible: Coxale endite spinous, with 2 stout widely separated terminal spines with small peg between them; small ringed bristle near base of endite. Basale: Ventral margin with 3 short a-bristles, 1 short lateral b-bristle just distal to a-bristles, 2 c-bristles (proximal smaller), and 2 closely spaced d-bristles (proximal small; distal long spinous); dorsal margin with 3 bristles (1 near midlength, 2 terminal); medial surface with few long distal spines. Exopodite with spinous tip just reaching distal end of 1st endopodial joint and 2 subterminal bristles (distal about half length of proximal). 1st endopodial joint with 4 ventral bristles (1 minute, 1 short, 1 long with short spines, 1 long with long spines in proximal half); dorsal margin with few minute terminal spines. 2nd endopodial joint: Ventral margin with short spines and 4 distal spine-like bristles (2 single proximal, 2 paired distal); dorsal margin with 9–11 bristles proximal to midlength (5 long, 2 or 3 medium (1 proximal, 1 or 2 distal), and 2 or 3 short medial with slender anterior spines). 3rd endopodial joint with 3 stout claws and 4 ringed bristles (no bristles with broad proximal part).

Maxilla: Endite I with 11 bristles; endite II with 6 bristles; endite III with 7 bristles; all endite bristles spinous or pectinate. Coxale with short dorsal bristle with long proximal spines. Basale with 4 bristles (1 long ventral, 1 short ventral near base of exopodite; 1 dorsal about half length of long ventral bristle and same length as dorsal bristle of coxale, 1 short medial at midwidth). Exopodite well developed, hirsute, with 3 bristles (proximal and middle terminal bristles with long hairs, other terminal bristle bare). 1st endopodial joint spinous, with 2 ringed alpha-bristles with short indistinct spines, 2 ringed beta-bristles (outer long pectinate, inner with short spines), and undulate cutting tooth. 2nd endopodial joint with 4 ringed a-bristles with few spines, 3 pectinate b-bristles, 3 c-bristles (2 outer pectinate, inner shorter ringed and with short spines), and 3 pectinate d-bristles (only outer ringed).

Fifth Limb: With 3 endites (bristles not counted). Prodopodite with long narrow tooth. 1st endopodial joint: Main tooth with proximal triangular tooth and 4 pectinate teeth; bristle (with long proximal spines) proximal to triangular tooth; anterior side of joint with row of 3 bristles with long proximal

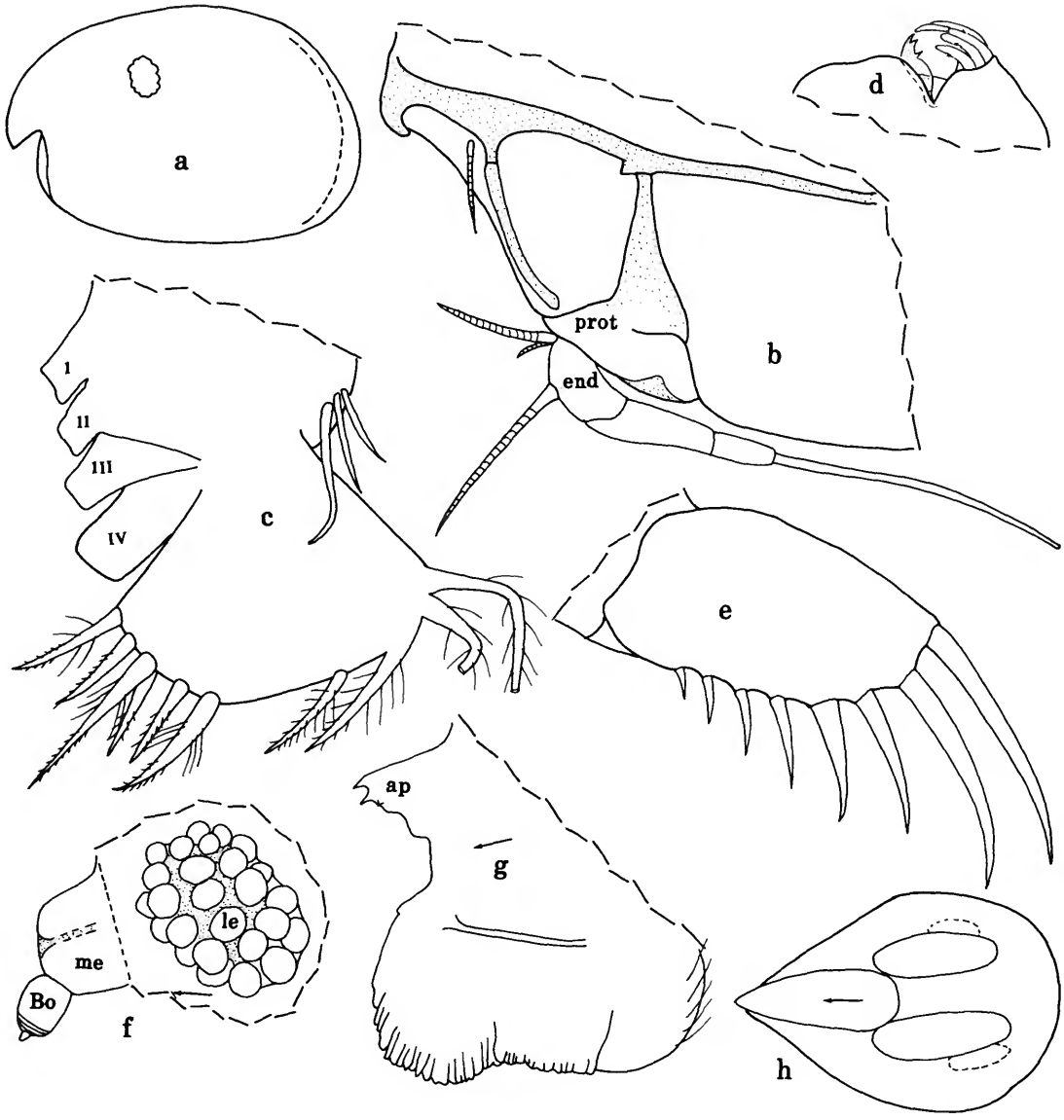


FIGURE 33.—*Paradoloria* species A, A–2 instar (sex unknown): *a*, complete specimen, length 1.97 mm; *b*, part prodopodite and endopodite right 2nd antenna, mv; *c*, right 6th limb (nabs), mv; *d*, tip 7th limb (nabs), lv; *e*, right lamella furca, lv; *f*, left lateral eye, medial eye, and Bellonci organ, lv; *g,h*, lateral and ventral views, respectively, of upper lip.

hairs (longest pectinate distally) and 1 short bristle (with long hairs) closer to protopodial tooth. 2nd exopodial joint with 3 cuspate unringed a-bristles, a total of about 6 ringed pectinate b′- and b″-bristles, 1 c-bristle with long proximal spines, and 1 d-bristle with long proximal spines. 3rd exopodial joint hirsute: inner lobe with ringed proximal bristle with long proximal hairs and 2 ringed terminal bristles with short spines; outer lobe with 2 ringed terminal bristles (1 with short spines, other with long proximal and short distal spines). 4th exopodial joint with 3 ringed bristles with short spines. 5th exopodial joint hirsute, separated from 4th joint by weak suture, with 2 ringed bristles (1 with short spines, other with long proximal and short distal spines).

Sixth Limb (Figure 33*c*; endite bristles not shown): With 2 or 3 bare epipodial bristles. Endite I with 1 short proximal medial and 2 longer terminal bristles; endite II with 2 short

proximal medial and 2 longer terminal bristles; endite III with 1 short proximal medial and 3 or 4 terminal bristles (2 or 3 long, 1 short (between long bristles)); endite IV with 6 bristles. End joint with 10 bristles.

Seventh Limb: With 18 bristles (distal group with 7 bristles on comb side and 5 bristles on opposite side; proximal group with 2 or 3 bristles on comb side and 3 or 4 bristles on opposite side); all bristles strongly tapered, with single bell, and with long terminal "clapper." Comb with 8 or 9 teeth. Side opposite comb with jaw bearing 3 or 4 minute teeth (Figure 33*d*).

Furca (Figure 33*e*): Each lamella with 8 claws, all articulated; claws decrease in length posteriorly along lamella; claw 3 slightly narrower than claw 4; claw 4 broader than claw 5; all claws with slender teeth along posterior edge (not shown); claw 1 with row of medial teeth with distal teeth stouter (not shown).

Bellonci Organ (Figure 33*f*): Barrel-shape, with distal rings and small terminal process.

Eyes (Figure 33*f*): Lateral eye large with about 26 amber-colored ommatidia and brown pigment between them. Medial eye smaller than lateral eye, with narrow band of brown pigment at midheight.

Upper Lip (Figure 33*g,h*): Unpaired anterior part with broadly convex outline in lateral view; paired posterior part without long tusks.

Genitalia: Absent.

Anterior of Body: With anterior process with 2 or 3 stout spines (Figure 33*g*).

Posterior of Body: Evenly rounded bare.

Y-Sclerite: Typical for subfamiliy.

REMARKS.—The specimen described above is interpreted to be an A–2 instar because all bristles of the 7th limb have only 1 bell, which is the same number reported on the A–2 instar of *Skogsbergia lerneri* (Kornicker) by Cohen (1983, fig. 4d), and on the A–2 male instar of *Skogsbergia galapagensis* Kornicker by Kornicker (1989:16). The specimen is tentatively interpreted to be the 4th instar because of having only 4 pectinate teeth on the main tooth of the 5th limb.

COMPARISONS.—*Paradoloria* species A differs from previously described species from the vicinity of Australia in having large lateral eyes.

Pterocypridina Kornicker, 1975

TYPE SPECIES.—*Pterocypridina excreta* Poulsen, 1962 (subsequent designation, Kornicker, 1975:142).

COMPOSITION.—Five species of *Pterocypridina* are known from the vicinity of Australia, *P. excreta* Poulsen, 1962:240, *P. dedeckkeri* Kornicker, 1983:6, and 3 new species described herein. A species from Flinders Passage at a depth of 12.8 m named *Cypridina* (?) *armata* by Brady (1898:89) may be a species of *Pterocypridina,* but because it is known only from the shell I concur with Müller (1912:50) who referred the species to "Cypridinarum genera dubia et species dubiae."

DISTRIBUTION.—Members of the genus have been collected off Thailand, Singapore, SE Australia, and SE North America. Known depth range 10–800 m.

Key to Species of *Pterocypridina* in Vicinity of Australia

1. Each valve without posterodorsal process . . . . . ***P. pax,*** new species
   Each valve with posterodorsal process 2
2. Posterodorsal process of valve very long, extending well past valve edge . . . . . ***P. appendix,*** new species
   Posterodorsal process short, not extending well past valve edge 3
3. Posterodorsal process broad, close to tip of caudal process . . . . . ***P. excreta***
   Posterodorsal process small, near middle of posterodorsal margin 4
4. Valve surface with polygons . . . . . ***P. dedeckkeri***
   Valve surface with U-shaped ridges . . . . . ***P. tressleri,*** new species

Pterocypridina dedeckkeri Kornicker, 1983

FIGURE 34

Pterocypridina dedeckkeri Kornicker, 1983:6, figs. 2–4, pls. 1–4; 1994, fig. 110ee.

HOLOTYPE.—USNM 158240, ovigerous female on slides and in alcohol.

TYPE LOCALITY.—Off Long Reef, Sydney, New South Wales, Australia; depth 43 m.

MATERIAL.—Holotype. None in present collection.

DISTRIBUTION.—Known only from type locality.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figure 34).—Reticulations completely covering valve surface, extending both to tip of rostrum and tip of caudal process (Kornicker, 1983, pl. 1a).

Infold: Bristles on anterior and ventral infolds shown in Figure 34*a*.

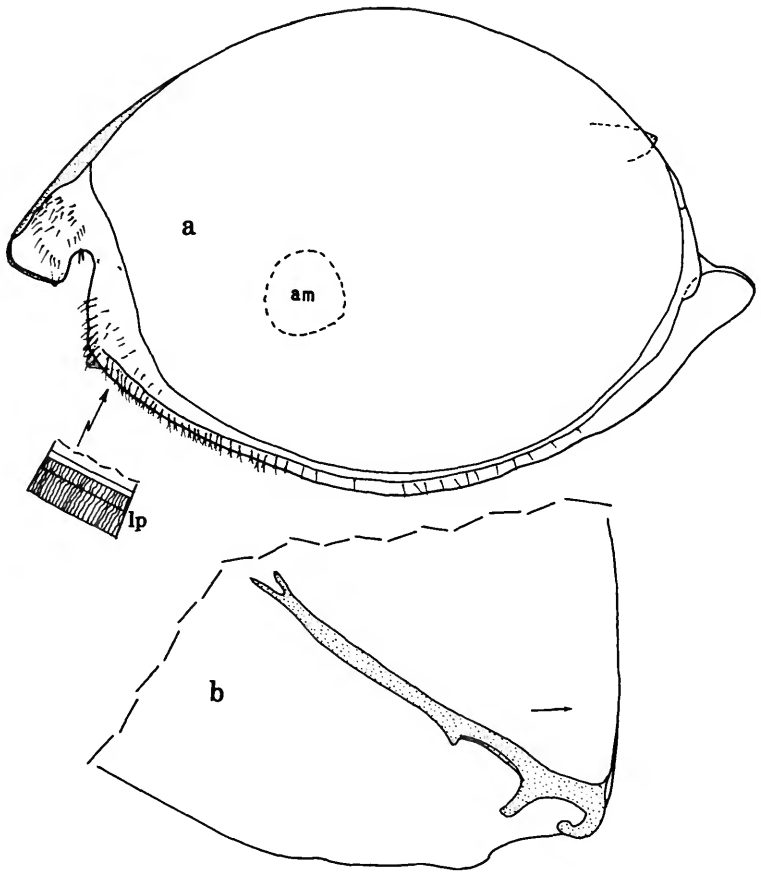


FIGURE 34.—*Pterocypridina dedeckkeri* Kornicker, 1983, ovigerous female, holotype, USNM 158240: *a*, right valve, iv; *b*, distal part protopodite left 2nd antenna, mv.

Second Antenna (Figure 34*b*): Medial longitudinal sclerite bifurcate at proximal end.

Pterocypridina tressleri Kornicker, new species

FIGURES 35, 36

Pterocypridina species B, Kornicker, 1994, fig. 110dd.

ETYMOLOGY.—Named in honor of Willis L. Tressler, for his contributions to the study of Ostracoda.

HOLOTYPE.—NMV J40005, ovigerous female on slide and in alcohol.

TYPE LOCALITY.—Slope 45, 42°02.20′S, 148°38.70′E, Tasmania, off Freycinet Peninsula; depth 800 m.

PARATYPES.—Slope 19: NMV J40006, 1 adult female with unextruded eggs.

DISTRIBUTION.—Slope 19, 520 m. Slope 45, 800 m.

DESCRIPTION OF ADULT FEMALE (Figures 35, 36).—Carapace oval in lateral view with well-developed rostrum and incisur (Figure 35*a–c;* caudal process of right valve slightly broader than that of left and with notch at dorsal end (Figure 35*g,h*); posterodorsal part of each valve with triangular alate process; rostrum and anteroventral margin with lateral processes; left valve only with small bulge at posterodorsal corner.

Ornamentation: Surface with U-shaped ridges with open ends generally facing anterior; each ridge either continuous or formed by disconnected short segments (Figure 35*d,e*); many ridges with minute spines along outer edge; some U-shaped ridges meet to form reticulations; surfaces of rostrum (dorsal to lateral process) and caudal process with minute pustules and no U-shaped ridges (Figure 35*c*).

Infold: Rostral infold with 26–29 undivided bristles forming 4 rows (Figure 35*f*); a pair of divided bristles (1 very long) at inner edge of incisur, and 2 short divided bristles set back from edge (Figure 35*f*). List along anteroventral and anterior 1/4 of ventral infold with 28–30 divided bristles each

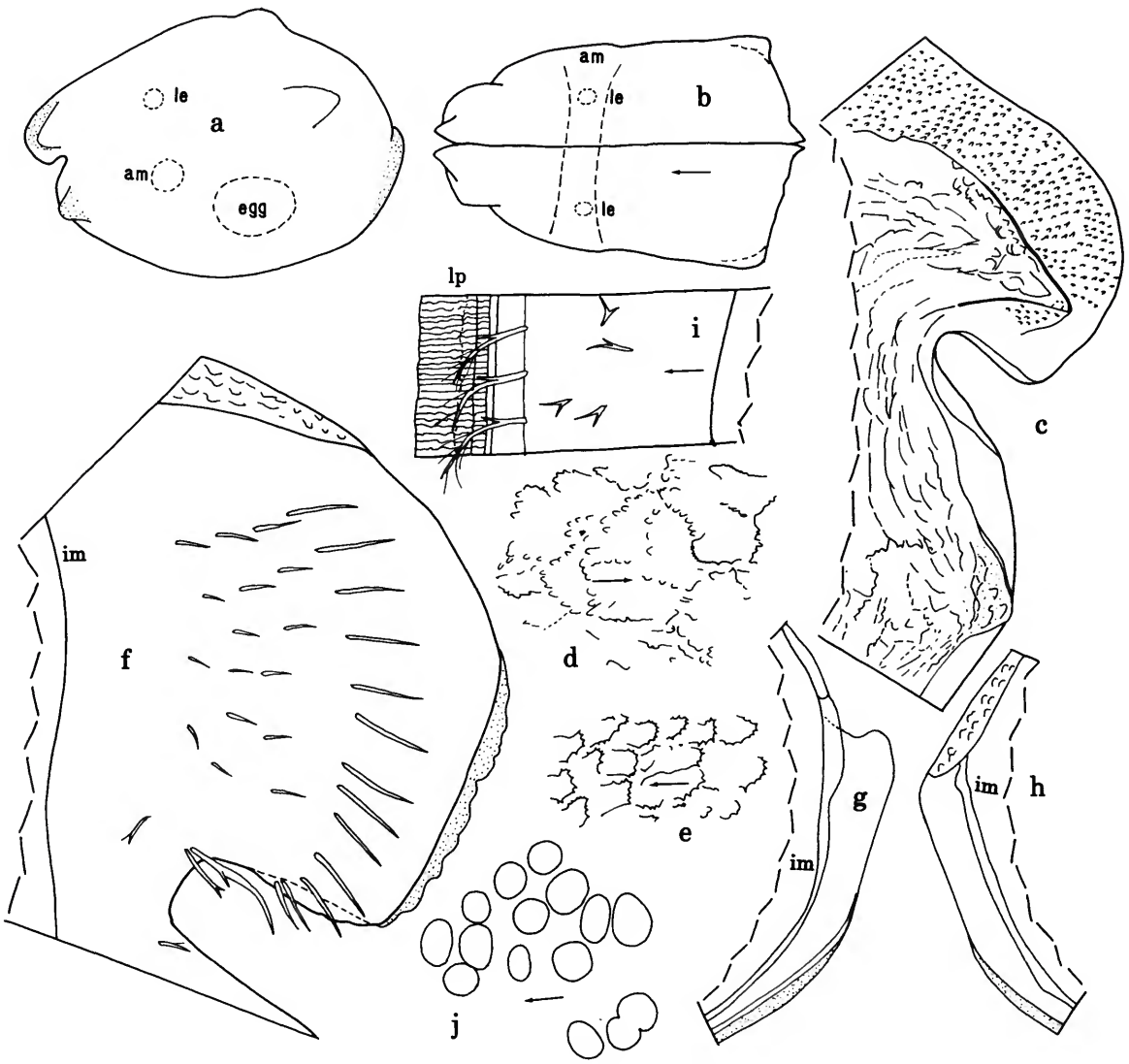


FIGURE 35.—*Pterocypridina tressleri* Kornicker, new species, ovigerous female, holotype, NMV J40005: *a,b*, lateral and dorsal views, respectively, of complete specimen, length 1.92 mm; *c*, anterior right valve, ov; *d*, surface ornamentation near midheight and midlength right valve, ov; *e*, surface ornamentation on posterodorsal alar process left valve, ov; *f*, anterior left valve, iv; *g,h*, posterior right and left valves, respectively, iv; *i*, infold and selvage anteroventral margin right valve, iv; *j*, central adductor muscle attachments left valve, ov.

consisting of short bare branch and long branch with long marginal hairs (Figure 35*i*); anteroventral infold also with about 19 short divided bristles proximal to list; posterior 3/4 of list of ventral infold (ending posteriorly where list curves away from valve edge anterior to caudal process) with 3–6 undivided widely separated bristles; broad list anterior to caudal process with minute protuberances (each bearing pore canal) along posterior edge and with an uneven row of minute bristles set back from posterior edge.

Selvage: Anterior and ventral margins with broad lamellar prolongation with smooth outer edge (Figure 35*i*); prolongation divided at inner end of incisur; prolongation narrow along ventral part of caudal process and absent along dorsal end; prolongation along anterior half of ventral margin with a weakly developed 2nd prolongation about 1/4 width of wider prolongation; prolongation with closely spaced striations (Figure 35*i*); striations more strongly developed and wavy along anteroventral margin and anterior half of ventral margin

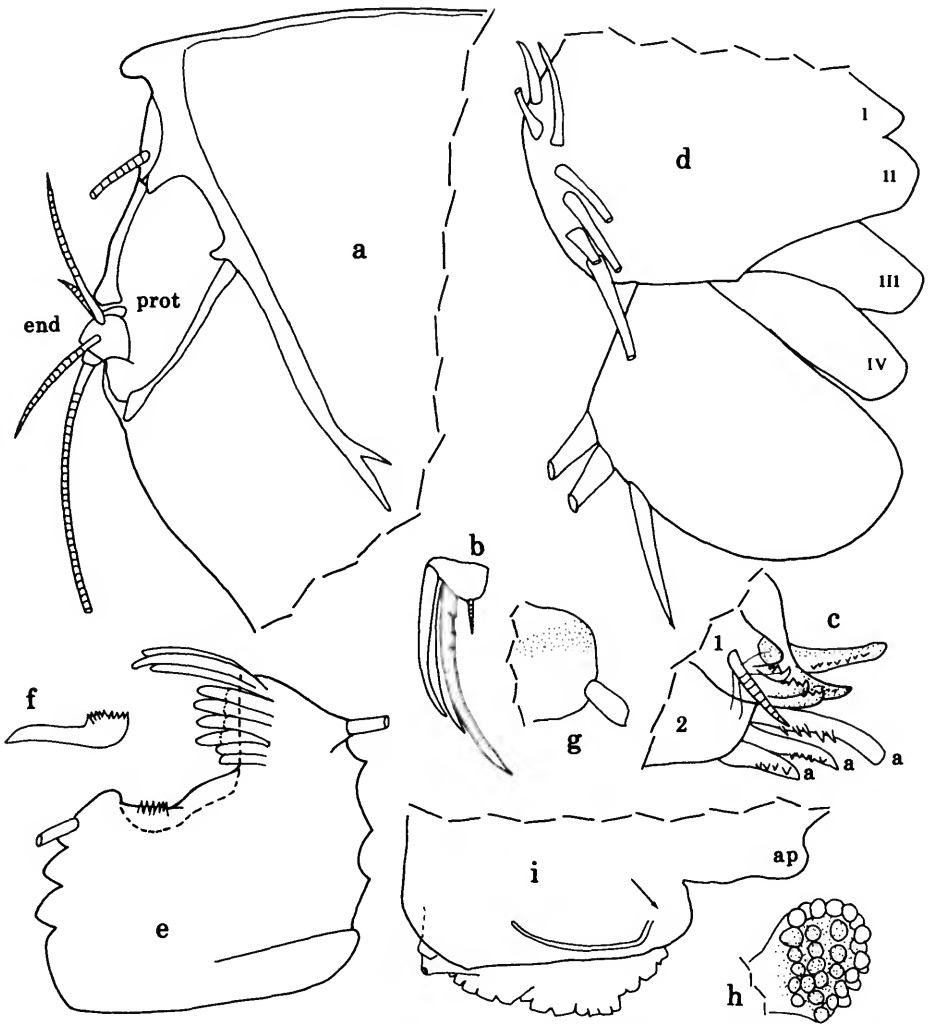


FIGURE 36.—*Pterocypridina tressleri* Kornicker, new species, ovigerous female, holotype, NMV J40005: *a*, part protopodite and endopodite, right 2nd antenna, mv; *b*, 2nd endopodial joint right mandible (3 bristles not shown), mv; *c*, part exopodite left 5th limb, pv; *d*, right 6th limb (nabs), mv; *e*, tip 7th limb (nabs), lv; *f*, jaw of 7th limb opposite that shown in *e*, lv; *g*, medial eye and Bellonci organ (pigment area stippled), lv; *h*, lateral eye (pigment area stippled); *i*, upper lip, lv.

(striations more strongly developed and more wavy than those of *P. dedeckkeri*).

Central Adductor Muscle Attachments (Figure 35*j*): Surface ridges absent over muscle attachments; about 15 ovoid muscle attachments in cluster just anterior and ventral to valve midheight and midlength.

Carapace Size (length, height in mm): Slope 19: NMV J40006, length 1.64, height including posterodorsal bulge 1.24, height excluding bulge 1.16; height 76% of length. Slope 45: NMV J40005 (holotype), length 1.92, height including posterodorsal bulge on left valve 1.37, height excluding bulge 1.34; height 71% of length. Length range 1.64–1.92; height range including bulge 1.24–1.37; range of height as percent of length 71–76.

First Antenna: c-bristle of 7th joint with 8 marginal filaments; g-bristle of 8th joint same length as c-bristle, with 10 short marginal filaments. Limb otherwise similar to that of *P. dedeckkeri* (tip of g-bristle missing on described specimen of *P. dedeckkeri*).

Second Antenna (Figure 36*a*): Protopodite similar to that of *P. dedeckkeri* including proximal bifurcation of medial longitudinal sclerite. Endopodite similar to that of *P. dedeckkeri* except base of terminal filament more clearly defined as being on small 2nd joint. Exopodite: Bristle of 2nd joint with

9–11 ventral spines; branch otherwise similar to that of *P. dedeckkeri*.

Mandible (Figure 36*b*): Coxale endite with minute spine-like bristle near base. Dorsal margin of 2nd endopodial joint with 11 bristles (1 of these short spinous). Limb otherwise similar to that of *P. dedeckkeri* (only 1 of 4 bristles shown in Figure 36*b*.)

Maxilla: Dorsal bristle of coxale bare; longest of the 3 a-bristles with few spines. Limb otherwise similar to that of *P. dedeckkeri*.

Fifth Limb (Figure 36*c*): Similar to that of *P. dedeckkeri*.

Sixth Limb (Figure 36*d*): Endite IV with 1 medial and 5 or 6 additional bristles (5 terminal, 0 or 1 lateral (adjacent to medial bristle)); end joint with 10 or 11 bristles; 7 or 8 epipodial bristles present. Limb otherwise similar to that of *P. dedeckkeri*.

Seventh Limb (Figure 36*e,f*): Bristles similar to those of *P. dedeckkeri*. Comb with 6 short teeth on each side of either 3 long slender teeth or 1 long slender tooth with slightly shorter alar process on each side (could not resolve which type present). Jaw opposite comb with distal fan with up to 10 minute teeth on each side.

Furca: Similar to that of *P. dedeckkeri*.

Bellonci Organ (Figure 36*g*): Cylindrical with minute terminal process.

Eyes: Medial eye similar to that of *P. dedeckkeri* (Figure 36*g*). Lateral eye about same size as medial eye with dense black pigment, with about 30 ommatidia (Figure 36*h*).

Upper Lip (Figure 36*i*), *Genitalia, Anterior of Body* (Figure 36*i*), *Posterior of Body, and Y-Sclerite:* Similar to those of *P. dedeckkeri*.

Eggs: Slope 19: NMV J40006, adult with 14 unextruded eggs (7 on each side). Slope 45: NMV J40005, holotype with 10 eggs (bearing lateral eyes) in marsupium; length of typical egg 0.41 mm; 1 egg inside carapace shown in Figure 35*a*.

COMPARISONS.—*Pterocypridina tressleri* differs from *P. dedeckkeri* in having mainly U-shaped ridges rather than polygons on the carapace surface, pustules rather than ridges on the outer surfaces of the rostrum and caudal process, a narrower caudal process, and fewer epipodial bristles on the 6th limb (7 or 8 compared to 11 or 12). *Pterocypridina tressleri* differs from *P. excreta* in having a smaller lateral posterodorsal process, and in having 5 rather than 6 pectinate teeth in the main tooth of the 5th limb. (Poulsen (1962:242) stated that the 5th limb of *P. excreta* is the same as that of *P. alata* Poulsen, 1962, which has 6 pectinate teeth.) Also, the sensory bristle of the 5th joint of the 1st antenna of *P. excreta* bears 9 stout proximal filaments compared to only 7 for *P. tressleri*, and the width of the end joint of the 6th limb is 44% of its length for *P. excreta* and 65% for *P. tressleri*. The number of ommatidia in the lateral eyes given in the literature is 12–15 for *P. excreta* (Poulsen, 1962:242), about 20 for *P. dedeckkeri* (Kornicker, 1983:9), and about 30 for *P. tressleri*, herein, but the dark black pigment that fills much of the eye between ommatidia makes exact counts difficult. The endopodite of the 2nd antenna of *P. tressleri* bears 2 proximal bristles compared to 3 on *P. excreta*, but the variability of that character is not known.

Pterocypridina pax Kornicker, new species

FIGURES 37, 38

Pterocypridina species A, Kornicker, 1994, fig. 110cc.

ETYMOLOGY.—From the Latin *pax* (peace, tranquility).

HOLOTYPE.—NMV J40004, partly dissected adult female in alcohol.

TYPE LOCALITY.—Slope 56, 34°55.79′S, 151°08.06′E, New South Wales, 44 km E of Nowra; depth 429 m.

PARATYPES.—Slope 56: USNM 193997, adult female on slide and in alcohol.

DISTRIBUTION.—Slope 56, 429 m.

DESCRIPTION OF ADULT FEMALE (Figures 37, 38).—Carapace similar in shape and ornamentation to that of *P. tressleri* except for absence of posterodorsal triangular alate process and stout lateral processes at anteroventral margin and rostrum (Figure 37*a–d*). Rostrum with low narrow lateral process along ventral edge (Figure 37*b*).

Infold: Rostral infold with 10–12 undivided bristles in addition to 2 divided bristles at edge of valve at inner end of incisur (Figure 37*e*); 2 short divided bristles present near inner end of incisur set back from valve edge; anteroventral and anterior 1/4 of ventral margin with row of 16–19 closely spaced divided bristles (not all shown in Figure 37*f*); anteroventral infold also with row of 5 divided bristles proximal to outer row of divided bristles; posterior 3/4 of ventral margin (to point where list curves away from ventral edge anterior to caudal process) with about 6 widely spaced bristles followed by about 5 more closely spaced bristles just anterior to ridge of caudal process; edge of broad list anterior to caudal process with minute protuberances each bearing a pore with small bristle (not shown in figure 37*g*).

Selvage: Selvage differs from that of *P. tressleri* in 2nd prolongation along anterior half of ventral margin being more strongly developed and about 1/2 instead of 1/4 the width of wider prolongation (Figure 37*f*); 2nd prolongation narrower along posterior half of ventral margin and terminates at posteroventral corner; prolongations with closely spaced striations better developed in proximal half and straight rather than wavy as in *P. tressleri*.

Carapace Size (length, height in mm): NMV J40004 (holotype), 1.46, 1.07; USNM 193997, 1.48, 1.06. Length range 1.46–1.48; height range 1.06–1.07; range of height as percent of length 72–73.

First Antenna (Figure 38*a*): 1st joint bare. 2nd joint with few indistinct short medial and dorsal spines. 3rd joint short

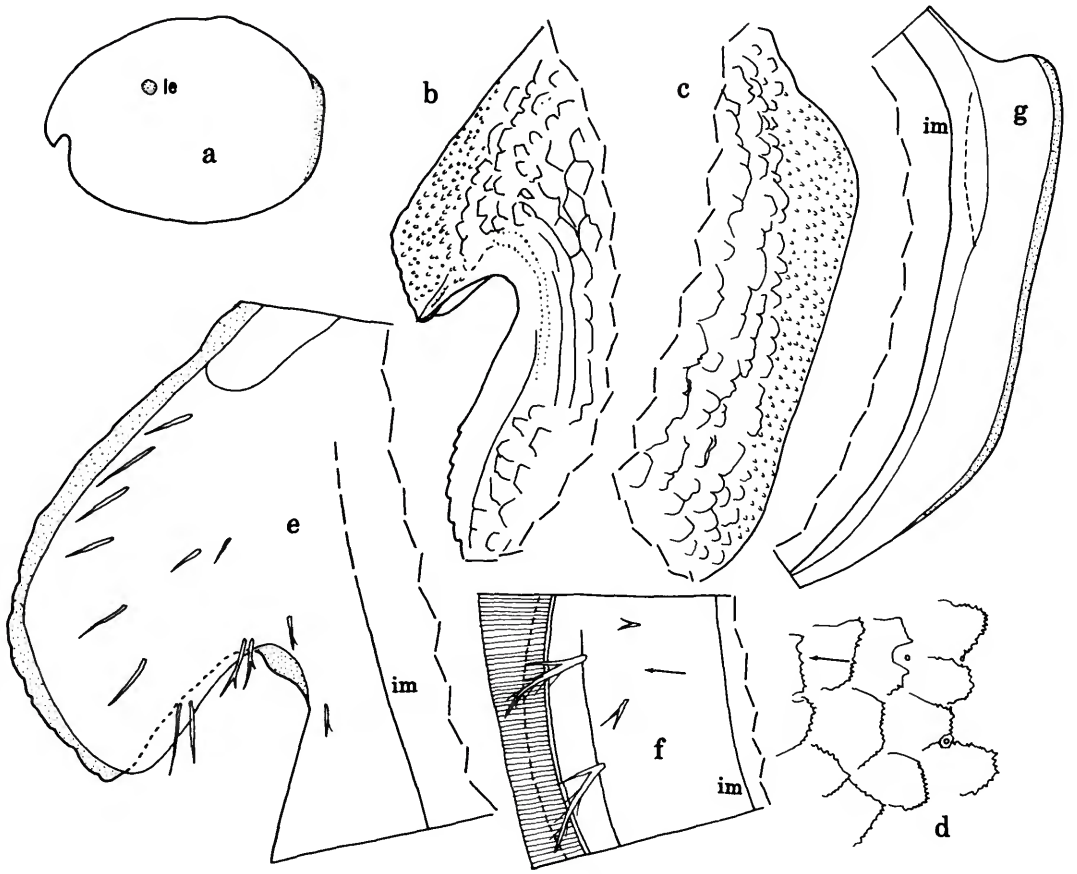


FIGURE 37.—*Pterocypridina pax* Kornicker, new species, adult female, holotype, NMV J40004: *a*, complete specimen, length 1.46 mm. Adult female, paratype, USNM 193997: *b,c*, anterior and posterior, respectively, left valve showing surface ornamentation, ov; *d*, surface ornamentation left valve (near midheight at posterior 2/3), ov; *e*, anterior right valve, iv; *f*, detail of infold and selvage anteroventral margin right valve, iv; *g*, posterior right valve (nabs), iv.

with 2 bristles (1 short ventral, 1 dorsal) with few spines. 4th joint long with 2 spinous bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 7 long proximal filaments followed by 3 shorter slender filaments and 1 very short subterminal filament. 6th joint with slender medial bristle. 7th joint: a-bristle longer and stouter than bristle of 6th joint, with few indistinct small spines; b-bristle about 1/4 longer than a-bristle, with 4 short proximal filaments, some with spines (not shown); c-bristle about 1/4 longer than sensory bristle of 5th joint, with 8 marginal filaments. 8th joint: d- and e-bristles slightly longer than b-bristle, bare with blunt tips; f-bristle slightly shorter than c-bristle, with 8 marginal filaments; g-bristle same length as c-bristle, with 10 marginal filaments.

Second Antenna: Protopodite with spinous medial bristle; proximal end of medial longitudinal sclerite not bifurcate (Figure 38*b*). Endopodite 2-jointed (Figure 38*b,c*): 1st joint with 2 or 3 bare proximal bristles (1 or 2 short, 1 long) and 1 distal bristle with indistinct spines; 2nd joint short with long terminal filament. Exopodite: 1st joint without minute medial distal bristle; bristle of 2nd joint reaching just past 9th joint, with 14 ventral spines and 6 slenderer dorsal spines; bristles of joints 3 and 4 long, with few ventral spines near midlength and natatory hairs; bristles of joints 5–8 long with natatory hairs; 9th joint with 3 bristles (1 short (dorsal) with long hairs, 2 long with natatory hairs); joints 3–8 with basal spines increasing in length on distal joints; basal spine of 8th joint same length as 9th joint; lateral spine of 9th joint slightly smaller than spine of 8th joint; joints 2–8 with small lateral spines in row along distal margins.

Mandible (Figure 38*d,e*): Coxale endite spinous with 2 stout spines at tip with peg between them; small spine-like bristle near base of endite; row of long medial hairs near basale. Basale: Ventral margin with 2 ringed medial a-bristles, 1 lateral ringed b-bristle, 1 minute medial bristle (with base almost on ventral margin) about halfway between b-and c-bristles, 2 short unequal ringed c-bristles, and 1 long spinous ringed d-bristle

FIGURE 38.—*Pterocypridina pax* Kornicker, new species, adult female, paratype, USNM 193997: *a*, left 1st antenna (nabs), mv; *b*, part protopodite and endopodite left 2nd antenna, mv; *c*, endopodite right 2nd antenna, mv; *d*, part right mandible (nabs), mv; *e*, 3rd endopodial joint right mandible, mv; *f*, part left 5th limb, av; *g*, left 6th limb, mv; *h*, tip 7th limb (nabs), lv; *i*, right lamella furca, lv; *j*, left lateral eye, lv.

(rings not shown); dorsal margin with 1 midbristle and 2 subterminal bristles. Exopodite about 3/4 length of dorsal margin of 1st endopodial joint, hirsute distally, and with 2 subterminal bristles. 1st endopodial joint with 4 bristles (1 minute bare, 1 short spinous, 1 long medial with long spines, 1 long lateral with short spines). 2nd endopodial joint: Ventral margin with 4 similar slender bristles (2 single proximal, 2 paired subterminal); dorsal margin with 8 or 9 bristles (1 or 2 short spinous, others longer, bare or spinous); spines present on medial surface, ventral margin, and proximally on dorsal margin. 3rd endopodial joint with 3 short claws (ventral and longest with few proximal teeth) and 4 slender ringed bristles (Figure 38*e*).

Maxilla: Endite I with 9 claws and bristles; endite II with 5 or 6 claws and bristles; endite III with 1 proximal bristle and 5 distal claws and bristles. Precoxale and coxale with dorsal

hairs; coxale with dorsal bristle with few indistinct short spines. Basale with a short dorsal bristle and 2 ventral bristles (1 short medial, 1 long ventral). Exopodite hirsute with 1 short proximal and 2 long distal bristles. 1st endopodial joint with 2 long bare alpha-bristles, 2 beta-bristles (outer of these pectinate), and large triangular cutting tooth. 2nd endopodial joint with 3 bare a-bristles, 2 pectinate b-bristles, 2 pectinate c-bristles, and 3 pectinate d-bristles (anterior 2 with 6 or 7 teeth (4 or 5 stout)).

Fifth Limb (Figure 38*f*): 3 endites each with about 5–7 bristles. Protopodite with long slender finger-like tooth. 1st exopodial joint: Anterior side with 1 proximal bristle (near protopodial tooth) with short marginal spines and distal row of 3 bristles (largest of these pectinate and with a few, indistinct, long, stout, proximal spines); main tooth with 5 pectinate teeth and proximal smooth triangular tooth (only largest pectinate tooth shown in Figure 38*f*); bristle with long proximal hairs near smooth tooth. 2nd exopodial joint with 3 or 4 unringed a-bristles (1 or 2 proximal small either bare or pectinate, 2 distal stout pectinate), a total of 5 pectinate ringed b′- and b″-bristles, 1 c-bristle and 1 d-bristle, both with long proximal hairs. 3rd exopodial joint with 3 bristles (all with long proximal hairs; 1 unringed) on inner lobe, and 2 bristles with long proximal hairs on outer lobe. Fused 4th and 5th exopodial joints with 3 bristles and small triangular process on distal inner corner.

Sixth Limb (Figure 38*g*): With 7 bare epipodial bristles. Endite I with 1 terminal and 2 medial bristles; endites II–IV each with 4 bristles. End joint with 8 or 9 bristles (posterior 2 plumose, remaining bristles either with short spines, or with long proximal and short distal spines); ventral edge with stout lateral spines; medial surface hirsute.

Seventh Limb: 10 bristles (5 on each side) in terminal group, each bristle with 2–6 bells; 2 or 3 bristles in proximal group (1 or 2 on each side), each bristle with 6 bells. Comb consisting of 6 short teeth on each side of 3 long recurved teeth (Figure 38*h*). Jaw opposite comb with distal fan with about 8 minute teeth on each side.

Furca (Figure 38*i*): Each lamella with 8 (usual) or 9 claws; claw 2 nonarticulated; claw 3 slenderer and slightly longer than claw 4; all claws with teeth along posterior margin (not shown); claw 1 with few distal large medial teeth (not shown); right lamella slightly anterior to left.

Bellonci Organ: Short, cylindrical, similar to that of *P. tressleri*.

Eyes: Medial eye unpigmented. Lateral eye small with about 13 ommatidia and brown pigment (Figures 37*a*, 38*j*).

Upper Lip, Genitalia, and Y-Sclerite: Similar to those of *P. dedeckkeri*.

Posterior of Body: Evenly rounded, bare.

Eggs: USNM 193997 with 8 large unextruded eggs; length of typical egg 0.25 mm.

COMPARISONS.—The carapace of *P. pax* differs from those of *P. excreta, P. alata, P. dedeckkeri,* and *P. tressleri* in not having large lateral processes and in having fewer bristles on the rostral infold. The mandibular basale of *P. pax* bears 2 a-bristles, whereas those of other species bear 3, but the variability of this character is not known. The caudal process of the carapace of *P. pax* differs in shape from that of *P. birostrata*. The furca of *P. pax* differs from that of *P. alata* in having the 4th claw articulated. The medial longitudinal sclerite of the protopodite of the 2nd antenna of *P. pax* differs from those of *P. dedeckkeri* and *P. tressleri* in not having a bifurcate proximal end.

Pterocypridina appendix Kornicker, new species

FIGURES 39–41

ETYMOLOGY.—From the Latin *appendix* (appendage, addition).

HOLOTYPE.—NMV J40002, undissected ovigerous female in alcohol.

TYPE LOCALITY.—Slope 22, 37°00.60′S, 150°20.70′E, New South Wales, off Eden; depth 363 m.

PARATYPES.—Slope 21: USNM 194029, adult male with choniostomatid copepod in marsupium, on slide and in alcohol; NMV J40001, 1 undissected juvenile in alcohol. Slope 22: USNM 194028, ovigerous female on slide and in alcohol; NMV J40003, undissected specimens: 3 ovigerous females (specimens 1–3), 4 adult females without eggs, 6 juveniles.

DISTRIBUTION.—Slope 21, 220 m. Slope 22, 363 m.

DESCRIPTION OF ADULT FEMALE (Figures 39, 40).—Carapace oval in lateral view with well-developed rostrum and incisur (Figure 39*a–d*); caudal process narrow and compressed (Figure 39*a,b*); caudal process of right valve with small notch at dorsal end (Figure 39*g*); posterodorsal part of each valve with long stout spine-like process extending well past valve edge (Figure 39*a,b,d*); rostrum with low lateral process (Figure 39*a,c*); anteroventral part of each valve with triangular process that may or may not extend past valve edge (Figure 39*a,c,f*); bulge present in vicinity of lateral eye, with steep dorsal margin appearing as ridge dorsal to lateral eye in lateral view (Figure 39*a*); left valve with triangular process at dorsal edge just posterior to midlength (Figure 39*a,b*).

Ornamentation (Figure 39*c–e*): Surface with irregular reticulations (Figure 39*e*) except near posteroventral margin and posterior part of each valve where posterior edges of reticulations coalesce and form irregular ridges (Figure 39*d*); posterodorsal spine with U-shaped ridges (Figure 39*d*); minute pustules and no reticulations along distal part of rostrum and on compressed caudal process (Figure 39*c*); surface of valves with minute pores or papillae generally near intersections of ridges forming reticulations (Figure 39*e*).

Infold: Rostral infold with 20–27 undivided bristles (Figure 39*f*); a pair of divided bristles (1 long with short branch at midlength, 1 short) at inner end of incisur; 1 divided bristle just posterior to inner end of incisur; 1 small bristle near inner ventral corner of incisur. Narrow list along anteroventral and

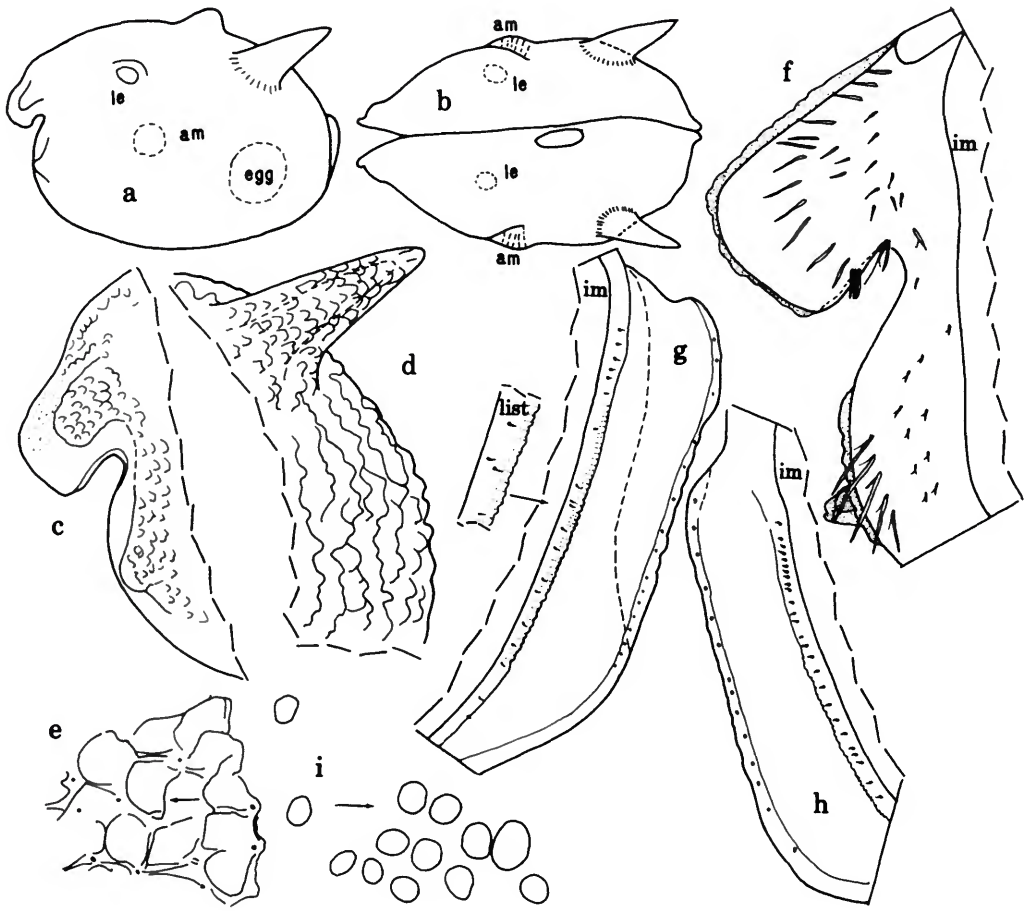


FIGURE 39.—*Pterocypridina appendix* Kornicker, new species, ovigerous female, paratype, USNM 194028: *a,b*, lateral and dorsal views, respectively, of complete specimen, length 1.69 mm; *c,d*, anterior and posterodorsal parts, respectively, left valve showing surface ornamentation, ov; *e*, detail of ornamentation near base of posterodorsal spine left valve, ov; *f*, anterior right valve, iv; *g,h*, posterior of right and left valves, respectively, iv; *i*, central adductor muscles right valve (drawn with body removed).

anterior 1/4 of ventral infold with 27 or 28 divided bristles each consisting of short bare branch and long branch with long marginal hairs (Figure 39*f*); anteroventral infold also with 8–12 short divided bristles (10 shown in Figure 39*f*) dorsal to narrow list; posterior 3/4 of list of ventral infold (ending posteriorly where list curves away from valve edge anterior to caudal process) with about 5 undivided bristles; broad list anterior to caudal process with minute protuberances (each bearing pore canal) along posterior edge, and row of minute bristles set back from posterior edge (Figure 39*g,h*). Posterior edge of caudal process with row of minute pores or papillae (Figure 39*g,h*).

Selvage: Anterior and ventral margins with broad lamellar prolongation with smooth outer edge; prolongation divided at inner end of incisur; prolongation absent along posterior and dorsal edge of caudal process; prolongation along anterior half of ventral margin with line dividing prolongation near midwidth; closely spaced striations similarly developed in both parts.

Central Adductor Muscle Attachments (Figure 39*i*): About 13 ovoid attachments just anterior and ventral to valve midpoint.

Carapace Size (mm): Slope 22: NMV J40002 (holotype), length 1.79; height excluding spines and dorsal process of left valve 1.26; height including dorsal process of left valve 1.34. USNM 194028: length 1.69, height excluding spines and dorsal process of left valve 1.15; height including spines 1.26; height including dorsal process of left valve 1.25; width excluding spines 1.08; width including spines 1.14. NMV J40003 (specimen 1), ovigerous female: length 1.73; height without dorsal process of left valve 1.23; height with dorsal process 1.31. NMV J40003 (specimen 2), ovigerous female: length 1.65; height without dorsal process of left valve 1.17; height

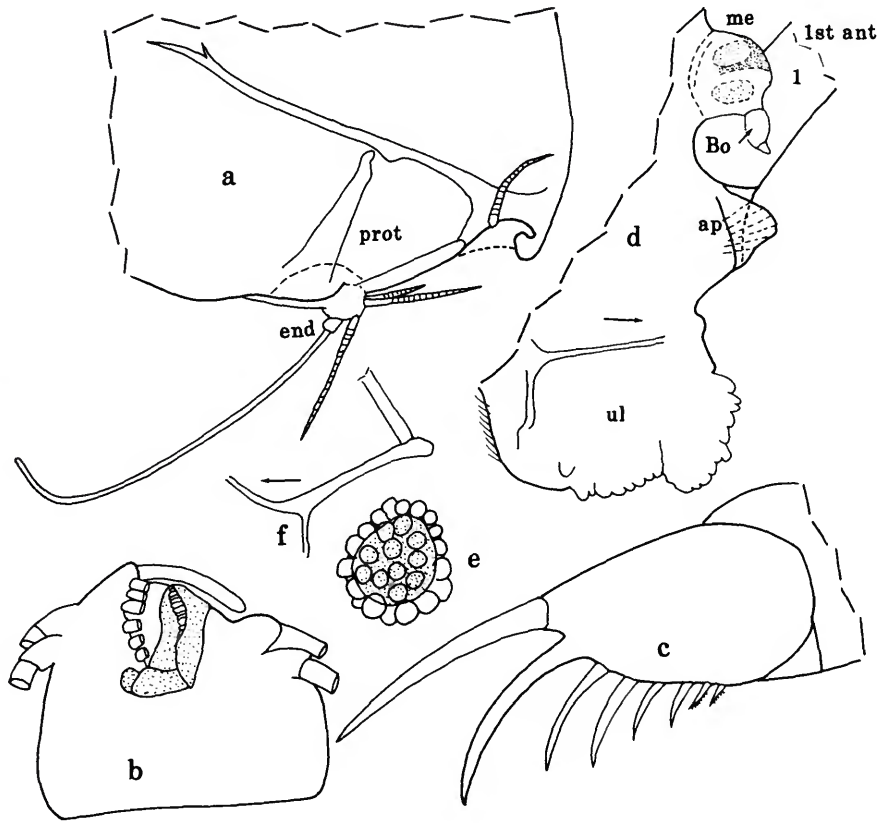


FIGURE 40.—*Pterocypridina appendix* Kornicker, new species, ovigerous female, paratype, USNM 194028: *a*, part protopodite and endopodite left 2nd antenna, mv; *b*, tip 7th limb (nabs), lv; *c*, left lamella furca, lv; *d*, anterior of body, lv; *e*, lateral eye; *f*, left Y-sclerite, lv.

with dorsal process 1.27. NMV J40003 (specimen 3), ovigerous female: length 1.75; height without dorsal process of left valve 1.20; height with dorsal process 1.32. Length range 1.65–1.79; height range including dorsal process of left valve 1.25–1.34.

First Antenna: 1st joint bare, with small amount of brown pigment proximally. 2nd joint with few ventral spines. 3rd joint short with 2 bristles (1 ventral reaching 5th joint, 1 dorsal). 4th joint with 2 bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 7 long proximal filaments followed by 3 shorter slender filaments and 1 small subterminal filament. 6th joint with slender medial bristle. 7th joint: a-bristle slightly longer and stouter than bristle of 6th joint; b-bristle about $^1/_3$ longer than a-bristle, with 4 short proximal filaments; c-bristle about $^1/_3$ longer than sensory bristle of 5th joint, with tip missing on both limbs of USNM 194028 (7 filaments on remaining part). 8th joint: d-and e-bristles slightly longer than b-bristle, bare with blunt tips; f-bristle slightly shorter than c-bristle, with 7 marginal filaments; g-bristle slightly shorter than c-bristle and slightly longer than f-bristle, with 10 marginal filaments.

Second Antenna: Protopodite with distal medial bristle (Figure 40*a*), and small amount of brown pigment in proximal dorsal corner. Endopodite 2-jointed (Figure 40*a*): 1st joint with 2 proximal bristles (1 half length of other) and 1 distal bristle; 2nd joint short with long terminal filament. Exopodite: 1st joint without minute medial distal bristle; bristle of joint 2 with 5 or 6 stout ventral spines; bristles of joints 3 and 4 with slender spines near midlength and natatory hairs; bristles of joints 5–8 with natatory hairs, no spines; 9th joint with 2 long bristles with natatory hairs; joints 3–8 with basal spines; spine of 8th joint same length as 9th joint; lateral spine of 9th joint about same length as spine of 8th joint; joints 2–8 with minute spines along distal margins.

Mandible: Coxale with brown pigment; endite spinous, with 2 stout spines at tip and peg between them; small spine-like bristle near base of endite. Basale: Ventral margin with 3 small a-bristles, 1 small lateral b-bristle close to a-bristles, 1 minute medial bristle with base on ventral margin halfway between b-and c-bristles, 2 short almost equal-length c-bristles, and 1 long spinous d-bristle; dorsal margin with 1 midbristle and 2 subterminal bristles. Exopodite about $^2/_3$ length of dorsal margin of 1st endopodial joint, hirsute distally,

and with 2 subterminal bristles (distal about half length of proximal). 1st endopodial joint with 3 bristles (1 short, 1 long lateral with short spines, 1 long medial with long spines). 2nd endopodial joint: Ventral margin with 4 similar slender bristles (2 single proximal, 2 paired subterminal); dorsal margin with 7 bristles (3 short, 4 longer); spines present on medial surface, ventral margin, and proximally on dorsal margin. 3rd endopodial joint with 3 short claws (ventral claw and longest claw with few proximal teeth) and 4 slender ringed bristles (right limb of USNM 194028 aberrant in lacking ventral claw).

Maxilla: Endite I with 7 claws and bristles; endite II with 6 claws and bristles; endite III with 1 proximal bristle and 5 distal claws and bristles. Precoxale and coxale with dorsal hairs; coxale with brown pigment and slender dorsal bristle. Basale with short dorsal bristle and 2 ventral bristles (1 short medial, 1 long ventral). Exopodite hirsute with 1 short proximal and 2 long distal bristles (proximal and middle bristle plumose). 1st endopodial joint with few distal spines near dorsal margin, 2 long bare alpha-bristles (lateral $^2/_3$ length of medial), 2 beta-bristles (outer stout pectinate), and elongate cutting tooth. 2nd endopodial joint with 3 bare a-bristles, 2 pectinate b-bristles, 2 pectinate c-bristles, and 3 pectinate d-bristles (posterior ringed, others unringed claw-like and with 6 or 7 anterior teeth and 1 or 2 posterior teeth).

Fifth Limb: 3 endites each with 3–7 bristles. Protopodite with long slender finger-like tooth. 1st exopodial joint: Anterior side with 1 proximal bristle near protopodial tooth and distal row of 3 bristles (largest with few proximal spines and pectinate distally, others with long proximal spines); main tooth with 5 pectinate teeth and proximal smooth triangular tooth; bristle with long proximal hairs proximal to smooth tooth. 2nd exopodial joint with 3 unringed pectinate a-bristles, a total of 5 pectinate ringed b′- and b″-bristles, 1 c-bristle, and 1 d-bristle. 3rd exopodial joint with 3 bristles on inner lobe (2 ringed and with long proximal hairs, 1 unringed with few small spines), and 2 bristles with long proximal hairs on outer lobe. Fused 4th and 5th joints with 3 bristles and with cluster of spines on distal inner corner.

Sixth Limb: Part with epipodial bristles fragmented and only 4 bristles remaining. Endite I with 2 medial and 2 terminal bristles; endites II and III each with 5 bristles; endite IV with 6 bristles. End joint with 9 bristles (posterior 2 plumose, remaining bristles with long proximal and short distal spines); ventral edge with stout lateral spines; medial surface hirsute.

Seventh Limb: 10 bristles (5 on each side) in terminal group, each bristle with 2–6 bells; 4 bristles in proximal group (1 on comb side, 3 on jaw side), each with 2–4 bells. Comb consisting of 6 short teeth on each side of 3 long recurved teeth (only middle claw completely shown in Figure 40*b*). Jaw opposite comb partly obscured on USNM 194028 (Figure 40*b*), but probably a toothed fan similar to that of *P. pax*.

Furca (Figure 40*c*): Each lamella with 7 or 8 claws (usually 7); claw 2 nonarticulated; claw 3 slenderer and either slightly longer than claw 4 or about same length; all claws with teeth along posterior margin (not all shown); claw 1 with row of medial teeth (distal teeth larger); right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figure 40*d*): Short with small triangular process at tip.

Eyes: Medial eye with small area of brown pigment, bare (Figure 40*d*). Lateral eye well developed, larger than medial eye, with about 30 ommatidia and black pigment (pigment makes counting of ommatidia difficult) (Figures 39*a,b*, 40*e*).

Upper Lip (Figure 40*d*), *Genitalia, and* Y-*Sclerite* (Figure 40*f*): Similar to those of *P. dedeckkeri*.

Anterior of Body (Figure 40*d*): With projecting anterior process just ventral to 1st antenna.

Posterior of Body: Evenly rounded, bare.

Eggs: USNM 194028 with 10 eggs (with lateral eyes) in marsupium; lengths of 5 eggs (mm): 0.31 (smallest), 0.34, 0.37, 0.37, 0.38 (largest) (average egg 0.35); position of 1 egg shown in Figure 39*a*. Holotype with 2 eggs in marsupium; length of 1 egg, 0.36 mm.

Parasites: USNM 194028 with numerous minute round organisms (possibly foreign eggs: 16 inside caudal process of left valve, 1 inside caudal process of right valve, and 2 or 3 along ventral edge of medial eye).

DESCRIPTION OF ADULT MALE (Figure 41).—Carapace shape and ornamentation similar to those of adult female but carapace smaller (Figure 41*a,b*).

Infold: Not examined.

Carapace Size (mm): USNM 194029, length 1.26; height excluding spines and dorsal process of left valve 0.85; height including spines 1.06; height including dorsal process of left valve 0.93.

First Antenna (Figure 41*c–e*): 1st joint bare. 2nd joint with few medial spines. 3rd joint short, with 2 bristles (1 ventral, 1 dorsal), both reaching 5th joint. 4th joint with 2 bristles (1 ventral, 1 dorsal), both reaching 7th joint (Figure 41*e*). Sensory bristle of 5th joint with 7 long proximal filaments followed by 3 shorter slenderer filaments and 1 small subterminal filament. 6th joint with slender medial bristle. 7th joint (Figure 41*c,e*): a-bristle slightly longer and stouter than bristle of 6th joint; b-bristle almost 3 times length of a-bristle, with 5 filaments (proximal filament with thick stem with small round proximal process and large terminal sucker with serrate edge; next 4 filaments short slender); c-bristle longer than sensory bristle of 5th joint, with proximal filament similar to proximal filament of b-bristle but with shorter thicker stem, larger proximal process and larger terminal sucker, and then many distal filaments (tip broken off both limbs of USNM 194029, with 8 short slender filaments on remaining part). 8th joint (Figure 41*d*): d- and e-bristles longer than b-bristle, bare with blunt tips; f-bristle long stout, with abundant thread-like filaments on proximal third followed by many stouter more widely spaced filaments; g-bristle long, stouter than f-bristle, with abundant thread-like filaments on proximal half followed by many stouter more widely spaced filaments.

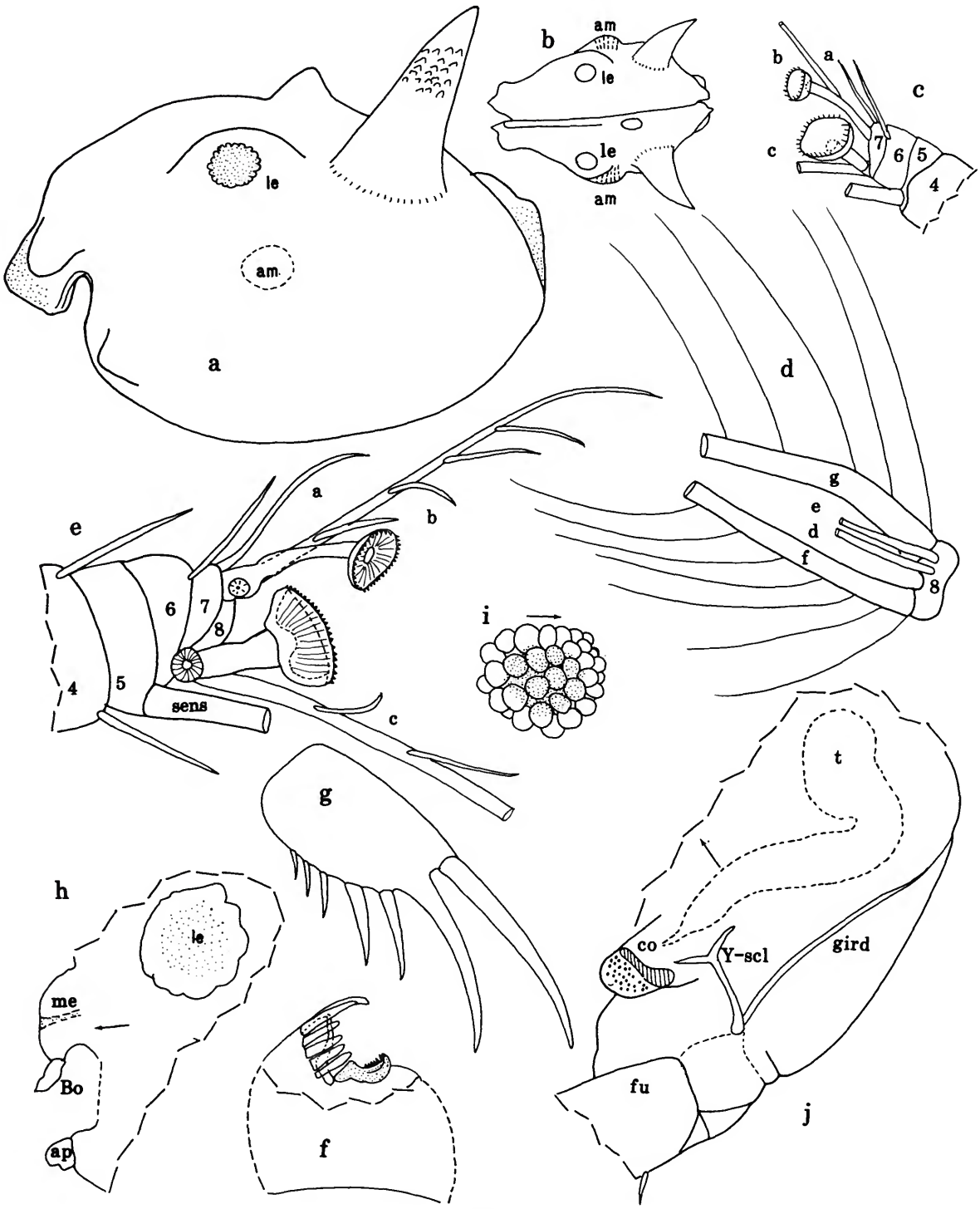


FIGURE 41.—*Pterocypridina appendix* Kornicker, new species, adult male, paratype, USNM 194029: *a,b*, lateral and dorsal views, respectively, of complete specimen, length 1.26 mm; *c*, tip right 1st antenna (nabs), mv; *d*, proximal parts of bristles of right 1st antenna, ventral towards top of figure, lv; *e*, tip left 1st antenna (nabs), mv; *f*, tip 7th limb (nabs), lv; *g*, right lamella furca, lv; *h*, dorsal part of anterior of body (lateral eye stippled but ommatidia not shown), lv; *i*, right lateral eye (area of black pigment stippled), lv; *j*, posterior of body, lv.

Second Antenna: Protopodite and endopodite similar to those of adult female. Exopodite: Bristle of 2nd joint with 5 or 6 ventral spines and 1 medial spine adjacent to short ringed terminal part; branch similar to that of adult female.

Mandible: Similar to that of adult female, but without pigment in coxale.

Maxilla: Endite I with 8 claws and bristles; endite II with 7 claws and bristles; endite III with 1 proximal bristle and 5 terminal claws and bristles. Remaining parts similar to those of adult female.

Fifth Limb: Similar to that of adult female.

Sixth Limb: With 6 or 7 epipodial bristles. Endite I with 3 bristles (2 medial, 1 terminal); endites II–IV each with 4 or 5 bristles. End joint with 9 or 10 bristles (posterior 2 plumose, remaining bristles with long proximal and short distal spines or only short spines); ventral edge with stout lateral spines; medial surface hirsute.

Seventh Limb: 12 or 13 bristles (6 or 7 on each side) in terminal group, each with 1–6 bells; 4 bristles in proximal group (1 on comb side, 3 on jaw side), each with 3–5 bells. Comb consisting of 4 short teeth on each side of 3 longer recurved teeth. Jaw opposite comb with fan having teeth along edge. (Note: On illustrated female limb (Figure 40*b*) jaw is closed, whereas on male it is open (Figure 41*f*); female limb stouter than that of male, and female comb teeth longer.)

Furca (Figure 41*g*): Each lamella with 7 claws; teeth of claws similar to those of adult female.

Bellonci Organ (Figure 41*h*): Similar to that of female.

Eyes: Medial eye similar to that of adult female (Figure 41*h*). Lateral eye very slightly larger than that of adult female, with 33 ommatidia and black pigment (Figure 41*a,b,h,i*).

Upper Lip: Similar to that of adult female.

Genitalia (Figure 41*j*): Short copulatory lobe on each side of body anterior to furca.

Anterior of Body (Figure 41*h*): Anterior process well developed.

Posterior of Body and Y-*Sclerite* (Figure 41*j*): Similar to those of adult female.

Parasites: USNM 194029 with female choniostomatid in marsupium.

COMPARISONS.—*Pterocypridina appendix* differs from previously described species of the genus in the great length of the posterodorsal spine on each valve. The lateral eye of the female *P. appendix* has about 30 ommatidia compared to about 13 for *P. pax.*

Cypridinodes Brady, 1902

TYPE SPECIES.—*Cypridinodes favus* Brady, 1902.

COMPOSITION.—Three species have been reported from the vicinity of Australia, *C. wyvillethomsoni* (Brady, 1902), *C. acuminata* (Müller, 1906), and *C. asymmetrica* (Müller, 1906). *Cypridinodes reticulata* Poulsen, 1962, has been reported closer to New Zealand.

DISTRIBUTION.—Indo-West Pacific Region. Maximum known depth 610 m.

Cypridinodes wyvillethomsoni (Brady, 1880)

FIGURES 42, 43

Philomedes wyville-thomsoni Brady, 1880:160, pl. 36: fig. 1a–c.—Müller, 1912:52 [referred to "Cypridinidarum genera dubia et species dubiae"].—Kornicker, 1994, figs. 109b, 110z,aa.

Philomedes Wyville-Thomsoni.—Skogsberg, 1920:380 [considered it possible that the species may belong in *Scleroconcha*].

Cypridinodes favus Brady.—Poulsen, 1962:281, figs. 128–130 [not *C. favus* Brady, 1902].

Cypridinodes wyvillethomsoni (Brady).—Kornicker, 1975:97.

HOLOTYPE.—Unique specimen, carapace length 5.2 mm; British Museum (Natural History), Registration No. 81.12.

TYPE LOCALITY.—*Challenger* station 161, about 38°S, 145°E, off entrance to Port Phillip, Victoria, Australia; depth 69.5 m.

MATERIAL.—Slope 1: USNM 193906, 1 ovigerous female on slide and in alcohol; USNM 193907, 1 adult male on slide and in alcohol; NMV J35974, 1 partly dissected ovigerous female in alcohol; 2 undissected adults and 25 undissected specimens in alcohol. Slope 19: NMV J35975, 1 undissected adult male in alcohol.

DISTRIBUTION.—Previously reported from the Coral Sea and SE Australia, at depths of 50–100 m. In the present collection: Slope 1, 204 m; Slope 19, 520 m. Known depth range 50–520 m. Kornicker (1975:92) incorrectly reported the depth of the species at 610 m (actually the depth for *C. reticulata*).

REMARKS.—Brady (1880:160, pl. 36: fig. 1a–c) described and illustrated the carapace of the holotype, but not appendages. Poulsen (1962:281, figs. 128–130) described and illustrated an adult male and a juvenile from the Coral Sea in the vicinity of eastern Australia, and described an adult female from SE Australia. The supplementary description of the species presented below mainly describes some details not mentioned by Poulsen and notes some differences.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Figure 42).—Carapace shape similar to that illustrated by Poulsen (1962, fig. 128a,b). Carapace with abundant U-shaped scales and scattered pores; USNM 193907 with many concretions. Infold not examined.

Carapace Size (length, height in mm): Slope 1: USNM 193907, 4.8, 3.1, height 65% of length. Slope 19: NMV J35975, 4.9, 3.0, height 61% of length. Length range 4.8–4.9; height range 3.0–3.1; range of height as percent of length 61–65.

First Antenna: Dorsal bristle of 3rd joint reaching just past midlength of dorsal margin of 4th joint. Sensory bristle of 5th joint with 9 long stout proximal filaments, 3 long slender distal filaments, and bifurcate tip. Short stout proximal filaments (filament number 1) of b- and c-bristles with terminal cup with thick walls and short hairs around edge, and proximal to cup a backward-pointing pointed process (Figure 42*a,b*); b-bristle

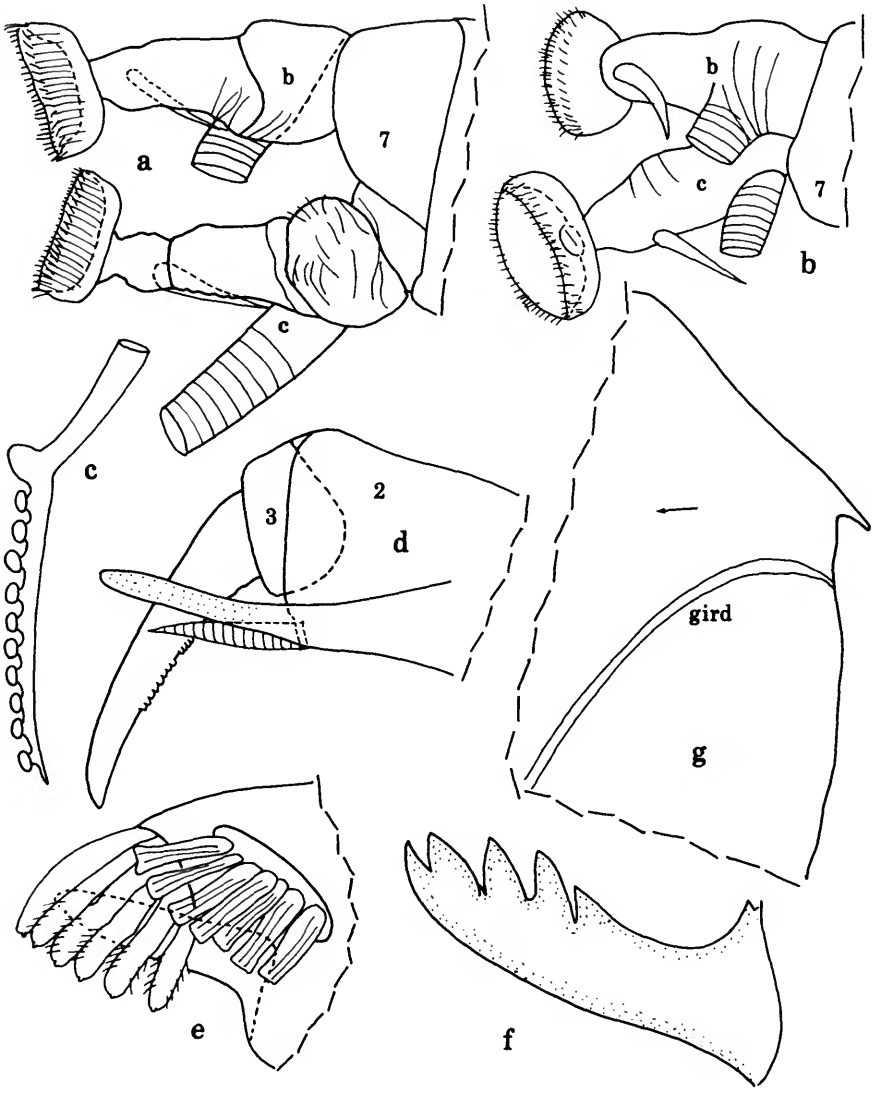


FIGURE 42.—*Cypridinodes wyvillethomsoni* (Brady, 1880), adult male, USNM 193907, length 4.8 mm: *a,b*, proximal filaments of b- and c-bristles 7th joint of right (mv) and left (lv) 1st antennae; *c*, proximal tooth and small suckers of 2nd filament of b-bristle 7th joint right 1st antenna, mv; *d*, tip right mandible (nabs), mv; *e*, tip 7th limb (nabs), lv; *f*, tooth opposite comb of 7th limb opposite that shown in *e*; *g*, posterodorsal part of body, lv.

with 4 additional filaments on stem (numbers 2 and 3 with large rounded tooth followed by 10 or 11 small suckers (Figure 42*c*); filaments 4 and 5 slender bare); c-bristle with 9 additional filaments on stem (filaments 2 and 3 with 10 or 11 small suckers and proximal tooth similar to those of b-bristle; filaments 4–10 slender, some with 3 or 4 spines); d- and e-bristles only about 1/2 length of f-bristle (possibly broken).

Mandible: Lateral bristle of distal ventral pair on 2nd endopodial joint about 3/4 length of stouter medial bristle (Figure 42*d*).

Seventh Limb: Proximal comb with 7 square-tipped teeth on each side; distal comb with 11 longer teeth with indistinct marginal spines and with rounded tips with minute terminal papilla (Figure 42*e*). Jaw opposite combs with 4 stout teeth on each side (Figure 42*f*).

Furca: Each lamella of USNM 193907 with 6 claws, all articulated. (Presence of only 6 furcal claws and the articulation of claw 2 probably an aberrancy.)

Lateral Eye: Well developed, with about 23 ommatidia and black pigment.

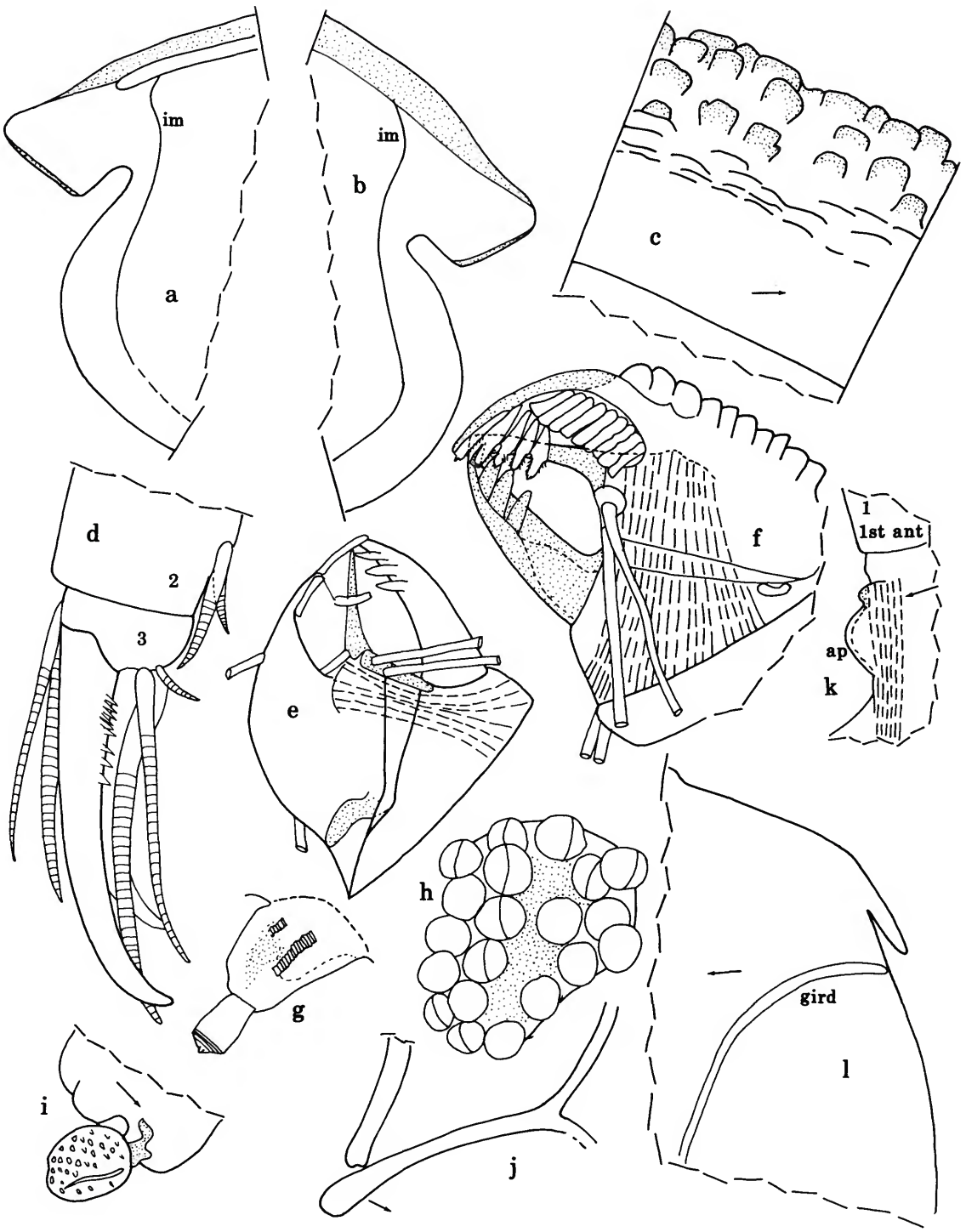


FIGURE 43.—*Cypridinodes wyvillethomsoni* (Brady, 1880), ovigerous female, USNM 193906, length 5.3 mm: *a,b*, anterior of right and left valves, respectively, iv; *c*, surface ornamentation along inner side of anterodorsal margin left valve, iv; *d*, tip right mandible, mv; *e*, tip 7th limb (nabs), lv; *f*, tip 7th limb opposite that shown in *e* (not all comb teeth or bristles shown), lv; *g*, medial eye and Bellonci organ, lv; *h*, lateral eye; *i*, right genital organ with attached spermatophore, lv; *j*, right Y-sclerite, lateral view; *k*, anterior of body near midheight. Ovigerous female (Slope 1), NMV J35974, length 5.2 mm: *l*, posterodorsal part of body.

Anterior of Body: Low rounded process ventral to 1st antenna.

Posterior of Body (Figure 42*g*): With small backward-pointing soft process in posterodorsal corner dorsal to posterior end of girdle.

Y-*Sclerite:* Ventral branch weakly developed.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figure 43).—Carapace similar in shape to that of adult male (Figure 43*a,b*). Surface with abundant U-shaped scales (Figure 43*c*) and scattered small pores; USNM 193906 with many concretions.

Infold: On left valve anteroventral list broadly crenulate with crenulations becoming more distinct, smaller, and closer together along ventral infold and terminating anterior to caudal process where list forms spined ridge. On right valve anteroventral list with much shallower crenulations, and list of ventral infold without crenulations. Bristles present along anteroventral list of both valves and between crenulate list and valve edge of left valve. Ridge anterior to caudal process of left valve of USNM 193906 with 33 digitate spines, of right valve with 42.

Carapace Size (length, height in mm): Slope 1: USNM 193906, 5.3, 3.7, height 70% of length; NMV J35974, 5.2, 4.1, height 79% of length. Length range 5.2–5.3; height range 3.7–4.1.

First Antenna: Dorsal bristle of 3rd joint same length as that of adult male. Sensory bristle of 5th joint with 9 stout proximal filaments, 3 slender distal filaments, and bifurcate tip. d- and e-bristles of 8th joint about $^1/_2$ to $^2/_3$ length of b-bristle of 7th joint.

Mandible: 2nd endopodial joint: Medial bristle of distal ventral pair much smaller than that of adult male (Figure 43*d*) (examined 2 females).

Fifth Limb: Epipodite with 71 bristles. Exopodite: Proximal triangular peg of main tooth with 2 or 3 minute triangular spines at tip; both bristles of outer lobe of 3rd joint with only short spines; 4th joint with 4 bristles; no peg observed between 4th and 5th joints.

Sixth Limb: Epipodite with 7 or 8 bristles. Endite I with 3 spinous bristles (2 short medial, proximal, 1 long terminal); endite II with 4 or 5 spinous bristles (1 or 2 short medial, proximal, 1 short and 2 long terminal); endite III with 4 spinous bristles (1 short medial, proximal, 1 short and 2 long terminal); endite IV with 5 spinous bristles (1 short medial, proximal, 2 short and 2 long terminal). End joint with 21 or 22 bristles (5 long bristles (with long proximal and short distal spines) with bases on edge near anterior end; 10 or 11 bristles (with long proximal and short distal spines) with bases just medial to edge along entire ventral margin; 4 very small bristles (bare or with long proximal spines) with bases just lateral to edge near anterior end; and 2 stouter posterior plumose bristles).

Seventh Limb: Proximal comb of terminal segment with 9 teeth on each side; distal comb with 11 teeth with indistinct marginal spines, and rounded tips with minute terminal papilla (Figure 43*e,f*).

Furca: USNM 193906 with 8 claws on right lamella and 7 on left; claw 2 nonarticulated; right lamella anterior to left by width of base of claw 1.

Eyes: Lateral eye similar in size to that of adult male, with 20 ommatidia and black pigment (Figure 43*h*). Medial eye with dark brown pigment (Figure 43*g*).

Genitalia (Figure 43*i*): With attached spermatophore.

Anterior of Body (Figure 43*k*): With low rounded anterior process ventral to 1st antenna.

Posterior of Body (Figure 43*l*): With backward-pointing soft process on posterodorsal corner similar to that of adult male.

Y-*Sclerite* (Figure 43*j*): Ventral branch weakly developed.

Eggs: Slope 1: USNM 193906 with 6 eggs (with visible black lateral eyes) in marsupium; length of typical egg 0.97 mm; 1 partly dissected specimen with 1 egg (with visible black lateral eyes) in marsupium; length of egg 0.85 mm.

REMARKS.—Of interest is that the medial bristle of the distal ventral pair on the margin of the 2nd endopodial joint of the mandible is less developed in the female than in the male on the 2 females and 1 male examined. The male is similar to that of the male illustrated by Poulsen (1962, fig. 128i). Sexual dimorphism in this character has not been noted previously.

Skogsbergia Kornicker, 1974

TYPE SPECIES.—*Skogsbergia minuta* Poulsen, 1962, by subsequent designation (Kornicker, 1974b:3).

COMPOSITION.—The genus includes 12 species, including 2 new species described herein (Kornicker, 1991:11).

DISTRIBUTION.—The genus is circumglobal between about 60°N and 38°S. Known depth range is 2–400 m. The genus has not been reported previously from the vicinity of Australia.

Skogsbergia vivax Kornicker, new species

FIGURES 44–47

ETYMOLOGY.—From the Latin *vivax* (lively).

HOLOTYPE.—NMV J40012, ovigerous female on slide and in alcohol.

TYPE LOCALITY.—Slope 40, 38°17.70′S, 149°11.30′E, Victoria, S of Point Hicks; depth 400 m.

PARATYPES.—Slope 40: NMV J40013, 1 ovigerous female; NMV J40014, 5 adult females; and NMV J40015, 9 specimens, all in alcohol.

DISTRIBUTION.—Slope 40, 400 m.

DESCRIPTION OF ADULT FEMALE (Figures 44–47).—Carapace elongate with convex dorsal and ventral margins and elongate caudal process with narrowly rounded tip (Figure 44*e*). Dorsal margin of caudal process forming obtuse angle with posterior margin of valve dorsal to caudal process (Figure 44*a,e,f*) (without notch that is present on *S. hesperidea* (Müller, 1906, fig. XXX: 21, 25). Anterior corner of rostrum narrowly rounded but proximal posterior corner with medial flap-like extension (Figure 44*a,c,d*); inside edge of right valve dorsal to

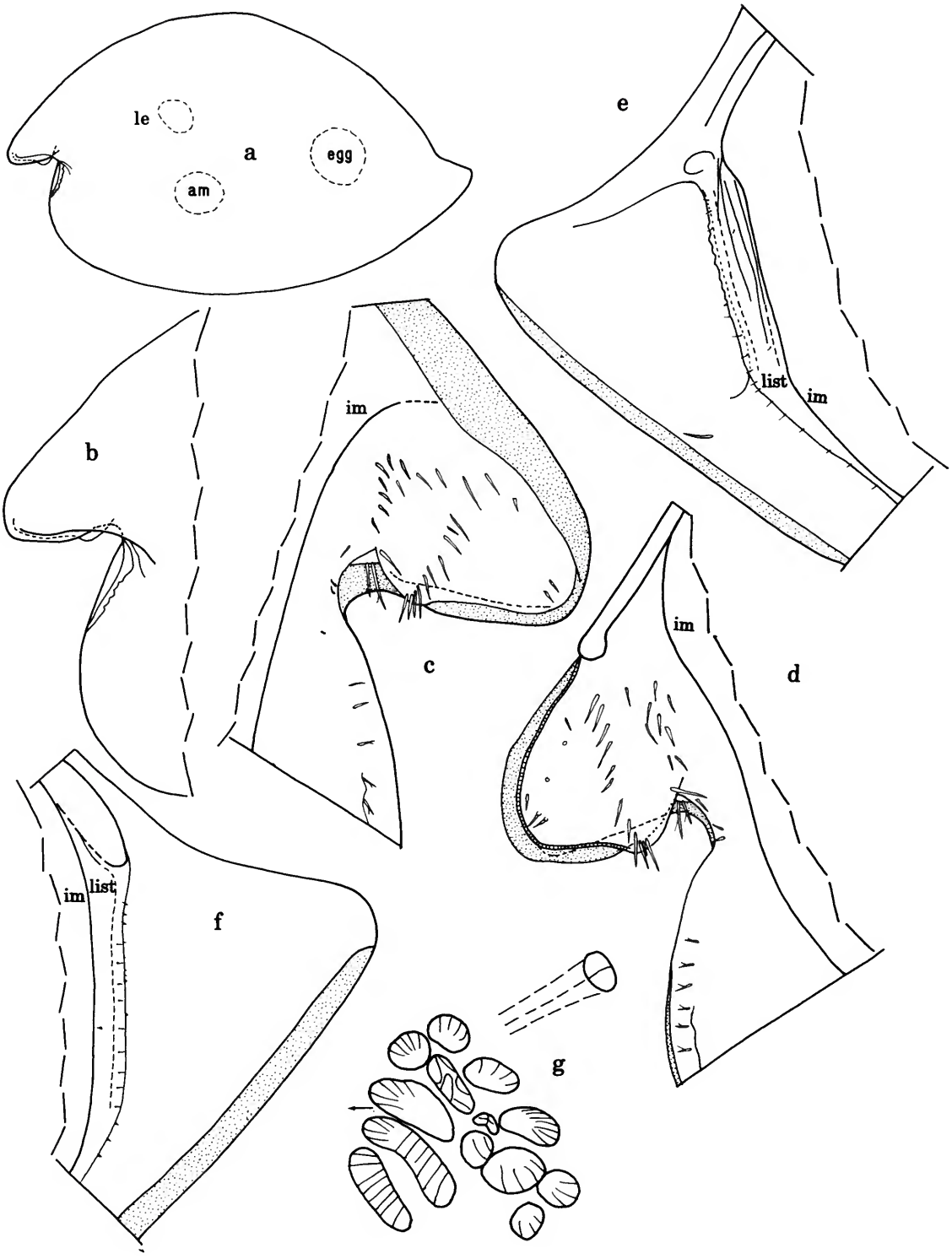


FIGURE 44.—*Skogsbergia vivax* Kornicker, new species, ovigerous female, holotype, NMV J40012: *a*, complete specimen, length 2.79 mm, ov; *b*, anterior left valve, ov; *c,d*, anteriors left and right valves, respectively, iv; *e,f*, posteriors left and right valves, respectively, iv; *g*, central adductor muscle attachments left valve, ov.

rostrum with sclerotized bar with knob-like anterior end (Figure 44*d*); outer surface with 2 narrow curved ridges extending from vicinity of inner end of incisur to anterior edge of valve ventral to incisur (posterior ridge scalloped) (Figure 44*a,b*).

Infold: Rostral infold with 26–28 bristles (2 bristles missing on illustrated right valve of holotype, but their past presence indicated by empty sockets) (Figure 44*c,d*); 2 divided bristles (anterior longer) at inner end of incisur and 1 small bristle just inward from them; 2 small bristles near ventral inner end of incisur (Figure 44*c,d*). Narrow list extends from anteroventral infold (anterior end shown in Figure 44*c,d*), continues along ventral margin close to valve edge, and then broadens to form wide shelf close to inner margin of infold at anterior end of caudal process (Figure 44*e,f*). Anteroventral list scalloped and with about 25 divided bristles (3 additional divided bristles in row anterior to anterior end of list (Figure 44*c,d*)) (2 or 3 list bristles shown in Figure 44*c,d*); anterior end of unscalloped ventral list with about 15 closely spaced divided bristles forming row continuing from anteroventral row; middle part of ventral infold with few widely spaced long bristles; posterior part of ventral infold with few minute widely spaced spine-like bristles along list. Posterior edge of broad list at anterior end of caudal process with small processes, some with minute papilla (Figure 44*e,f*); flat surface of broad list with row of minute spines inward from posterior edge; sclerotized bar (dashed in Figure 44*e,f*) beneath broad list of both valves, but better developed in left valve where outer edge forms right angle at dorsal end (Figure 44*e*).

Selvage: Lamellar prolongation of selvage narrow and nonstriate along dorsal and anterior margins of rostrum but broad and narrowly striate along dorsal margin of incisur; prolongation divided at inner end of incisur, broad and narrowly striate along ventral margin of incisur, and narrow and nonstriate along anteroventral and ventral margins of valve; prolongation absent at both tip and dorsal margin of caudal process and posterior and dorsal margins of valve.

Central Adductor Muscle Attachments: Obscured on undissected specimen, but comprising at least 13 elongate and oval attachments on valve with body removed, which may not show all muscle attachments (Figure 44*g*).

Carapace Size (length, height in mm): Slope 40: NMV J40012 (holotype), 2.79, 1.79; NMV J40014 (only 4 of 5 specimens measured), 2.50, 1.51; 2.67, 1.66; 2.38, 1.51; 2.59, 1.59. Length range 2.38–2.79; height range 1.51–1.79; range of height as percent of length 60–64.

First Antenna (Figure 45*a*): 1st joint bare. 2nd joint with medial rows of minute spines. 3rd joint with spinous ventral bristle about half length of 4th joint, small dorsal bristle at midlength, and medial row of minute indistinct spines. 4th joint with 2 small bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 9 long stout proximal filaments (1 broken off near base on illustrated limb) followed by 3 slender shorter filaments with marginal spines and 1 small bare subterminal filament; stem distal to 3rd slender filament with marginal spines. 6th joint with short spinous medial bristle. 7th joint: a-bristle spinous, about same length as bristle of 6th joint; b-bristle shorter than sensory bristle of 5th joint, with 5 short spinous marginal filaments; stem of b-bristle distal to 5th filament with marginal spines; c-bristle almost twice length of bristle of 5th joint, with about 11 spinous marginal filaments and small bare subterminal filament. 8th joint: d- and e-bristles well developed, bare with blunt tips; f- and g-bristles about same length as c-bristle, each with about 9 pectinate marginal filaments and small bare subterminal filament.

Second Antenna: Protopodite with short spinous distal medial bristle (Figure 45*c*); small node with 2 minute spines present on dorsal margin at about 1/4 length measured from anterior end (Figure 45*b*). Endopodite unjointed, with 4 proximal bristles (2 short bare, 1 long bare, 1 long spinous), and 1 very long bare terminal filament (Figure 45*c*). Exopodite: bristle of 2nd joint reaching past 9th joint, with 3 slender proximal dorsal spines, 3 proximal ventral hairs, followed by about 9 small slender ventral spines; bristle of 3rd joint with few proximal slender ventral spines and distal natatory hairs; bristles of joints 4–8 with natatory hairs; 9th joint with 4 bristles (1 short dorsal with few short hairs, 1 medium and 2 long with natatory hairs); joints 3–8 with slender basal spines increasing in length on distal joints; spine of 8th joint slightly longer than 9th joint; 9th joint with slender lateral spine (with bifurcate tip) about same length as spine of 8th joint; joints 4–8 (possible 2–8) with indistinct minute spines in vicinity of dorsal corner.

Mandible: Coxale endite with long marginal spines along edges but short spines on medial surface, and with 2 slender apical spines (right limb of USNM 193979 with small triangular process between apical spines (Figure 45*d*), but left limb without process (Figure 45*e*)); small unringed bristle with few spines present near base (Figure 45*e*). Basale (Figure 45*e*): dorsal margin with fairly long bristle (with indistinct short marginal spines) at midlength and 2 spinous terminal bristles (medial about 3/4 length of lateral); ventral margin with 2 a-bristles (longer spinous), 1 small b-bristle with base lateral, 2 c-bristles with indistinct marginal spines (minute peg adjacent to longer bristle), and 1 long d-bristle with long proximal and short distal spines. Exopodite about 3/4 length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 bristles (distal almost half length of proximal). 1st endopodial joint with 4 bristles (1 minute bare, 1 short and 1 long with short spines, and 1 long with long proximal and short distal spines). 2nd endopodial joint: Ventral margin with spines and 4 slender equilength spinous bristles (2 single proximal, 2 paired distal); dorsal margin with about 17 bristles (5 long spinous, 3 medium spinous, 4 short with stout spines, and 5 short with indistinct slender spines) (not all bristles shown in Figure 45*e*); medial surface with indistinct rows of minute spines. 3rd endopodial joint with 3 stout pectinate claws (dorsal claw longer), 2 short, spinous, medial, ventral bristles, and 2 ringed lateral bristles (ventral long spinous, dorsal short).

Maxilla: Endite I with 10 bristles; endite II with 5 bristles;

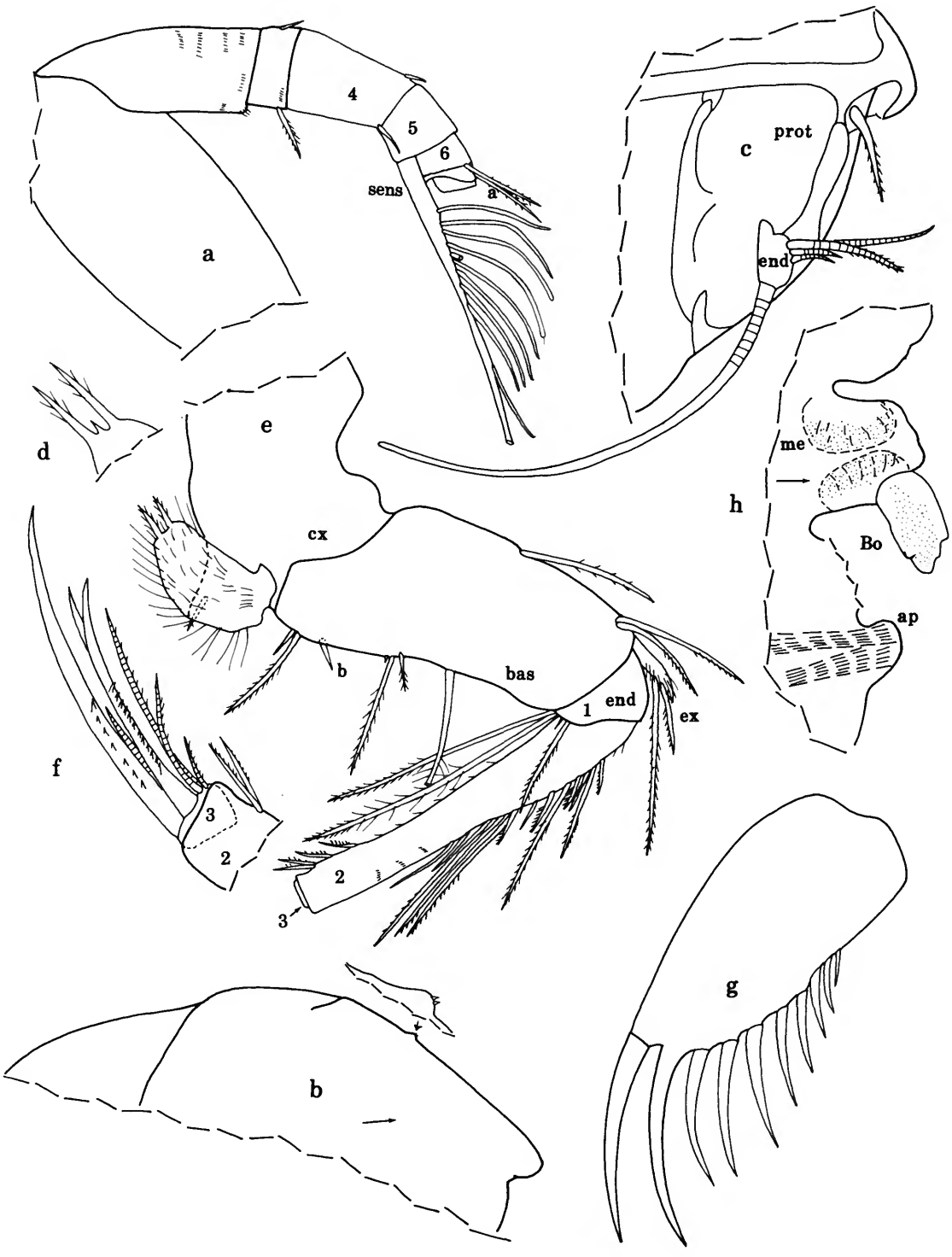


FIGURE 45.—*Skogsbergia vivax* Kornicker, new species, ovigerous female, holotype, NMV J40012: *a*, left 1st antenna (nabs), mv; *b*, dorsal margin protopodite left 2nd antenna, mv; *c*, distal protopodite and endopodite left 2nd antenna, mv; *d*, tip coxale endite right mandible, mv; *e*, part left mandible (nabs), mv; *f*, tip left mandible, mv; *g*, left lamella furca, lv; *h*, dorsal part anterior of body, lv.

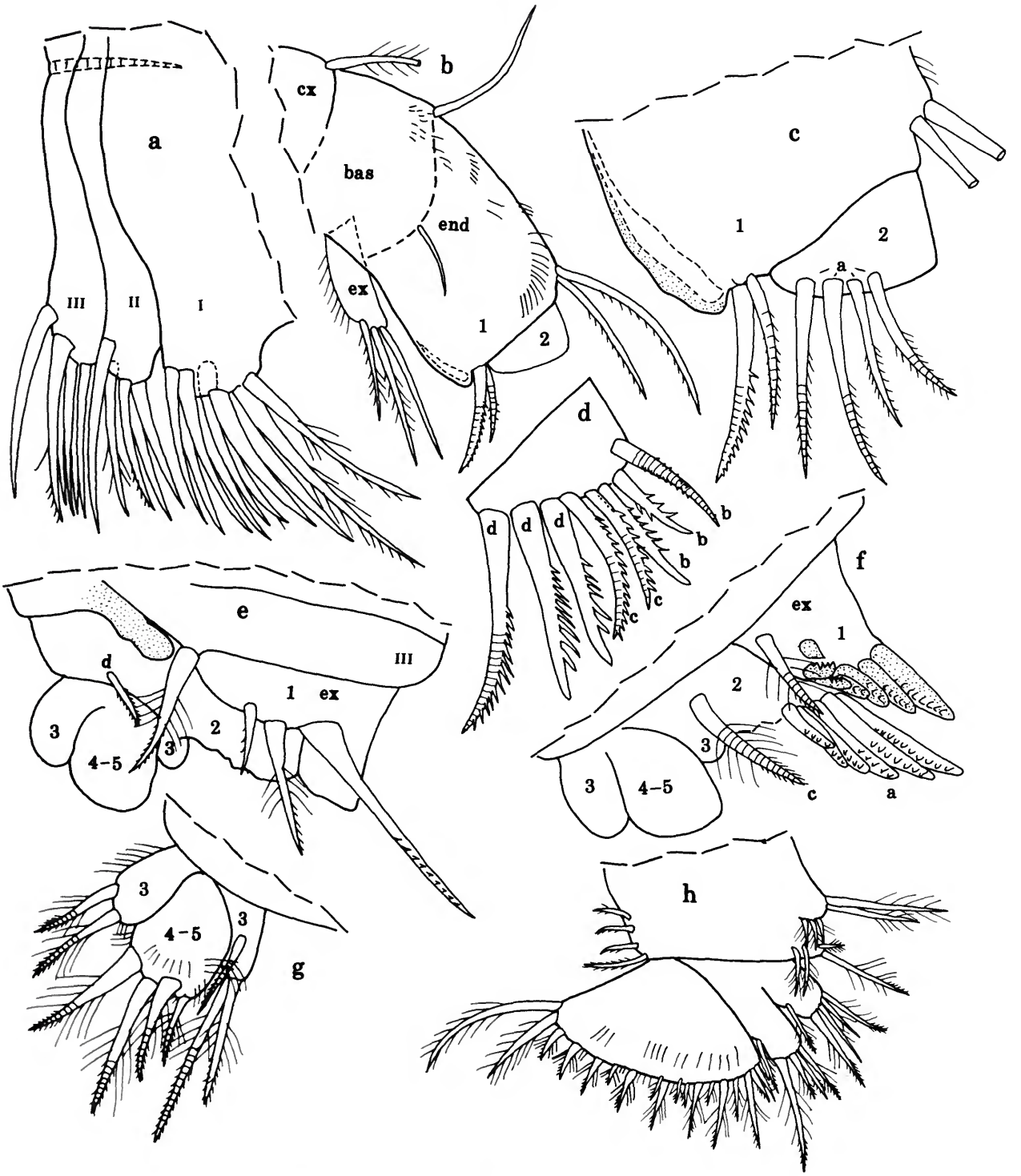


FIGURE 46.—*Skogsbergia vivax* Kornicker, new species, ovigerous female, holotype, NMV J40012: *a*, endites right maxilla (spines not shown on all bristles), mv; *b*, part left maxilla (nabs), mv; *c*, distal right maxilla (nabs), lv; *d*, 2nd endopodial joint left maxilla (nabs), mv; *e*, part right 5th limb (nabs), av; *f*, part left 5th limb (nabs), pv; *g*, exopodial joints 3–5 left 5th limb, pv; *h*, left 6th limb, mv.

endite III with 1 proximal and 6 terminal bristles (Figure 46*a*). Coxale with plumose dorsal bristle (Figure 46*b*). Basale with slender bare dorsal bristle and short medial bristle at midwidth (Figure 46*b*). Exopodite hirsute, with 3 bristles (middle and proximal bristle spinous) (Figure 46*b*). 1st endopodial joint with dorsal spines, triangular cutting tooth, 2 slender subequal alpha-bristles with short marginal spines, and 2 beta-bristles (medial stout pectinate, lateral short slender with short marginal spines) (Figure 46*b,c*). 2nd endopodial joint with 4 spinous a-bristles, 3 pectinate b-bristles (outer ringed, middle unringed claw-like with few teeth, inner unringed claw-like), 2 pectinate c-bristles, and 3 stout pectinate claw-like d-bristles (outer ringed) (Figure 46*d*).

Fifth Limb: Epipodite with 57 plumose bristles (proximal bristle short). Protopodite with undulate tooth with rounded tip (Figure 46*e*). Endites I, II, and III with about 6, 4, and 7 bristles, respectively. 1st exopodial joint: Main tooth with small smooth proximal peg with pointed tip and 6 cuspate teeth (longest tooth with about 7 cusps excluding tip) (Figure 46*f*); bristle proximal to smooth peg with long proximal and short distal spines; anterior side of joint with row of 3 bristles (outer stout pectinate, middle with long proximal and short distal spines, inner short with few minute spines), and 1 stout bristle (with long proximal and short distal spines) near tooth of protopodite (Figure 46*e*). 2nd exopodial joint: With 6 pectinate, unringed, claw-like a-bristles (longest with about 12 cusps) (Figure 46*f*), 3 pectinate ringed b′-bristles (longest with about 19 cusps) (not shown), and 3 pectinate ringed b″-bristles (longest with about 20 cusps, of which proximal 8 shorter) (not shown); posterior side of joint with c-bristle with long proximal and short distal spines (Figure 46*f*); anterior side with small d-bristle with few short marginal spines (Figure 46*e*). 3rd exopodial joint (Figure 46*g*): Inner lobe with 1 proximal and 2 terminal bristles, all with long proximal and short distal spines (shorter of terminal bristles unringed, others ringed); outer lobe hirsute, with 2 ringed bristles with long proximal and short distal spines. 4th and 5th joints fused, hirsute, with minute rounded terminal process bearing spines, and 4 ringed bristles with long proximal and short distal spines (Figure 46*g*).

Sixth Limb (Figure 46*h*): With 4 short epipodial bristles with indistinct minute marginal spines. Endite I with 3 short, spinous, proximal, medial and 2 long terminal bristles with long distal spines; endite II with 2 short, spinous, proximal, medial and 2 terminal bristles (1 long with long proximal and short distal spines, 1 minute with long spines); endite III with 1 long, spinous, proximal, medial and 4 spinous terminal bristles; endite IV with 1 long, spinous, proximal, medial and 4 spinous terminal bristles. End joint with 16–19 bristles (2 or 3 small (with short spines) near anterior end, followed by 9 long, 3–5 short (all with long proximal and short distal spines), and 2 plumose posterior bristles); medial surface with long distal hairs; lateral surface with stiff spines along distal edge (absent near each end).

Seventh Limb: With total of 26–28 bristles: 10 or 11 bristles in proximal group (6 on comb side, 4 or 5 on peg side), each bristle with 4–6 bells; 16 or 17 bristles in distal group, all on terminal segment (8 on comb side, 8 or 9 on peg side), each bristle with 1–7 bells. Terminal comb with 3 long curved teeth (middle longer), and on each side 7 or 8 short teeth; 2 cup-like processes with 6–8 marginal teeth opposite comb (Figure 47*a,b*).

Furca (Figure 45*g*): Each lamella with 10 claws; claw 2 nonarticulated, remaining claws articulated; claw 5 very slightly broader than 4th claw but about same length; all claws with well-defined teeth along posterior edge, and most also with indistinct short hairs along anterior edge (teeth and hairs not shown); in general, teeth similar in size along each claw; claw 1 with distal medial teeth (not shown); right lamella anterior to left by width of base of claw 1, and with few spines along anterior edge proximal to claw 1.

Bellonci Organ (Figure 45*h*): Cylindrical with tapered tip and light amber-colored internal area (stippled in Figure 45*h*).

Eyes: Medial eye bare, with 2 light amber-colored areas (stippled in Figure 45*h*). Lateral eye larger than medial eye, with 29 ommatidia (amber-color in transmitted light), without black pigment between ommatidia (Figures 44*a*, 47*c,d*).

Upper Lip (Figure 47*e,f*): Anterior unpaired part with large glandular processes (7 posterior larger and with rounded tips); paired posterior part with small glandular processes along ventral edge and 1 larger slightly lateral process at posterior end; small lateral lobe with 1 glandular opening present proximally on each side near posterior end of paired part. (Lip of holotype somewhat opaque resulting in internal sclerites and other details being obscured.)

Genitalia (Figure 47*g–j*): Ring with attached spermatophore on each side of body anterior to furca.

Anterior of Body (Figure 45*h*): With prominent rounded anterior process between medial eye and upper lip.

Posterior of Body (Figure 47*g*): Evenly rounded, bare.

Y-*Sclerite* (Figure 47*g,i*): Somewhat obscured on holotype, and anterior end of left sclerite broken off; ventral branch not observed.

Eggs: Holotype with 18 eggs in marsupium (1 egg shown in Figure 44*a*); lengths of 3 typical eggs: 0.33, 0.34, 0.35.

COMPARISONS.—In the key to species of *Skogsbergia* presented in Kornicker (1992a:59), *S. vivax* keys to *S. calyx* Kornicker. It is considerably larger than that species (length of *S. calyx* 1.18–1.21 mm, compared to 2.38–2.79 mm for *S. vivax*). Also, the appendages of *S. vivax* differ as follows: 2nd antenna with longer bristle on the 2nd exopodial joint; 5th limb with shorter protopodial tooth, longer bristle on the 1st exopodial joint adjacent to the protopodial tooth, and more a-bristles on the 2nd exopodial joint; and 7th limb with more bristles.

REMARKS.—It is possible that this species should be referred to *Pterocypridina* rather than *Skogsbergia*. Poulsen (1962:243)

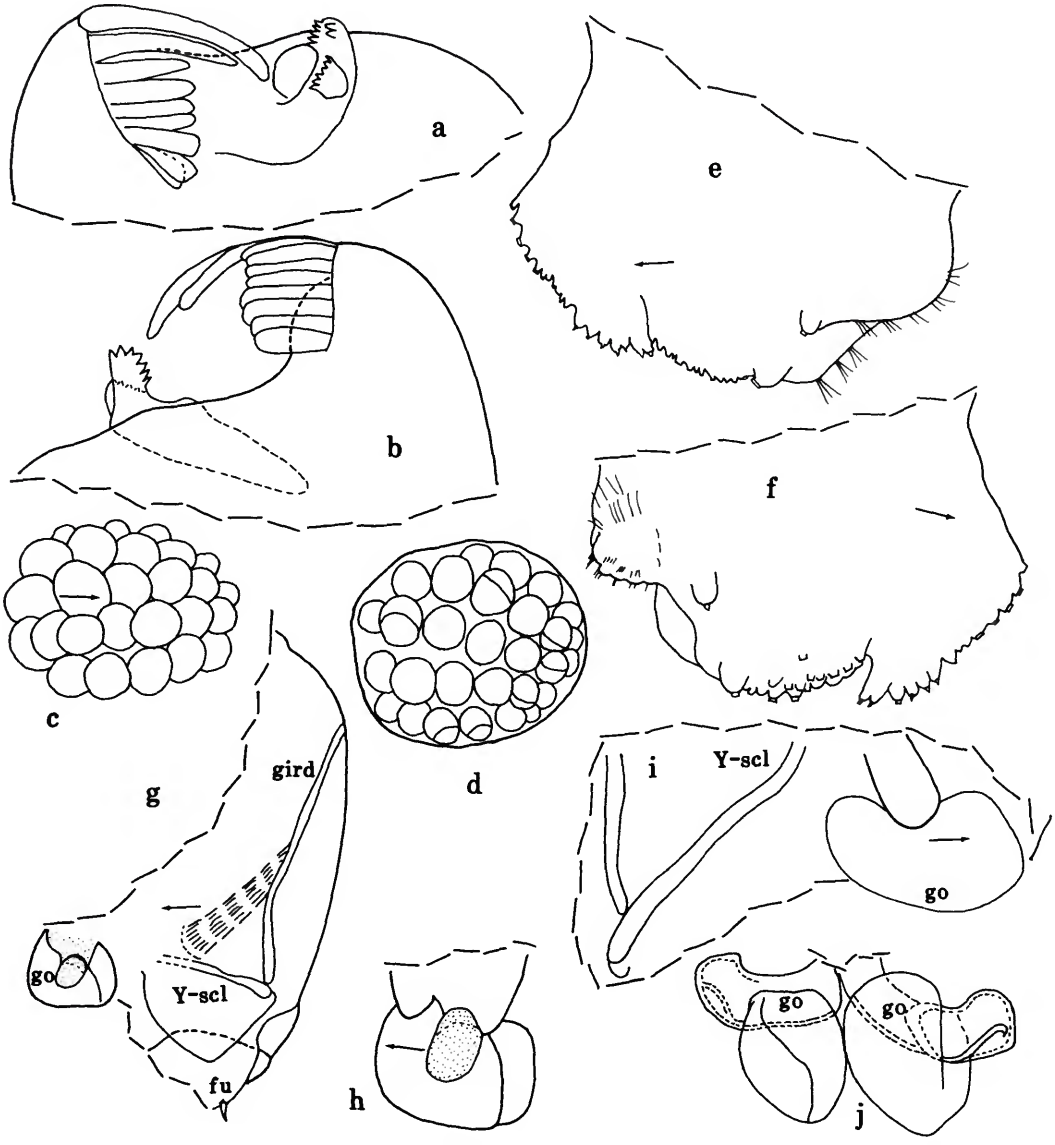


FIGURE 47.—*Skogsbergia vivax* Kornicker, new species, ovigerous female, holotype, NMV J40012: *a,b*, tips of opposing 7th limbs (nabs); *c*, right lateral eye (drawn in natural position), lv; *d*, left lateral eye (drawn lying flat on slide), lv; *e,f*, left and right views of upper lips, lv; *g*, posterior of body, lv; *h*, detail of genital organ with attached spermatophore in *g*, lv; *i*, part posterior of body, lv; *j*, left and right genitalia and spermatophores (removed from body).

referred to *Pterocypridina* as *P. birostrata* a species having a rostrum somewhat similar to that of *S. vivax*. *Skogsbergia vivax* differs from *P. birostrata* in not having plumose alpha-bristles on the 1st endopodial joint of the maxilla. The main difference between *Skogsbergia* and *Pterocypridina* is in the suckers of the 1st antenna of the adult male (Kornicker, 1983:3). Until males are known, the genus of either species cannot be known with certainty.

Skogsbergia tenax Kornicker, new species

FIGURES 48–51

Skogsbergia species A, Kornicker, 1994, fig. 110bb.

ETYMOLOGY.—From the Latin *tenax* (holding fast).

HOLOTYPE.—NMV J40011, partly dissected adult female in alcohol.

TYPE LOCALITY.—Slope 22, 37°00.60′S, 150°20.70′E, New South Wales, off Eden; depth 363 m.

PARATYPES.—Slope 22: USNM 194041, adult female on slide and in alcohol; USNM 194042, 1 adult male on slide and in alcohol.

DISTRIBUTION.—Slope 22, 363 m.

DESCRIPTION OF ADULT FEMALE (Figures 48–50).—Carapace elliptical in lateral view with convex ventral and dorsal margins, and evenly rounded posterior margin with almost negligible concavity at dorsal end of caudal process (Figure 48*a,b,f*). Anterior end of rostrum rounded and proximal posterior corner pointed; ventral edge of rostrum with narrow flap-like medial extension (Figure 48*c,e*). Outer surface of valve smooth. Carapace with few small areas of brown pigment near rostrum (stippled in Figure 48*d,e*). About 15 "streamers" (with bases at inner end of incisur lateral to lamellar prolongation of selvage) extend into incisur area (Figure 48*c*). (Whether the streamers are individual hairs or are folds in a transparent velum could not be resolved, but because none are tangled, I think it may be the latter; they have not been reported previously in Myodocopina.)

Infold: Rostral infold with about 60 undivided bristles (those close to tip and along anterior and ventral edges longer); 2 divided bristles (anterior longer) at inner end of incisur, and 3 small bristles near inner end of ventral corner of incisur (Figure 48*e*). Narrow list extending from anteroventral infold (anterior end shown in Figure 48*e*), continuing along ventral margin close to valve edge, and then broadening to form ridge close to inner margin of infold at anterior end of caudal process (Figure 48*f*). Anteroventral list with about 17 divided bristles (3 anterior of these shown in Figure 48*e*); anterior end of ventral list with about 25 closely spaced divided bristles forming row continuing from anteroventral row; posterior part of ventral list (with posterior end at ventral end of broad list of caudal process) with row of about 35 undivided bristles. Broad list of caudal process with straight anterior and posterior edges, a row of about 20 minute spines at midwidth, and numerous minute pore-canals or ridges mostly restricted to posterior half of ridge (Figure 48*f*). Anteroventral and anterior 1/4 of ventral infold between list and inner margin of infold with about 50 undivided bristles, mostly shorter than bristles along anteroventral list (5 shown in Figure 48*e*).

Selvage: Lamellar prolongation of selvage narrow and nonstriate along dorsal and anterior margins of rostrum but broad and with indistinct closely spaced striations along dorsal margin of incisur; prolongation divided at inner end of incisur, broad with indistinct closely spaced striations along ventral margin of incisur, narrow and nonstriate along anteroventral margin of valve, then becoming broader along ventral margin and comprising 2 layers, with 1 layer about 1/2 width of other; prolongation a single layer and very narrow along edge of caudal process.

Carapace Size (length, height in mm): NMV J40011 (holotype), 1.69, 1.15, height 68% of length; USNM 194041, 1.90, 1.32, height 69% of length. Length range 1.69–1.90; height range 1.15–1.32; range of height as percent of length 68–69.

First Antenna (Figure 48*g*): 1st joint with few minute stiff distal medial, lateral, and dorsal hair-like growths that could be foreign (visible under oil-immersion: ×100 objective, ×15 ocular). 2nd joint with medial, lateral, ventral, and dorsal spines. 3rd joint with fairly long medial spines and 2 spinous bristles (1 medial terminal, about same length as 4th joint, 1 dorsal longer, with base at midlength). 4th joint with 2 spinous terminal bristles (1 minute ventral, 1 dorsal, about same length as 5th joint). Sensory bristle of 5th joint of left limb of USNM 194041 probably aberrant, with only 5 long and 1 short proximal filaments (short filament adjacent to 2nd long filament) followed by 3 slender filaments (shorter than long proximal filaments) and 1 small subterminal filament (Figure 48*g*); sensory bristle of right limb probably typical, with 9 long proximal filaments followed by 3 slender shorter filaments and 1 small subterminal filament; stem and all filaments without marginal spines. 6th joint with short medial bristle. 7th joint (bristles not shown): a-bristle about same length as bristle of 6th joint, with indistinct marginal spines; b-bristle about twice length of a-bristle, with 5 short spinous marginal filaments; c-bristle much longer than sensory bristle of 5th joint, tip broken off on both limbs of USNM 194041, but with 8 slender filaments on remaining part, some with spines. 8th joint (bristles not shown): d- and e-bristles well developed, bare with blunt tips; f-bristle longer than sensory bristle of 5th joint but shorter than c- and g-bristles, with 8 proximal filaments (1st 7 with marginal spines, 8th longer bare) and small bare subterminal filament; g-bristle about same length as c-bristle, with 9 proximal filaments (proximal 5 of these with spines; 9th filament much longer and stouter) and small bare subterminal filament.

Second Antenna: Protopodite with short, spinous, distal, medial bristle and areas of brown pigment (stippled) (Figure 48*h*); numerous medial hair-like growths with blunt tips near insertion of endopodite (probably foreign (present on both limbs of USNM 194041 (Figure 48*h*), but absent on female holotype and adult male)). Endopodite either unjointed or comprising 2 small joints (difficult to resolve) (Figure 48*h,i*): 1st joint with 4 bristles (3 bare proximal (1 long, 2 short), and 1 longer spinous distal); 2nd joint with very long bare terminal filament with blunt tip. Exopodite: Bristle of 2nd joint reaching just past 9th joint, with 7 very stout ventral spines (all except distal spine absent on right limb of USNM 194041); bristles of joints 3–8 with natatory hairs, no spines; 9th joint with 4 bristles (1 short bare dorsal; 1 medium with natatory hairs (some hairs fairly broad and spine-like), 2 long with natatory hairs); joints 3–8 with stout basal spines increasing in length on distal joints; spine of 8th joint about twice length of 9th joint; 9th joint with stout lateral spine about same length as joint; joints 2–8 with minute spines along distal edges.

Mandible: Coxale endite with long marginal spines and 2

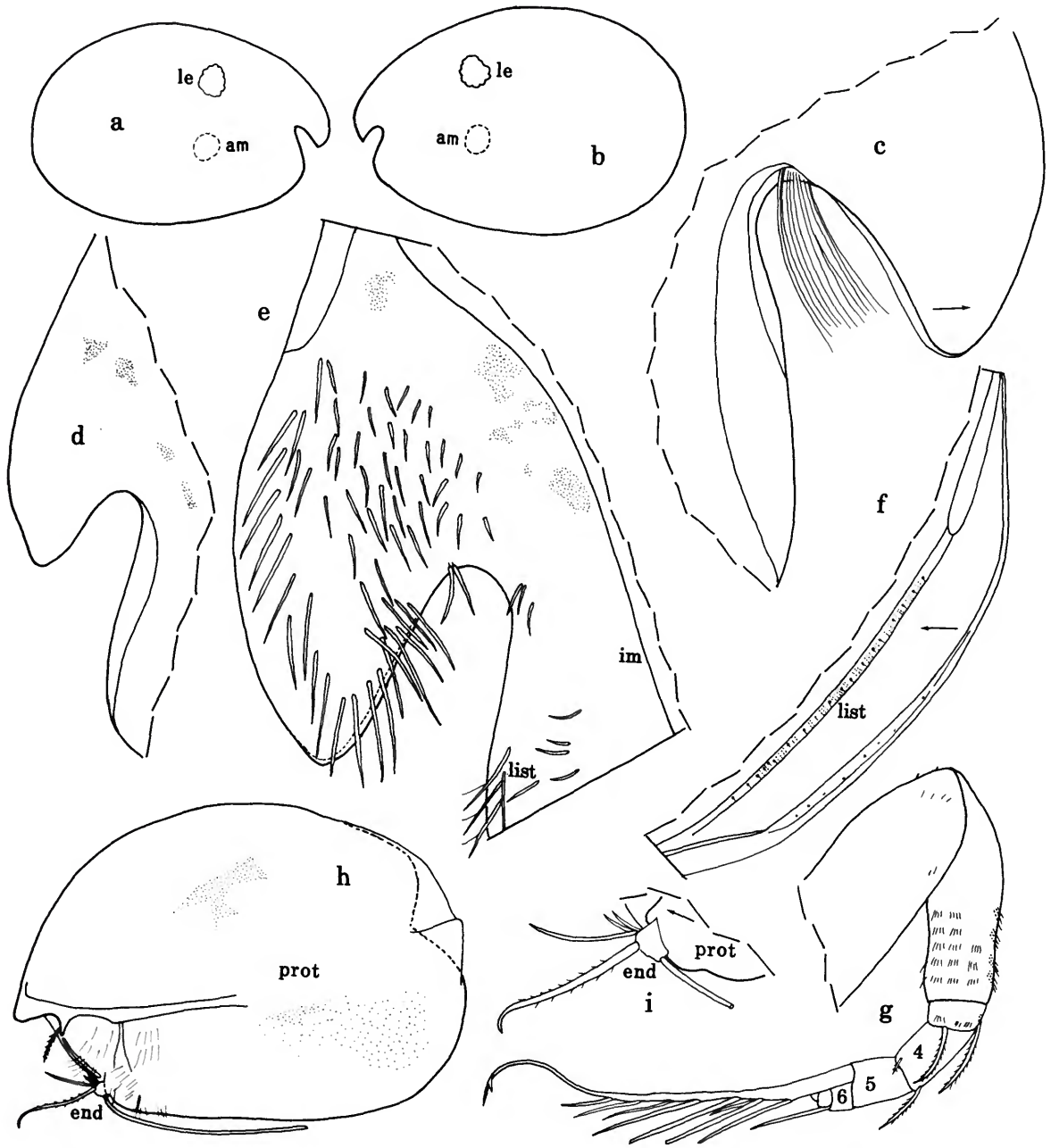


FIGURE 48.—*Skogsbergia tenax* Kornicker, new species, adult female, holotype, NMV J40011: *a*, complete specimen, length 1.69 mm. Adult female, paratype, USNM 194041: *b*, complete specimen, length 1.90 mm; *c*, anterior right valve showing long "streamers," ov; *d*, anterior left valve showing areas of brown pigment (stippled) ("streamers" not shown), ov; *e*, anterior left valve (areas of brown pigment stippled; "streamers" not shown), iv; *f*, posterior right valve, iv; *g*, left 1st antenna (nas), mv; *h*, protopodite and endopodite right 2nd antenna (areas of brown pigment stippled), mv; *i*, detail of endopodite of 2nd antenna shown in *h*.

long stout pectinate terminal spines with short blunt process between them; small bristle near base of endite. Basale (Figure 49*a*): Dorsal margin with fairly long bristle near midlength and 2 equilength terminal bristles; ventral margin with 3 a-bristles, 1 small b-bristle with base lateral, 2 short c-bristles (additional small medial bristle or peg about midway between b-bristle and

FIGURE 49.—*Skogsbergia tenax* Kornicker, new species, adult female, paratype, USNM 194041: *a*, basale left mandible, mv; *b*, part left maxilla (nabs), mv; *c*, part right maxilla (limb twisted; nabs); *d*, part right 5th limb (nabs), av; *e*, part left 5th limb (nabs), pv; *f*, right 6th limb (areas of brown pigment stippled), mv.

proximal c-bristle), and 1 long d-bristle with long spines except near tip; large area of brown pigment in vicinity of a- and b-bristles (stippled). Exopodite about 3/4 length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 subterminal ventral bristles (distal about half length of proximal). 1st endopodial joint with 4 ventral bristles (1 minute bare, 1 short and 1 long with short spines, and 1 long with long spines except near tip). 2nd endopodial joint: Ventral margin with 4 slender unringed equilength bristles (2 unpaired proximal, 2 paired distal); dorsal margin with many bristles (obscured by debris on both limbs of USNM 194041; 1 cleaning bristle with stouter spines than on others); medial surface with rows of indistinct spines. 3rd endopodial joint with 3 fairly equal stout claws (medial claw with few proximal teeth), 2 ringed medial ventral bristles (1 short, 1 about same length as claws), and 2 ringed lateral bristles (1 ventral about same length as claws, 1 dorsal slightly shorter).

Maxilla: Endite I with 10 bristles; endite II with 7 bristles; endite III with 1 proximal and 5 terminal bristles (Figure 49*b*). Precoxale and coxale with hairs near dorsal margin (not shown); coxale of USNM 194041 without usual plumose dorsal bristle, but it may have broken off during dissection. Basale with short dorsal bristle, short medial bristle, and long ventral bristle with long spines (Figure 49*b*). Exopodite hirsute, with 3 bristles (middle and proximal bristles with long spines or hairs; proximal bristle short) (Figure 49*c*). 1st endopodial joint with dorsal spines, triangular cutting tooth (Figure 49*c*), 1 slender bare alpha-bristle (Figure 49*b*), and 2 beta-bristles (longest pectinate) (Figure 49*c*). 2nd endopodial joint with 4 a-bristles (bare or with few spines), 3 b-bristles (outer ringed pectinate, middle and inner unringed claw-like with few stout teeth), 2 pectinate c-bristles, and 3 stout pectinate claw-like d-bristles. (Illustrated left limb (Figure 49*c*) either twisted or aberrant in that cutting tooth of 2nd endopodial joint and beta-bristles are anterior rather than posterior; 2 paired bristles proximal to endite III on illustrated left limb not observed on right limb; short medial bristle and short dorsal bristle present on basale of right limb (Figure 49*b*) not observed on left limb (Figure 49*c*).) Area of brown pigment present near endites II and III (stippled in Figure 49*b*).

Fifth Limb: With 3 endites. Protopodite with elongate slender tooth (Figure 49*d*). 1st exopodial joint: Main tooth with small smooth proximal peg and 6 cuspate teeth (longest tooth with about 6 cusps excluding tip) (Figure 49*e*); bristle proximal to smooth peg with long proximal spines; anterior side with row of 3 bristles (outer stout pectinate and with long spines, middle shorter with long spines, inner very short with long spines) and 1 bristle (with long spines) between row of 3 bristles and protopodial tooth (Figure 49*d*). 2nd exopodial joint with 4 pectinate, unringed, claw-like a-bristles, 2 or 3 pectinate ringed b′-bristles (2 on holotype, 3 on USNM 194041), and 4 pectinate ringed b″-bristles; posterior side of joint with c-bristle with long proximal and short distal spines (Figure 49*e*); anterior side with long d-bristle with long proximal spines (Figure 49*d*). 3rd endopodial joint: Inner lobe hirsute, with ringed proximal bristle with long proximal and short distal spines, and 2 terminal bristles (outer bristle unringed, with short spines; inner bristle slightly longer, ringed, bare); outer lobe hirsute, with 2 ringed terminal bristles with long proximal and short distal spines. 4th and 5th exopodial joints fused, hirsute, with 4 ringed bristles (1 with long proximal and short distal spines, others with short spines) (Figure 49*e*). Small areas of brown pigment in vicinity of endite I and inner lobe of 3rd exopodial joint (stippled in Figure 49*d,e*). (Not all bristles and rings on bristles shown in illustrations.)

Sixth Limb (Figure 49*f*): With 4 fairly long bare epipodial bristles (right limb of USNM 194041 also with small peg (possibly stump of broken bristle, but much thinner than other bristles)). Endite I with 4 spinous bristles (2 short proximal medial, 2 longer terminal); endite II with 4 spinous bristles (2 short proximal medial, 2 terminal (1 long, 1 short)); endite III with 1 long, spinous, proximal, medial and 4 terminal bristles (2 with short spines, 2 with long proximal and short distal spines); endite IV with 1 long, spinous, proximal, medial and 6 terminal bristles (1 unringed on anteroventral corner, either bare or with small spines, 5 spinous ringed (3 with short spines, 2 with long proximal and short distal spines)). End joint with 11–13 bristles (1 anterior bare unringed bristle on right limb of USNM 194041, but not on left; 3 ringed, with short spines; 6 or 7 ringed, with long proximal and short distal spines; 2 plumose posterior, longer than others and weakly ringed); medial side of end joint hirsute; lateral side with stiff spines along distal edge (spines absent near each end). Areas of brown pigment present (under oil immersion (×100 objective, ×15 ocular) pigment appears as closely spaced dots (pigmented areas shown as stippling in Figure 49*f*)). (Rings and spines not shown on all bristles.)

Seventh Limb (Figure 50*a*): With total of 18 bristles: 6 bristles in proximal group (either 3 on each side (USNM 194041), or 4 on comb side and 2 on jaw side (holotype)), each bristle with 4 or 5 bells; 12 bristles in distal group, all on terminal segment (6 on each side), each bristle with 1–6 bells. Terminal comb with 3 long curved teeth (middle tooth slightly longer), and on each side 4 short flat-tipped teeth; low toothed process opposite comb (on USNM 194041 toothed process obscured by comb teeth (detail in illustration)).

Furca (Figure 50*b*): Each lamella with 8 or 9 claws; claw 2 nonarticulated, remaining claws articulated; claw 5 broader than claw 4 but about same length; all except claw 9 with well-defined teeth along posterior edge (not shown); claws 1 and 2 with indistinct short distal hairs on anterior margins; claw 1 with about 8 large medial teeth on distal half (not shown); right lamella anterior to left by width of base of claw 1 and with few spines along anterior edge (not shown); lamellae without pigment. (Holotype with 8 claws on each lamella; USNM 194041 with 9 on right lamella and 8 on left.)

Bellonci Organ (Figure 50*c*): Short, cylindrical, with tapered tip and long distal hairs. (Hairs have not been reported

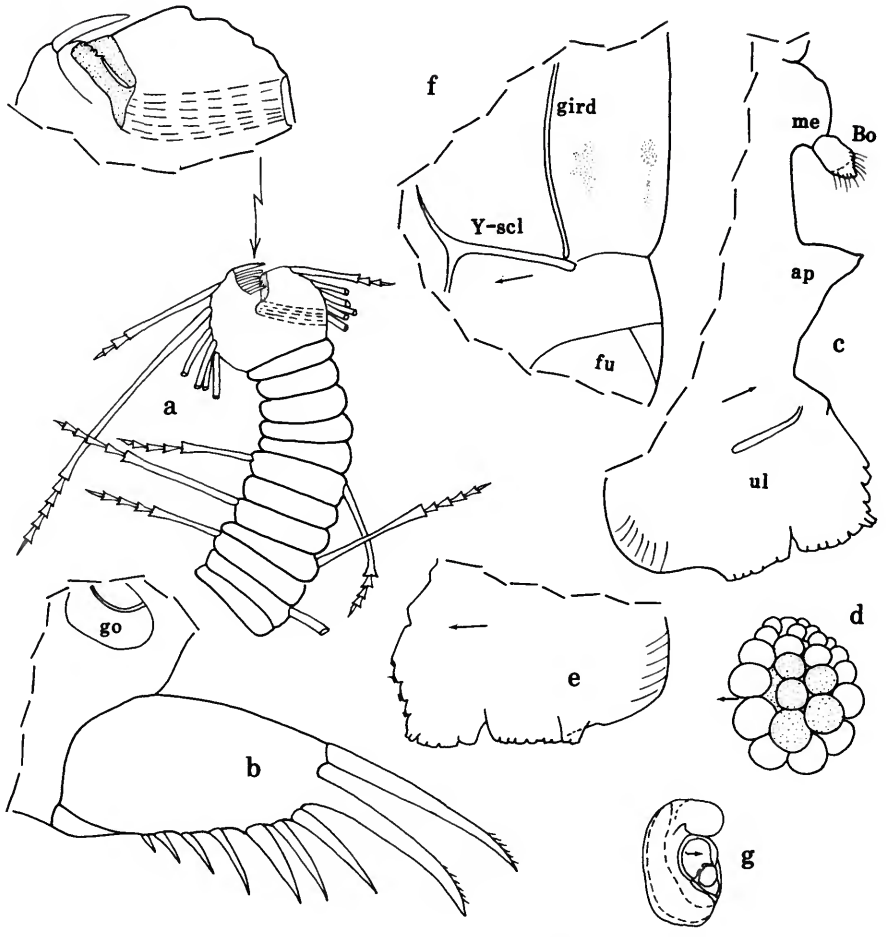


FIGURE 50.—*Skogsbergia tenax* Kornicker, new species, adult female, paratype, USNM 194041: *a*, 7th limb; *b*, right lamella furca and part right genitalia, lv; *c*, anterior of body, lv; *d*, left lateral eye, lv; *e*, upper lip, lv; *f*, part posterior of body (areas of brown pigment stippled), lv; *g*, right genitalia, lv.

previously on other Cypridinidae, and they are not present on the adult male described herein; therefore, I think they are probably a foreign growth.)

Eyes: Medial eye bare, light amber-color (Figure 50*c*). Lateral eye larger than medial eye, with brown pigment in central part, and with about 29 amber-colored ommatidia (Figures 48*a,b*, 50*d*) (not all ommatidia shown in Figure 50*d*).

Upper Lip (Figure 50*c,e*): Anterior unpaired part with large glandular openings; posterior paired part with small lateral process (with 2 glandular openings) on left side of USNM 194041 (Figure 50*e*) but not on right side (Figure 50*c*).

Genitalia (Figure 50*b,g*): Complex oval structure on each side of body anterior to furca.

Anterior of Body (Figure 50*c*): With prominent triangular anterior process between medial eye and upper lip.

Posterior of Body (Figure 50*f*): Evenly rounded, bare, with small areas of brown pigment (stippled in illustration) proximal to furca.

Y-*Sclerite* (Figure 50*f*): Typical for subfamily.

Eggs: USNM 194041 with 22 fairly large unextruded eggs (11 on each side); lengths of 2 eggs (mm): 0.133, 0.185.

DESCRIPTION OF ADULT MALE (Figure 51).—Carapace similar in shape to that of adult female except for slightly greater concavity at dorsal end of caudal process (Figure 51*a*), and slightly broader flap-like medial extension along ventral edge of rostrum (Figure 51*b,c*). Long "streamers" extend anteriorly from inner end of incisur as on adult female (Figure 50*c*).

Infold: Bristles not counted but appearing similar in number and type to those of adult female. Broad posterior list anterior to caudal process differs from that of female in having minute nodes along posterior edge (Figure 50*d*).

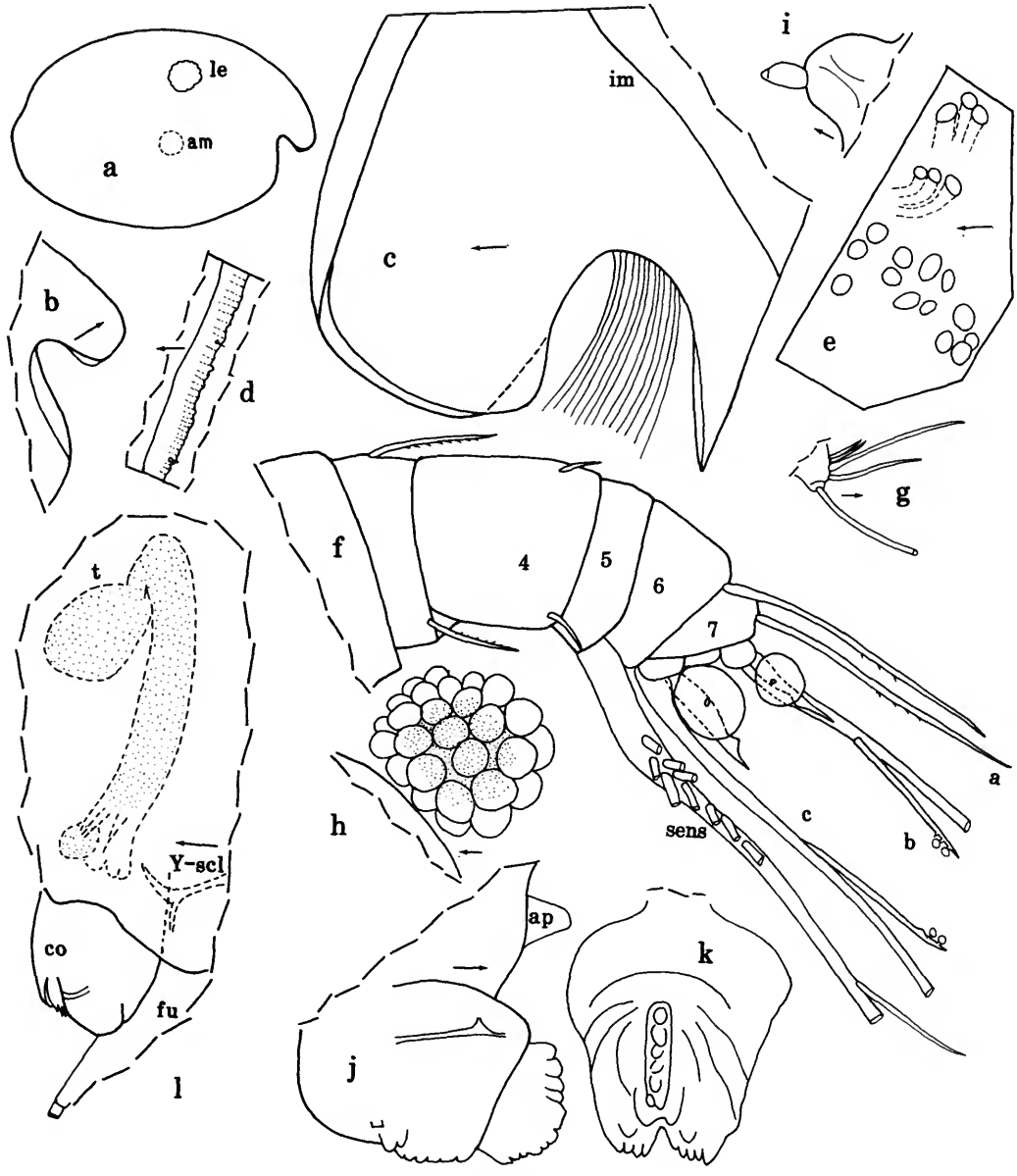


FIGURE 51.—*Skogsbergia tenax* Kornicker, new species, adult male, paratype, USNM 194042: *a*, complete specimen, length 1.57 mm; *b*, anterior right valve, ov; *c*, anterior right valve showing "streamers" (infold bristles not shown), iv; *d*, list of posterior of right valve near ventral margin, iv; *e*, central adductor muscle attachments left valve, ov; *f*, distal left 1st antenna (nabs), mv; *g*, endopodite left 2nd antenna, lv; *h*, left lateral eye and posterodorsal edge of protopodite of left 2nd antenna, lv; *i*, medial eye and Bellonci organ, lv; *j*, upper lip, lv; *k*, upper lip from anterior, ventral to bottom; *l*, left copulatory apparatus (area of brown pigment stippled), lv.

Selvage: In general, similar to that of adult female.

Central Adductor Muscle Attachments (Figure 51*e*): About 19 oval attachments.

Carapace Size (length, height in mm): USNM 194042, 1.57, 1.01, height 64% of length.

First Antenna (Figure 51*f*): 1st joint bare. 2nd joint with few indistinct distal ventral spines. 3rd joint short with 2 bristles (1 ventral terminal, 1 dorsal at midlength), both shorter than 4th joint and with short spines. 4th joint with 2 very short bare bristles (1 ventral terminal, 1 dorsal subterminal). 5th joint

short; long sensory bristle with stout proximal part, 9 long stout bare proximal filaments (only proximal parts shown), 3 long slender distal filaments with few spines, and 1 small bare subterminal filament. 6th joint with slender medial bristle (with few small spines) near dorsal margin. 7th joint: a-bristle similar to bristle of 6th joint; b-bristle with stout proximal filament with indistinct large sucker, 2 distal filaments each with 2 minute suckers and small tooth proximal to suckers, then 2 shorter slender filaments with minute spines, and marginal spines on stem distal to filaments; c-bristle much longer than b-bristle, with stout proximal filament with sucker larger than that of b-bristle, then 2 filaments each with 2 minute suckers and small tooth proximal to suckers, then 7 or more shorter bare filaments (tip of bristle missing on both limbs of USNM 194042). 8th joint (bristles not shown): d- and e-bristles well developed, filament-like with blunt tips; f- and g-bristles stout, probably about same length as c-bristle, with abundant long thin filaments on proximal part and many short distal filaments, some with spines.

Second Antenna: Protopodite (including pigmentation) similar to that of female except without foreign growths near insertion of endopodite. Endopodite differs from that of adult female in that longest and stoutest bristle of proximal 4 is penultimate (Figure 57*g*). Exopodite similar to that of adult female.

Mandible: Similar to that of adult female, including pigmentation. Dorsal bristles of 2nd exopodial joint were obscured on the described adult female; therefore, those of the male are described here: 7 or 8 long bristles and 8 or 9 short bristles (none of the short bristles have the stout spines observed on 1 bristle of adult female).

Maxilla: Endite I with 11 bristles; endite II with 7 bristles; endite III with 1 long proximal and 5 terminal bristles. Coxale with slender dorsal bristle (this bristle was broken off on described adult female). Basale with 3 distal bristles (ventral long, dorsal short, medial shorter). Exopodite similar to that of adult female. 1st endopodial joint differs from that of adult female in having 2 slender bare alpha-bristles. Pigmentation and 2nd endopodial joint similar to that of adult female.

Fifth Limb: Limb similar to that of adult female with following exceptions: 2nd endopodial joint with 2 pectinate ringed b′-bristles, and brown pigmentation more widely distributed (present proximal to endItes, and in 2nd endopodial joint, inner lobe of 3rd endopodial joint, and fused 4th and 5th joints). Endite bristles not counted but, in general, appearing similar to those of female.

Sixth Limb: With 3 bare epipodial bristles. Endites I–III similar to those of adult female; endite IV with 1 proximal and 5 terminal bristles. End joint with 9–11 bristles (1 anterior unringed with few short spines, 2 ringed with short spines, 4–6 ringed with long proximal and short distal spines, 2 plumose posterior longer than others). Brown pigmentation more widely distributed than in female limb. Hairs and spines on limb similar to those of adult female.

Seventh Limb: With total of 18 bristles: 6 in proximal group (2 on comb side, 4 on jaw side) each bristle with 4 or 5 bells; 12 bristles in distal group, all on terminal segment (6 on each side), each bristle with 1–6 bells. Comb and jaw similar to those of adult female.

Furca: USNM 194042: Left lamella with 7 claws, right with 8, otherwise similar to that of adult female.

Bellonci Organ (Figure 51*i*): Similar to that of adult female except without hairs.

Eyes: Medial eye (Figure 51*i*) and lateral eye similar to that of adult female, except latter with 27 ommatidia (Figure 51*h*).

Upper Lip (Figure 51*j,k*): Similar to that of adult female, except posterior paired part with small lateral process with 2 glandular openings on each side near posterior end; right side of USNM 194042 with additional minute process with 1 glandular opening just posterior to other lateral process.

Genitalia (Figure 51*l*): Copulatory lobes on each side of body anterior to furca.

Anterior of Body (Figure 51*j*): With triangular anterior process with rounded tip.

Posterior of Body: Evenly rounded, bare.

Y-*Sclerite* (Figure 51*l*): Similar to that of adult female.

COMPARISONS.—The carapace of *S. tenax* differs from that of *S. vivax* in being much smaller, in not having a projecting triangular caudal process, and in having a more rounded rostrum. In the key to species of *Skogsbergia* presented in Kornicker (1992a:59), *S. tenax* keys closest to *S. menezi* Kornicker, 1970:10, and *S. strophinx* Kornicker, 1991:12. It differs from those species in having many more bristles on the rostral infold (*S. strophinx* with about 14 bristles; *S. menezi* with about 16 bristles; *S. tenax* with about 60 bristles).

Rheina Kornicker, 1989

TYPE SPECIES.—*Rheina prex* Kornicker, 1989.

COMPOSITION.—The genus includes the type species and a new species described herein.

DISTRIBUTION.—*Rheina prex* was collected west of the Bay of Biscay at abyssal depths (Kornicker, 1989:46). The new species, *R. relax*, is from off Tasmania; the exact depth is unknown but it is not deeper than 478 m (see "Type Locality" below).

Rheina relax Kornicker, new species

FIGURES 52-54

ETYMOLOGY.—From the Latin *relax* (loosen, slacken, unbend).

HOLOTYPE.—NMV J40009, undissected ovigerous female in alcohol.

TYPE LOCALITY.—Slope 85, 41°52.87′S, 148°37.93′E to 41°59.56′S, 148°31.13′E, Tasmania, 37 km NE of Cape Tourville, Freycinet Peninsula; collected in 3 m Isaac-Kidd midwater trawl sample that hit bottom; bottom depth 124–478

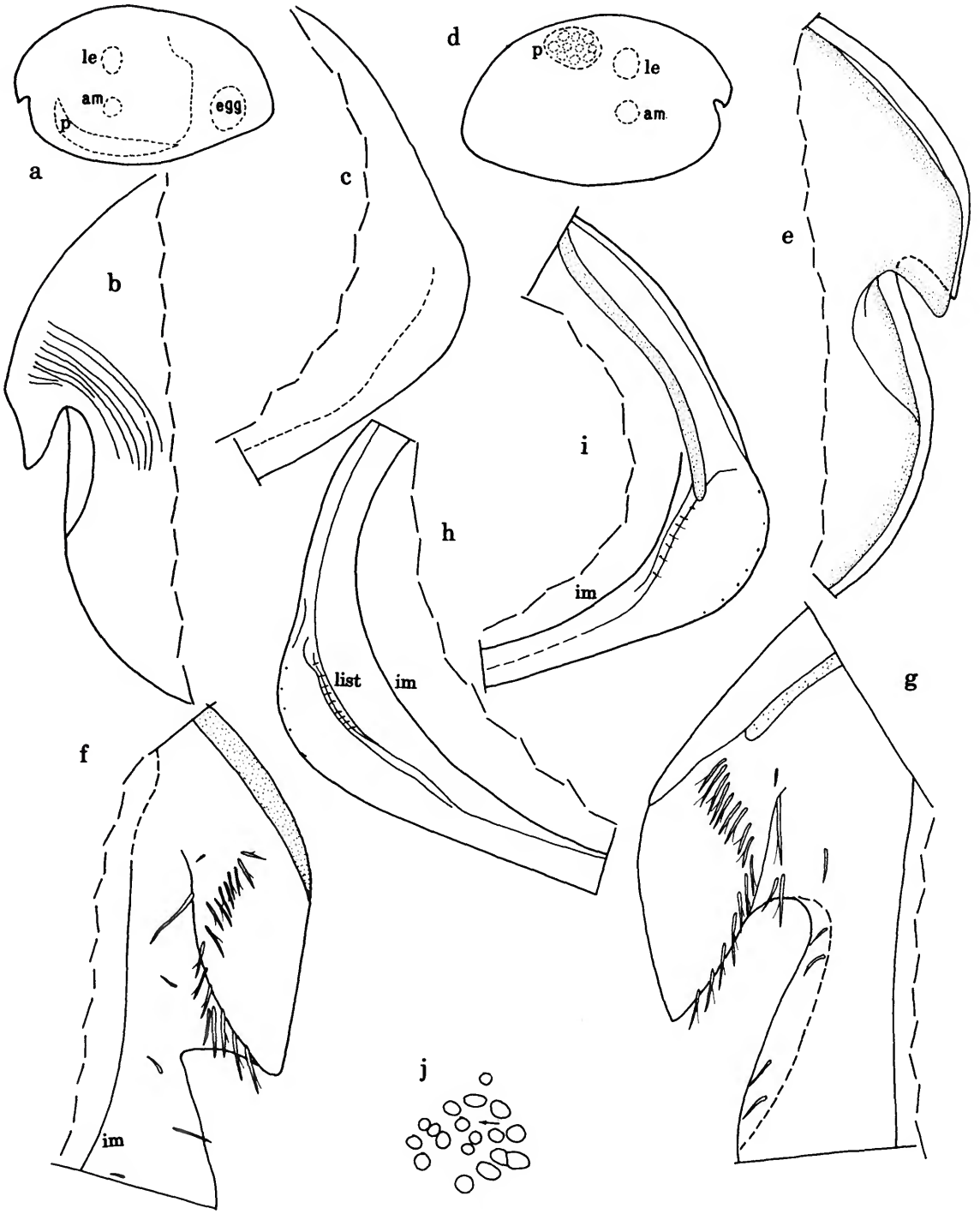


FIGURE 52.—*Rheina relax* Kornicker, new species, ovigerous female, paratype, USNM 194018: *a*, complete specimen, length 1.57 mm; *b,c*, anterior (showing surface ornamentation) and posterior, respectively, of left valve, ov. Adult female, paratype, USNM 194017: *d*, complete specimen showing parasitic copepod egg-sac within marsupium, length 1.67 mm; *e*, anterior of specimen showing both right (stippled) and left valves; *f,g*, anteriors of left and right valves, respectively, iv; *h,i*, posteriors of left and right valves, respectively, iv; *j*, central adductor muscle attachments left valve, ov.

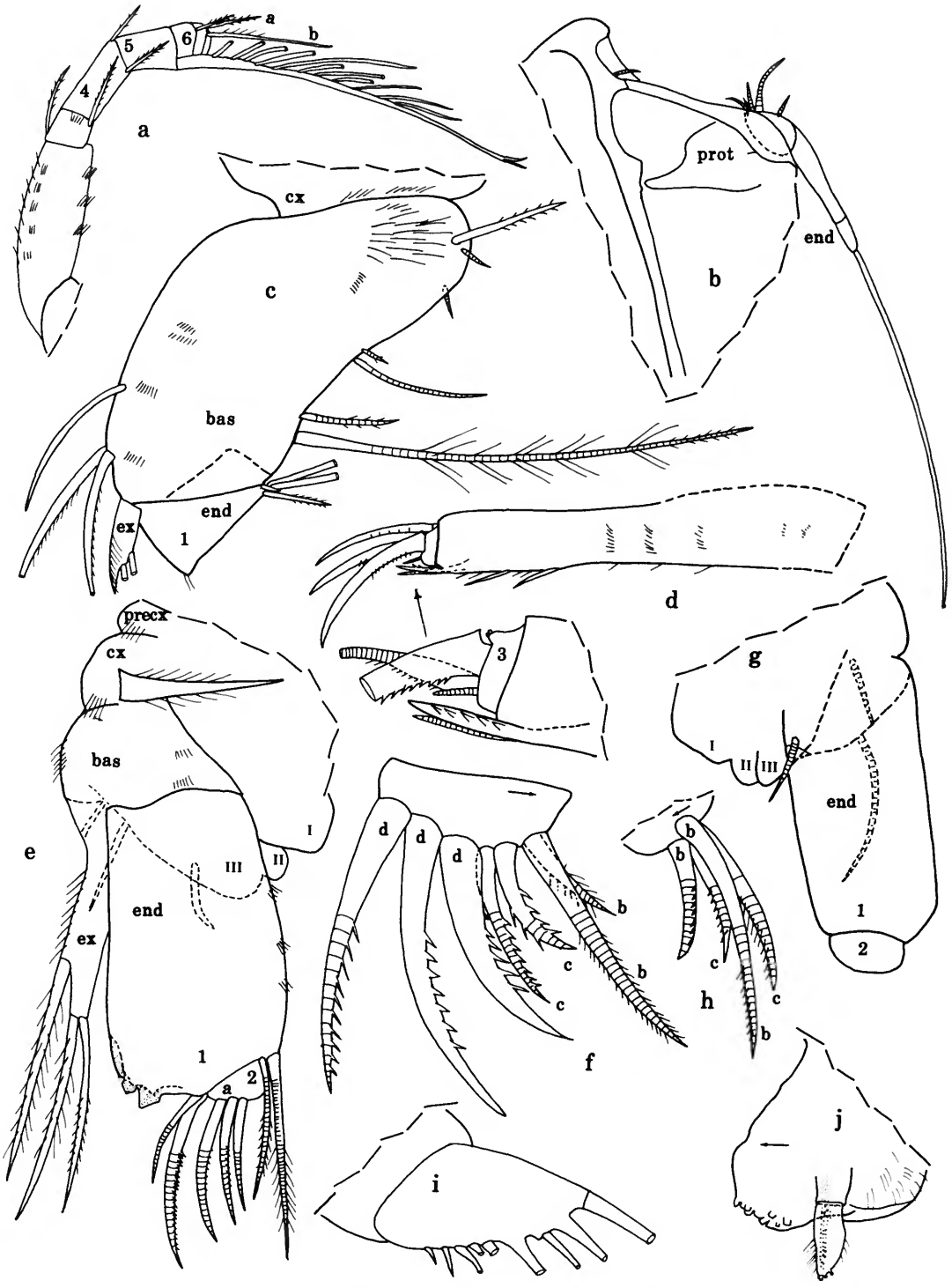


FIGURE 53.—*Rheina relax* Kornicker, new species, adult female, paratype, USNM 194017: *a*, left 1st antenna (nabs), mv; *b*, distal protopodite and endopodite left 2nd antenna, mv; *c*, part right mandible, mv; *d*, distal right mandible (nabs), mv; *e*, twisted right maxilla (nabs); *f*, 2nd endopodial joint right maxilla (nabs), lv; *g*, part left maxilla (nabs), lv; *h*, 2nd endopodial joint left maxilla (nabs), lv; *i*, left lamella furca, mv; *j*, upper lip, lv.

m. (Because only 1 species was collected (3 adult females plus 3 juveniles), it is likely that specimens came from the water column.)

PARATYPES.—Slope 21: 1 partly dissected A–2 juvenile in alcohol (length 1.07 mm, height 0.70 mm); 1 undissected A–2 juvenile in alcohol. Slope 85: USNM 194017, adult female with choniostomatid copepods, on slide and in alcohol; USNM 194018, partly dissected ovigerous female with cryptoniscid isopod in alcohol; NMV J17675, 1 undissected ovigerous female with torn shell in alcohol, lost, and 3 undissected juveniles in alcohol.

DISTRIBUTION.—Slope 21, 220 m. Slope 85, 124–478 m (see "Type Locality" above for comments on depth).

DESCRIPTION OF ADULT FEMALE (Figures 52–54).—Carapace elongate (Figure 52*a,d*); anterior edge of rostrum either straight (Figure 52*e*) or with slight concavity (Figure 52*b*); posterior end truncate (Figure 52*a,c*) or with very slight concavity at dorsal end of caudal process (Figure 52*h,i*).

Ornamentation: Carapace smooth but indistinct striations observed on some specimens just posterior to incisur (Figure 52*b*).

Infold: Infold of rostrum with well-defined list with 6 or 7 bristles along anterior half and 1 longer bristle near posterior end (Figure 52*f,g*); row of 9 bristles dorsal to rostral list and 1 small bristle posterior to row; 2 bristles near inner end of incisur and 1 bristle posterior to them; anteroventral infold and anterior 1/3 of ventral infold with row of about 30 closely spaced bristles; posterior 2/3 of ventral infold with row of about 16 widely spaced bristles; broad list of caudal process with row of 7–9 minute bristles near posterior edge (Figure 52*h,i*); no bristles posterior to broad list. Right valve with long bar with posterior end just dorsal to broad list of caudal process and anterior end at posterior juncture of hinge (Figure 52*g,i*).

Selvage: Lamellar prolongation of selvage broad and striate along lower margin of incisur, narrow and without striations elsewhere.

Central Adductor Muscle Attachments (Figure 52*j*): About 18 oval attachments.

Carapace Size (length, height in mm): Slope 85: NMV J40009 (holotype), 1.36, 0.86, height 63% of length; USNM 194017, 1.67, 1.05, height 63% of length; USNM 194018, 1.57, 0.96, height 61% of length; NMV J17675, torn specimen length about 1.6. Length range 1.36–1.67; height range 0.86–1.05; range of height as percent of length 61–63.

First Antenna (Figure 53*a*): 1st joint bare. 2nd joint spinous. 3rd joint short with indistinct medial spines and 2 spinous bristles (1 ventral, 1 dorsal). 4th joint with 2 spinous bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 8 long stout proximal filaments (only proximal part of most filaments shown), 3 shorter slender distal filaments, and bifurcate tip. 6th joint with short spinous medial bristle near dorsal margin. 7th joint: a-bristle longer than bristle of 6th joint, spinous; b-bristle about twice length of a-bristle, with 5 short proximal filaments; c-bristle with tip missing on both limbs of USNM 194017, remaining part longer than bristle of 5th joint, with 7 filaments (some with few spines). 8th joint: d-and e-bristles about twice length of b-bristle, bare with blunt tips; f-bristle long but with tip missing, 8 filaments (some with spines) on remaining part; g-bristle about 1/2 longer than bristle of 5th joint, with 10 filaments (some with spines) and bifurcate tip. (Only a- and b-bristles of 7th joint and no bristles of 8th joint shown.)

Second Antenna: Protopodite with short bare distal medial bristle (Figure 53*b*). Endopodite 3-jointed (Figure 53*b*): 1st joint with 4 proximal bristles (distal of these longer than others) and 1 short distal bristle; 2nd joint very long, bare; 3rd joint short with very long terminal filament. Exopodite: Joint 1 with few distal spines along dorsal margin; bristle of 2nd joint short, reaching 7th joint, ventral margin with 1 slender indistinct proximal spine and 7 stout pointed spines (spine 3rd from last longer than others); bristle of joint 3 long, with about 25 proximal ventral spines (proximal 14 of these fairly transparent), proximal dorsal hairs, and distal hairs on both margins; bristles of joints 4–8 long, with natatory hairs, no spines; 9th joint with 2 long bristles (dorsal of these shorter) with natatory hairs; joints 3–8 with small basal spines increasing in size on distal joints (spine of 8th joint about half length of 9th joint); 9th joint with lateral spine at distal dorsal corner (spine as long as joint); joints 2–8 with minute spines along distal edge; joint 2 also with few indistinct spines along ventral edge.

Mandible: Coxale endite spinous, bifurcate with 2 stout terminal prongs, with unringed bristle near base. Basale (Figure 53*c*): Ventral margin with 2 small a-bristles, 1 small lateral b-bristle, 2 c-bristles, and 2 d-bristles (1 very long); dorsal margin with 3 bristles (1 at distal 2/3, 2 subterminal); medial surface with long spines in proximal ventral corner and short indistinct spines near dorsal edge. Exopodite about same length as dorsal margin of 1st endopodial joint, hirsute distally, with 2 distal ventral bristles (proximal bristle more than twice length of other). 1st endopodial joint with 4 ventral bristles (2 long, 1 short, 1 minute); distal dorsal corner of joint with row of spines (Figure 53*c*). 2nd endopodial joint (Figure 53*d*): Spinous ventral margin with 2 single and 2 paired bristles; medial of paired bristles unringed, stouter than other and with 5 stout dorsal teeth; dorsal margin with about 17 bristles (9 short cleaning bristles with long spines, 1 short bare bristle, and 7 long bristles) (bristles not shown); medial surface with rows of spines. 3rd endopodial joint with 1 slender dorsal claw, 2 stout claws at midwidth, and 3 bristles (longest lateral and with somewhat broader proximal part (2 long bristles not shown in Figure 53*d*, but detail shows proximal part of longest bristle)).

Maxilla: Endite I with 8 spinous bristles (some with spear-like tips and some with triaenid-type tips); endite II with 4 spinous bristles; endite III with 1 proximal bristle (could be interpreted to be on basale) and 5 terminal spinous bristles. Precoxale and coxale with dorsal hairs (Figure 53*e*); coxale with stout hirsute dorsal bristle (Figure 53*e*). Bristles of basale obscured on mounted limbs of USNM 194017, but left limb

FIGURE 54.—*Rheina relax* Kornicker, new species, adult female, paratype, USNM 194017: *a*, part right 5th limb (nabs), av; *b*, part left 5th limb (nabs), pv; *c*, right 6th limb (area of brown pigment stippled), mv; *d*, 7th limb; *e*, dorsal part of anterior of body, lv; *f*, medial eye and Bellonci organ, lv; *g*, left lateral eye, lv; *h*, posterior of body, lv.

interpreted to have 2 bristles (1 long, 1 short) (Figure 53*g*) and right limb with 1 short bristle (Figure 53*e*). Exopodite well developed, hirsute, with 1 plumose proximal bristle and 2 terminal bristles (middle plumose, other with indistinct short hairs) (Figure 53*e*). 1st endopodial joint; cutting tooth with 3 cusps (Figure 53*e*) (cusps not shown in Figure 53*g*); dorsal margin spinous, with 2 spinous alpha-bristles; ventral margin with 2 beta-bristles (medial bristle stout pectinate, lateral bristle

shorter slender bare) (Figure 53*e*). 2nd endopodial joint with 3 a-bristles (inner 2 pectinate, outer bare) (Figure 53*e*), 2 spinous b-bristles (1 more than twice length of other), 2 pectinate c-bristles, and 3 pectinate d-bristles (posterior ringed, 2 others unringed, claw-like) (Figure 53*f,h*). (Right limb twisted (Figure 53*e*).)

Fifth Limb: 3 endites with spinous and pectinate bristles (not all shown in Figures 54*b*). Protopodite with short lobate sclerotized anterior tooth (Figure 54*a*). 1st exopodial joint: anterior side with row of 3 bristles (with long proximal hairs) plus 1 bristle with long proximal hairs closer to protopodial tooth (Figure 54*a*); main tooth with smooth triangular proximal tooth and 6 pectinate teeth (Figure 54*b*); bristle with long proximal hairs proximal to smooth tooth. 2nd exopodial joint: with 3 pectinate a-bristles (smallest bristle weakly ringed, others unringed), 6 ringed pectinate b-bristles (only 2 b-bristles shown), 1 stout c-bristle with long proximal and short distal spines (Figure 54*b*), and 1 stout d-bristle with long proximal hairs (Figure 54*a*). 3rd exopodial joint (Figure 54*a*): Inner lobe with short proximal bristle with long proximal hairs, and 2 terminal bristles with short hairs; outer lobe hirsute, with 2 terminal bristles (outer with long proximal and short distal spines, inner with few indistinct short hairs). 4th and 5th exopodial joints fused, hirsute, each estimated joint with 2 bristles; short slender process with terminal spines present between estimated joints (Figure 54*a*).

Sixth Limb (Figure 54*c*): With 4 bare epipodial bristles. Endite I with 2 short medial and 1 long terminal bristle; endite II with either 1 short medial and 3 terminal bristles (middle bristle short, with base on medial side of edge) (Figure 54*c*), or 2 short medial and 2 long terminal bristles; endite III with 1 medial and 3 terminal bristles; endite IV with 1 medial and 2 terminal bristles; all endite bristles spinous. End joint with 7 anterior bristles (with 1 wreath of long proximal spines and short distal spines) followed by 1 bristle (with many long proximal and short distal spines) and 2 plumose bristles. Medial side of limb hirsute (not all hairs shown); lateral side of end joint with long stiff spines. Limb with brown pigment indicated by stippling in illustration.

Seventh Limb (Figure 54*d*): Limb with 15–17 bristles: 2–4 proximal and 6 terminal on comb side; 4 proximal and 3 terminal on jaw side; bristles with 1–5 bells. Comb with 11 teeth (3 long teeth in middle, 2 shorter narrow teeth (with indistinct marginal spines) and 2 short broad flat-tipped teeth on each side); a short sclerotized prong with 3 minute teeth located along inner side of comb (detail in illustration). A sclerotized jaw with about 14 teeth (2 large and about 5 small along each edge) just proximal to inner bristles at base of comb.

Furca (Figure 53*i*): Right lamella anterior to left by width of base of claw 1; each lamella with 9 claws; claw 3 slenderer than claw 4 but about same length; claws 2 and 4 nonarticulated; all claws with teeth along posterior margins (not shown). (Illustrated furca with most claws broken.)

Bellonci Organ (Figure 54*e,f*): Short, cylindrical, with triangular tip with small terminal process.

Eyes: Medial eye small, bare, with brown pigment (stippled) (Figure 54*e,f*). Lateral eye large, about 3 times size of medial eye, with about 24 ommatidia and brown pigment (stippled) between ommatidia (Figure 54*g*).

Upper Lip (Figure 53*j*): Anteroventral unpaired part with fairly large glandular processes; paired tusks well developed, each with proximal pedestal, 3 or 4 glandular openings near tip, and with long hairs along anterior and posterior edges; posterior lobes of lip evenly rounded, hirsute.

Genitalia (Figure 54*h*): Unusually large lobe with attached spermatophore on each side of body just anterior to furca.

Anterior of Body (Figure 54*e*): With rounded anterior process between medial eye and upper lip.

Posterior of Body (Figure 54*h*): Evenly rounded, bare.

Y-*Sclerite:* Typical for subfamily (only posterior end shown in Figure 54*h*).

Eggs: Holotype with 8 eggs in marsupium, length of typical egg 0.29 mm; USNM 194018 with 8 eggs (length of typical egg including transparent vellum 0.31 mm; length without vellum 0.28 mm) (1 egg shown in Figure 52*a*); NMV J17675, torn specimen with 1 egg in marsupium (some may have been lost), length with vellum 0.33 mm, length without vellum, 0.27 mm.

Parasites: USNM 194017 with choniostomatid copepods in marsupium: 1 female, 1 copepodite, and 14 egg sacs (some egg sacs with fairly well-developed copepodites, others with round eggs (Figure 52*d*)); USNM 194018 with 1 male or juvenile cryptoniscid isopod within ostracode carapace (ventral side of isopod adjacent to ventral part of body of ostracode; anterior end of isopod pointing anteriorly (Figure 52*a*)).

COMPARISONS.—*Rheina relax* differs from *R. prex* in having a lateral eye, in having both claws 2 and 4 of furca unarticulated, in having a jaw on the 7th limb, and in having only 2 bristles on the 9th exopodial joint of the 2nd antenna.

AZYGOCYPRIDININAE Kornicker, 1970

This subfamily includes two genera, *Azygocypridina* Sylvester-Bradley, 1950, and *Isocypridina* Kornicker, 1975; both genera are in the collection.

Azygocypridina Sylvester-Bradley, 1950

TYPE SPECIES.—*Crossophorus imperator* Brady, 1880:158, by monotypy.

COMPOSITION.—Only 1 species is known from Australia, *A. lowryi* Kornicker, 1985:698.

DISTRIBUTION.—Genus cosmopolitan, but not known from Arctic waters, reported between depths of 139 m (Kornicker, 1985:698) and 2930 m (Athersuch, 1980:139).

Azygocypridina lowryi Kornicker, 1985

FIGURE 55

Azygocypridina lowryi Kornicker, 1985:698, figs. 1, 2; 1994, fig. 110pp.

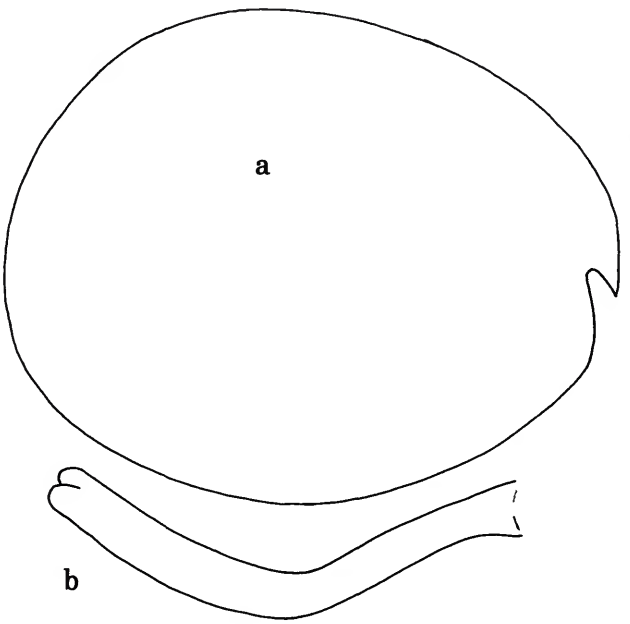


FIGURE 55.—*Azygocypridina lowryi* Kornicker, 1985, instar III, NMV J35971: *a*, complete specimen, length 4.3 mm; *b*, 7th limb.

HOLOTYPE.—Adult female, Australian Museum, Sydney, N.S.W., Register number P25023.

TYPE LOCALITY.—Off Sydney, N.S.W.; 33°52′18″S, 151°40′E; depth 200 m; BMR sta 1651, M.V. *San Pedro Strait.*

MATERIAL.—Slope 1: NMV J35969, 22 specimens including adult females and juveniles. Slope 5: NMV J35970, 1 undissected specimen in alcohol (length 8.0 mm, height 6.5 mm). Slope 32: NMV J35971, 1 instar III female in alcohol.

DISTRIBUTION.—Previously collected at depths of 139–365.8 m in the Tasman Sea off N.S.W. and Queensland, Australia (Kornicker, 1985:699). Present collection: Slope 1, 204 m; Slope 5, 800 m; Slope 32, 1000 m. Known depth range 139–1000 m.

SUPPLEMENTARY DESCRIPTION OF INSTAR III FEMALE (Figure 55).—Carapace oval in lateral view with small incisur (Figure 55*a*).

Carapace Size (length, height in mm): Slope 32: NMV J35971, 4.3, 3.5, height 81% of length.

Second Antenna: Endopodite: Joint 1 with 3 bristles; joint 2 with 1 bristle; joint 3 with long terminal filament. Exopodite: 9th joint with 6 bristles.

Maxilla: 1st endopodial joint with 3 slender alpha-bristles and 2 beta-bristles (inner slender spinous, outer stout pectinate). 2nd endopodial joint with 4 a-bristles, 2 pectinate b-bristles, 2 slender pectinate c-bristles, and 3 pectinate d-bristles.

Fifth Limb: Main tooth of 1st exopodial joint with proximal spinous bristle, smooth triangular tooth, and 3 stout pectinate teeth. Inner lobe of 3rd exopodial joint separated from 4th joint, with 5 bristles; outer lobe of 3rd exopodial joint with 2 bristles. 4th exopodial joint separated from 5th joint by marginal indentation and thin suture, with 3 bristles. 5th exopodial joint forming 2 lobes; proximal lobe with 2 bristles; distal lobe with 6 bristles.

Sixth Limb: Well developed with numerous bristles.

Seventh Limb (Figure 55*b*): Elongate, bare.

Furca: Each lamella with 13 claws.

REMARKS.—Exopodite of 2nd antenna unusual in having 6 bristles on 9th joint. Exopodite of 2nd antenna of instar III female described by Kornicker (1985:703) has only 4 bristles on 9th joint. The presence of 2 rather than 4 bristles on the outer lobe of the 3rd exopodial joint of the 5th limb, and the bilobed 5th exopodial joint of the same limb identifies the specimen as *Azygocypridina* rather than *Isocypridina,* which bears 4 bristles on the outer lobe of the 3rd joint, and has a single-lobed 5th joint.

Isocypridina Kornicker, 1975

TYPE SPECIES.—*Isocypridina quatuorsetae* Kornicker, 1975, by monotypy (Kornicker, 1975:207).

COMPOSITION.—The new species described herein, which is the second known species in the genus, is the first from the vicinity of Australia.

DISTRIBUTION.—Previously recorded from the American Quadrant in Subantarctic and Antarctic Regions (50°33′S to 59°10′S at bathyal and abyssal depths (248–3170 m) (Kornicker, 1975:222). The present occurrence in the vicinity of Australia extends the range northward to 38°40.29′S.

Isocypridina fallax, Kornicker, new species

FIGURES 56, 57

ETYMOLOGY.—From the Latin *fallax* (deceitful, false).

HOLOTYPE.—NMV J35984, undissected adult male in alcohol.

TYPE LOCALITY.—Slope 66, 38°40.29′S, 149°18.6′E, Victoria, 96 km S of Point Hicks; depth 2900 m.

PARATYPES.—Slope 66: USNM 193954, 1 ovigerous female on slide and in alcohol; USNM 193956, 1 adult male on slide and in alcohol; USNM 193957, 1 instar III (sex unknown); NMV J35985, 10 undissected juveniles in alcohol (3 instar I, 2 instar II, and 5 later instars); NMV J35986, 1 ovigerous female.

DISTRIBUTION.—Slope 66, 2900 m.

DESCRIPTION OF ADULT FEMALE (Figures 56, 57*a–i*).—Carapace oval in lateral view with small incisur (Figure 56*a*).

Central Adductor Muscle Attachments: Some of the attachments on the right valve of USNM 193954 as seen through the valve are shown in Figure 56*b*.

Carapace Size (length, height in mm): Slope 66: USNM 193954, 6.0, 4.7, height 78% of length; NMV J35986, ovigerous female, 6.0, 4.9, height 82% of length.

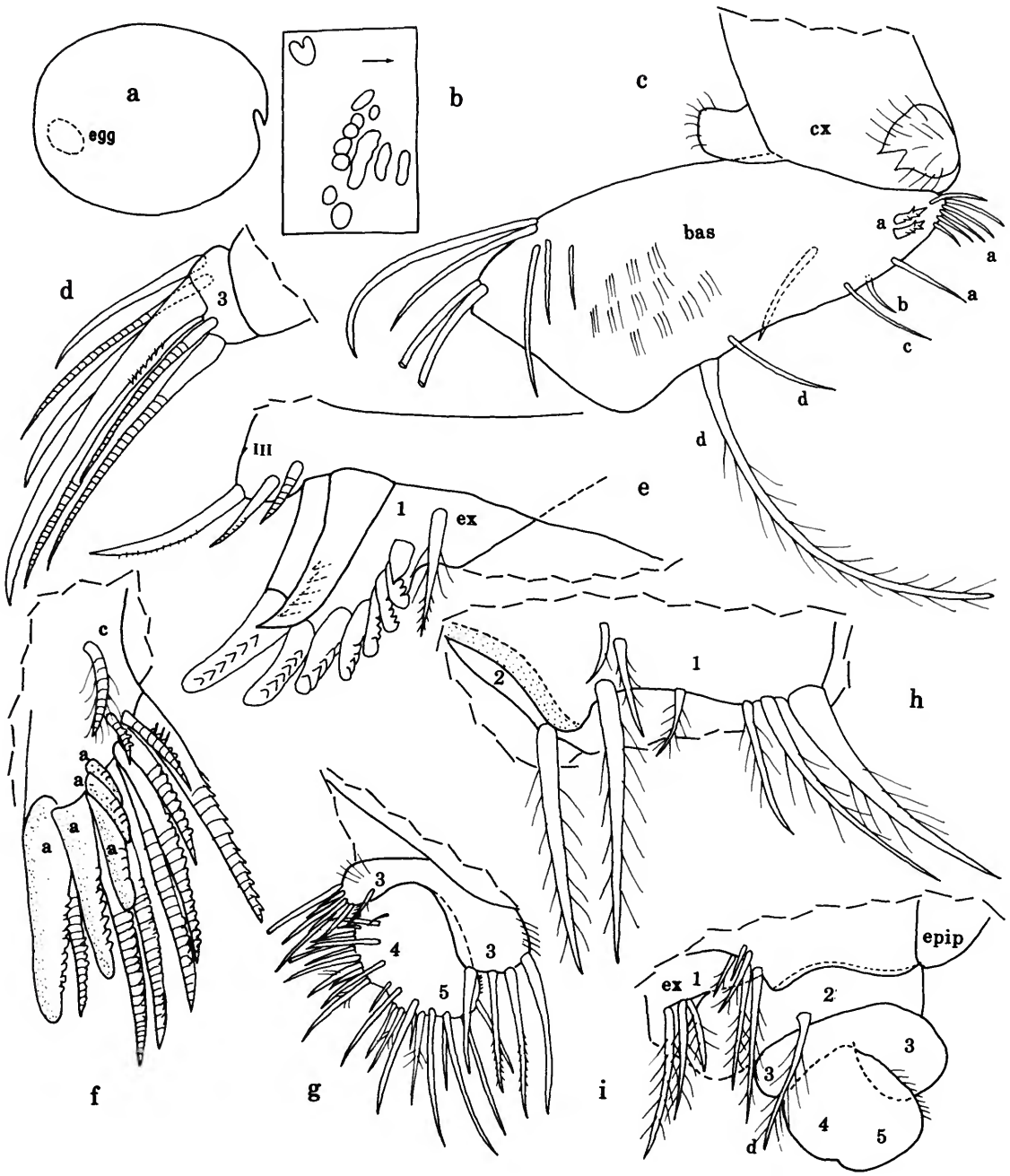


FIGURE 56.—*Isocypridina fallax* Kornicker, new species, ovigerous female, paratype, USNM 193954: *a*, complete specimen, length 6.0 mm; *b*, central adductor muscle attachments right valve (not all shown), ov; *c*, proximal right mandible, mv; *d*, 3rd endopodial joint right mandible, mv; *e,f,g*, parts right 5th limb, pv; *h*, part right 5th limb, av; *i*, part left 5th limb, av.

First Antenna: 1st joint bare. 2nd joint with ventral spines and 11 or 12 bristles (8 dorsal, 1 lateral, and 2 or 3 ventral). 3rd joint with 6 dorsal bristles and 1 subterminal ventral bristle. 4th joint trapezoidal, with 10 terminal bristles (4 dorsal, 6 ventral). Stout sensory bristle of 5th joint with numerous long proximal and short distal filaments. Medial bristle of short 6th joint about

same length as combined lengths of joints 5–8 measured along dorsal edge. 7th joint: a-bristle straight, spine-like, ringed, about same length as bristle of 6th joint; b-bristle stout, shorter than bristle of 5th joint, with numerous short filaments; c-bristle slenderer than b-bristle, about twice length of bristle of 5th joint, with numerous short marginal filaments. 8th joint: d-and e-bristles bare: d-bristle about half diameter of e-bristle and less than $^2/_3$ its length; e-bristle longer than b-bristle; f- and g-bristles slightly longer than c-bristle, with numerous filaments.

Second Antenna: Protopodite with distal medial bristle. Endopodite 3-jointed: 1st joint with 8 bristles (5 proximal, 3 distal); 2nd joint with distal ventral bristle; 3rd joint with long terminal filament. Exopodite: Bristle of 2nd joint reaching well past 9th joint, with natatory hairs (ventral hairs stouter than dorsal hairs); bristles of joints 3–8 and 8 bristles of 9th joint with natatory hairs (2 dorsal bristles of 9th joint short); joints 3–8 with basal spines (spine of 8th joint longer than 9th joint); 9th joint with 1 or 2 lateral spines (longest about half length of joint); joints 2–7 with minute terminal spines at distal dorsal corner.

Mandible: Coxale endite spinous with 2 stout terminal prongs; dorsal margin of coxale with hirsute short thumb-like process (Figure 56*c*). Basale (Figure 56*c*): Lateral side with proximal bristle; ventral margin with 8–10 a-bristles (2 stout pectinate, 6–8 slender), 1 small b-bristle with base on lateral side, 1 short c-bristle, and 2 d-bristles (proximal short slender, distal long stout with long spines except for short spines near tip (tip not shown)); dorsal margin with 5 bristles (some on medial surface) at distal $^2/_3$, and 2 subterminal; medial surface spinous. Exopodite reaching beyond 1st endopodial joint, with spinous tip and 2 short subterminal bristles (proximal about $^1/_3$ longer than distal). 1st endopodial joint with 4 long bristles (1 with long spines) and 2 small ventral bristles. 2nd endopodial joint: Dorsal margin with abundant bristles; ventral margin with 6 distal bristles. 3rd endopodial joint with short dorsal claw, 2 unequal longer claws with proximal ventral teeth, and 4 ringed bristles (Figure 56*d*).

Maxilla: Endite I with about 21 spinous bristles (4 minute medial); endite II with 7 spinous bristles; endite III with 5 bristles along anterior margin (ventral of these long stout with long spines) and 6 terminal bristles. Coxale with stout plumose dorsal bristle and crescents of short dorsal spines. Basale: anterior margin with 5 distal bristles extending onto medial surface; posterior margin with long terminal bristle with long proximal and short distal spines. Exopodite well developed, hirsute, with short proximal bristle with long spines, and 2 long bare terminal bristles. 1st endopodial joint with dorsal spines, smooth narrow cutting tooth, 7 bare alpha-bristles, and 4 beta-bristles (outer stout pectinate, others shorter, slender, bare). 2nd endopodial joint with 6 bare ringed a-bristles, 4 pectinate ringed b-bristles, 4 pectinate ringed c-bristles, and 3 stout pectinate d-bristles (inner 2 unringed claw-like).

Fifth Limb: Epipodite with 88 plumose bristles. Endites I–III with numerous bristles (not all bristles of endite III shown in Figure 56*e*). Protopodite without anterior tooth but with anterior knob at midwidth, with 3–5 bristles adjacent to inner edge (Figure 56*h,i*). 1st exopodial joint: Main tooth with proximal spinous bristle, smooth triangular peg with small terminal spine, and 7 pectinate teeth (Figure 56*e*); anterior side with 3 adjacent bristles with long hairs (Figure 56*h,i*); right limb of USNM 193954 with additional small bristle closer to knob of protopodite (Figure 56*h*). 2nd exopodial joint with 5 pectinate unringed a-bristles, 9 pectinate ringed b′- plus b″-bristles, 1 short posterior c-bristle with few long proximal hairs (Figure 56*f*), and 1 long anterior d-bristle with long hairs (Figure 56*i*). 3rd exopodial joint (Figure 56*g*): Inner lobe not fused to 4th, hirsute with 8 bristles; outer lobe hirsute with 4 bristles. 4th and 5th exopodial joints separated by indentation in outer margin; 4th joint with 12 bristles (Figure 56*g*); 5th joint with hairs along outer edge and 12 bristles (Figure 56*g*).

Sixth Limb (Figure 57*a*): With 5 plumose epipodial bristles. Endite I with 4 bare medial bristles and 4 spinous terminal bristles; endite II with 4–6 bare medial bristles and about 12 spinous terminal bristles; endite III with 13 bristles (some bare); endite IV with about 20 bristles (some bare). End joint hirsute, with small posteroventral lobe with 7–9 bristles (most with long proximal and short distal spines); ventral margin of joint anterior to lobe with about 53 bristles (most long bristles with long spines at midlength and small spines distally; short bristles bare). (Only epipodial bristles and bristles of posteroventral lobe of end joint shown.)

Seventh Limb: Limb with about 165 bristles (about 63 terminal, 102 proximal); some bristles long and stout with as many as 10 bells, others short and slender with as few as 2 bells. Terminal comb with about 13 spinous teeth with short medial branch (Figure 57*b,c*); side opposite comb with tooth similar to those of comb but shorter, and short spinous peg on margin inward from tooth (Figure 57*b*).

Furca (Figure 57*d*): Each lamella with 27–29 claws. USNM 193954: Starting with claw 2, claws arranged in 5 or 6 groups, as follows:

	No. of claws in each group					
	I	II	III	IV	V	VI
Left lamella	3	2	2	2	2	17
Right lamella	4	2	2	2	16	0

Bellonci Organ (Figure 57*i*): Small unpigmented.

Lateral Eye (Figure 57*e*): Hirsute flap without ommatidia.

Upper Lip (Figure 57*f–h*): Narrow, vertical, anterior, glandular field just dorsal to 2 ventral lobes; each lobe with circular lateral glandular field; a Y-shaped sclerite forms boundary around lateral field. USNM 193954 with area of brown pigment slightly posterior to midpoint of lateral field (stippled in Figure 57*f*).

Genitalia: None observed.

Anterior of Body (Figure 57*f*): Low rounded process

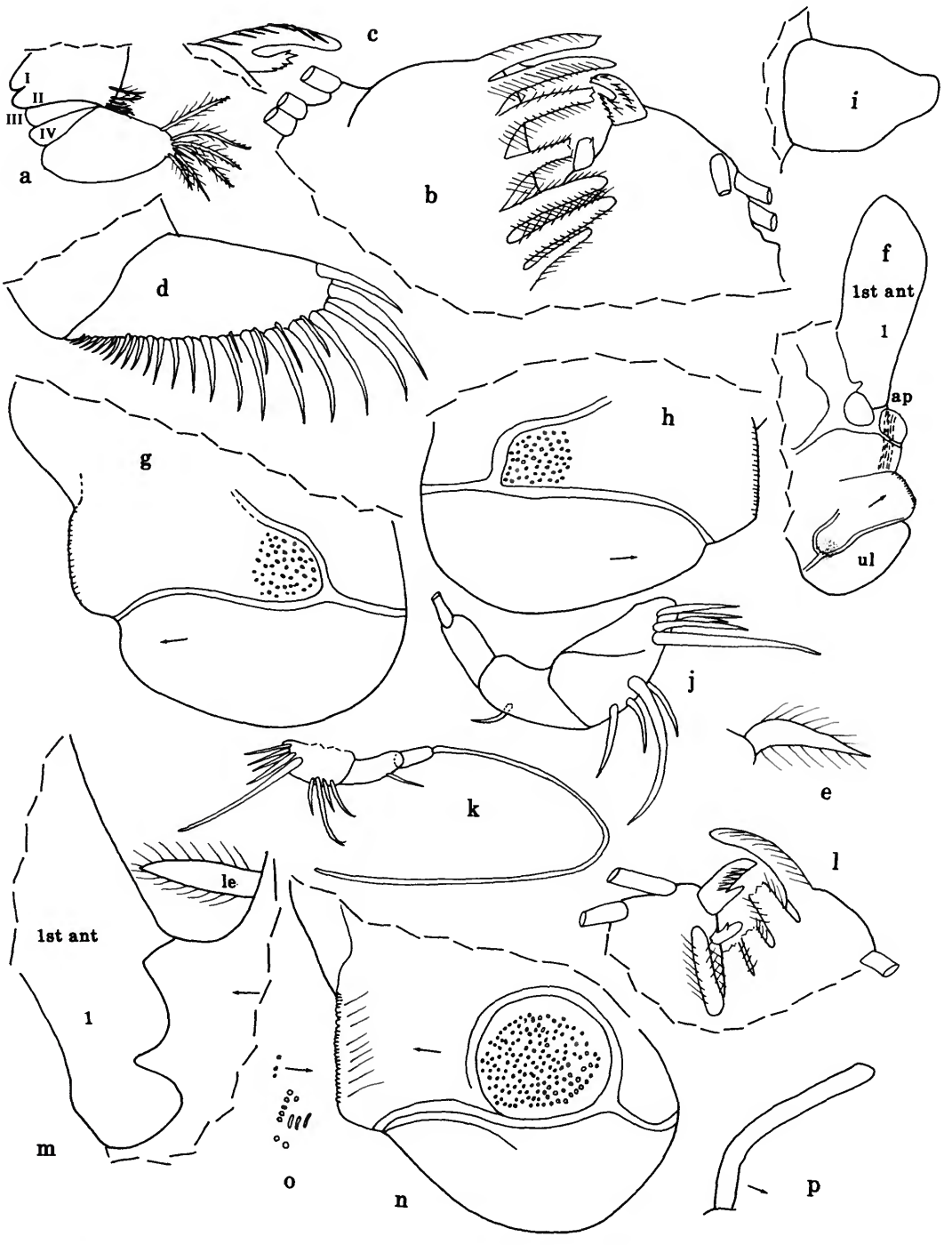


FIGURE 57.—*Isocypridina fallax* Kornicker, new species, ovigerous female, paratype, USNM 193954: *a*, right 6th limb (nabs), mv; *b*, tip 7th limb (nabs); *c*, tooth near middle of row of comb teeth showing short inner branch; *d*, right lamella furca, lv; *e*, right lateral eye, anterior to right; *f*, anterior of body (area of brown pigment in upper lip stippled); *g,h*, left and right views, respectively, of upper lip (in natural position), lv; *i*, Bellonci organ, anterior to right. Adult male, paratype, USNM 193956, length 5.2 mm: *j,k*, endopodites left and right 2nd antennae, respectively, mv; *l*, tip 7th limb (nabs); *m*, dorsal part of anterior of body showing left lateral eye; *n*, upper lip, lv; *o*, central adductor muscle attachments right valve, ov. Instar III, paratype, USNM 193957, length 2.47 mm: *p*, right 7th limb.

between upper lip and Bellonci organ.

Posterior of Body: Evenly rounded and with long hairs; no hairs observed on slightly protruding posterodorsal corner.

Y-*Sclerite:* Without ventral branch.

Eggs: Slope 66: USNM 193954 with 8 well-developed eggs; length of 1 egg 0.93 mm (location of 1 egg shown in Figure 56*a*). NMV J35986, unopened specimen with about 17 eggs (number estimated through shell). (The length of an egg of the holotype (USNM 136174) of *I. quatuorsetae* was measured during this study and found to be 0.93 mm.)

DESCRIPTION OF ADULT MALE (Figure 57*j–o*).—Carapace similar in shape to that of adult female.

Central Adductor Muscle Attachments: Some attachments of right valve as seen through valve shown in Figure 57*o*.

Carapace Size (length, height in mm): USNM 193956 and holotype: 5.2, 4.3, height 83% of length.

First Antenna: 1st joint bare. 2nd joint with ventral spines, 8 dorsal bristles, 1 lateral bristle, and 2 ventral bristles. 3rd joint with 5 or 6 dorsal bristles and 1 subterminal ventral bristle. 4th joint trapezoidal, with 4 terminal dorsal bristles and 5 or 6 terminal ventral bristles. Bristles of 5th and 6th joints similar to those of adult female. 7th joint: a-bristle similar to that of adult female except bearing short spines; b-bristle slightly shorter than bristle of 5th joint, with 15 filaments with spoon-shaped tips and several short terminal filaments with plain tips (proximal spoon-tipped filaments shorter than distal spoon-tipped filaments); c-bristle about twice length of bristle of 5th joint, with 18 or 19 filaments with spoon-tips and about 9 distal filaments with plain tips (proximal spoon-tipped filaments shorter than distal spoon-tipped filaments). 8th joint: Bristles similar to those of adult female.

Second Antenna: Protopodite and exopodite similar to those of adult female. Endopodite 3-jointed (Figure 57*j,k*): 1st joint with 9 bristles (5 proximal, 4 distal); 2nd and 3rd joints similar to those of adult female.

Mandible: Coxale, bristles of lateral side and ventral margin of basale, medial spines of basale, exopodite, and 1st and 3rd endopodial joints similar to those of adult female. Dorsal margin of basale with 6 bristles at distal $^2/_3$ and 2 subterminal. 2nd endopodial joint with abundant bristles on dorsal margin and 6 or 7 distal bristles on ventral margin.

Maxilla: Endite bristles not counted. Basale, exopodite, and 2nd endopodial joint similar to those of adult female. 1st endopodial joint with 7 bare alpha-bristles and 3 beta-bristles (outer stout pectinate, inner 2 short, slender, bare).

Fifth Limb: Epipodite with 73 bristles but some could be missing. Protopodite with 4 or 5 bristles adjacent to anterior knob. 1st exopodial joint: Anterior side with 3 adjacent bristles similar to those of adult female; main tooth differs from that of adult female in having 6 pectinate teeth. 2nd exopodial joint similar to that of adult female, except right limb of USNM 193956 with only 8 b′- plus b″-bristles. Inner lobe of 3rd exopodial joint not fused to 4th exopodial joint, hirsute, with 7 bristles; outer lobe hirsute, with 4 bristles. 4th joint separated from 5th by indentation in outer margin, with 12 or 13 bristles. 5th joint with hairs along outer margin and 8 bristles.

Sixth Limb: With 5 plumose epipodial bristles. Endite I with 2 short bare medial and 3 long spinous terminal bristles; endite II with 4 bare medial bristles and 8 additional bristles (some bare); endite III with 12 bristles (some bare); endite IV with 13 or 14 bristles (some bare). End joint hirsute, with small posteroventral lobe with 5 or 6 long bristles with long proximal and short distal spines; ventral margin of joint anterior to lobe with about 54 bristles (most long bristles with long spines at midlength and short spines distally; short bristles bare).

Seventh Limb: Limb with about 114 bristles (about 64 terminal, 50 proximal); bristles similar to those of adult female. Terminal comb with 9 spinous teeth similar to those of adult female; side opposite comb similar to that of adult female (Figure 57*l*).

Furca: Same type as that of adult female, with 27 or 28 claws. USNM 193956: Starting with claw 2, claws arranged in 6 or 7 groups, as follows:

	No. of claws in each group						
	I	II	III	IV	V	VI	VII
Left lamella	2	2	2	2	2	2	15
Right lamella	2	2	2	2	2	16	0

Bellonci Organ and Lateral Eye (Figure 57*m*): Similar to those of adult female.

Upper Lip (Figure 57*n*): Similar to that of adult female except sclerite around lateral glandular field circular. USNM 193956 without brown pigment observed on adult female (USNM 193954).

Genitalia: Similar to that of *I. quatuorsetae* illustrated by Kornicker (1975, fig. 126).

Anterior and Posterior of Body, and Y-*Sclerite:* Similar to those of adult female.

DESCRIPTION OF INSTAR III (sex unknown) (Figure 57*p*).—Shape of carapace similar to that of adult female.

Carapace Size (length, height in mm): USNM 193957, 2.47, 1.93, height 78% of length.

Second Antenna: Protopodite with fairly long distal medial bristle. Endopodite 3-jointed: 1st joint with 2 short bristles; 2nd joint with 1 distal bristle; 3rd joint with long terminal filament. Exopodite: 9th joint with 4 bristles.

Fifth Limb: 1st exopodial joint: Main tooth with proximal spinous bristle, triangular smooth tooth, and 3 stout pectinate teeth. Inner lobe of 3rd exopodial joint distinctly separated from 4th exopodial joint; outer lobe with 4 bristles. 4th and 5th exopodial joints fused, with shallow indentation on outer edge between joints.

Sixth Limb: Well developed, with many bristles.

Seventh Limb (Figure 57*p*): Elongate without bristles.

COMPARISONS.—The adult 5th limb of *I. fallax* differs from that of *I. quatuorsetae* in not having the inner lobe of the 3rd

exopodial joint fused to the 4th exopodial joint. The carapace of *I. fallax* is smaller than that of *I. quatuorsetae* (length of female *fallax* 6.0 mm, length of female *quatuorsetae* 8.0 mm; length of male *fallax* 5.2 mm, length of male *quatuorsetae* 7.0 mm).

CYLINDROLEBERIDIDAE Müller, 1906

The Cylindroleberididae include three subfamilies: Cylindroleberidinae, Cyclasteropinae, and Asteropteroninae. All have been reported from the vicinity of Australia (Kornicker, 1981:18) and are represented in the present collection.

CYLINDROLEBERIDINAE Müller, 1906

The Cylindroleberidinae are represented in the collection by nine genera: *Archasterope, Parasterope, Skogsbergiella, Homasterope, Bathyleberis, Synasterope, Domromeus, Xenoleberis* (new genus in Kornicker, 1994), and *Xandarasterope*, new genus.

Parasterope Kornicker, 1975

Parasterope Poulsen, 1965:361 [nomen nudum].—Kornicker, 1975:401.

TYPE SPECIES.—*Asterope muelleri* Skogsberg (by Kornicker, 1975a:401).

COMPOSITION.—Only four species of *Parasterope* are known from the vicinity of Australia, *P. sequax, P. lux, P. physinx*, and *P. whatleyi*, all new species, herein.

DISTRIBUTION.—Members of the genus are cosmopolitan between latitudes of 55°N to 65°S with a depth range of intertidal depths to 4303 m (Kornicker, 1989:90).

REMARKS.—For comparative purposes I examined a paratype of *Parasterope micrommata* Kornicker, 1975:419, from 112–124 m near Macquarie Island, and have illustrated herein the female 1st antenna (Figure 60).

Key to Species of *Parasterope* in Vicinity of Australia

1. Lateral eyes well developed with about 17 ommmatidia . . ***P. physinx,*** new species
   Lateral eyes small or lacking 2
2. Lateral eye pigmented, visible through shell . . . . . ***P. lux,*** new species
   Lateral eye either lacking or not visible through shell 3
3. 7th limb with cone-shaped tip; gills poorly developed . . ***P. whatleyi,*** new species
   7th limb with usual convex tip; gills well developed . . . . ***P. sequax,*** new species

Parasterope sequax Kornicker, new species

FIGURES 58, 59, 61*m*

ETYMOLOGY.—From the Latin *sequax* (following, follower, attendant).

HOLOTYPE.—NMV J36007, undissected adult female in alcohol (a small ostracode present inside marsupium of holotype).

TYPE LOCALITY.—Slope 27, 38°25.00′S, 149°00.00′E, Victoria, S of Point Hicks; depth 1500 m.

PARATYPES.—Slope 27: USNM 193863, dissected ovigerous female on slide and in alcohol; NMV J36008, specimen 1, partly dissected ovigerous female in alcohol; NMV J36009, 2 undissected adult females and 3 late juveniles in alcohol. Slope 67: NMV J36010, partly dissected ovigerous female in alcohol.

DISTRIBUTION.—Slope 27, 1500 m. Slope 67, 1277 m.

DESCRIPTION OF ADULT FEMALE (Figures 58, 59).—Carapace pear-shape in lateral view (Figures 58*a*, 59*d*).

Infold: Rostral infold with about 15 bristles along list, about 125 bristles dorsal to list, and about 20 bristles between list and incisur, all bristles with single pointed tips. Anteroventral infold with about 70 bristles between list and valve edge. Narrow list, with anterior end ventral to incisur, continuing along ventral margin then broadens along posteroventral corner of valve. Ventral infold with about 20 bristles forming row between list and valve edge (posterior bristle in row lies adjacent to anterior end of broad posteroventral list). Broad posteroventral list with 33–38 wide flat triangular diaphanous bristles; bases of diaphanous bristles with tubular pores; row of 19 bristles (not more than 1 or 2 bristles between each pair of diaphanous bristles, and no bristles between ventral 11 or 12 diaphanous bristles) slightly closer to anterior edge of broad list than diaphanous bristles. Posteroventral infold between list and valve edge with 4–6 fairly long bristles opposite ventral 11–14 diaphanous bristles of broad list, and right valve only with single bristle opposite dorsal end of broad list; no processes present between broad list and valve edge. Edge of valve posterior to broad list with about 40 minute pores (pores continue along ventral valve edge).

Selvage: Narrow lamellar prolongation with long marginal hairs at inner end of ventral margin of incisur.

Vestment: Rows of long spines in anterodorsal corner proximal to upper part of rostral infold.

Central Adductor Muscle Attachments: Each valve with 18–20 oval attachments just anteroventral to midpoint (Figure 59*e,g*).

Carapace Size (length, height in mm): Slope 27: NMV

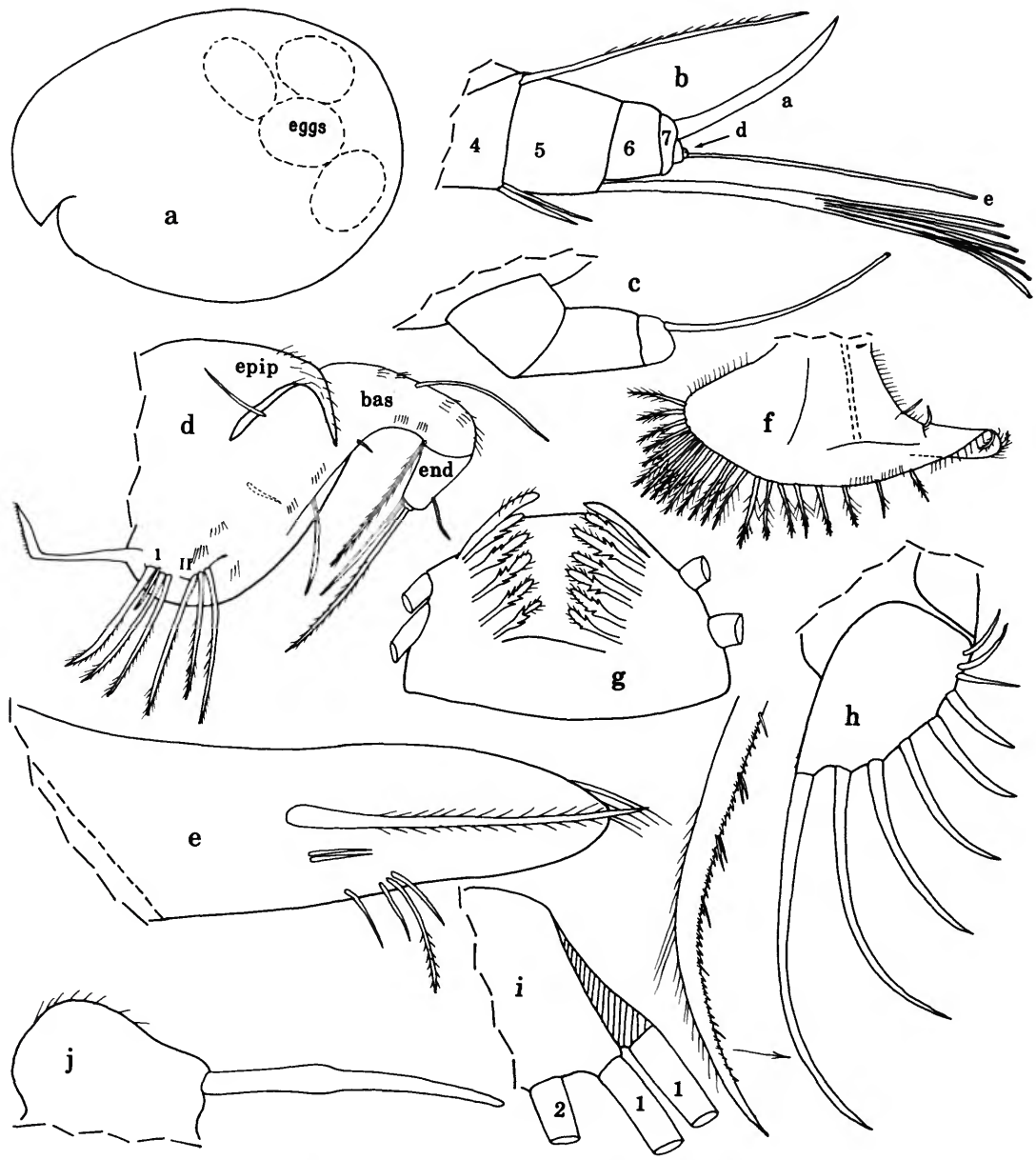


FIGURE 58.—*Parasterope sequax* Kornicker, new species, ovigerous female, paratype, USNM 193863: *a*, complete specimen, length 1.96 mm; *b*, distal right 1st antenna (nabs), lv; *c*, endopodite right 2nd antenna, mv; *d*, left maxilla, mv; *e*, comb right 5th limb (nabs), lv; *f*, left 6th limb, mv; *g*, tip 7th limb; *h*, left lamella furca, lv; *i*, parts right and left (striated) lamellae of furca showing overlap; *j*, medial eye and Bellonci organ.

J36007 (holotype), 2.01, 1.47; NMV J36008, specimen 1, 1.99, 1.44; USNM 193863, 1.96, 1.48; NMV J36009, 2 specimens: 2.04, 1.47 (ovigerous); 1.94, 1.40. Slope 67: NMV J36010, 1.99, 1.44. Length range = 1.94–2.04; height range = 1.40–1.48. Ratio of height to length ranges from 72%–75.5%.

First Antenna: 1st joint spinous. 2nd joint spinous, with stout dorsal spinous bristle and bare lateral bristle. Combined 3rd and 4th joints slightly longer than wide, separated by fairly straight lateral suture and slightly concave medial suture; 3rd joint with row of indistinct spines proximal to small bare bristle on short ventral margin and 6 spinous bristles (medial of terminal pair with short spines, others with long spines) on long

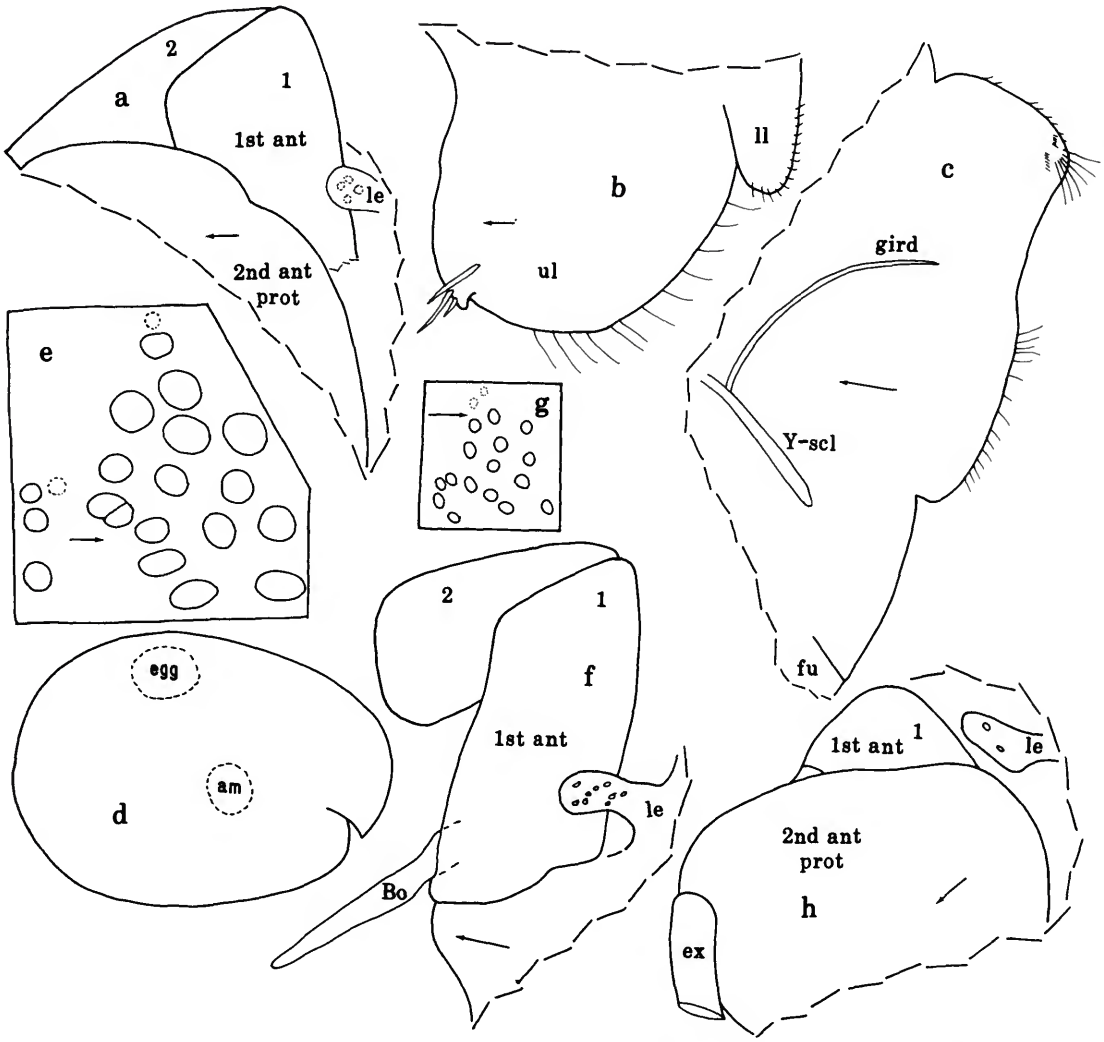


FIGURE 59.—*Parasterope sequax* Kornicker, new species, ovigerous female, paratype, USNM 193963: *a*, dorsal part anterior of body, lv; *b*, upper and lower lips, lv; *c*, posterior of body, lv. Ovigerous female, paratype, NMV J36010: *d*, complete specimen, length 1.99 mm; *e*, central adductor muscle attachments right valve (body removed), ov; *f*, dorsal part anterior of body, lv. Adult female, holotype, NMV J36007: length 2.01 mm: *g*, central adductor muscle attachments right valve, ov. Ovigerous female, paratype, NMV J36008, length 1.99 mm: *h*, dorsal part anterior of body, lv.

dorsal margin. 4th joint with 2 rows of indistinct ventral spines (not shown), 2 short ventral bristles, and 1 long spinous dorsal bristle (Figure 58*b*). 5th joint without spines or teeth; sensory bristle long slender with 6 terminal filaments (Figure 58*b*). Medial bristle of 6th joint long spinous (not shown). 7th joint: a-bristle claw-like, about 1/3 shorter than bristle of 6th joint; b-bristle stout, about 1/4 longer than a-bristle, with 4 long marginal filaments; c-bristle reaching slightly past sensory bristle of 5th joint, about 1/4 longer than b-bristle, with 5 marginal filaments. 8th joint: d-bristle represented by minute pore or peg (whether pore or peg could not be resolved under oil immersion, ×100 objective, ×15 ocular); e-bristle almost as long as sensory bristle of 5th joint, bare with blunt tip (Figure 58*b*); f-bristle bent dorsally, tip missing on both limbs of USNM 193863, 4 filaments on remaining part; g-bristle same length as c-bristle, with 6 marginal filaments. (Only a-bristle of 7th joint and d- and e-bristles of 8th joint shown in Figure 58*b*.)

Second Antenna: Protopodite with spines along distal dorsal margin and on medial surface in dorsal half, with small distomedial bristle (spines and bristle not shown in Figure 59*h*). Endopodite 3-jointed with long terminal filament (Figure 58*c*). Exopodite: 1st joint with 2 rows of long distal hairs on concave

dorsal margin; bristle of 2nd joint reaching 9th joint, with abundant thin ventral spines; bristles of joints 3–8 with natatory hairs, some with few minute indistinct ventral spines; 9th joint with 4 bristles (2 long with natatory hairs, 1 medium with few short spines, 1 short bare); joints 3–8 with small basal spines increasing in size on distal joints (spine of 8th joint about 1/4 length of 9th joint); 9th joint with small lateral spine about 1/3 length of joint; joints 2–8 with row of small spines along distal edges.

Mandible: Coxale endite broken off both limbs of USNM 193863. Basale endite with 4 end bristles, 1 dwarf bristle, glandular peg, and 3 or 4 triaenid bristles (1 bristle proximal to glandular peg, 2 or 3 distal) with 5–11 pairs of spines proximal to terminal pair. Basale: Ventral margin with 1 triaenid bristle (with 5 pairs of spines proximal to terminal pair) near endite and proximal to U-shaped boss; dorsal margin with 2 long spinous terminal bristles (lateral bristle slightly shorter); medial surface with rows of spines in dorsal half. Exopodite about same length as dorsal margin of 1st endopodial joint, hirsute distally, with 2 small subterminal bristles. 1st endopodial joint with 3 ventral bristles (shortest with short spines, others with long spines). 2nd endopodial joint: Ventral margin with 3 long terminal bristles with short spines; dorsal margin with 1 short proximal bristle and stout spinous a-, b-, c-, and d-bristles; medial surface near dorsal margin with 3 cleaning bristles between b- and c-bristles, 5 cleaning bristles between c- and d-bristles, and 1 long spinous g-bristle adjacent to d-bristle; medial surface also with rows of spines; lateral surface near dorsal margin with long spinous e-bristle between b- and c-bristles and long spinous f-bristle between c- and d-bristles. 3rd endopodial joint with stout straight dorsal claw with few minute ventral spines, 4 stout spinous bristles, and 1 slender shorter spinous bristle.

Maxilla (Figure 58*d*, 61*m*): Epipodite long pointed hirsute. Endite I with 1 short and 3 long spinous bristles; endite II with 3 long spinous bristles. Basale spinous: Dorsal margin with 2 long bristles (1 proximal, 1 distal); ventral margin with 1 long proximal backward-pointing bristle, 1 small bristle at midlength, and long terminal spinous bristle; lateral side with 1 proximal bristle at about midheight. 1st endopodial joint without spines, with fairly long alpha-bristle and long bare beta-bristle. 2nd endopodial joint with long spinous terminal bristle about 1/3 longer than beta-bristle.

Fifth Limb (Figure 58*e*): Comb with stout spinous exopodial bristle just reaching past tip of comb, 2 short slender bristles just ventral to base of stout bristle, and 4 lateral bristles with bases set back from ventral edge at comb midlength (2 distal bristles with bases close together).

Sixth Limb (Figure 58*f*): Small medial bristle in proximal anterior corner. Anterior margin of stem with well-defined upper and lower endite sutures each with 1 bare bristle. Lateral flap of skirt with 1 small hirsute bristle. Anterior tip of skirt with 1 or 2 small spinous bristles; ventral and posteroventral margin with 22 or 23 bristles (anterior bristle with short spines, next 5 or 6 with long proximal hairs and short distal spines, remaining bristles with hairs to tip). Limb hirsute.

Seventh Limb: Each limb with 15 or 16 bristles (4 on terminal segment (2 on each side), 2 on next segment (1 on each side), 9 or 10 on proximal segments (4–6 on each side)); each bristle with 2–4 bells and without spines. Combs forming acute angle with each other; each comb with 12 spinous teeth; teeth towards each end slightly shorter (Figure 58*g*).

Furca (Figure 58*h*): Each lamella with 9 or 10 claws (USNM 193863 with 9 on left and 10 on right; holotype with 9 on both); 2 posterior claws bristle-like, recurved; posterior edge of claws 1–7 with long slender teeth between more numerous small teeth (detail in Figure 58*h*); anterior edge of each lamella with few spines. Furca of USNM 193863 unusual in having left lamella anterior to right by width of base of claw 1 (Figure 58*i*), but holotype and NMV J36008 with right lamella anterior to left.

Bellonci Organ (Figures 58*j*, 59*f*): Elongate, broad near midlength, with rounded tip.

Eyes: Medial eye hirsute, unpigmented (Figure 58*j*). Lateral eye minute, unpigmented, with few internal cells (Figure 59*a,f,h*); eye not visible through shell. (Lateral eye so small and indistinct that it easily could be overlooked, and I am not entirely confident of its presence, but the structure interpreted to be a lateral eye was observed on both sides of USNM 193863 (Figure 59*a*), on the left side of NMV J36008 (Figure 59*h*) (right side in vicinity of eye fragmented when body was removed from shell), and on the left side of NMV J36010 (Figure 59*f*).)

Lips (Figure 59*b*): 3 small anterior spines on each lobe of upper lip. Lower lip a hirsute lateral flap on each side of mouth.

Genitalia: Oval ring on each side of body anterior to furca.

Posterior of Body (Figure 59*c*): Posterodorsal corner rounded, spinous. Posterior edge of body posterior to girdle hirsute.

Y-*Sclerite:* Typical for subfamily (posterior end shown in Figure 59*c*).

Gills: Well developed.

Eggs: Slope 27: USNM 193863 with 10 eggs in marsupium (4 eggs shown in Figure 58*a*), length of 3 typical eggs (mm): 0.39, 0.40, 0.43; NMV J36008 with 6 eggs in marsupium, length of typical egg 0.37 mm. Slope 67: NMV J36010, specimen with 6 well-developed eggs, some with distinct valves, in marsupium (1 egg shown in Figure 59*d*), length of 3 eggs (mm): 0.43, 0.47, 0.51.

COMPARISONS.—*Parasterope sequax* resembles *P. micrommata* Kornicker, 1975a:419, which also has minute lateral eyes. It differs from that species in not having distal teeth on the 5th joint of the 1st antenna (the teeth on *P. micrommata* are shown in Figure 60) and in having 1 or 2 rather than 3 or 4 bristles at the anterior tip of the skirt of the 6th limb. *Parasterope sequax* differs from *P. anommata*, which is without lateral eyes, in having a carapace with 6 rather than 31–34 bristles between the valve edge and broad posterodorsal list of the infold, and 19 rather than 63 small bristles on the broad list. *Parasterope*

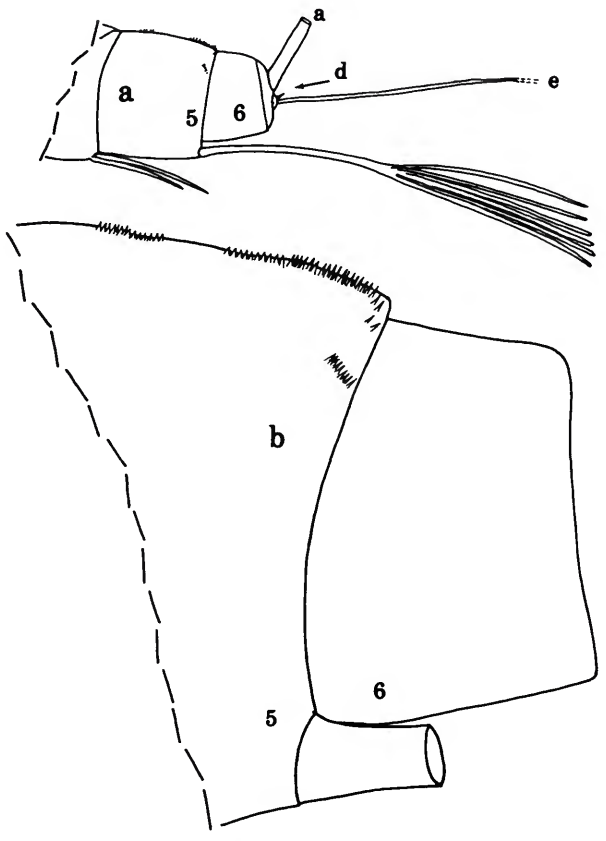


FIGURE 60.—*Parasterope micrommata* Kornicker, 1975a, ovigerous female, paratype, USNM 128053, length 1.73 mm: *a*, distal right 1st antenna (nabs), lv; *b*, detail showing spines of 5th joint shown in *a*.

sequax differs from *P. styx* Kornicker, 1975a:432, which is without lateral eyes, in having a 6th limb with 1 instead of no lower endite bristle and 1 instead of 5 or 6 bristles dorsal to the upper endite. *Parasterope sequax* differs from *P. longungues* Poulsen, 1965:382, which is without lateral eyes, in having a maxilla with a long distal dorsal bristle on the basale. *Parasterope sequax* differs from *P. hiruta* Chavtur, 1983:76, in having a maxilla with 2 rather than 3 dorsal bristles on the basale. *Parasterope sequax* differs from *P. antyx* Kornicker, 1989:97, which is without lateral eyes, in having a longer and slenderer stem on the sensory bristle of the 5th joint of the female 1st antenna, and in having a long distal bristle on the dorsal margin of the basale of the maxilla.

Parasterope lux Kornicker, new species

FIGURE 61*a–l*

ETYMOLOGY.—From the Latin *lux* (light).

HOLOTYPE.—NMV J36004, ovigerous female on slide and in alcohol.

TYPE LOCALITY.—Slope 32, 38°21.90′S, 149°20.00′E, Victoria, S of Point Hicks; depth 1000 m.

PARATYPES.—None.

DISTRIBUTION.—Slope 32, 1000 m.

DESCRIPTION OF ADULT FEMALE (Figure 61).—Carapace oval in lateral view; incisur just ventral to valve midheight (Figure 61*a*).

Infold: Rostral infold with about 16 bristles along list, about 115 bristles dorsal to list, and about 17 bristles between list and incisur, all bristles with single pointed tips. Anteroventral infold with about 75 bristles between list and valve edge. Narrow list, with anterior end ventral to incisur, continues along ventral margin then broadens along posteroventral corner of valve. Ventral infold with about 29 bristles forming row between list and valve edge (posterior bristle in row lies adjacent to anterior end of broad posteroventral list). Broad posteroventral list with 42 or 43 wide flat triangular diaphanous bristles with tubular pores at base; row of 19–21 bristles (not more than 1 bristle between each pair of diaphanous bristles, and no bristles between ventral 15–17 bristles) slightly closer to anterior edge of broad list than diaphanous bristles. Posteroventral infold between broad list and valve edge with 7 long bristles opposite ventral 18 or 19 diaphanous bristles of list.

Selvage: Narrow lamellar prolongation with long marginal hairs at inner end of ventral margin of incisur.

Vestment: Long spines on anterodorsal corner proximal to infold of dorsal end of rostrum.

Central Adductor Muscle Attachments: Each valve with about 17 oval attachments just anteroventral to midpoint (location shown in Figure 61*a*).

Carapace Size (length, height in mm): NMV J36004 (holotype), 1.97, 1.38. Height 70% of length.

First Antenna: Except for ventral spines of 3rd and 4th joints being more distinct (Figure 61*b*), and presence of minute lateral spines along distal edge of dorsal margin of 5th joint, limb similar to that of *P. sequax*.

Second Antenna: Protopodite and endopodite similar to those of *P. sequax*. Exopodite: Bristle of 3rd joint with about 8 fairly stout proximal spines on ventral margin; basal spines slightly larger than those of *P. sequax* (spine of 8th joint about $^1/_3$ length of 9th joint); lateral spine of 9th joint about $^1/_2$ length of joint; exopodite otherwise similar to that of *P. sequax*.

Mandible: Coxale endite: Small medial bristle at base of ventral branch (Figure 61*c*); dorsal branch broken off both limbs of holotype; ventral branch with spines forming 5 oblique rows and tip with 1 short and 2 longer slender spines. Basale endite with 4 end bristles, 1 dwarf bristle, glandular peg, and 3 triaenid bristles (1 proximal to peg, 2 distal) with 5 or 6 pairs of marginal spines excluding terminal pair. Basale: ventral margin with 1 triaenid bristle (with 4 or 5 pairs of marginal spines excluding terminal pair) adjacent to base of endite and proximal to U-shaped boss; dorsal margin with 2 long spinous terminal bristles (about same length); medial surface with few rows of spines at midheight. Exopodite about

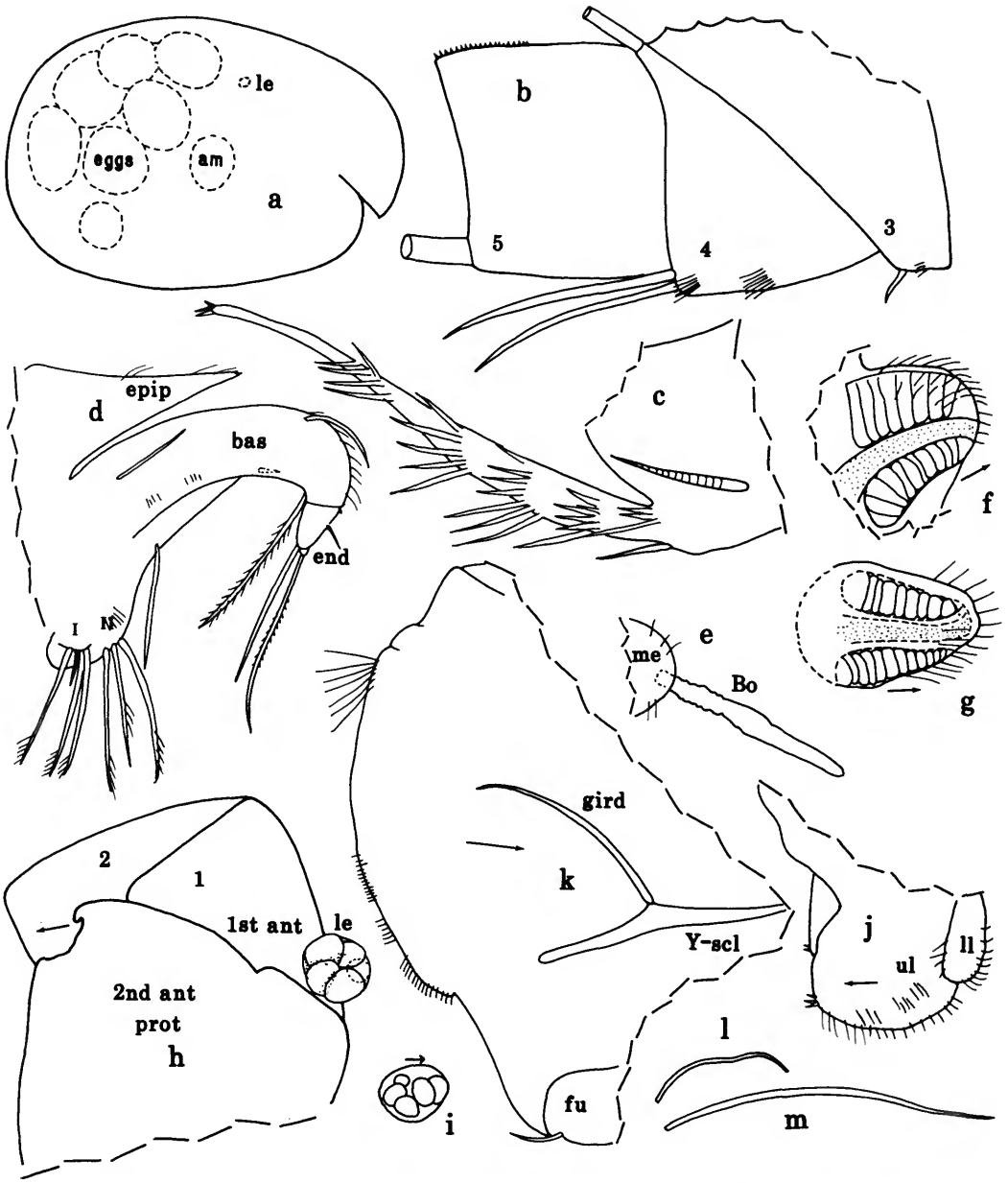


FIGURE 61.—*Parasterope lux* Kornicker, new species, ovigerous female, holotype, NMV J36004: *a*, complete specimen, length 1.97 mm; *b*, part right 1st antenna (nabs), mv; *c*, ventral branch coxale endite left mandible, mv; *d*, left maxilla, mv; *e*, medial eye and Bellonci organ; *f,g*, lateral and dorsal views, respectively, of medial eye; *h*, dorsal part anterior of body, lv; *i*, right lateral eye; *j*, lips, lv; *k*, posterior of body, lv; *l*, distal dorsal bristle of basale left maxilla, mv. *Parasterope sequax* Kornicker, new species, ovigerous female, paratype, USNM 193863: *m*, distal dorsal bristle of basale left maxilla (drawn at same magnification as *l*), mv.

3/4 length of dorsal margin of 1st endopodial joint, hirsute distally, and with 2 small subterminal bristles. 1st and 3rd endopodial joints similar to those of *P. sequax*. 2nd endopodial joint: Medial surface with 3 cleaning bristles between b- and c-bristles and 5 or 6 adjacent to c-bristle; joint otherwise similar to that of *P. sequax*.

Maxilla (Figure 61*d*): Except for distal dorsal bristle of basale being about 1/2 length of similarly placed bristle on *P.*

sequax, limbs similar (lateral bristle not observed) (Figure 61*l,m*). Left limb only of holotype with minute spine-like bristle proximal to alpha-bristle of 1st endopodial joint (Figure 61*d*).

Fifth Limb: Comb similar to that of *P. sequax*.

Sixth Limb: Posteroventral margin of skirt with 23 or 24 bristles; limb otherwise similar to that of *P. sequax*.

Seventh Limb: Each limb with 17 bristles (4 on terminal segment (2 on each side), 2 on next segment (1 on each side), 11 on proximal segments (5 or 6 on each side)); each bristle with 3 or 4 bells. Combs forming acute angle with each other (similar to that of *P. sequax*); each comb with 12–15 spinous teeth.

Furca: Each lamella with 9 claws (posterior 1 or 2 claws bristle-like, recurved); claws 1–7 with long slender teeth between more numerous smaller teeth (similar to those of *P. sequax*).

Bellonci Organ (Figure 61*e*): Similar to that of *P. sequax*.

Eyes: Medial eye hirsute with brownish pigment along center line and amber-colored cells along edges (Figure 61*e–g*). Lateral eye small but distinctly visible, with 4 large and 1 smaller ommatidia, and with brownish pigment between ommatidia (Figure 61*h,i*); eye visible through shell (Figure 61*a*).

Lips (Figure 61*j*): Upper lip with 3 small anterior spines on each lobe and 2 minute anterior spines on saddle between lobes. Lower lip a lateral hirsute flap on each side of mouth.

Genitalia, Posterior of Body (Figure 61*k*), Y-*Sclerite* (Figure 61*k*), *and Gills:* Similar to those of *P. sequax*.

Eggs: Holotype with 14 eggs in marsupium (some eggs visible in Figure 61*a*). Length of typical egg 0.41 mm.

COMPARISONS.—The main difference between *P. lux* and *P. sequax* is in the lateral eye. The lateral eyes of both species are small, but the eye of *P. sequax* is indistinct and was not seen with certainty on specimens examined, whereas the eye of *P. lux* is distinct and easily visible through the shell. Another difference is that the distal dorsal bristle on the basale of the maxilla of *P. sequax* (Figure 61*m*) is about twice as long as that of *P. lux* (Figure 61*l*).

Parasterope physinx Kornicker, new species

FIGURES 62, 63

ETYMOLOGY.—From the Greek *physinx* (bladder, bubble).

HOLOTYPE.—NMV J36006, ovigerous female on slide and in alcohol.

TYPE LOCALITY.—Slope 40, 38°17.70′S, 149°11.30′E, Victoria, S of Point Hicks; depth 400 m.

PARATYPES.—None.

NONTYPES.—Slope 22: 1 partly dissected male (late instar) in alcohol (length 1.03 mm, height 0.70 mm, lost); NMV J36005, 1 female (late instar or adult) on slide and in alcohol (shell distorted; length about 1.16 mm). These specimens are considered to be nontypes because of their small size; the appendages are similar to those of *P. physinx*. The material is insufficient to explore fully the possibility that it may represent a new species.

DISTRIBUTION.—Slope 22, 363 mm. Slope 40, 400 m.

DESCRIPTION OF ADULT FEMALE (Figures 62, 63).—Carapace viewed laterally narrower at anterior end; incisur ventral to midheight; posterior end evenly rounded (Figure 62*a*).

Infold: Rostrum with about 14 bristles on or posterior to list and about 50 bristles anterior and dorsal to list (not all shown in Figure 62*b*). Anteroventral and ventral list with about 70 bristles (few shown in Figure 62*b*). Narrow list with anterior end at inner end of incisur extends along ventral infold and broadens along posterior infold. Broad posterior list with 28 broad transparent bristles (about 10 closer than others to anterior edge of list) and about 53 small slender bristles (1–4 bristles between adjacent transparent bristles) (Figure 62*c*); row of 5 fairly long bristles present between ventral half of broad list and valve edge (4 of these shown in Figure 63*c*).

Vestment: Anterodorsal corner of vestment proximal to infold with clusters of long spines.

Carapace Size (length, height in mm): NMV J36006 (holotype), 1.44, 1.03, height 72% of length.

First Antenna (Figure 62*d,e*): 1st joint with medial and lateral spines. 2nd joint spinous, with long dorsal bristle with long spines, and short lateral bristle with short spines. 3rd joint with distinct suture separating it from 4th joint, with small bare ventral bristle and 6 spinous dorsal bristles (4 single with long spines followed by 2 paired (medial with short spines, lateral with long spines)). 4th joint with concave distal margin, with ventral spines and 2 ventral bristles reaching past distal margin of 5th joint, and 1 long dorsal bristle, all bristles with short spines. Sensory bristle of 5th joint long, slender, with 6 long terminal filaments; distal dorsal edge of joint with about 30 minute lateral teeth (Figure 62*e*). Medial bristle of 6th joint with short spines. 7th joint: a-bristle claw-like, with minute teeth along dorsal margin; b-bristle about $^1/_3$ longer than a-bristle, with 4 marginal filaments; c-bristle long, with 5 marginal filaments. 8th joint: d-bristle a minute peg (not shown); e-bristle about $^2/_3$ length of c-bristle, bare with blunt tip; f-bristle bent dorsally, with 4 marginal filaments; g-bristle about same length as c-bristle, with 5 marginal filaments.

Second Antenna: Protopodite with slender spines along both dorsal margin and dorsal half of medial surface, and with small distomedial bristle (Figure 62*f*). Endopodite short, 3-jointed, with long subterminal filament about twice length of stem (Figure 62*f*). Exopodite: Bristle of 2nd joint reaching just past 9th joint, with slender ventral spines; bristles of joints 3–5 or 6 with slender proximal ventral spines and natatory hairs; bristles of joints 6 or 7 to 8 with natatory hairs; 9th joint with 4 bristles (2 long with natatory hairs, 2 short with short hair-like spines); joint 1 with rows of distal spines along dorsal concave margin; joints 2–8 with row of short spines along distal

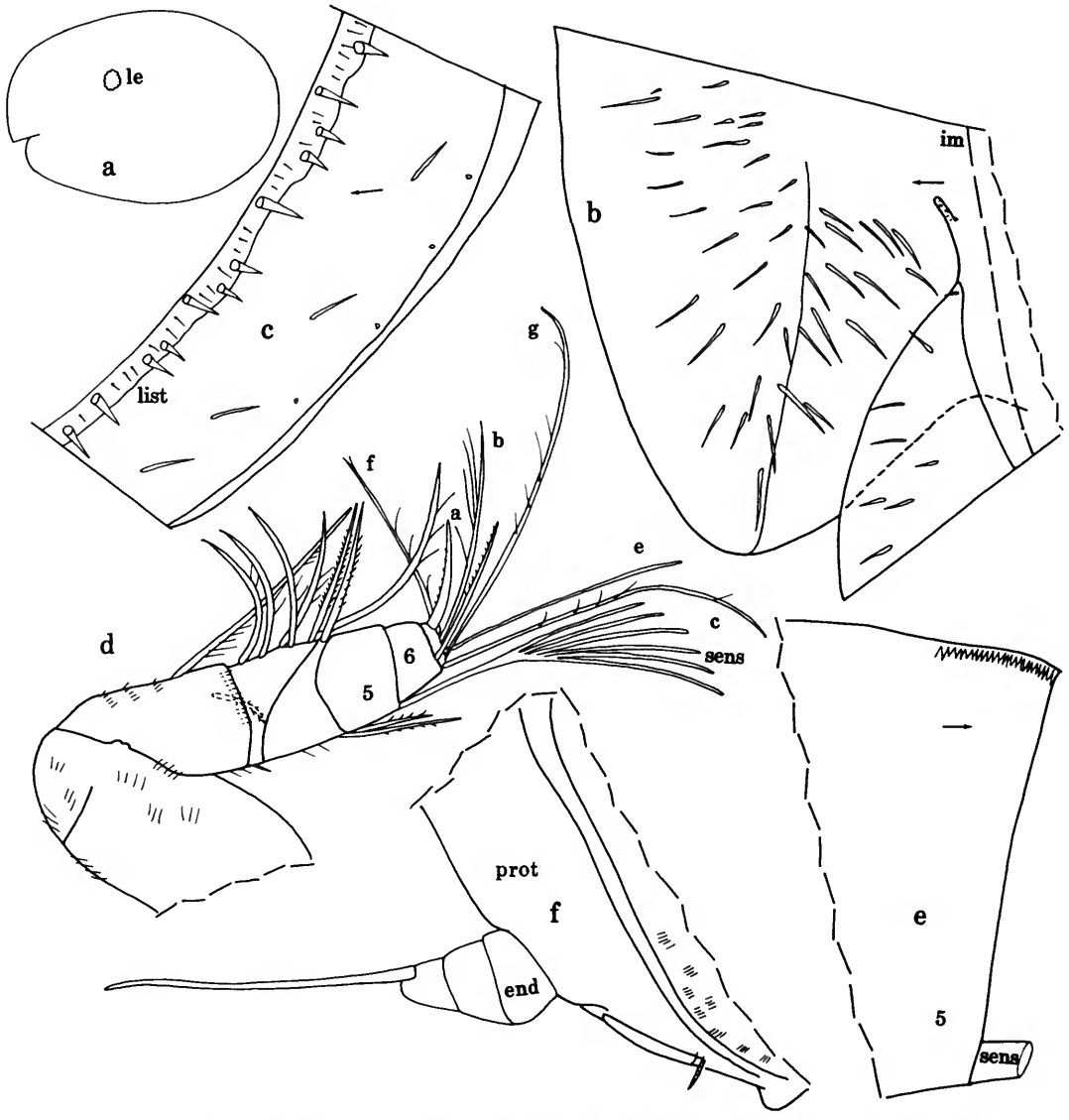


FIGURE 62.—*Parasterope physinx* Kornicker, new species, ovigerous female, holotype, NMV J36006: *a*, complete specimen, length 1.44 mm; *b,c*, anterior and posteroventral infolds, respectively, of right valve, iv; *d*, left 1st antenna, mv; *e*, 5th joint right 1st antenna, lv; *f*, distal protopodite and endopodite left 2nd antenna, mv.

margins and basal spines increasing slightly in size on distal joints; basal spine of 8th joint about half length of 9th joint; 9th joint with lateral spine about $^2/_3$ length of joint.

Mandible (Figure 63*a*): Coxale endite broken off on both limbs of holotype; minute bristle at base of endite. Basale endite with 3 triaenid bristles (with 5 or 6 pairs of spines plus long terminal pair), distinct glandular peg, small dwarf bristle with few small marginal spines, and 4 spinous end bristles. Basale: Ventral margin with short triaenid bristle (with 4 pairs of spines plus longer terminal pair) proximal to U-shaped depression; dorsal margin with cluster of proximal spines and 2 equilength spinous terminal bristles; medial surface with few rows of spines in dorsal half. Exopodite about same length as dorsal margin of 1st endopodial joint, with distal spines and 2 small bristles with few minute spines. 1st endopodial joint with 3 long bristles (shortest with short spines, 1 long with short spines, longest with long spines). 2nd endopodial joint: Ventral margin with 3 terminal bristles with short spines; dorsal margin with 1 short proximal bristle, stout spinous a-, b-, c-, and d-bristles, 8 medial spinous cleaning bristles (2 between b- and

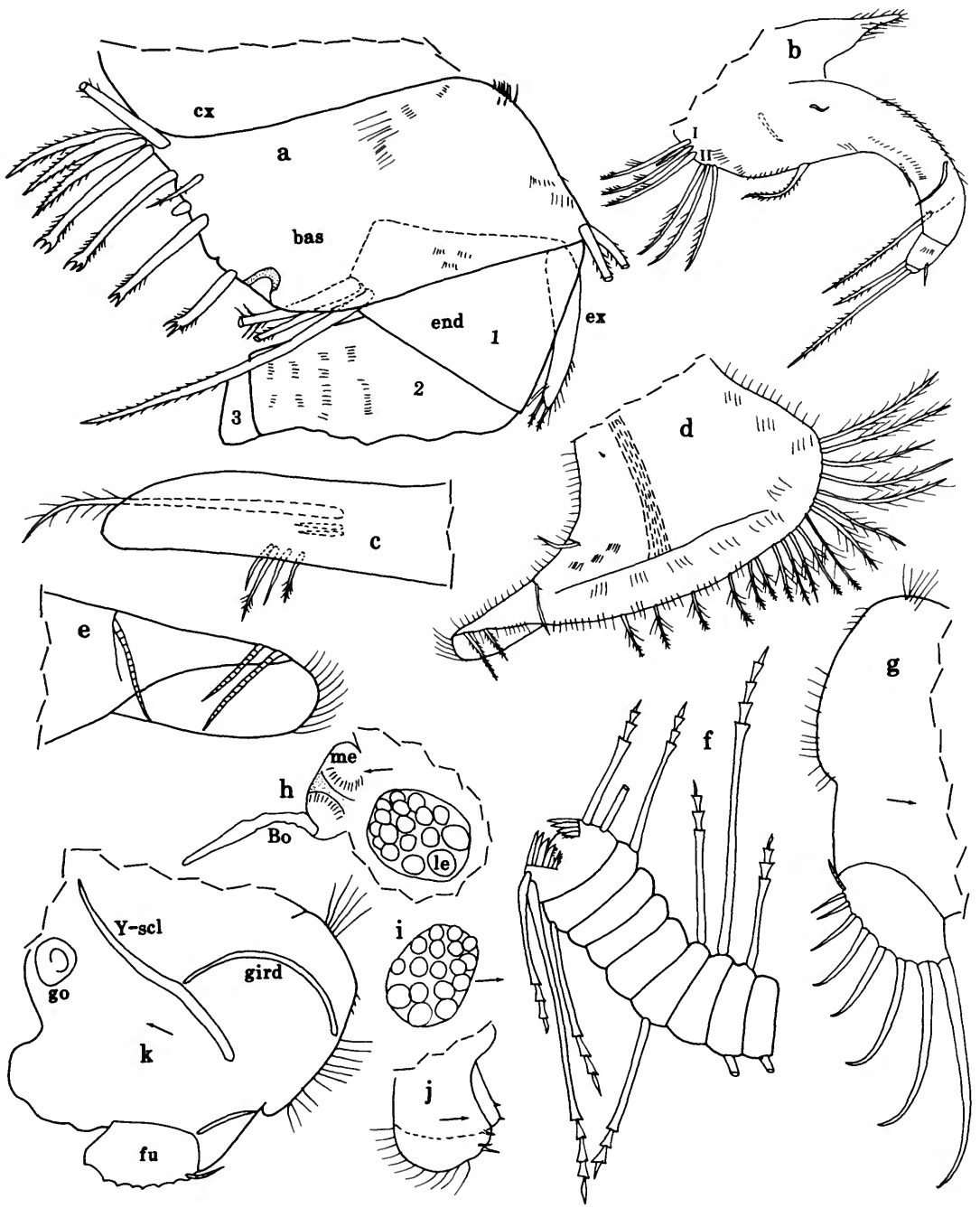


FIGURE 63.—*Parasterope physinx* Kornicker, new species, ovigerous female, holotype, NMV J36006: *a*, part left mandible (nabs), mv; *b*, left maxilla, mv; *c*, comb right 5th limb (nabs), mv; *d*, right 6th limb, mv; *e*, anterior tip left 6th limb, mv; *f*, 7th limb; *g*, posterior of body and right lamella of furca, lv; *h*, left lateral eye, medial eye, and Bellonci organ, lv; *i*, right lateral eye, lv; *j*, upper lip, lv; *k*, posterior of body, lv.

c-bristles, and 6 in row adjacent to c-bristle), 1 long spinous lateral e-bristle between b- and c-bristles, 1 long spinous lateral f-bristle between c- and d-bristles, and 1 long spinous medial g-bristle distal to d-bristle; medial surface with rows of spines. 3rd endopodial joint with spinous dorsal claw and 5 spinous bristles (4 long, 1 short). (Bristles of 2nd and 3rd endopodial joints not shown.)

Maxilla (Figure 63*b*): Epipodite hirsute reaching to about

midlength of dorsal margin of basale. Endite I with 1 short and 3 long spinous bristles; endite II with 3 long spinous bristles. Basale: Lateral side with 1 short bare proximal bristle at midheight (slightly longer on right limb); medial side spinous, with 1 short bare proximal bristle dorsal to midheight, and 1 longer bare distal bristle near dorsal margin; ventral margin with 1 fairly long stout spinous backward-oriented proximal bristle, 1 short distal bristle, and 1 long spinous subterminal bristle. 1st endopodial joint with few medial spines, 1 short alpha-bristle, and 1 long beta-bristle with indistinct spines. 2nd endopodial joint with long spinous terminal bristle almost twice length of beta-bristle of 1st joint.

Fifth Limb (Figure 63*c*): Comb with stout spinous exopodial bristle reaching past tip of comb; lateral side with 2 small slender bristles ventral to base of stout bristle, and 4 bristles at midlength of comb close to ventral margin.

Sixth Limb (Figure 63*d,e*): Medial surface with minute ringed bristle in anterodorsal corner; anterior margin with a slender bristle at both upper and lower endites. Lateral flap at anterior end of skirt with usual hairs but without bristles. Anteroventral corner with 2 bristles (anterior bristle slightly longer). Ventral and posteroventral margin with total of 18 or 19 bristles (7 on posteroventral margin plumose, others with long proximal and short distal spines). Limb hirsute.

Seventh Limb (Figure 63*f*): Proximal and distal groups each with 6 bristles (3 on each side) with 2–4 bells (usually 3 or 4). Terminus with opposing combs, each with about 10 alate and spinous teeth.

Furca (Figure 63*g*): Each lamella with 9 claws, of which 9th claw bristle-like, ringed, recurved; 8th claw somewhat bristle-like; claws 1–8 with teeth along posterior margin (not shown); claws 1–5 with spines along anterior margin (not shown).

Bellonci Organ (Figure 63*h*): Elongate, broad at midlength, with rounded tip.

Eyes: Lateral eye well developed with 17 light amber-colored ommatidia without dark pigment between them (Figures 62*a*, 63*h,i*). Medial eye slightly smaller than lateral eye, bare, with small area of brown pigment at midlength (Figure 63*h*).

Lips: Upper lip comprising 2 hirsute lobes, each with 2 anterior spines, and middle saddle with 3 anterior spines (Figure 63*j*). Lower lip a hirsute flap on each side of mouth (not shown).

Genitalia (Figure 63*k*): Oval ring on each side of body anterior to furca.

Anterior of Body: Without anterior process.

Posterior of Body (Figure 63*g,k*): With slender spines at midheight and longer spines on dorsal edge of rounded posterodorsal margin.

Y-Sclerite (Figure 63*k*): Typical for subfamily.

Gills: Well developed.

Eggs: Holotype with 9 eggs in marsupium; length of typical egg 0.34 mm.

COMPARISONS.—*Parasterope physinx* differs from *P. sequax* and *P. lux* in having well-developed lateral eyes. In the key to species of *Parasterope* south of latitude 35°S by Kornicker (1975:401), *P. physinx* keys out to *P. crinita* Kornicker, 1975. The carapace of *P. physinx* bears 5 bristles between the broad posterior list and the posterior margin of the valve compared to 33 or 34 on *P. crinita*. (Note concerning *P. crinita:* Kornicker (1975:427) described the 6th limb of *P. crinita* as having 2 or 3 faint bristles on the lateral flap, and illustrated them (Kornicker, 1975, fig. 264c). I reexamined the mounted 6th limb of the same specimen (USNM 128278, holotype) and believe that bristles are probably absent and that the "faint bristles" described and illustrated by Kornicker (1975) may be matted hairs.) *Parasterope physinx* resembles *P. muelleri* (Skogsberg, 1920:483). The distal of the anterior bristle of the pair on the anteroventral corner of the skirt of the 6th limb is slightly longer than the proximal bristle on *P. physinx* and about twice as long on *P. muelleri*.

Parasterope whatleyi Kornicker, new species

FIGURES 64–66

ETYMOLOGY.—Named for Dr. Robin Whatley, University College of Wales, for his contributions to the study of Ostracoda.

HOLOTYPE.—NMV J36011, undissected adult female in alcohol.

TYPE LOCALITY.—Slope 53, 34°52.72′S, 151°15.04′E, New South Wales, 54 km ESE of Nowra; depth 996 m.

PARATYPES.—Slope 53: USNM 194012, adult female on slide and in alcohol plus male and female choniostomatid copepods in alcohol; USNM 194013, adult male on slide and in alcohol; NMV J36012, adult partly dissected female plus male choniostomatid in alcohol; NMV J37721, 2 undissected juveniles in alcohol.

DISTRIBUTION.—Slope 53, 996 m.

DESCRIPTION OF ADULT FEMALE (Figures 64, 65).—Carapace pear shape in lateral view (Figure 64*a*).

Infold: Rostral infold with 5 bristles along list, 5 bristles between list and incisur, and 13 bristles dorsal to list, all bristles with single pointed tips. Anteroventral infold with 13 bristles between list and valve edge. Narrow list with anterior end ventral to incisur; narrow list continues along ventral margin then broadens along posteroventral corner of valve. Ventral infold with 10 bristles (posterior bristle in row lies near anterior end of broad list). Broad posteroventral list with about 25 wide flat triangular diaphanous bristles (some quite small); about 10 bristles between diaphanous bristles (not more than 1 or 2 bristles between each pair of diaphanous bristles); each valve with 1 bristle on infold between broad list and valve edge near dorsal end of broad list. Outer edge of posterior infold with about 8 broad pore canals and many narrow canals, all leading to valve edge.

Selvage: Narrow lamellar prolongation with long marginal

FIGURE 64.—*Parasterope whatleyi* Kornicker, new species, adult female, paratype, USNM 194012: *a*, complete specimen, length 1.55 mm; *b*, central adductor muscle attachments right valve (with body removed), ov; *c*, distal left 1st antenna (nabs), mv; *d*, endopodite right 2nd antenna, mv; *e*, right maxilla, mv; *f*, distal left maxilla, lv; *g*, comb left 5th limb (nabs), mv; *h*, 7th limb.

hairs at inner end of ventral margin of incisur.

Vestment: Row of long spines at anterodorsal corner proximal to upper part of rostral infold.

Central Adductor Muscle Attachments (Figure 64*b*): Each valve with about 14 oval attachments just anterior to midlength (not all shown in Figure 64*a*).

Carapace Size (length, height in mm): Slope 53: NMV J36011 (holotype), 1.54, 1.16, height 75% of length; USNM 194012, 1.55, 1.13, height 73% of length; NMV J36012, 1 partly dissected specimen, 1.56, 1.19, height 76% of length.

Length range 1.54–1.56, height range 1.13–1.19; range of height as percent of length 73–76.

First Antenna (Figure 64*c*): 1st joint with numerous spines on medial surface. 2nd joint with dorsal spines, row of short lateral spines along distal edge, 1 long dorsal bristle with long spines, and 1 bare distal lateral bristle. Combined 3rd and 4th joints quadrate, separated by slightly concave sutures on both lateral and medial sides; 3rd joint with few minute spines proximal to small bare bristle on short ventral margin, and 6 bristles (2 single then 2 pairs; medial of terminal pair with short spines, others with long spines) on long dorsal margin. 4th joint with slightly concave distal edge, with 1 long dorsal bristle with short spines, and 2 shorter bare ventral bristles. 5th joint with distal row of minute spines perpendicular to dorsal margin and small spines at distal dorsal corner; sensory bristle fairly short, with 6 terminal filaments. Medial bristle of 6th joint long spinous (proximal part shown). 7th joint: a-bristle claw-like, slightly shorter than bristle of 6th joint; b-bristle 1/3 longer than a-bristle, with 4 long marginal filaments (proximal filament slenderer than others); c-bristle about 1/3 longer than sensory bristle of 5th joint, more than twice length of a-bristle, with 5 short marginal filaments. 8th joint: d-bristle represented by minute peg; e-bristle reaching tip of sensory bristle of 5th joint, bare with blunt tip; minute lateral pore near bases of d- and e-bristles; f-bristle bent dorsally, tip missing on both limbs of USNM 194012, 3 short filaments on remaining part; g-bristle same length as c-bristle, with 6 marginal filaments. (b-bristle of 7th joint, and f- and g-bristles of 8th joint not shown.)

Second Antenna: Protopodite without spines, with small distomedial bristle. Endopodite distinctly 3-jointed with long terminal filament near distal dorsal corner (Figure 64*d*). Exopodite: Bristle of 2nd joint reaching 7th joint, with numerous slender ventral spines; bristles of joints 3–8 with natatory hairs, some with few minute indistinct ventral spines; 9th joint with 3 bristles (1 long and 1 medium with natatory hairs, 1 short bare); joints 4–8 with minute basal spines (spine of 8th joint about 1/6 length of 9th joint); 9th joint with small lateral spine about 1/3 length of joint; 3rd joint with medial row of minute spines along distal edge; joints 3–7 with minute indistinct spines on distal dorsal corner.

Mandible: Coxale endite obscured on left limb of USNM 194012 and broken off on right limb as well as on both limbs of a second specimen. Basale endite with 4 subequal end bristles, 1 dwarf bristle, glandular peg, and 2 triaenid bristles (1 on each side of glandular peg) with small spines. Basale: ventral margin with 1 triaenid bristle (with 7 pairs of slender spines proximal to terminal pair) near endite and proximal to U-shaped boss; dorsal margin with 2 long terminal bristles (bare or with few spines); medial surface with rows of hairs in dorsal half. Exopodite about 3/4 length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 small subterminal bristles. 1st endopodial joint with 3 ventral bristles (shortest with short spines, others with short proximal and long distal spines). 2nd endopodial joint: Ventral margin with 3 long terminal bristles with short spines; dorsal margin with 1 short proximal bristle and stout a-, b-, c-, and d-bristles; medial surface near dorsal margin with 1 short cleaning bristle adjacent to b-bristle, 2 or 3 short cleaning bristles (longest with stout distal spines) adjacent to c-bristle, and 1 long g-bristle adjacent to d-bristle; medial surface also with rows of spines; lateral surface near dorsal margin with long e-bristle between b-and c-bristles, and long f-bristle between c-and d-bristles. 3rd endopodial joint with stout slightly curved dorsal claw with proximal ventral spines, 4 stout spinous bristles, and 1 slender shorter spinous bristle.

Maxilla (Figure 64*e,f*): Epipodite well developed, hirsute distally. Endite I with 4 bristles (3 long, 1 short); endite II with 3 long bristles; 1 minute bristle between endites. Basale with 1 medial bristle near dorsal margin, 1 long ventral proximal backward-pointing bristle, 1 shorter distal ventral bristle (Figure 64*f*) (not observed on illustrated right limb of USNM 194912 (Figure 64*e*)), and 1 long spinous terminal ventral bristle; lateral side with 1 short proximal bristle near midheight. Endopodite: 1st joint with small alpha-bristle and long beta-bristle; 2nd joint with very long terminal bristle. (Distal part of illustrated right limb twisted (Figure 64*e*).)

Fifth Limb (Figure 64*g*): Comb with stout spinous exopodial bristle just reaching past tip of comb, 2 short slender bristles just ventral to base of stout bristle, and 4 lateral bristles set back from edge at comb midlength.

Sixth Limb (Figure 65*a*): Slender medial bristle in proximal anterior corner. Anterior margin of stem with well-defined upper and lower sutures (especially lower) each with small bare bristle. Lateral flap with hairs but no bristles. Anterior tip of skirt with 2 small spinous bristles (anterior bristle longer and stouter); ventral and posteroventral margin with 17 or 18 spinous bristles (posterior 6 with long spines to tip, others with long proximal and short distal spines). Limb hirsute.

Seventh Limb (Figure 64*h*): Each limb with 12 or 13 bristles (6 distal, 3 on each side; 6 or 7 proximal, 3 or 4 on each side); each bristle with 2–4 bells and spines on "clapper" of terminal bell. Terminal segment cone-shape; each comb with about 9 small teeth, some with proximal marginal spines.

Furca (Figure 65*b*): Each lamella with 9 claws; 3 posterior claws bristle-like, recurved; claws 1–6 with teeth along posterior edge (not shown); claws 1–3 with few long slender teeth between rows of smaller teeth, and slender spines along anterior edge (not shown); right lamella anterior to left by width of base of claw 1; anterior edge of each lamella bare.

Bellonci Organ (Figure 65*c*): Elongate, crenulate proximally, tapering to rounded tip.

Eyes: Lateral eyes absent. Medial eye well developed, bare, with light amber color near middle (Figure 65*c*).

Lips (Figure 65*d,e*): Upper lip: Saddle between lobes with anterior spine; each lobe hirsute, with 2 anterior spines. Lower lip a hirsute flap on each side of mouth (Figure 65*d*).

Genitalia (Figure 65*b*): Light amber oval area on each side of body anterior to furca.

Posterior of Body (Figure 65*b*): Posterodorsal corner just dorsal to posterior end of girdle with row of long spines and

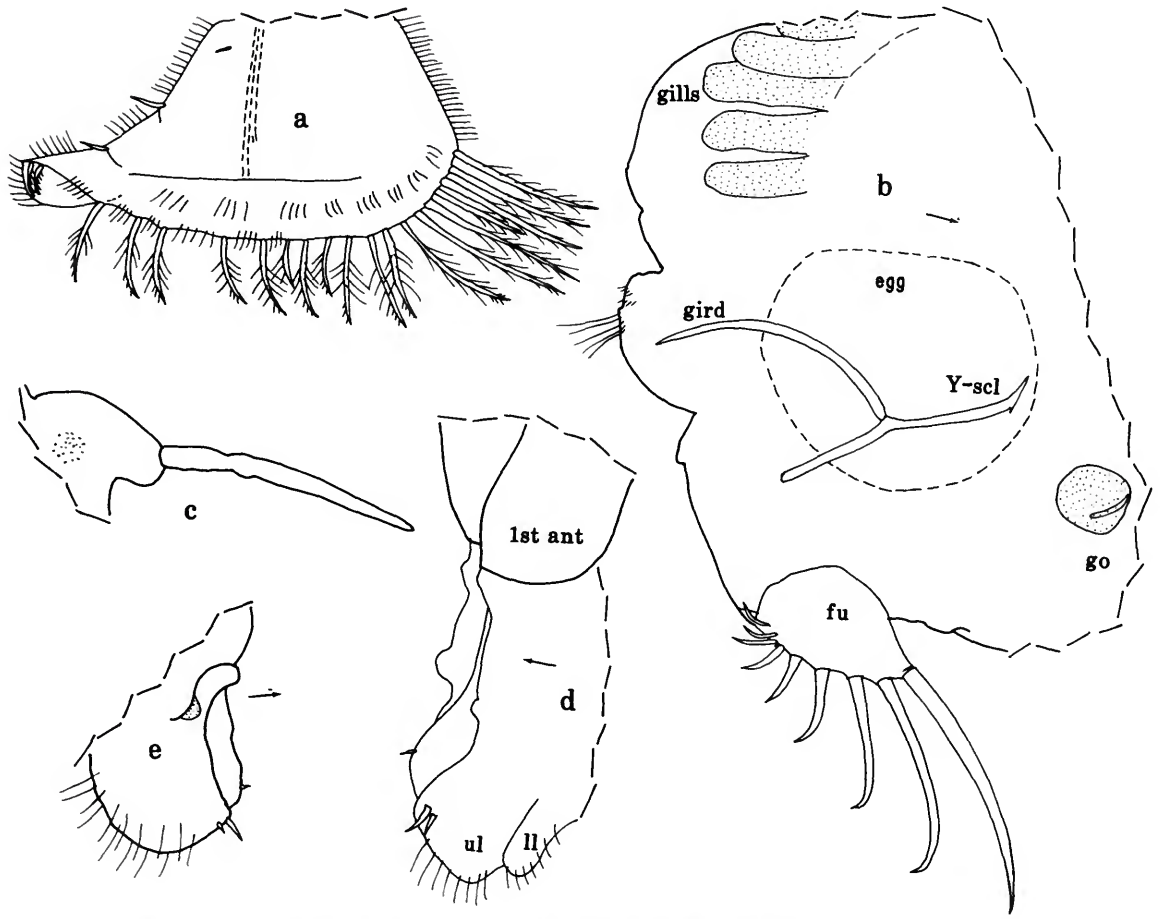


FIGURE 65.—*Parasterope whatleyi* Kornicker, new species, adult female, paratype, USNM 194012: *a*, right 6th limb, mv; *b*, posterior of body and right lamella of furca, lv; *c*, medial eye and Bellonci organ; *d*, anterior of body, lv; *e*, upper lip, lv.

also shorter spines dorsal to row.

Y-*Sclerite* (Figure 65*b*): Anterior end truncate.

Gills (Figure 65*b*): 5 small amber-colored gills on each side of body.

Eggs: USNM 194012 with about 8 large unextruded eggs (1 egg shown in Figure 65*b*).

Parasites: USNM 194012 with adult male and female choniostomatid copepods in marsupium (female shown in Figure 64*a*). NMV J36012, partly dissected adult female with male choniostomatid.

DESCRIPTION OF ADULT MALE (Figure 66).—Carapace oval in lateral view, with greatest height at midlength; incisur more open than that of female (Figure 66*a*).

Infold: Not examined.

Central Adductor Muscle Attachments (Figure 66*b*): Each valve with about 15 oval attachments at midlength.

Carapace Size (length, height in mm): USNM 194013, 1.41, 0.96, height 68% of length.

First Antenna (Figure 66*c*): 1st joint bare. 2nd joint with dorsal spines, short lateral row of small spines along distal edge near dorsal margin, dorsal bristle with long spines, and lateral bristle with short spines. 3rd joint with 5 or 6 long spinous bristles on long dorsal margin and small bare bristle on short ventral margin. 4th joint short oblique, with long dorsal bristle with short spines and 2 short bare ventral bristles. 5th joint short oblique (longer on medial side); sensory bristle with abundant narrow filaments (not shown) and very stout stem. 6th joint long, with long bare medial bristle; sclerotized edge of ventral margin of joint broader in proximal half. 7th joint: a-bristle about same length as bristle of 6th joint, claw-like with few indistinct proximal spines along dorsal edge; b-bristle about 1/3 longer than a-bristle, with 5 marginal filaments; c-bristle about twice length of stem of sensory bristle of 5th joint, with 9 marginal filaments with broad proximal part (see detail in Figure 66*c*) followed by 5 slender marginal filaments. 8th joint: d-bristle represented by minute peg; e-bristle same

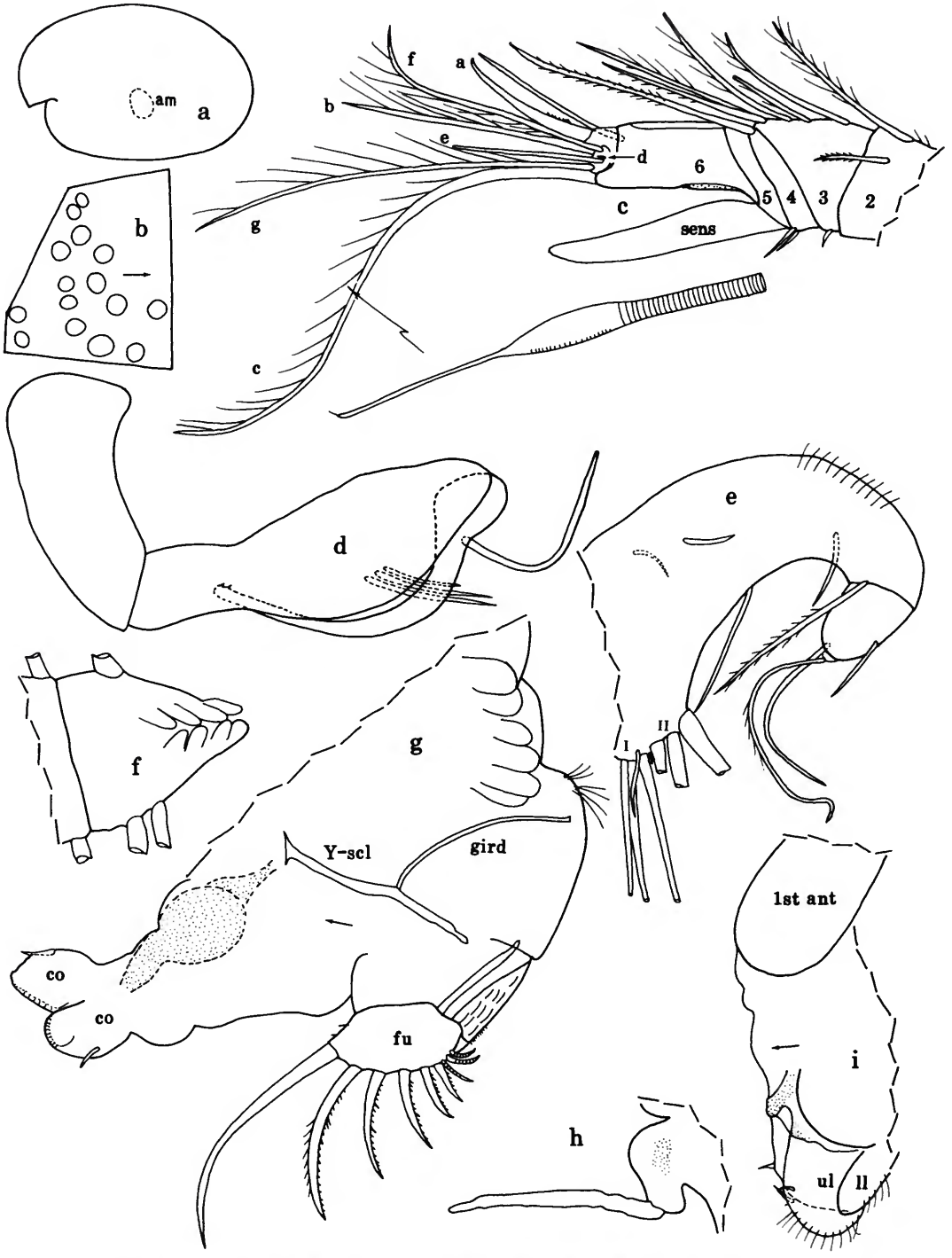


FIGURE 66.—*Parasterope whatleyi* Kornicker, new species, adult male, paratype, USNM 194013: *a*, complete specimen, length 1.41 mm; *b*, central adductor muscle attachments right valve, ov; *c*, distal left 1st antenna (filaments of sensory bristle not shown), lv; *d*, endopodite right 2nd antenna, mv; *e*, left maxilla (epipodite not shown), mv; *f*, tip 7th limb; *g*, posterior of body and left lamella of furca, lv; *h*, medial eye and Bellonci organ; *i*, anterior of body, lv.

length as a-bristle, bare with blunt tip; f-bristle about 1/2 length of c-bristle, with 8 slender marginal filaments; g-bristle about 2/3 length of c-bristle, with 9 marginal filaments (proximal 3 filaments slightly broader in proximal 1/3).

Second Antenna: Protopodite with short distal medial bristle. Endopodite 3-jointed (Figure 66*d*): 1st joint bare; 2nd joint broad distally, with 3 bare lateral bristles near ventral margin; 3rd joint reflexed on 2nd joint, with long proximal filament and narrow tip with 2 small ridges on inner edge. Exopodite: Bristles of joints 2–9 with natatory hairs; 9th joint with 4 bristles (2 long, 1 medium, 1 short dorsal); joints 2–8 with small basal spines; spine of 8th joint about 1/6 length of 9th joint; lateral spine of 9th joint 1/3 to 1/2 length of joint; joints 2–8 with minute spines on distal dorsal corner and long hairs along distal dorsal margin.

Mandible: Coxale endite broken off on both limbs of USNM 194013; small ringed bristle at base of ventral branch. Basale endite similar to that of adult female; each triaenid bristle with 6 pairs of slender spines proximal to terminal pair. Basale and exopodite similar to those of adult female. 1st endopodial joint with 3 ventral bristles (shortest with few long proximal spines followed by short spines; longest with long spines, other with short proximal and long distal spines). 2nd endopodial joint: Ventral margin with 3 long terminal bristles with short spines; dorsal margin with 2 proximal bristles (1 short and 1 medium) and a- to g-bristles similar to those of adult female; medial surface with 1 or 2 short cleaning bristles adjacent to b-bristle, 3 cleaning bristles adjacent to c-bristle (longest with stout distal spines), and rows of spines. 3rd endopodial joint similar to that of adult female except left limb of USNM 194013 with 3 instead of 4 stout bristles.

Maxilla (Figure 66*e*) *and Fifth Limb:* Similar to those of adult female.

Sixth Limb: Ventral and posteroventral margin with 14–16 bristles. Limb otherwise similar to that of adult female.

Seventh Limb (Figure 66*f*): Each limb with 11 bristles (5 distal, 2 or 3 on each side; 6 proximal, 3 on each side); each bristle with 2–4 bells. Terminal segment similar to that of adult female.

Furca (Figure 66*g*): Similar to that of adult female except claw 1 without teeth along posterior edge.

Bellonci Organ (Figure 66*h*), *Lips* (Figure 66*i*), *Posterior of Body* (Figure 66*g*), *and Y-Sclerite* (Figure 66*g*): Similar to those of adult female.

Genitalia (Figure 66*g*): Copulatory limbs coalesced proximally, separating distally into 2 lobes, each with 1 bristle.

Gills (Figure 66*g*): About 6 small gills on each side of body.

COMPARISONS.—The 6th limb of the female *P. whatleyi* bears a total 17 or 18 bristles along the ventral and posteroventral margin compared to 25 on *P. longungues* Poulsen (1965, fig. 127a). The small teeth of the terminal combs of the 7th limb and the small gills of *P. whatleyi* resemble those of *P. longungues*; Poulsen (1965:387) interpreted the slight development of the teeth of the combs of the 7th limbs of the specimen that he described as indicating it to be the last juvenile stage. He also interpreted the lack of endite bristles on the 6th limb of his specimen to indicate a last juvenile stage; however, on another member of the subfamily both endite bristles already appeared on the A–4 instar (Hiruta, 1979:117), so I think it likely that if the endite bristles are lacking on the A–1 instar of *P. longungues*, they also are lacking on the adult. A bristle is present on each of the 2 endites of the 6th limb of *P. whatleyi*. No previously described species of *Parasterope* other than *P. longungues* have a 7th limb with a cone-shaped tip and small weakly developed comb teeth similar to those of *P. whatleyi*. Previously described species herein also differ from *P. whatleyi* in having lateral eyes.

Homasterope Kornicker, 1975

TYPE SPECIES.—*Asterope curta* Skogsberg, 1920:498.

COMPOSITION.—Only one species is known from the vicinity of Australia, *H. trebax*, new species, herein.

DISTRIBUTION.—The genus was known previously from southern oceans between latitudes of 48°30′S and 65°S (Kornicker, 1975:525). The northern limit is expanded herein to 38°16.40′S.

Homasterope trebax Kornicker, new species

FIGURES 67–69

ETYMOLOGY.—From the Latin *trebax* (experienced, cunning, crafty).

HOLOTYPE.—NMV J35977, adult female on slide and in alcohol.

TYPE LOCALITY.—Slope 32, 38°21.90′S, 149°20.00′E, Victoria, S of Point Hicks; depth 1000 m.

PARATYPES.—Slope 32: NMV J35978, 1 adult male on slide and in alcohol; NMV J35979, partly dissected adult female in alcohol; NMV J35980, 4 juveniles in alcohol. Slope 33: NMV J35981, 2 juveniles in alcohol. Slope 34: NMV J35982, 1 ovigerous female on slide and in alcohol; NMV J35983, 1 undissected female (either late instar or adult) in alcohol (length 1.23 mm; height 0.88 mm).

DISTRIBUTION.—Slope 32, 1000 m; Slope 33, 930 m; Slope 34, 800 m.

DESCRIPTION OF ADULT FEMALE (Figures 67, 68).—Carapace pear-shape in lateral view (Figure 67*a,e*).

Infold: Rostral infold with 20 bristles anterior and dorsal to list, 3 bristles along list, and 3 bristles posterior to list; anteroventral infold with 12 bristles; ventral infold to point opposite ventral of the hyaline flap-like bristle of broad posteroventral list with 8 bristles. Narrow list with anterior end ventral to incisur continues along ventral margin then broadens along posteroventral and posterior margins. Broad part of list with 21 hyaline flap-like bristles and 6–8 small bristles (not more than 1 small bristle between adjacent flap-like bristles); right valve only with bristle between list and posterodorsal corner of shell edge; no additional bristles or processes between broad list and posterior shell edge.

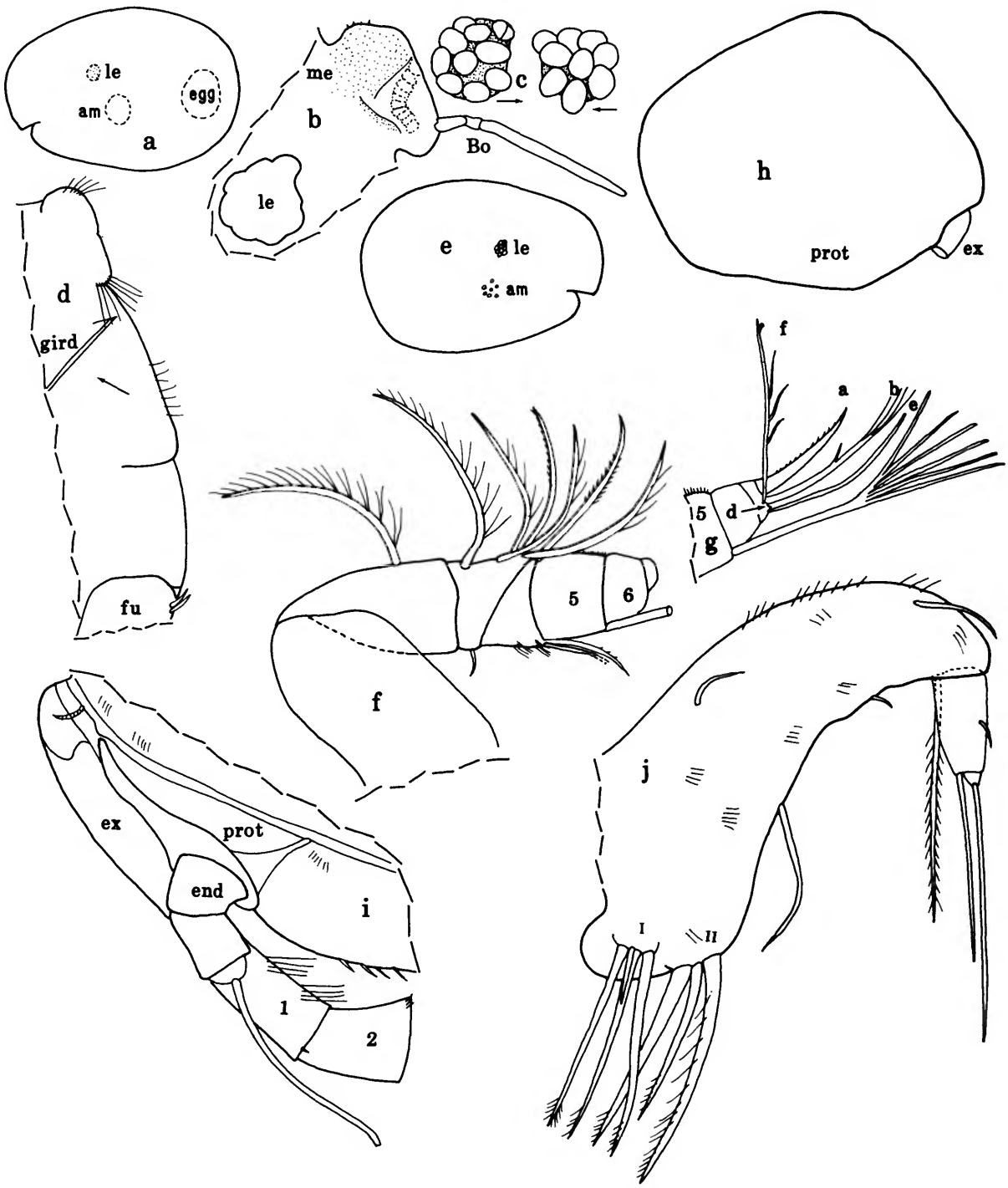


FIGURE 67.—*Homasterope trebax* Kornicker, new species, ovigerous female, paratype, NMV J35982: *a*, complete specimen, length 1.37 mm; *b*, medial eye, Bellonci organ, and outline of right lateral eye; *c*, right and left lateral eyes, respectively, lv; *d*, posterior of body, lv. Adult female, holotype, NMV J35977: *e*, complete specimen, length 1.40 mm; *f*, right 1st antenna (nabs), lv; *g*, distal right 1st antenna (nabs), lv; *h*, protopodite left 2nd antenna, mv; *i*, distal protopodite, endopodite, and joints 1 and 2 of exopodite right 2nd antenna, mv; *j*, left maxilla (epipodite not shown), mv.

Selvage: Short lamellar prolongation with long marginal fringe along inner end of ventral edge of incisur.

Vestment: Long spines present on vestment just proximal to inner margin of infold near anterodorsal corner of valve.

Carapace Size (length, height in mm): Slope 32: NMV J35977 (holotype), 1.40, 0.99, height 71% of length; NMV J35979: paratype, 1.39, 1.00, height 72% of length. Slope 34: NMV J35982 (paratype), 1.37, 0.98, height 72% of length. Length range 1.37–1.40, height range 0.98–1.00, range height as percent of length 71–72.

First Antenna (Figure 67*f,g*): 1st and 2nd joints spinous (spines not shown); 2nd joint with long recurved dorsal bristle with long spines. 3rd and 4th joints separated by distinct suture better developed on medial side; 3rd joint with 1 small ventral bristle and 5 dorsal bristles (distal 2 paired, others single; proximal bristle stout, recurved, with long spines; 2nd bristle and lateral of distal pair with proximal part parallel to dorsal edge of joint, and with few long spines; 3rd bristle similar to 1st but thinner; medial bristle of distal pair with short spines). 4th joint with long dorsal bristle with short spines and 2 slender ventral bristles; ventral margin with distal spines. 5th joint (Figure 67*g*): Distodorsal margin of holotype with minute lateral spines along edge, but spines absent on paratype from Slope 34; sensory bristle long slender with 6 long terminal filaments. Medial bristle of 6th joint reaching tip of a-bristle of 7th joint (not shown), with short spines. 7th joint (Figure 67*g*): a-bristle with short dorsal spines; b-bristle about $^1/_4$ longer than a-bristle, with short proximal filament and 3 long distal filaments excluding stem; c-bristle reaching past sensory bristle of 5th joint, about $^1/_3$ longer than b-bristle, with 5 marginal filaments excluding stem (bristle not shown). 8th joint (Figure 67*g*): d-bristle represented by minute papilla; e-bristle about same length as b-bristle, bare with blunt tip; f-bristle bent dorsally, with 4 short filaments excluding stem; g-bristle with tip broken off, with 4 filaments on remaining part (not shown).

Second Antenna (Figure 67*h,i*): Protopodite with small distomedial bristle, abundant medial spines, few slender spines along distal dorsal edge and stouter spines along distal ventral edge (Figure 67*i*, spines not shown in Figure 67*h*). Endopodite 3-jointed with long terminal filament about $^1/_3$ to $^1/_2$ longer than length of combined joints 1–3. Exopodite: 1st joint with minute medial bristle on terminal edge and long distal medial spines near dorsal margin; bristle of 2nd joint reaching just past 9th joint, with abundant slender ventral spines; bristle of 3rd joint with slender proximal ventral spines, proximal dorsal hairs, and distal ventral and dorsal hairs; bristles of 4th and 5th joints similar to that of 3rd but spines smaller or absent; bristles of joints 6–8 with natatory hairs, no spines; 9th joint with 3 bristles (2 long with natatory hairs, 1 short with small spines); basal spines absent; joints 2–8 with minute spines on distal edges.

Mandible: Coxale endite with small bristle at base of ventral branch (endite broken off on both mounted specimens). Basale endite with 4 end bristles, 2 dwarf bristles (1 much smaller than other), glandular peg, and 3 triaenid bristles, each with 4 pairs of spines excluding terminal pair. Basale: Ventral margin with 1 triaenid bristle (with 4 or 5 pairs of spines excluding terminal pair) close to proximal end of endite, and U-shaped boss; dorsal margin with long slender proximal spines near endite and 2 long terminal bristles; medial surface with long spines in dorsal half. Exopodite about $^4/_5$ length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 small spinous subterminal bristles. 1st endopodial joint with 3 ventral bristles (shortest with short spines, others with long spines). 2nd endopodial joint: Ventral margin with 3 terminal bristles with short spines; dorsal margin with 1 fairly long proximal bristle and stout spinous a-, b-, c-, and d-bristles; lateral surface with long e-bristle between b- and c-bristles, and long f-bristle between c- and d-bristles; medial surface with distal rows of spines, 4 cleaning bristles (1 just distal to base of b-bristle, 3 in oblique row near base of c-bristle), and 1 long spinous g-bristle just distal to base of d-bristle. 3rd endopodial joint with stout straight dorsal claw with about 20 ventral teeth, and 5 spinous bristles (shortest about $^3/_5$ length of dorsal claw).

Maxilla (Figure 67*j*): Endite I with 1 short and 3 long bristles; endite II with 3 long bristles (middle bristle shorter and slenderer). Epipodite with distal hairs (not shown). Basale: Dorsal margin spinous, with 2 bristles with bases on medial side (1 proximal, 1 distal); ventral margin with long backward-pointing proximal bristle, 1 short distal bristle, and 1 long spinous terminal bristle; lateral side with 1 proximal bristle at midheight (not observed on all specimens) (not shown). 1st endopodial joint with small bare alpha-bristle and 1 long beta-bristle. 2nd endopodial joint with long terminal bristle extending well past beta-bristle.

Fifth Limb (Figure 68*a*): Comb with stout spinous exopodial bristle reaching past end of comb, 2 short slender bristles ventral to base of stout bristle, and 2 pairs of bristles near ventral margin of comb; 31–36 bristles along ventral margin (only distal bristle shown in Figure 68*a*).

Sixth Limb (Figure 68*b*): Small ringed medial bristle in anterior dorsal corner. Anterior margin with bristle at upper and lower endite sutures and 1 or 2 bristles (usually 1) dorsal to bristle of upper suture. Anteroventral corner with 3 bristles; lateral flap hirsute but without bristles. Ventral and posteroventral margin with 16–18 spinous and hirsute bristles (not all spines and hairs shown).

Seventh Limb (Figure 68*c*): Limb with 12 bristles: 6 proximal (3 on each side) and 6 distal (3 on each side), each bristle with 3 or 4 bells. Terminus with opposing combs, each with 5 spinous teeth.

Furca (Figure 68*d*): Each lamella with 8 or 9 claws (right lamella of ovigerous female from Slope 34 aberrant in having a 10th claw close to claw 7 and similar to it); claws 1–7 with teeth along posterior edges (not shown); other claws ringed, bristle-like, recurved; claws 1–3 or 4 with slender spines along anterior edge (not shown); right lamella anterior to left by width of base of claw 1.

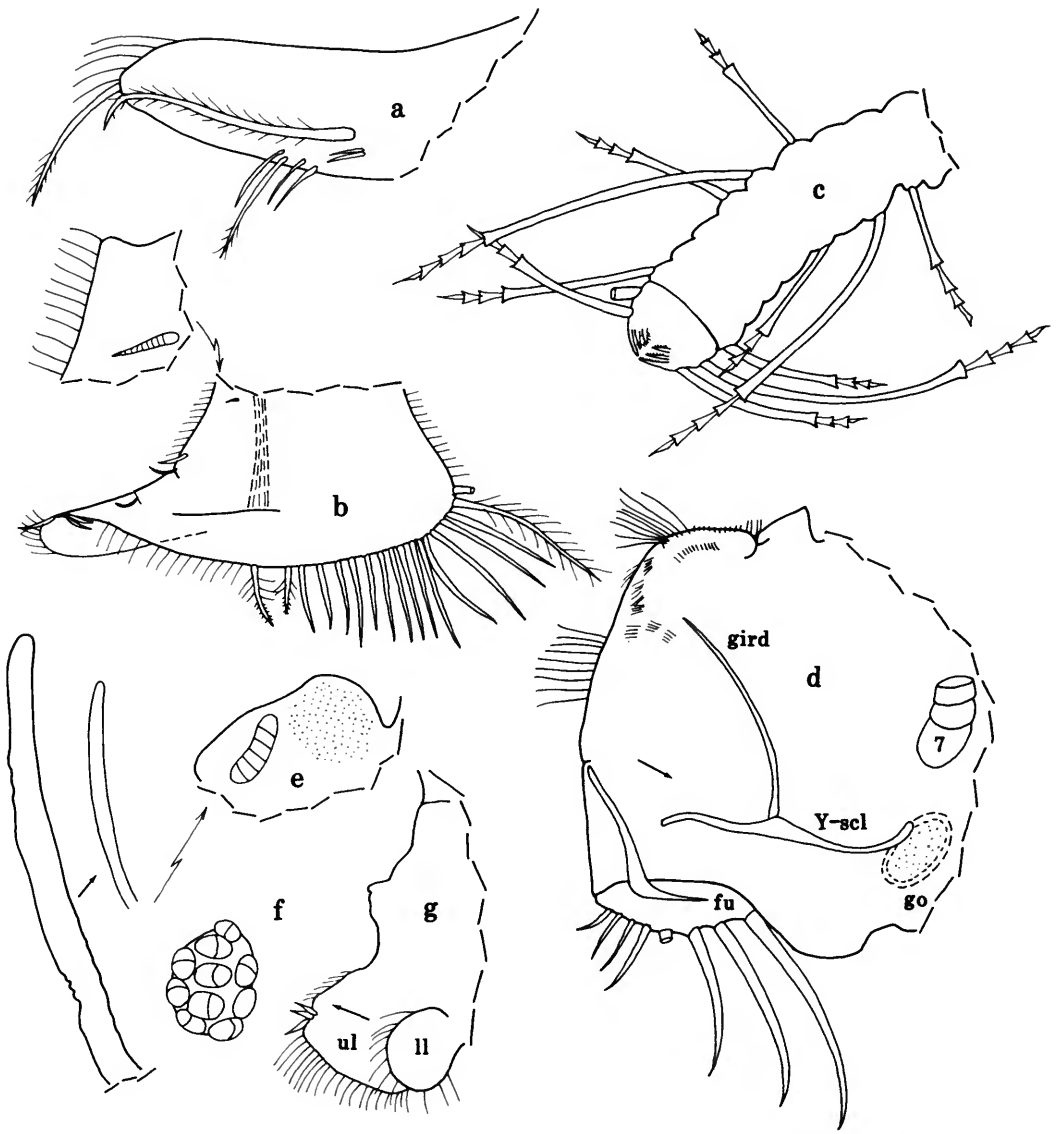


FIGURE 68.—*Homasterope trebax* Kornicker, new species, adult female, holotype, NMV J35977: *a*, comb left 5th limb (nabs), lv; *b*, right 6th limb, mv; *c*, 7th limb; *d*, posterior of body and right lamella of furca, lv; *e*, medial eye and Bellonci organ; *f*, lateral eye; *g*, anterior of body, lv.

Bellonci Organ (Figure 68*e*): Elongate, cylindrical, with or without 1 or 2 indistinct proximal sutures, and with rounded tip.

Eyes: Lateral eye well developed, with 9–13 large divided light amber-colored ommatidia; slightly darker amber-colored or brown pigment between ommatidia (Figures 67*a–c,e*, 68*f*). Medial eye about 1/3 larger than lateral eye, bare or with few short spines, contains area with brown pigment (stippled in Figure 68*e*). Both lateral and medial eyes visible though shell.

Lips (Figure 68*g*): Upper lip with 2 adjacent hirsute lobes separated by saddle; each lobe with 3 weak broad anterior spines; saddle with 2 minute anterior spines (spines not shown). Lower lip with hirsute lateral lap on each side of mouth.

Genitalia (Figure 68*d*): Oval ring on each side of body anterior to furca.

Posterior of Body (Figures 67*d*, 68*d*): Hirsute at mid-height; dorsal corner with long spines.

Y-*Sclerite* (Figure 68*d*): Typical for genus.

Gills: Weakly developed.

Eggs: NMV J35979 with 6 eggs in marsupium (1 egg shown in Figure 67*a*); length of typical egg including

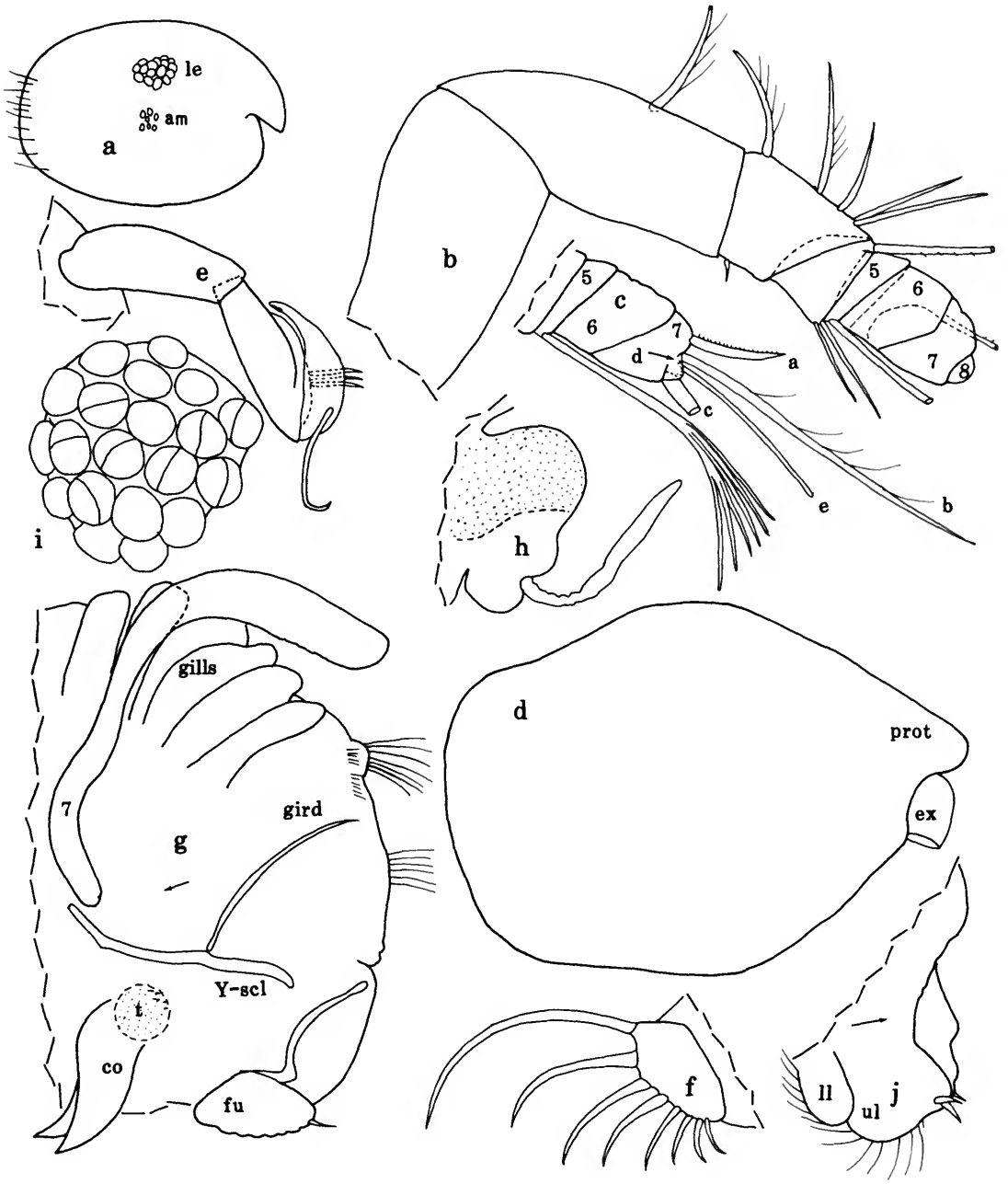


FIGURE 69.—*Homasterope trebax* Kornicker, new species, adult male, paratype, NMV J35979: *a*, complete specimen, length 1.49 mm; *b*, right 1st antenna (nabs); lv; *c*, tip right 1st antenna (nabs), lv; *d*, protopodite left 2nd antenna (drawn at same magnification as female protopodite in Figure 67*h*,), mv; *e*, endopodite left 2nd antenna, mv; *f*, left lamella furca, lv; *g*, posterior of body (bristles of 7th limb (7) and most furcal claws not shown), lv; *h*, medial eye and Bellonci organ (pigmented area stippled); *i*, left lateral eye; *j*, lips, lv.

transparent sheath 0.35 mm; length excluding sheath 0.33 mm. Holotype with small unextruded eggs.

DESCRIPTION OF ADULT MALE (Figure 69).—Carapace oval in lateral view (not pear-shape like adult female) (Figure 69*a*). Long and short hairs form vertical row near posterior end of valve.

Infold: Rostral infold with 15 bristles anterior and dorsal to list, 3 bristles along list, and 3 bristles posterior to list; anteroventral infold with 12 bristles; ventral infold to point opposite ventral of the hyaline flap-like bristles of broad posteroventral list with 6 bristles. Topography of list similar to that of adult female; broad posteroventral and posterior list with 18 hyaline flap-like bristles and 3 small bristles (not more than 1 small bristle between adjacent flap-like bristles); right valve only with bristle between list and posterodorsal corner of valve edge; no additional bristles or processes between broad list and posterior edge of valve. (Left valve of specimen from Slope 32 aberrant in having no list on rostrum.)

Selvage: Lamellar prolongation along ventral edge of incisur narrower than that of adult female and without fringe of long hairs.

Vestment: With long spines near anterodorsal corner as on adult female.

Carapace Size (length, height in mm): Slope 32: NMV J35978, 1.49, 1.05, height 70% of length.

First Antenna (Figure 69*b,c*): 1st joint bare. 2nd joint with medial spines (not shown) and 1 dorsal bristle with long spines. 3rd joint longer than that of female; separated from 4th joint by distinct suture; short ventral margin with 1 small bristle; long dorsal margin with 5 bristles (distal paired, others single; proximal bristle stout, recurved, with long spines; 2nd bristle separated from 1st by wide space, slender with long spines; remaining bristles slender, bare). 4th joint with long slender dorsal bristle and 2 shorter slenderer ventral terminal bristles. 5th joint much shorter than that of adult female, with similar sensory bristle, but without dorsal spines (Figure 69*c*). Medial bristle of 6th joint with base close to dorsal margin and reaching past tip of a-bristle of 7th joint, with few small spines (Figure 69*b*). 7th joint (Figure 69*c*): a-bristle with short dorsal spines; b-bristle almost 4 times length of a-bristle, with 5 marginal filaments; c-bristle with tip broken off, stump about 5 times length of b-bristle and with 15 short marginal filaments. 8th joint (Figure 69*c*): d-bristle represented by small papilla; e-bristle shorter than b-bristle, bare with blunt tip; f-bristle not bent dorsally as on adult female, broken but similar to c-bristle (not shown); g-bristle about $2^1/_2$ times length of b-bristle, with about 7 marginal filaments (not shown).

Second Antenna: Protopodite about 40% longer than that of female (Figure 69*d*), with small distal medial bristle (not shown); without spines present on female. Endopodite with 3 elongate joints (Figure 69*e*): 1st joint bare; 2nd joint with 2 or 3 short bristles just distal to midlength; 3rd joint reflexed, with long proximal filament, and tip with about 6 minute ridges. Exopodite: Bristle of 2nd joint more than twice combined lengths of joints 2–9; bristles of joints 2–8 with natatory hairs, no spines; 9th joint with 3 bristles (2 long, 1 medium, all with natatory hairs); basal spines not observed, also lateral spine of 9th joint not observed; no long spines on 1st joint (present on female).

Mandible: Coxale endite with small bristle near base of ventral branch; endite broken off on both limbs of NMV J35978. Basale endite similar to that of adult female. Basale: ventral margin similar to that of adult female; dorsal margin with 1 or 2 bare slender bristles just distal to midlength (absent on female), and 2 longer terminal bristles of same length; joint without spines present on female. Exopodite and 1st and 3rd endopodial joints similar to those of adult female. 2nd endopodial joint: Ventral margin with 3 long spinous terminal bristles; dorsal margin with 2 long proximal bristles, and stout a- to g-bristles similar to those of adult female; medial surface spinous, with 3–5 cleaning bristles (0 or 1 near base of b-bristle, and 3 or 4 in oblique row between b- and c-bristles).

Maxilla: Epipodite with hirsute pointed tip reaching midlength of dorsal margin of basale (fragmented on female examined). Proximal lateral bristle on basale at midheight (obscured on female). Limb otherwise similar to that of adult female.

Fifth Limb: Details obscured on NMV J35978 but of similar type to that of female.

Sixth Limb: Shape of limb similar to that of adult female. Each limb of NMV J35978 with 1 bristle on upper and lower endites and 1 similar bristle just dorsal to upper endite bristle. Small medial bristle in anterodorsal corner; 3 slender bristles at anteroventral corner; no bristles on lateral flap. Ventral and posteroventral margin with 12 or 13 spinous and hirsute bristles.

Seventh Limb: Similar to that of adult female (bristles and combs not shown in Figure 69*g*).

Furca (Figure 69*f*): Left lamella with 8 claws, right with 9; furca otherwise similar to that of adult female.

Bellonci Organ (Figure 69*h*): Elongate with rounded tip, similar to that of adult female.

Eyes: Maximum length of lateral eye twice that of female eye, with 20 amber-colored ommatidia (female with only 10) (Figure 69*a,i*); matrix between ommatidia with darker amber-colored pigment; eye visible through shell. Medial eye smaller than lateral eye, similar to that of adult female (Figure 69*h*).

Upper Lip (Figure 69*j*): Similar to that of adult female.

Genitalia (Figure 69*g*): Oval amber-colored testis on each side of body; copulatory organ appears joined in proximal part then divided distally into 2 scoop-like prongs.

Posterior of Body (Figure 69*g*): With hairs at midheight and low dorsal protuberance with long spines.

Y-*Sclerite* (Figure 69*g*): Similar to that of adult female.

Gills (Figure 69*g*): With 6 narrow weakly developed translucent gills on each side of posterodorsal part of body.

COMPARISONS.—The 6th limb of *H. trebax* differs from the 4 previously described species of the genus in having 1 or 2 bristles dorsal to the bristle of the upper endite of the 6th limb (other species have none). The lateral eye of the female *H. trebax* has 9–13 ommatidia compared to 20 for *H. maccaini* Kornicker, 1975:526. The lateral eye of the female *H. micra* has 10 ommatidia, but the carapace differs from that of *H. trebax* in

having 25–29 bristles between the broad list and the posterior margin of the valve (*H. trebax* has 1 at most). Only the male is known of *H. glacialis* (Müller, 1912:47); that species is smaller than *H. trebax*, has fewer claws on the furca, and has more bristles on the 7th limb. *Homasterope curta* (Skogsberg, 1920:467) has about 80 bristles between the broad list and the posterior margin of valve compared to none or 1 for *H. trebax*.

Xandarasterope Kornicker, new genus

ETYMOLOGY.—From the Greek *xandaros* (a fabulous sea-monster) plus *asterope*.

TYPE SPECIES.—*Xandarasterope storthynx*, new species herein.

COMPOSITION.—Two new species described herein.

DISTRIBUTION.—New South Wales, off Nowra, 1545–2250 m; off Victoria, Australia; depth 1277–2900 m.

DIAGNOSIS.—The genus is defined on the following characters.

Carapace Size Rostrum overhanging lower edge of incisur at inner end of incisur.

First Antenna: Sensory bristle of 5th joint of adult female with 1 short proximal filament and 6 long terminal filaments. d- and e-bristles of 8th joint well developed filament-like, almost equilength, both with parallel sides and blunt tips.

Mandible: Exopodite about half length of dorsal margin of 1st endopodial joint. Dorsal margin of 2nd endopodial joint with lateral bristle (e-bristle) between b- and c-bristles.

Maxilla: Exopodite absent. 1st endopodial joint with 1 alpha-bristle and 1 beta-bristle. 2nd endopodial joint with 1 terminal bristle.

Furca: Each lamella trapezoidal in shape and with slender bristles between and slightly lateral to main claws.

COMPARISONS.—The only previously described genus in the Cylindroleberidinae with slender bristles between furcal claws is *Dolasterope* Poulsen, 1965:318 (known only from the type species). *Dolasterope* differs from *Xandarasterope* in having the inner end of the incisur rounded, numerous filaments (23 on the type species) on the distal half of the sensory bristle of the 5th joint of the female 1st antenna, 2 bristles on the 2nd endopodial joint of the maxilla, and a triangular furcal lamella.

Xandarasterope storthynx Kornicker, new species

FIGURES 70–73

Xandarasterope species A, Kornicker, 1994, fig. 111d-f.

ETYMOLOGY.—From the Greek *storthynx* (point, spike).

HOLOTYPE.—NMV J40026, partly dissected adult female in alcohol.

TYPE LOCALITY.—Slope 66, 38°40.29′S, 149°18.06′E, Victoria, 96 km S of Point Hicks; depth 2900 m.

PARATYPES.—Slope 17: USNM 193999, 1 ovigerous female on slide and in alcohol; NMV J40023, 1 juvenile in alcohol. Slope 66: USNM 193958, 1 ovigerous female on slide and in alcohol; NMV J40024, 1 late juvenile (length 2.02 mm, height 1.45 mm); NMV J40025, 1 early juvenile (length 1.64 mm, height 1.22 mm).

DISTRIBUTION.—Slope 17, 2250 m. Slope 66, 2900 m.

DESCRIPTION OF ADULT FEMALE (Figures 70–73).—Carapace oval in lateral view with incisur ventral to valve midheight; dorsal and ventral margins strongly convex (Figures 70*a*, 73*a,c*).

Infold: Rostral infold dorsal to list of right valve of USNM 193958 with about 10 long bristles, 30 short bristles, and about 10 empty sockets once containing bristles (Figure 70*c*); rostral infold with about 6 long bristle along list and about 25 long bristles between list and incisur (Figure 70*c*); anteroventral infold with about 90 bristles; narrow list with anterior end near inner end of incisur continues along ventral margin then broadens along posteroventral and posterior infolds (Figure 70*d,e*); ventral infold to point opposite ventral hyaline flap-like bristle on broad posteroventral list with about 60 bristles between list and valve edge; posteroventral and posterior infolds (from point opposite ventral flap-like bristle) with row of about 11 long bristles followed by about 40 shorter bristles (not all shown in Figure 70*d,e*); 7 short tubular processes between posterior list and valve edge in same region as row of small bristles (Figure 70*d*); broad posteroventral and posterior list with 28–31 broad hyaline flap-like bristles and 64 (USNM 193999) to 108 (USNM 193958) closely spaced slender bristles (about 16 long, remainder short; generally about 2–4 slender bristles between each pair of flap-like bristles) in row anterior to hyaline flap-like bristles (not all shown in Figure 70*d,e*); some flap-like bristles longer and broader than others and with about 10 tubular pores at base (not all shown in Figure 70*d,e*); on left valve only of USNM 193958 posterior part of ventral infold with small crescent-like structures (the 10 posterior of these shown in Figure 70*e*).

Selvage: Short fringed lamellar prolongation along inner part of ventral edge of incisur (Figure 70*c*). Short fringed segment also present on right valve just dorsal to dorsal end of broad posterior list.

Vestment: Vestment proximal to anterodorsal infold with long spines; a few spines on posterodorsal vestment just dorsal to broad posterior list.

Central Adductor Muscle Attachments (Figures 70*b*, 73*c,d*): Comprising 53–56 small ovoid attachments.

Carapace Size (length, height in mm): Slope 17: USNM 193999, 2.22, 1.68, height 76% of length. Slope 66: Holotype, 2.39, 1.99, height 83% of length; USNM 193958, 2.37, 1.85, height 78% of length. Length range 2.22–2.39, height range 1.68–1.99; range of height as percent of length 76–83.

First Antenna: 1st and 2nd joints spinous; 2nd joint with long spinous dorsal bristle and backward-pointing lateral bristle (Figure 70*f*). 3rd joint with distinct suture separating it from 4th joint, with row of distal spines on ventral margin extending onto lateral surface, 1 small bare ventral bristle, and 6 dorsal bristles (proximal 4 single with long spines; next 2 paired (lateral with long spines, medial with short spines)). 4th

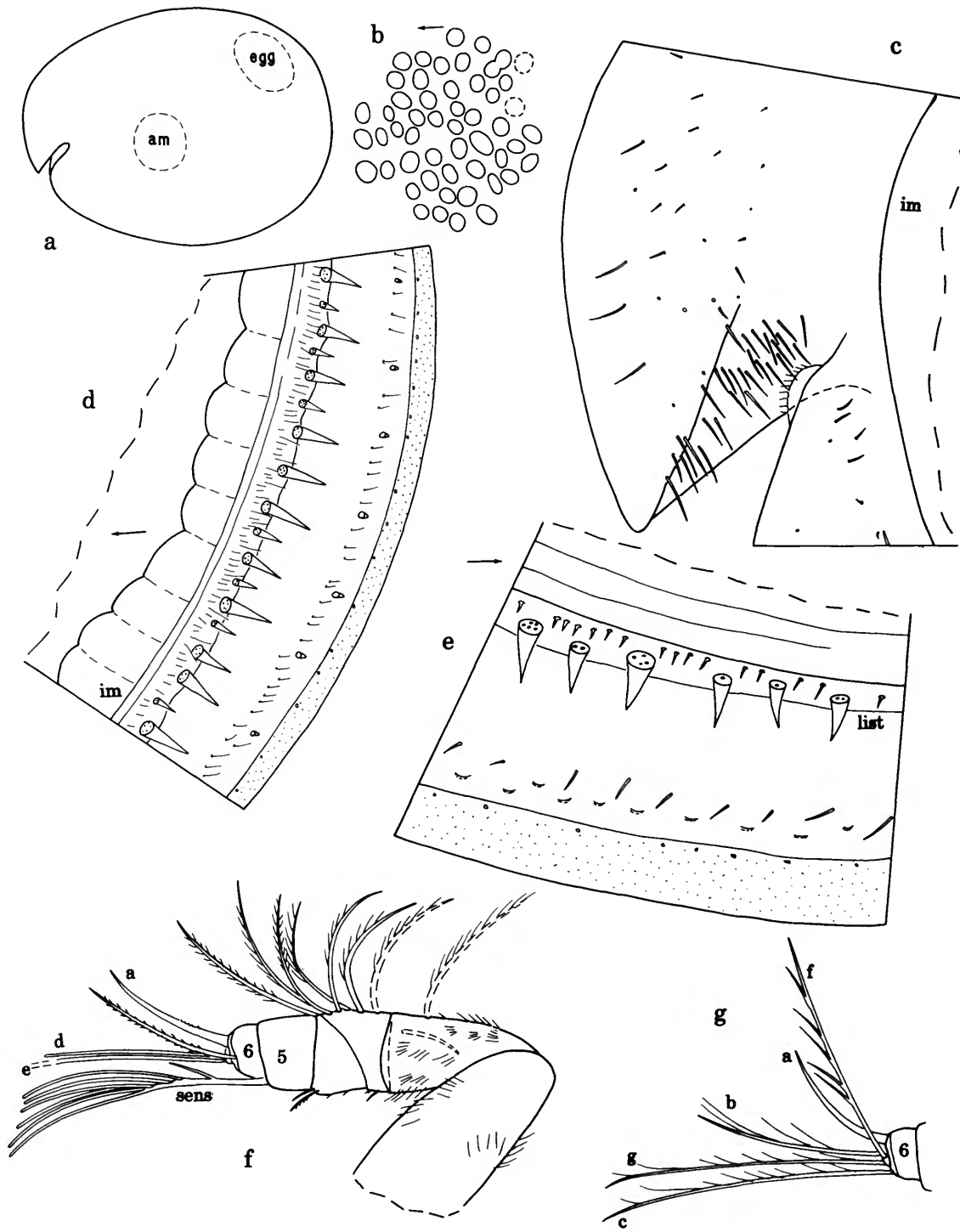


FIGURE 70.—*Xandarasterope storthynx* Kornicker, new species, ovigerous female, paratype, USNM 193958: *a*, complete specimen, length 2.37 mm; *b*, central adductor muscle attachments left valve, ov; *c,d*, anterior and posterior infolds, respectively, of right valve, iv; *e*, posteroventral infold left valve, iv; *f*, right 1st antenna (nabs), mv; *g*, tip left 1st antenna (nabs), lv.

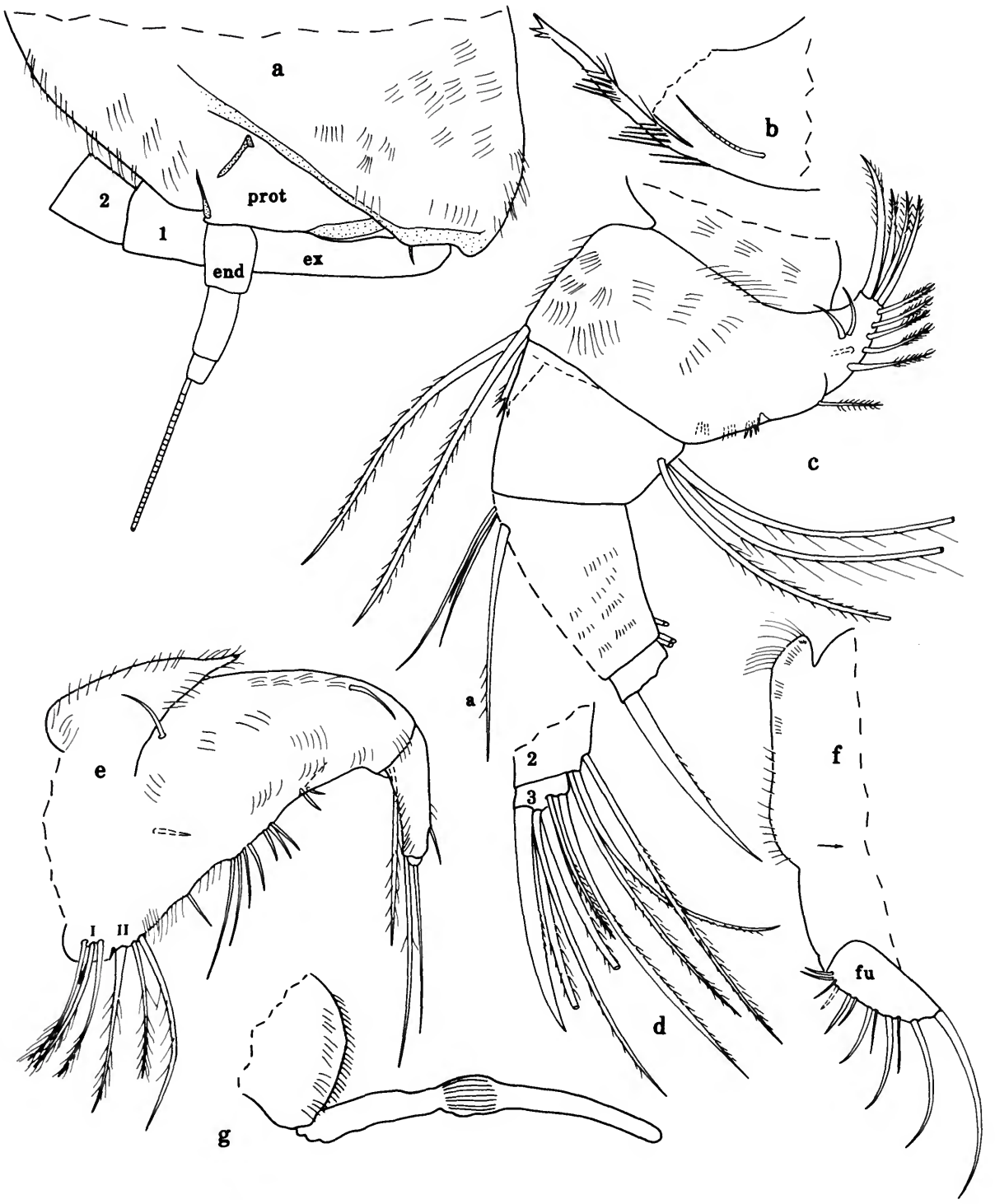


FIGURE 71.—*Xandarasterope storthynx* Kornicker, new species, ovigerous female, paratype, USNM 193958: *a*, part left 2nd antenna, mv; *b*, ventral branch coxale endite left mandible, mv; *c,d*, proximal and distal parts right mandible (nabs), mv; *e*, left maxilla, mv; *f*, posterior of body and right lamella of furca, lv; *g*, medial eye and Bellonci organ, lv.

joint with ventral spines, 2 small ventral bristles (bare or with short spines), and 1 long dorsal bristle with short spines. Sensory bristle of 5th joint long slender, with short proximal filament and 6 long distal filaments. Medial bristle of 6th joint long, with short spines. 7th joint (Figure 70*g*): a-bristle claw-like with minute dorsal spines in proximal third; b-bristle about 1/3 longer than a-bristle, with 4 marginal filaments; c-bristle about 2 1/2 times length of a-bristle, with 9 marginal filaments. 8th joint (Figures 70*f,g*, 73*b*): d- and e-bristles filament-like, slightly longer than f-bristle, bare with blunt tips; e-bristle stouter than d-bristle (distal part of d- and e-bristles broken off on USNM 193958 (Figure 70*f*), but on holotype d-bristle complete on left limb, and e-bristle complete on right limb (composite shown in Figure 73*b*)); f-bristle almost twice length of a-bristle, bent dorsally, with 5 marginal filaments; g-bristle about same length as c-bristle, with 8 marginal filaments.

Second Antenna (Figures 71*a*, 73*e*): Protopodite with abundant slender spines on dorsal and ventral margins and medial surface, and small bare distomedial bristle. Endopodite well developed, distinctly 3-jointed, with long terminal filament. Exopodite: 1st joint with few distal spines on concave margin (not shown); bristle of 2nd joint reaching end of 9th joint, with abundant fairly short hair-like spines; bristles of joints 3–8 with natatory hairs, some also with minute spines at about 1/3 length; 9th joint with 3 bristles (2 long with natatory hairs, 1 short (dorsal) with few small hairs); joints 2–8 with row of small spines along distal edges but no basal spines; 9th joint with 1 or 2 small lateral spines.

Mandible: Coxale endite (Figure 71*b*): Dorsal branch with long slender bare bristle near base of ventral branch (dorsal branch broken off on both limbs of USNM 193958); ventral branch with 3 or 4 oblique rows of slender spines and tip with 3 small teeth (dorsal larger). Basale endite with small glandular peg, 2 dwarf bristles, 5 triaenid bristles with 14–19 pairs of spines excluding terminal pair, and 4 spinous end bristles (Figure 71*c*). Basale (Figure 71*c*): Ventral margin with 1 triaenid bristle (with 8–11 paired spines excluding terminal pair) close to base of endite and proximal to U-shaped boss, and several fairly stout spines distal to U-shaped boss; dorsal margin with spines and 2 long stout terminal bristles with short spines; medial and lateral surfaces with rows of spines. Exopodite reaching midlength of dorsal margin of 1st endopodial joint, hirsute with 2 short subterminal bristles (Figure 71*c*). 1st endopodial joint with 3 long ventral bristles (shortest with short spines, others with long spines). 2nd endopodial joint: Dorsal margin with 3 short slender proximal bristles (Figure 71*c*), stout spinous a-, b-, c-, and d-bristles (all about same width and length), long spinous lateral e-bristle between b- and c-bristles, long stout lateral f-bristle (about same length as d-bristle) between c- and d-bristles, and long stout spinous medial g-bristle just distal to base of d-bristle; medial surface with spines, and 16–18 spinous cleaning bristles near dorsal margin (not shown); ventral margin with 3 long spinous terminal bristles (Figure 71*d*). 3rd endopodial joint with straight dorsal claw with few minute ventral teeth at midlength and 1 short and 4 long spinous bristles (Figure 71*d*).

Maxilla (Figure 71*e*): Endite I with 1 short bristle and 3 long spinous bristles; endite II with 3 long spinous bristles and 1 minute bare bristle. Epipodite hirsute, with narrow tip reaching to about midlength of dorsal margin of basale. Basale: hirsute; dorsal margin with 2 bristles (1 proximal, 1 distal); ventral margin with 6 slender bristles on USNM 193999 and 9 or 10 on USNM 193958, and 1 long spinous terminal bristle; lateral side with short proximal bristle near midheight. 1st endopodial joint with ventral and dorsal hairs, short distal alpha-bristle, and long beta-bristle. 2nd endopodial joint with terminal bristle either shorter than beta-bristle or about same length.

Fifth Limb (Figure 72*a*): Comb with stout spinous exopodial bristle reaching past tip of comb, 2 slender bristles just ventral to base of stout bristle, 2 pairs of bristles closer to ventral edge of comb, long hairs (not all shown) on dorsal edge of tip, and abundant short slender hairs (with bases on medial side and medial to ventral bristles) along ventral edge; 4 bristles with bases on lateral side almost on ventral margin (1 proximal, 1 at midlength, 2 near tip).

Sixth Limb (Figure 72*b*): Small medial spine in proximal anterior corner. Anterior margin with a short bristle at upper and lower endite sutures; anteroventral corner with 2 short bristles on USNM 193999 and 4 short bristles on USNM 193958; lateral flap with 2 or 3 hirsute bristles (anteroventral corner plus lateral flap with total of 5–7 bristles); ventral and posterior margins with 23–29 bristles (posterior 7 or 8 plumose, others with long proximal and short distal hairs). Limb hirsute.

Seventh Limb (Figure 72*c*): Each limb with 17–22 bristles (holotype and USNM 193999 with 17 or 18 bristles; USNM 193958 with 22 bristles); 2 long proximal and 2 long terminal bristles with 4 or 5 bells, others with 2 or 3 bells. Terminus with opposing combs, each with 12–15 spinous teeth.

Furca (Figures 71*f*, 72*d*, 73*f,g*): Each lamella with 6 stout claws followed by 3 ringed bristle-like claws; 2 or 3 lateral bristles (similar to bristle-like claws) present almost on ventral margin (1 between claws 2 and 3, 1 between claws 3 and 4, and 1 or none between claws 4 and 5); right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figures 71*g*, 73*h*): Elongate, broadening and striated near midlength; sides subparallel or tapered distal to broad segment; tip broadly rounded.

Eyes: Lateral eyes absent. Medial eye unpigmented, with abundant dorsal hairs (Figures 71*g*, 73*h*).

Lips (Figures 72*e*, 73*i*): Upper lip with 2 hirsute lobes separated by saddle; anterior margin of saddle hirsute, undulate, with 1–3 short spines, and appearing more sclerotized than usual for members of subfamily; each lobe with

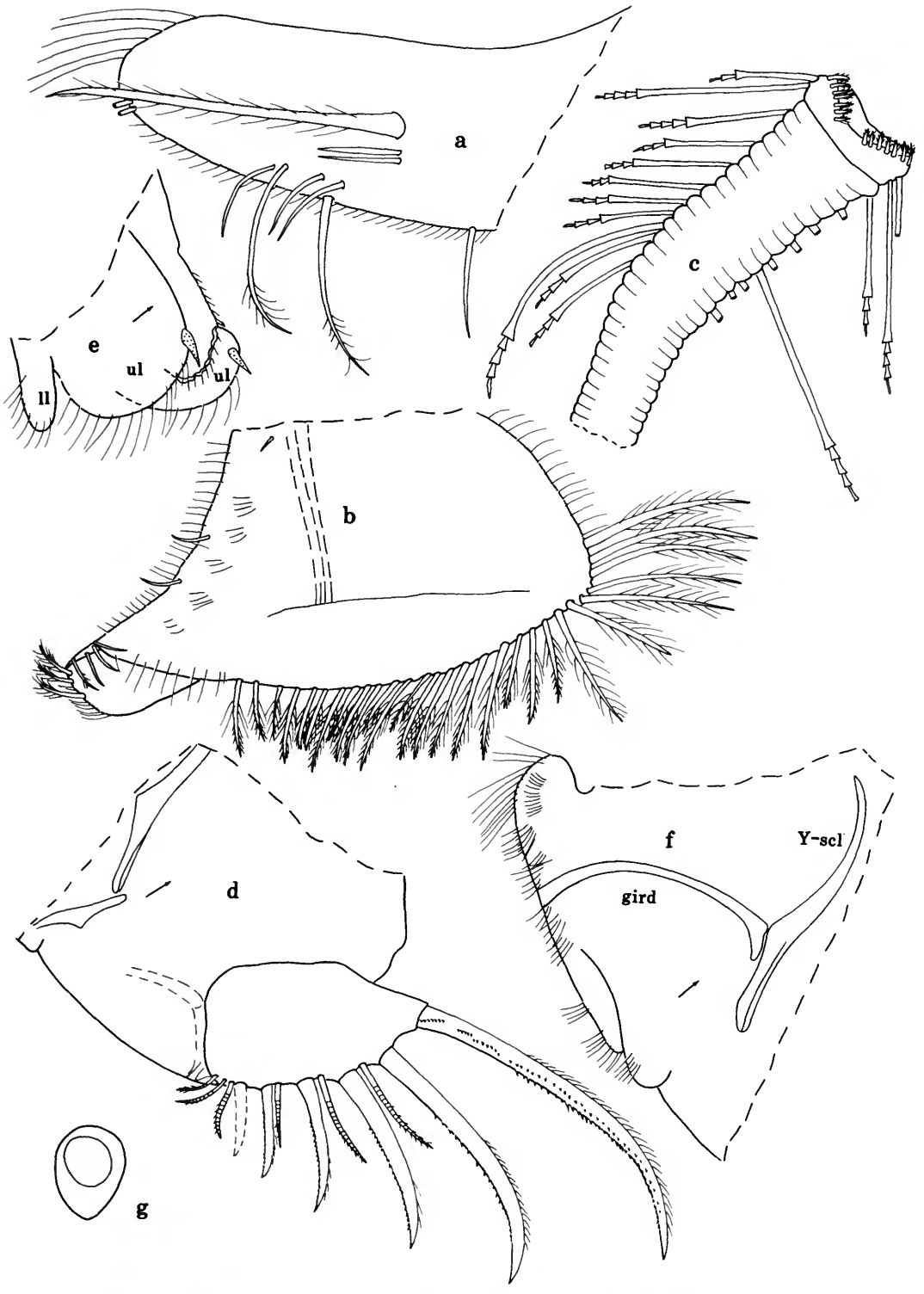


FIGURE 72.—*Xandarasterope storthynx* Kornicker, new species, ovigerous female, paratype, USNM 193958: *a*, comb left 5th limb, lv; *b*, right 6th limb, mv; *c*, 7th limb; *d*, right lamella furca, lv; *e*, upper lip, showing both left and right lobes, and right lower lip; *f*, posterodorsal part of body, lv; *g*, genitalia(?).

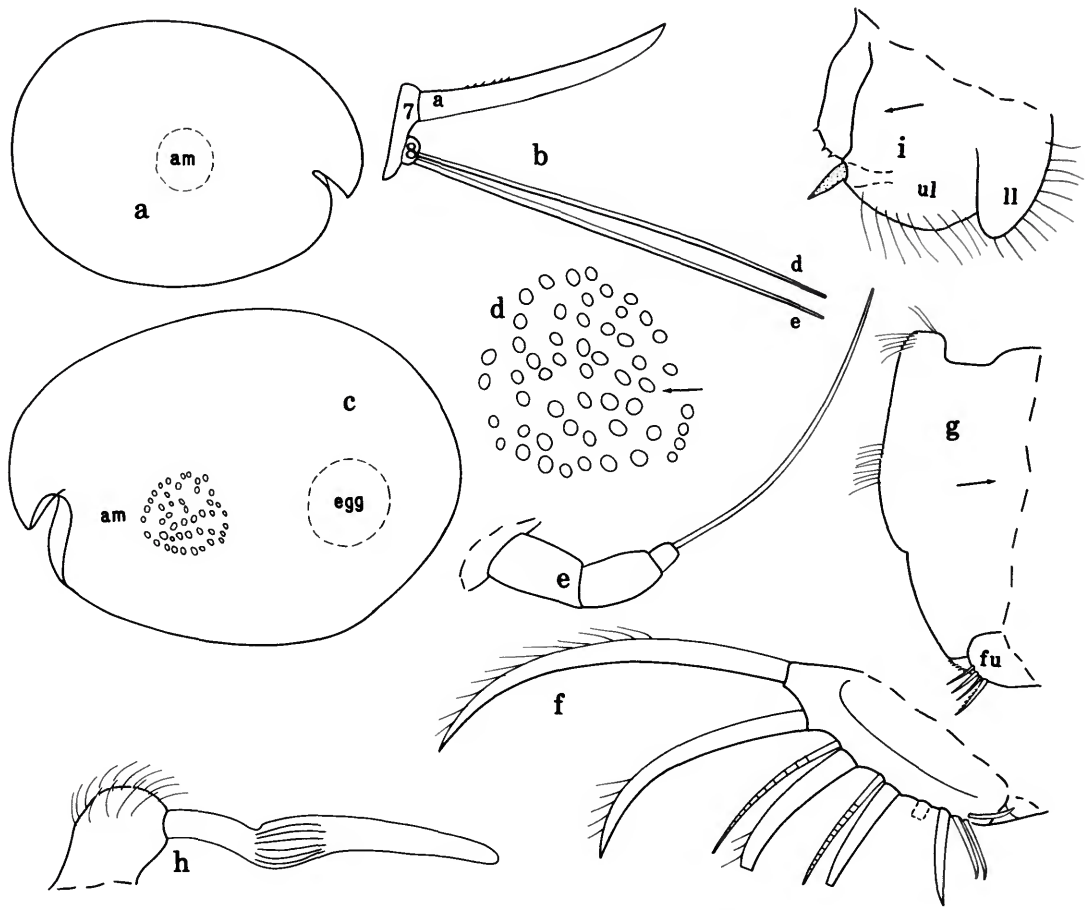


FIGURE 73.—*Xandarasterope storthynx* Kornicker, new species, adult female, holotype, NMV J40026: *a*, complete specimen, length 2.39 mm; *b*, distal left 1st antenna (e-bristle from right limb) (nabs), mv. Ovigerous female, paratype, USNM 193999: *c*, complete specimen, length 2.22 mm; *d*, detail of central adductor muscle attachments in *c*; *e*, endopodite left 2nd antenna, lv; *f*, left lamella furca, lv; *g*, posterior of body, lv; *h*, medial eye and Bellonci organ, lv; *i*, lips, lv.

stout anterior spine. Lower lip a hirsute flap on each side of mouth.

Genitalia (Figure 72*g*): An indistinct oval on each side of body anterior to furca.

Gills: 7 long gills on each side of body.

Anterior of Body: Without anterior process.

Posterior of Body (Figures 71*f*, 72*f*, 73*g*): Middle part hirsute; short thumb-like dorsal process with stiff spines.

Y-*Sclerite* (Figure 72*f*): Typical for subfamily.

Eggs: Slope 17: USNM 193999 with 9 well-developed eggs in marsupium (length of 1 egg 0.46 mm). Slope 66: USNM 193958 with 10 eggs in marsupium (length of 1 egg 0.55 mm). Location of 1 egg in each specimen shown in Figures 70*a*, 73*c*.

Parasites: Holotype with a juvenile nematode (identified as parasitic by Duane Hope, Smithsonian Institution). (The nematode was observed on a slide after the ostracode was partly dissected; whether it was originally inside the shell or inside the body of the ostracode is not known. The body and carapace of the holotype were examined later and no additional nematodes are present. The nematode is mounted in glycerine on a separate slide deposited with the holotype of *X. storthynx* in the Museum of Victoria.)

Xandarasterope trux Kornicker, new species

FIGURES 74–81

ETYMOLOGY.—From the Latin *trux* (fierce).

HOLOTYPE.—NMV J40030, partly dissected female in alcohol.

TYPE LOCALITY.—Slope 69, 38°29.33'S, 149°19.98'E, Victoria, 76 km S of Point Hicks; depth 1840 m.

PARATYPES.—Slope 27: USNM 193861, ovigerous female on slide and in alcohol; USNM 193862, A–1 male with

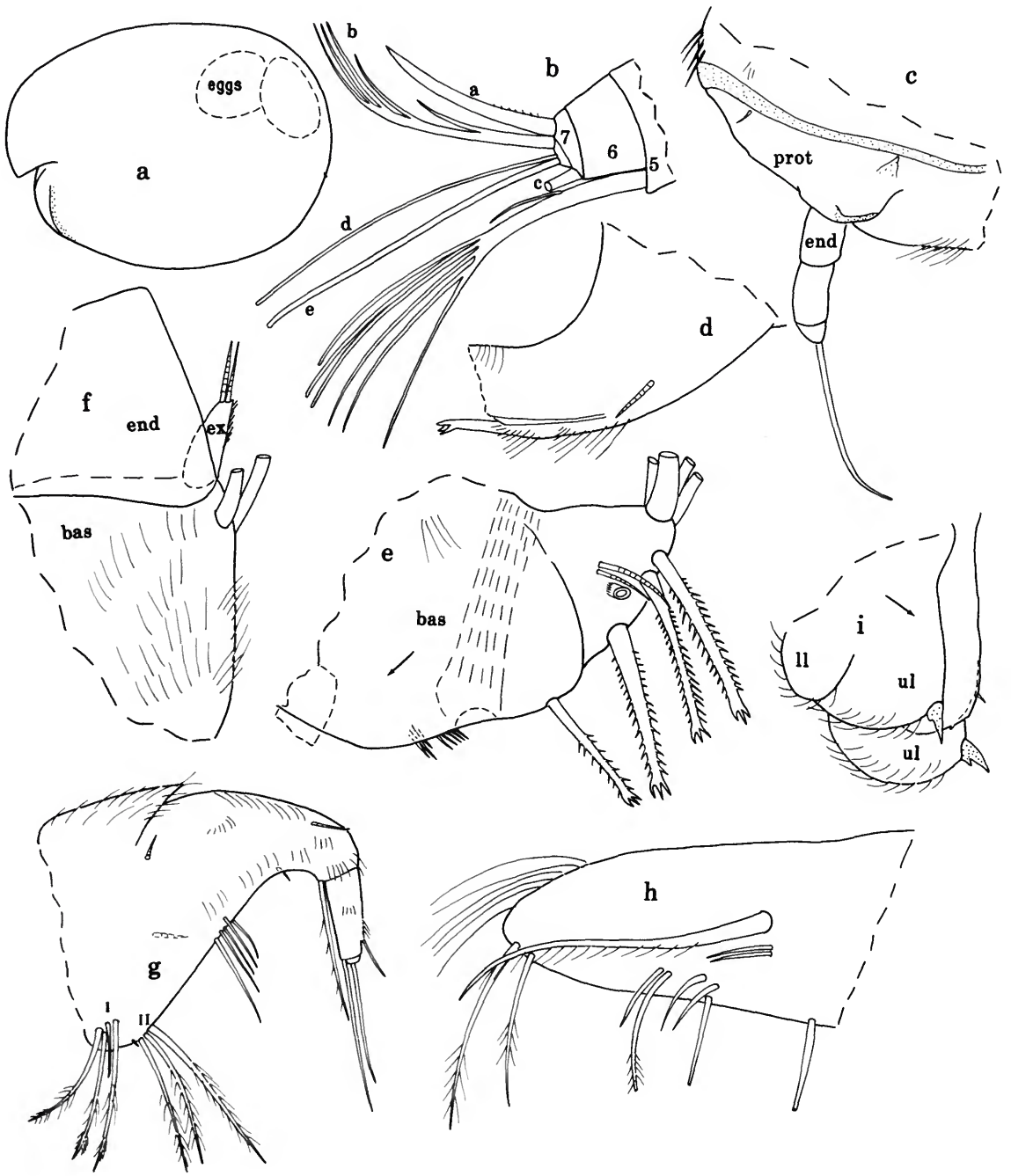


FIGURE 74.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a*, complete specimen, length 1.83 mm; *b*, distal left 1st antenna (nabs), lv; *c*, distal protopodite and endopodite right 2nd antenna, mv; *d*, ventral branch coxale endite left mandible, mv; *e,f*, parts right mandible, mv; *g*, left maxilla, mv; *h*, comb left 5th limb (nabs), lv; *i*, lips.

choniostomatid copepod in marsupium, on slide and in alcohol; NMV J40028, partly dissected A–1 male in alcohol. Slope 55: NMV J40027, undissected adult female in alcohol. Slope 69: USNM 193959, ovigerous female on slide and in alcohol; USNM 193960, adult male with choniostomatid copepods in marsupium on slide and in alcohol; NMV J40031, 4 undis-

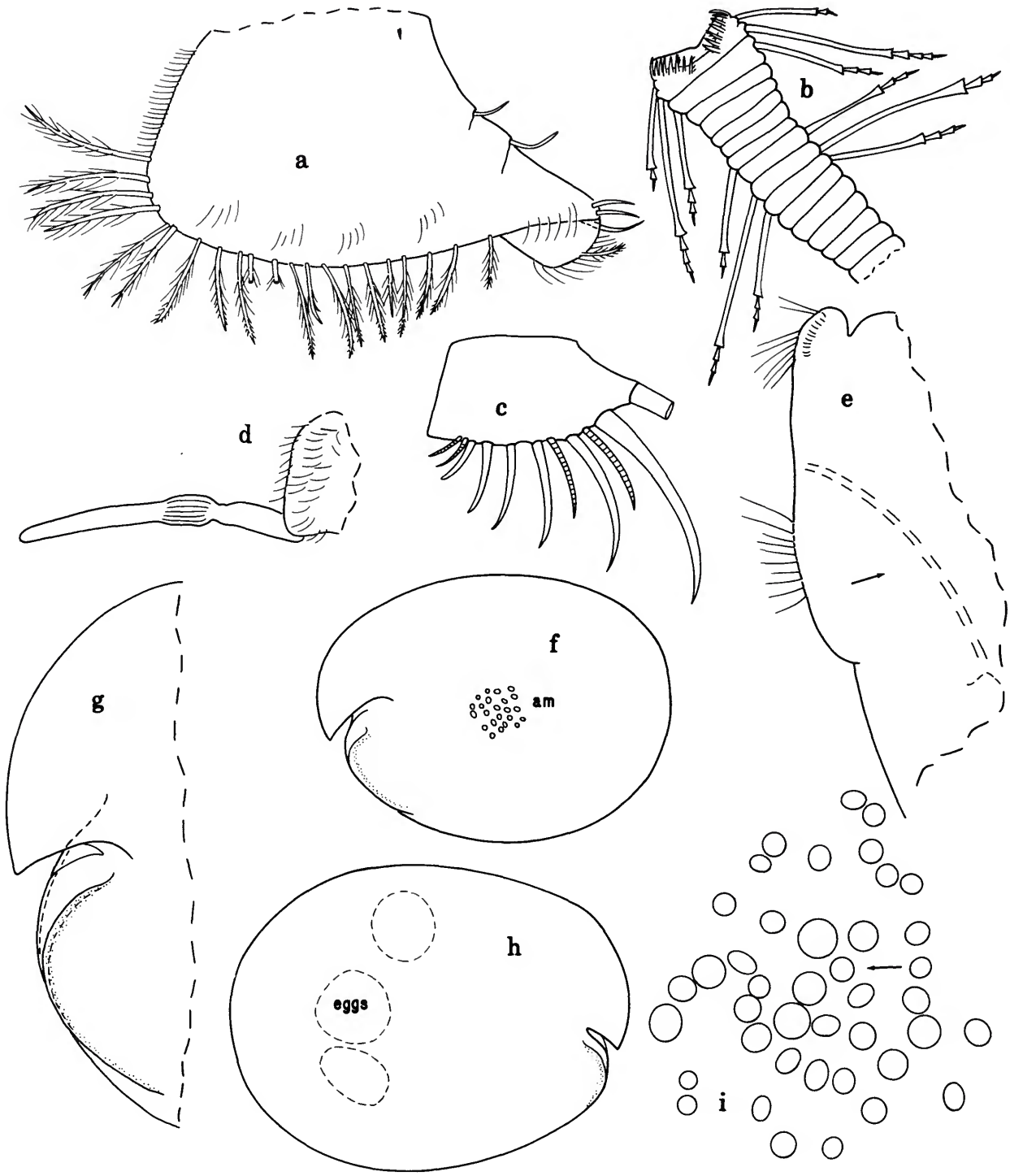


FIGURE 75.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a*, left 6th limb, mv; *b*, 7th limb; *c*, right lamella furca, lv; *d*, medial eye and Bellonci organ, lv; *e*, posterodorsal part of body, lv. Adult female, holotype, NMV J40030: *f*, complete specimen, length 1.98 mm; *g*, detail of anterior of left valve shown in *f*. Ovigerous female, paratype, USNM 193861: *h*, complete specimen, length 2.06 mm; *i*, central adductor muscle attachments left valve, ov.

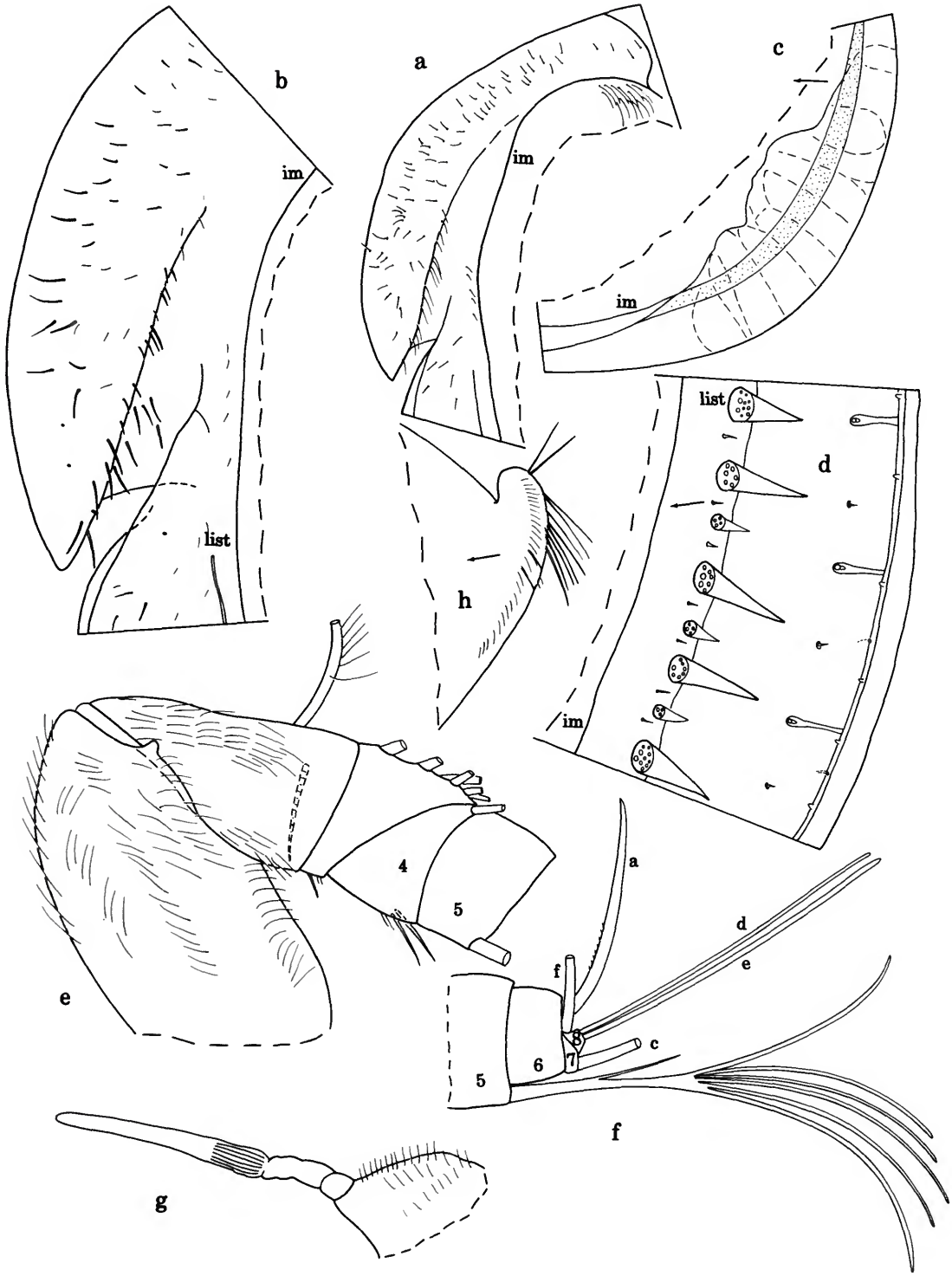


FIGURE 76.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a,b*, anterior right valve, iv; *c*, posteroventral part right valve, iv; *d*, posterior infold right valve, iv; *e*, proximal left 1st antenna, mv; *f*, distal right 1st antenna (nabs), lv; *g*, medial eye and Bellonci organ, lv; *h*, posterodorsal process, lv.

sected specimens in alcohol (length 1.76 mm, height 1.36 mm, male; 1 ovigerous female, 2 juveniles).

NONTYPE.—Slope 67: USNM 194005, partly dissected adult male in alcohol; NMV J40029, 1 juvenile male in alcohol.

DISTRIBUTION.—Slope 27, 1500 m. Slope 55, 1545 m. Slope 67, 1277 m. Slope 69, 1840 m.

DESCRIPTION OF ADULT FEMALE (Figures 74–79*a,b*).—Carapace ovoid in lateral view (Figures 74*a*, 75*f,h*); height greatest just posterior to midlength; small incisur at midheight; tip of rostrum pointed. Anteroventral part of each valve ventral to incisur with lateral process (outer edge of process stippled in Figures 74*a*, 75*f–h;* process more strongly developed along its anterior edge).

Infold: Rostral infold with about 86 bristles (about 60 bristles dorsal to list (bristles extending to anterior juncture), and about 26 bristles along list and between list and incisur (Figure 76*a,b*); some bristles with bifurcate tip. Anteroventral and ventral infolds with total of about 100 bristles (not all shown in Figure 76*a*). Narrow list with anterior end ventral to incisur continues along ventral valve margin then broadens along posteroventral corner of valve (anterior end of list shown in Figure 76*b*). Broad posteroventral list with 24–28 wide flat triangular diaphanous bristles (some less than half length of others); bases of diaphanous bristles with tubular pores (1 or 2 large and up to 9 small pores); row of about 26 bristles near posterior edge of broad list (1 or 2 bristles between each pair of diaphanous bristles) (Figure 76*d*). Posteroventral infold between list and valve edge with row of 6 or 7 small processes and 12–16 bristles (5 or 6 anterior bristles opposite ventral 7 diaphanous bristles of broad list and dorsalmost bristle opposite dorsal diaphanous bristle, others present between small processes (1 or 2 between each pair of processes)) (3 bristles and 3 processes shown in Figure 76*d*); each process with 2 parallel lines (lines not observed on all specimens) leading to valve edge (Figure 76*d*). Edge of valve with small widely separated pores (those along posteroventral edge shown in Figure 76*d*); only on left valve posterior part of ventral infold with minute crescent-like structures (not shown) similar to those of left valve of *X. storthynx.*

Selvage: Wide lamellar prolongation with fringe of long hairs at inner end of ventral margin of incisur.

Vestment: Vestment in vicinity of anterior juncture proximal to infold with long hairs or spines (Figure 76*a*); a few spines on posterodorsal vestment just dorsal to broad posterior list. Vestment in vicinity of posteroventral corner of valve lobate with internal soft structures forming cells (Figure 76*c*).

Central Adductor Muscle Attachments (Figure 75*f,i*): With about 45 oval attachments just anteroventral to valve midpoint (all attachments not shown in Figure 75*f*).

Carapace Size (length, height in mm): Slope 27: USNM 193861, 2.06, 1.62, height 79% of length. Slope 55: NMV J40027, 2.00, 1.56, height 79% of length. Slope 69: NMV J40030 (holotype), 1.98, 1.55, height 78% of length; USNM 193959, 1.83, 1.41, height 77% of length. Length range 1.83–2.06, height range 1.41–1.62; range of height as percent of length 77–79.

First Antenna: 1st joint spinous; small sclerotized medial process at midheight of suture separating 1st and 2nd joints (Figure 76*e*). 2nd joint spinous, with stout spinous dorsal bristle and bare lateral bristle (Figure 76*e*). 3rd and 4th joints with fairly straight suture separating them; 3rd joint with row of distal spines on ventral margin extending onto lateral surface, 1 small bare bristle on short ventral margin and 6 spinous bristles (medial of terminal pair with short spines, others with long spines) on long dorsal margin (Figure 76*e*). 4th joint with few distal ventral spines, 2 short bare ventral bristles, and long dorsal bristle with short spines (Figure 76*e*). 5th joint with smooth dorsal margin; sensory bristle with short proximal filament and 6 long terminal filaments (Figures 74*b*, 76*f*). Medial bristle of 6th joint long spinous (not shown). 7th joint: a-bristle claw-like, about same length as bristle of 6th joint, with proximal spines on dorsal edge; b-bristle stout, about 1/3 longer than a-bristle, with 4 long marginal filaments (Figure 74*b*); c-bristle reaching past sensory bristle of 5th joint, about 1/4 longer than f-bristle, with 8 marginal filaments. 8th joint: d-and e-bristles (d-bristle slightly narrower) about same length as f-bristle, bare with blunt tips (Figure 74*b*, 76*f*); f-bristle bent dorsally, almost twice length of a-bristle, with 5 marginal filaments; g-bristle same length as c-bristle, with 7 marginal filaments (not shown).

Second Antenna: Protopodite with abundant medial spines and small distomedial bristle (Figures 74*c*, 77*a*). Endopodite 3-jointed with long terminal filament almost twice length of stem (only proximal part shown in Figure 77*a*). Exopodite: 1st joint with few distal spines on dorsal concave margin; bristle of 2nd joint reaching 9th joint, with abundant very slender closely spaced ventral spines; bristles of joints 3–8 long, with natatory hairs, no spines; 9th joint with 3 bristles (2 long with natatory hairs, 1 short (dorsal) with short spines); joints 2–8 with minute spines forming row along distal margins; 9th joint with 1 or more small lateral spines on distal edge; branch with neither terminal medial spine on 1st joint nor basal spines on joints 2–8.

Mandible: Coxale endite: Ventral branch with small medial bristle near base, 3 or 4 oblique rows of spines, and 3 small teeth at tip (Figures 74*d*, 77*b,c*); dorsal branch (Figure 77*b*): Ventral margin with 4 nodes; main spine with fairly long hairs along posterior edge; abundant long hairs on margin between main spine and tip of branch (tip obscured); long hirsute dorsal bristle set back from tip of branch; dorsal margin of branch serrate distally. Basale endite (Figure 74*e*) with 4 spinous end bristles, 3 triaenid bristles with about 15 pairs of marginal spines, 2 dwarf bristles, and small glandular peg. Basale: ventral margin with 1 triaenid bristle (with 6–8 pairs of marginal spines plus terminal pair) near base of endite and proximal to well-developed U-shaped boss; several stout spines on margin near U-shaped boss (Figure 74*e*); dorsal margin spinous, with 2 long equilength spinous terminal bristles (Figure 77*d*, not shown in Figure 77*e*); medial surface with

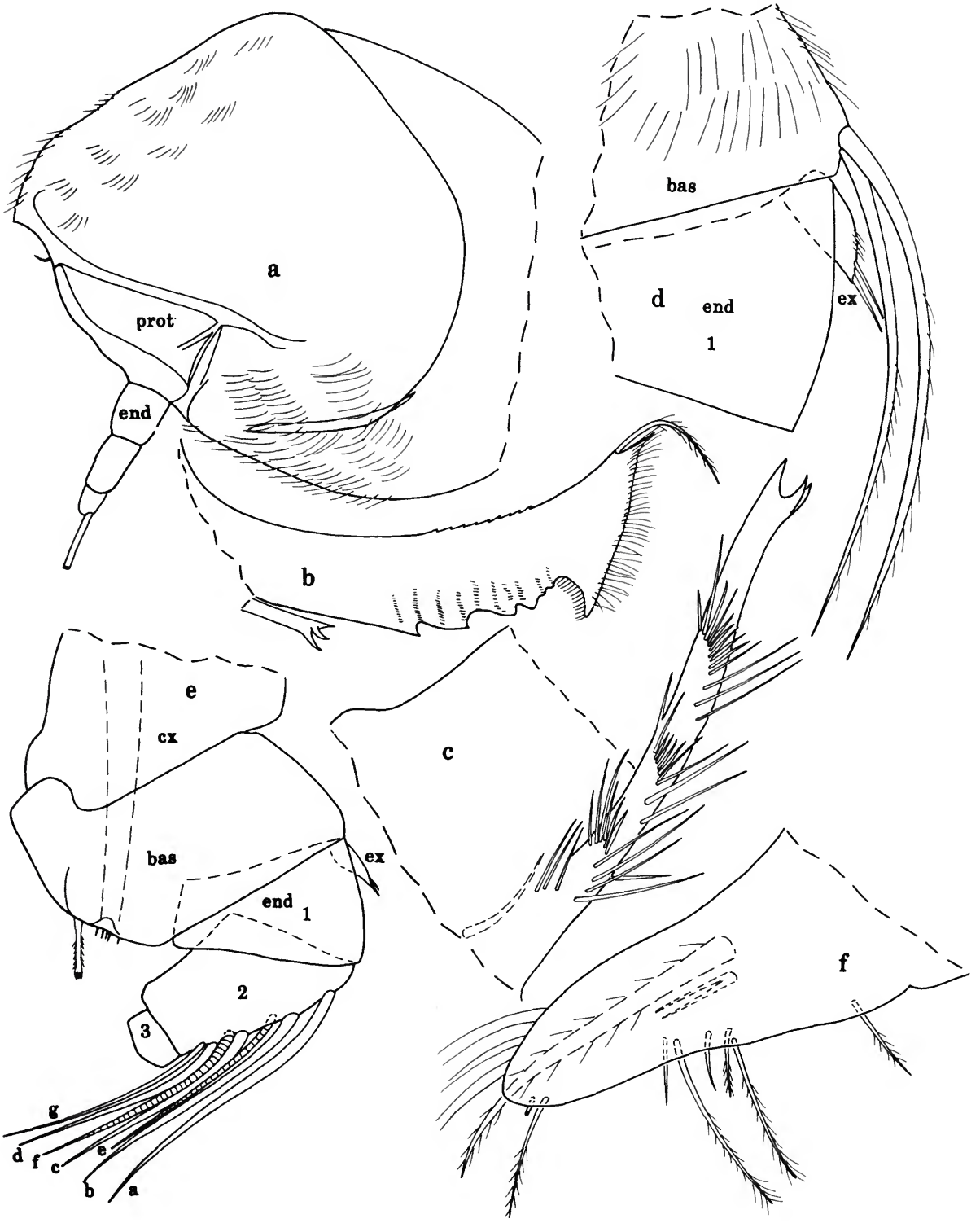


FIGURE 77.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a*, protopodite and endopodite right 2nd antenna, mv; *b*, distal coxale endite right mandible, mv; *c*, ventral branch coxale endite left mandible, lv; *d,e*, parts left mandible (nabs), mv; *f*, comb right 5th limb (nabs), mv.

abundant spines in dorsal half (Figure 74*f*). Exopodite about half length of dorsal margin of 1st endopodial joint, hirsute with 2 small bristles (Figures 74*f*, 77*d,e*). 1st endopodial joint with 3 long ventral bristles (shortest with short spines, others with long spines) (not shown). 2nd endopodial joint fairly short (Figure 77*e*): Ventral margin with 3 long terminal bristles with short spines; dorsal margin with stout a-, b-, c-, and d-bristles, 3 slender bristles proximal to a-bristle (1 of these medial (not shown); medial side spinous, with 10–14 cleaning bristles (not shown), and 1 long g-bristle distal to base of d-bristle; lateral side with 1 long e-bristle between b- and c-bristles and 1 long f-bristle between c- and d-bristles (Figure 77*e*). 3rd endopodial joint with stout dorsal claw with ventral spines, 4 stout spinous bristles, and 1 slender shorter spinous bristle (not shown).

Maxilla (Figures 74*g*, 78*a*): Epipodite extremely hirsute, reaching to about midlength of dorsal margin of basale. Endite I with 4 bristles (1 short bare, others long spinous); endite II with 4 bristles (1 minute bare, others long spinous). Basale spinous: Ventral margin with row of 5 bare bristles near midlength, 1 small bare distal bristle, and 1 long spinous terminal bristle; medial surface near dorsal margin with 2 bare bristles (1 proximal, 1 distal); lateral surface with 1 proximal bristle near midheight. 1st endopodial joint spinous, with short bare alpha-bristle and long beta-bristle with indistinct spines. 2nd endopodial joint with terminal bristle (with indistinct spines) shorter than beta-bristle.

Fifth Limb (Figures 74*h*, 77*f*): Comb tapering distally, with stout spinous exopodial bristle reaching past tip; 2 short slender bristles just ventral to base of exopodial bristle; 2 pairs of lateral bristles with bases set back from ventral margin at midlength of comb; 1 lateral bristle near proximal pair with base almost on ventral margin; 3 additional lateral bristles (1 proximal, 2 distal) with bases almost on ventral margin.

Sixth Limb (Figures 75*a*, 78*b*): Small medial bristle in proximal anterior corner. Anterior margin with 2 fairly closely spaced endite bristles. Lateral flap of skirt with small hirsute bristle. Anterior end of skirt with 3 or 4 small bristles; ventral and posteroventral margins with total of 20 or 21 bristles (14 or 15 ventral with long proximal and short distal spines plus 6 plumose bristles on posteroventral corner). Limb hirsute.

Seventh Limb: Each limb with 12 bristles (4 on terminal segment (2 on each side), 2 on next segment (1 on each side), 6 on proximal segments (3 on each side)) (Figures 75*b*, 78*c*); each bristle with 2–4 bells and without spines. Combs forming obtuse angle; each comb with 12 or 13 spinous teeth; teeth towards each end of comb slightly shorter (Figure 78*d*). Limb increasing in width distal to proximal bristles (Figures 75*b*, 78*c*).

Furca (Figures 75*c*, 78*e*): Each lamella with 9 claws; proximal 2 claws bristle-like, indistinctly ringed; claws 1–7 with small teeth along posterior edge; claws 8 and 9 with small indistinct spines; claw 1 with few teeth very slightly longer than others (not with some very long teeth as in many other species of the subfamily); claws 1–5 with distal hairs along anterior edge. Each lamella with 2 indistinctly ringed spinous bristles on lateral edge (1 between claws 2 and 3, other between claws 3 and 4); anterior edge of each lamella with few small spines; claw 1 of right lamella anterior to claw 1 of left lamella by width of claw base. (Not all teeth on claws and not all spines or hairs shown.)

Bellonci Organ (Figures 75*d*, 76*g*): Elongate with rounded tip.

Eyes: Lateral eyes absent. Medial eye hirsute, unpigmented (Figures 75*d*, 76*g*).

Lips (Figures 74*i*, 79*a,b*): Upper lip a hirsute lobe on each side of depressed saddle (Figure 74*i*); stout bifurcate spine on inner side of each lobe (spines visible in anterior view of USNM 193861 (Figure 79*a*) but not observed in lateral view (Figure 79*b*)). Saddle with several small anterior spines (Figures 74*i*, 79*a*). Lower lip a hirsute lateral flap on each side of mouth (shown in Figures 74*i*, 79*b* but not in Figure 79*a*).

Genitalia: Oval ring on each side of body anterior to furca.

Anterior of Body (Figures 74*i*, 79*a,b*): Hirsute, without anterior process.

Posterior of Body (Figures 75*e*, 76*h*): With thumb-like spinous posterodorsal process.

Y-*Sclerite:* Typical for subfamily.

Gills: 7 well-developed gills on each side.

Eggs: Slope 27: USNM 193861 with 10 eggs in marsupium (length of typical egg 0.42 mm; location of 3 eggs shown in Figure 75*h*). Slope 69: USNM 193959 with 6 eggs in marsupium (length of 3 eggs (mm): 0.50, 0.50, 0.56; location of 2 eggs shown in Figure 74*a*).

DESCRIPTION OF ADULT MALE (Figures 79*c–h*, 80).—Carapace differs from that of female in being smaller (Figures 79*c,d*, 80*g*). Vertical row of hairs near posterior end usually present on male Cylindroleberidinae absent.

Infold and Selvage: Not examined.

Central Adductor Muscle Attachments (Figure 80*g,h*): About 42 ovoid attachments.

Carapace Size (length, height in mm): Slope 67: USNM 194005, 1.77, 1.29, height 77% of length. Slope 69: USNM 193960, 1.66, 1.21, height 73% of length. Length range 1.66–1.77, height range 1.21–1.29; range of height as percent of length 73–77.

First Antenna (Figure 79*e*): 1st joint bare. 2nd joint spinous with long spinous dorsal bristle and short lateral bristle. 3rd joint with distinct suture separating it from 4th joint, with 1 small bare ventral bristle and 6 dorsal bristles (4 proximal single with long spines; next 2 paired (lateral with few short spines, medial longer and with many short spines)). 4th joint separated from 5th by oblique suture parallel to suture between 3rd and 4th joints, with 2 slender bare terminal ventral bristles and 1 long bare terminal dorsal bristle. 5th joint fused to 6th except for short medial suture at ventral margin (dashed in Figure 79*e*) (a small step in ventral margin where a muscle is attached (Figure 79*e*) may indicate location of division between 5th and 6th joints); sensory bristle with abundant thin filaments (not all shown). 6th joint with terminal medial bristle reaching past tip of a-bristle of 7th joint. 7th joint: a-bristle claw-like

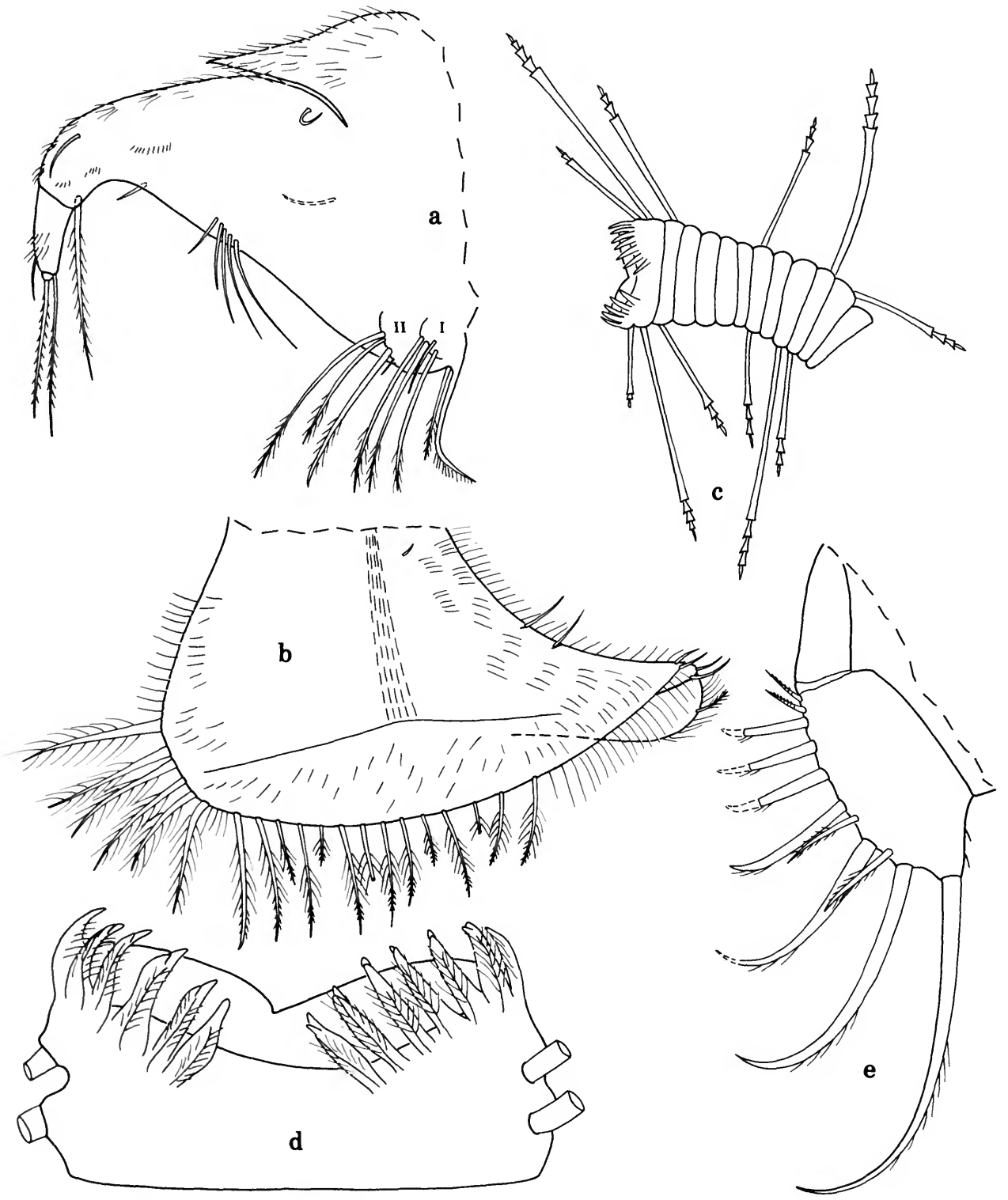


FIGURE 78.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a*, right maxilla, mv; *b*, left 6th limb, mv; *c*, 7th limb; *d*, detail tip 7th limb in *c*; *e*, right lamella furca, lv.

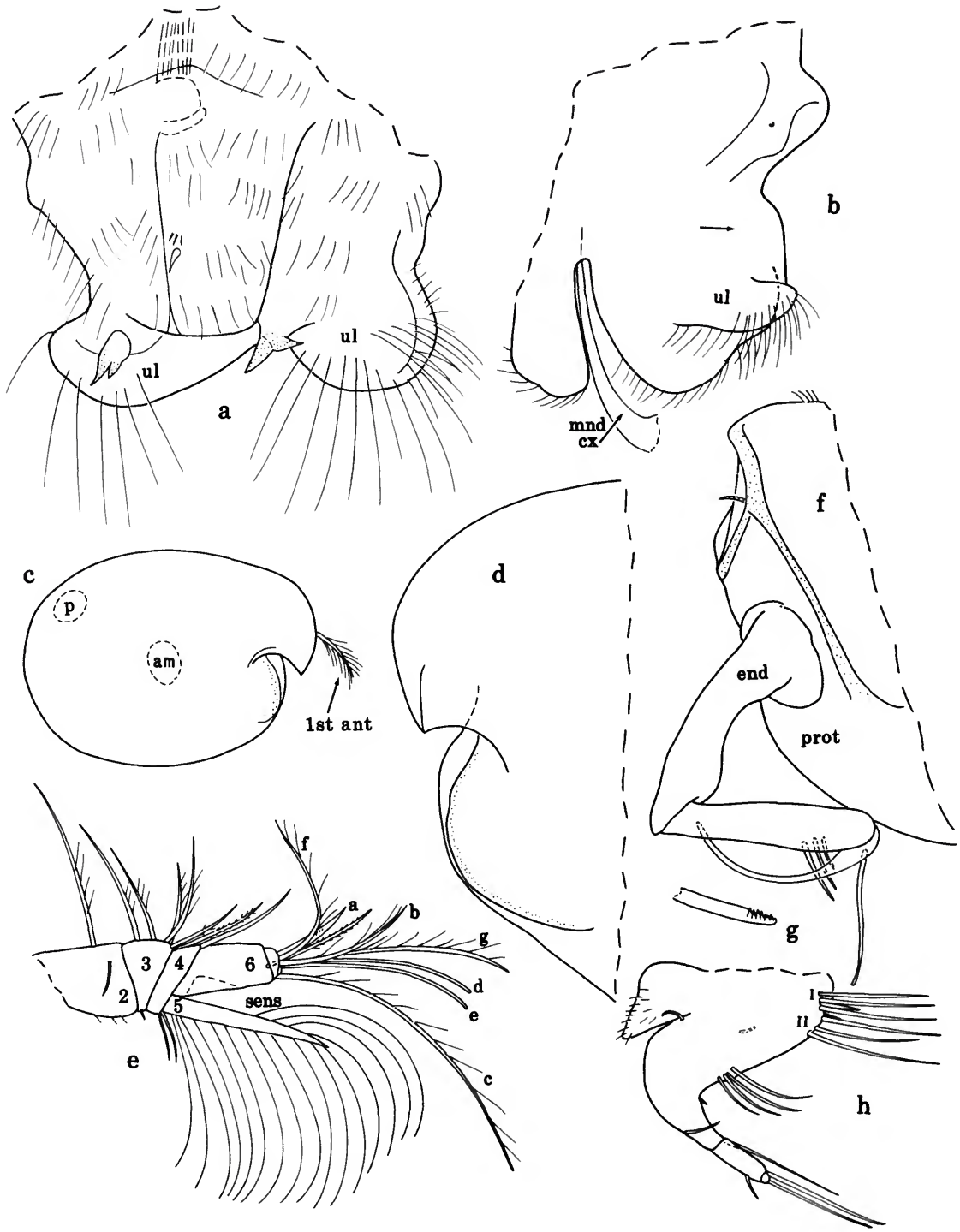


FIGURE 79.—*Xandarasterope trux* Kornicker, new species, ovigerous female, paratype, USNM 193959: *a*, upper lip, av; *b*, upper and lower lips and coxale endite of mandible (inserted in mouth), lv. Adult male, paratype, USNM 193960: *c*, complete specimen (sensory bristle of 5th joint of 1st antenna protruding anteriorly), length 1.66 mm; *d*, anterior left valve, ov; *e*, distal right 1st antenna, lv; *f*, distal protopodite and endopodite right 2nd antenna, mv; *g*, tip 3rd endopodial joint left 2nd antenna, mv; *h*, right maxilla, mv.

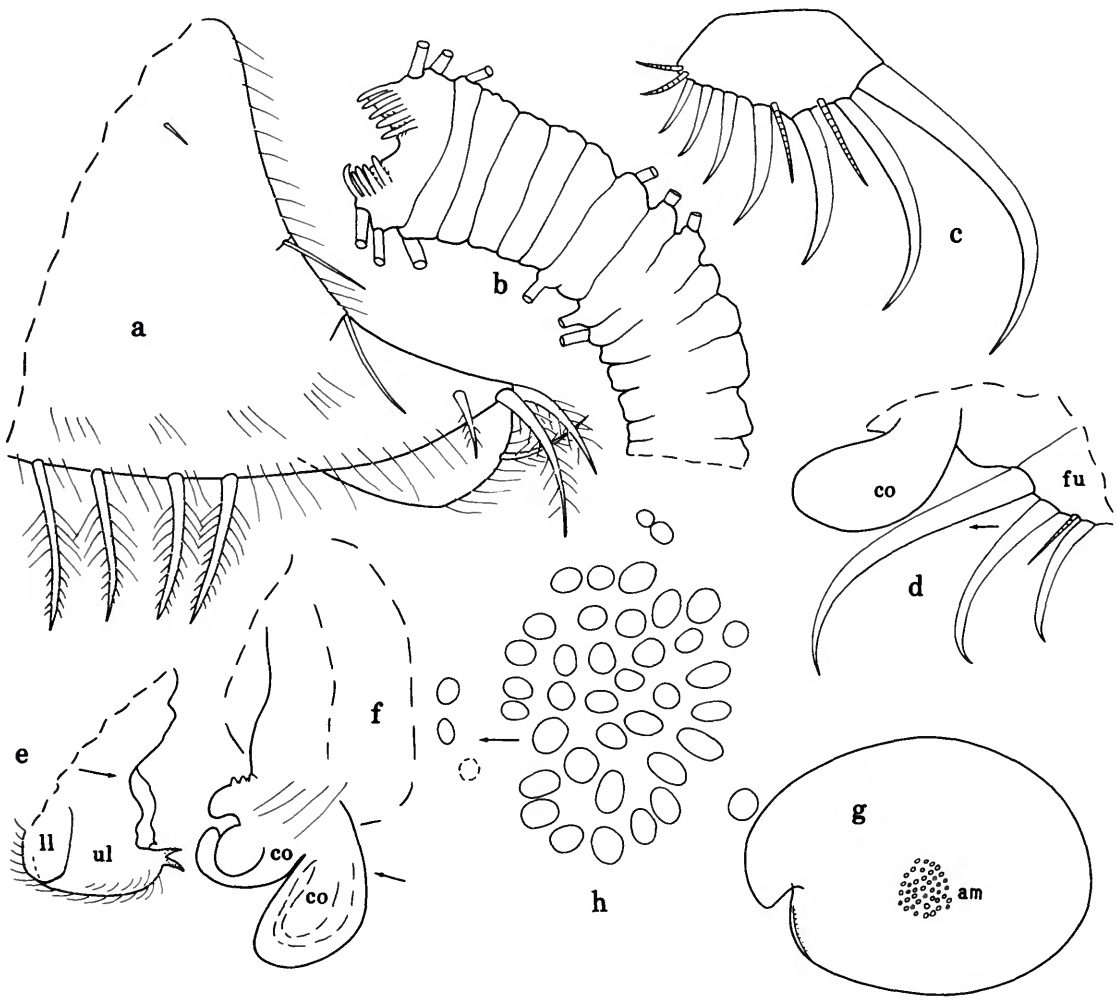


FIGURE 80.—*Xandarasterope trux* Kornicker, new species, adult male, paratype, USNM 193960: *a*, anterior part left 6th limb, mv; *b*, 7th limb; *c*, right lamella furca, lv; *d*, distal left furcal lamella and outline of left copulatory limb, lv; *e*, lips, lv; *f*, left and right copulatory limbs, lv. Adult male, nontype, USNM 194005: *g*, complete specimen, length 1.77 mm; *h*, central adductor muscle attachments, left valve, ov.

with few indistinct distal spines; b-bristle about 1/3 longer than a-bristle, with 4 marginal filaments; c-bristle about 4 times longer than a-bristle, with 10 marginal filaments. 8th joint: d- and e-bristles filament-like, about twice length of a-bristle, bare with blunt tips; e-bristle stouter than d-bristle; f-bristle about twice length of a-bristle, with 6 marginal filaments; g-bristle about 2/3 length of c-bristle, with 8 marginal filaments.

Second Antenna: Protopodite with few distal dorsal spines and small bare distomedial bristle (Figure 79*f*). Endopodite 3-jointed (Figure 79*f,g*): 1st joint elongate bare; 2nd joint elongate with 3 distal bristles; 3rd joint elongate, narrow, reflexed on 2nd joint, with long proximal filament and about 6 minute terminal ridges (Figure 79*g*). Exopodite: 1st joint with few distal spines on dorsal concave surface; bristle of 2nd joint reaches well past 9th joint, with long natatory hairs; bristles of joints 3–8 and 2 long bristles of 9th joint with natatory hairs, no spines; short dorsal bristle of 9th joint with few short spines or hairs; joints 2–8 each with long hairs on distal dorsal corner and row of minute spines along distal edge; 9th joint with row of minute lateral spines at distal 2/3 and with 3 minute lateral terminal spines similar to those along distal edges of joints 2–8.

Mandible: Coxale endite of USNM 193960 broken off.

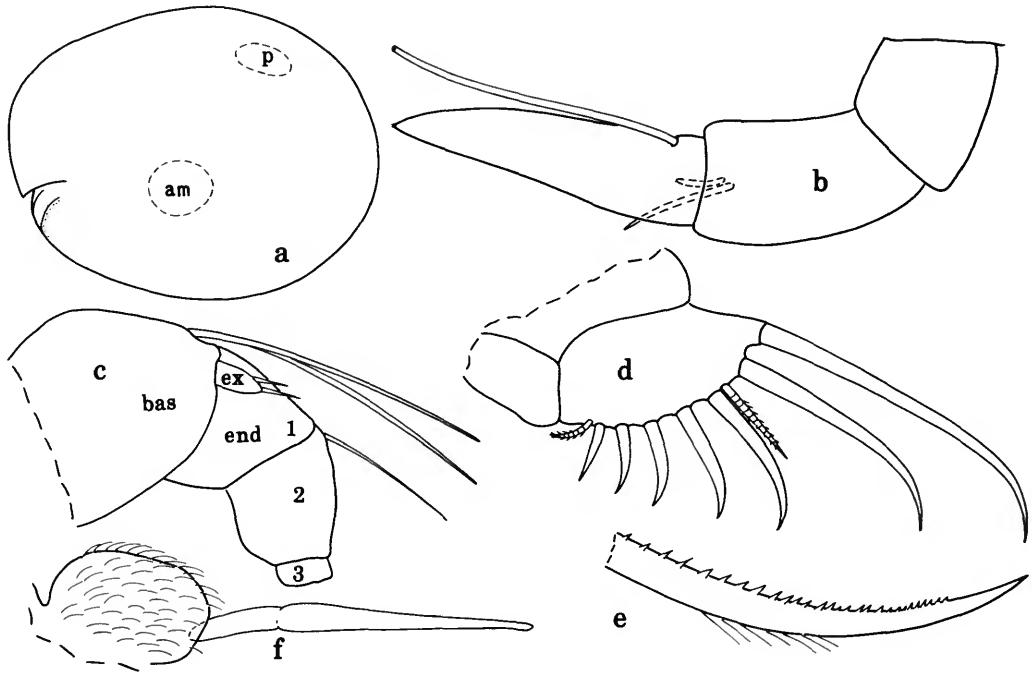


FIGURE 81.—*Xandarasterope trux* Kornicker, new species, A–1 male, paratype, USNM 193862: *a*, complete specimen, length 1.65 mm; *b*, endopodite left 2nd antenna, mv; *c*, part right mandible (nabs), lv; *d*, right lamella of furca, lv; *e*, distal half of claw 1 left lamella of furca, lv; *f*, medial eye and Bellonci organ, lv.

Basale endite with glandular peg, 2 dwarf bristles, 3 triaenid bristles with 8–13 pairs of weakly developed spines excluding terminal pair, and 4 spinous end bristles. Basale: Ventral margin with 1 small triaenid bristle (with 5 or 6 pairs of spines excluding terminal pair) close to base of endite and proximal to U-shaped boss, and several weak spines distal to U-shaped boss; dorsal margin with spines and 2 long stout terminal bristles with short marginal spines; medial surface with rows of spines. Exopodite hirsute, about 1/3 length of dorsal margin of 1st endopodial joint, with 2 short bristles reaching midlength of 1st endopodial joint. 1st endopodial joint with 3 long ventral bristles (2 with long spines on proximal 2/3, 1 (shortest) with long spines on proximal 1/3 and short spines distally). 2nd endopodial joint with 16 cleaning bristles, otherwise similar to that of adult female. 3rd endopodial joint similar to that of adult female.

Maxilla (Figure 79*h*): Basale with 4 long ventral bristles at midlength (1 less than on female); limb otherwise similar to that of adult female. (Spines of bristles not shown.)

Fifth Limb: Exopodial bristles similar to those of adult female.

Sixth Limb (Figure 80*a*): Anteroventral corner with 3 spinous bristles; ventral and posteroventral margins with total of 14–16 bristles; limb otherwise similar to that of adult female.

Seventh Limb (Figure 80*b*): USNM 193960: Terminus with opposing combs, each with 8–10 spinous teeth. Margin between combs of male limb more concave than on adult female; limb otherwise similar to that of adult female. USNM 194005 (1 limb examined) with 14 bristles (9 in proximal group, 5 in distal group).

Furca (Figure 80*c,d*), *Bellonci Organ, Eyes, Lips* (Figure 80*e*), *Anterior and Posterior of Body, and Y-Sclerite:* Similar to those of adult female.

Genitalia (Figure 80*d,f*): 1 or 2 lobes on each side of body anterior to furca.

Parasites: USNM 193960 with choniostomatid copepods (1 female, 1 copepodite) inside marsupium (location of female copepod shown in Figure 79*c*).

DESCRIPTION OF A–1 MALE (Figure 81).—Carapace similar in shape to that of adult female (Figure 81*a*).

Infold and Selvage: Not examined.

Central Adductor Muscle Attachments: Similar to those of adult female (location shown in Figure 81*a*).

Carapace Size (length, height in mm): Slope 27: USNM 193862, 1.65, 1.42; NMV J40028, 1.65, 1.42.

First Antenna: Similar to that of adult female, including numbers of filaments on sensory bristle of 5th joint and bristles of joints 7 and 8.

Second Antenna: Protopodite and exopodite similar to

those of adult female. Endopodite 3-jointed (Figure 81*b*): 1st joint short bare; 2nd joint elongate with 2 short distal bristles; 3rd joint long, tapering distally, with minute nipple at tip, and long proximal filament almost twice length of joint.

Mandible: Bristles of dorsal margin of basale and exopodite similar to those of adult female (Figure 81*c*). Remaining part of appendage not examined in detail.

Maxilla: 4 instead of 5 bare ventral bristles at midlength of basale; limb otherwise similar to that of adult female.

Fifth Limb: Comb similar to that of adult female.

Sixth Limb: Not examined.

Seventh Limb: Same number and distribution of bristles as on adult female; bristles cylindrical, similar to those of adult female (not strongly tapered as on juveniles of some other species of Cylindroleberidinae); bristles with 1–3 bells. Angle between combs obtuse but smaller than angle on adult female; each comb with 7 spinous teeth.

Furca (Figure 81*d*): Similar to that of adult female except with only 8 claws (claw 8 ringed, bristle-like) and 1 lateral bristle (between claws 2 and 3). Teeth along posterior margins of claws 1–7 similar to those of adult female (Figure 81*e*).

Bellonci Organ (Figure 81*f*): Similar to that of adult female.

Eyes: Lateral eyes absent. Medial eye similar to that of adult female (Figure 81*f*).

Gills: 7 well-developed gills on each side reaching just past posterior edge of body.

Parasites: USNM 193862 with female choniostomatid copepod in marsupium (location shown in Figure 81*a*).

REMARKS.—The adult male USNM 194005 is designated a nontype because the anteroventral margin of the valve has a lateral process much smaller than on other specimens referred to the species. The lateral process is the main character separating *X. trux* and *X. storthynx;* USNM 194005 is referred to *trux* rather than *storthynx* because of its 7th limb having only 14 bristles, and the small size of the carapace.

SEXUAL DIMORPHISM.—Carapace of male smaller than that of the female. 1st antenna with usual dimorphism present in the Cylindroleberidinae, except male limb with fused 5th and 6th joints and f-bristle not long. Male 2nd antenna with fewer spines on protopodite, with endopodite formed as clasper, and with longer bristle on 2nd exopodial joint (bristle having natatory hairs, not short slender spines as on female). Exopodite of male mandible slightly shorter than that of female. Margin of 7th limb between opposing combs more concave on male than on female.

COMPARISONS.—The carapace of the female *X. trux* differs from that of the female *X. storthynx* in being smaller (length 1.83–2.06 mm compared to 2.22–2.39 mm), in having a well-developed lateral process on the anteroventral part of the valve, and in having fewer small bristles on the broad posteroventral list. The appendages of females of the 2 species differ in *X. trux* in having fewer triaenid bristles on the basale of the mandible and in having 12 rather than 17–22 bristles on the 7th limb.

Archasterope Poulsen, 1965

Archasterope Poulsen, 1965:339.—Kornicker, 1993:109.
Empoulsenia Kornicker, 1975:499.

TYPE SPECIES.—*Archasterope dentata* Poulsen, 1965:339.

COMPOSITION.—*Archasterope dentata* Poulsen, 1965; *A. bulla* Kornicker, 1975; *A. quinquesetae* (Skogsberg, 1920); *A. pentathrix* (Kornicker, 1975); *A. antarctica* (Kornicker, 1975); *A. weddellensis* (Kornicker, 1975); *A. polythrix* (Chavtur, 1983); *A. monothrix* (Kornicker, 1988), and 4 new species described herein: *Archasterope efficax, A. apex, A. altrix,* and *A. verax.*

DISTRIBUTION.—Northwest Pacific at depths of 85–2570 m; in the Sea of Japan (only in subarctic), and in Okhotsk and Bering seas at 300 m, and in adjacent Pacific (Kuril Islands, Kamchatka) at depths of 510–2570 m (Chavtur, 1983:81). In Antarctic waters at depths of 40–1212 m (Kornicker, 1975:501). Beaufort Sea at a depth of 101 m (Kornicker, 1988:24). Off southeast Australia at a depth of 180 m (Poulsen, 1965:339). Off Tasmania and Victoria, Australia, at a depth of 204–800 m, herein. Known depth range 40–2579 m.

REMARKS.—Poulsen (1965:345) stated that *Philippiella* (a preoccupied name), which he proposed for 2 species (*Asterope quinquesetae* Skogsberg, 1920, and *A. spinifera* Skogsberg, 1920), differed from *Archasterope* "by its high number of cleaning bristles on the 7th limb, by the rather many pairs of spines on the triaenid bristles of the mandible, and by the lacking of the numerous long bristles on the medial list in front of the posterior shell margin." Kornicker (1975:465, 499) proposed the new genus *Skogsbergiella* to contain *A. spinifera* and several new species, and the new genus *Empoulsenia* to contain *A. quinquesetae* and several new species. *Skogsbergiella* differs from both *Archasterope* and *Empoulsenia* in having a ridge on the posterior infold of the right valve between the list and posterior valve margin, and in having 2 or 3 short stout terminal dorsal spines on the 1st endopodial joint of the mandible; at this time these characters remain useful in identifying *Skogsbergiella.* However, characters of additional species have blurred the small differences between *Archasterope* and *Empoulsenia;* therefore, separation of the 2 genera is no longer warranted, and *Empoulsenia* is placed in the synonymy of *Archasterope* herein (also see Kornicker, 1993:109–120).

EMENDED DIAGNOSIS.—Right valve of carapace without ridge between list and posterior end of valve.

First Antenna: Sensory bristle of 5th joint of female with 1 proximal and 6 terminal filaments; d-bristle of 8th joint at least half length of e-bristle, both bristles filament-like.

Mandible: Dorsal margin of 1st endopodial joint without stout terminal spines. Dorsal margin of 2nd endopodial joint with long lateral e-bristle between b- and c-bristles.

CORRECTION.—Kornicker (1988:24) described the 1st antenna of *Empoulsenia monothrix* as having the 5th and 6th joints fused; they are not fused, as shown in his illustration (Kornicker, 1988, fig. 16d).

Key to Species of *Archasterope* in Vicinity of Australia

(Adult females)

1. Dorsal margin of mandibular basale with 1 bristle at midlength . . . . . *A. efficax,* new species
   Dorsal margin of mandibular basale with 3–7 bristles at midlength 2
2. Ventral margin of basale of maxilla with 4–7 proximal bristles 3
   Ventral margin of basale of maxilla with 1 proximal bristle 4
3. Lateral eye small with 8–12 ommatidia; dorsal margin of mandibular basale with 5 bristles . . . . . *A. dentata*
   Lateral eye absent; dorsal margin of mandibular basale with 3 or 4 bristles . . . . . *A. verax,* new species
4. Dorsal margin of mandibular basale with 3 short bristles; dorsal margin of basale of maxilla with 3 or 4 distal bristles . . . . . *A. altrix,* new species
   Dorsal margin of mandibular basale with 7 short bristles; dorsal margin of basale of maxilla with 1 distal bristle . . . . . *A. apex,* new species

Archasterope efficax Kornicker, new species

FIGURES 82–86

Archasterope species A, Kornicker, 1994, fig. 111g–k.

ETYMOLOGY.—From the Latin *efficax* (effectual, powerful).

HOLOTYPE.—NMV J37165, partly dissected ovigerous female in alcohol.

TYPE LOCALITY.—Slope 48, 41°57.50′S, 148°37.90′E, Tasmania, off Freycinet Peninsula; depth 400 m.

PARATYPES.—Slope 1: NMV J37167, 7 juveniles in alcohol. Slope 40: USNM 193983, ovigerous female on 2 slides and in alcohol; USNM 193984, 1 adult male on 2 slides and in alcohol. Slope 48: NMV J37166, 1 undissected juvenile male in alcohol.

DISTRIBUTION.—Slope 1, 204 m. Slope 40, 400 m. Slope 48, 400 m.

DESCRIPTION OF ADULT FEMALE (Figures 82–84).—Carapace elongate with slightly convex ventral and dorsal margins and evenly rounded anterior and posterior margins; incisur ventral to midheight (Figures 82*a*, 84*e*).

Infold: Anterior and anteroventral infold with numerous bristles (Figure 82*b*); broad list of posterior infold with 21–24 broad transparent bristles with pores at bases, 24 long slender bristles, and about 86 minute bristles (Figure 82*c*); posterior infold between broad list and posterior end of valve with 6 processes and about 40 bristles (bristles posterior to 5–7 broad transparent bristles at ventral end of posterior list longer).

Selvage: Fringed lamellar prolongation along ventral edge of incisur.

Vestment: Anterodorsal part of vestment proximal to infold with few rows of long hairs.

Central Adductor Muscle Attachments (Figure 84*e,f*): Comprising 18 or 19 ovoid attachments just anterior to valve midlength and just ventral to valve midheight.

Carapace Size (length, height in mm): Slope 40: USNM 193983, 2.03, 1.21, height 60% of length. Slope 48: NMV J37165 (holotype), 2.13, 1.25, height 59% of length. Length range 2.03–2.13, height range 1.21–1.25; range of height as percent of length 59–60.

First Antenna (Figure 82*d–f*): 1st joint with medial and lateral spines (Figure 82*e*). 2nd joint with ventral spines, proximal dorsal spines, medial and lateral spines near ventral margin, and 2 bristles (long dorsal bristle with long spines, short lateral bristle with broad distal 3rd bearing triaenid-type spines (Figure 82*d*). 3rd joint with well-defined distal margin, small bare ventral bristle, and 6 dorsal bristles (2 single (proximal), then 2 almost adjacent, and 2 paired (distal); all dorsal bristles with long spines) (dorsal bristles not shown). 4th joint with concave dorsal margin and 3 bristles (1 long dorsal, 2 short ventral) with short spines (Figure 82*f*). Sensory bristle of 5th joint with short proximal filament and 6 long terminal filaments. Medial bristle of 6th joint about 1/4 longer than a-bristle of 7th joint, with short marginal spines (bristle not shown). 7th joint (Figure 82*f*): a-bristle claw-like with indistinct dorsal spines; b-bristle slightly shorter than sensory bristle of 5th joint, with 4 long marginal filaments; c-bristle longer than sensory bristle of 5th joint, with 9 marginal filaments. 8th joint (Figure 82*f*): d-and e-bristles well developed with blunt tips; d-bristle slenderer than e-bristle and about 3/4 of its length; f-bristle bent dorsally, about same length as c-bristle, with 5 marginal filaments; g-bristle slightly longer than c-bristle, with 6 marginal filaments (bristle not shown).

Second Antenna (Figure 82*g*): Protopodite with small distal medial bristle, distal spines on dorsal margin, medial spines on distal dorsal half, and row of few medial hairs near base of endopodite. Endopodite 3-jointed with terminal filament about twice length of stem. Exopodite: Bristle of 2nd joint reaching 9th joint, with numerous slender hair-like ventral spines (proximal spines shorter and stouter); bristle of joint 3 with ventral spines and natatory hairs; bristles of joints 4–8 with natatory hairs; 9th joint with 4 bristles (2 long with natatory hairs, 2 short with short slender spines); joint 4 with 2 or 3 minute basal spines; joints 5–8 with small basal spine

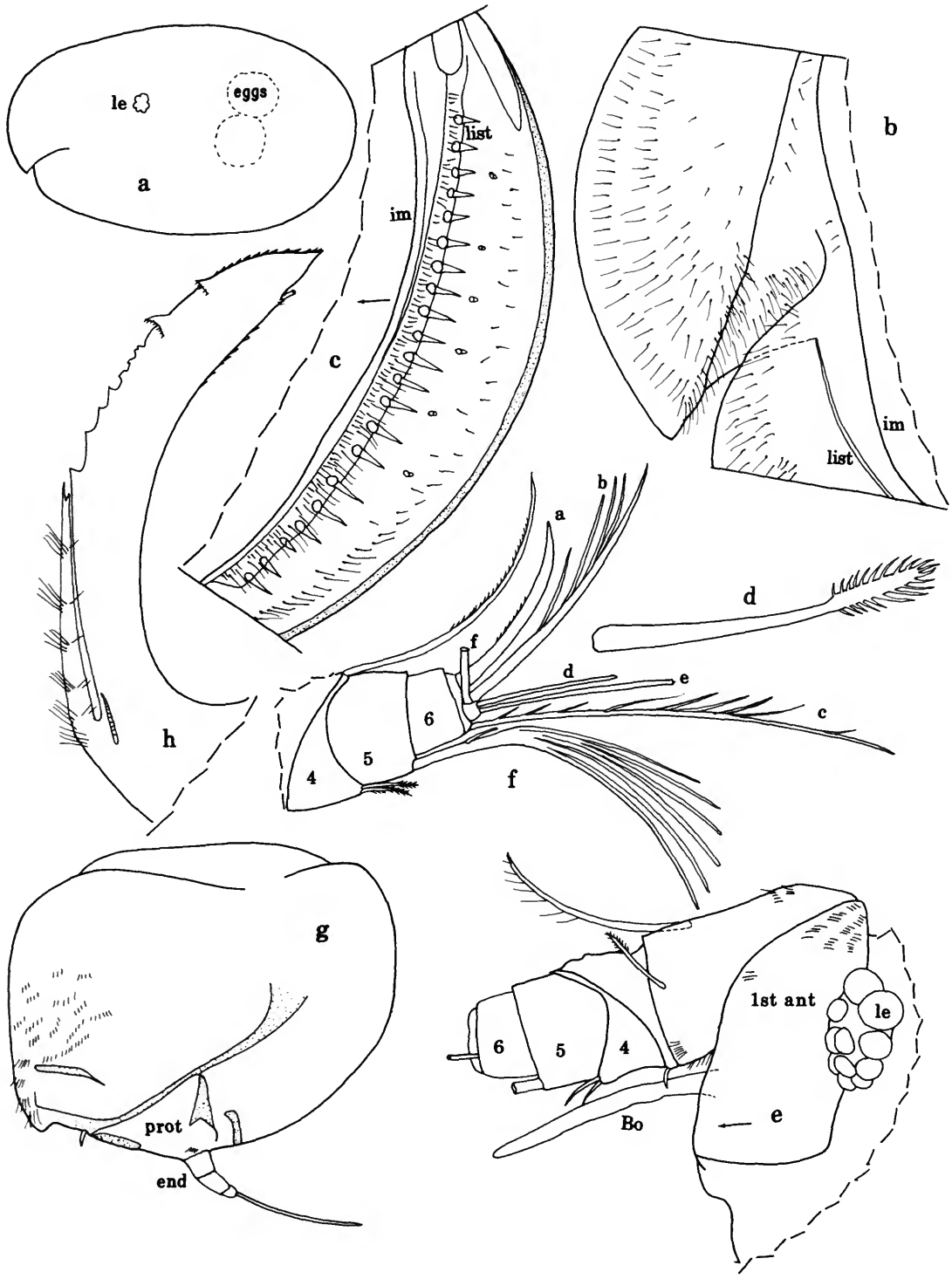


FIGURE 82.—*Archasterope efficax* Kornicker, new species, ovigerous female, paratype, USNM 193983: *a*, complete specimen, length 2.03 mm; *b,c*, anterior and posterior, respectively, right valve, iv; *d*, lateral bristle 2nd joint right 1st antenna, lv; *e*, dorsal part anterior of body, lv; *f*, distal left 1st antenna (nabs), lv; *g*, protopodite and endopodite right 2nd antenna, mv; *h*, coxale endite left mandible, mv.

(spine of 8th joint about 1/5 length of 9th joint); 9th joint with lateral spine about half length of joint; joints 2–8 with row of minute spines along distal edges.

Mandible: Coxale endite (Figure 82*h*): With small bristle at base of ventral branch; ventral branch with spines forming 6 rows and with tip having 1 short stout spine and 1 longer slender spine; ventral margin of dorsal branch with 7 low nodes proximal to small main spine; edge between main spine and tip of branch with a spine similar to main spine but smaller, then row of smaller spines; tip of branch with small spines but no bristle; dorsal margin of dorsal branch with bristle (with few spines near base) set back from tip of branch (bristle broken on illustrated endite) and with serrations proximal to bristle; coxale proximal to endite and with long medial hairs (Figure 83*a*). Basale endite with 4 spinous end bristles, glandular peg, 2 dwarf bristles, and 3 triaenid bristles with 10 or 11 paired spines excluding terminal pair (Figure 83*a*). Basale (Figure 83*a,b*): Ventral margin with short triaenid bristle (with 3 paired spines proximal to terminal pair) proximal to U-shaped boss; dorsal margin with long proximal hairs, 1 short bare bristle at midlength, and 2 long terminal bristles with short spines; lateral side with long proximal hairs near dorsal margin. Exopodite hirsute, about half length of dorsal margin of 1st endopodial joint, with 2 short subterminal bristles (Figure 83*b*). 1st endopodial joint with 3 long ventral bristles (1 with short spines, 2 with long spines). 2nd endopodial joint: Dorsal margin with 2 short slender proximal bristles with short spines, stout spinous a-, b-, c-, and d-bristles (c-bristle with base broader than that of d-bristle), 1 long spinous lateral e-bristle between b- and c-bristles, 1 long spinous lateral f-bristle between c- and d-bristles, 1 long spinous medial g-bristle near base of d-bristle, and 8 cleaning bristles (3 between b- and c-bristles, 5 at base of c-bristle; spines not shown on cleaning bristles in Figure 83*b*); ventral margin with 3 long spinous terminal bristles; medial surface with rows of spines. 3rd endopodial joint with stout dorsal claw with small ventral spines at midlength, and 5 bristles (1 medium, 4 long) with short marginal spines.

Maxilla (Figure 83*c*): Epipodite with hirsute tip broken off on illustrated limb. Endite I with 4 bristles (1 short slender, 3 long stout spinous); endite II with 3 long stout spinous bristles; 1 or 2 indistinct minute spine-like bristles between endites but closer to endite II (barely visible at high magnification (×100 objective, ×15 ocular)). Basale: Medial surface near dorsal margin with stout proximal bristle (broken off on both limbs of USNM 193983, but stump remaining on left limb shown in Figure 83*c*) and 1 short slender distal bristle; ventral margin with 9 or 10 slender bare medial bristles proximal to midlength of basale, 1 small distal bristle (base on lateral surface), and 1 long spinous terminal bristle; medial surface spinous; usual proximal lateral bristle not observed, possibly obscured. 1st endopodial joint with few distal spines, small bare alpha-bristle, and long beta-bristle with few short marginal spines. 2nd endopodial joint with terminal bristle (with few spines) reaching very slightly past tip of beta-bristle.

Fifth Limb (Figure 83*d*): Lateral side of comb with stout spinous exopodial bristle reaching past end of comb, 2 short slender bristles just ventral to base of stout bristle, 2 pairs of bristles closer to ventral margin of comb, and 4 bristles almost on ventral margin.

Sixth Limb (Figure 84*a,b*): Limb hirsute. Small medial bristle near proximal anterior corner. Anterior margin of right limb of USNM 193983 with 1 bristle at both upper and lower endite sutures (Figure 84*b*), but left limb with bristle only at lower suture (Figure 84*a*) (the possibility that the bristle of the upper suture may have been pulled out is indicated by an indistinct empty socket, but the socket was not identified with certainty). Anteroventral corner with 3 small bristles. Posteroventral margin with 26 bristles (possibly 1 or 2 more were present on missing section of proximal posterior margin of illustrated limb (Figure 84*a*).

Seventh Limb (Figure 83*e*): Each limb with 12 bristles: 6 proximal (3 on each side) and 6 distal (3 on each side); each bristle with 3 or 4 bells. Terminus with opposing combs, each with about 11 spinous teeth of similar length.

Furca (Figure 84*c*): Each lamella with 9 claws (posterior 2 bristle-like, recurved); claws 1–7 with teeth along posterior edge (not shown); claws 1–5 with distal hairs along anterior edge (not shown); small triangular segment posterior to lamellae with minute spines.

Bellonci Organ (Figures 82*e*, 83*f*): Elongate with rounded tip.

Eyes: Medial eye unpigmented, bare (Figure 83*f*). Lateral eye well developed, about same size as medial eye or slightly smaller, unpigmented, with 12 or 13 ommatidia (Figures 82*a,e*, 83*g*, 84*e*).

Lips: Upper lip a hirsute lobe on each side of indented saddle; each lobe with 2 or 3 small spines (Figure 83*i;* only 1 spine shown in Figure 83*h*). Lower lip a hirsute flap on each side of mouth (Figure 83*h,i*).

Genitalia: Oval structure on each side of body anterior to furca.

Anterior of Body (Figures 82*e*, 83*h*): Without anterior process.

Posterior of Body (Figure 84*d*): Dorsal half hirsute; with short spinous thumb-like dorsal process.

Y-*Sclerite* (Figure 84*d*): Typical for subfamily.

Eggs: Slope 40: USNM 193983 with 19 eggs in marsupium (2 shown in Figure 82*a*) (lengths of 3 eggs (mm): 0.30, 0.31, 0.32). Slope 48: Holotype with 17 eggs in marsupium (1 shown in Figure 84*e*) (length of typical egg 0.31 mm).

DESCRIPTION OF ADULT MALE (Figures 85, 86).—Carapace with dorsal margin sloping posteriorly, and with low ridge extending from anteroventral corner to inner end of incisur (stippled in Figure 85*c*); posterior end with vertical row of hairs (Figure 85*a*). Carapace larger and more elongate than that of adult female (Figure 85*a,b*).

Infold: Not examined.

Carapace Size (length, height in mm): Slope 40: USNM 193984, 2.60, 1.39; height 0.53% of length.

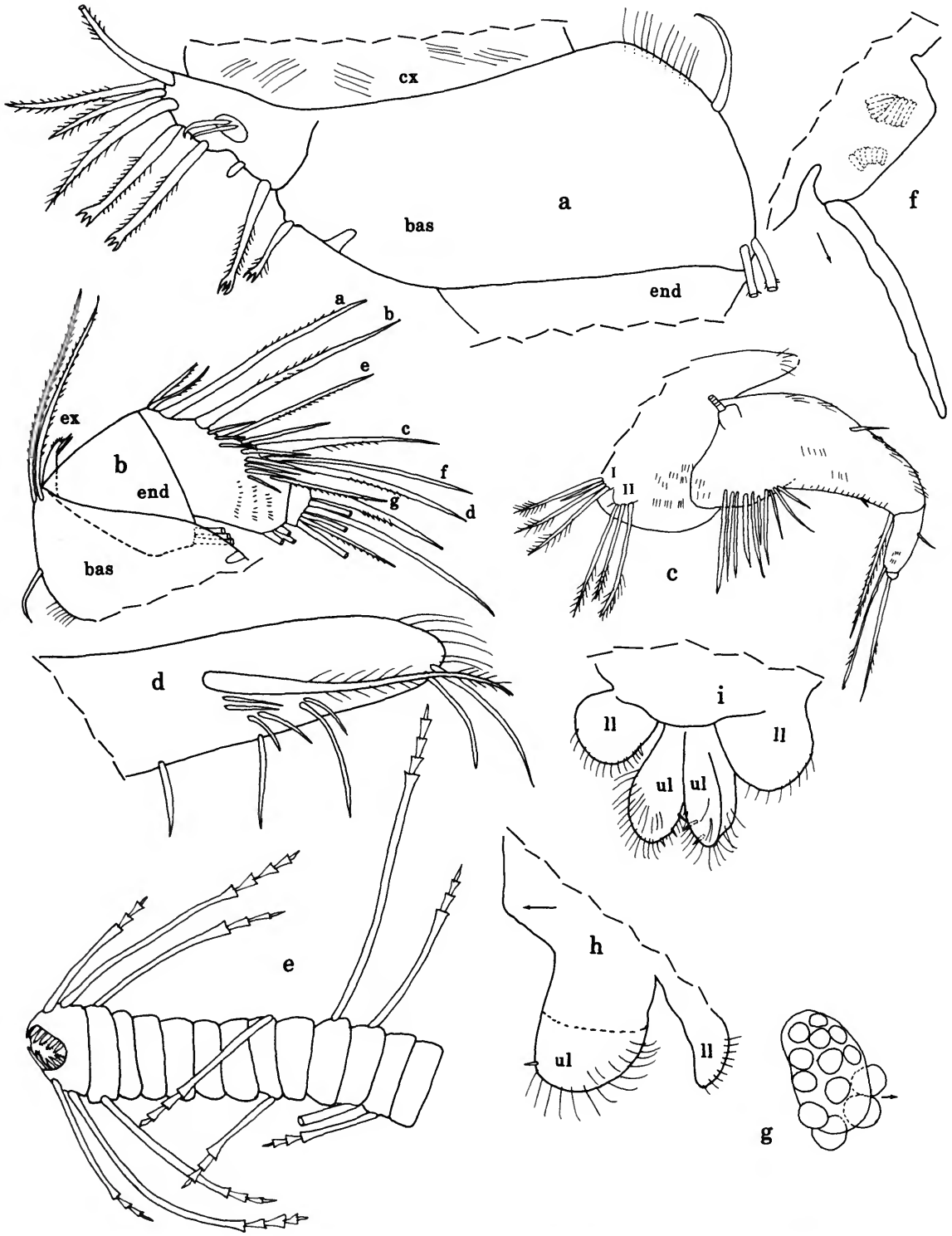


FIGURE 83.—*Archasterope efficax* Kornicker, new species, ovigerous female, USNM 193983: *a,b,* parts left mandible, mv; *c,* left maxilla, mv; *d,* comb right 5th limb (nabs), lv; *e,* 7th limb; *f,* medial eye and Bellonci organ, lv; *g,* right lateral eye, lv; *h,i,* lateral and anterior views, respectively, of upper and lower lips.

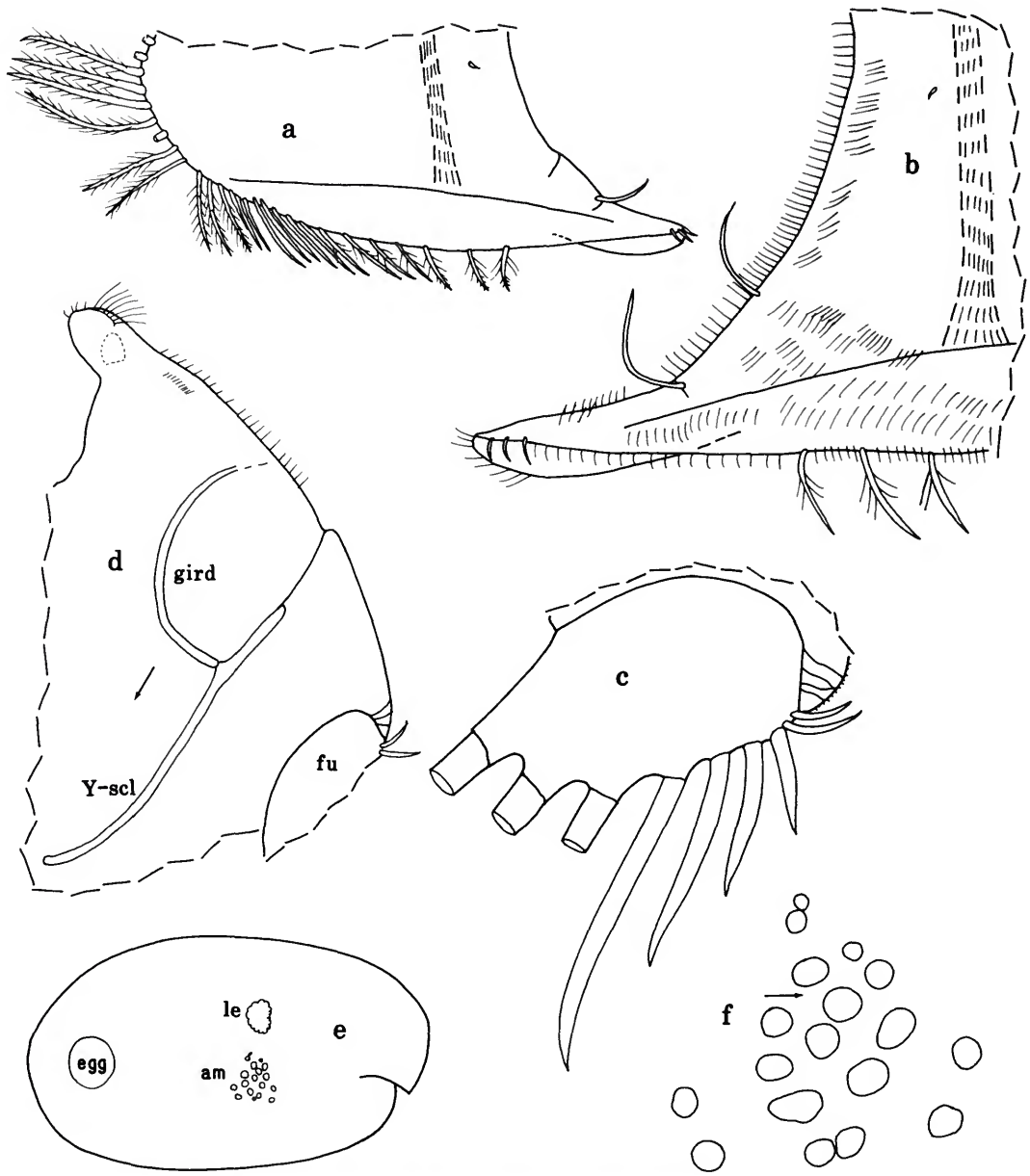


FIGURE 84.—*Archasterope efficax* Kornicker, new species, ovigerous female, USNM 193983: *a*, left 6th limb, mv; *b*, anterior right 6th limb, mv; *c*, left lamella furca, lv; *d*, posterior of body, lv. Ovigerous female, holotype, NMV J37165: *e*, complete specimen, length 2.13 mm; *f*, central adductor muscle attachments right valve, ov.

First Antenna (Figure 85*b,d–f*): 1st joint without spines. 2nd joint with medial spines and 2 bristles (dorsal long with long spines; lateral short with triaenid type spines on distal 1/3) (Figure 85*d*). 3rd joint with distal margin defined better on medial side, with small bare ventral bristle and 6 dorsal bristles (2 widely separated single, then 4 in 2 distal pairs) with long spines. 4th joint longer than that of female, with straight distal margin, 2 small bare subterminal ventral bristles, and 1 long terminal dorsal bristle with short spines. 5th joint short (dorsal margin longer on medial side) (Figure 85*d*); sensory bristle stout with abundant slender filaments and few stouter filaments at tip (filaments not shown) (Figure 85*e*). 6th joint with long medial bristle (with short spines) near dorsal margin (Figure 85*e*). 7th joint (Figure 85*e,f*): a-bristle on small pedestal,

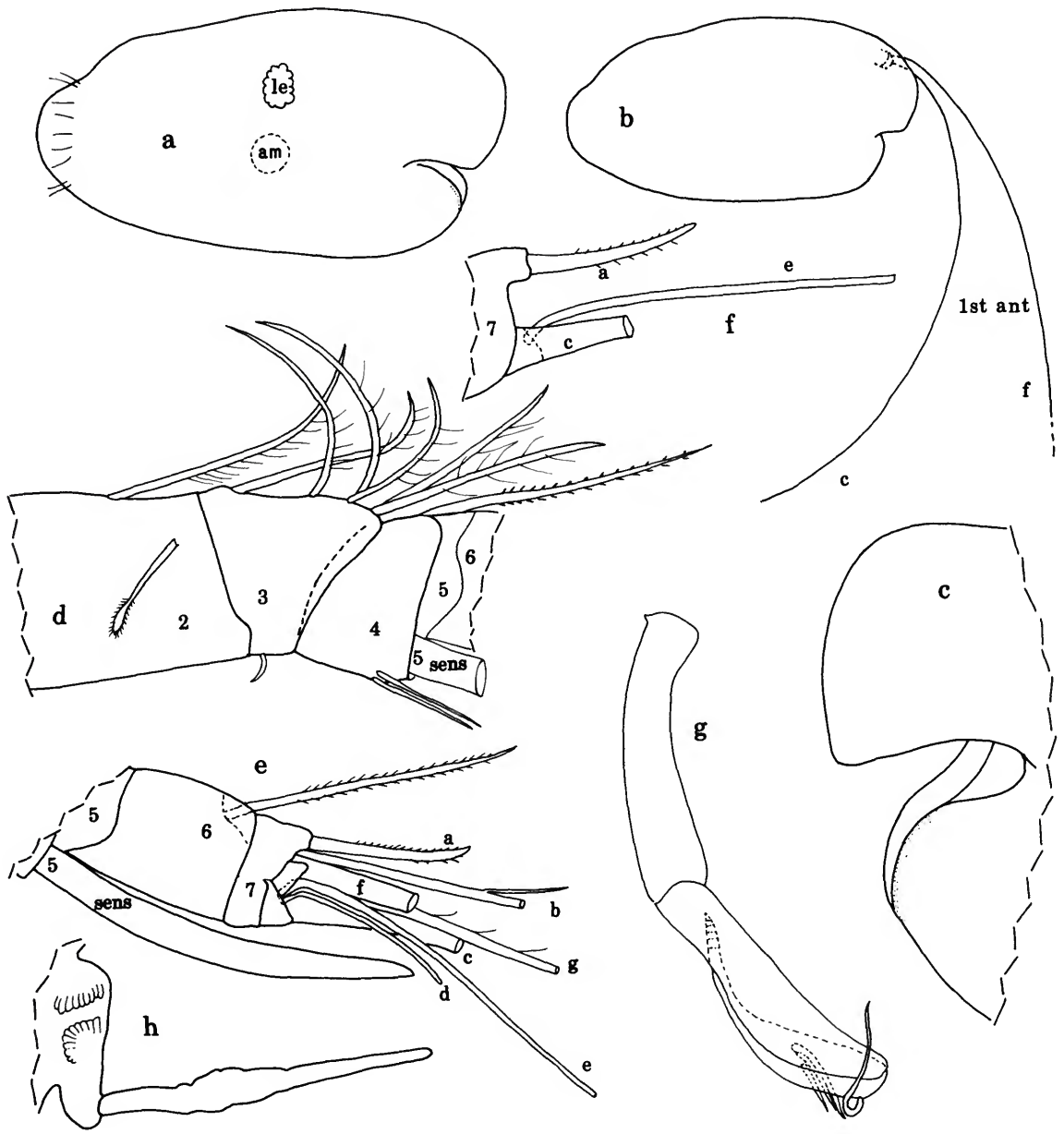


FIGURE 85.—*Archasterope efficax* Kornicker, new species, adult male, USNM 193984: *a*, complete specimen, length 2.60 mm; *b*, c- and f-bristles of right 1st antenna protruding from inside of carapace; *c*, anterior left valve, ov; *d,e*, parts right 1st antenna (nabs), lv; *f*, distal left 1st antenna (nabs), mv; *g*, endopodite right 2nd antenna, mv; *h*, medial eye and Bellonci organ, lv.

claw-like, spinous; b-bristle about 3 times length of a-bristle, with 5 marginal filaments, some with abundant spines; c-bristle extremely long (tip missing on both limbs of USNM 193984, with 41 or 42 short bare filaments on remaining parts). 8th joint (USNM 193984): Right limb (Figure 85*e*): d-bristle ventral to e-bristle, about half its length and slenderer, bare with blunt tip; e-bristle twice length of a-bristle, bare with blunt tip. Left limb: d-bristle missing; e-bristle twice length of a-bristle, bare with blunt tip (Figure 85*f*). 8th joint (continued): f-bristle similar to c-bristle (tip missing on left limb of USNM 193984, with 32 short bare filaments on remaining part); g-bristle about twice length of b-bristle (with tip missing on both limbs of USNM

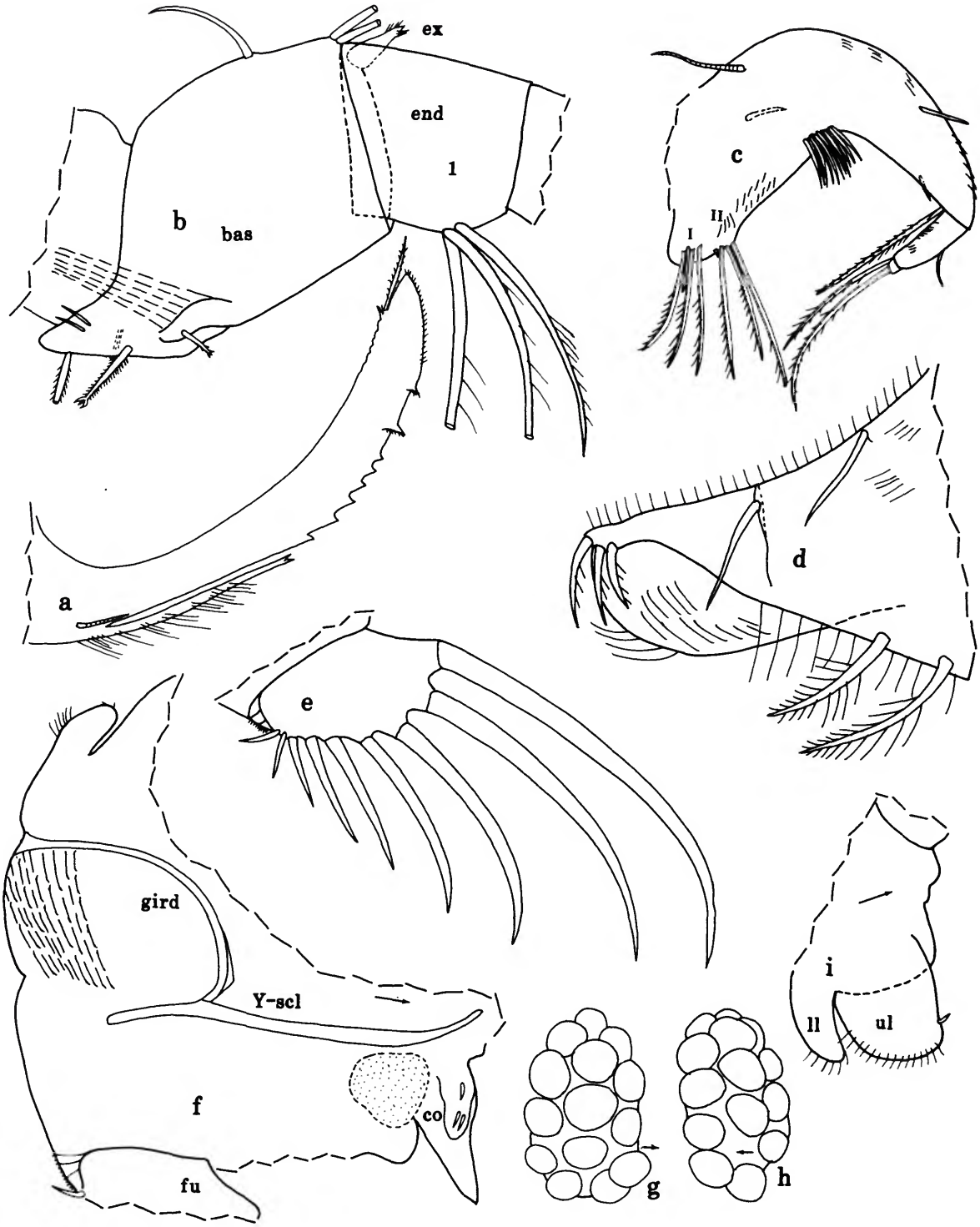


FIGURE 86.—*Archasterope efficax* Kornicker, new species, adult male, USNM 193984: *a*, coxale endite right mandible, mv; *b*, part left mandible, mv; *c*, left maxilla (epipodite not shown), mv; *d*, anterior tip right 6th limb, mv; *e*, right lamella furca, lv; *f*, posterior of body, lv; *g,h*, right and left lateral eyes (in natural position), respectively, lv; *i*, lips, lv.

193984, with 7 or 8 marginal filaments on remaining part). (The unusual ventral location of the d-bristle relative to the e-bristle of the 8th joint of the right limb of USNM 193984 is interpreted to be an aberrancy, as is the absence of a d-bristle on the left limb.)

Second Antenna: Protopodite with indistinct spines near dorsal margin and small distomedial bristle. Endopodite 3-jointed (Figure 85*g*): 1st joint elongate bare; 2nd joint elongate with 3 short bristles; 3rd joint elongate, reflexed on 2nd joint, with slender proximal filament, and ridges along pointed tip. Exopodite: 2nd joint about 3 times length of 3rd joint; bristles of joints 2–8 long with natatory hairs, no spines; 9th joint with small lateral spine and 3 or 4 bristles with natatory hairs; joints 2–8 with few distal hairs and minute spines.

Mandible (Figure 86*a,b*): Coxale endite (Figure 86*a*): With small bristle at base of ventral branch; ventral branch with spines forming 7 rows, and tip with 2 long and 1 short spine (only 2 long shown); ventral margin of dorsal branch with 6 low nodes proximal to small main spine; edge between main spine and tip of branch with 2nd smaller spine similar to main spine, then row of small spines; tip of branch with small spines but no bristle; dorsal margin of dorsal branch with spinous bristle reaching well past tip of branch and serrations proximal to bristle. Basale endite with 4 spinous end bristles (not shown), small glandular peg, 2 dwarf bristles, and 2 triaenid bristles each with about 17 pairs of weak spines excluding terminal pair (Figure 86*b*). Basale (Figure 86*b*): Longer relative to width than basale of adult female and without proximal lateral and dorsal hairs, otherwise similar to that of female. Exopodite hirsute, about 1/3 length of dorsal margin of 1st endopodial joint, with 2 short subterminal bristles. 1st endopodial joint with 3 ventral bristles (2 with long spines except for short spines near tip, 1 with few long proximal spines and then short spines). 2nd endopodial joint (not shown): Ventral margin and medial surface similar to that of adult female; dorsal margin with 3 short slender spinous proximal bristles, stout spinous a-, b-, c-, and d-bristles (c-bristle shorter than d-bristle and with slightly stouter base), long slender spinous e-, f-, and g-bristles, and 10 cleaning bristles (oblique row of 4 between b- and c-bristles, and oblique row of 6 at base of c-bristle). 3rd endopodial joint similar to that of adult female.

Maxilla (Figure 86*c*): Ventral margin of basale near midlength with 10 or 11 bristles and lateral side with proximal bristle; limb otherwise similar to that of adult female.

Fifth Limb: Comb similar to that of adult female.

Sixth Limb (Figure 86*d*): Small bristle near proximal anterior corner (not shown). Anterior margin of both limbs of USNM 193984 with 1 bristle at both upper and lower sutures (Figure 86*d*). Anteroventral corner with 3 small spinous bristles. Posteroventral margin with about 29 bristles (2 shown).

Seventh Limb and Furca (Figure 86*e*): Similar to those of adult female.

Bellonci Organ (Figure 85*h*): Broader proximal to midlength than organ of adult female.

Eyes: Medial eye similar to that of adult female (Figure 85*h*). Lateral eye larger than that of adult female, with 14 ommatidia, unpigmented (Figures 85*a*, 86*g,h*).

Lips (Figure 86*i*, only 1 of 2 or 3 spines shown), *Anterior of Body* (Figure 86*i*), *and* Y-*Sclerite* (Figure 86*f*): Similar to those of adult female.

Genitalia (Figure 86*f*): Triangular lobe (with 3 small proximal bristles) on each side of body anterior to furca.

Posterior of Body (Figure 86*f*): Part ventral to girdle with crescentic ridges not observed on female; short spinous thumb-like dorsal process present.

COMPARISONS.—The basale of the mandible of *A. efficax* bears only 1 dorsal bristle at midlength compared to 3–5 bristles on previously described species of the genus. The basale of the maxilla of *A. efficax* bears fewer dorsal bristles and more ventral bristles than on the maxillae of previously described species of the genus.

Archasterope apex Kornicker, new species

FIGURES 87–89

ETYMOLOGY.—From the Latin *apex* (tip, top).

HOLOTYPE.—NMV J37164, ovigerous female on slide and in alcohol.

TYPE LOCALITY.—Slope 47, 41°58.60′S, 148°38.80′E, Tasmania, off Freycinet Peninsula; depth 500 m.

PARATYPES.—None.

DISTRIBUTION.—Slope 47, 500 m.

DESCRIPTION OF ADULT FEMALE (Figures 87–89).—Carapace elongate with slightly convex dorsal and ventral margins and evenly rounded anterior and posterior margins; incisur ventral to midheight (Figure 87*a*).

Infold: Anterior and anteroventral infold with numerous bristles (Figure 87*b*); broad list of posterior infold with 22–24 broad transparent bristles with pores at base and with 3–6 long and 42–47 short bristles (Figure 87*c*); posterior infold between broad list and posterior end of valve with 7 processes and about 40 bristles; about 45 bristles in row on ventral infold between anteroventral infold and ventral end of broad list of posterior infold.

Selvage: Fringed lamellar prolongation along inner part of ventral edge of incisur. Right valve with row of long hairs near dorsal end of broad list of posterior infold (Figure 87*c*); left valve with row of short spines at that locality.

Vestment: Anterodorsal part of vestment proximal to infold with few rows of long hairs.

Central Adductor Muscle Attachments (Figure 87*d*): Comprising about 22 ovoid attachments just anterior to valve midlength and just ventral to valve midheight.

Carapace Size (length, height in mm): NMV J37164 (holotype), 2.13, 1.22, height 57% of length.

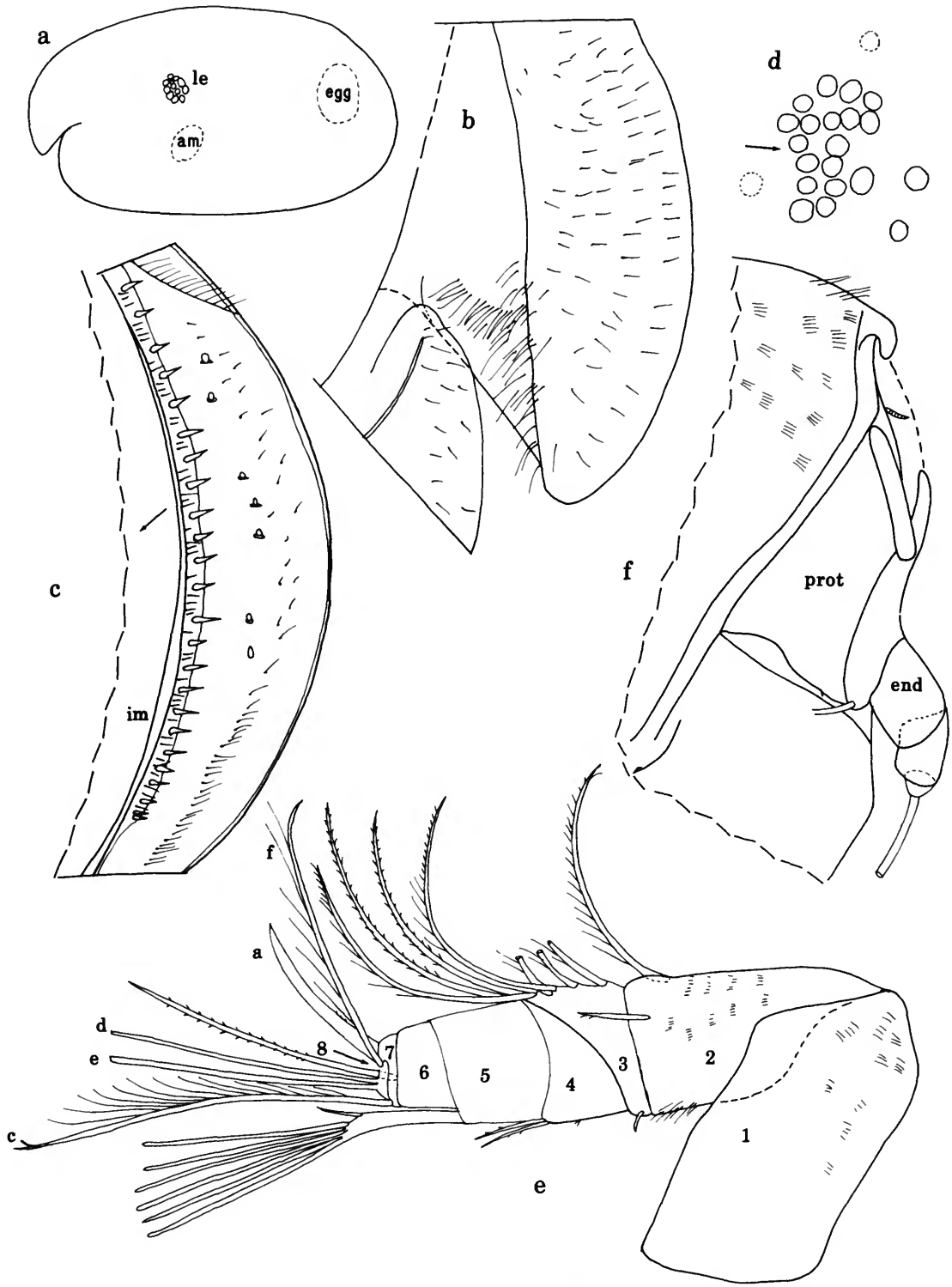


FIGURE 87.—*Archasterope apex* Kornicker, new species, ovigerous female, holotype, NMV J37164: *a*, complete specimen, length 2.13 mm; *b*, anterior left valve, iv; *c*, posterior right valve, iv; *d*, central adductor muscle attachments right valve, ov; *e*, left 1st antenna, lv; *f*, distal protopodite and endopodite left 2nd antenna, mv.

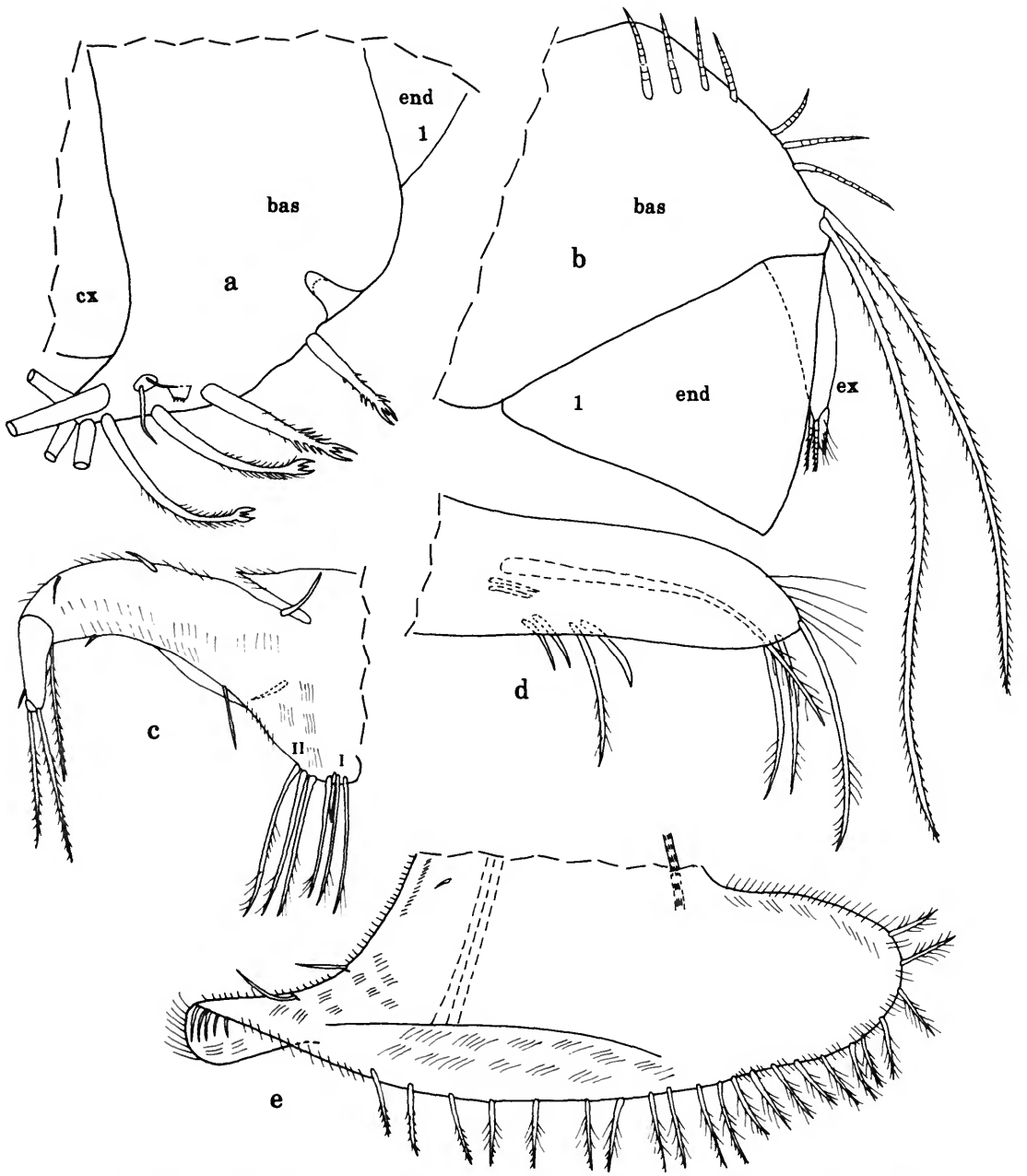


FIGURE 88.—*Archasterope apex* Kornicker, new species, ovigerous female, holotype, NMV J37164: *a,b*, parts left mandible, mv; *c*, right maxilla, mv; *d*, comb left 5th limb (nabs), mv; *e*, right 6th limb, mv.

First Antenna (Figure 87*e*): 1st joint with medial and lateral spines. 2nd joint spinous, with 2 bristles (dorsal long spinous, lateral short with few indistinct spines). 3rd joint with well-defined distal margin, small ventral bristle, and 6 dorsal bristles (2 single proximal, 2 almost adjacent, 2 paired distal; medial of distal pair with short spines, others with long proximal and short distal spines). 4th joint with slightly concave distal margin, few minute ventral spines, and 3 bristles (1 long dorsal with short spines, 2 short ventral with few indistinct short spines). Sensory bristle of 5th joint with short proximal filament and 6 long terminal filaments. Medial bristle of 6th joint longer than a-bristle of 7th joint, with short marginal spines. 7th joint: a-bristle claw-like with indistinct proximal dorsal spines; b-bristle (not shown) about 1 1/2 times

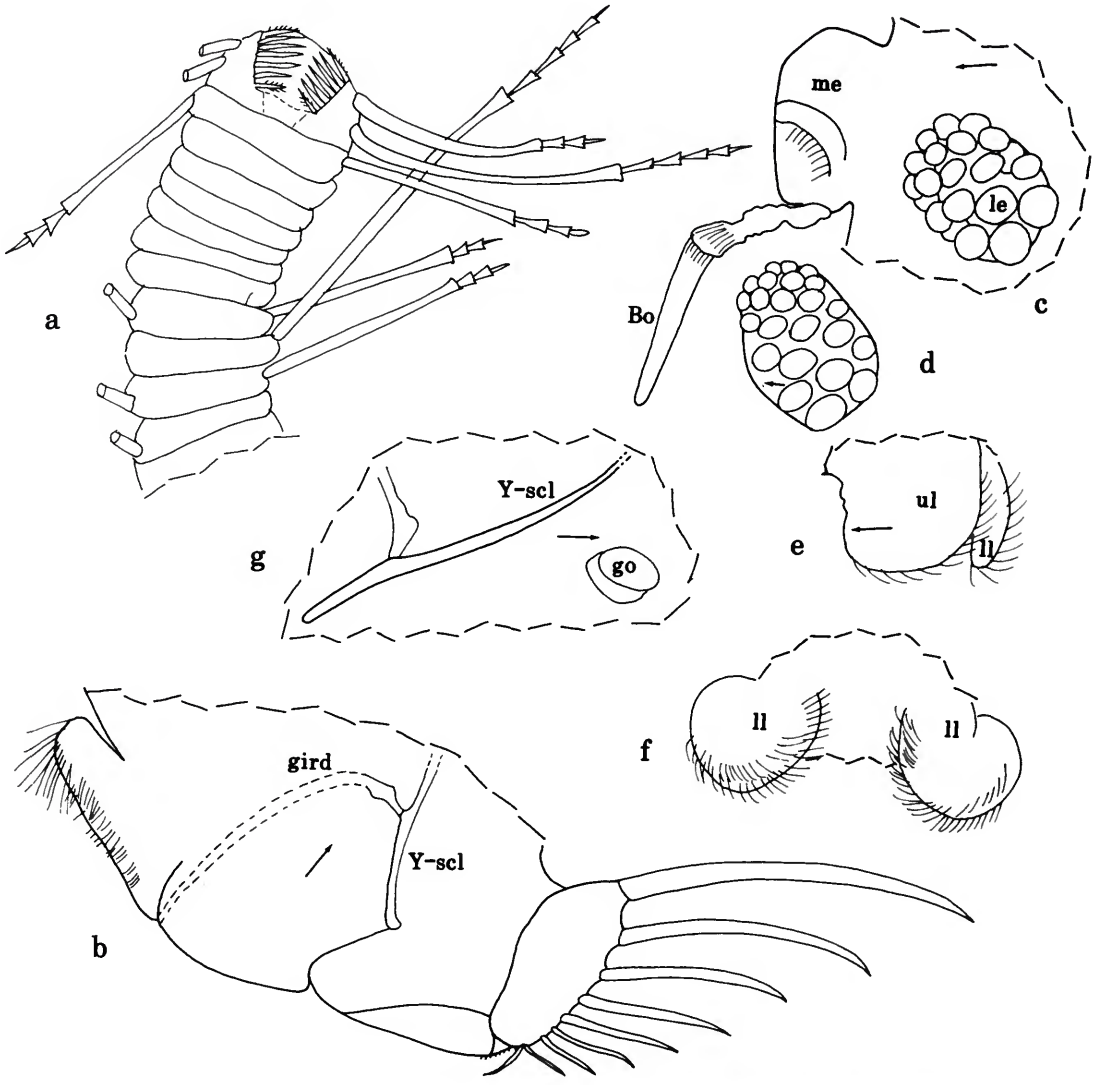


FIGURE 89.—*Archasterope apex* Kornicker, new species, ovigerous female, holotype, NMV J37164: *a*, 7th limb; *b*, posterior of body and right lamella of furca, lv; *c*, left lateral eye, medial eye, and Bellonci organ, lv; *d*, left lateral eye; *e*, lips, lv; *f*, lower lips flattened under cover slip, av or pv; *g*, right genital organ and Y-sclerite, lv.

length of a-bristle, with 4 marginal filaments, some with spines; c-bristle longer than sensory bristle of 5th joint, with 13 marginal filaments and bifurcate tip. 8th joint: Filament-like d-and e-bristles reaching distal end of sensory bristle of 5th joint, bare with blunt tips; e-bristle slightly stouter than d-bristle but same length; f-bristle bent dorsally, about twice length of a-bristle, with 6 marginal filaments, some with spines; g-bristle (not shown) about same length as c-bristle, with 10 filaments (tip obscured).

Second Antenna: Protopodite with small distal medial bristle, distal spines on dorsal margin, and medial spines on dorsal half (Figure 87*f*). Endopodite 3-jointed with long terminal filament (Figure 87*f*). Exopodite: 1st joint with distal spines along dorsal margin; bristle of 2nd joint reaching 9th joint, with numerous slender spines along ventral margin; bristles of joints 3–8 with natatory hairs and proximal ventral spines (spines on bristles of joints 7 and 8 minute); 9th joint with 4 bristles (2 long with natatory hairs, 2 short with short slender spines); joints 4–8 with small basal spines; spine of 8th joint about 1/3 length of 9th joint; 9th joint with lateral spine about 1/2 length of joint; joints 2–8 with row of minute spines along distal edge.

Mandible: Coxale endite broken off on both limbs of holotype. Basale endite with 4 spinous end bristles, glandular

peg with minute terminal papillae, 2 dwarf bristles, and 4 triaenid bristles (3 shown), each with 8–17 pairs of spines (distal pairs larger) excluding terminal pair. Basale (Figure 88*a,b*): Ventral margin with triaenid bristle with 4 or 5 pairs of spines excluding terminal pair proximal to deep U-shaped boss; dorsal margin with 7 short bare bristles (proximal 3 medial) and 2 long terminal bristles with short spines. Exopodite hirsute, about 1/2 length of dorsal margin of 1st endopodial joint, with diaphanous hirsute terminal process and 2 short spinous subterminal bristles (Figure 88*b*). 1st endopodial joint with 3 long ventral bristles (1 with short spines, 2 with long spines) (bristles not shown). 2nd endopodial joint: Dorsal margin with 4 unequal slender bare proximal bristles, stout spinous a-, b-, c-, and d-bristles (base of c-bristle about same width as base of d-bristle), 1 long spinous lateral e-bristle between b- and c-bristles, 1 long spinous lateral f-bristle between c- and d-bristles, 1 long spinous medial g-bristle near base of d-bristle, and 17 spinous cleaning bristles (5 near bases of a- and b-bristles, 5 between bases of b- and c-bristles, and 7 between bases of c- and d-bristles (outer cleaning bristle about 1/2 length of c-bristle)); ventral margin with 3 long spinous terminal bristles; medial surface with rows of spines. 3rd endopodial joint with stout dorsal claw with small ventral spines, and 5 bristles (1 medium, 4 long) with short spines.

Maxilla (Figure 88*c*): Epipodite short with slender hirsute tip. Endite I with 4 bristles (1 short slender, 3 long stout spinous); endite II with 3 long spinous bristles. Basale: Medial surface near dorsal margin with 1 bare proximal bristle, 1 short bare bristle at midlength, and 1 short bare distal bristle; ventral margin with 1 bare proximal bristle, 1 small distal bristle (base on lateral side), and 1 long spinous terminal bristle; lateral side with 1 proximal bristle near midheight; medial surface and dorsal and ventral margins spinous. 1st endopodial joint with small bare alpha-bristle near distal end, and long spinous beta-bristle. 2nd endopodial joint with long spinous terminal bristle slightly shorter than beta-bristle.

Fifth Limb (Figure 88*d*): Lateral side of comb with stout spinous exopodial bristle reaching past end of comb, 2 short slender bristles just ventral to base of stout bristle, 2 pairs of bristles closer to ventral margin of comb near midlength, and 2 distal bristles almost on ventral margin.

Sixth Limb (Figure 88*e*): Limb hirsute; posterior end broadly rounded. Small medial bristle near proximal anterior corner. Anterior margin with bristle at upper and lower sutures. Anteroventral corner with 5 small bristles; lateral flap without bristles; posteroventral margin with 19–22 spinous bristles.

Seventh Limb (Figure 89*a*): Each limb with 12 bristles: 6 proximal (3 on each side, 2 bristles with 3 and 1 with 5 bells) and 6 distal (3 on each side, 2 bristles with 3 and 1 with 5 bells). Terminus with opposing combs, each with 13 or 14 spinous teeth (teeth at each end of comb slightly shorter).

Furca (Figure 89*b*): Each lamella with 9 claws (posterior claw bristle-like, recurved); claws 1–8 with long and short teeth along posterior edges (not shown); claws 1–5 or 6 with distal hairs along anterior edges (not shown); small triangular process posterior to lamella with minute indistinct spines.

Bellonci Organ (Figure 89*c*): Elongate, crinkled proximally, broad striate with suture or fold at midlength, then tapering to rounded tip.

Eyes: Medial eye unpigmented, bare (Figure 89*c*). Lateral eye well developed, about same size as medial eye, unpigmented, with 23 ommatidia (Figure 89*c,d*) (when body viewed laterally with eye in place small ommatidia along dorsal edge not visible (Figure 87*a*)).

Genitalia (Figure 89*g*): Oval structure on each side of body anterior to furca.

Lips: Upper lip a hirsute lobe on each side of indented saddle; a minute anterior spine dorsal to lobe (Figure 89*e*). Lower lip a hirsute flap on each side of mouth (Figure 89*e,f*).

Anterior of Body: Without anterior process.

Posterior of Body (Figure 89*b*): Hirsute dorsal to dorsal end of girdle; with short spinous thumb-like process.

Y-*Sclerite* (Figure 89*b,g*): Typical for subfamily.

Eggs: Holotype with 13 eggs in marsupium (1 shown in Figure 87*a*); lengths of 3 eggs in mm (excluding transparent sheath) 0.33, 0.33, 0.34.

COMPARISONS.—The maxilla of *A. apex* differs from those of previously described species of the genus in having only 1 proximal ventral bristle on the basale; other species have at least 4. The basale of the mandible of *A. efficax* differs from that of *A. apex* in having only 3 instead of 9 dorsal bristles.

Archasterope altrix Kornicker, new species

FIGURES 90, 91

ETYMOLOGY.—From the Latin *altrix* (nourisher, wet-nurse).

HOLOTYPE.—NMV J37163, adult female on slide and in alcohol.

TYPE LOCALITY.—Slope 34, 38°16.40'S, 149°27.60'E, Victoria, S of Point Hicks; depth 800 m.

PARATYPES.—Slope 34: USNM 194046, adult female on slide and in alcohol.

DISTRIBUTION.—Slope 34, 800 m.

REMARKS.—Because the species is similar to *Archasterope apex*, appendages are compared to those of that species in the description below.

DESCRIPTION OF ADULT FEMALE (Figures 90, 91).—Carapace elongate, slightly higher posterior to midlength; incisur ventral to midheight (Figures 90*a*, 91*c*).

Infold: Anterior and anteroventral infold with numerous bristles (Figure 90*b*); broad list of posterior infold with 25 broad transparent bristles with pores at base, 1 or 2 long bristles (near ventral end), and 33 short bristles (not all shown in Figure 90*c*); posterior infold between broad list and posterior end of valve with 7 processes and about 40 bristles (not all bristles shown in Figure 90*c*); about 40 bristles between anteroventral infold and ventral end of broad list of posterior infold.

Selvage: Fringed lamellar prolongation along inner part of

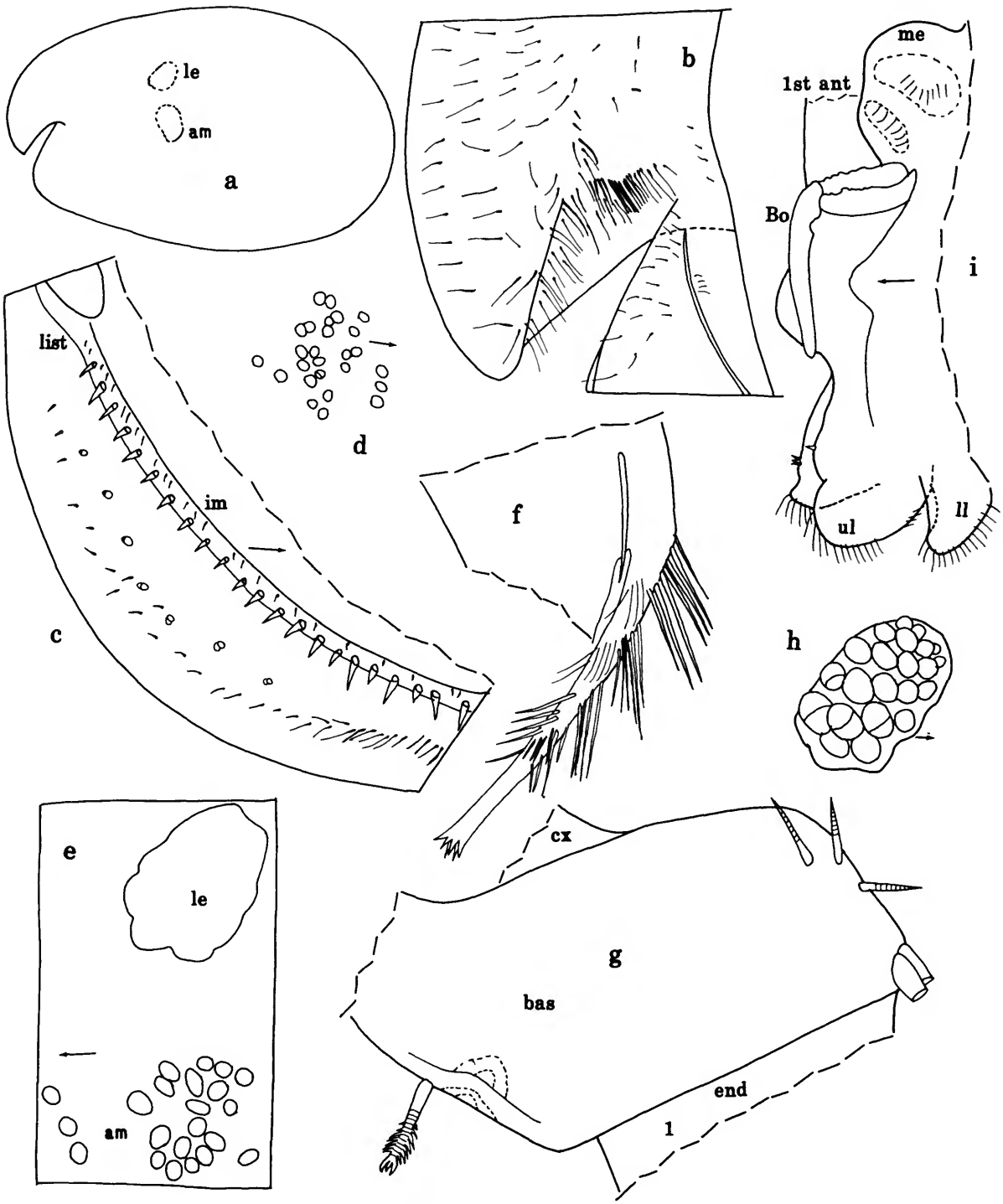


FIGURE 90.—*Archasterope altrix* Kornicker, new species, adult female, paratype, USNM 194046: *a*, complete specimen, length 2.23 mm; *b*, anterior right valve, iv; *c*, posteroventral infold left valve, iv; *d*, central adductor muscle attachments right valve, ov; *e*, outline of left lateral eye and central adductor muscles protruding from left side of body after carapace removed; *f*, ventral branch coxale endite left mandible, mv; *g*, part basale left mandible, mv; *h*, right lateral eye, lv; *i*, anterior of body, lv.

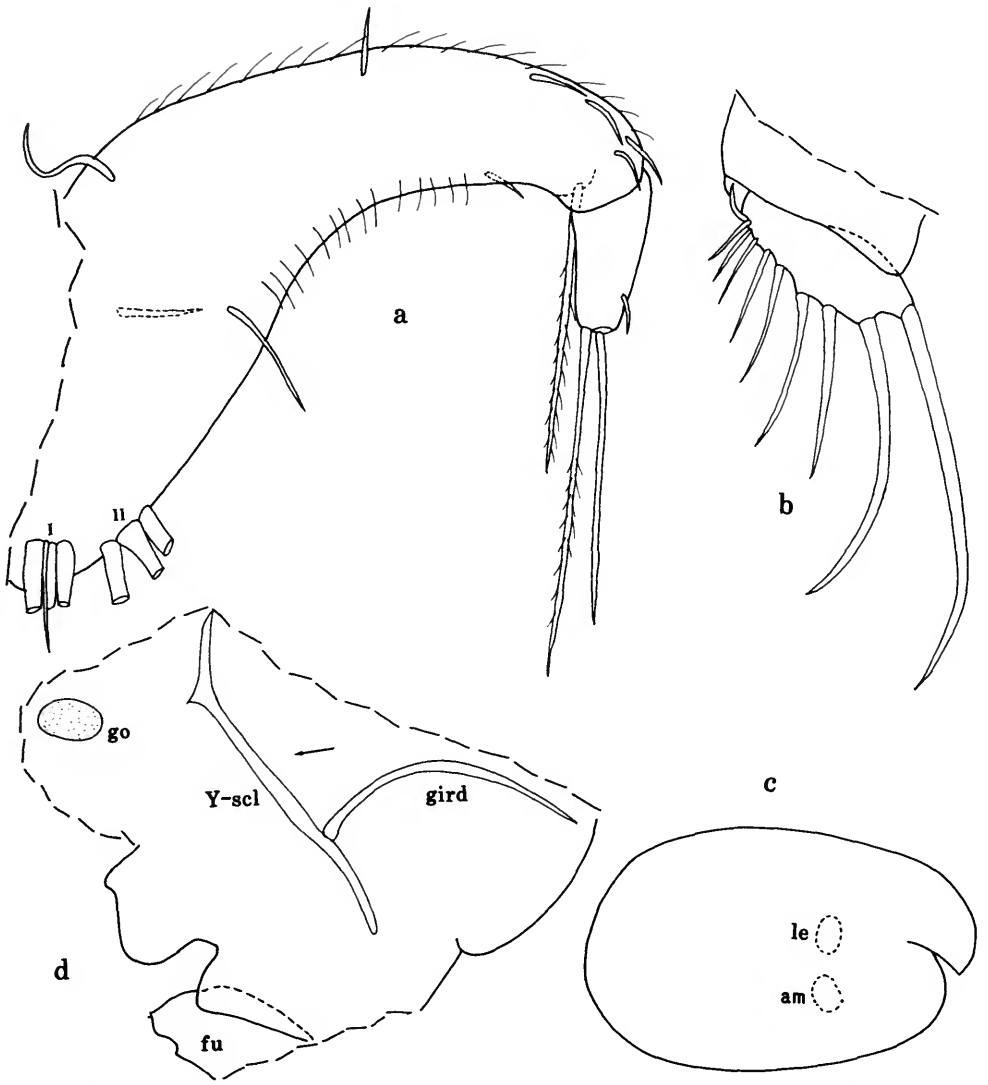


FIGURE 91.—*Archasterope altrix* Kornicker, new species, adult female, paratype, USNM 194046: *a*, left maxilla (epipodite not shown), mv; *b*, right lamella furca, lv. Adult female, holotype, NMV J37163: *c*, complete specimen, length 2.06 mm; *d*, posterior of body, lv.

ventral edge of incisur.

Vestment: Anterodorsal part of vestment proximal to infold with few rows of spines.

Central Adductor Muscle Attachments: Comprising about 26 ovoid attachments anterior to midlength (Figure 90*d*) (only 22 muscle ends counted protruding from body removed from shell (Figure 90*e*)).

Carapace Size (length, height in mm): Holotype, 2.06, 1.37, height 67% of length; USNM 194046, 2.23, 1.42, height 64% of length. Length range 2.06–2.23, height range 1.37–1.42; range of height as percent of length 64–66.

First Antenna: Similar to that of *A. apex*.

Second Antenna: Similar to that of *A. apex*, except right limb of USNM 194046 with 3 bristles on 9th exopodial joint (left limb with 4 as on *A. apex*).

Mandible: Coxale endite broken off except for ventral branch of left limb of USNM 194046; with small slender bristle at base of ventral branch; ventral branch with 5 oblique rows of slender spines and tip with about 6 minute teeth (Figure 90*f*). Basale endite similar to that of *A. apex*. Basale: Ventral margin with triaenid bristle (with 6 or 7 pairs of spines excluding terminal pair) proximal to deep U-shaped boss; dorsal margin with 3 short bristles near midlength and 2 long terminal bristles (Figure 90*g*). Exopodite and endopodite similar to those of *A. apex*.

Maxilla (Figure 91*a*): Epipodite, endites, and endopodite

similar to those of *A. apex*. Basale differs from that of *A. apex* in having 3 or 4 dorsal bristles near distal end instead of only 1.

Fifth, Sixth, and Seventh Limbs: Similar to those of *A. apex*.

Furca (Figure 91*b*): Each lamella with 9 or 10 claws, otherwise similar to that of *A. apex*, which has only 9 claws.

Bellonci Organ (Figure 90*i*), *Medial Eye* (Figure 90*i*); *Lateral Eye* (Figures 90*a,e,h*, 91*c*); *Anterior of Body* (Figure 90*i*), *Posterior of Body, Y-Sclerite* (Figure 91*d*), *and Genitalia* (Figure 91*d*): Similar to those of *A. apex*.

Lips (Figure 90*i*): Except for saddle between 2 lobes of upper lip having 3 small anterior spines, lips similar to those of *A. apex*.

Eggs: USNM 194046 with unextruded minute round eggs (diameter of largest egg 0.055 mm).

COMPARISONS.—*Archasterope altrix* differs from *A. apex* in having 3 short bare bristles instead of 7 near midlength of the dorsal margin of the mandibular basale, and 3 or 4 short bristles instead of 1 on the distal end of the dorsal margin of the basale of the maxilla. *Archasterope altrix* differs from *A. efficax* in having 3 short bare bristles instead of 1 near midlength of the dorsal margin of the mandibular basale, and 1 bristle instead of 9 or 10 proximal to midlength on the ventral margin of the basale of the maxilla.

Archasterope verax Kornicker, new species

FIGURES 92, 93

ETYMOLOGY.—From the Latin *verax* (speaking truly).

HOLOTYPE.—NMV J37170, adult female (with male or juvenile cyproniscid parasite) on slide and in alcohol.

TYPE LOCALITY.—Slope 81, 42°00.25'S, 148°43.55'E, Tasmania, Freycinet Peninsula, 48 km ENE of Cape Tourville; depth 1264 m.

PARATYPES.—Slope 34: NMV J37169, adult female on slide and in alcohol; NMV J37168, undissected male (probably A–1 instar) in alcohol.

NONTYPES.—Slope 32: NMV J40010, 1 adult male on slide; NMV J40069, undissected adult male in alcohol.

DISTRIBUTION.—Slope 32, 1000 m. Slope 34, 800 m. Slope 81, 1264 m.

DESCRIPTION OF ADULT FEMALE (Figure 92).—Carapace elongate with slightly convex ventral and dorsal margins and evenly rounded anterior and posterior margins; incisur ventral to midheight (Figure 92*a*).

Infold: Anterior and anteroventral infolds with numerous bristles; broad list of posterior infold with 19–23 broad transparent bristles with pores at base, and 10–13 bristles (1 or 2 long, remainder short); posterior infold between broad list and posterior end of valve with 4 processes and about 15 bristles; about 25 bristles in row on ventral infold between anteroventral infold and ventral end of broad list of posterior infold.

Selvage: Fringed lamellar prolongation along inner part of ventral edge of incisur.

Vestment: Anterodorsal part of vestment proximal to infold with few rows of long hairs.

Central Adductor Muscle Attachments (Figure 92*a,b*): Comprising about 22 ovoid attachments just anterior to valve midlength and just ventral to valve midheight.

Carapace Size (length, height in mm): Slope 81: NMV J37170 (holotype), 1.97, 1.10, height 56% of length. Slope 34: NMV J37169, 2.04, 1.10, height 54% of length. Length range 1.97–2.04, height 1.10; height range as percent of length 54–56.

First Antenna (Figure 92*c*): 1st and 2nd joints similar to those of *A. apex*. 3rd joint similar to that of *A. apex* except 2 distal lateral bristles on dorsal margin with short spines, others with long proximal and short distal spines. Sensory bristle of 5th joint with fairly long slender proximal filament and 6 longer and stouter terminal filaments. Medial bristle of 6th joint about $1\frac{1}{2}$ times length of a-bristle of 7th joint, with short marginal spines (not shown). 7th joint: a-bristle claw-like bare; b-bristle longer than a-bristle, with 4 marginal filaments and spines on stem distal to filaments; c-bristle slightly longer than sensory bristle of 5th joint, with about 6 marginal filaments. 8th joint: d- and e-bristles filament-like, bare with blunt tips; e-bristle stouter and longer than d-bristle; minute lateral pore on joint just proximal to d-bristle; f-bristle bent dorsally, with 5 marginal filaments (some filaments as well as stem between 4th and 5th filaments spinous); g-bristle about same length as c-bristle, with 6 marginal filaments and bifurcate tip (not shown).

Second Antenna: Protopodite and endopodite similar to those of *A. apex* (Figure 92*d*). Exopodite: Bristle of 2nd joint reaching past 9th joint, with abundant slender ventral spines; bristles of joints 3–8 with natatory hairs and small proximal ventral spines; 9th joint with 4 bristles (2 long with natatory hairs, 2 short (spination obscured)); 9th joint with lateral spine about half length of joint; basal spines minute (obscured on mounted paratype); joints 2–8 with minute spines along distal edges.

Mandible (Figure 92*e,f*): Coxale endite broken off both limbs of holotype; paratype with small bristle proximal to base of ventral branch; ventral branch with 3 oblique rows of spines and tip with 3 small teeth (dorsal tooth smallest); ventral margin of dorsal branch with 6 low nodes proximal to small main spine; edge between main spine and tip of spine with minute spines; tip of branch with small spines but no bristle; dorsal margin of dorsal branch with bristle (with few spines near base) set back from tip of branch (bristle broken on illustrated endite) and with serrations proximal to bristle; coxale proximal to endite with long proximal hairs. Basale endite with 4 spinous end bristles, glandular peg with terminal papillae, 2 dwarf bristles, and 2 triaenid bristles with 6–13 pairs of spines excluding terminal pair (4–7 distal pairs longer). Basale: ventral margin with triaenid bristle (with 3 or 4 pairs of

FIGURE 92.—*Archasterope verax* Kornicker, new species, adult female, holotype, NMV J37170: *a*, complete specimen, length 1.97 mm; *b*, central adductor muscle attachments, right valve, ov; *c*, distal right 1st antenna (nabs), lv; *d*, endopodite left 2nd antenna, mv; *e*, part right mandible, mv; *f*, right maxilla, mv; *g*, comb left 5th limb (nabs), lv; *h*, left 6th limb, mv; *i*, posterior of body from left side with attached cyproniscid parasite; *j*, medial eye and Bellonci organ, lv; *k*, lips, lv. Adult female, paratype, NMV J37169 (from slope 34), length 2.04 mm: *l*, coxale endite left mandible, mv.

spines excluding terminal pair) proximal to deep U-shaped process; dorsal margin with 3 or 4 spinous bristles near midlength and 2 long terminal bristles with short spines. Exopodite hirsute, about 1/2 length of dorsal margin of 1st endopodial joint, with 2 short subterminal bristles. 1st endopodial joint with 3 long ventral bristles (1 with short spines, 2 with long and short spines). 2nd endopodial joint: Dorsal margin with 1 short slender proximal bristle, stout spinous a- to g-bristles (base of c-bristle about same width as base of d-bristle), and 10 or 11 cleaning bristles (1 between bases of a- and b-bristles, 3 or 4 between bases of b-and c-bristles, and 6 in vicinity of c- and d-bristles); ventral margin with 3 long spinous terminal bristles; medial surface with rows of spines. 3rd endopodial joint with stout straight dorsal claw and 5 spinous bristles (1 short, 4 long).

Maxilla (Figure 92*f*): Epipodite hirsute with long slender tip reaching past midlength of dorsal margin of basale. Endite I with 4 bristles (1 short slender, 3 long spinous); endite II with 3 long spinous bristles (middle bristle shorter). Basale: Medial surface near dorsal margin with 2 or 3 fairly long bristles (1 bare proximal, 1 bare near midlength, and none or 1 distal); ventral margin with 4 or 5 proximal bristles, 1 small distal bristle (with base on lateral side), and 1 long spinous terminal bristle; lateral side with 1 proximal bristle near midheight; medial surface and dorsal and ventral margins hirsute. 1st endopodial joint with small bare alpha-bristle and long spinous beta-bristle. 2nd endopodial joint with long spinous terminal bristle slightly longer than beta-bristle. (Left limb of holotype extremely aberrant, lacking all bristles on basale and endopodite.)

Fifth Limb (Figure 92*g*): Lateral side of comb with stout spinous exopodial bristle reaching past end of comb, 2 slender bristles just ventral to base of stout bristle, 2 pairs of bristles closer to ventral margin of comb, 1 bristle near proximal pair with base almost on ventral margin, and 3 additional bristles (1 proximal, 2 distal) with bases almost on ventral margin.

Sixth Limb (Figure 92*h*): Limb hirsute; posteroventral corner rounded but posterior margin dorsal to corner fairly straight; posterior end, unlike that of *A. apex*, with short projection. Small medial bristle near proximal anterior corner. Anterior margin with bristle at upper and lower sutures. Anteroventral corner with 4 small spinous bristles; lateral flap without bristles; ventral margin anterior to midlength without bristles; posteroventral margin with 11–13 spinous bristles.

Seventh Limb: Each limb with 12 bristles: 6 proximal (3 on each side, 2 with 3 and 1 with 4 bells) and 6 distal (3 on each side, 2 with 3 and 1 with 4 bells). Terminus with opposing combs, each with 13 spinous teeth.

Furca (Figure 92*i*): With 7 or 8 claws (anterior 5 stout curved, posterior 2 or 3 straight slender, none bent backwards).

Bellonci Organ (Figure 92*j*): Similar to that of *A. apex*.

Eyes: Medial eye unpigmented, bare (Figure 92*j*). Lateral eyes absent.

Upper Lip (Figure 92*k*): Each lateral lobe with 1 or 2 minute anterior spines.

Anterior and Posterior of Body, Y-Sclerite, and Genitalia: Similar to those of *A. apex*.

Gills: With 7 well-developed gills on each side of body (4 shown in Figure 92*i*).

Eggs: Holotype with fairly large unextruded eggs.

Parasites: Holotype with cyproniscid isopod (Figure 92*i*).

DESCRIPTION OF PRESUMED ADULT MALE (Figure 93).—Carapace with more open incisur than that of adult female (Figure 93*a*).

Infold: Not examined.

Carapace Size (length, height in mm): Slope 32: NMV J40010, dissected specimen, 2.34, 1.18, height 50% of length; NMV J40069, undissected specimen, 2.32, 1.25, height 54% of length. Length range 2.32–2.34, height range 1.18–1.25; range of height as percent of length 50–54.

First Antenna (Figure 93*b,c*): Joints 1–6 similar to those of adult male *A. efficax*. 7th joint: Claw-like a-bristle shorter than that of *A. efficax;* b-bristle about 3 times length of a-bristle, with 4 marginal filaments (tip of bristle missing) (not shown); c-bristle very long and stout, with 22 filaments (tip of bristle missing) (not shown). 8th joint: d-bristle about twice length of a-bristle; e-bristle about twice length of d-bristle and stouter; f-bristle slenderer than c-bristle and about 2/3 its length, with 15 filaments (tip of bristle missing) (not shown); g-bristle almost as long as f-bristle, with 9 filaments (not shown).

Second Antenna: Protopodite with small distal medial bristle. Endopodite and exopodite similar to those of male *A. efficax*, except both limbs of *A. verax* with 4 bristles on 9th exopodial joint.

Mandible: Coxale endite: With small bristle at base of ventral branch; ventral branch with spines forming 4 rows, and tip with 3 spines (2 long, 1 short); ventral margin of dorsal branch with 7 low nodes proximal to small main spine; edge between main spine and tip of branch with row of small spines; tip of branch with slender spine-like bristle; dorsal margin of dorsal branch with spinous bristle reaching well past bristle at tip of branch; margin with serrations proximal to bristle. Basale endite with 4 end bristles, 2 dwarf bristles, glandular peg, and 2 triaenid bristles with about 10 pairs of spines. Basale: Ventral margin with small triaenid bristle (with about 7 pairs of spines) proximal to U-shaped boss; dorsal margin with 2 or 3 spinous bristles near midlength and 2 longer terminal bristles. Exopodite and 1st and 3rd endopodial joints similar to those of adult female; 2nd endopodial joint similar to that of adult female except dorsal margin with 2 short proximal bristles and spines of cleaning bristles shorter and slenderer.

Maxilla: Epipodite and endites similar to those of adult female. Basale: Medial surface near dorsal margin with 1 bare proximal bristle and 3 widely separated bare bristles distal to midlength; ventral margin with 2 closely spaced proximal bristles, 1 small distal bristle (with base on lateral side), and 1 long spinous terminal bristle. Endopodite similar to that of adult female.

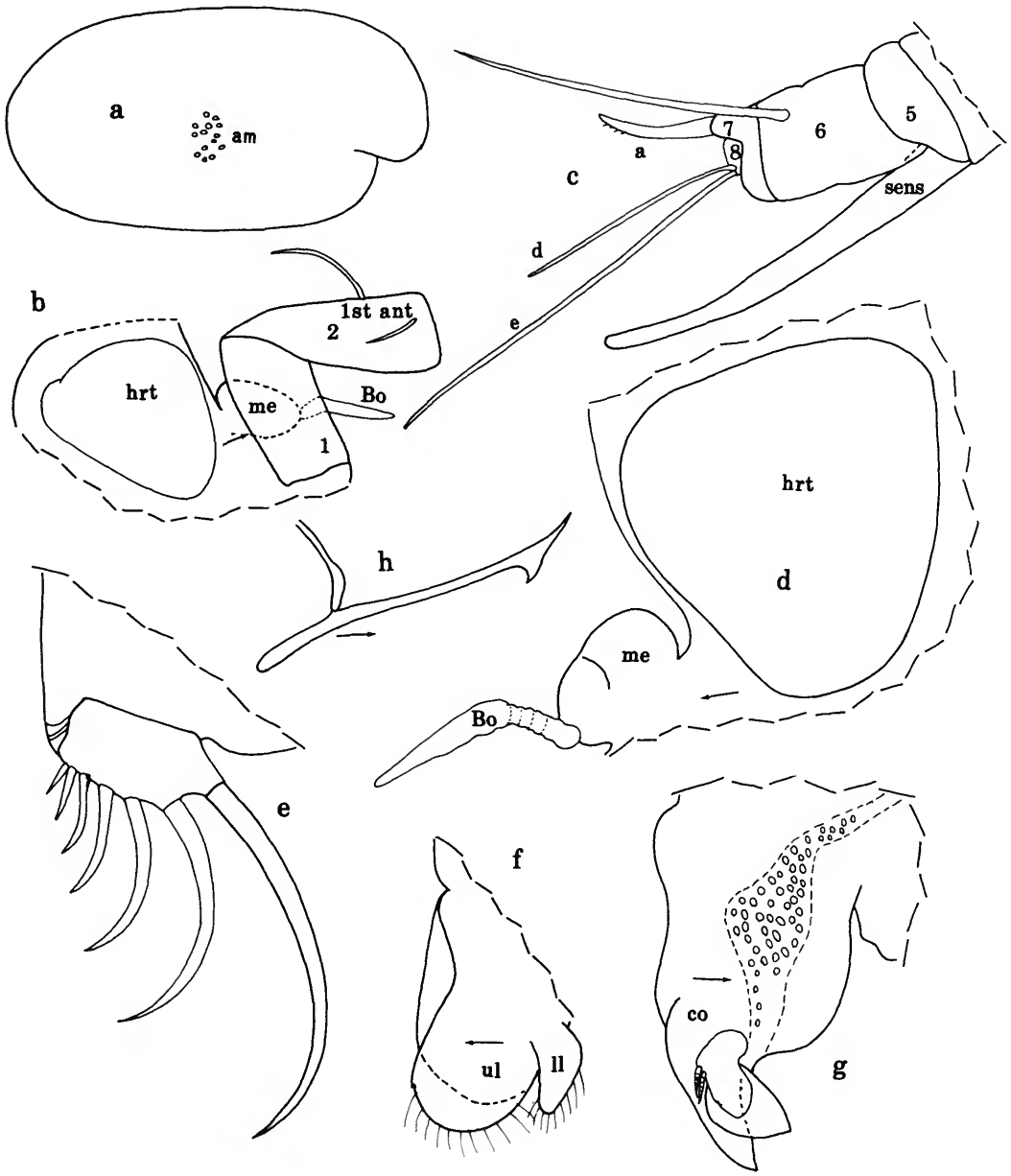


FIGURE 93.—*Archasterope verax* Kornicker, new species, adult male, nontype, NMV J40010: *a*, complete specimen, length 2.34 mm; *b*, dorsal part of anterior of body, lv; *c*, distal right 1st antenna (nabs), mv; *d*, dorsal part of anterior of body, lv; *e*, right lamella furca, lv; *f*, upper and lower lips, lv; *g*, copulatory organ, lv; *h*, right Y-sclerite, lv.

Fifth Limb: Comb bristles similar to those of adult female.

Sixth Limb: Posteroventral margin with 14 or 15 spinous bristles (anterior of these at about midlength of ventral edge of limb); limb otherwise similar to that of adult female.

Seventh Limb: Each limb with 12 bristles: 6 proximal (3 on each side, 2 short with 2 or 3 bells, 1 long with 3 bells) and 6 distal (3 on each side, 2 short with 2 or 3 bells, 1 long with 3 bells). Terminal combs similar to those of adult female.

Furca (Figure 93*e*): Each lamella with 7 claws, fewer than on adult female.

Bellonci Organ and Eyes (Figure 93*b,d*): Similar to those of adult female.

Upper Lip (Figure 93*f*): Each lateral lobe with minute anterior spine.

Genitalia (Figure 93*g*): Coalesced proximally, lobate distally.

Y-*Sclerite* (Figure 93*h*): Typical for subfamily.

Anterior of Body: No anterior process.

Posterior of Body: Not examined.

Gills: 7 well-developed gills on each side of posterior of body.

Heart: Dissected specimen with unusually large heart (Figure 93*b,d*).

REMARKS.—The males described above are designated nontypes because the basale of the maxilla has fewer ventral bristles and more dorsal bristles than present on the adult female, suggesting that they may not be conspecific. The males are referred to *A. verax* because of similarities of other appendages, especially the lack of lateral eyes.

COMPARISONS.—*Archasterope verax* differs from *A. efficax, A. apex, A. altrix,* and *A. dentata* in having no lateral eyes. *Archasterope verax* also differs from *A. dentata* in having fewer dorsal bristles on the basale of both the mandible and maxilla. *Archasterope verax* also differs from *A. apex* in having fewer dorsal bristles on the mandibular basale and more proximal ventral bristles on the basale of the maxilla. *Archasterope verax* also differs from *A. efficax* in having more dorsal bristles on the mandibular basale and fewer ventral bristles on the basale of the maxilla. *Archasterope verax* also differs from *A. altrix* in having more proximal ventral bristles and fewer distal dorsal bristles on the basale of the maxilla. The 6th limb of *A. verax* bears fewer posteroventral bristles than on limbs of previously described species referred to the genus.

Skogsbergiella Kornicker, 1975

TYPE SPECIES.—*Asterope spinifera* Skogsberg, 1920.

COMPOSITION.—Only 1 species is known from the vicinity of Australia, *S. senex,* new species, herein. Six additional species have been described from southern oceans (Kornicker, 1975:466).

DISTRIBUTION.—In southern oceans from south of 38°13'S to the Weddell Sea. Known depth range 6–3431 m (Kornicker, 1975:466).

EMENDED DIAGNOSIS.—With the inclusion of *S. senex* it is necessary to emend the original diagnosis presented in Kornicker (1975:465).

First Antenna: Sensory bristle of 5th joint of adult female with 7 or 8 filaments (generally 1 slender proximal and 6 or 7 stout terminal).

Sixth Limb: Anterior margin with 1 bristle at upper endite suture and 0 or 1 bristle at lower endite suture.

Skogsbergiella senex Kornicker, new species

FIGURES 94–96

ETYMOLOGY.—From the Latin *senex* (old, senior, older).

HOLOTYPE.—NMV J40016, partly dissected adult female in alcohol.

TYPE LOCALITY.—Slope 25, 38°25.90'S, 148°58.60'E, Victoria, S of Point Hicks; depth 1850 m.

PARATYPES.—Slope 25: USNM 193902, 1 adult female on slide and in alcohol; NMV J40017, 1 juvenile in alcohol. Slope 27: NMV J40018, 1 partly dissected instar IV in alcohol (length 2.11 mm, height 1.43 mm); NMV J40019, 3 juveniles in alcohol. Slope 69: NMV J40020, 1 ovigerous female on slide and in alcohol; NMV J40021, 1 undissected juvenile (length 2.73 mm, height 1.77 mm) in alcohol.

DISTRIBUTION.—Slope 25, 1850 m; Slope 27, 1500 m; Slope 69, 1840 m.

DESCRIPTION OF ADULT FEMALE (Figures 94–96).—Carapace oval in lateral view with incisur at about midheight (Figure 94*a,b*). Posterior ridge of right valve well defined and set well inward from posterior margin of valve (generic character) (Figure 94*e*); posterior edge of left valve also set inward from posterior margin of valve but not forming distinct ridge (Figure 94*d*). Anteroventral and ventral edges of each valve set back from valve margin but more so on right valve than on left (Figure 94*c*). Inset edge of right valve along anteroventral and ventral margins continuous with posterior ridge.

Infold: Rostral and anteroventral infolds with abundant bristles (not shown); narrow list with anterior end near inner end of incisur (Figure 94*c*) continues along ventral margin then broadens along posteroventral and posterior infolds (Figure 94*d,e*); ventral infold to point opposite ventral diaphanous broad triangular bristle on broad posteroventral list with about 60 bristles between list and valve edge; posteroventral and posterior infolds (from point opposite ventral diaphanous triangular bristle) with row of about 50 long bristles followed by about 25 shorter bristles (some of latter shown in Figure 94*d,e*); 3 or 4 scoop-like processes between posterior list and valve edge (Figure 94*d,e*); broad posteroventral and posterior list with 32 broad diaphanous triangular bristles and 31 small bristles (not more than 2 bristles (generally only 1) between each pair of diaphanous bristles) (not all shown in Figure 94*d,e*).

Selvage: Short fringed lamellar prolongation along ventral edge of incisur (Figure 94*c*). Long hairs in vicinity of hinge socket of right valve (Figure 94*e*).

Vestment: Vestment proximal to anterodorsal infold with long spines.

Hinge (Figure 94*d,e*): Right valve with posterodorsal socket and left valve with elongate process, which probably fits into socket.

Central Adductor Muscle Attachments: Comprising about 50 small oval attachments (Figure 94*a*).

Carapace Size (length, height in mm): Slope 25: NMV J40016 (holotype), 3.00, 2.09, height 70% of length; USNM 193902, 3.03, 2.07, height 68% of length. Slope 69: NMV J40020, 3.32, 2.16, height 65% of length. Length range

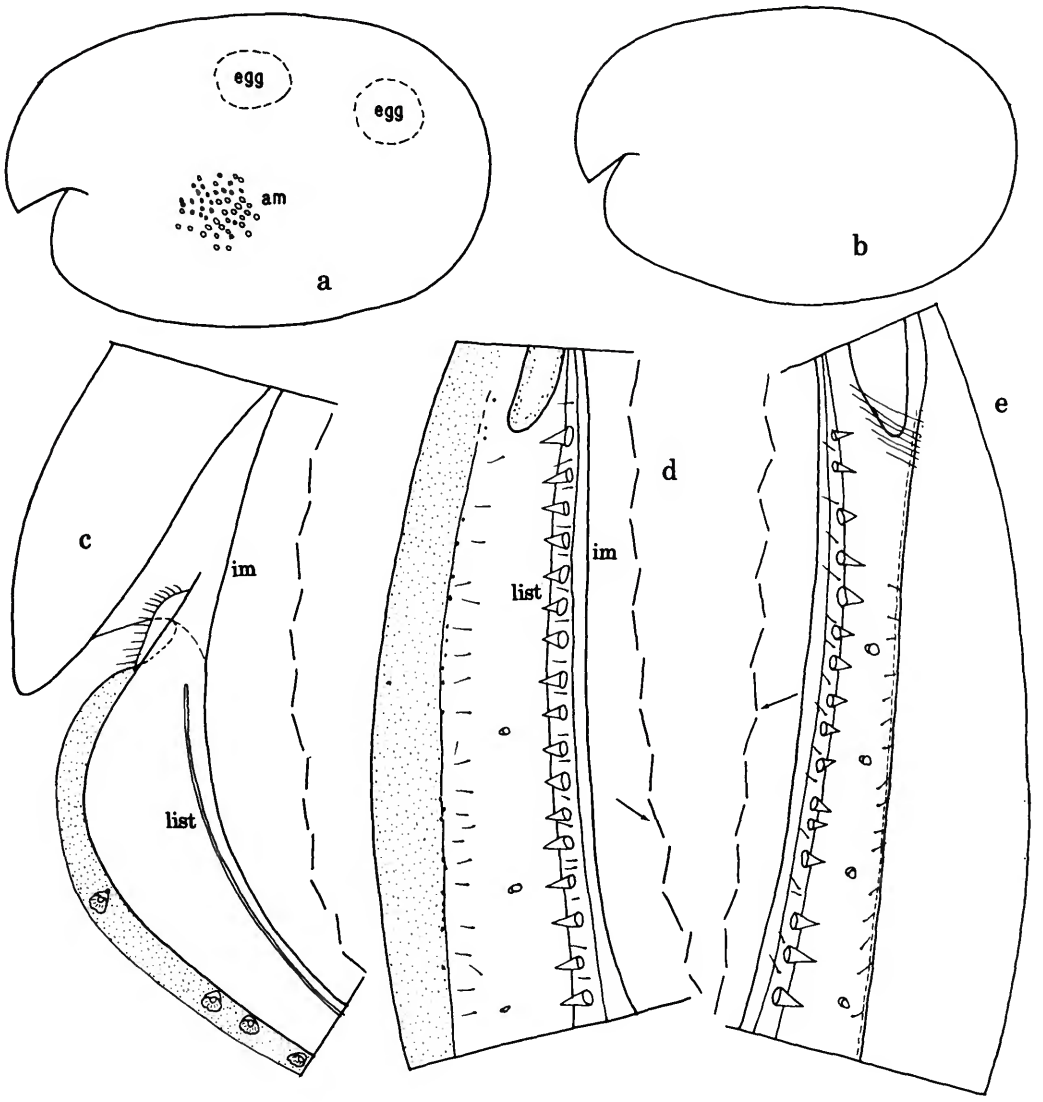


FIGURE 94.—*Skogsbergiella senex* Kornicker, new species, ovigerous female, paratype, NMV J40020: *a*, complete specimen, length 3.32 mm. Adult female, paratype, USNM 193902: *b*, complete specimen, length 3.03 mm; *c*, anterior right valve (nabs), iv; *d,e*, posterior infolds left and right valves, respectively, iv.

3.00–3.32, height range 2.07–2.16; range of height as percent of length 65–70.

First Antenna: 1st and 2nd joint with abundant spines; 2nd joint with dorsal bristle with long proximal and short distal spines and shorter lateral bristle (with base close to base of dorsal bristle) with short spines. Suture separating 3rd and 4th joints well defined; 3rd joint with small bare ventral bristle and 6 (NMV J40020 and holotype) or 7 (NMV J40016) spinous dorsal bristles (2 distal bristles paired, others single). 4th joint with long dorsal bristle with short spines and 2 ventral bristles with small spines (longest bristle 100%–132% length of ventral margin of 5th joint) (Figure 95*a*). Sensory bristle of 5th joint with slender proximal filament of varying length and 7 long stout terminal filaments (holotype, USNM 193902, and NMV J40020 examined) (Figure 95*b,c*). 6th joint with stout medial bristle with short spines (not shown). 7th joint (Figure 94*b*): a-bristle bare, shorter than bristle of 6th joint; b-bristle about 1/3 longer than a-bristle, with proximal filament, 4 longer distal marginal filaments excluding stem, and short distal hairs; c-bristle reaching well past sensory bristle of 5th joint, with 8

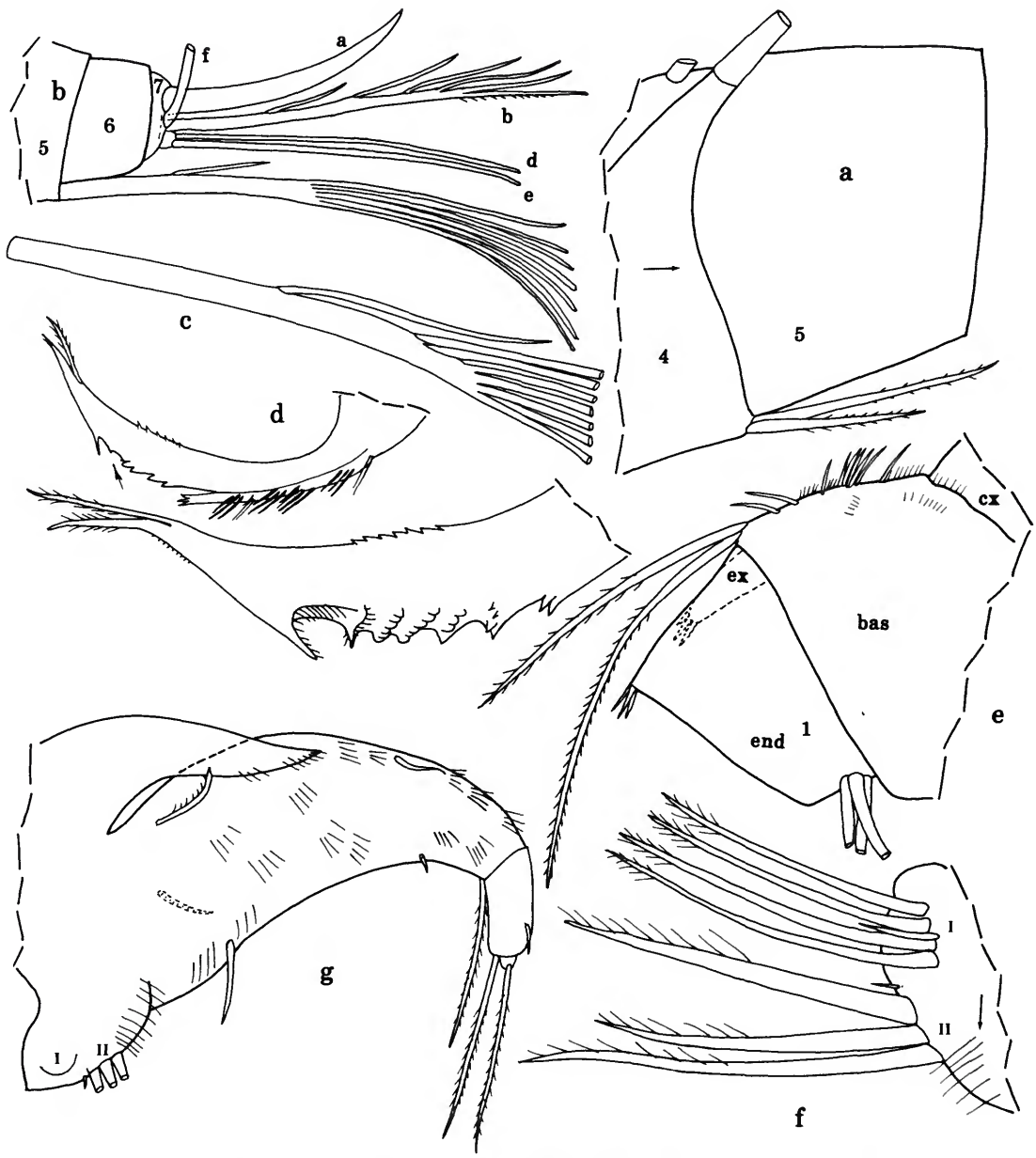


FIGURE 95.—*Skogsbergiella senex* Kornicker, new species, adult female, paratype, USNM 193902: *a*, part left 1st antenna (nabs), mv; *b*, distal right 1st antenna (nabs), lv; *c*, sensory bristle 5th joint left 1st antenna, mv; *d*, coxale endite right mandible, lv; *e*, part right mandible, mv; *f*, endites left maxilla, mv; *g*, left maxilla (bristles of endite I not shown), mv.

marginal filaments excluding stem (not shown). 8th joint (Figure 95*b*): d- and e-bristles well developed, slightly shorter than b-bristle, of about same length, bare with blunt tips; d-bristle slenderer than e-bristle; f-bristle bent dorsally, with 5 marginal filaments excluding stem and short distal hairs; g-bristle about same length as c-bristle, with 7 marginal filaments excluding stem (not shown).

Second Antenna: Protopodite with small distal medial bristle and distal dorsal and medial spines. Endopodite 3-jointed with long terminal filament. Exopodite: 1st joint with minute medial bristle on distal edge; bristle of 2nd joint reaching well past 9th joint, with abundant slender ventral

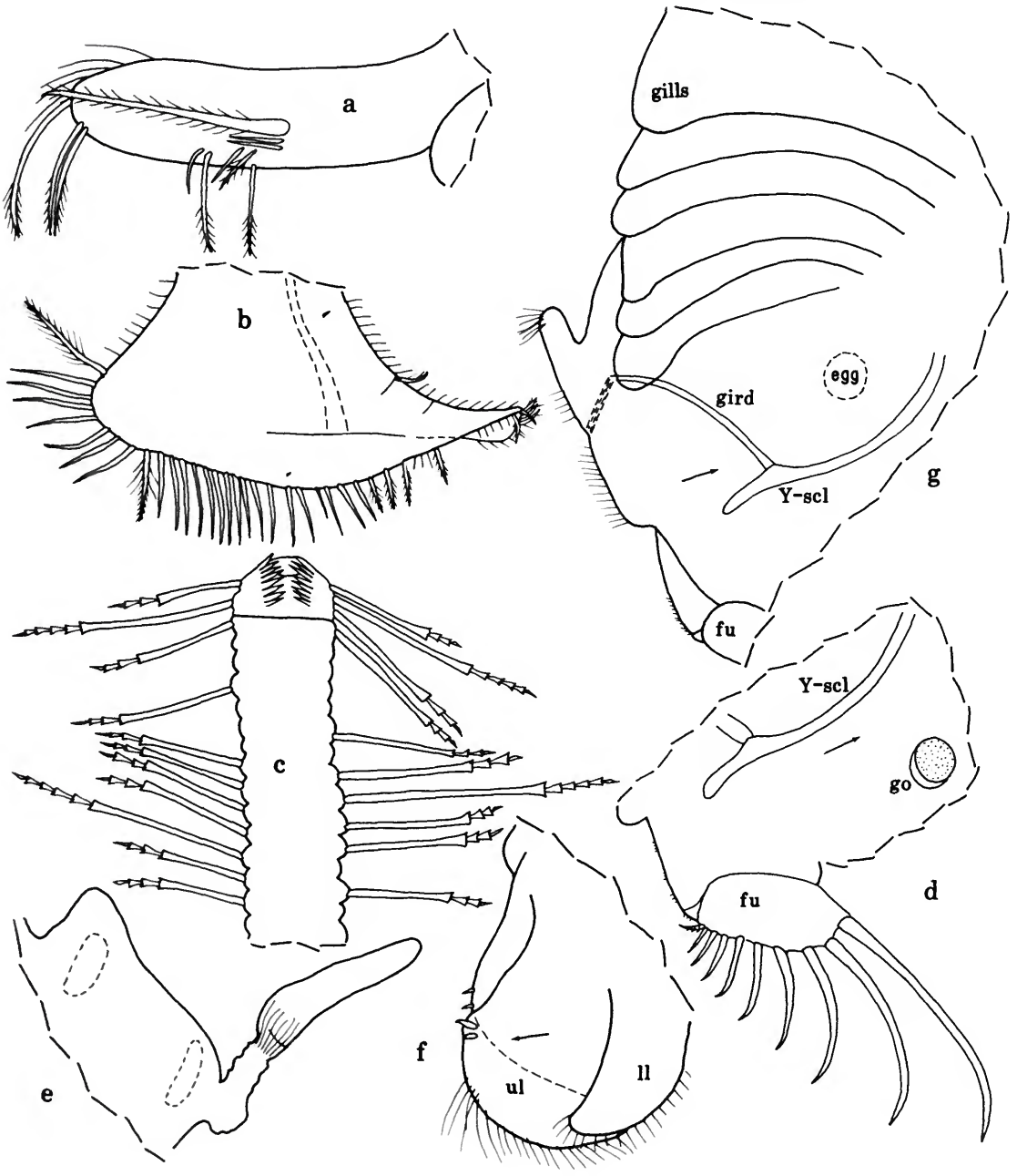


FIGURE 96.—*Skogsbergiella senex* Kornicker, new species, adult female, paratype, USNM 193902: *a*, comb left 5th limb (nabs), lv; *b*, left 6th limb, mv; *c*, 7th limb; *d*, part of posterior of body and right lamella of furca, lv; *e*, medial eye and Bellonci organ, lv; *f*, upper and lower lips, lv; *g*, posterior of body, lv.

spines; bristles of joints 3–8 with natatory hairs; bristles of joints 3–5 also with indistinct small ventral spines; 9th joint with 4 bristles (2 long with natatory hairs, 2 small with short spines); joints 2–8 with slender spines along distal margins; joints 4–8 with basal spines larger on distal joints (spine of 8th joint almost $^1/_2$ length of 9th joint); 9th joint with 1 or 2 lateral spines about same size as basal spine of 8th joint.

Mandible: Coxale endite (Figure 95*d*): With small bristle near base of ventral branch (not shown); ventral branch with 6 oblique rows of spines and 3 small teeth at tip; ventral margin

of dorsal branch with 6 angular and rounded teeth, short main spine, and long slender tip; dorsal margin of dorsal branch with minute distal serrations and long subterminal hirsute bristle. Basale endite with 4 end bristles, 5 triaenid bristles (with 7–10 pairs of distal spines), 2 dwarf bristles, and elongate glandular process (not shown). Basale (Figure 95*e*): Ventral margin with 1 triaenid bristle (with 7–9 pairs of spines) near endite and proximal to U-shaped boss (not shown); dorsal margin with 9 small bare bristles and 2 stout terminal bristles with short spines; spines present along dorsal margin and on medial and lateral surfaces near dorsal margin. Exopodite about 1/2 length of dorsal margin of 1st endopodial joint, with hirsute tip and 2 short subterminal bristles (Figure 95*e*). 1st endopodial joint with 2 or 3 terminal dorsal spines and 3 long ventral bristles (1 slender with short spines, 2 stout, longer, with long proximal and short distal spines). 2nd endopodial joint: Dorsal margin with 2 short proximal bristles, stout spinous a-, b-, c-, and d-bristles, long spinous lateral e-bristle between b- and c-bristles, long spinous lateral f-bristle between c- and d-bristles, and long spinous medial g-bristle distal to base of d-bristle; medial surface with spines, and about 20 spinous cleaning bristles near dorsal margin; ventral margin with 3 long spinous terminal bristles. 3rd endopodial joint with straight dorsal claw (with few indistinct ventral teeth at midlength) and 1 short and 4 long spinous bristles.

Maxilla (Figure 95*f,g*): Endite I with 1 short and 3 or 4 long bristles (3 on holotype and NMV J40020, 4 on USNM 193902); endite II with 3 long spinous bristles; 1 minute bristle between endites but closer to endite II (Figure 95*f*). Epipodite with spinous pointed tip reaching to about midlength of dorsal margin of basale. Basale (Figure 95*g*): hirsute; dorsal margin with 1 proximal bare or spinous bristle and 1 distal bare bristle; ventral margin with 1 backward-oriented proximal bare bristle, 1 small distal bare bristle, and 1 long spinous terminal bristle; lateral surface with 1 proximal bristle at midheight. 1st endopodial joint with 1 small bare alpha-bristle and 1 long spinous beta-bristle. 2nd endopodial joint with long spinous terminal bristle about same length as beta-bristle.

Fifth Limb (Figure 96*a*): Comb with stout spinous exopodial bristle reaching past tip of comb, 2 slender bristles just ventral to base of stout bristle, and 2 pairs of bristles closer to ventral edge of comb; 3 bristles with bases on lateral side very close to ventral margin (1 at midlength, 2 near tip).

Sixth Limb (Figure 96*b*): Small medial spine in proximal anterior corner. Anterior margin with upper endite suture with spinous bristle and lower suture without bristle; anteroventral corner with 3 spinous bristles; lateral flap with 2 hirsute bristles; ventral and posterior margins with 23–32 spinous and hirsute bristles (not all spines and hairs shown). Limb hirsute.

Seventh Limb (Figure 96*c*): Each limb with 19–24 bristles (2 proximal and 2 terminal bristles with 5 bells, others with 3 or 4 bells). Terminus with opposing combs, each with about 16 spinous teeth (spines not shown).

Furca (Figure 96*d*): Each lamella with 10 claws; claws 1–9 with short and long teeth along posterior edges (not shown); claw 10 annulate, recurved, with spines along anterior edge; claws 1–4 with slender spines along anterior edges (not shown); anterior edge of lamella with few small spines (not shown); right lamella anterior to left by width of claw 1; segment posterior to lamellae with minute spines.

Bellonci Organ (Figure 96*e*): Elongate, broad near midlength, tapering to rounded tip; indistinctly striated near midlength.

Eyes: Lateral eyes absent. Medial eye well developed, unpigmented, bare (Figure 96*e*).

Lips (Figure 96*f*): Upper lip with 2 hirsute lobes separated by saddle; saddle and each lobe with 2 broad weak anterior spines. Lower lip a hirsute flap on each side of mouth.

Genitalia (Figure 96*d*): Small pigmented oval on each side of body anterior to furca.

Gills (Figure 96*g*): 7 well-developed gills on each side of body.

Anterior of Body: Without anterior process.

Posterior of Body (Figure 96*g*): With minute spines near furca, hirsute middle segment, and long thumb-like dorsal process with stiff spines at tip.

Y-*Sclerite* (Figure 96*g*): Typical for genus.

Eggs: USNM 193902 with small unextruded eggs. NMV J40020 with 17 eggs in marsupium (2 shown in Figure 94*a*) (length of 1 egg 0.51 mm).

Protistans (Figure 94*c*): USNM 193902 with vase-like unidentified protistans (with short stem and internal structures) attached to medial side of turned-in anteroventral margin of each valve. NMV J40020 with abundant segmented filaments attached to appendages.

COMPARISONS.—*Skogsbergiella senex* differs from most previously described species of the genus in having 8 filaments (1 proximal, 7 terminal) on the sensory bristle of the 5th joint of the 1st antenna (except for some specimens of *S. spinifera* (Skogsberg, 1920), previously described species have a total of 6 or 7), in having a minute bristle between endites of the maxilla, and in not having a bristle on the lower endite on the anterior margin of the 6th limb. Two other species without lateral eyes or with minute eyes are *S. pax* Kornicker, 1975:495, and *S. macrothrix* Kornicker, 1975:476. *Skogsbergiella senex* differs from *S. spinifera* in lacking lateral eyes.

Synasterope Kornicker, 1975

TYPE SPECIES.—*Synasterope implumis* Poulsen, 1965 (designation by Kornicker, 1975:440).

COMPOSITION.—Only 1 species of the genus has been described previously from the vicinity of Australia, *Synasterope bassana* Poulsen, 1965, from Bass Strait at a depth of 180 m (Poulsen, 1965:402). An additional species is described herein from depths of 220–363 m.

DISTRIBUTION.—Species of this genus are widespread

between latitudes of about 43°N to 73°S and depths of 1–4450 m (Kornicker and Caraion, 1974:23; Kornicker, 1974a, fig. 4; 1989:102).

Synasterope solox Kornicker, new species

FIGURES 97, 98

ETYMOLOGY.—From the Latin *solox* (coarse, rough, bristly).

HOLOTYPE.—NMV J40022, adult female in alcohol with body separated from carapace.

TYPE LOCALITY.—Slope 21, 36°57.40′S, 150°18.80′E, New South Wales, off Eden; depth 220 m.

PARATYPES.—Slope 22: USNM 194039, adult female on slide and in alcohol.

DISTRIBUTION.—Slope 21, 220 m. Slope 22, 363 m.

DESCRIPTION OF ADULT FEMALE (Figures 97, 98).—Carapace elongate with parallel ventral and dorsal margins, evenly rounded anterior and posterior margins, and incisur ventral to midheight (Figure 97*a*).

Ornamentation: Surface smooth with very few minute bristles. In transmitted light many small amber-colored cells visible (probably on inner side of shell); some cells arranged in rows forming circles and reticulations.

Infold: Rostral infold with about 42 long and short bristles (Figure 97*b*). Anteroventral infold with about 33 bristles (Figure 97*b*). Narrow list with anterior end just ventral to incisur continues along ventral infold and then broadens along posteroventral and posterior infold (Figure 97*b,c*). Anterior half of ventral infold with row of about 7 bristles ventral to list; posterior half of ventral margin with 3 widely spaced bristles then row of 8 long closely spaced bristles to point where infold broadens. Posteroventral and posterior infold with a row of about 42 bristles just outside broad list (bristles in ventral half of row longer than those in dorsal half) (Figure 97*c*). Posterior infold with row of 3 processes, all ventral to valve midheight (Figure 97*c*). Broad posteroventral and posterior list with about 20 broad transparent triangular bristles and about 18 slender bristles (not shown), mostly 1 bristle between adjacent triangular bristles (both triangular and slender bristles at midwidth of list).

Vestment (Figure 97*b*): Rows of spines in anterodorsal corner proximal to infold.

Central Adductor Muscle Attachments (Figure 97*d*): Comprising 15 ovoid attachments.

Carapace Size (length, height in mm): Slope 21: NMV J40022 (holotype), 1.45, 0.71, height 46% of length. Slope 22: USNM 194039, 1.45, 0.66, height 46% of length. Length range 1.45–1.54, height range 66–71; height as percent of length 46.

First Antenna (Figure 97*e,f*): 1st joint with medial and lateral spines. 2nd joint broadening distally, with medial and lateral spines, 1 spinous dorsal bristle, and 1 short bare lateral bristle (Figure 97*e*). 3rd and 4th joints forming square; indistinct suture separating joints present medially at ventral end and laterally at dorsal end, absent elsewhere; 3rd joint with minute bare ventral bristle and 6 dorsal bristles (2 proximal bristles separated by short space and with long proximal and short distal spines; next 2 bristles almost adjacent to each other (both with long proximal and shorter distal spines, but spines of lateral bristle shorter and slenderer); next 2 bristles adjacent to each other and with spination similar to previous 2 bristles). 4th joint with 3 bristles (2 ventral, 1 dorsal) with short spines. Sensory bristle of 5th joint with stout proximal part and 6 terminal filaments; base of proximal filament adjacent to distal end of 6th joint (Figure 97*f*). Medial bristle of 6th joint about 1 1/2 times length of a-bristle of 7th joint, with short marginal spines (not shown). 7th joint (Figure 97*f*): a-bristle claw-like bare; b-bristle extending well past a-bristle, with 4 marginal filaments; c-bristle long with 5 marginal filaments (distal filament smaller). 8th joint (Figure 97*f*): d-bristle represented by minute peg (lateral pore just proximal to base of bristle (not shown)); e-bristle about same length as b-bristle, bare with blunt tip; f-bristle bent dorsally (both bristles broken on USNM 194039 and with 3 short spinous filaments on remaining part); g-bristle (not shown) long with 6 marginal filaments (distal filament shorter).

Second Antenna (Figure 97*g*): Protopodite with small, bare, distal, medial bristle, rows of long spines on dorsal half of medial surface, and few rows of minute medial spines proximally near ventral margin (not shown). Endopodite 3-jointed: sutures separating joints visible but indistinct; end joint with long terminal filament. Exopodite: 1st joint with row of long distal spines on dorsal margin, and without terminal medial bristle; bristle of 2nd joint reaching 9th joint, with abundant slender spines along ventral margin or along both ventral and dorsal margins; bristle of joint 3 with proximal ventral spines and distal natatory hairs; left limb of USNM 194039 with bristles of joints 4–7 (bristle of joint 8 missing) with few proximal ventral spines and distal natatory hairs, but bristles of joints 4–8 of right limb with only natatory hairs; 9th joint with 3 bristles (1 long and 1 medium with natatory hairs, 1 short (dorsal) with short spines); joints 2–8 with minute spines on part of distal edge, but without basal spines; 9th joint with 1 or 2 indistinct small lateral spines with serrate tips.

Mandible (Figure 98*a*): Coxale with medial spines; endite broken off both limbs of USNM 194039. Basale endite with 4 spinous end bristles (not shown), 3 triaenid bristles with 3–6 pairs of marginal spines excluding terminal pair (bristles not shown), and 2 slender equilength dwarf bristles adjacent to indistinct glandular peg. Basale: with small ringed bristle (bare or with few distal spines) near base of endite and proximal to elongate U-shaped boss near ventral margin; dorsal margin with short spinous recurved bristle at midlength and 2 long spinous subterminal bristles; medial surface bare. Stem of exopodite about half length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 small terminal bristles. 1st endopodial joint with 3 long ventral bristles (2 with long spines, 1 with short spines) (bristles not shown). 2nd endopodial joint: ventral margin with 3 long spinous terminal

FIGURE 97.—*Synasterope solox* Kornicker, new species, adult female, holotype, NMV J40022: *a*, complete specimen, length 1.45 mm; *b,c*, anterior and posterior infolds, respectively, iv; *d*, central adductor muscle attachments left valve, ov; *e*, dorsal part of anterior of body, lv; *f*, distal left 1st antenna (nabs), lv; *g*, distal protopodite and endopodite left 2nd antenna, mv; *h*, comb right 5th limb (nabs), lv; *i*, Bellonci organ; *j*, posterior of body, lv.

bristles (not shown); dorsal margin with 1 short bare proximal bristle and stout spinous a-, b-, c-, and d-bristles (c-bristle slightly stouter than others; d-bristle more spinous than others); lateral side with long spinous f-bristle between c- and d-bristles (not shown) but without e-bristle between b- and c-bristles; medial side with short rows of spines, 9 cleaning bristles (1

FIGURE 98.—*Synasterope solox* Kornicker, new species, adult female, holotype, NMV J40022: *a*, part left mandible, mv; *b*, endites right maxilla, mv; *c,d*, right and left maxillae, respectively (endites not shown), mv; *e*, anterior right 6th limb, lv; *f*, 7th limb; *g*, posterior of body and left lamella of furca, lv; *h*, upper and lower lips, lv.

between a- and b-bristles, 2 near base of b-bristle (only sockets shown), and 6 forming oblique row near base of c-bristle (only sockets shown)), and 1 long spinous g-bristle adjacent to d-bristle. 3rd endopodial joint with short straight claw with few ventral spines near midlength, 1 short spinous medial bristle, and 4 long spinous bristles (not shown).

Maxilla: Epipodite hirsute with pointed tip reaching to midlength of basale (Figure 98*d*). Endite I with 4 bristles (3 long spinous, 1 short bare); endite II with spines and 3 long spinous bristles (Figure 98*b*). Basale (Figure 98*c,d*): lateral surface with 1 short proximal bristle; ventral margin with 1 short backward-pointing proximal bristle (broken off on illustrated left limb), 1 small distal bristle, and 1 long spinous terminal bristle; dorsal margin with 1 proximal bristle (this bristle on medial side at midheight on illustrated left limb (Figure 98*d*) but on dorsal margin of illustrated right limb (Figure 98*c*)) and 1 longer distal bristle with base on medial side. 1st endopodial joint with small bare alpha-bristle and long bare beta-bristle. 2nd endopodial joint with long bare terminal bristle about same length as beta-bristle.

Fifth Limb (Figure 97*h*): Lateral side of comb with long spinous exopodial bristle, 1 short slender bristle just ventral to base of exopodial bristle, 5 bristles near ventral margin ventral to proximal part of exopodial bristle, 1 proximal bristle with base almost on ventral margin, and 2 distal bristles with bases close to ventral margin; only 3 bristles (long anterior bristle and 2 short posterior bristles) shown of the many spinous bristles along ventral margin.

Sixth Limb (Figure 98*e*): Anterior margin with well-defined upper and lower endites, each with 1 bristle (bristle of distal endite longer). Skirt with 1 slender hirsute bristle on edge of lateral flap, 4 small spinous bristles (3 of 4 broken on illustrated limb) at anterior tip, and short bristles along ventral edge (both limbs of USNM 194039 fragmented so that number of ventral and posteroventral bristles not ascertained). Medial surface of anterodorsal corner of limb that usually has small medial bristle also missing from limbs.

Seventh Limb (Figure 98*f*): Both proximal and distal groups with 6 bristles, 3 on each side, each with 2 or 4 bells. Terminus with opposing combs, each with 9 or 10 spinous teeth.

Furca (Figure 98*g*): Each lamella with 9 claws; posterior 2 claws bristle-like, recurved on right lamella of USNM 194039 but not on left; small spinous triangular process following each lamella; right lamella anterior to left by width of base of claw 1.

Bellonci Organ (Figure 97*e,i*): Elongate with broadly rounded tip.

Eyes: Lateral eyes absent. Medial eye unpigmented, bare (Figure 97*e*).

Lips (Figures 97*e*, 98*h*): Each lobe of upper lip hirsute and with 2 minute anterior spines. Lower lip a hirsute lateral flap on each side of mouth.

Genitalia (Figure 97*j*): Oval on each side of body anterior to furca.

Posterior of Body (Figures 97*j*, 98*g*): Short section dorsal to furca with minute spines; posterodorsal corner broadly rounded and with cluster of long spines.

Y-*Sclerite* (Figures 97*j*, 98*g*): Typical for subfamily.

Gills: 7 well-developed gills on each side extending well past posterior end of body (not shown).

Eggs: USNM 194039 with 8 small unextruded eggs on each side of body.

COMPARISONS.—The female *S. solox* differs from the female *S. bassana* Poulsen, 1965, which also lives in the vicinity of Australia, in being smaller, lacking lateral eyes, in having a shorter and stouter stem (proximal to filaments) on the sensory bristle of the 5th joint of the 1st antenna, and in not having 3 small bristles near endite II of the maxilla.

In the following, *S. solox* is compared with other species of *Synasterope* without lateral eyes. The 7th limb of *S. solox* differs from that of *S. mystax* Kornicker, 1975, in having 12 rather than 19–21 bristles. The female *S. solox* differs from the female *S. brachythrix* Kornicker, 1975, in having a 1st antenna with a shorter and stouter stem (proximal to filaments) on the sensory bristle of the 5th joint and an e-bristle on the 8th joint much longer than the a-bristle of the 7th joint, and in having a distal medial bristle on the protopodite of the 2nd antenna. The female *S. solox* differs from the female *S. dimorpha* Kornicker, 1975, in having a shorter and stouter stem (proximal to filaments) on the sensory bristle of the 5th joint of the 1st antennae, and in having 3 rather than 8 processes on the posterior infold of the shell. *Synasterope solox* differs from *S. arnaudi* Kornicker, 1975, *S. phalanx* Kornicker, 1989, and *S. helix* Kornicker, 1989, in being smaller and in having a row of over 40 bristles on the posteroventral and posterior infold rather than less than 10. *Synasterope solox* differs from *S. hirpex* Kornicker, 1989, in having 1 instead of 4 bristles on the upper endite of the 6th limb, and 1 instead of none on the lower endite, and also in having many more bristles on the posteroventral and posterior infold of each valve. *Synasterope solox* differs from *S. index* Kornicker, 1989, in being larger and in having fewer bristles on the 7th limb. *Synasterope solox* differs from *S. psitticina* (Darby, 1965) in being smaller and in having a longer proximal ventral bristle on the mandibular basale. *Synasterope solox* differs from *S. williamsae* Kornicker, 1986b, in being larger and in having many more bristles on the posteroventral and posterior infold. Both *S. solox* and *S. cushmani* Kornicker, 1974a, have many bristles on the posteroventral and posterior infolds; the stem (proximal to filaments) of the sensory bristle of the 5th joint of the female 1st antenna of *S. solox* is shorter than that of *S. cushmani*, and the posterior of the body of *S. solox* has fewer spines.

Domromeus Kornicker, 1989

TYPE SPECIES.—*Domromeus heptathrix* Kornicker, 1989:124.

COMPOSITION.—*Domromeus* includes the type species and *D. merx*, new species, herein.

DISTRIBUTION.—*Domromeus heptathrix* from in and west of the Bay of Biscay at depths of 1980–2360 m (Kornicker, 1989:124). *Domromeus merx* from off Eden, New South Wales, at a depth of 363 m.

REMARKS.—In the diagnosis of *Domromeus*, the sensory bristle of the 5th joint of the 1st antenna is described as having 7 terminal filaments and no small proximal filament (Kornicker, 1989:124). The diagnosis is emended to include *D. merx*, which has 8 terminal filaments and no small proximal filament. Other genera having a sensory bristle with more than 6 terminal filaments are *Heptonema* Poulsen, 1965:328, with 7 terminal filaments and no proximal filament, *Polyleberis* Kornicker, 1974, with 7–9 terminal filaments and no proximal filament, *Dolasterope* Poulsen, 1965:317, with 23 filaments on distal half, and 4 species of *Skogsbergiella* Kornicker, 1975:465 (*S. macrothrix* Kornicker, 1975:477, and *S. spinifera* (Skogsberg, 1920:465), with 7 terminal filaments on some specimens, *S. pax* Kornicker, 1975:495 with 7 terminal filaments, and *S. senex*, new species, herein, with 1 proximal and 7 terminal filaments); the presence of more than 6 terminal filaments on members of these genera and *Domromeus* are interpreted to be due to convergence.

EMENDED DIAGNOSIS.—Posterior infold of right valve without the linear ridge between broad list and posterior valve margin present on species of *Skogsbergiella*.

First Antenna: Dorsal margin of 3rd joint with 3–6 bristles. Sensory bristle of 5th joint of 1st antenna of adult female with 7 or 8 terminal filaments of equal width and without proximal filament. (Only the A–1 male of *D. merx* is known; it is assumed that the sensory bristle is similar to that of the adult female.) 8th joint with well-developed filament-like d-bristle.

Mandible: Exopodite reaching to at least midlength of dorsal margin of 1st endopodial joint. 2nd joint with lateral e-bristle between b- and c-bristles, and with relatively few cleaning bristles (8 or 9).

Maxilla: 2nd endopodial joint with usual alpha- and beta-bristles. 3rd endopodial joint with single terminal bristle.

Sixth Limb: Anterior margin with 1 bristle at upper endite and with either no bristle or 1 bristle at lower endite.

Seventh Limb: Each limb with 12 or 13 bristles. (In the diagnosis of the genus, Kornicker (1989:124) stated, "each limb with 6 or 7 bristles"; it should have been 6 or 7 proximal bristles.)

Furca: Without bristles between main claws.

Lateral Eye: The two known species are without lateral eyes, but if additional species are collected at shallower depths, they probably will have eyes.

COMPARISONS.—The main diagnostic features of the genus are (1) absence of linear ridge on infold of right valve, which separates the genus from *Skogsbergiella;* (2) presence of a well-developed filament-like d-bristle on the 8th joint of the 1st antenna, which separates the genus from all Cylindroleberidinae except *Skogsbergiella, Archasterope, Xandarasterope*, and *Dolasterope;* (3) presence of 7 or 8 terminal filaments on the sensory bristle of the 5th joint of the 1st antenna on adult females (and probably also on late instars), which separates the genus from all Cylindroleberidinae other than *Heptonema, Polyleberis*, and 2 species of *Skogsbergiella;* (4) furca without bristles between claws, which separates the genus from *Dolasterope* and *Xandarasterope*. No genus other than *Domromeus* has the above combination of characters.

Domromeus merx Kornicker, new species

FIGURES 99, 100

ETYMOLOGY.—From the Latin *merx* (commodities, goods, wares).

HOLOTYPE.—NMV J35976, A–1 male on slide and in alcohol.

TYPE LOCALITY.—Slope 22, 37°00.60′S, 150°20.70′E, New South Wales, off Eden; depth 363 m.

PARATYPES.—None.

DISTRIBUTION.—Slope 22, 363 m.

DESCRIPTION OF A–1 MALE (Figures 99, 100).—Carapace elongate with sloping posterodorsal margin in lateral view; incisur ventral to valve midheight (Figure 99*a*). Inner side of posterior end of right valve similar to that of left (both without linear ridge between list and posterior valve margin).

Infold: Anterior and anteroventral infold with numerous bristles (Figure 99*b*); list of rostrum poorly developed; vertical part of list just ventral to incisur broader than list along ventral infold, but not as well defined; broad list of posterior infold with about 16 broad transparent bristles with pores at base (see detail in Figure 99*c*), about 16 long slender bristles, and about 40 smaller bristles (Figure 99*c*); posterior infold between broad list and posterior end of shell with 5 or 6 processes, and 4 or 5 bristles near ventral end.

Selvage: Fringed lamellar prolongation along ventral edge of incisur (not shown).

Vestment: Anterodorsal part of vestment proximal to infold and also posterodorsal fold anterior to posterior juncture with few rows of long hairs (Figure 99*c*).

Central Adductor Muscle Attachments (Figure 99*d*): Comprising about 14 ovoid attachments just anterior to valve midlength at about midheight.

Carapace Size (length, height in mm): NMV J35976 (holotype), 1.55, 0.72, height 46% of length.

First Antenna (Figure 99*e,f*): 1st joint with medial spines. 2nd joint with proximal dorsal spines, proximal medial and lateral spines near dorsal margin, and 2 bristles (long dorsal bristle with long spines, short lateral bristle with few indistinct short spines). 3rd joint with distal margin poorly defined on medial side except near ventral and dorsal ends and slightly better defined on lateral side, with small bare ventral bristle, and 6 dorsal bristles (2 single proximal, 4 paired distal; medial bristle of most distal pair with short spines, others with long spines). 4th joint with concave distal margin defined better on

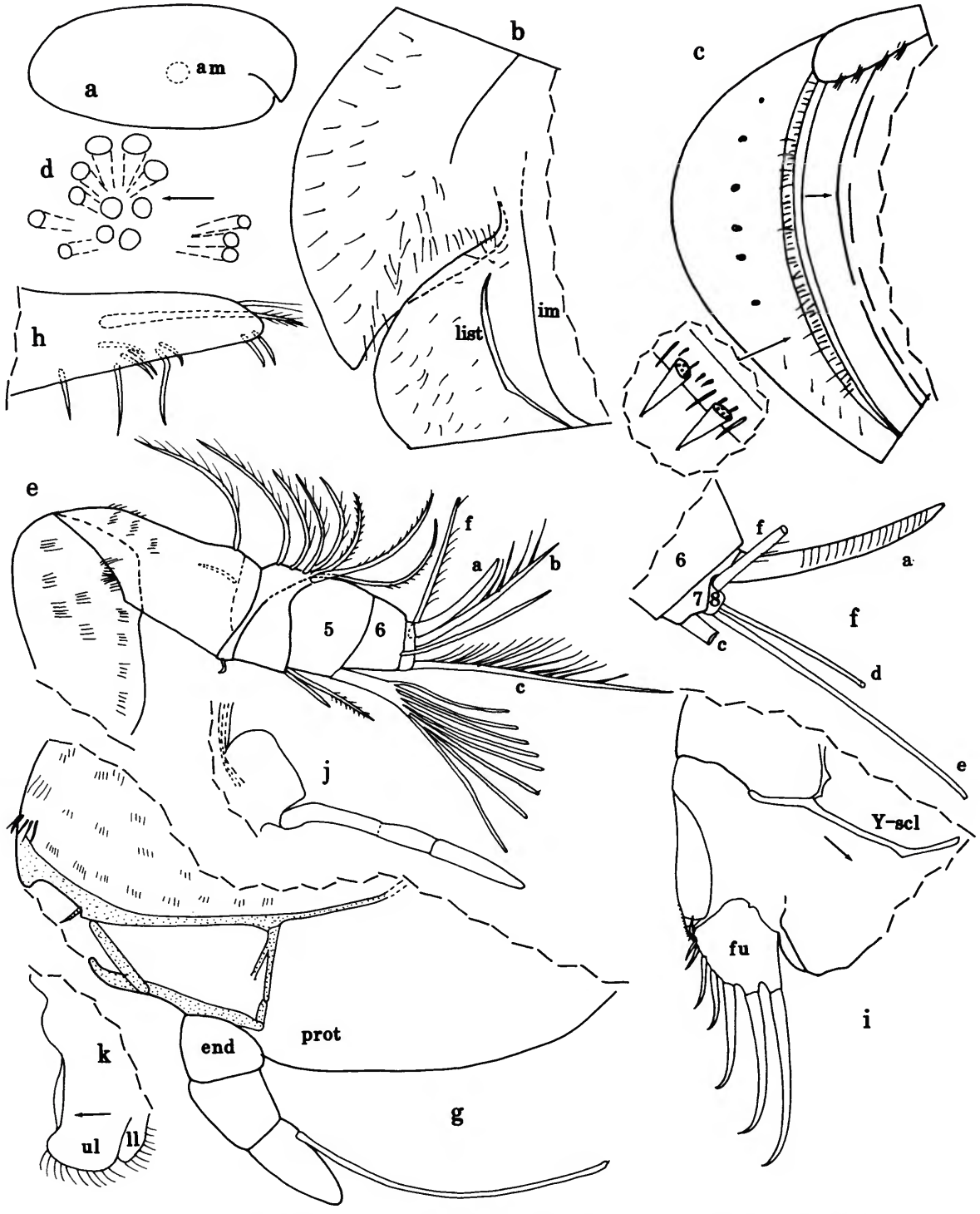


FIGURE 99.—*Domromeus merx* Kornicker, new species, A–1 male, holotype, NMV J35976: *a*, complete specimen, length 1.55 mm; *b*, anterior right valve, iv; *c*, posterior left valve, iv; *d*, central adductor muscles protruding from left side of body (carapace removed); *e*, left 1st antenna (nabs), mv; *f*, distal right 1st antenna (nabs), lv; *g*, distal protopodite and endopodite right 2nd antenna, mv; *h*, comb left 5th limb (nabs), mv; *i*, part posterior of body and right lamella of furca, lv; *j*, medial eye and Bellonci organ, lv; *k*, upper and lower lips, lv.

medial side and with 3 bristles (1 long dorsal with short spines, 2 shorter ventral (shortest bare, other with short spines)). Sensory bristle of 5th joint with short stout proximal part and 8 long bare terminal filaments, all about same width. Medial bristle of 6th joint longer than a-bristle of 7th joint, bare. 7th joint (Figure 99*e,f*): a-bristle claw-like, bare; b-bristle about 1 1/2 times a-bristle, with 4 long marginal filaments; c-bristle about same length as sensory bristle of 5th joint, with 16 filaments. 8th joint (Figure 99*f*): d- and e-bristles well developed with blunt tips; d-bristle slenderer than e-bristle and about 1/2 its length; f-bristle with tip broken on both limbs of holotype, remaining part with 8 short filaments followed by space and 1 short filament; g-bristle about same length as c-bristle, with 6 marginal filaments (tip of bristle missing on both limbs of holotype) (not shown).

Second Antenna (Figure 99*g*): Protopodite with small distal medial bristle (with terminal papilla) and medial spines on distal dorsal half (distal spines near dorsal margin stouter) (Figure 99*g*). Endopodite 3-jointed (Figure 99*g*): 1st and 2nd joints short bare; 3rd joint slightly longer with rounded tip and long proximal filament. Exopodite: 1st joint with 2 rows of long distal dorsal hairs; bristle of 2nd joint just reaching 9th joint, with numerous slender ventral spines; bristles of joints 3–7 with natatory hairs and minute proximal ventral spines; bristle of 8th joint with natatory hairs; 9th joint with 4 bristles (2 long with natatory hairs, 2 short with small slender spines); joints 2–8 without basal spines; 9th joint with short lateral spine with serrate tip; joints 2–8 with small spines along distal edges.

Mandible: Coxale endite (Figure 100*a*): With small bristle at base of ventral branch; ventral branch with spines forming 4 rows and tip with 3 short slender terminal spines; ventral margin of dorsal branch with 7 low nodes proximal to small main spine, then row of small spines and slender terminal bristle-like spine (indistinct on mounted limbs); dorsal margin of dorsal branch with long bristle (with short hairs) set back from tip of branch and with serrations proximal to bristle. Basale endite with 3 spinous end bristles, 2 dwarf bristles, small indistinct glandular peg (not shown), and 3 triaenid bristles with 5–7 paired spines excluding terminal pair (Figure 100*b*). Basale (Figure 100*b*): ventral margin with elongate U-shaped boss; dorsal margin with 1 short spinous bristle at midlength, and 2 terminal bristles (long bristle with short spines, shorter bristle about 1/2 length long bristle, bare); joint without hairs or spines. Exopodite hirsute, about 1/2 length of dorsal margin of 1st endopodial joint, with 2 short spinous subterminal bristles. 1st endopodial joint with 3 long ventral bristles (1 with short spines, 2 with long spines). 2nd endopodial joint: dorsal margin with 3 small broad spines medial to 1 short bare proximal bristle, stout a-, b-, c-, d-bristles, all with few spines along posterior edge (c-bristle slightly stouter than others), 1 long spinous lateral e-bristle, 1 long spinous lateral f-bristle, 1 fairly long spinous medial g-bristle, and 8 or 9 medial cleaning bristles (left limb of holotype: 2 between b- and c-bristles, 7 adjacent to c-bristle; right limb: 1 between a- and b-bristles, 2 between b- and c-bristles, 5 adjacent to c-bristle) (cleaning bristles not shown); ventral margin with 3 long spinous terminal bristles; medial surface with few rows of minute spines. 3rd endopodial joint with stout dorsal claw with small spines (spines proximal along ventral edge, distal along dorsal edge) and 5 bristles (1 short medial, 1 long lateral, 3 long terminal).

Maxilla (Figure 100*c*): Epipodite fairly short with hirsute tip. Endite I with 4 bristles (1 short slender, 3 long stout spinous); endite II with 3 long stout spinous bristles (middle bristle shorter slenderer). Basale: medial surface near dorsal margin with 3 bristles (1 proximal, 1 near midlength, 1 distal); ventral margin with 1 backward-pointing proximal bristle, 1 unusually long distal bristle, and 1 longer spinous terminal bristle; lateral surface with 1 proximal bristle just dorsal to midheight; medial surface spinous (not all spines shown). 1st endopodial joint with small bare alpha-bristle and long bare beta-bristle. 2nd endopodial joint with bare terminal bristle about same length as beta-bristle.

Fifth Limb (Figure 99*h*): Lateral side of comb with stout spinous exopodial bristle reaching past end of comb, 1 short slender bristle just ventral to base of stout bristle, 2 pairs of bristles closer to ventral margin of comb, and 4 bristles almost on ventral margin.

Sixth Limb (Figure 100*d*): Limb hirsute with broadly rounded posterior end. Small medial bristle near proximal anterior corner. Anterior margin with a spinous bristle at both upper and lower endite sutures. Anteroventral corner with 2 spinous bristles. Lateral flap without bristles. Anterior 2/3 of ventral margin with 8–9 short spinous bristles; posterior 1/3 of ventral margin with 1 bristle on one limb of holotype (Figure 100*d*) but no bristle on other limb.

Seventh Limb (Figure 100*e*): Each limb with 12 tapered bristles: 6 bristles in proximal group (3 on each side, each with 2 or 3 bells) and 6 distal (3 on each side, each with 1–3 bells). Terminus with opposing combs, each with about 9 spinous teeth of similar length (not all spines of teeth shown).

Furca (Figure 99*i*): Each lamella with 8 claws (posterior claw bristle-like recurved); claws 1–7 with teeth along posterior edges (not shown); claws 1–3 with distal hairs along anterior edges (not shown); small triangular segment posterior to lamellae with minute spines along edge.

Bellonci Organ (Figure 99*j*): Elongate with 2 indistinct sutures near midlength and rounded tip.

Eyes: Lateral eyes absent. Medial eye well developed, unpigmented, bare (Figure 99*j*).

Lips (Figure 99*k*): Upper lip a hirsute lobe (without spines) on each side of indented saddle. Lower lip a hirsute lobe on each side of mouth.

Genitalia: Absent.

Anterior of Body: Without anterior process.

Posterior of Body (Figure 100*f*): Bare except for long spines on short thumb-like dorsal process and minute spines near small triangular process adjacent to furca.

Y-*Sclerite* (Figure 100*f*): Typical for subfamily.

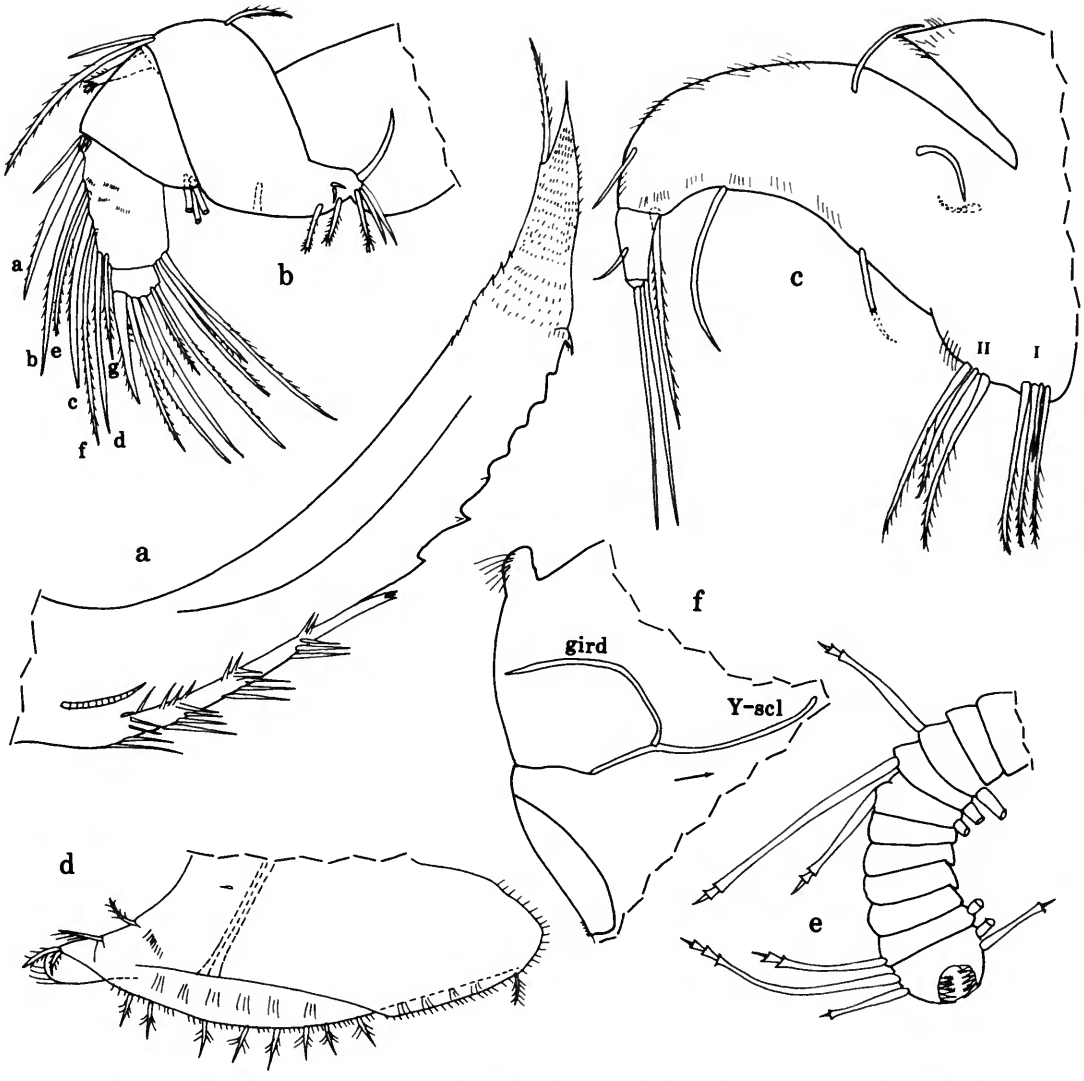


FIGURE 100.—*Domromeus merx* Kornicker, new species, A–1 male, holotype, NMV J35976: *a*, coxale endite right mandible, mv; *b*, right mandible, mv; *c*, right maxilla, mv; *d*, right 6th limb, mv; *e*, 7th limb; *f*, posterior of body, lv.

COMPARISONS.—The carapace of *D. merx* is larger than that of *D. heptathrix* (length of A–1 male *D. merx* 1.55 m; length of adult female *D. heptathrix* 1.13–1.25 mm) and is more elongate. The dorsal margin of the 3rd joint of the 1st antenna of *D. heptathrix* bears 3 or 4 bristles compared to 6 on *D. merx*. The 6th limb of *D. merx* has a posterior extension absent on *D. heptathrix* and has fewer bristles along the posteroventral corner.

Bathyleberis Kornicker, 1975

TYPE SPECIES.—*Bathyleberis grossmani* Kornicker, 1975.

COMPOSITION.—Three species have been described previously from southern oceans between latitudes of 41°S and 61°S at depths of 71–4303 m (Kornicker, 1988:28), but none have been described from the vicinity of Australia. A new species is described herein.

DISTRIBUTION.—Circumglobal in southern oceans between about 38°S and 61°S; known depth range 2–4303 m (Chavtur, 1983:81; Kornicker, 1988:28).

Bathyleberis babax Kornicker, new species

FIGURES 101, 102

ETYMOLOGY.—From the Latin *babax* (chatterer, loud talker).

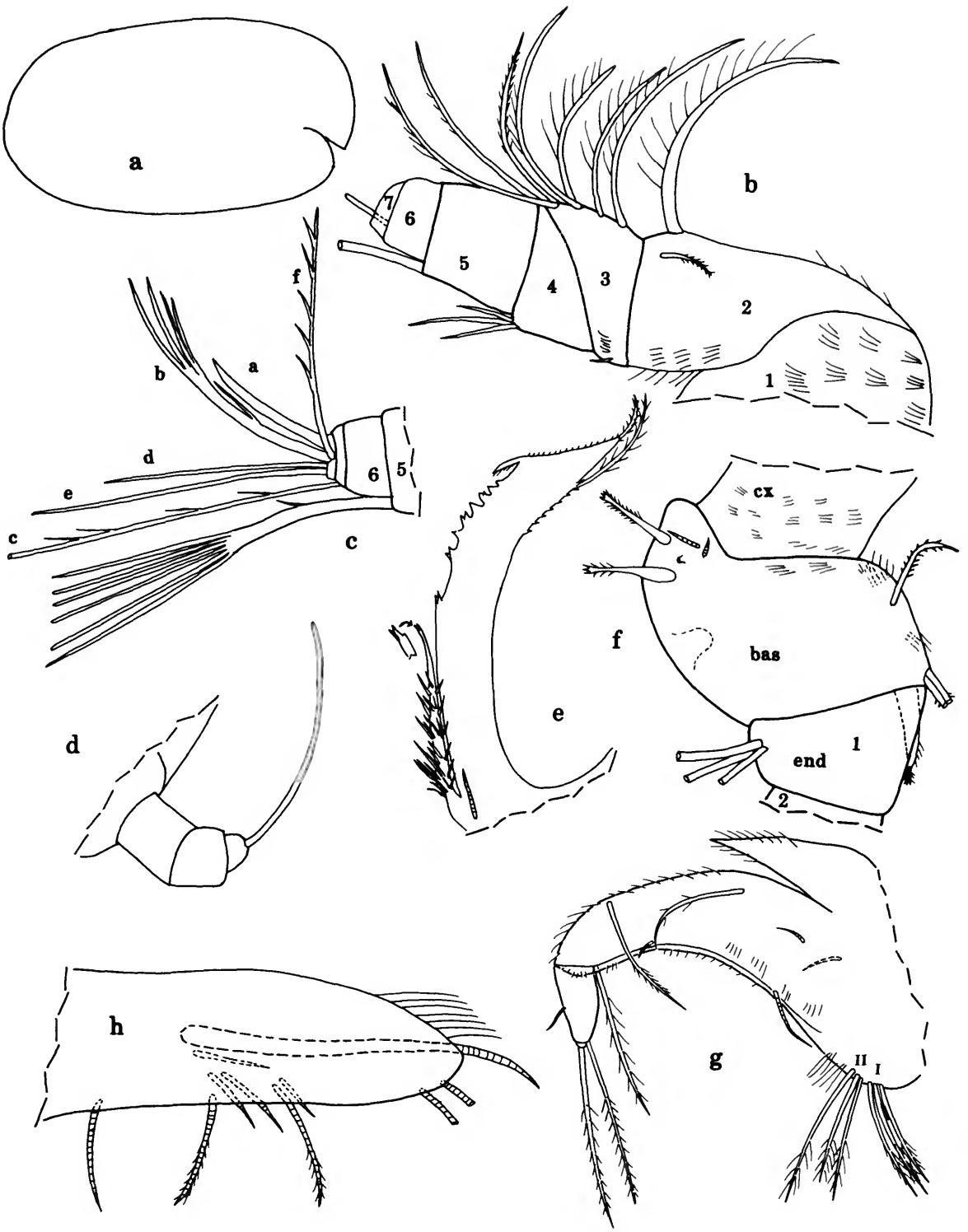


FIGURE 101.—*Bathyleberis babax* Kornicker, new species, A–1 female, holotype, NMV J35972: *a*, complete specimen, length 2.09 mm; *b,c*, left 1st antenna (nabs), lv; *d*, endopodite right 2nd antenna, mv; *e*, coxale endite left mandible, mv; *f*, part left mandible (nabs), mv; *g*, right maxilla, mv; *h*, comb left 5th limb (nabs), mv.

HOLOTYPE.—NMV J35972, A–1 female on slide and in alcohol.

TYPE LOCALITY.—Slope 27, 38°25.00'S, 149°00.00'E, Victoria, S of Point Hicks; depth 1500 m.

PARATYPE.—Slope 81: NMV J35973, partly dissected A–1 female in alcohol.

DISTRIBUTION.—Slope 27, 1500 m. Slope 81, 1264 m.

DESCRIPTION OF A–1 FEMALE (Figures 101, 102).—Carapace elongate with evenly rounded anterior and posterior margins and slit-like incisur ventral to midheight (Figure 101*a*).

Infold: Rostral infold dorsal to list with about 35 long bristles; rostral infold between list and incisur with about 12 bristles (7 forming horizontal row); anteroventral infold with small bristle just ventral to inner end of incisur followed by about 20 mostly longer bristles; narrow list (with anterior end ventral to incisur) paralleling and close to inner margin of anteroventral infold and near midwidth along posterior half of ventral infold, then broadening along posteroventral and posterior infold; ventral infold just anterior to anterior end of broad posteroventral list with row of about 7 bristles between list and valve edge; broad posteroventral and posterior list with about 20 transparent triangular bristles and about 40 short and long bristles along proximal edge of list, up to 3 bristles between each pair of triangular bristles; infold between broad list and valve edge with row of about 26 bristles, mostly in ventral 1/3; infold posterior to dorsal half of broad list with 4 processes.

Selvage: Ventral edge of incisur with short fringed lamellar prolongation.

Vestment: Long spines in anterodorsal corner proximal to infold.

Carapace Size (length, height in mm): Slope 27: NMV J35972 (holotype), 2.09, 1.14, height 55% of length. Slope 81: NMV J35973, 2.09, 1.06, height 51% of length. Length 2.09, height range 1.06–1.14; range of height as percent of length 51–55.

First Antenna: 1st joint spinous (Figure 101*b*). 2nd joint spinous, with 2 spinous bristles (1 short lateral near dorsal margin, 1 long dorsal). 3rd joint separated from 4th joint by indistinct medial and lateral sutures, with 7 bristles (1 small ventral, 6 longer spinous dorsal), and with row of lateral spines near ventral margin. 4th joint with fairly straight lateral and concave medial distal margins and with 4 bristles (3 short ventral, 1 longer spinous dorsal). Sensory bristle of 5th joint with 7 filaments (1 short proximal, 6 longer terminal) (Figure 101*c*). Medial bristle of 6th joint shorter than sensory bristle of 5th joint (bristle not shown in Figure 101*c*). 7th joint (Figure 101*c*): a-bristle claw-like, about 3/4 length of bristle of 6th joint; b-bristle almost twice length of a-bristle, with 4 marginal filaments (1 short proximal, 3 longer distal); c-bristle with distal part broken off on both limbs of holotype (stump reaching distal end of sensory bristle of 5th joint, with 5 marginal filaments). 8th joint (Figure 101*c*): d-bristle 1/4 to 1/3 longer than a-bristle, bristle-like with pointed tip; e-bristle longer and stouter than d-bristle, filament-like with blunt tip; f-bristle bent dorsally, about same length as b-bristle, with 5 short marginal filaments; g-bristle (not shown) about 1/3 longer than b-bristle, with 6 marginal filaments (distal filament shorter than others).

Second Antenna: Protopodite with distal spines along dorsal margin and on dorsal half of medial surface, and small distal medial bristle. Endopodite with 3 well-defined joints and long terminal bristle (Figure 101*d*). Exopodite: bristle of 2nd joint reaching 9th joint, with long slender ventral hair-like spines; bristles of joints 3–8 with natatory hairs and minute proximal ventral spines; 9th joint with 4 bristles (2 long with natatory hairs, 1 short with indistinct short hairs, 1 minute, dorsal, bare); joints 3–8 with small basal spines; 9th joint with lateral spine about 1/3 length of joint; joint 1 with 2 or 3 rows of long distal spines on dorsal concave margin; joints 2–8 with distal rows of minute spines.

Mandible (Figure 101*e,f*): Coxale with abundant medial spines. Coxale endite (Figure 101*e*): small ringed bristle near base of ventral branch; ventral branch with 6 rows of spines and tip with 2 spines; dorsal branch with 7 short single and double distal teeth and main spine (with rather long marginal spines along posterior edge) along ventral margin, long terminal bristle (with marginal hairs), long dorsal bristle (with marginal hairs) set back from tip of branch, and few dorsal serrations proximal to dorsal bristle. Basale (Figure 101*f*): endite with 4 end bristles (not shown), 3 triaenid bristles (2 shown) (distal with 3 pairs of spines proximal to terminal pair, others with about 10 pairs of spines proximal to terminal pair), 2 dwarf bristles, and glandular peg; medial surface with indistinct U-shaped boss near ventral margin and proximal spines near dorsal margin; lateral surface with proximal spines near dorsal margin; dorsal margin with proximal spines, 1 spinous dorsal bristle near midlength, and 2 spinous terminal bristles (proximal lateral bristle less than half length of distal medial bristle). Exopodite tapering distally, about 3/4 length of dorsal margin of 1st endopodial joint, hirsute, with 2 short terminal bristles with long marginal spines. 1st endopodial joint with 3 stout ventral bristles (2 long bristles with long proximal and short distal spines; shortest bristle distal with short spines). 2nd endopodial joint: dorsal margin with 1 or 2 proximal bristles and stout spinous a-, b-, c-, and d-bristles; lateral surface with long spinous e- and f-bristles; medial surface with rows of spines, 10 or 11 cleaning bristles (1 or 2 between a- and b-bristles, 3 or 4 between b- and c-bristles, 5 or 6 between c-and d-bristles), and long spinous g-bristle; ventral margin with 3 spinous terminal bristles. 3rd endopodial joint with fairly straight dorsal claw (with few small dorsal spines near tip) and 5 spinous bristles (4 stout, 1 slender).

Maxilla (Figure 101*g*): Epipodite hirsute with pointed tip almost reaching middle of dorsal margin of basale. Endite I with 4 bristles (3 long spinous, 1 short); endite II with 3 long spinous bristles. Basale: medial surface spinous (not all spines shown), with 3 bristles near dorsal margin (1 short proximal, 1 long near midlength, 1 long distal); ventral margin with 1

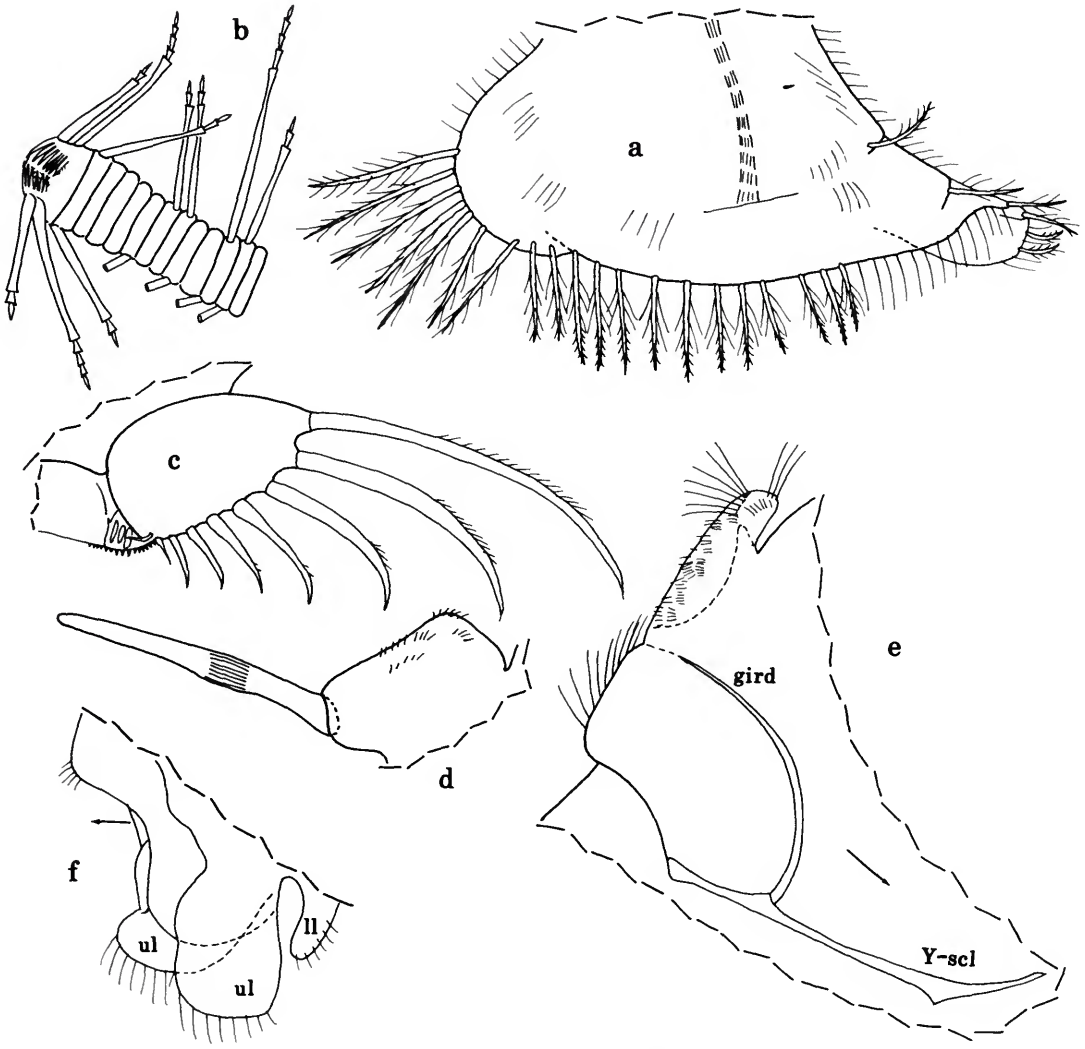


FIGURE 102.—*Bathyleberis babax* Kornicker, new species, A–1 female, holotype, NMV J35972: *a*, left 6th limb, mv; *b*, 7th limb; *c*, right lamella furca, lv; *d*, medial eye and Bellonci organ, lv; *e*, part of posterior of body from right side; *f*, upper lip (both left and right lobes) and left flap of lower lip, lv.

proximal backward-oriented bristle, 1 minute distal bristle (with base on lateral side), 1 long spinous terminal bristle, and narrow transparent spinous medial vellum along edge (vellum laps over proximal end of 1st endopodial joint); lateral surface with short proximal bristle near midheight. Endopodite: 1st joint with short bare alpha-bristle and long spinous beta-bristle; 2nd joint with spinous terminal bristle reaching past tip of beta-bristle; suture between 1st and 2nd joints very weakly developed.

Fifth Limb (Figure 101*h*): Lateral side of comb with stout spinous exopodial bristle, 1 slender bristle just ventral to base of exopodial bristle, 2 pairs of bristles closer to ventral margin, 1 bristle near proximal pair but closer to ventral margin, and 1 proximal and 2 terminal bristles almost on ventral margin; ventral margin with long and short bristles forming single row (distal 5 longer than others) (not shown).

Sixth Limb (Figure 102*a*): Small medial bristle near proximal anterior corner of trunk; anterior margin with an upper and lower bristle (with thin indistinct marginal hairs) on well-defined endite sutures; anteroventral corner of skirt with 2 short spinous bristles; lateral flap with 2 slender spinous bristles; posteroventral margin of skirt with 20 or 21 spinous bristles (those at posterior corner longer).

Seventh Limb (Figure 102*b*): Proximal group with 8 tapering bristles, 4 on each side, each with 2–4 bells; distal group with 6 tapering bristles, 3 on each side, each with 2–4

bells. Terminus with opposing combs, each with 14 or 15 spinous teeth (all spines not shown).

Furca (Figure 102*c*): Each lamella with 9 or 10 claws and bristles; next-to-last claw straight; last claw bristle-like, recurved; remaining claws curved and with teeth along posterior edges (not shown); claws 1–5 with spines along anterior edges; each claw of right lamella anterior to like-numbered claw of left lamella; edge following lamellae with abundant closely spaced minute spines.

Bellonci Organ (Figure 102*d*): Elongate, broadening and striated near midlength, and with broadly rounded tip.

Eyes: Lateral eyes absent. Medial eye large, unpigmented, with hairs visible only at high magnification (×100 objective, ×15 ocular) (Figure 102*d*).

Lips (Figure 102*f*): Upper lip with hirsute lobe on each side of saddle; saddle with minute anterior spine. Lower lip: lateral hirsute flap on each side of mouth.

Genitalia: None observed.

Posterior of Body (Figure 102*e*): Segment dorsal to furca with minute spines on ventral part (Figure 102*c*); segment with dorsal end at dorsal end of girdle with long hairs; segment dorsal to dorsal end of girdle with rows of short spines on ventral part and thumb-like terminal process with rows of both long and short spines.

Y-*Sclerite* (Figure 102*e*): Typical for genus.

Gills: 7 well-developed gills on each side of body.

Eggs: Holotype with minute unextruded eggs.

COMPARISONS.—The trunk of the 6th limb of *B. babax* bears 2 bristles on the anterior margin compared to only 1 for *B. monothrix* Kornicker, 1975, and 6 or 7 for *B. grossmani* Kornicker, 1975. The dorsal margin of the mandibular basale of *B. babax* bears 1 bristle near midlength compared to 4 or 5 on *B. oculata* Kornicker, 1975. *Bathyleberis babax* also differs from *B. oculata* in lacking lateral eyes. The 7th limb of *B. babax* bears 14 bristles compared to 30 for *B. thrix* Kornicker, 1988 (both species known only from female late instars). *Bathyleberis babax* differs from *B. hancocki* Baker, 1979, in having a lateral bristle on the 2nd joint of the 1st antenna and a much longer distal dorsal bristle on the basale of the maxilla. *Bathyleberis babax* differs from *B. kurilensis* (Chavtur, 1978) in having 4 bristles on the anteroventral corner (including lateral flap) of the 6th limb compared to 5 or 6, and in the 2 distal dorsal bristles on the basale of the maxilla being longer. The maxilla of *B. babax* differs from that of *B. garthi* Baker, 1979, in having longer dorsal bristles on the basale.

REMARKS.—I examined an adult female paratype of *B. garthi* (USNM 151396) and find it to have lateral eyes with 5 or 6 ommatidia, thus it differs also in this character from *B. babax*, which is without lateral eyes. Although Baker (1979:294) did not mention a lateral bristle on the 2nd joint of the 1st antenna, I find one on the paratype similar to that of *B. babax*. The basale of the maxilla of the holotype of *B. garthi* illustrated by Baker (1979, fig. 3g) has 2 proximal ventral bristles, but the paratype I examined has only 1, suggesting that the number may vary within the species.

In the description of *B. monothrix*, Kornicker (1975:541) stated that the sensory bristle of the 5th joint of the 1st antenna bears 1 short proximal and 6 long terminal filaments, but an illustration of the bristle (1975, fig. 336d) shows 7 long terminal filaments in addition to the short proximal filament. I reexamined the antenna of the illustrated specimen and find the illustration incorrect and the description correct.

Appendix 1

Station Data with Species in Samples

(Except for Slopes 5 and 85, samples taken with WHOI epibenthic sled; stations arranged in chronological order.)

Slope 1: New South Wales, off Nowra (34°59.52′S, 151°5.94′E), 204 m, coarse shell, 14 Jul 1986.
Azygocypridina lowryi, Cypridinodes wyvillethomsoni, Archasterope efficax.

Slope 5: New South Wales, off Nowra (34°54.68′S, 151°11.36′E), 800 m, trawl, 5-m otter, 15 Jul 1986.
Azygocypridina lowryi.

Slope 7: New South Wales, off Nowra (34°52.29′S, 151°15.02′E), 1096 m, shell, 15 Jul 1986.
Paradoloria fax.

Slope 17: New South Wales, off Nowra (34°43.10′S, 151°23.00′E), 2250 m, 17 Jul 1986.
Paradoloria fax, Xandarasterope storthynx.

Slope 19: New South Wales, off Eden (37°07.30′S, 150°20.20′E), 520 m, coarse grey shell, 20 Jul 1986.
Cypridinodes wyvillethomsoni, Pterocypridina tressleri.

Slope 21: New South Wales, off Eden (36°57.40′S, 150°18.80′E), 220 m, muddy shell, 20 Jul 1986.
Paradoloria fax, Pterocypridina appendix, Rheina relax, Synasterope solox.

Slope 22: New South Wales, off Eden (37°00.60′S, 150°20.70′E), 363 m, coarse shell, 21 Jul 1986.
Pterocypridina appendix, Skogsbergia tenax, Domromeus merx, Parasterope physinx, Synasterope solox.

Slope 25: Victoria, S of Point Hicks (38°25.90′S, 148°58.60′E), 1850 m, muddy sandstone, 22 Jul 1986.
Skogsbergiella senex.

Slope 27: Victoria, S of Point Hicks (38°25.00′S, 149°00.00′E), 1500 m, compacted clay, 22 Jul 1986.
Paradoloria fax, Bathyleberis babax, Parasterope sequax, Skogsbergiella senex, Xandarasterope trux.

Slope 32: Victoria, S of Point Hicks (38°21.90′S, 149°20.00′E), 1000 m, clayey shell, coarse biogenic sand, 23 Jul 1986.
Azygocypridina lowryi, Metavargula calix, Metavargula procax, Metavargula spadix, Paradoloria mordax, Archasterope verax, Homasterope trebax, Parasterope lux.

Slope 33: Victoria, S of Point Hicks (38°19.60′S, 149°24.30′E), 930 m, rocks, clay with biogenic sand, 23 Jul 1986.
Metavargula procax, Homasterope trebax.

Slope 34: Victoria, S of Point Hicks (38°16.40′S, 149°27.60′E), 800 m, coarse sand, shell, 23 Jul 1986.
Archasterope altrix, Archasterope verax, Homasterope trebax.

Slope 40: Victoria, S of Point Hicks (38°17.70′S, 149°11.30′E), 400 m, coarse sand, shell, mud, and sponges, 24 Jul 1986.
Skogsbergia vivax, Archasterope afficax, Parasterope physinx.

Slope 45: Tasmania, off Freycinet Peninsula (42°02.20′S, 148°38.70′E), 800 m, coarse shelly sand, 27 Jul 1986.
Pterocypridina tressleri.

Slope 46: Tasmania, off Freycinet Peninsula (42°00.20′S, 148°37.70′E), 720 m, coarse shelly sand, 27 Jul 1986.

Metavargula apex, Metavargula currax, Paradoloria pugnax, Paradoloria species A.

Slope 47: Tasmania, off Freycinet Peninsula (41°58.60′S, 148°38.80′E), 500 m, coarse shell, 27 Jul 1986.

Archasterope apex.

Slope 48: Tasmania, off Freycinet Peninsula (41°57.50′S, 148°37.90′E), 400 m, coarse shell, 27 Jul 1986.

Archasterope efficax.

Slope 53: New South Wales 54 km ESE of Nowra (34°52.72′S, 151°15.04′E, 996 m, to 34°54.03′ S, 151°19.05′E, 990 m), mud, fine sand, fine shell, 22 Oct 1988.

Parasterope whatleyi.

Slope 55: New South Wales 59 km E of Nowra (34°53.46′S, 151°18.79′E, 1545 m, to 34°55.32′S, 151°19.83′E, 1583 m) compacted muddy clay, 22 Oct 1988.

Xandarasterope trux.

Slope 56: New South Wales 44 km E of Nowra (34°55.79′S, 151°08.06′E), 429 m, muddy coarse shell, 22 Oct 1988.

Metavargula apex, Pterocypridina pax.

Slope 66: Victoria, 96 km S of Point Hicks (38°40.29′S, 149°18.06′E, 2900 m, to 38°39.44′S, 149°15.04′E, 2900 m), compacted clay, 25 Oct 1988.

Isocypridina fallax, Paradoloria fax, Xandarasterope storthynx.

Slope 67: Victoria, 67 km S of Point Hicks (38°23.95′S, 149°17.02′E), 1277 m, fine mud with coral, 25 Oct 1988.

Paradoloria tryx, Parasterope sequax, Xandarasterope trux.

Slope 69: Victoria, 76 km S of Point Hicks (38°29.33′S, 149°19.98′E), 1840 m, sandy mud, fine shell, 26 Oct 1988.

Paradoloria tryx, Skogsbergiella senex, Xandarasterope trux.

Slope 81: Tasmania, 48 km ENE of Cape Tourville, Freycinet Peninsula, (42°00.25′S, 148°43.55′E, 1264 m, to 41°57.77′S, 148°42.08′E, 1130 m), gravelly, partly biogenic sandy mud, 30 Oct 1988.

Metavargula spadix, Archasterope verax, Bathyleberis babax.

Slope 85: Tasmania, 37 km NE of Cape Tourville, Freycinet Peninsula, (41°52.87′S, 148°37.93′E, ?m (bottom depth 478 m) to 41°59.56′S, 148°31.13′E, 124 m (bottom depth 124 m)), coarse biogenic gravel, 3-m Isaac-Kidd midwater trawl (hit bottom), 30 Oct 1988.

Rheina relax.

Appendix 2

Sampling Details for Benthic Stations on Four Transects on the SE Australian Continental Slope

(Stations are listed in order of increasing depth within transect and are labelled with a transect prefix and depth suffix.)

Station	Slope	Latitude (S)	Longitude (E)	Date	Gear*	Sediment	Number of species
			Nowra, New South Wales transect				
NSW-204	1	34°59.52′	151°05.94′	14 Jul 1986	ES	coarse shell	21
NSW-429	56	34°55.79′	151°08.06′	22 Oct 1988	ES	muddy coarse shell	10
NSW-503	2	34°57.90′	151°08.00′	14 Jul 1986	ES	biogenic shell, bryozoans	1
NSW-770	6	34°51.90′	151°12.60′	15 Jul 1986	ES	shell with crinoids	1
NSW-800	5	34°54.68′	151°11.36′	15 Jul 1986	OT		1
NSW-996	53	34°52.72′	151°15.04′	22 Oct 1988	ES	mud, fine sand, and shell	8
NSW-1096	7	34°52.29′	151°15.02′	15 Jul 1986	ES	shell	1
NSW-1545	55	34°53.46′	151°18.79′	22 Oct 1988	ES	compacted muddy clay	1
NSW-2250	17	34°43.10′	151°23.00′	17 Jul 1986	ES		3
			Eden, New South Wales transect				
EDEN-220	21	36°57.40′	150°18.80′	20 Jul 1986	ES	muddy shell	9
EDEN-363	22	37°00.60′	150°20.70′	21 Jul 1986	ES	coarse shell	20
EDEN-520	19	37°07.30′	150°20.20′	20 Jul 1986	ES	coarse grey shell	7
			Eastern Victoria, Bass Strait transect				
BS-400	40	38°17.70′	149°11.30′	24 Jul 1986	ES	coarse sand, shell, mud, and sponges	16
BS-600	39	38°19.10′	149°14.30′	24 Jul 1986	ES	coarse sand	3
BS-800	34	38°16.40′	149°27.60′	23 Jul 1986	ES	coarse sand, shell	5
BS-930	33	38°19.60′	149°24.30′	23 Jul 1986	ES	rocks, clay with biogenic sand	3
BS-1000	32	38°21.90′	149°20.00′	23 Jul 1986	ES	clayey shell, coarse biogenic sand	13
BS-1277	67	38°23.95′	149°17.02′	25 Oct 1988	ES	fine mud with coral	7
BS-1500	27	38°25.00′	149°00.00′	22 Jul 1986	ES	compacted clay	7
BS-1840	69	38°29.33′	149°19.98′	26 Oct 1988	ES	sandy mud, fine shell	8
BS-1850	25	38°25.90′	148°58.60′	22 Jul 1986	ES	muddy sandstone	4
BS-2900	66	38°40.29′	149°18.06′	25 Oct 1988	ES	compacted clay	4
			Freycinet Peninsula, Tasmania transect				
TAS-400	48	41°57.50′	148°37.90′	27 Jul 1986	ES	coarse shell	4
TAS-500	47	41°58.60′	148°38.80′	27 Jul 1986	ES	coarse shell	3
TAS-720	46	42°00.20′	148°37.70′	27 Jul 1986	ES	coarse shelly sand	9
TAS-800	45	42°02.20′	148°38.70′	27 Jul 1986	ES	coarse shelly sand	3
TAS-1264	81	42°00.25′	148°43.55′	30 Oct 1988	ES	gravelly, partly biogenic sandy mud	6
TAS-1770	82	41°57.30′	148°58.54′	30 Oct 1988	ES	biogenic rubble	1
TAS-124-478	85	41°52.87′	148°37.93′	30 Oct 1988	IKMT	coarse biogenic gravel	1

*Gear used is abbreviated as follows: ES = WHOI epibenthic sled; OT = 5-m otter trawl; IKMT = Isaac-Kidd midwater trawl, which hit bottom.

Appendix 3

Number of Ommatidia in Lateral Eyes of Species in Collection from Australia

(Data mostly from adults, but late juveniles indicated by *; X = species without lateral eyes; Azygocypridininae omitted.)

Taxon (depth range m)	Number of ommatidia		Reference
	Female	Male	
CYPRIDINIDAE			
CYPRIDININAE			
CYPRIDININI			
Cypridinodes wyvillethomsoni (204–520)	20	23	Herein
Metavargula apex (429–720)	0[a]	0[a]	Herein
Metavargula calix (1000)	0[a]	nd	Herein
Metavargula currax (720)	0[a]	nd	Herein
Metavargula procax (930–1000)	0[a]	0[a]	Herein
Metavargula spadix (1000–1264)	0[a]	0[a]	Herein
Paradoloria fax (220, 1096–2900)	X	X?	Herein
Paradoloria mordax (1000)	0[a]	0[a]	Herein
Paradoloria pugnax (720)	7	0[a]	Herein
Paradoloria tryx (1073–1277)	7	7	Herein
Pseudodoloria plax (400–1500)	0[a]	0[a]	Kornicker, 1994
Pterocypridina appendix (220–363)	30	33	Herein
Pterocypridina pax (429)	13	nd	Herein
Pterocypridina tressleri (520–800)	30	nd	Herein
Rheina relax (220–478)	24	nd	Herein
Skogsbergia tenax (363)	29	27	Herein
Skogsbergia vivax (400)	29	nd	Herein
Vargula dentata (800–996)	X	nd	Kornicker, 1994
Vargula fugax (996–1000)	0[a]	0[a]	Kornicker, 1994
Vargula hex (500–1000)	3–4	4	Kornicker, 1994
Vargula matrix (1277–1840)	0[a]	0[a]	Kornicker, 1994
Vargula psydrax (429–2250)	X	X	Kornicker, 1994
Vargula rapax (400)	15	nd	Kornicker, 1994
Vargula stranx (600–720)	4–5	nd	Kornicker, 1994
Vargula trifax (204–429)	13	13	Kornicker, 1994
Vargula vertex (363)	15	15	Kornicker, 1994
Vargula vix (400)	13	nd	Kornicker, 1994
PHILOMEDIDAE			
PHILOMEDINAE			
Euphilomedes ernyx (220)	5	nd	Kornicker, 1995
Igene illex (770–996)	X	nd	Kornicker, 1995
Philomedes fortax (720)	X	nd	Kornicker, 1994
Philomedes pseudolofthousae (1840–2900)	2	Many*	Kornicker, 1994
Philomedes ptyx (1000–1840)	0[a]	nd	Kornicker, 1994
Philomedes sphinx (1850)	X	nd	Kornicker, 1994
Philomedes thorax (800)	0[b]	29	Kornicker, 1994
Pleoschisma mindax (220)	4	nd	Kornicker, 1994
Pleoschisma pnyx (204–520)	5	24	Kornicker, 1994
Pleoschisma pseudoferox (204)	3–4*	nd	Kornicker, 1994
Scleroconcha solox (429–1264)	0[a]	33	Kornicker, 1995
PSEUDOPHILOMEDINAE			
Harbansus felix (204)	X	nd	Kornicker, 1995
Harbansus hapax (429–996)	X	nd	Kornicker, 1995
Harbansus tenax (400)	X	nd	Kornicker, 1995
Harbansus vatrax (204)	4–5	5	Kornicker, 1995
Harbansus vortex (363)	0[a]	nd	Kornicker, 1995
Pseudophilomedes fornix (996)	X	nd	Kornicker, 1994

Appendix 3.—Continued.

Taxon (depth range m)	Number of ommatidia		Reference
	Female	Male	
RUTIDERMATIDAE			
Metaschisma nex (204)	0[b]	0[a]*	Kornicker, 1994
Scleraner trifax (204)	5	Many	Kornicker, 1994
SARSIELLIDAE			
SARSIELLINAE			
Alphasarsiella altrix (400)	X	nd	Kornicker, 1995
Alphasarsiella anax (363)	X	nd	Kornicker, 1995
Chelicopia pertinex (204–400)	5	5	Kornicker, 1994
Chelicopia triplex (204)	5	nd	Kornicker, 1994
Cymbicopia cervix (363–400)	2	nd	Kornicker, 1995
Cymbicopia climax (363)	2	2	Kornicker, 1995
Eusarsiella bex (429–720)	5–6	6	Kornicker, 1994
Eusarsiella edax (363–520)	5	5	Kornicker, 1994
Eusarsiella fallomagna (204–429)	5	nd	Kornicker, 1994
Eusarsiella iayx (363–720)	5	nd	Kornicker, 1994
Neomuelleriella klomax (520)	X	nd	Kornicker, 1995
Neomuelleriella nex (363–400)	5	nd	Kornicker, 1995
Parasarsiella poorei (204)	5	8	Kornicker, 1994
Spinacopia crux (204)	4	nd	Kornicker, 1995
Spinacopia illex (363)	4	nd	Kornicker, 1995
Spinacopia rex (1000–1850)	X	X	Kornicker, 1995
Spinacopia sandix (204–363)	4	4	Kornicker, 1995
Spinacopia syrinx (400)	X	nd	Kornicker, 1995
Spinacopia trox (204)	4	nd	Kornicker, 1995
DANTYINAE			
Nealella lux (204)	5	nd	Kornicker, 1994
Dantya tryx (204)	5	nd	Kornicker, 1994
CYLINDROLEBERIDIDAE			
CYLINDROLEBERIDINAE			
Archasterope altrix (800)	23	nd	Herein
Archasterope apex (500)	23	nd	Herein
Archasterope efficax (204–400)	12–13	14	Herein
Archasterope verax (800–1264)	X	X	Herein
Bathyleberis babax (1500)	X*	nd	Herein
Domromeus merx (363)	nd	X*	Herein
Homasterope trebax (800–1000)	9–13	20	Herein
Parasterope lux (1000)	5	nd	Herein
Parasterope physinx (363–400)	17	nd	Herein
Parasterope sequax (1277–1500)	0[a]	nd	Herein
Parasterope whatleyi (996)	X	X	Herein
Skogsbergiella senex (1500–1850)	X	nd	Herein
Synasterope solox (220–363)	X	nd	Herein
Xandarasterope storthynx (2250–2900)	X	nd	Herein
Xandarasterope trux (1277–1840)	X	X	Herein
Xenoleberis bex (600)	X	nd	Kornicker, 1994
CYCLASTEROPINAE			
Leuroleberis mackenziei (204)	70	70	Kornicker (1981:115, 1994)
ASTEROPTERONINAE			
Asteropterygion magnum (204–363)	X	X	Poulsen (1965:185), Kornicker, 1994
Macroasteropteron mindax (996)	X	nd	Kornicker, 1994

[a] Cells within eye, no ommatidia.

[b] With pigment but without cells or ommatidia.

Appendix 4

Material from Museum of Victoria "Crustacea" Database

CYLINDROLEBERIDIDAE

Archasterope altrix
holotype, stn SLOPE 34, NMV J37163 (1 female)
Archasterope apex
holotype, stn SLOPE 47, NMV J37164 (1 ovigerous female, 1 slide)
Archasterope efficax
holotype, stn SLOPE 48, NMV J37165 (1 ovigerous female, 1 slide)
paratypes, stn SLOPE 1, NMV J37167 (7 juveniles)
paratype, stn SLOPE 48, NMV J37166 (1 juvenile male)
Archasterope verax
holotype, stn SLOPE 81, NMV J37170 (1 female, 1 slide)
paratype, stn SLOPE 34, NMV J37169 (1 female, 1 slide)
paratype, stn SLOPE 34, NMV J37168 (1 male)
nontype, stn SLOPE 32, NMV J40010 (1 male, 1 slide)
nontype, stn SLOPE 32, NMV J40069 (1 male)
Bathyleberis babax
holotype, stn SLOPE 27, NMV J35972 (1 A–1 female, 1 slide)
paratype, stn SLOPE 81, NMV J35973 (1 A–1 female)
Domromeus merx
holotype, stn SLOPE 22, NMV J35976 (1 A–1 male, 1 slide)
Homasterope trebax
holotype, stn SLOPE 32, NMV J35977 (1 female, 1 slide)
paratype, stn SLOPE 32, NMV J35978 (1 male, 1 slide)
paratype, stn SLOPE 32, NMV J35979 (1 female)
paratypes, stn SLOPE 32, NMV J35980 (4 juveniles)
paratypes, stn SLOPE 33, NMV J35981 (2 juveniles)
paratype, stn SLOPE 34, NMV J35982 (1 ovigerous female, 1 slide)
paratype, stn SLOPE 34, NMV J35983 (1 female, 1 slide)
Parasterope lux
holotype, stn SLOPE 32, NMV J36004 (1 ovigerous female, 1 slide)
Parasterope physinx
holotype, stn SLOPE 40, NMV J36006 (1 ovigerous female, 1 slide and in alcohol)
nontype, stn SLOPE 22, NMV J36005 (1 female (late instar or adult), 1 slide)
Parasterope sequax
holotype, stn SLOPE 27, NMV J36007 (1 adult female)
paratype, stn SLOPE 27, NMV J36008 (1 ovigerous female, 1 slide)
paratypes, stn SLOPE 27, NMV J36009 (2 adult females and 3 late juveniles)
paratype, stn SLOPE 67, NMV J36010 (1 ovigerous female)
Parasterope whatleyi
holotype, stn SLOPE 53, NMV J36011 (1 adult female)
paratype, stn SLOPE 53, NMV J36012 (1 female with male choniostomatid copepod)
paratypes, stn SLOPE 53, NMV J37721 (2 juveniles)
Skogsbergiella senax
holotype, stn SLOPE 25, NMV J40016 (1 female)
paratype, stn SLOPE 25, NMV J40017 (1 juvenile)
paratype, stn SLOPE 27, NMV J40018 (1 instar IV)
paratypes, stn SLOPE 27, NMV J40019 (3 juveniles)
paratype, stn SLOPE 69, NMV J40020 (1 ovigerous female, 1 slide)
paratype, stn SLOPE 69, NMV J40021 (1 juvenile)
Synasterope solox
holotype, stn SLOPE 21, NMV J40022 (1 female, 1 slide)
Xandarasterope storthynx
holotype, stn SLOPE 66, NMV J40026 (1 adult female)
paratype, stn SLOPE 17, NMV J40023 (1 juvenile)
paratype, stn SLOPE 66, NMV J40024 (1 late juvenile)
paratype, stn SLOPE 66, NMV J40025 (1 early juvenile)
Xandarasterope trux
holotype, stn SLOPE 69, NMV J40030 (1 female)
paratype, stn SLOPE 55, NMV J40027 (1 female)
paratype, stn SLOPE 27, NMV J40028 (1 A–1 male)
paratypes, stn SLOPE 69, NMV J40031 (1 male, 1 ovigerous female, 2 juveniles)
nontype, stn SLOPE 67, NMV J40029 (1 juvenile male)

CYPRIDINIDAE

Azygocypridina lowryi
nontypes, stn SLOPE 1, NMV J35969 (22 specimens)
nontype, stn SLOPE 5, NMV J35970 (1 specimen)
nontype, stn SLOPE 32, NMV J35971 (1 instar III female, 1 slide)
Cypridinodes wyvillethomsoni
nontype, stn SLOPE 19, NMV J35975 (1 adult male)
nontypes, stn SLOPE 1, NMV J35974 (1 ovigerous female, 2 adults, 25 others)
Isocypridina fallax
holotype, stn SLOPE 66, NMV J35984 (1 adult male)
paratypes, stn SLOPE 66, NMV J35985 (10 juveniles)
paratype, stn SLOPE 66, NMV J35986 (1 ovigerous female)
Metavargula apex
holotype, stn SLOPE 56, NMV J35987 (1 female)
paratypes, stn SLOPE 56, NMV J37159 (2 ovigerous

females, 3 juveniles)

Metavargula calix
holotype, stn SLOPE 32, NMV J37160 (1 ovigerous female, 1 slide)

Metavargula currax
holotype, stn SLOPE 46, NMV J35988 (1 ovigerous female, 1 slide)

Metavargula procax
holotype, stn SLOPE 33, NMV J35989 (1 female, 1 slide)

Metavargula spadix
holotype, stn SLOPE 81, NMV J35990 (1 ovigerous female)
paratypes, stn SLOPE 81, NMV J35991 (14 specimens)
paratype, stn SLOPE 81, NMV J35992 (1 adult male)

Paradoloria fax
holotype, stn SLOPE 66, NMV J37162 (1 ovigerous female)
paratype, stn SLOPE 21, NMV J35996 (1 female)
paratype, stn SLOPE 7, NMV J37161 (A–1 male, 1 slide)
paratype, stn SLOPE 17, NMV J35993 (1 ovigerous female)
paratype, stn SLOPE 17, NMV J35994 (1 ovigerous female)
paratype, stn SLOPE 17, NMV J35995 (1 juvenile)
paratypes, stn SLOPE 27, NMV J35997 (2 ovigerous females)
paratypes, stn SLOPE 66, NMV J35998 (9 specimens: adult males, females and juveniles)

Paradoloria mordax
holotype, stn SLOPE 32, NMV J35999 (1 male)
paratypes, stn SLOPE 32, NMV J36000 (4 adult males and 4 ovigerous females)

Paradoloria pugnax
holotype, stn SLOPE 46, NMV J36001 (1 adult male, 1 slide)

Paradoloria tryx
holotype, stn SLOPE 67, NMV J36002 (1 adult female)

Pseudodoloria plax
holotype, stn SLOPE 32, NMV J35540 (1 ovigerous female)
paratype, stn SLOPE 67, NMV J35608 (1 juvenile)
paratype, stn SLOPE 67, NMV J35609 (1 female)
paratypes, stn SLOPE 67, NMV J35610 (5 juveniles)
paratypes, stn SLOPE 32, NMV J35524 (5 males, 4 females)
paratypes, stn SLOPE 32, NMV J35532 (7 specimens)

Pterocypridina appendix
holotype, stn SLOPE 22, NMV J40002 (1 ovigerous female)
paratype, stn SLOPE 21, NMV J40001 (1 juvenile)
paratypes, stn SLOPE 22, NMV J40003 (3 ovigerous females, 4 females, 6 juveniles)

Pterocypridina pax
holotype, stn SLOPE 56, NMV J40004 (1 adult female)

Pterocypridina tressleri
holotype, stn SLOPE 45, NMV J40005 (1 ovigerous female, 1 slide)
paratype, stn SLOPE 19, NMV J40006 (1 ovigerous female)

Rheina relax
holotype, stn SLOPE 85, NMV J40009 (1 ovigerous female)
paratype, stn SLOPE 21, NMV J40007 (A–2 juvenile)
paratype, stn SLOPE 21, NMV J40008 (A–2 juvenile)
paratypes, stn SLOPE 85, NMV J17675 (3 juveniles)

Skogsbergia tenax
holotype, stn SLOPE 22, NMV J40011 (1 female)

Skogsbergia vivax
holotype, stn SLOPE 40, NMV J40012 (1 ovigerous female, 1 slide)
paratype, stn SLOPE 40, NMV J40013 (1 ovigerous female)
paratypes, stn SLOPE 40, NMV J40014 (5 females)
paratypes, stn SLOPE 40, NMV J40015 (9)

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U.S. GOVERNMENT PRINTING OFFICE: 1996 387-410/00021

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