

West African Myodocopid Ostracoda
(Cylindroleberididae)

LOUIS S. KORNICKER
and
FRANCISCA ELENA CARAION

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Louis S. Kornicker
and Francisca Elena Caraión



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ABSTRACT

Kornicker, Louis E., and Francisca Elena Caraion. West African Myodocopid Ostracoda (Cylindroleberididae). *Smithsonian Contributions to Zoology*, number 179, 78 pages, 43 figures.—Twelve species, of which nine are new, and seven genera in the Family Cylindroleberididae, collected from the research vessels *Thalassa* and *Cornide de Saavedra* in 1971 from the shelf and slope of Spanish Sahara, Mauritania, and Senegal, are described and illustrated.

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West African Myodocopid Ostracoda (Cylindroleberididae)

Louis S. Kornicker
and *Francisca Elena Caraion*

Introduction

This work reports on the shelf and slope myodocopid Ostracoda of the family Cylindroleberididae collected from the research vessels *Thalassa* (18 stations) and *Cornide de Saavedra* (5 stations) in the vicinity of Spanish Sahara (2 stations), Mauritania (15 stations), and Senegal (1 station) (Figure 1). The single sample from Senegal was collected at the surface; the remaining samples were taken with bottom trawls.

The *Thalassa* collection contained 131 specimens and the *Cornide de Saavedra* collection contained 13 specimens of Cylindroleberididae. Of these, 17 could not be identified at the species level. The remaining specimens are referred to 12 species (9 new) in seven genera. These 12 species were found off Mauritania, of which two were also found off Spanish Sahara; no specimens were identified at the generic level from the single planktonic sample off Senegal. The range of latitudes from which each species was collected is shown in Figure 2, and the range of depths in Figure 3.

All specimens identified at the generic and specific levels were assigned USNM numbers, including those deposited in the Museum of Natural History "Grigore Antipa," Bucharest, Romania. Specimens deposited in the Bucharest museum have been noted in the text and their USNM num-

ber placed in brackets. Remaining specimens were deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

The only cylindroleberid previously identified from the study area is *Cycloleberis lobiancoi* Müller, 1894 (Klie, 1943:50). We examined Klie's specimens and refer them herein to *Cycloleberis squamiger* (Scott, 1894), a species Scott (1894:140) described from the Gulf of Guinea as *Asterope squamiger*. Klie (1940:409) identified two species of cylindroleberids, *Asterope grimaldi* Skogsberg, 1920, and *Asterope muelleri* Skogsberg, 1920, from Southwest Africa, but Klie's identifications need verification. Three species of Cylindroleberididae have been reported from South Africa: *Asteropteron nodulosum* Poulsen, 1965; *Cycloleberis galathea* Poulsen, 1965, and *Archasterope* species indeterminate (Kornicker, in press). It is possible that *Cypridina* (?) *bradyi* de Folin, 1870, from the coast of Senegal is a cylindroleberid, but the description does not permit generic placement.

Only three species in the present collection have been reported from other regions: *Cycloleberis squamiger* (Scott, 1894), *Parasterope muelleri* (Skogsberg, 1920) and *Polyleberis mackenziei* Kornicker, 1974b (Table 1). The two latter species are present in the Gulf of Naples (Skogsberg, 1920:491; Kornicker, 1974b:36, 50). *Parasterope muelleri* has also been reported from the West Indies (Poulsen, 1965:370), the Bahamas (Kornicker, 1958:239), and from Southwest Africa (Klie, 1940:409), but the species may consist of several sibling species, and Klie's identification is certainly questionable.

Louis S. Kornicker, Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560. Francisca Elena Caraion, Institute of Biological Sciences, Bucharest, Romania.

TABLE 1.—World distribution and depth zones of species of *Cylindroleberididae* discussed herein (x, reported; —, not reported)

Species	West					Depth zone
	Spanish Sahara	Mauritania	Gulf of Guinea	Mediterranean	Indies, Bahamas	
<i>Parasterope muelleri</i> *	—	x	—	x	x	shelf
<i>Parasterope alpha</i>	—	x	—	—	—	bathyal
<i>Parasterope sohni</i>	x	x	—	—	—	bathyal
<i>Parasterope mauritania</i>	—	x	—	—	—	shelf
<i>Parasterope thrix</i>	—	x	—	—	—	bathyal
<i>Synasterope bensoni</i>	—	x	—	—	—	shelf-bathyal
<i>Cylindroleberis bacescui</i>	—	x	—	—	—	shelf
<i>Prionotoleberis pax</i>	—	x	—	—	—	shelf-bathyal
<i>Polyleberis mackenziei</i>	—	x	—	x	—	shelf-bathyal
<i>Cycloleberis squamiger</i>	x	x	x	—	—	shelf-bathyal
<i>Asteropteron upsilon</i>	—	x	—	—	—	shelf-bathyal
<i>Asteropteron setiferum</i>	—	x	—	—	—	bathyal

* Also reported off South West Africa by Klie (1940:409) but the identification is questionable.

Cycloleberis squamiger has been collected in the Gulf of Guinea (Scott, 1894:00). Two genera in the collection, *Polyleberis* and *Prionotoleberis* have been reported only from the Gulf of Naples (Kornicker, 1974b).

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34e–o, and 35 were made by the junior author. Descriptions, drawings of carapaces, body parts, and some appendages are by the senior author.

Station Data

Research vessel *Thalassa*, January and February 1971. Collector: Prof. Dr. Mihai (Micael) Băcescu.

Station X008; 16 January; 21°03'06"N, 17°37'1"W; 338 m; sand with mud, Băcescu dredge; Islamic Republic of Mauritania.

Prionotoleberis pax, new species: 1 adult ♀

Station X018; 20 January; 19°22'05"N, 16°48'05"W; 170–175 m; from Gorgonacea; Islamic Republic of Mauritania.

Parasterope muelleri: 3 ovigerous ♀ + 1 juvenile

Station X023; 22 January; 18°59'02"N, 16°22'07"W; 14 m; sand; Băcescu dredge; Islamic Republic of Mauritania.

Synasterope bensoni, new species: 1 adult ♀

Station X031; 27 January; 18°40'00"N, 16°41'05"W; 560 m; Menzies trawl, Islamic Republic of Mauritania.

Parasterope alpha, new species: 1 ovigerous ♀

Station X033; 28 January; 19°21'02"N, 16°45'01"W; 22 m; mud, sand; Băcescu dredge; Islamic Republic of Mauritania.

Polyleberis mackenziei: 2 adult ♀ + 2 juveniles

Cycloleberis squamiger, new combination: 1 juvenile

Station X041; 29 January; 20°10'05"N, 17°32'09"W; 52 m; sand; Băcescu dredge; Islamic Republic of Mauritania.

Parasterope mauritania, new species: 1 ovigerous ♀, 2 juvenile ♂, 2 juveniles unsexed

Parasterope species indeterminate (not *P. mauritania*): 8 juveniles

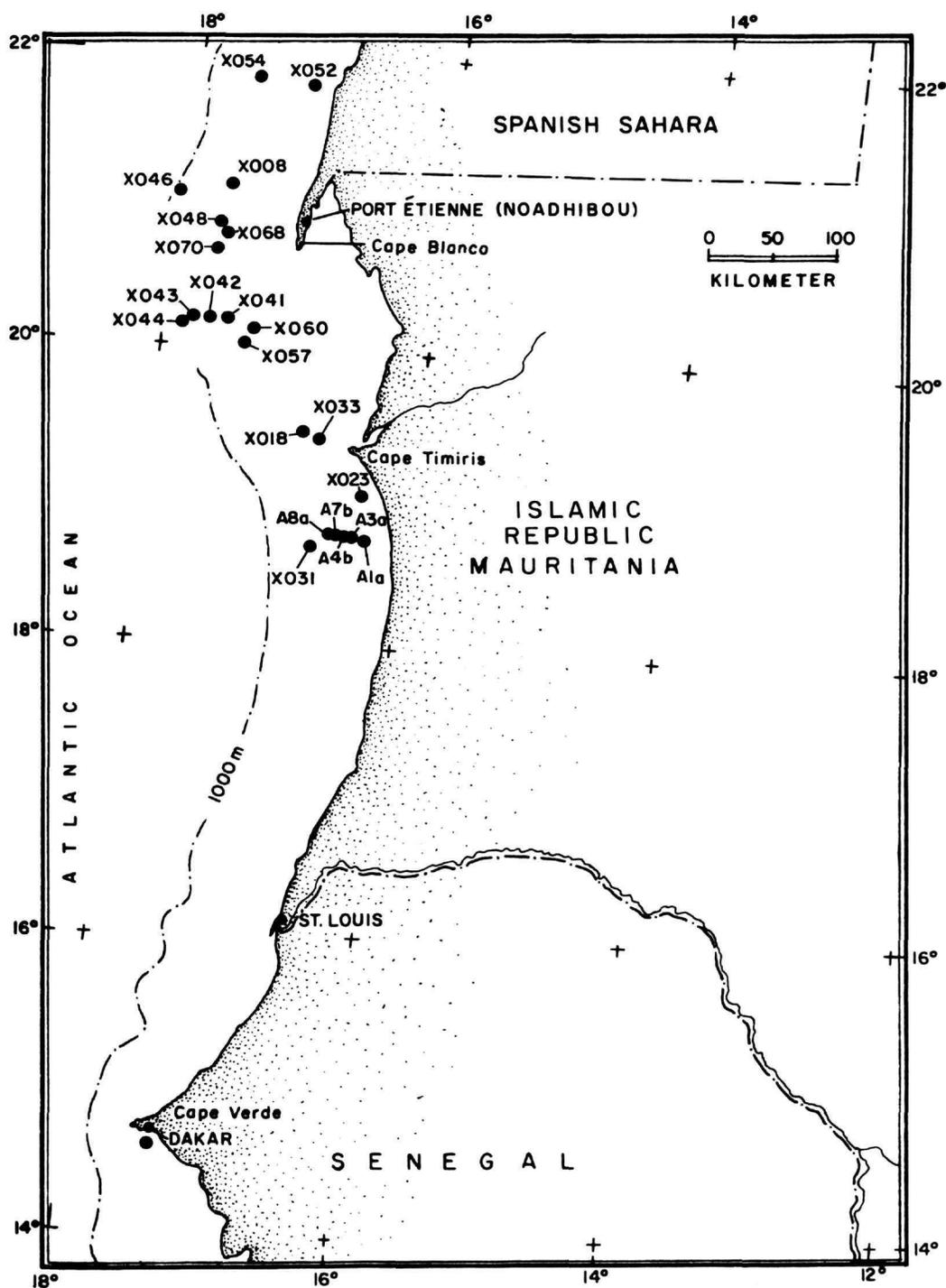


FIGURE 1.—Station map showing distribution of cylindroberids collected aboard the *Thalassa* (station numbers preceded by X) and *Cornide de Saavedra* (station numbers preceded by A).

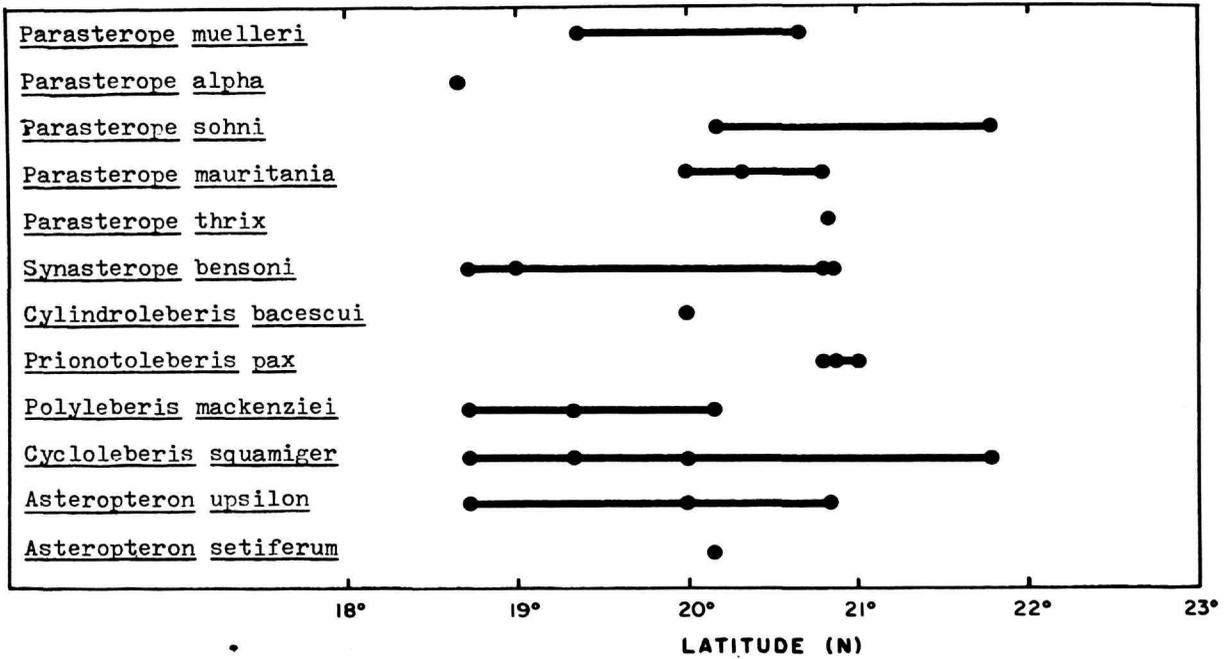


FIGURE 2.—Latitudinal distribution of species in study area.

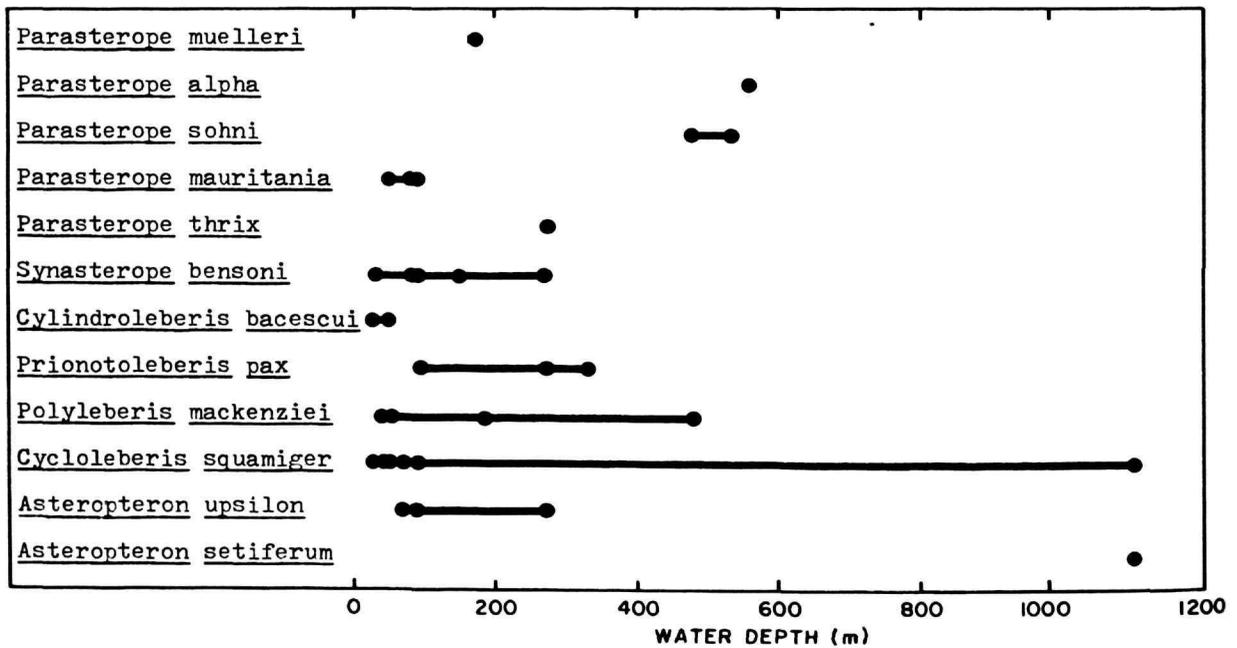


FIGURE 3.—Depth distribution of species in study area.

- Cylindroleberis bacescui*, new species: 2 A-1 ♂, 1 juvenile ♂, 1 juvenile ♀, 1 A-1 ♀
Polyleberis mackenziei: 1 A-1 ♂
 Station X042; 29 January; 20°10'00"N, 17°39'00"W; 187 m; mud, sand; Băcescu dredge; Islamic Republic of Mauritania.
- Polyleberis mackenziei*: 1 ovigerous ♀, 1 adult ♀ with cyproniscid isopod in marsupium.
 Station X043; 29 January; 20°09'08"N, 17°43'01"W; 480 m; mud; Menzies trawl; Islamic Republic of Mauritania.
- Polyleberis mackenziei*: 1 ♀
Parasterope sohni, new species: 1 A-1 ♂
 Station X044; 29 January; 20°09'06"N, 17°48'09"W; 1100 m; mud; Menzies trawl; Islamic Republic of Mauritania.
- Asteropteron setiferum*, new species: 1 adult ♀
Cycloleberis squamiger, new combination: 2 juveniles
 Station X046; 29 January; 20°49'09"N, 17°58'08"W; 1120 m; sandy mud; Menzies trawl, Islamic Republic of Mauritania.
- Cylindroleberidinae genus indeterminate: 1 adult ♂
 Station X048; 29 January; 20°50'05"N, 17°39'00"W; 270 m; mud + sand; Băcescu dredge; Islamic Republic of Mauritania.
- Prionotoleberis pax*, new species: 8 ovigerous ♀; 1 juvenile ♂ and ♀ with a chonistomatid copepod within carapaces; plus 11 specimens
Parasterope thrinx, new species: 1 ovigerous ♀
Synasterope bensoni, new species: 1 ovigerous ♀, 1 adult ♀, 1 adult ♂
Asteropteron upsilon, new species: 1 juvenile
 Station X052; 30 January; 21°47'00"N, 17°09'00"W; 53 m; sand; Rallier dredge, Spanish Sahara.
- Asteropteron* species indeterminate: 1 juvenile, probably instar III
Cycloleberis squamiger, new combination: 1 adult ♂, 2 juveniles
 Station X054; 30 January; 21°47'00"N, 17°30'06"W; 534 m; mud + sand; Rallier dredge; Spanish Sahara.
- Parasterope sohni*, new species: 1 ovigerous ♀
Cylindroleberis species indeterminate: 1 juvenile ♂
 Station X057; 31 January; 20°17'03"N, 17°36'06"W; 82 m; sand; Trawl's sonde; Islamic Republic of Mauritania.
- Parasterope mauritania*, new species: 1 A-1 ♂
Asteropteron upsilon, new species: 1 adult ♀
 Station X060; 1 February; 20°00'07"N, 17°18'04"W; 30 m; sand + mud; Băcescu dredge; Islamic Republic of Mauritania.
- Cylindroleberis bacescui*, new species: 7 ovigerous ♀, 9 adult ♀; 2 adult ♂, 16 juveniles
 Station X068; 4 February; 20°47'06"N; 17°36'06"W; 96 m; sand and mud; Băcescu dredge; Islamic Republic of Mauritania.
- Prionotoleberis pax*, new species: 15 specimens including adult females and juveniles
Synasterope bensoni, new species: 1 adult ♀
Parasterope mauritania, new species: 1 adult ♀, 1 A-1 ♂ with 3 chonistomatid copepods
Cylindroleberis species indeterminate: 1 adult ♂
 Station X070; 5 February; 20°40'04"N, 17°41'01"W; 170-175 m; sand and mud from Gorgonacea washings; Islamic Republic of Mauritania.
- Parasterope muelleri*: 1 ovigerous ♀
 Station off Dakar; 0-1 m plankton sample (bottom at 15 m).
 Cylindroleberidinae genus indeterminate: 2 adult ♂ + 1 A-1 ♂
- Research vessel *Cornide de Saavedra*, September 1971. Collector: Dr. Ramon Margalef. Collected with a Van Veen grab on continental shelf of the Islamic Republic of Mauritania.
- Station A1a, sample 10; 18°44'N, 16°20'W; 20 m.
Polyleberis mackenziei: 3 juvenile ♂ + 3 juveniles unsexed
Cycloleberis squamiger, new combination: 1 juvenile
 Station A3a, sample 11; 18°44'N, 16°24'W; 35 m.
Asteropteron upsilon, new species: 1 adult? ♀
Polyleberis species indeterminate: 1 juvenile ♀
Cycloleberis squamiger, new combination: 1 juvenile ♀
 Station A4b, sample 12; 18°44'N, 16°26'W; 55 m.
Polyleberis species indeterminate: 1 juvenile ♀
 Station A7b, sample 14; 18°44'N, 16°32'W; 94 m.
Cycloleberis squamiger, new combination: 1 juvenile ♂
 Station A8a, sample 15; 18°44'N, 16°34'W; 150 m.
Synasterope bensoni, new species: 1 adult ♀ with large unextruded eggs.

CYLINDROLEBERIDIDAE MÜLLER, 1906

This family contains two subfamilies, Cylindroleberidinae Müller, 1906, and Cyclasteropinae Poulsen, 1965. Both subfamilies are represented in the study area.

Key to the Subfamilies of Cylindroleberididae

(from Kornicker, in press)

- Surface of carapace smooth, without ornamentation; 1st antenna with 1 dorsal bristle on 2nd joint; end joint of endopodite of maxilla with 1 (rarely 2) bristles CYLINDROLEBERIDINAE
 Surface of carapace either smooth or ornamented; 1st antenna with 2 or more dorsal bristles on 2nd joint; end joint of endopodite of maxilla with 4-6 bristles CYCLASTEROPINAE

CYLINDROLEBERIDINAE MÜLLER, 1906

This subfamily is represented in the study area by five genera: *Parasterope* Poulsen, 1965; *Syna-*

sterope Poulsen, 1965; *Cylindroleberis* Brady, 1868; *Polyleberis* Kornicker, 1974b; *Prionotoleberis* Kornicker, 1974b.

Key to the Genera of Cylindroleberidinae in This Study

1. Mandibular exopodite less than one-third length of dorsal margin of 1st endopodite joint2
Mandibular exopodite more than one-half length of dorsal margin of 1st endopodite joint3
2. Sensory bristle of female 1st antenna with 1 short proximal bristle and 6 long terminal bristles *Cylindroleberis*
Sensory bristle of female 1st antenna without proximal bristle and with 7-9 long terminal bristles *Polyleberis*
3. First endopodite joint of mandible with long lateral bristle between b- and c-bristles *Parasterope*
First endopodite joint of mandible without long lateral bristle between b- and c-bristles4
4. Sensory bristle of female 1st antenna with proximal bristle *Prionotoleberis*
Sensory bristle of female 1st antenna without proximal bristle *Synasterope*

MICROMORPHOLOGY OF CARAPACE (based on scanning-electron microphotographs) (Figures 4, 8, 11, 12, 15, 16, 19, 21, 23).—The presence of long bristles emerging from concentrically ringed pores was first illustrated for a species of this subfamily (*Synasterope cushmani* Kornicker, 1974) by Kornicker (1974a). He also illustrated shorter bristles emerging from simple pores and noted that concentrically ringed pores often had near them a small simple pore. All the species whose lateral surfaces were examined herein have concentrically ringed pores with or without a minute satellite pore (*Parasterope muelleri*, Figure 4b; *Synasterope bensoni*, new species, Figure 11b,c; *Cylindroleberis bacescui*, new species, Figure 15f; *Prionotoleberis pax*, new species, Figure 19b; *Polyleberis mackenziei*, Figures 21c, 23a,b). The bristle emerging from one of the concentrically rimmed pores on *Synasterope bensoni* (Figure 11d) is smaller than those usually present in this type pore. That species also had a simple pore containing a short bristle near a small simple satellite pore (Figure 11e). Most of the satellite pores near concentrically rimmed pores observed on the species examined have a narrow rim raised above the surface of the surrounding carapace (Figures 4b, 11b-d, 15f, 19b, 21c, 23a). A pore with a short hair observed on *Cylindroleberis bacescui* has immediately surrounding the bristle a raised rim from which faint ribs appear to radiate (Figure 15c,e). Pores with slightly raised rims, which are not associated with either hairs or pores

with hairs, are widely scattered on the valve surfaces (Figure 4c, 11b, 15c,d, 21b).

Posterior spine-bearing list: The presence of pores and tubes at the base of flaplike bristles on the posterior list were illustrated for many species of Cylindroleberidinae by Kornicker (in press) and for *Synasterope cushmani* Kornicker, 1974, by Kornicker (1974a). These occur also on species in the present collection (*Parasterope muelleri*, Figure 4d-f; *Parasterope mauritania*, new species, Figure 8de; *Synasterope bensoni*, new species, Figures 11l, 12a-e; *Cylindroleberis bacescui*, new species, Figure 16f-h; *Prionotoleberis pax*, new species, Figure 19f-h; *Polyleberis mackenziei*, Figures 21d,f, 23e,k,l). About nine rimmed pores were observed at the base of a flaplike bristle of *Parasterope mauritania* (Figure 8e); the number of pores on most of the other species were difficult to discern because of being hidden by tubes. The following species generally have one bristle between each pair of flaplike bristles: *Parasterope muelleri* (Figure 4d-f), *P. mauritania* (Figure 8c,d), *Cylindroleberis bacescui* (Figure 16f,g), *Prionotoleberis pax* (Figure 19f,g), *Polyleberis mackenziei* (Figures 21d, 23e,h). *Synasterope bensoni* has two to four bristles between each pair of flaplike bristles (Figures 11l, 12a,b).

Infold between spine-bearing list and posterior margin of valve: Scooplike processes were photographed on *Parasterope mauritania*, new species (Figure 8c,f,h,i), *Cylindroleberis bacescui*, new spe-

cies (Figure 16i-k), *Prionotoleberis pax*, new species (Figure 19f,i-l), and *Polyleberis mackenziei* (Figures 21d,e; 23e-j). Processes without scooplike tips were observed on *Parasterope mauritania*, new species (Figure 8c,f,g), but it is possible that these are scooplike processes with the tips broken off. *P. mauritania* possesses numerous minute pores with emerging bottle-shaped processes (Figure 8c,f,j-l). *Polyleberis mackenziei* (Figures 21d,e; 23e-j), and *Cylindroleberis bacescui* (Figure 16i,j) have pores on the infold near the posterior valve margin. Pores are present near the list on *Parasterope muelleri* (Figure 4e,f). Many species have bristles forming a row anterior to the posterodorsal valve margin (*Parasterope mauritania*, Figure 8c; *Synasterope bensoni*, Figure 11l, 12a-e). A row of bristles is present near the ventral end only of the posterior infold of *Prionotoleberis pax* (Figure 19f).

Posterior selvage: Kornicker (1974a) observed that a serrate selvage was present along the posterior margin of *Synasterope cushmani* Kornicker, 1974, except opposite scooplike processes. A similar discontinuous serrate selvage was observed on *Prionotoleberis pax*, new species (Figure 19j-l) and *Polyleberis mackenziei* (Figure 23f,j). The serrate margin of the lamellar prolongation of the selvage near the posteroventral margin of *Synasterope bensoni*, new species, is illustrated in Figure 12a,f.

Vestment: Bristles forming a row anterior to the posteroventral list are present on *Cylindroleberis bacescui*, new species (Figure 16f,g,l).

Selvage along lower margin of incisur: The fringed lamellar prolongation along the lower inner margin of the incisur is illustrated for *Synasterope bensoni* and *Cylindroleberis bacescui* in Figures 11h and 16b, respectively.

Central muscle scars: The central muscle scars are visible as dark depressions on the outside of the valves of *Parasterope muelleri* (Figure 4a) and *Cylindroleberis bacescui* (Figure 15a). The latter scars also appear as dark areas when viewed from the inside (Figure 16a,c). The attached muscle does not cover the whole dark area (Figure 16c,d). The outside surface of the muscle appears to have a pebbly texture (Figure 16d). The ovoid muscle scars of *Synasterope bensoni* appear lighter than the surrounding inside surface (Figure 11i,j). The muscle scars on *S. bensoni* are vesicular and rougher than the surrounding surface (Figure 11j,k).

Parasterope Poulsen, 1965

Five species of *Parasterope* were collected: *P. muelleri* (Skogsberg, 1920); *P. alpha*, new species; *P. sohni*, new species; *P. mauritania*, new species; *P. thrix*, new species.

DISTRIBUTION.—Members of *Parasterope* are widespread between latitudes of about 55°N to 65°S with a depth range of intertidal depths to 4303 m (Kornicker, in press). Species in the present collection were from off Mauritania and Spanish Sahara at depths of 52–560 m.

Key to the Species of *Parasterope* in This Study

1. Sixth limb with posteroventral bristles on end joint 2
Sixth limb without posteroventral bristles on end joint 3
2. Sixth limb with 6 or 7 posteroventral bristles on end joint; one of the terminal bristles on dorsal margin of mandibular basale short; dorsal margin of mandibular basale with fairly long midbristle; lateral eyes consisting of minute reddish brown spots without ommatidia
..... *P. sohni*, new species
- Sixth limb with 14–20 posteroventral bristles on end joint; both terminal bristles on dorsal margin of mandibular basale long; dorsal margin of mandibular basale without midbristle; lateral eyes well developed 4
3. Basale of maxilla with 2 distal bristles, 1 ventral, 1 dorsal; carapace of adult female longer than 1.6 mm *P. thrix*, new species
Basale of maxilla without distal bristles; carapace of adult female shorter than 1.5 mm
..... *P. mauritania*, new species
4. Carapace shorter than 1.45 mm *P. muelleri*
Carapace longer than 1.55 mm *P. alpha*, new species

Parasterope muelleri (Skogsberg, 1920)

FIGURES 4,5

- Asterope Mülleri* Skogsberg, 1920:483, fig. 89.—Vos, 1957:8, pl. 3: figs. 2a-f[?].
Cylindroleberis teres (Norman).—Müller, 1894:220, pl. 4: figs. 13, 30, 43, pl. 5: figs. 15, 24, 25, pl. 8: fig. 5.
Asterope teres (Norman).—Müller, 1912:46 [part].
Asterope muelleri (Skogsberg).—Klie, 1940:409, figs. 7–10[?].
Asteropina mulleri (Skogsberg).—Kornicker, 1958:239, figs. 60a-f, 61a-f, 86a-d,g.
Asterope mulleri (Skogsberg).—Reys, 1965b:258 [listed] [?].
Parasterope muelleri (Skogsberg).—Poulsen, 1965:370, figs. 122–124 [?].—Kornicker, 1974b:36.

HOLOTYPE.—One adult female on slides in Swedish State Museum, Stockholm (Skogsberg, 1920:491).

TYPE-LOCALITY.—English Channel off Salcombe, coast of England.

MATERIAL.—[USNM 139852], 1 ovigerous female in the Museum of Natural History "Grigore Antipa," Bucharest, Romania; USNM 139859, 2 ovigerous females, not dissected, 1 juvenile; USNM 143977, 1 ovigerous female.

LOCALITY.—[USNM 139852], USNM 139859 from station X018; USNM 143977 from station X070.

DISTRIBUTION.—In the present collection, the species was collected only off Mauritania at depths of 170–175 m (Figures 2, 3). The species has previously been described from the Mediterranean Sea, the English Channel, the Bahamas, the West Indies, and also from Southwest Africa by Klie (1940), but that identification is probably incorrect (Poulsen, 1965; Kornicker, 1974b).

SUPPLEMENTARY DESCRIPTION OF FEMALE (Figures 4, 5).—Carapace tumid in lateral view, greatest height behind valve middle (Figure 5a); incisur short, placed just below valve middle; ventral, dorsal, and posterior margins rounded; surface smooth with minute punctae visible under high magnification.

Infold (Figure 4d–f): Infold behind rostrum with about 4 bristles along list, about 5–7 bristles between list and incisur, and about 18–21 bristles anterior and dorsal to list; about 6–8 small bristles forming row along anterodorsal infold; about 26–30 bristles on broad anteroventral infold; about 17–19 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of anterior part of infold, extending along ventral infold and con-

tinuing on posterior infold where it broadens; posterior list with about 29–30 broad transparent flaplike bristles and about 17–18 small bristles forming row mostly anterior to flaplike bristles; not more than 1 small bristle between adjacent flaplike bristles; about 17 bristles between broad posterior list and posterior margin of valve, all bristles being confined to ventral half of posterior infold.

Selvage: Very faint lamellar prolongation present along lower margin of incisur.

Size: [USNM 139852], length 1.36 mm, height 0.93 mm; USNM 139859, 2 specimens; length 1.27 mm, height 0.87 mm; length 1.29 mm, height 0.92 mm; USNM 143976, length 1.24 mm, height 0.80 mm.

First antenna (Figure 5c): 1st and 2nd joints with spines on lateral and medial surfaces; 2nd joint with long spinous dorsal bristle and short spinous lateral bristle (on holotype, lateral bristle pointing backward); 3rd joint with minute ventral bristle and 6 long spinous dorsal bristles; 3rd joint plus 4th joint quadrate, separated by distinct suture; 4th joint with distinctly concave distal margin and 3 bristles, 1 long spinous dorsal bristle and 2 slender spinous ventral bristles (longer of these just reaching end of stem, shorter reaching just past middle of 6th joint); sensory bristle of 5th joint long, with 6 terminal filaments; dorsal margin of 5th joint with short spines forming row along distal part; medial bristle of 6th joint with short marginal spines. Seventh joint: a-bristle almost as long as bristle of 6th joint, with lateral and medial row of minute teeth along dorsal margin; b-bristle almost reaching tip of sensory bristle on 5th joint, with 5 filaments including tip of bristle; c-bristle reaching past sensory filament, with 4 short filaments near middle and 1 near tip. Eighth joint: d-bristle absent; e-bristle bare and almost reaching tip of sensory bristle; f-bristle bent dorsally, with 3 marginal filaments near middle and 1 near tip; g-bristle similar to c-bristle.

Second antenna (Figure 5d,e): Protopodite with spines forming clusters along dorsal margin and dorsal part of medial surface and with small medial bristle. Endopodite 3-jointed, with terminal bristle about twice length of stem. Exopodite: 1st joint with spines forming row near distal margin; bristle of 2nd joint reaching past 9th joint, with spines along ventral margin; bristles of 3rd to 8th joints

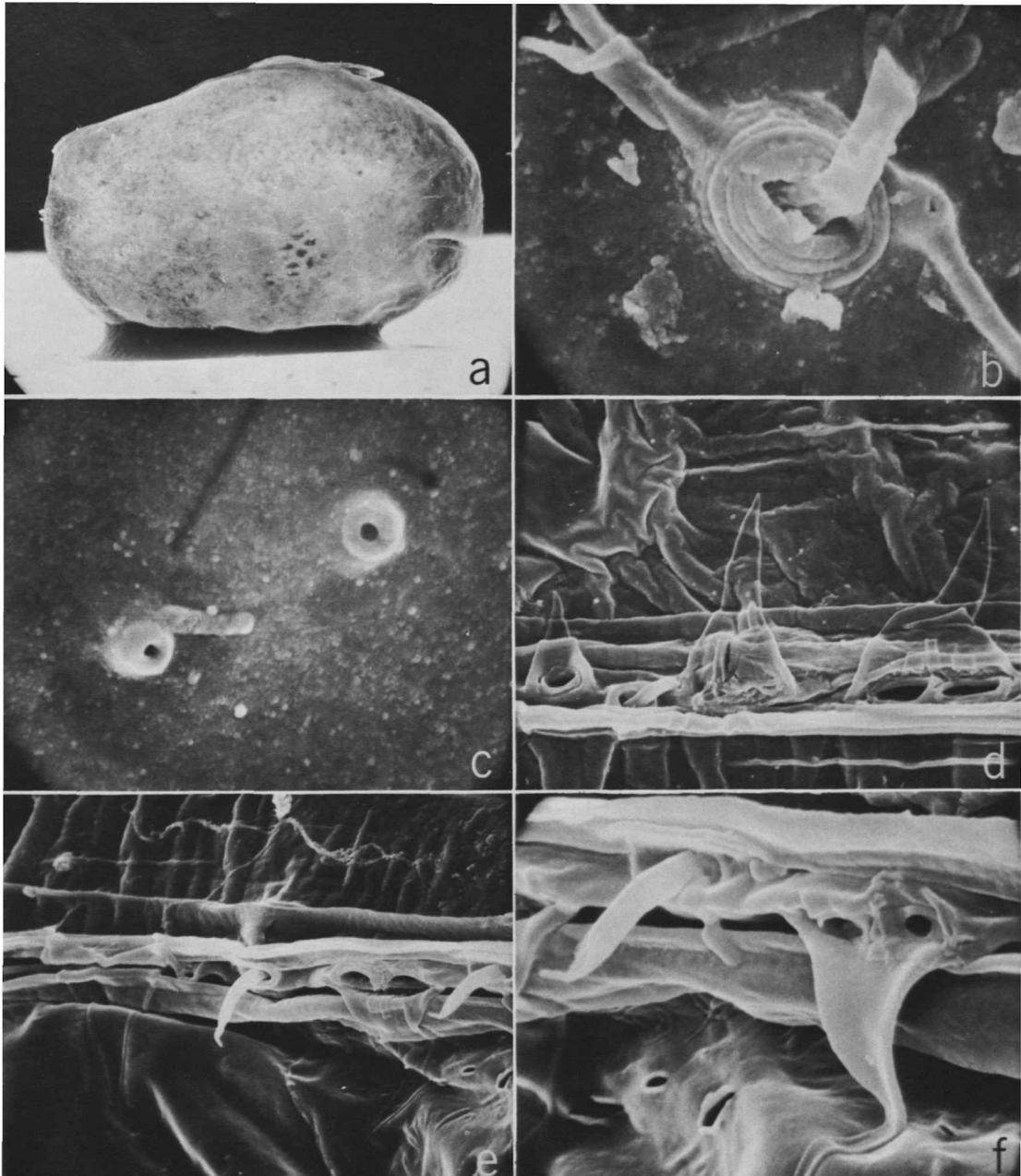


FIGURE 4.—*Parasterope muelleri*, female, USNM 139859, right valve: *a*, complete valve, lateral view, note central muscle scars, $\times 80$; *b*, detail of "*a*" showing concentrically ringed pore with bristle, and small satellite pore to right (light colored diagonal ridge trending from upper left to lower right is wrinkle that formed probably during freeze-drying operation), $\times 10,000$; *c*, detail of "*a*" showing two minute pores, $\times 8000$; *d*, detail of posterior list on infold showing flaplike bristles with pores and tubes at their bases, and also a bristle emerging from pore between two flaplike bristles, posterior of valve to bottom of photograph, $\times 3200$; *e*, similar to "*d*" but from part of list closer to dorsal margin of valve, $\times 3200$; *f*, detail of pores and bristles partly shown at right of "*e*," $\times 7500$. (Photos reduced to 74%.)

with natatory hairs; bristles of 3rd to 5th joints with marginal spines along part of ventral margin; 9th joint with large lateral spine about one-half length of joint, and 4 bristles (2 long with natatory hairs, 2 short with short marginal spines); basal spines present on joints 3 to 8, spine on

joint 8 about one-half to three-fourths length of 9th joint; joints 2 to 8 with short spines forming row along distal margin.

Mandible (Figure 5f,g): Coxale endite remained in mouth of [USNM 139852] and not described here. Basale: endite with usual 4 pectinate end

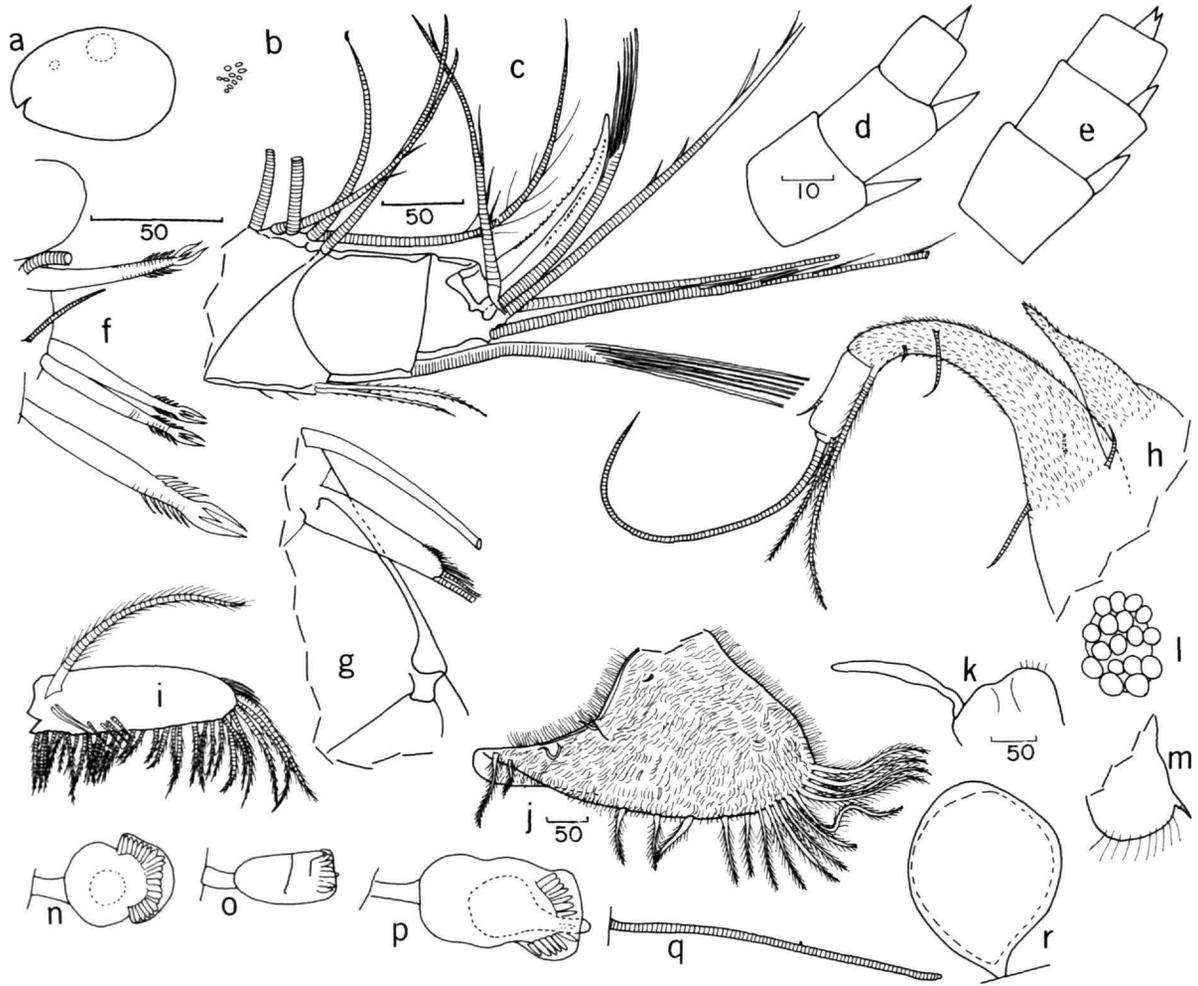


FIGURE 5.—*Parasterope muelleri*, female, [USNM 139852], length 1.36 mm: a, complete specimen showing position of lateral eye and 1 of 15 eggs in marsupium; b, sketch of central muscle scars on left valve, lateral view; c, distal part of 1st antenna; d, joints 7-9 of exopodite of right 2nd antenna, medial view; e, joints 7-9 exopodite of left 2nd antenna, lateral view; f, part of basale endite on right mandible, medial view; g, exopodite of right mandible, lateral view; h, right maxilla, medial view; i, comb of right 5th limb, lateral view; j, right 6th limb, medial view; k, medial eye and rod-shaped organ; l, right lateral eye; m, upper lip, anterior to right; n-p, protostians attached to anterior and posterior of valve margins; q, r, organisms attached to mandible. (Same magnification in microns: c, h, i; d, e, n-r; f, g; k-m.)

bristles, 1 long slender dwarf bristle (about two-thirds length of triaenid bristle), elongate peg, and 3 triaenid bristles with 4–5 pairs of marginal spines excluding terminal pair; 1 triaenid bristle with 2–3 pairs of marginal spines excluding terminal pair present on ventral margin of basale near base of endite and proximal to U-shaped sclerotized process; dorsal margin of basale with 2 long spinous terminal bristles; medial and lateral surfaces with long spines forming clusters (no spines present on dorsal half of medial surface); basale extremely short with proximal margin oriented at right angle to dorsal margin. Exopodite hirsute with 2 short subterminal bristles almost reaching distal end of dorsal margin of 1st endopodite joint. Endopodite: 1st joint with 3 long spinous ventral bristles; ventral margin of 2nd joint with 3 spinous terminal bristles; dorsal margin with 1 short spinous proximal bristle and stout spinous a-, b-, c-, and d-bristles; 1 long spinous lateral bristle present between b- and c-bristles, and c- and d-bristles; 3 medial spinous cleaning bristles present between b- and c-bristle; 5 medial spinous cleaning bristles present just proximal to base of c-bristle; 1 long spinous medial bristle present at base of d-bristle; medial surface with few spines forming clusters; end joint with dorsal claw and 5 bristles, 4 long, 1 short, all with spines.

Maxilla (Figure 5*h*): Epipodial appendage hirsute with pointed tip reaching to about middle of dorsal margin of basale; endite I with 4 bristles, 3 long, 1 short; endite II with 3 long bristles. Basale hirsute on medial and lateral surfaces and along dorsal margin; medial surface with 2 bare bristles, both near dorsal margin (distal bristle about twice length of proximal bristle); ventral margin with 1 proximal bristle (about same length as distal medial bristle on [USNM 139852], and twice length on USNM 143977), 1 short distal bristle and 1 long spinous terminal bristle. Endopodite: 1st joint with 1 short dorsal bristle and 1 long spinous 6-bristle; end joint with long spinous terminal bristle about twice length of 6-bristle.

Fifth limb (Figure 5*i*): Epipodial appendage with 58 bristles; comb with 2 short slender bristles ventral to base of stout spinous exopodial bristle and 4 additional bristles present near ventral margin of comb.

Sixth limb (Figure 5*j*): Medial surface with minute bristle in anterodorsal corner; anterior mar-

gin with 1 upper and 1 lower bristle; anteroventral corner with 2 spinous bristles, lateral flap without bristles; posteroventral margin with 14–15 spinous bristles, medial and lateral surfaces hirsute.

Seventh limb: Proximal and distal groups each with 6 bristles (3 + 3); each bristle with 3 or 4 bells. Terminus consisting of opposing combs, each with about 12 spinous teeth.

Furca: Each lamella with 9 claws of which posterior 2 are small bristle-like.

Rod-shaped organ (Figure 5*k*): Elongate with rounded tip.

Eyes (Figure 5*k,l*): Medial eye with faint hairs on dorsal part; lateral eye about same size as medial eye, with 17 ommatidia.

Posterior: Dorsum twisted on [USNM 139852], and therefore lateral outline not observable, posterior spinous.

Upper lip (Figure 5*m*): Upper lip consisting of 2 hirsute lobes and hirsute lateral flap on each side; 2 anterior spines present on each lobe.

Genitalia: Oval sclerotized process on each side. Brush organ not observed.

Eggs: [USNM 139852] with 15 eggs; USNM 143977 with 2 eggs, USNM 139859 with 7 eggs.

ATTACHED ORGANISMS.—Organisms attached to mandible of USNM 139841 (Figure 5*n-r*).

REMARKS.—The present specimens referred to *P. muelleri* differ from those in the original description by Skogsberg (1920:483) in not having bristles on the dorsal half of the posterior infold of the carapace and in having longer ventral bristles on the 4th joint of the 1st antenna.

Parasterope alpha, new species

FIGURE 6

HOLOTYPE.—[USNM 139841], ovigerous female, length 1.67 mm. Valves and some appendages in alcohol, remaining appendages on slides. In collection of Museum of Natural History "Grigore Antipa," Bucharest.

TYPE-LOCALITY.—Station X031.

ETYMOLOGY.—The specific name from the first letter of the Greek alphabet.

DISTRIBUTION.—Collected only at the type-locality (Figures 2, 3).

DESCRIPTION (Figure 6).—Carapace tumid in lateral view, greatest height behind valve middle

(Figure 6a); incisur short, placed just below valve middle; ventral, dorsal, and posterior margins rounded; surface smooth with minute punctae visible under high magnification.

Infold: Behind rostrum with about 10 bristles along list, about 5 bristles between list and incisur, and about 35 bristles anterior and dorsal to list; about 12 small bristles forming row along anterodorsal infold; about 50 bristles on broad anteroventral infold; about 21 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of anterior part of infold, extending along ventral infold and continuing on posterior infold where it broadens; posterior broad list with about 22–24 broad transparent bristles and about 30 small bristles, 1 or 2 small bristles between each transparent bristle; 24–26 bristles between broad posterior list and posterior margin of valve.

Selvaige: Lamellar prolongation with marginal fringe present along lower margin of incisur.

Size: [USNM 139841], length 1.67 mm, height 1.19 mm, height 71 percent of length.

First antenna (Figure 6b): 1st and 2nd joints with spines on lateral and medial surfaces; 2nd joint with short spinous lateral bristle and long spinous dorsal bristle; 3rd joint with minute ventral bristle and 6 long spinous dorsal bristles; 3rd plus 4th joints quadrate, separated by distinct suture; 4th joint with concave distal margin and 3 bristles, 1 long spinous dorsal bristle and 2 slender spinous ventral bristles (longer of these almost reaching distal margin of 6th joint, shorter bristle reaching just past distal margin of 5th joint); sensory bristle on 5th joint long, with 6 terminal filaments; lateral surface of 5th joint with short spines forming row along distal part of dorsal margin and dorsal part of distal margin; medial bristle of 6th joint with short marginal spines. Seventh joint: a-bristle almost as long as bristle of 6th joint, with lateral and medial row of minute teeth along concave dorsal margin; b-bristle almost reaching tip of sensory bristle on 5th joint, with 5 filaments including stem (proximal filament only slightly shorter than terminal filaments); c-bristle reaching past sensory bristle, with 4 marginal filaments near middle and 1 near tip. Eighth joint: d-bristle absent; e-bristle bare and reaching tip of sensory bristle; f-bristle bent dorsally, with 3 marginal

filaments near middle and 1 near tip; g-bristle similar to c-bristle.

Second antenna (Figure 6c): Protopodite with spines forming clusters along dorsal (anterior) margin and dorsal part of medial surface, and small medial bristle. Endopodite distinctly 3-jointed, terminal bristle about twice length of stem. Exopodite: 1st joint with spines forming rows along distal part of dorsal margin; 2nd to 8th joints with short faint spines forming row along distal margins; bristle of 2nd joint reaching 9th joint, with short spines along ventral margin; bristles of 3rd to 8th joints with natatory hairs; bristles on 3rd to 5th joint with faint marginal spines along ventral margin; 9th joint with 1 large lateral spine about one-half length of joint and 4 bristles (2 long with natatory hairs, 2 short with short marginal spines); small basal spine present on joints 4 to 8.

Mandible (Figure 6d–i): Coxale endite (Figure 6f,g): small slender bristle present near base of ventral branch; ventral branch with about 5 oblique rows of spines (spines in 2 proximal rows more slender than spines in remaining rows); tip of ventral branch with 3 minute spines; dorsal branch with low nodes forming 5 rows along ventral margin and small main spine; margin between main spine and tip of dorsal branch with minute spines becoming longer distally; tip of dorsal branch with short spinelike prolongation; bristle on dorsal margin of dorsal branch with base some distance from tip of branch and with marginal hairs (bristle extending well past tip of dorsal branch). Basale: endite with usual 4 pectinate end bristles, 1 fairly long slender dwarf bristle (more than three-fourths length of triaenid bristle), elongate glandular peg (Figure 6h), and 3 triaenid bristles with 5 to 6 pairs of marginal spines, excluding terminal pair; 1 triaenid bristle with 3 pairs of marginal terminal pair; 1 triaenid bristle with 3 pairs of marginal spines (excluding terminal pair) present on ventral margin of basale near base of endite and proximal to U-shaped sclerotized process (bristle not present on left limb of [USNM 139841]); dorsal margin of basale with 2 long spinous terminal bristles; medial and lateral surfaces with long spines forming clusters (no spines present on dorsal half of medial surface); basale extremely short with proximal margin oriented at right-angle to dorsal margin. Endopodite: 1st joint

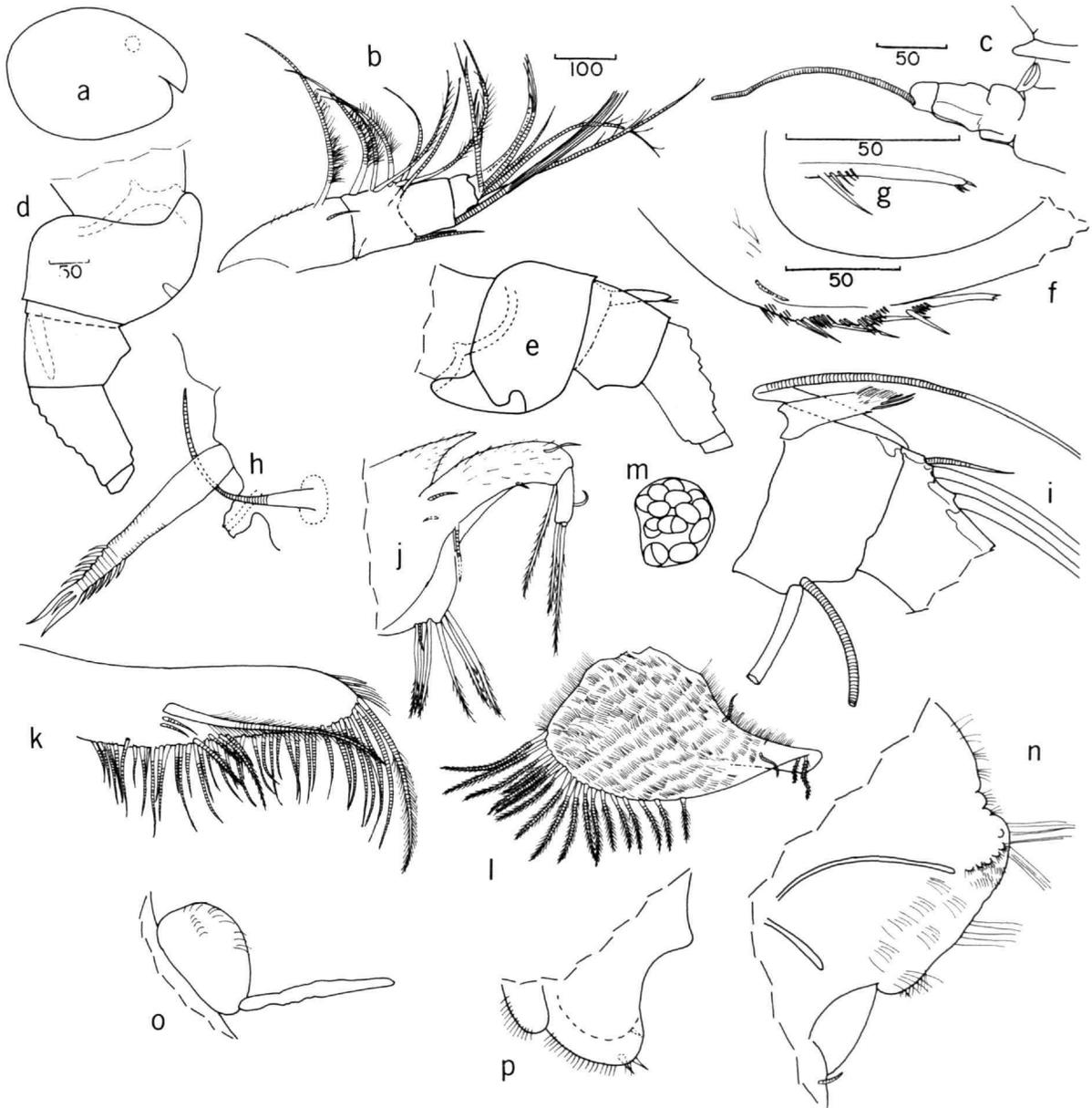


FIGURE 6.—*Parasterope alpha*, new species, female, [USNM 139841], holotype, length 1.67 mm: *a*, complete specimen showing position of lateral eye; *b*, right limb of 1st antenna, lateral view; *c*, endopodite of 2nd antenna; *d*, stem of right mandible showing position of exopodite, medial view; *e*, stem of left mandible, medial view; *f*, proximal part of coxale endite of mandible; *g*, tip of ventral branch of coxale endite shown in "*f*"; *h*, part of basale endite showing one triaenid bristle, dwarf bristle and glandular peg; *i*, exopodite and parts of 1st and 2nd endopodial joints of left mandible, medial view; *j*, left maxilla, medial view; *k*, comb of right 5th limb, lateral view; *l*, left 6th limb, medial view; *m*, left lateral eye; *n*, posterior of body, anterior to left; *o*, medial eye and rod-shaped organ; *p*, upper lip, anterior to right. (Same magnification in microns: *b*, *l*; *c*, *i*, *k*; *d*, *e*, *j*, *m-p*; *g*, *h*.)

with 3 long spinous ventral bristles; ventral margin of 2nd joint with 3 spinous terminal bristles; dorsal margin with 1 short spinous proximal bristle and stout spinous a-, b-, c-, and d-bristles; 1 long spinous lateral bristle present between b- and c-bristles, and c- and d-bristles; 2-3 medial spinous cleaning bristles present between b- and c-bristles; 4 or 5 medial spinous cleaning bristles present just proximal to base of c-bristle; 1 long spinous medial bristle present at base of d-bristle; medial surface with few spines forming clusters; end joint with dorsal claw and 5 bristles, 4 long, 1 short, all with spines. Exopodite reaching distal margin of 1st endopodite joint (Figure 6d,e,i).

Maxilla (Figure 6j): Epipodial appendage hirsute, pointed tip reaching to about middle of dorsal margin of basale; endite I with 4 bristles, 3 long, 1 short; endite II with 3 long bristles. Basale extremely hirsute with long hairs on medial and dorsal surfaces; medial surface with 2 short bare bristles, 1 proximal, 1 distal, both near dorsal margin; lateral surface with 1 minute proximal bristle; ventral margin with 1 short proximal bristle, 1 minute distal bristle, and 1 long spinous terminal bristle. Endopodite: 1st joint with 1 short dorsal bristle and 1 long 6-bristle with faint marginal spines; end joint with long spinous terminal bristle extending past 6-bristle.

Fifth limb (Figure 6k): Epipodial appendage with 65 bristles; 2 slender bare bristles present ventral to base of stout spinous exopodial bristle; 4 additional bristles present near ventral margin of comb, all with marginal spines except distal slender bristle.

Sixth limb (Figure 6l): Medial surface with minute bristle in anterodorsal corner; anterior margin with 1 upper and 1 lower bristle; anteroventral corner with 2 spinous bristles; lateral flap without bristles; posteroventral margin with 17-20 spinous bristles; medial and lateral surfaces hirsute.

Seventh limb: Proximal and distal groups each with 6 bristles (3 + 3); each bristle with 3 or 4 bells. Terminus consisting of opposing combs, each with 12 spinous teeth.

Furca: Each lamella with 9 claws of which posterior 2 are small bristle-like; claws 1 to 7 with teeth along posterior margins; some main claws with hairs along anterior margins.

Rod-shaped organ: Elongate with rounded tip (Figure 6o).

Eyes: Medial eye with faint hairs on dorsal part (Figure 6o); lateral eye about same size as medial eye, with 12 or 13 ommatidia (Figure 6m).

Posterior: Dorsum forming right angle; posterior with long hairs and spines; 5-6 minute lateral crenets fringed with short spines present on each side of dorsum (Figure 6n).

Upper lip: Consisting of 2 hirsute lobes and hirsute lateral flap on each side; 2 anterior spines present on each lobe; 1 anterior spine on saddle between lobes (Figure 6p).

Genitalia: Oval sclerotized process on each side. Brush organ not observed.

Eggs: [USNM 139841] with 6 well-developed eggs or larvae in marsupium.

COMPARISONS.—*P. alpha* is very close to *Parasterope muelleri* (Skogsberg, 1920) but has a larger carapace, length 1.67 mm compared to maximum length of 1.41 mm for *P. muelleri*. In addition to carapace size, *P. alpha* has fewer hyaline bristles and more small bristles along the broad list on the posterior infold and in having 2 small bristles between the hyaline bristles in 8 or 9 instances. The lateral eye on the gravid female of *P. alpha* has only 12-13 ommatophores compared to 17 on *P. muelleri*.

Parasterope sohni, new species

FIGURE 7

HOLOTYPE.—[USNM 141556], ovigerous female, length 1.78 mm. Valves and some appendages in alcohol, remaining appendages on slide, in collection of Museum of Natural History "Grigore Antipa," Bucharest Romania.

TYPE-LOCALITY.—Station X054.

ETYMOLOGY.—The species is named in honor of Dr. I. Gregory Sohn.

ADDITIONAL SPECIMENS.—USNM 141829, 1 A-1 male, Station X043.

DISTRIBUTION.—Collected off Spanish Sahara and Mauritania at depths of 480-534 m (Figures 2, 3).

DESCRIPTION OF FEMALE (Figure 7).—Carapace elongate in lateral view, greatest height at valve middle (Figure 7a); dorsal and ventral margins evenly rounded and subparallel; incisur just below valve middle (Figure 7b); posterodorsal margin angular.

Infold (Figure 7c): Behind rostrum with about

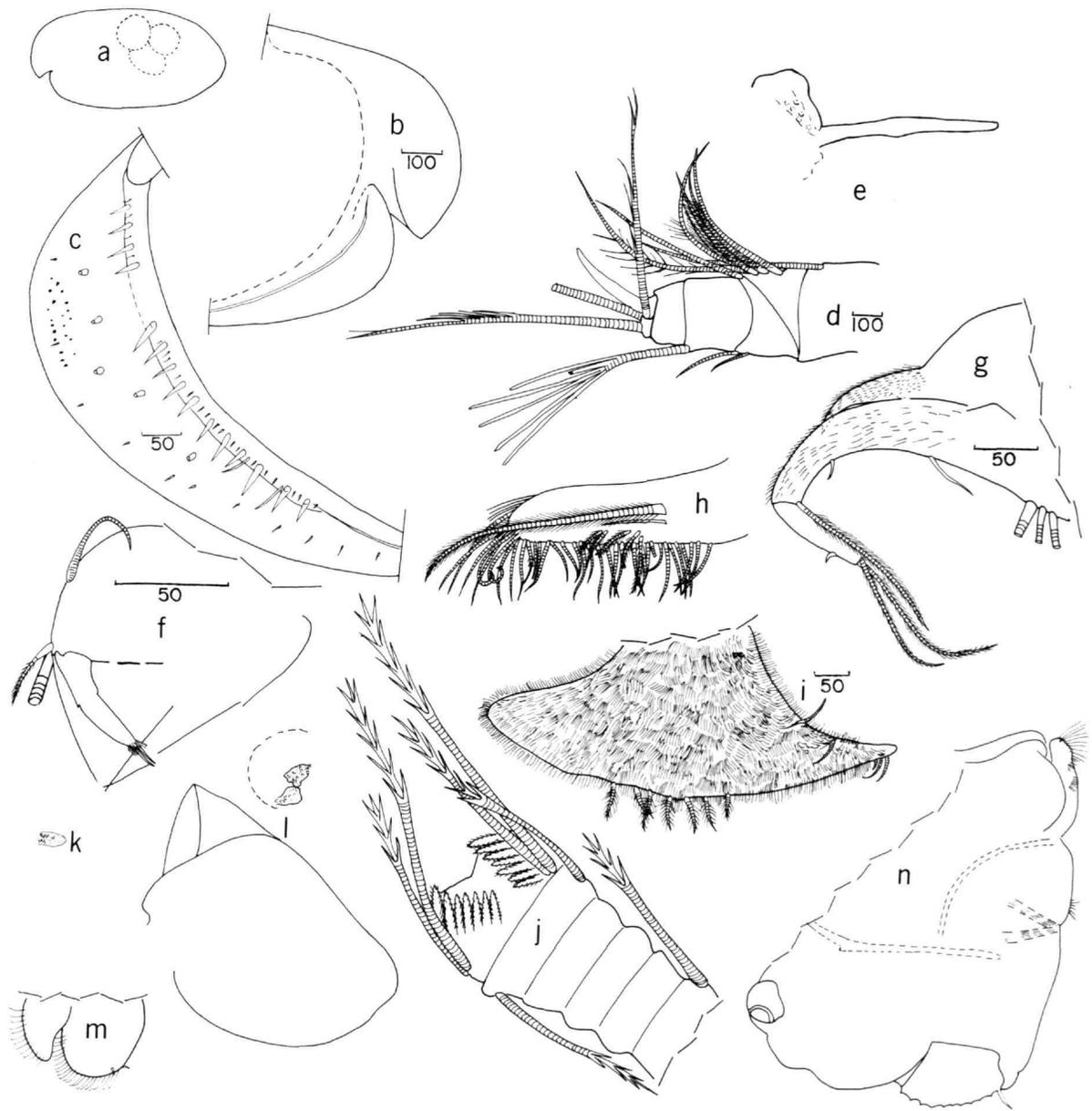


FIGURE 7.—*Parasterope sohni*, new species, female, [USNM 141556], holotype, length 1.78 mm: a, complete specimen showing position of eggs; b, anterior of right valve, bristles not shown, medial view; c, posterior of left valve, medial view; d, distal part of 1st antenna (not all bristles shown); e, medial eye and rod-shaped organ; f, basale, exopodite, and part of 1st endopodial joint of left mandible, lateral view; g, right maxilla (dorsal bristles on basale not shown), medial view; h, comb of left 5th limb, lateral view; i, left 6th limb, medial view; j, tip of 7th limb; k, right lateral eye (reddish brown); l, left lateral eye, protopodite of left 2nd antenna, and part of 1st and 2nd joints of 1st antenna (all shown in natural position on animal); m, upper lip, anterior to right; n, posterior part of animal, anterior to left. (Same magnification in microns: c, e, k-n; e, f, j; g, h.)

6 bristles along list, about 10 bristles between list and incisur, and about 25 bristles anterior and dorsal to list; about 25 bristles on broad anteroventral infold; about 10 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of anterior part of infold (Figure 7*b*), extending along ventral infold and meeting with slight overlap the posteroventral corner of broad posterior list; broad posterior list with about 21 broad transparent bristles, 2–4 long bristles on anterior part, and about 25 short bristles, 1 or 2 short bristles between each transparent bristle; about 8 short bristles and 5 faint processes between broad posterior list and posterior margin of valve; dorsal part of posterior infold with field of about 21 minute processes.

Selva: Lamellar prolongation with marginal fringe along lower margin of incisur.

Size: [USNM 141556], holotype, length 1.78 mm, height 0.88 mm, height 49 percent of length.

First antenna (Figure 7*d*): 1st and 2nd joints with spines on lateral and medial surfaces; terminal margin of 1st joint with small process just dorsal to midline on medial side; 2nd joint with short spinous lateral bristle and long spinous dorsal bristle; 3rd joint with minute ventral bristle and 6 long spinous dorsal bristles; 3rd plus 4th joints wider than long, separated by distinct suture; 4th joint with concave distal margin and 3 bristles, 1 long spinous dorsal bristle and 2 slender spinous (very faint spines) ventral bristles (longer of these almost reaching middle of 6th joint, shorter bristles reaching just past middle of 5th joint); 4th joint with minute spines forming single row on lateral surface; sensory bristle of 5th joint long, with 6 terminal filaments; no spines on 5th joint; medial bristle of 6th joint with few marginal spines. Seventh joint: a-bristle shorter than bristle of 6th joint; b-bristle reaching past tip of sensory bristle of 5th joint, with 5 filaments including stem (proximal filament just reaching past proximal end of next filament); c-bristle reaching past sensory bristle, with 9 marginal filaments plus 1 near tip. Eighth joint: d-bristle minute; e-bristle bare and reaching tip of sensory bristle; f-bristle bent dorsally, with 3 marginal filaments, tip bifurcate; g-bristle slightly longer than c-bristle, with 5 marginal filaments, tip bifurcate.

Second antenna: Protopodite with short spines

forming rows on dorsal part of medial surface, and small medial bristle. Endopodite 3-jointed but distal joint not marked by suture (marked only by break in sclerotization of vestment); terminal bristle about one and one-half length of stem. Exopodite: 1st joint with long hairs forming clusters along distal part of dorsal margin; 2nd to 8th joints with short faint spines forming row along distal margins; bristle of 2nd joint just reaching 9th joint, with fairly long spines along ventral margin and a few hairs proximally along dorsal margin; bristles of 3rd to 8th joints with natatory hairs; 9th joint with minute lateral spine with square tip consisting of 5 points, and 3 bristles (2 long with natatory hairs, 1 short and either bare or with minute faint marginal spines); minute basal spines present on joints 6 to 8.

Mandible (Figure 7*f*): Coxale endite: small slender bristle present near base of ventral branch; ventral branch with 5 or 6 oblique rows of rather short spines; tip of ventral branch with 3 minute teeth; 1 additional minute spine present on dorsal margin just proximal to tip; dorsal branch with 7 or 8 angular nodes along ventral margin and small main spine; margin between main spine and tip of dorsal branch with minute spines (tip of branch obscure on single endite examined; dorsal branch of right mandible absent, possibly remained in mouth of specimen); dorsal margin of branch dentate distally. Basale: endite with usual 4 pectinate end bristles, 2 short dwarf bristles, elongate glandular peg and 3 triaenid bristles with 6–9 pairs of marginal spines (excluding terminal pair); dorsal margin of basale with spinous midbristle, and 2 spinous terminal bristles (lateral of these slightly shorter than midbristle; medial bristle reaching past middle of end joint of endopodite; both bristles missing on left limb). Endopodite: 1st joint with 3 long spinous ventral bristles; ventral margin of 2nd joint with 3 spinous terminal bristles; dorsal margin with short stout spines forming row proximal to single proximal bristle, and stout spinous a-, b-, c-, and d-bristles; 1 long spinous lateral bristle present between b- and c-bristles, and c- and d-bristles; 1 short spinous bristle (slightly medially) present between a- and b-bristles; 2 medial spinous cleaning bristles between b- and c-bristles; 5 medial spinous cleaning bristles forming oblique row from point just proximal to b-bristle to point just proximal to base of c-bristle; 1 long spinous medial

bristle (about three-fourth length of d-bristle) present just distal to base of d-bristle; medial surface with few short spines forming rows; end joint with dorsal claw and 5 bristles, 4 long, 1 short, all with spines. Exopodite hirsute distally, with 2 short bristles reaching distal margin of 1st endopodite joint.

Maxilla (Figure 7g): Epipodite appendage hirsute, with pointed tip reaching to about middle of dorsal margin of basale; endite I with 4 bristles, 3 long, 1 short; endite II with 3 long bristles. Basale with hairs on medial surface and dorsal margin; medial surface with 1 short proximal bristle near dorsal margin; lateral surface with 1 proximal bristle (longer than proximal bristle on medial surface); ventral margin with 1 proximal backward-pointing bristle and 1 short distal bristle (latter bristle with base on lateral surface) and long spinous terminal bristle; dorsal margin with short distal bristle. Endopodite: 1st joint with 1 short dorsal bristle and 1 long δ -bristle with faint marginal spines; end joint with long spinous terminal bristle extending just past end of δ -bristle.

Fifth limb (Figure 7h): Epipodial appendage with 58 bristles; 1 slender bare bristle ventral to base of stout spinous exopodial bristle; 4 additional bristles (2 pairs) near ventral margin of comb; 1 additional bristle almost on ventral edge of comb near proximal paired bristles.

Sixth limb (Figure 7i): Medial surface with minute bristle in anterodorsal corner; anterior margin with 1 upper bristle and 1 lower bristle; anteroventral corner with 3 spinous bristles; lateral flap without bristles; posteroventral margin with 6 or 7 bristles near middle; medial and lateral surfaces hirsute.

Seventh limb (Figure 7j): Proximal and distal groups each with 6 bristles (3 + 3); each bristle with 3 to 5 bells. Terminus with opposing combs, each with 12–14 spinous teeth.

Furca: Each lamella with 10 claws of which posterior 2 or 3 are small bristle-like; claws 1 to 7 with long and short teeth along posterior margins; some main claws with hairs along anterior margins.

Rod-shaped organ: Elongate, 1-jointed, with rounded tip (Figure 7e).

Eyes: Medial eye without pigment, bare (Figure 7e); lateral eye minute, consisting of reddish brown pigment spots without ommatidia (Figure 7k,l).

Posterior: Dorsum consisting of short spinous thumblike process (Figure 7n).

Upper lip: Consisting of 2 hirsute lobes and hirsute lateral flap on each side; 1 or 2 minute anterior spines present on each lobe and 1 longer slender spine on anterior of saddle between lobes (Figure 7m).

Genitalia: Oval sclerotized process on each side (Figure 7n). Brush organ not observed.

Eggs: [USNM 141556] with 4 eggs in marsupium.

DESCRIPTION A-1 MALE.—Carapace similar in shape to female; USNM 141829, length 1.65 mm, height 0.83, height 50 percent length.

First antenna: Sensory bristle of 5th joint with 1 short proximal and 6 long terminal filaments.

Second antenna: Endopodite 3-jointed: 1st joint bare; 2nd joint elongate with 2 short distal bristles; 3rd joint elongate with 1 proximal bristle, tip rounded.

Mandible: Similar to that of female in having 1 short and 1 long terminal bristle on dorsal margin of basale; dorsal margin of 2nd endopodite joint of endopodite with 2 proximal bristles.

Sixth limb: Middle of end joint with 4 or 5 short bristles, anteroventral corner of end joint with 3 short bristles; anterior margin of limb with upper and lower bristles.

Seventh limb: Each limb with 12 bristles, 6 proximal (3 + 3), 6 terminal (3 + 3).

Furca: Each lamella with 9 claws; posterior 2 small, bristle-like.

Rod-shaped organ: Similar to that on female.

Eyes: Lateral eye minute, similar to that of adult female. Medial eye similar to that of female.

Posterior: Thumblike spinous process similar to that of female.

Upper lip: Similar to that of female.

REMARKS.—The presence of a short proximal bristle on A-1 stage of a species of *Parasterope* was previously reported by Kornicker (in Bowman and Kornicker, 1967:16) on *Parasterope pollex* Kornicker, 1967.

COMPARISONS.—The new species, *Parasterope sohni*, differs from previously described species by having the following combination of characters: lateral eyes consisting of minute reddish brown spots without ommatidia; terminal bristles on dorsal margin of mandibular basale consisting of 1

long bristle and 1 very short bristle; sixth limb with 6 or 7 bristles at middle of ventral margin.

Parasterope mauritania, new species

FIGURES 8, 9

HOLOTYPE.—[USNM 139860], ovigerous female, length 1.35 mm. Right valve and some appendages in alcohol; left valve and remaining appendages on slides. Deposited in Museum of Natural History "Gigore Antipa," Bucharest, Romania.

TYPE-LOCALITY.—Station X041.

PARATYPES.—USNM 141102, 1 juvenile male, deposited in NMNH; [USNM 141103], 1 juvenile male deposited in Museum of Natural History "Gigore Antipa," Bucharest; USNM 141104, 3 juveniles deposited in NMNH. Paratypes from same sample as holotype.

ADDITIONAL SPECIMENS.—USNM 141825, 1 adult female, length 1.41 mm, height 0.65 mm, height 46 percent of length; USNM 141826, 1 A-1 male, length 1.32 mm, height 0.60 mm, height 45 percent of length (3 copepodids in carapace); USNM 141827, 1 A-1 male, length 1.36 mm, height 0.65 mm, height 48 percent of length, USNM 141825, 141826 from *Thalassa* station X068; USNM 141827 from *Thalassa* station X057.

DISTRIBUTION.—Collected at three stations off Mauritania at depths of 52–96 m (Figures 2, 3).

DESCRIPTION OF FEMALE (Figures 8, 9a–o).—[USNM 139860] with 21–23 hyaline spines on broad list on posterior infold, and 17 long bristles between broad list and posterior margin of valve (Figures 8, 9b). Size: length 1.35 mm, height 0.64 mm, height 47.4 percent of length. Carapace otherwise similar to that of *P. aberrata* described by Skogsberg (1920:504).

First antenna (Figure 9c): Longer of 2 ventral bristles on 4th joint just reaching distal margin of 6th joint. Limb otherwise similar to that of *P. aberrata* described by Skogsberg (1920:506).

Second antenna (Figure 9d–f): Endopodite: terminal bristle on endopodite 2.50–2.75 times length of stem; 2nd and 3rd joints fused, but presence of 3rd joint indicated by slight change in outline at usual position of suture on other species. Protopodite with few spines forming clusters along anterodorsal margin. Exopodite with long hairs forming

cluster distally on dorsal margin of 1st joint. Limb otherwise as described for *P. aberrata* by Skogsberg (1920:506).

Mandible (Figure 9g): Coxale endite with small bristle near base of ventral branch. Basale endite with 4 end bristles (1 of these quite short), 2 triaenid bristles with about 9 pairs of marginal spines excluding terminal pair, reduced glandular peg, and 2 subequal dwarf bristles. Endopodite: medial surface of 2nd joint with 1 short cleaning bristle between b- and c-bristles, but closer to b-bristle, 4 cleaning bristles forming row with longest bristle just proximal to c-bristle, and minute spines forming 2 short rows (about 5 to 8 spines in each row) near middle of dorsal half of surface. Limb otherwise as described for *P. aberrata* by Skogsberg (1920:506).

Maxilla (Figure 9h,i): Epipodial appendage short, faintly hirsute. Basale hirsute; medial surface with 1 short proximal bristle and 1 longer bristle near tip of epipodite, both bristles near dorsal margin; lateral surface with 1 short proximal bristle; ventral margin with 1 backward pointing proximal bristle. Endopodite similar to limb of *P. aberrata* described by Skogsberg (1920:508).

Fifth limb (Figure 9j): Epipodial appendage with about 53 bristles. Lateral surface of comb with 1 bristle just ventral to base of stout exopodial bristle and 5 bristles near ventral margin.

Sixth limb (Figure 9k,l): Medial surface with minute bristle in proximal anterior corner. Limb otherwise like limb of *P. aberrata* described by Skogsberg (1920:508).

Seventh limb, furca, rod-shaped organ, and medial eye (Figure 9m): Similar to limbs of *P. aberrata* described by Skogsberg (1920:508).

Lateral eye: About same size as medial eye, pigmented, with 12–13 ommatidia.

Upper lip: Each lobe with 2 medial spines (Figure 9o).

Posterior: Dorsum consisting of short process with spines; posterior with short hairs along margin (Figure 9n).

Eggs: [USNM 139860] with 4 eggs in marsupium.

DESCRIPTION OF JUVENILE MALE (Figure 9p–u).—Shape in lateral view similar to adult female except for more acuminate posterodorsal margin. Size: USNM 141102, length 1.37 mm, height 0.65 mm, [USNM 141103], length 1.45 mm, height 0.69 mm, USNM 141826, length 1.32 mm, height 0.60 mm.

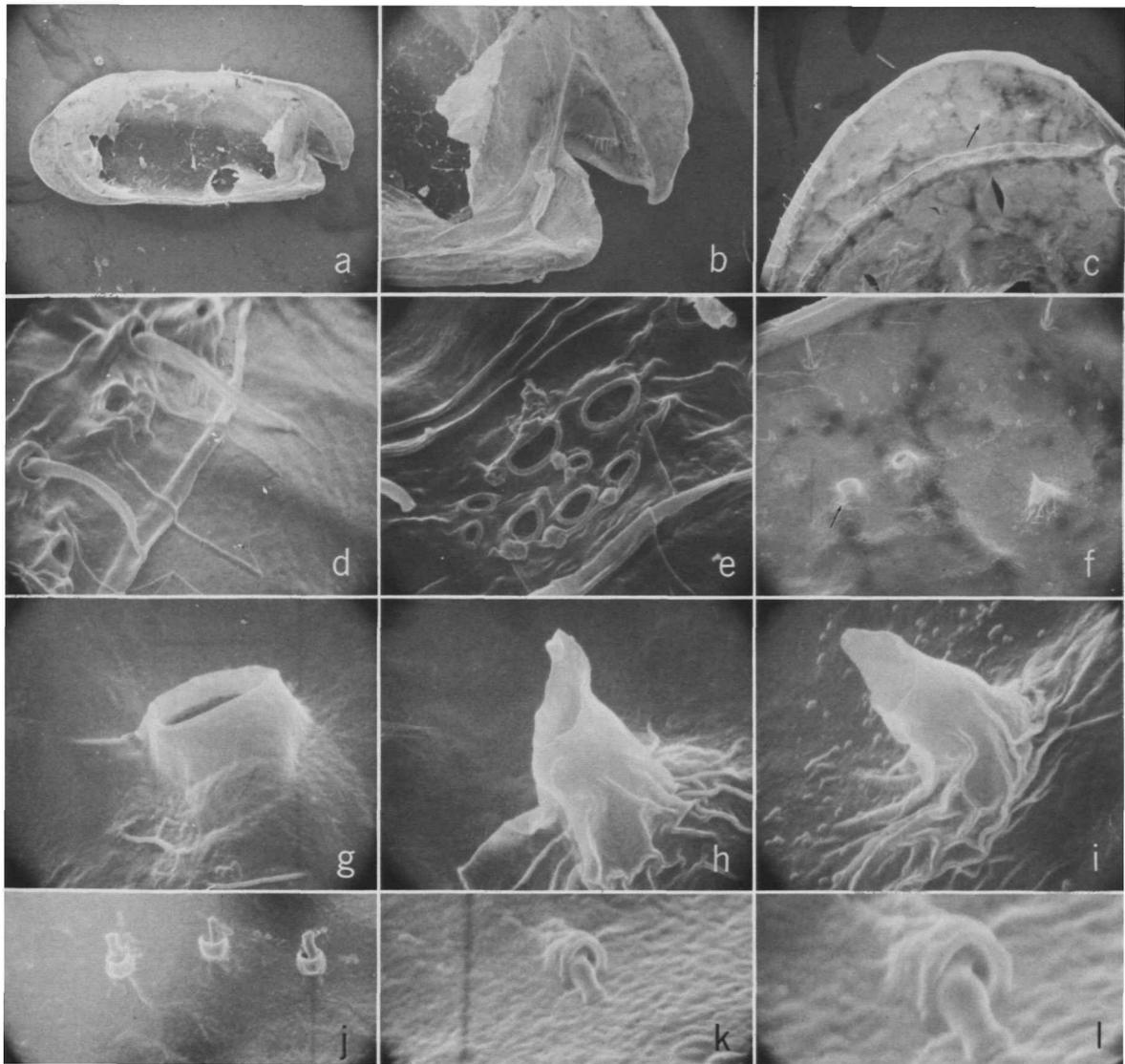
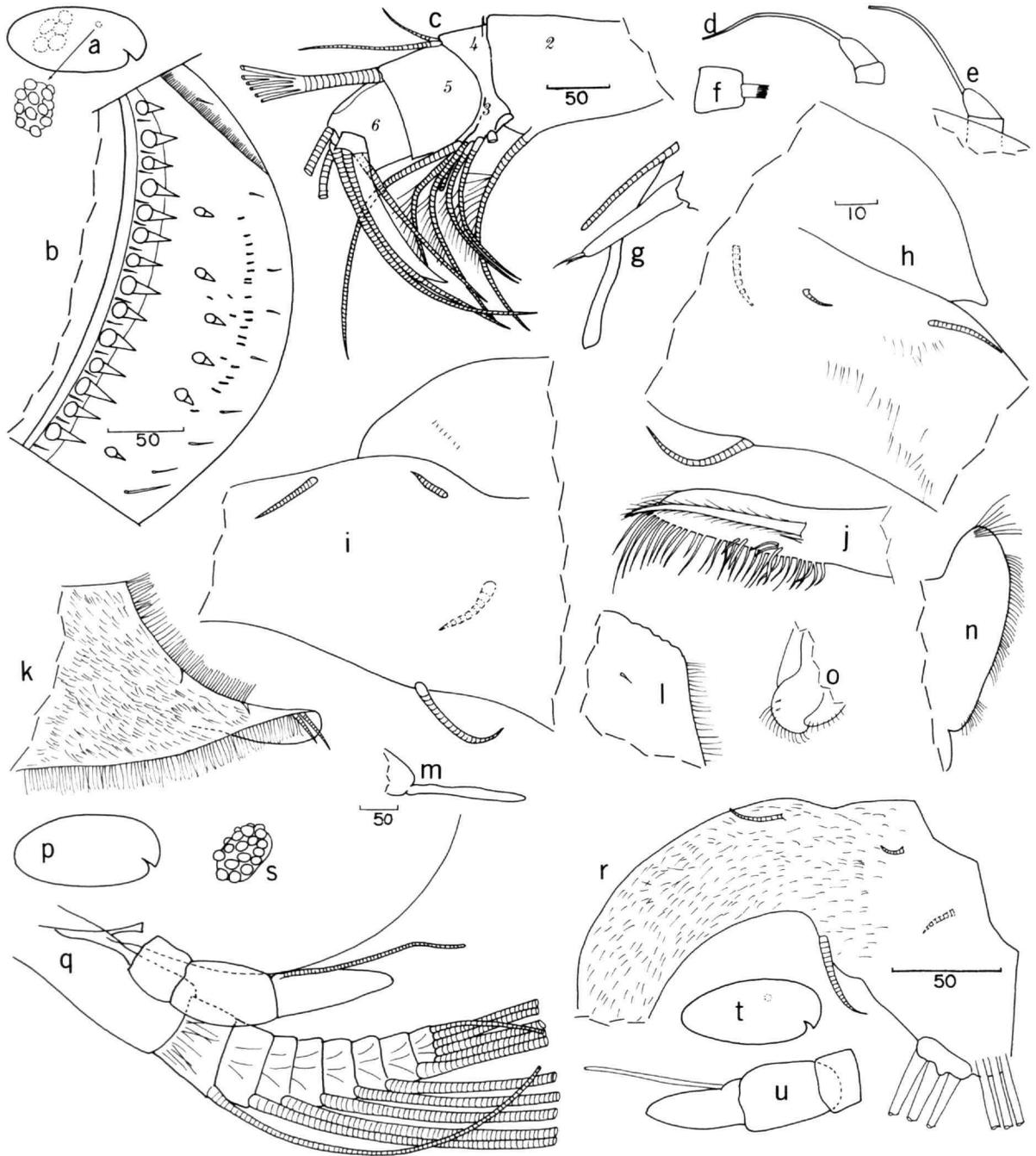


FIGURE 8.—*Parasterope mauritania*, new species, female, [USNM 139860], holotype, length 1.35 mm, left valve, medial view: a, complete valve, $\times 70$; b, detail of "a" showing anterior part, $\times 200$; c, detail of "a" showing posterior part, posterior of valve (towards top), $\times 280$; d, detail of "c" showing list with two single bristles and flaplike bristle with single pore and several collapsed tubes at its base, $\times 5000$; e, detail of "c" showing pores at base of a flaplike bristle on list, $\times 5000$; f, detail of "c" showing a scooplike process (second from dorsal end; see arrow on "c"), two lipped pores (broken scooplike processes?) and 15 minute pores containing bottle-shaped processes, $\times 1000$; g, detail of "f" showing a lipped pore (see arrow in "f," $\times 7000$); h, i, detail of "f" showing scooplike process, $\times 7000$; j, detail of "f" showing three pores with bottle-shaped process, $\times 5000$; k, oblique view of pore with bottle-shaped process, $\times 10,000$; l, same as "k," $\times 20,000$. (Photos reduced to 53%.)



First antenna: Sensory bristle of 5th limb similar to that of adult female.

Second antenna (Figure 9*q,u*): Endopodite 3 jointed with long proximal filament on 3rd joint; 9th joint of exopodite with 4 bristles.

Mandible, maxilla (Figure 9*r*), 5th limb, posterior, rod-shaped organ, and medial eye: similar to those organs on adult female.

Sixth limb: Limbs of USNM 141102 and [USNM 141103] with no posteroventral bristles, limbs of USNM 141826 with 1 short bristle in middle of ventral margin.

Seventh limb: Similar to adult female except short bristles tapering distally on both specimens examined. Long bristles also tapering on smaller specimen.

Furca: Similar except possibly with one less claw (not examined in detail).

Lateral eye (Figure 9*s*): Larger than on female, with about 20 ommatidia.

PARASITES.—Two larval copepods inside the carapace of USNM 141826, a juvenile (A-1) male.

COMPARISONS.—The 6th limbs of *Parasterope aberrata* (Skogsberg 1920), *P. nana* Poulsen, 1965, some specimens of *P. corrugata* Poulsen, 1965, and the new species, *P. mauritania*, have no posteroventral bristles on the 6th limb. The basale of the maxilla of *P. mauritania* bears a single bristle near the dorsal margin opposite the tip of the epipodite. This bristle is not present on *P. aberrata*. The

FIGURE 9.—*Parasterope mauritania*, new species. Female, [USNM 139860], holotype, length 1.35 mm: *a*, complete specimen showing position of eggs and lateral eye, and detail of lateral eye; *b*, posterior of right valve, medial view; *c*, distal end of 1st antenna (filaments not shown on bristles of 7th and 8th joints); *d*, endopodite of right 2nd antenna, medial view; *e*, endopodite of left 2nd antenna, lateral view; *f*, 9th joint of exopodite of left 2nd antenna, medial view; *g*, exopodite of right mandible, lateral view; *h*, exopodite and proximal part of basale of left maxilla, medial view; *i*, same, right maxilla; *j*, comb of right 5th limb, lateral view; *k*, anterior part, left 6th limb, medial view; *l*, antero-dorsal corner showing dwarf bristle of left 6th limb, medial view; *m*, rod-shaped organ and part of medial eye; *n*, dorsum, anterior to left; *o*, upper lip, anterior to left. Juvenile male, [USNM 141103], length 1.45 mm: *p*, complete specimen; *q*, endopodite and exopodite of right 2nd antenna, medial view; *r*, proximal part of right maxilla, medial view; *s*, left lateral eye. Juvenile male, USNM 141102, length 1.37 mm: *t*, complete specimen; *u*, endopodite of left 2nd antenna, medial view. (Same magnification in microns: *b*, *d-f*, *n*, *u*; *c*, *j*, *k*, *q*; *g*, *r*; *h*, *i*, *l*; *m*, *o*, *s*.)

female carapace of *P. mauritania* is shorter than that of *P. aberrata*, 1.35–1.41 mm compared to 1.65–1.71 mm. The carapace of *P. nana* and *P. corrugata* differs from that of *P. mauritania* in lacking processes on the posterior infold.

Parasterope thrix, new species

FIGURE 10

HOLOTYPE.—[USNM 141261], ovigerous female, length 1.68 mm. Valves and some appendages in alcohol, remaining appendages on slide. Deposited in Museum of Natural History "Grigore Antipa," Bucharest, Romania.

TYPE-LOCALITY.—Station X048.

DISTRIBUTION.—Collected only at type-locality (Figures 2, 3).

ETYMOLOGY.—The specific name, from the Greek *thrix* (hair) refers to the distal bristle present on the dorsal margin of the basale of the maxilla.

DESCRIPTION.—Holotype with 22 hyaline spines on broad list on posterior infold, and 34 long bristles between broad list and posterior margin of valve; 38 short bristles distributed along inner margin of broad list anterior to hyaline bristles, 1 to 2 short bristles between each pair of hyaline bristles (3 or 4 of the short bristles near ventral margin much longer than others). Carapace otherwise similar to that of *P. aberrata* described by Skogsberg (1920:504). Size: [USNM 141261], length 1.68 mm, height 0.84 mm, height 50 percent of length (Figure 10*a*).

First and second antenna (Figure 10*b*): Similar to those of *P. mauritania*, new species.

Mandible (Figure 10*c-e*): [USNM 141261], 2nd joint of endopodite of left limb with 1 cleaning bristle between a- and b-bristles, 3 cleaning bristles between b- and c-bristles, and 5 cleaning bristles forming oblique row near base of c-bristle; right limb with 3 cleaning bristles between b- and c-bristles and 6 cleaning bristles forming oblique row near base of c-bristle; medial surface of 2nd joint with minute spines forming about 5 rows; limb otherwise similar to that of *P. mauritania*.

Maxilla (Figure 10*f*): Hairs not observed on epipodial appendage. Limb similar to that on *P. mauritania* except for having 2 additional bristles on basal; 1 distal bristle on dorsal margin, 1 distal bristle on ventral margin.

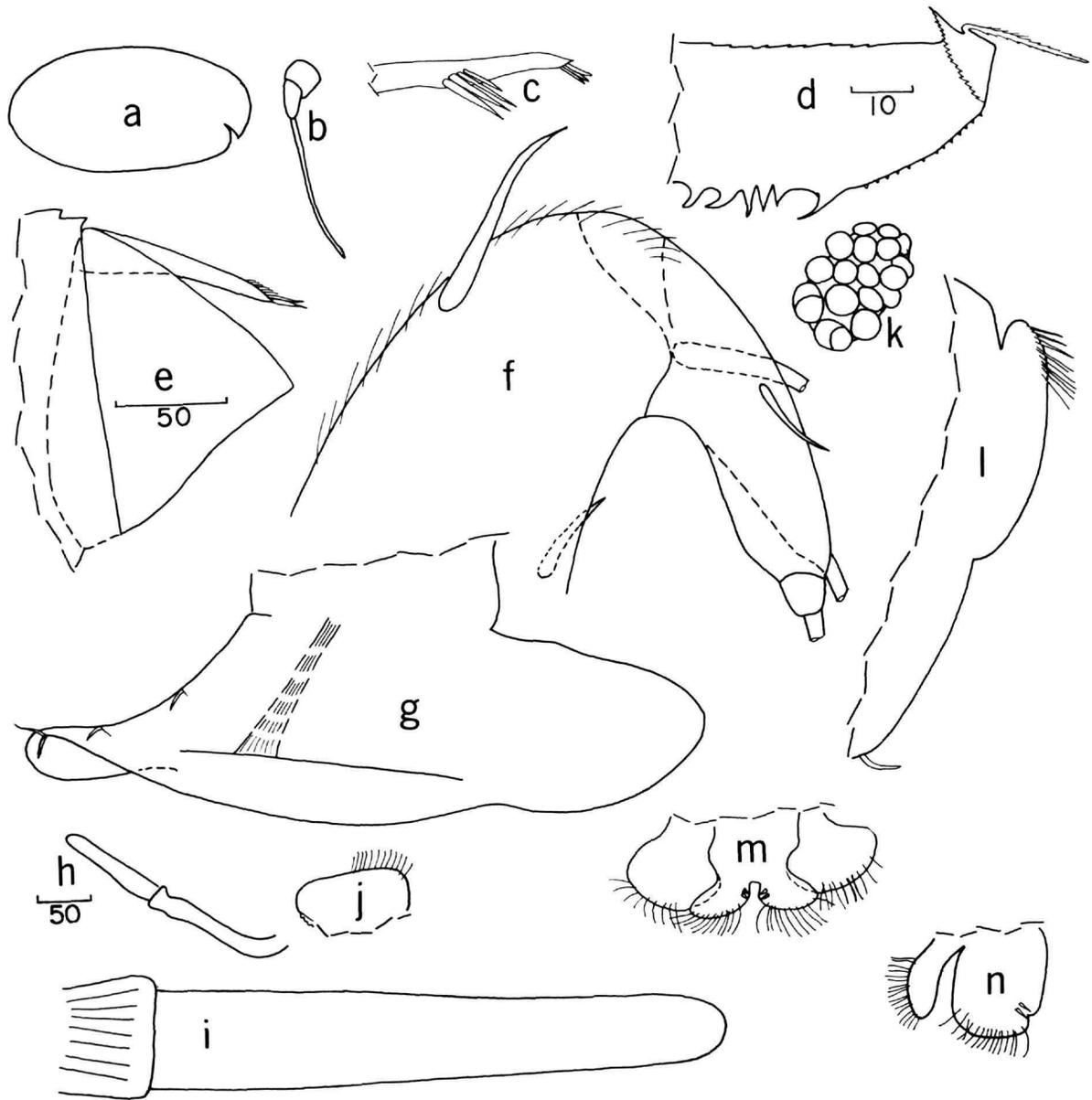


FIGURE 10.—*Parasterope thrix*, new species, female, [USNM 141261], holotype, length 1.68 mm: a, complete specimen; b, endopodite of 2nd antenna; c, tip of ventral branch of coxale endite of left mandible, lateral view; d, tip of dorsal branch of coxale endite of right mandible, medial view; e, exopodite and 1st endopodite joint of left mandible, medial view; f, distal part of basale, and endopodial joints of left maxilla, medial view; g, right 6th limb, medial view; h, rod-shaped organ; i, detail of distal half of rod-shaped organ shown in "h"; j, medial eye; k, lateral eye; l, dorsum; m, upper lip, anterior view; n, same as "m," lateral view, anterior to right. (Same magnification in microns: c, d, f, i; h, j-n.)

Fifth limb: Epipodial appendage with 57 or 58 bristles. Limb otherwise similar to that of *P. mauritania*.

Sixth limb (Figure 10g): Medial bristle in proximal anterior corner not observed with certainty. Limb otherwise similar to that on *P. mauritania*.

Seventh limb: Similar to that on *P. mauritania* and *P. aberrata*.

Lateral eye (Figure 10k): About same size as medial eye and with 17 ommatidia.

Posterior: Dorsum consisting of short process with spines (Figure 10l).

Medial eye and rod-shaped organ (Figure 10h-f): Medial eye with dorsal hairs. Rod-shaped organ 2-jointed with rounded tip.

Furca: Each lamella with 9 claws; posterior 3 claws small.

Upper lip (Figure 10m,n): Each lobe with 2 spines.

Eggs: [USNM 141261] with 5 eggs in marsupium.

COMPARISONS.—The maxilla of *P. thrix* differs from that of *P. aberrata*, *P. nana*, and *P. mauritania* in having a distal bristle on both the dorsal and ventral margins of the basale. Neither *P. nana* nor *P. corrugata* Poulsen have processes on the posterior infold.

Parasterope species indeterminate

MATERIAL.—USNM 141817, 8 juveniles, Station X041.

Synasterope Poulsen, 1965

One species of *Synasterope* was collected: *S. bensoni*, new species.

DISTRIBUTION.—Members of this genus are widespread from latitudes of about 30°N to 73°S and depths of 1–4450 m (Kornicker, in press). The genus was represented in the present collections in samples collected off Spanish Sahara and Mauritania at depths of 14–270 m.

Synasterope bensoni, new species

FIGURES 11–14

HOLOTYPE.—[USNM 141270], ovigerous female, length 1.17 mm. Valves and some appendages in alcohol, remaining appendages on slide; in collec-

tion of the Museum of Natural History, "Grigore Antipa," Bucharest.

TYPE-LOCALITY.—Station X048.

ETYMOLOGY.—The species is named in honor of Dr. Richard H. Benson.

ALLOTYPE.—[USNM 141271], adult male, length 1.14 mm. Valves and some appendages in alcohol, remaining appendages on slide; from station X048; in collection of Museum of Natural History "Grigore Antipa," Bucharest.

PARATYPE.—USNM 141264, adult female, length 1.28 mm. Valves and appendages in alcohol; station X048.

ADDITIONAL SPECIMENS.—USNM 141822, 1 adult female from *Thalassa* station X068; USNM 143972, 1 adult female from *Cornide de Saavedra* station A8a, sample 15; USNM 141561, 1 adult female from *Thalassa* station X023.

DISTRIBUTION.—Collected at four stations off Mauritania at depths of 14–270 m (Figures 2, 3).

DESCRIPTION OF FEMALE (Figures 11–13).—Carapace oval in lateral view with slitlike incisure below valve middle; holotype with straight dorsal margin (Figure 13a); posterior evenly rounded or with ventral corner more oblique than dorsal corner (Figures 13a,n,s).

Infold (Figure 11l, 12a–e): Between list and anterodorsal margin of rostrum with about 21 bristles; list and area below list with about 6 bristles; about 18 bristles present on infold below incisure to point on ventral margin where single row of bristles starts; infold on ventral margin with about 7 bristles; posterior ridge with about 30 very faint flaplike bristles, and about 10 short bristles; about 7 bristles present between posterior ridge and posterior valve margin (most in ventral half of valve); no posterior processes.

Size: [USNM 141270], ovigerous female, length 1.17 mm, height 0.75 mm; height 64.1 percent of length; USNM 141264, adult female, length 1.28 mm, height 0.80 mm, height 62.5 percent of length; USNM 141822, adult female, length 1.21 mm, height 0.67 mm, height 55 percent of length; USNM 143972, adult female, length 1.11 mm, height 0.67 mm, height 60 percent of length; USNM 141561, 1 adult female, length 1.37 mm, height 0.79 mm, height 0.58 percent of length.

First antenna (Figure 13b): 1st joint with long spines on medial surface near ventral margin; 2nd joint with short spines forming clusters on medial

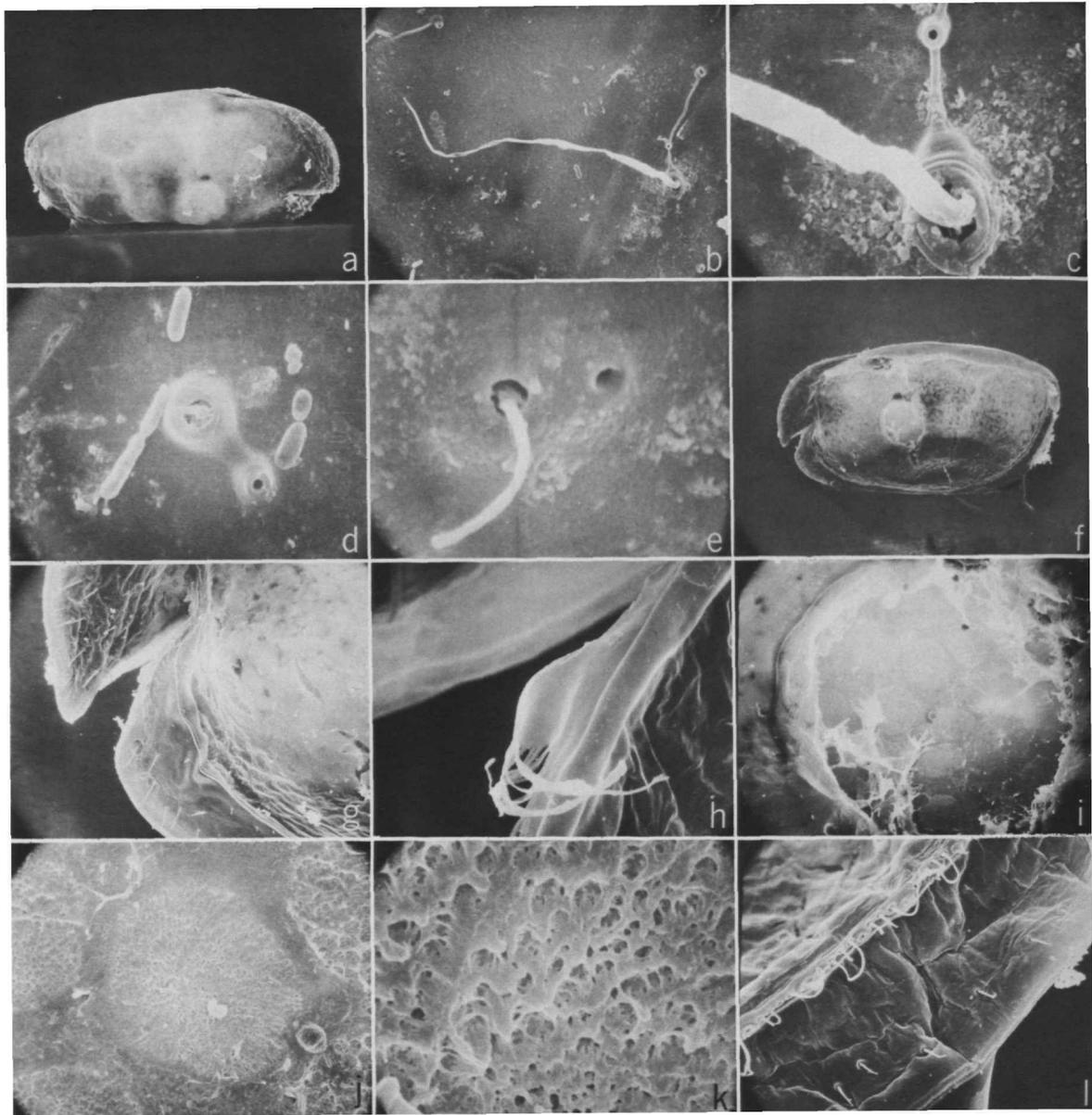


FIGURE 11.—*Synasterope bensoni*, new species, female, USNM 143972, right valve: *a*, complete valve, lateral view, $\times 75$; *b*, detail of "*a*" showing pore with bristle and four small rimmed pores without bristles, $\times 1900$; *c*, detail of "*b*" showing concentrically rimmed pore with bristle and rimmed satellite pore, $\times 9500$; *d*, pore with short hair and rimmed satellite pore on valve surface anterior to central muscle, $\times 8500$; *e*, small unrimmed pore with hair and small unrimmed satellite pore, $\times 17,000$; *f*, complete valve, medial view, $\times 75$; *g*, detail of "*f*" showing anterior part, $\times 320$; *h*, detail of "*g*" showing fringed lamellar prolongation on selvage along inner part of lower margin of incisur, $\times 315$; *i*, detail of "*f*" showing central adductor muscle scars (faint discs), $\times 500$; *j*, detail of central adductor muscle scars shown in "*i*," $\times 2000$; *k*, detail of muscle scar near center of "*j*," $\times 10,000$; *l*, detail of "*f*" showing middle part of posteroventral infold, $\times 1000$. (Photos reduced to 52%.)

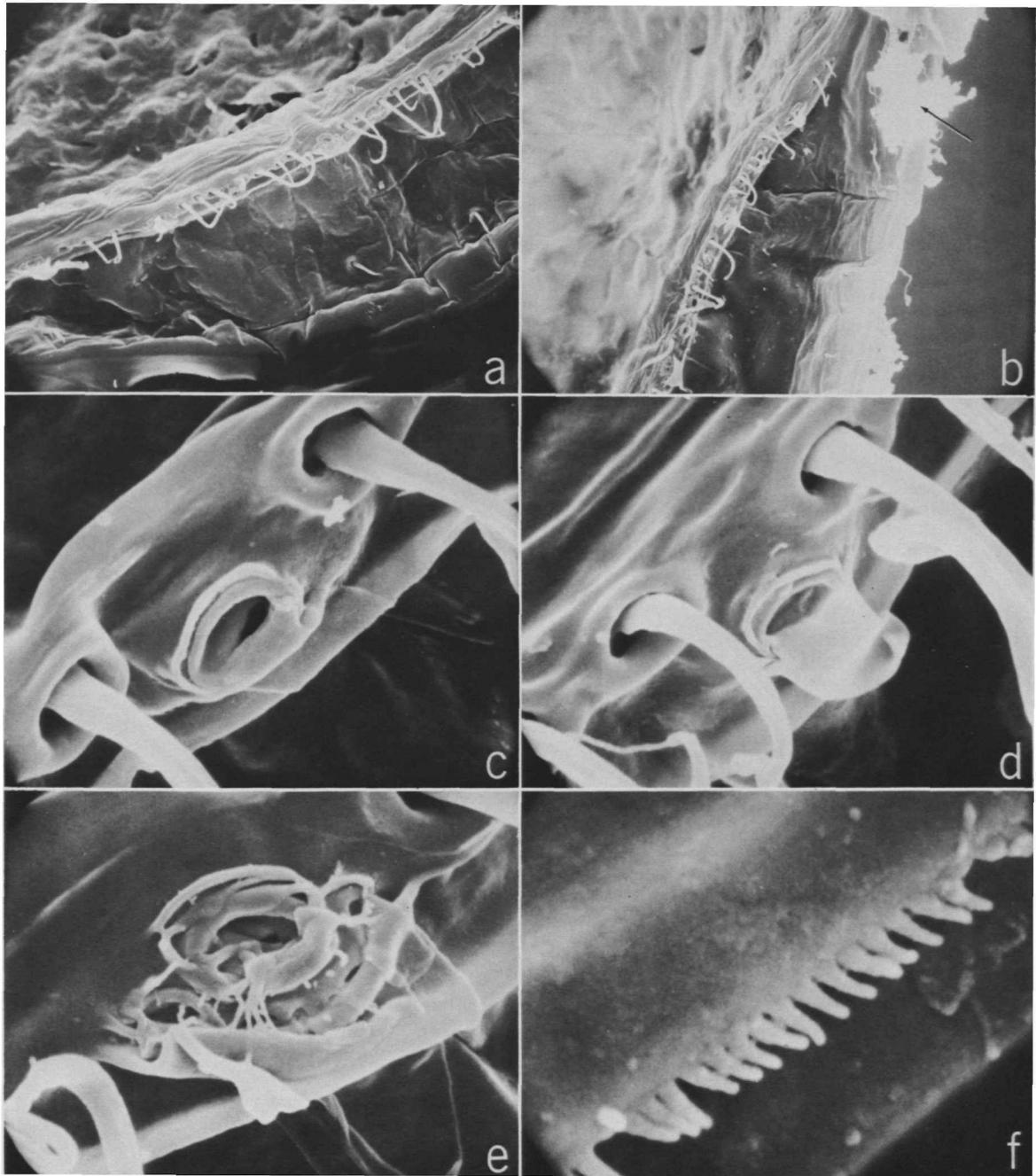


FIGURE 12.—*Synasterope bensoni*, new species, female, USNM 143972, right valve, medial view: *a*, posteroventral infold near ventral end, $\times 1000$; *b*, posteroventral infold near dorsal end (white objects indicated by arrows are debris), $\times 890$; *c,d,e*, details of broad posteroventral list showing pores and bristles, $\times 1000$; *f*, serrate margin of posteroventral selvage $\times 20,000$. (Photos reduced to 78%.)

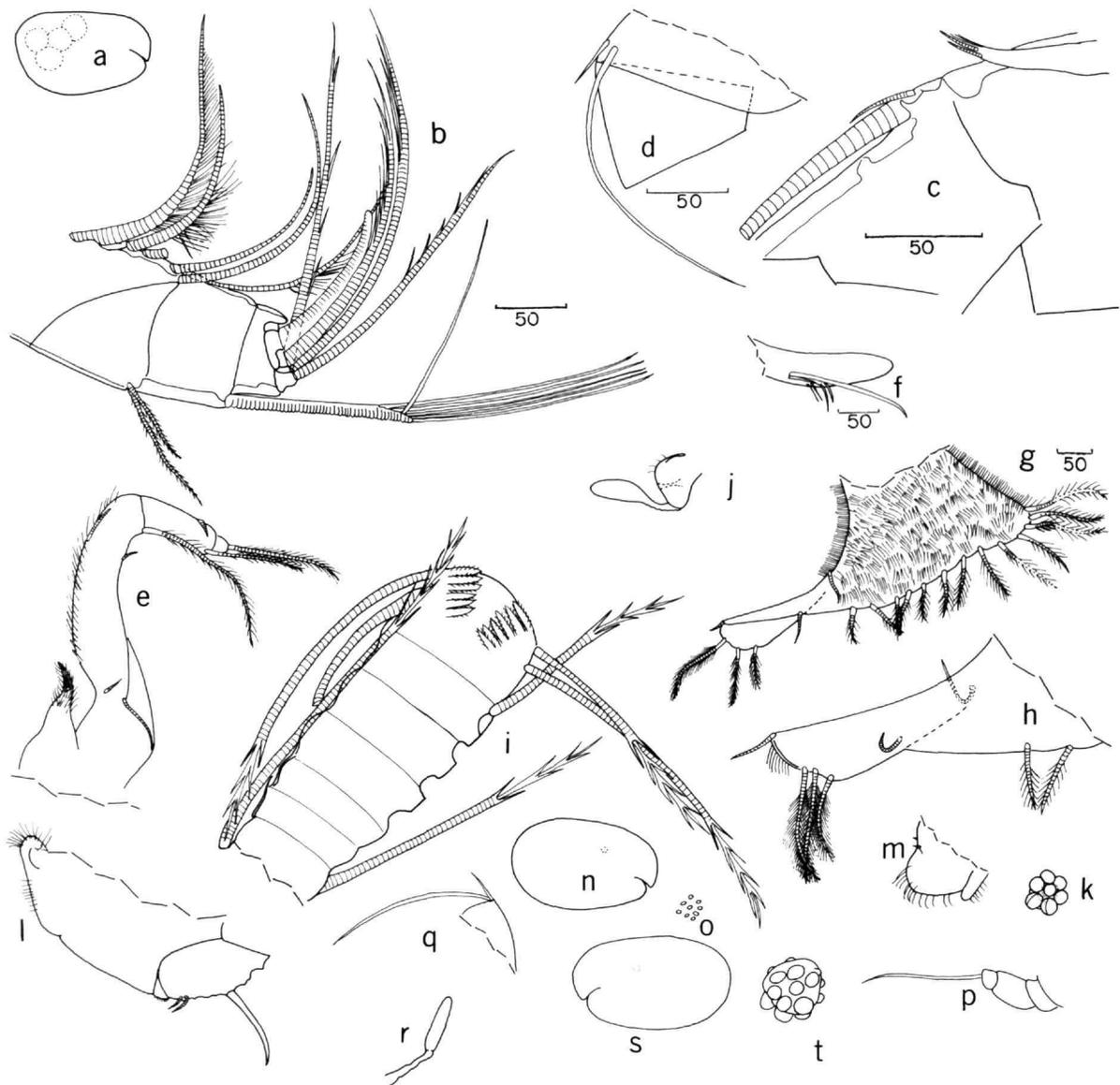


FIGURE 13.—*Synasterope bensoni*, new species. Female, [USNM 141270], holotype, length 1.17 mm: a, complete specimen showing position of eggs; b, tip of 1st antenna (not all bristles shown), lateral view; c, exopodite of left mandible, lateral view; d, terminal bristles on dorsal margin of basale of right mandible, medial view; e, left maxilla, medial view; f, comb of right 5th limb, lateral view; g, right 6th limb, medial view; h, anteroventral part of left 6th limb, lateral view; i, tip of 7th limb; j, medial eye and rod-shaped organ; k, right lateral eye; l, posterior of body, anterior to right (not all furcal claws shown); m, upper lip, anterior to left. Female, USNM 141264, length 1.28 mm: n, complete specimen showing position of lateral eye; o, central muscle scars on right valve, lateral view; p, endopodite of left 2nd antenna, medial view; q, terminal bristles on dorsal margin of basale of left mandible, lateral view; r, rod-shaped organ. Female, USNM 141561, length 1.39 mm: s, complete specimen showing position of lateral eye; t, lateral eye. (Same magnification in microns: b, e, h; c, i; d, p-r; f, m, j-l, t.)

and lateral surfaces, especially near ventral margin lateral surface without bristle; dorsal margin with long spinous bristle; 3rd joint weakly separated from 4th joint on medial side, with short ventral bristle and 6 spinous dorsal bristles; combined 3rd and 4th joints slightly wider than long; 4th joint with 1 long spinous dorsal bristle and 2 spinous ventral bristles; longer of 2 ventral bristles twice length of shorter bristles, reaching past 8th joint; sensory bristle of 5th joint long, slender with 6 terminal filaments; distomedial bristle of 6th joint spinous, reaching past a-claw of 7th joint. Seventh joint: a-claw with blunt tip; b-bristle with 3 marginal filaments, tip bifurcate; c-bristle with 6 filaments including stem. Eighth joint: d-bristle consisting of minute spine; e-bristle bare, just reaching tip of a-bristle of 7th joint; f-bristle bent, with 5 filaments including stem; g-bristle with 6 filaments including stem.

Second antenna (Figure 13*p*): Protopodite with minute distomedial bristle, and with spines along ventral margin. Endopodite small, weakly 3-jointed, with terminal filament. Exopodite: 1st joint bare; bristle of 2nd joint reaching past 9th joint and with abundant spines along ventral margin; joints 4 to 9 with large basal spines; joints 2 to 8 with short spines forming row along distal margin; bristles on joints 2 to 8 with marginal spines and natatory hairs; 9th joint with 3 bristles (an additional short bristle on USNM 141561), all with marginal spines; 2 longer bristles of 9th joint with natatory hairs.

Mandible (Figure 13*c,d,q*): Coxale endite broken off holotype. Basale endite with 4 spinous end bristles, 1 dwarf bristle (USNM 141561 with 2 dwarf bristles), 3 triaenid bristles with 3–4 pairs of marginal spines excluding terminal pair, and prominent glandular peg; 1 triaenid bristle with 4

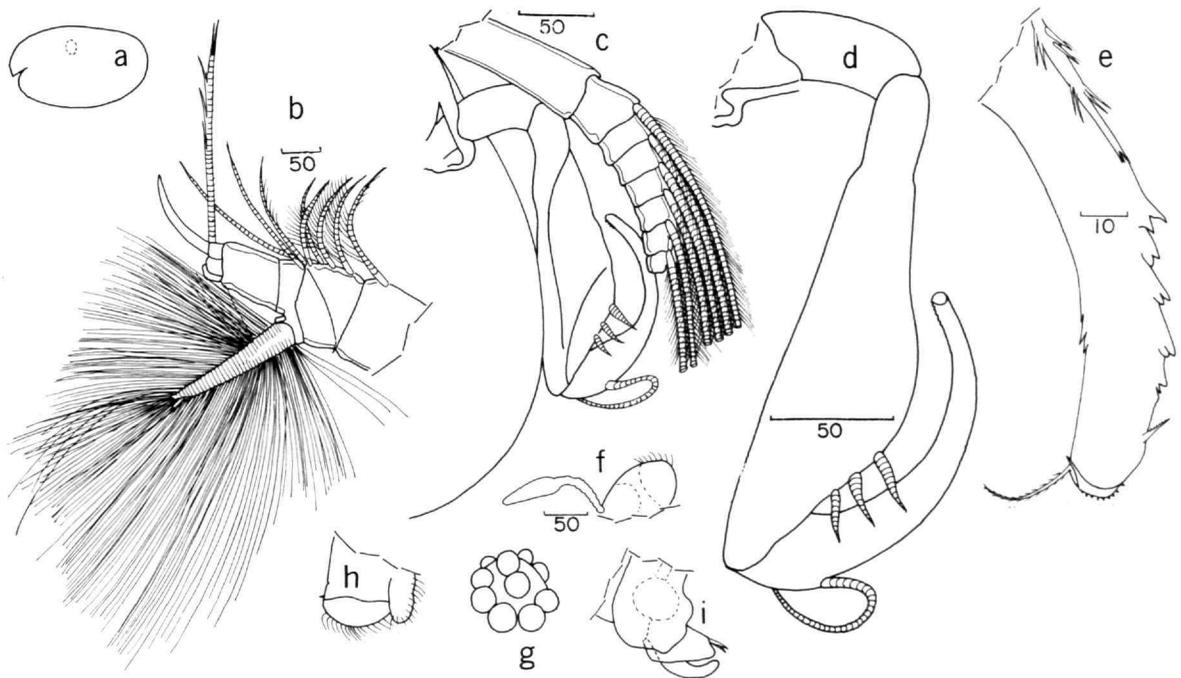


FIGURE 14.—*Synasterope bensoni*, new species, adult male, [USNM 141271], length 1.14 mm: a, complete specimen showing position of lateral eye; b, distal part of 1st antenna (all bristles not shown); c, endopodite and joints 1–8 of left 2nd antenna, medial view; d, detail of endopodite shown in "c"; e, coxale endite of left mandible, medial view; f, medial eye and rod-shaped organ; g, right lateral eye; h, upper lip, anterior to right; i, right copulatory organ, anterior to right, lateral view. (Same magnification in microns: f–i.)

pairs of marginal spines excluding terminal pair present on basale near base of endite and proximal to U-shaped sclerotized process. Dorsal margin of basal with 2 subterminal bristles, 1 long, 1 short; midbristle absent. Exopodite about three-fourths length of dorsal margin of 1st endopodite joint; tip with 2 short bristles. Endopodite: 1st joint with 3 long spinous ventral bristles; dorsal margin of 2nd joint with 1 short proximal bristle, and stout spinous a-, b-, c, and d-bristles, c-bristle slightly wider and shorter than d-bristle; no lateral bristle present between b- and c-bristles (USNM 141561 with short cleaning bristle between b- and c-bristle); 3 short cleaning bristles present just proximal to base of c-bristle (USNM 141561 with 5 short bristles here); 1 long spinous lateral bristle present between c- and d-bristles; 1 medium length spinous medial bristle present just distal to base of d-bristle; ventral margin and 2nd joint with 3 long spinous terminal bristles; medial surface of joint with few faint spines forming clusters. End joint with short straight dorsal claw, 1 short spinous medial bristle, and 4 long spinous bristles.

Maxilla (Figure 13e): Epipodite hirsute, with elongate tip. Endite I with 3 long bristles and 1 short bristle; endite II with 3 long bristles. Basale with faint hairs along dorsal margin; medial surface with 1 short bristle near base of epipodite; dorsal margin with 1 short bristle just distal to midlength; ventral margin with 1 short backward-pointing proximal bristle, 1 minute distal bristle and 1 long spinous terminal bristle. First endopodite joint with 1 short dorsal bristle and long slender spinous 6-bristle; 2nd joint with 1 long stout spinous bristle.

Fifth limb (Figure 13f): 1 short slender bristle present on comb ventral to base of long spinous exopodial bristle; 4 additional bristles present close to ventral margin.

Sixth limb (Figure 13g,h): Anterior margin with 1 upper and 1 lower bristle; anterior tip with 3 spinous bristles plus 1 short slender bristle on lateral flap; posteroventral margin with 13–15 bristles; limb hirsute. On USNM 141561, lower anterior bristle almost twice length of upper bristle, and with minute anterodorsal bristle. USNM 141822 with 9 posteroventral bristles and 4 bristles on anterior tip in addition to 1 on lateral flap; left limb only with 1 upper and 2 lower bristles on anterior margin.

Seventh limb (Figure 13i): Proximal and distal group each with 6 bristles, 3 on each side; each bristle with 3 to 4 bells; opposing terminal combs each with about 13 spinous teeth.

Rod-shaped organ and eyes (Figure 13j,r): Rod-shaped organ elongate, 1- or 2-jointed with slender proximal half and bulbous distal half, tip rounded (Figure 13j,r) medial eye pigmented, with dorsal hairs (Figure 13j); lateral eye pigmented, about same size as medial eye, and with 7 ommatidia (Figure 13k); USNM 141561 with about 12 ommatidia (Figure 13l).

Furca (Figure 13l): Holotype with 8 or 9 claws on each lamella; posterior 2 or 3 claws bristle-like; minute spines present on margin of lamella posterior to last claw.

Upper lip (Figure 13m): Lip consisting of 2 hirsute lobes with 2 minute spines on anterior margin just above lobes; small hirsute flap posterior to upper lip present on each side of mouth.

Posterior (Figure 13l): Posterior with short hirsute thumblike dorsum (thumblike process not present on USNM 141561, which has a spinous dorsum forming almost a right angle.

Eggs: [USNM 141270], with 5 eggs in marsupium.

DESCRIPTION OF ADULT MALE (Figure 14).—Carapace about same size as that of female but with maximum height slightly anterior to middle, an evenly rounded posterior, and slightly more open incisur (Figure 14a). Size: [USNM 141271], length 1.14 mm, height 0.70 mm, height 61.4 percent of length.

First antenna (Figure 14b): Joints 1 to 3 similar to that on female. Longer bristle on ventral margin of 4th joint just reaching 8th joint; distal margin of 5th joint extending across limb and well defined; sensory bristle of 5th joint reaching well past 8th joint, with abundant filaments; spinous medial bristle of 6th joint reaching past end of a-claw of 7th joint, with base near middle of distal margin of joint. Seventh joint: a-claw with pointed tip; b-bristle with 4 marginal filaments and bifurcate tip (some filaments spinous); c-bristle with 7 marginal filaments and bifurcate tip (tip of bristle missing on limb examined). Eighth joint: d-bristle absent; e-bristle bare, about three-fourths length of b-bristle; f-bristle bent, with 3 spinous marginal filaments and bifurcate tip; g-bristle with 5 marginal filaments and bifurcate tip. (Note: Unlike the male *Cylindroleberis bacescui*, new species,

which bears long c- and f-bristles, those bristles on *S. bensoni* are about the same length in both sexes.)

Second antenna (Figure 14c,d): Protopodite with minute distomedial bristle, but without surface spines. Endopodite 3-jointed; 1st joint elongate bare; 2nd joint with 3 bristles distal to middle of ventral margin; 3rd joint elongate, reflexed, with long proximal bristle and serrate tip. Exopodite similar to that on female.

Mandible (Figure 14e): Coxale endite: slender bristle present near base of ventral branch; ventral branch with 5 oblique rows of spines; tip of ventral branch with 3 minute spines; ventral margin of dorsal branch with nodes forming 5 rows distal to end of ventral branch and short main spines; bristle on dorsal margin with base some distance from tip of branch and with marginal hairs. Basale and endopodite similar to those on female, except for 4 instead of 3 cleaning bristles just proximal to base of c-bristle on male.

Maxilla, fifth limb: Similar to those on female.

Sixth limb: Minute medial bristle present in proximal anterior corner. Limb similar to that on female.

Seventh limb: Similar to that on female but only about 8 teeth observed in terminal combs.

Furca: Each lamella with 9 claws, posterior 3 or 4 claws bristle-like.

Rod-shaped organ (Figure 14f), upper lip (Figure 14h), posterior: Similar to those on female.

Eyes: Lateral eye larger than that on some females and with 20 ommatidia (Figure 14g). Medial eye about same size as lateral eye, with dorsal hairs (Figure 14f).

Copulatory appendage: Lobate with several bristles and hooklike process (Figure 14i).

COMPARISONS.—The new species *Synasterope bensoni* is distinguished from other species of *Synasterope* in that one of the two subterminal bristles on the dorsal margin of the mandibular basale is extremely short, only about one-sixth the length of the longer bristle.

REMARKS.—The female, USNM 141561, from station X023 differed from the holotype in being larger, having a very long lower bristle on the anterior of the 6th limb, in having two dwarf bristles on the coxale endite of the mandible, in having more ommatophores in the lateral eyes, and being without a thumblike dorsum. Because the few specimens on hand did not permit proper assessment

of intraspecific variability, it was expedient to include the specimen from station X023 in *S. bensoni*.

Cylindroleberis Brady, 1868

One species of *Cylindroleberis* was collected: *C. bacescui*, new species.

DISTRIBUTION.—Members of *Cylindroleberis* are known with some certainty only from between longitudes of about 20°W to 130°E and between latitudes of about 45°N and 24°S and from shallow depths (intertidal to 52 m). Many species now assigned to several other genera were placed in this genus by earlier authors. Specimens in the genus in the present collection were from off Mauritania at depths of 30–52 m.

Cylindroleberis bacescui, new species

FIGURES 15–18

HOLOTYPE.—[USNM 139844], ovigerous female, length 1.86 mm. Valves and some appendages in alcohol, remaining appendages on slide, in collection of Museum of Natural History "Grigore Antipa," Bucharest, Romania.

TYPE-LOCALITY.—*Thalassa* station X060.

ETYMOLOGY.—The species is named in honor of Dr. Mihai C. Băcescu, who collected the specimens described herein.

PARATYPES.—[USNM 139845], adult male; USNM 139848, 1 ovigerous female; USNM 138949, 4 ovigerous females, 9 adult females without eggs, 1 adult male, 15 juveniles; USNM 141105, 1 ovigerous female, 1 A-1 male, length 1.92 mm, height 0.76 mm. Paratypes from same sample as holotype. [USNM 139845] and 2 ovigerous females from [USNM 139849] are in the Museum of Natural History "Grigore Antipa," Bucharest.

ADDITIONAL SPECIMENS.—USNM 141818, 1 A-1 male; USNM 141819, 1 A-1 male, 1 juvenile male, 1 juvenile female; 1 A-1 female (length 1.45 mm, height 0.62, unextruded small eggs); all from *Thalassa* station X041.

DISTRIBUTION.—Collected at two stations off Mauritania at depths of 30–52 m (Figures 2, 3).

DESCRIPTION OF FEMALE (Figures 15–17).—Carapace elongate with subparallel dorsal and ventral margins (Figure 17a); anterior margin evenly rounded with slitlike incisur below valve middle;

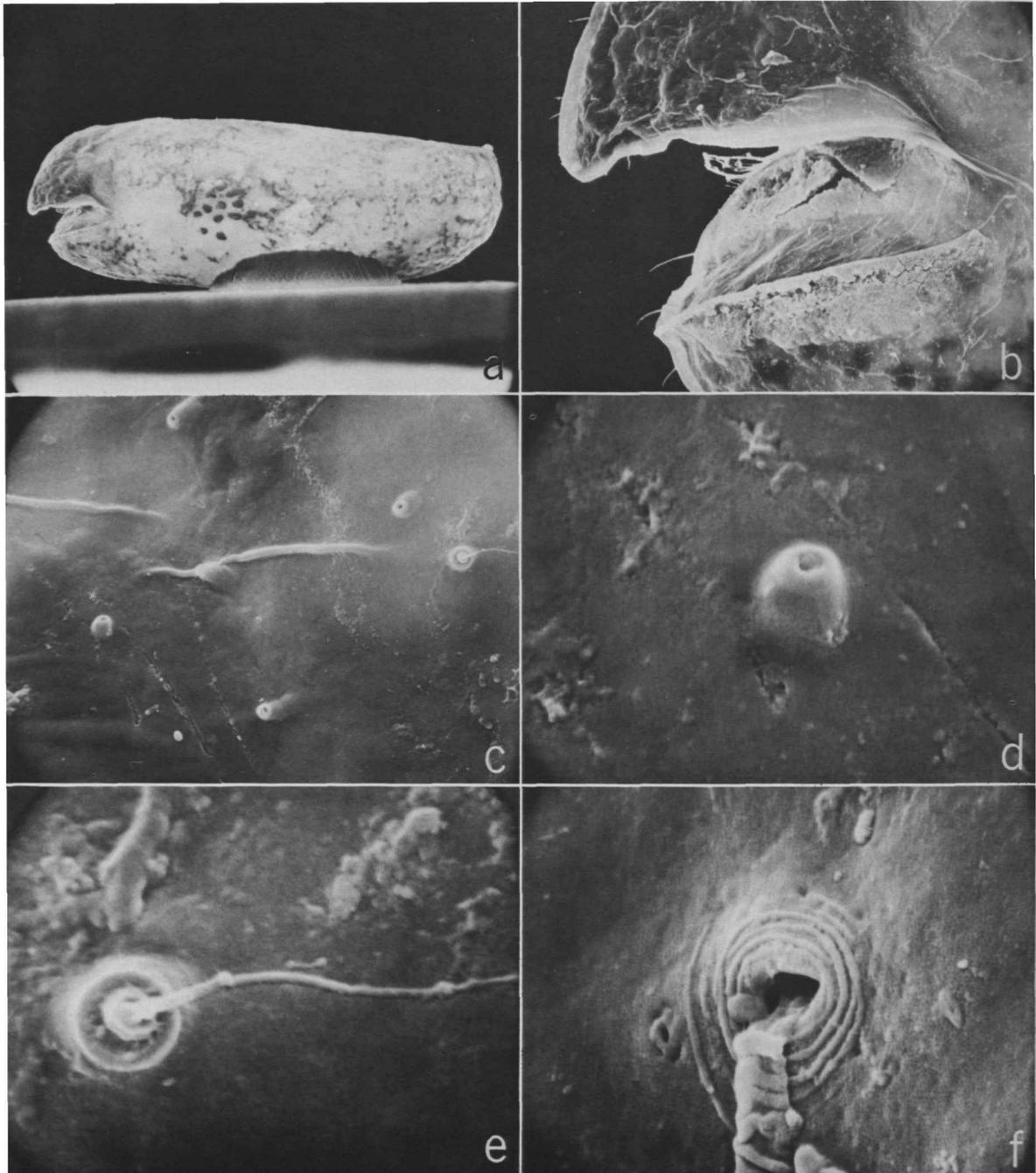


FIGURE 15.—*Cyindroleberis bacescui*, new species, female, USNM 139849A, left valve, lateral view: *a*, complete valve showing central muscle scars, dorsal margin of valve folded inward, $\times 55$; *b*, detail of “*a*” showing incisure (note fringed lamellar prolongation along lower margin of incisure near inner end), $\times 300$; *c*, detail of “*a*” showing simple raised pores and pore with hair, darker area at lower left is caused by central muscle scar, $\times 2000$; *d*, detail of “*c*” showing raised pore, $\times 10,000$; *e*, detail of “*c*” showing pore with hair, $\times 10,000$; *f*, concentrically ringed pore with bristle and minute satellite pore, $\times 10,000$. (Photos reduced to 78%.)

posterior slightly more rounded at posteroventral corner; surface smooth with minute punctae visible under high magnification.

Infold (Figure 16e-k, 17c): Behind rostrum with about 3 bristles along list, about 6 bristle forming row ventral to list near inner end of incisur, and about 23 long bristles and several small bristles dorsal to list; about 20 bristles on broad anteroventral infold ventral to incisur; about 21 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of anterior part of infold, extending along ventral infold and continuing on posterior infold where it broadens; posterior broad list with about 32 broad transparent bristles and about 19 small bristles, generally no more than 1 small bristle between 2 transparent bristles; 10 bristles between broad posterior list and posteroventral margin of valve (bristles confined to area near ventral third-to-half of broad posterior list); 5 elongate processes present between broad posterior list and posterior margin of valve; 2-4 minute pores or pegs present near each process.

Selva: Very faint striate selva observed along lower margin of incisur (Figure 16b).

Size: [USNM 139844], holotype, length 1.86 mm, height 0.78 mm, height 42 percent of length; USNM 139848, shell torn and distorted, measured length 1.79 mm, height 0.75 mm, height 42 percent of length (measurements of USNM 139848 should not be used in species diagnosis). Four ovigerous females, USNM 139849 and [USNM 139849]: length 1.88 mm, height 0.76 mm, height 40 percent of length; length 1.84 mm, height 0.78 mm, height 42 percent of length; length 1.91 mm, height 0.76 mm, height 40 percent of length; length 1.89 mm, height 0.79 mm, height 41 percent of length. USNM 141105, length 1.83 mm, height 0.75 mm, height 41 percent of length.

First antenna (Figure 17d-f): 1st joint with spines on lateral surface near distal dorsal corner and long hairs on medial surface; 2nd joint with short spinous lateral bristle and conspicuous bulge on dorsal margin bearing long spinous dorsal bristle; 2nd joint without lateral or medial spines and hairs; 3rd joint with minute ventral bristle and 6 long spinous dorsal bristles (5th and 6th bristles adjacent to each other, remaining bristles isolated; 3rd plus 4th joints quadrate, suture separating them indistinct; 4th joint with sublinear

distal margin and 3 bristles, 1 long spinous dorsal bristle and 2 slender ventral bristles (longer of these with short marginal spines and reaching just past distal end of 8th joint, shorter bristle bare or with few spines and reaching just past distal end of 5th joint; sensory bristle of 5th joint long, with 1 short proximal and 6 long terminal filaments; medial bristle of 6th joint with short marginal spines. Seventh joint: a-bristle about two-thirds length of bristle on 6th joint, with minute teeth forming row near middle of lateral surface; b-bristle almost as long as sensory bristle of 5th joint, with 5 filaments including tip; c-bristle reaching slightly past sensory bristle of 5th joint and with 4 marginal filaments near middle and 1 near tip. Eighth joint: d-bristle absent; e-bristle bare and not quite reaching tip of sensory bristle; f-bristle bent dorsally, with 4 short marginal filaments near middle and 1 near tip, filaments and bristle with marginal spines; g-bristle similar to c-bristle.

Second antenna (Figure 17g): Protopodite bare, without distomedial bristle. Endopodite weakly 3-jointed, terminal bristle about one-and-a-half times length of stem. Exopodite: 2nd to 8th joints with short spines forming row along distal margins; bristle of 2nd joint reaching just past 9th joint, with short marginal spines along ventral and dorsal margins; bristles of 2nd to 8th joints with natatory hairs; bristles of 3rd to 5th joints with marginal spines along proximal part of ventral margin; 9th joint with 2 long bristles with natatory hairs, 2 short bristles with short marginal spines, and lateral spine about three-fourths length of joint; small basal spines present on joints 4 to 8.

Mandible (Figure 17h,i): Coxale endite: short slender bristle present near base of ventral branch; ventral branch with 5 or 6 oblique rows of spines; tip of ventral branch with 3 minute spines (ventral of these stouter and about twice length of 2 dorsal spines); dorsal branch with small proximal spine just distal to tip of ventral branch, 4 rows of low nodes along ventral margin, and short main spine; margin between main spine and tip of dorsal branch with minute spines; tip of dorsal branch with short spinelike prolongation; bristle on dorsal margin of dorsal branch with base some distance from tip of dorsal branch and with marginal hairs (bristle extending well past tip of dorsal branch). Basale: endite with usual 4 pectinate end bristles,

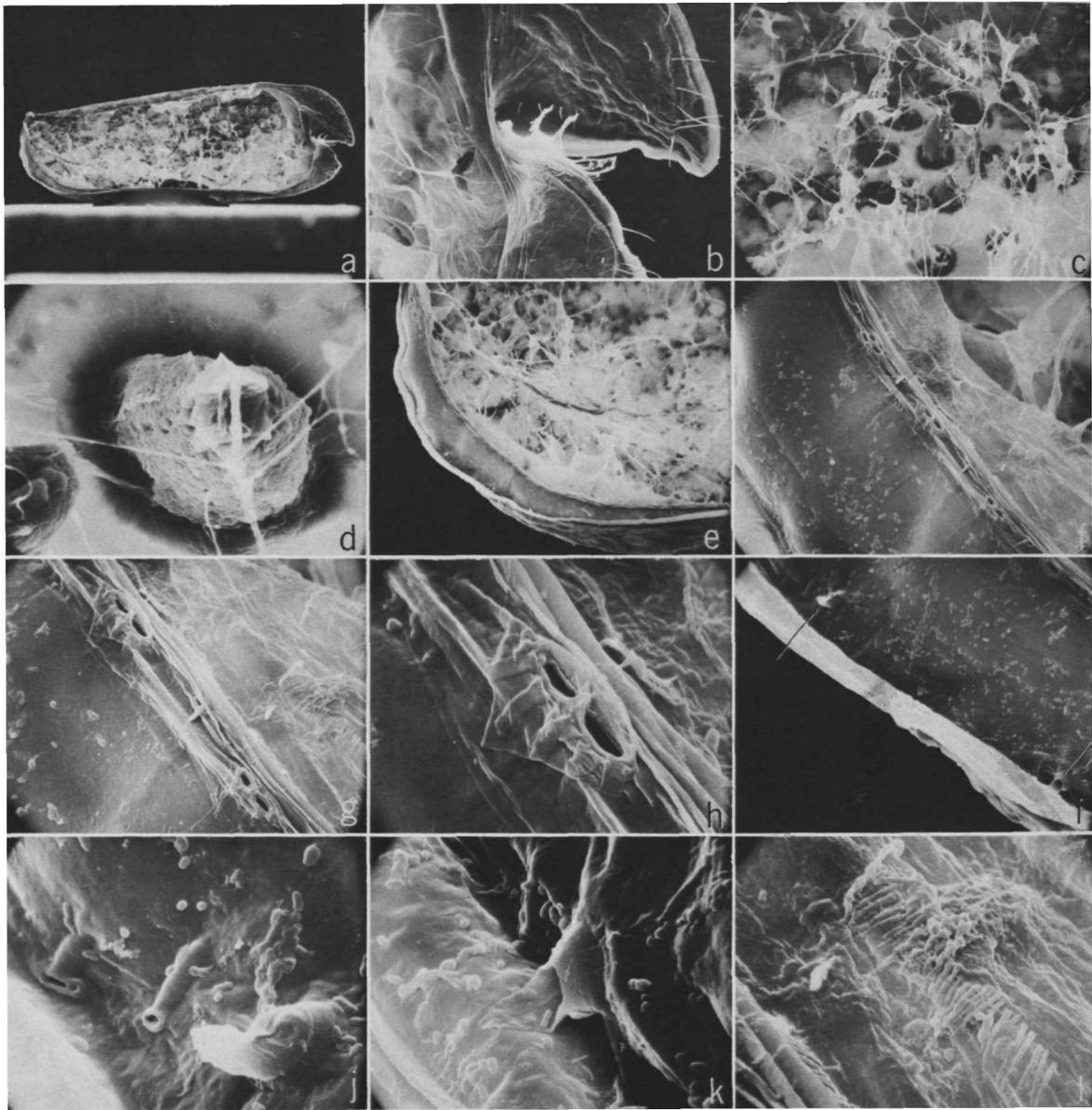


FIGURE 16.—*Cylindroleberis bacescui*, female, USNM 139849A, left valve, medial view: *a*, complete valve, dorsal margin folded inward, $\times 55$; *b*, detail of "*a*" showing incisure, $\times 300$; *c*, detail of "*a*" showing central muscle scars (note fragments of muscle attached to two scars), $\times 270$; *d*, detail of "*c*" showing lower muscle scar with fragment of attached muscle, $\times 2000$; *e*, posteroventral corner of valve, $\times 200$; *f*, detail of "*e*" showing list with flaplike bristles and single bristles between them (minute light colored elliptical objects are bacteria), $\times 1000$; *g*, detail of list shown in "*f*," $\times 2000$; *h*, detail of "*g*" showing flaplike bristle with tubes and pores at its base, $\times 5000$; *i*, detail of "*e*" showing two scooplike processes (arrows) and pores near posterior valve margin, $\times 1000$; *j*, detail of "*i*" showing two pores and upper scooplike process, $\times 5000$; *k*, detail of "*i*" showing lower scooplike process, $\times 5000$; *l*, detail of "*g*" showing bristles on vestment anterior to list, $\times 5000$. (Photos reduced to 52%.)

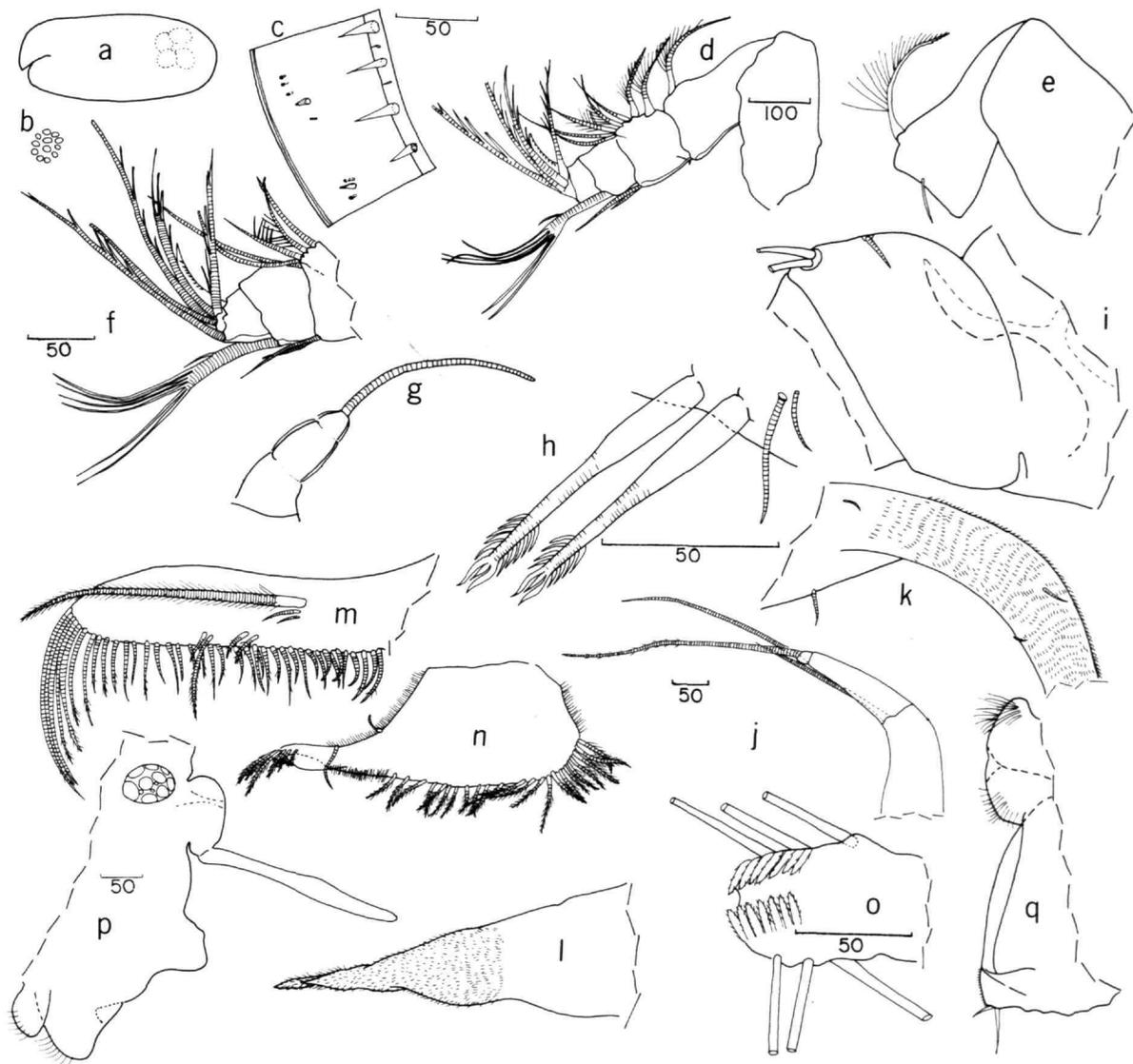


FIGURE 17.—*Cylindroleberis bacescui*, new species, female, [USNM 139844], holotype, length 1.86 mm: a, complete carapace showing position of eggs; b, sketch of central muscle scars on left valve, medial view; c, detail of posteroventral infold; d, left 1st antenna, medial view; e, joints 1 and 2 of right 1st antenna lateral view; f, tip of right 1st antenna in "d"; g, endopodite of right 2nd antenna, medial view; h, dwarf bristles and 2 triaenid bristles of basale endite of mandible, medial view; i, basale of right mandible, medial view; j, distal part of right maxilla, medial view; k, basale of left maxilla, medial view; l, epipodite of right maxilla, medial view; m, comb of left 5th limb, lateral view; n, left 6th limb, lateral view; o, tip of 7th limb; p, anterior of animal showing lateral eye, rod-shaped organ, and upper lip; q, posterior showing dorsum and last 2 claws on right furcal lamella. (Same magnification in microns: c, i, d, j, m; e, p, q; f, k, l; g, o.)

short glandular peg, 2 dwarf bristles (proximal of these about half length of distal bristle; longer dwarf bristle about half length of nearest triaenid bristle), 3 triaenid bristles with 4 or 5 pairs of marginal spines, excluding terminal pair; 1 triaenid bristle with 4 pairs of marginal spines (excluding terminal pair) present on ventral margin of basale near base of endite and proximal to U-shaped sclerotized process; dorsal margin of basale with 1 short bare midbristle (on 3 specimens examined midbristle bent medially and not projecting dorsally from margin) and 2 long spinous terminal bristles. Endopodite: 1st joint with 3 long spinous ventral bristles; ventral margin of 2nd joint with 3 spinous terminal bristles; dorsal margin with 1 short proximal bristle and stout spinous a-, b-, c-, and d-bristles; no lateral bristle present between b- and c-bristles; 1 long spinous lateral bristle present between c- and d-bristles; 1 short spinous medial cleaning bristle present just distal to base of b-bristle; 5 cleaning bristles forming oblique row near base of c-bristle; 1 long spinous medial bristle present at base of d-bristle (on left limb of holotype this bristle is aberrant, being quite short); medial surface of 2nd joint with few rows of short spines; end joint with dorsal claw with few minute teeth near middle of ventral margin, and 5 spinous bristles, 4 long, 1 short. Exopodite small, about one-fourth length of dorsal margin of 1st endopodite joint (length of exopodite including both terminal bristles).

Maxilla (Figure 17j-l): Epipodial appendage hirsute with pointed tip reaching past middle of dorsal margin of basale; endite I with 4 bristles, 3 long, 1 short; endite II with 3 long bristles. Basale hirsute with faint hairs on medial surface and dorsal margin; medial surface with 2 short bristles, 1 proximal, 1 distal, both near dorsal margin; ventral margin with 1 short proximal bristle, 1 minute faint distal bristle, and 1 long spinous terminal bristle. Endopodite: 1st joint with 1 short dorsal bristle and 1 long 6-bristle with faint marginal spines; end joint with long spinous terminal bristle extending past 6-bristle.

Fifth limb (Figure 17m); 2 short slender bristles present ventral to base of stout spinous exopodial bristle; 4 additional bristles present near ventral margin of comb.

Sixth limb (Figure 17n): Medial surface with minute bristle in anterodorsal corner more than

usual distance from anterior margin; anterior margin with 1 upper and 1 lower bristle; anteroventral corner with 6 or 7 bristles plus 1 ventrally located bristle on lateral flap; posteroventral margin with 23-26 spinous bristles; medial surface with hairs near ventral margin; lateral surface, anterior, posterior and ventral margins hirsute.

Seventh limb (Figure 17o): Proximal and distal groups each with 6 bristles (3 + 3), each bristle with 3 to 5 bells. Terminus consisting of opposing combs, each with about 14 spinous teeth.

Furca: Each lamella with 9 claws; posterior claw bent backward, most claws with teeth along posterior margins, some with hairs along anterior margin; short spines present on lamella posterior to bristle-like claw.

Rod-shaped organ: Elongate, broadening near middle, with rounded tip (Figure 17p).

Eyes: Medial eye bare (Figure 17p); lateral eye with about 9 large ommatidia; greatest length of lateral eye about two-thirds greatest length of medial eye.

Posterior: Dorsum spinous, forming small projecting process; posterior with long hairs (Figure 17q).

Upper lip: Consisting of 2 hirsute lobes and hirsute lateral flap on each side; no spines observed (Figure 17p).

Genitalia brush organ: Not observed; about 6 minute eggs present in ovaries [USNM 139844].

Eggs: [USNM 139844]—5 eggs; USNM 139848—8 eggs; USNM 139849, 4 specimens with 5, 9, 15 and 16 eggs.

DESCRIPTION OF ADULT MALE (Figure 18).—Carapace differing in lateral outline from female in having more open incisur and depressed postero-dorsal corner (Figure 18a); surface smooth with minute punctae visible under high magnification; hairs forming vertical row near posterior end of valve.

Infold: Behind rostrum without visible list, 7 bristles forming row parallel to upper margin of incisur and about 30 bristles dorsal to this row; 14 long bristles present parallel to and just within anteroventral valve margin ventral to incisur; broad anteroventral infold below incisur with 16 additional bristles; about 18 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of incisur, extending along ventral infold

and continuing onto posterior infold where it broadens; posterior broad list with about 31 broad transparent bristles and about 16 small bristles; generally not more than 1 small bristle between each pair of hyaline bristles; 12 long bristles present between posterior list and posteroventral margin of valve (bristles confined to area near ventral third-to-half of broad posterior list); 5 elongate processes present between broad posterior list and posterior margin of valve; several minute pores (or pegs) present near each process.

Selvage: Faint fringed selvage present along inner margin of lower edge of incisor.

Size: USNM 139845, length 2.02 mm, height 0.94 mm, height 46.5 percent of length.

First antenna (Figure 18*b,c*): Medial surface of 1st joint with long hairs forming clusters near ventral margin; 2nd joint with spines forming clusters on proximal half of medial surface, 1 spinous dorsal bristle on middle of dorsal margin, and 1 spinous lateral bristle; 3rd joint with 1 short ventral bristle and 6 spinous dorsal bristles; 4th

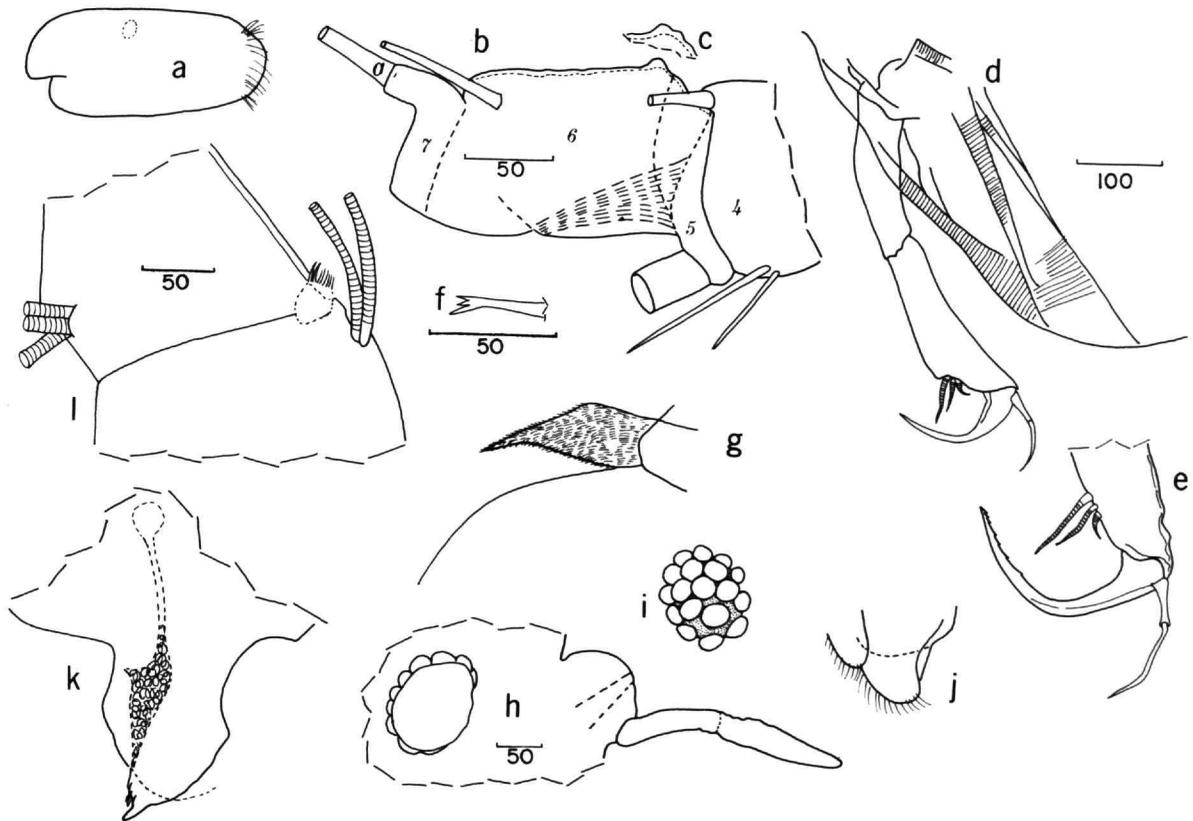


FIGURE 18.—*Cylindroleberis bacescui*, new species, adult male, [USNM 139845], length 2.02 mm: a, complete specimen showing position of lateral eye; b, tip of right 1st antenna, medial view (not all bristles shown); c, proximal knob on dorsal margin of 6th joint on left 1st antenna, lateral view; d, endopodite and part of protopodite of 2nd antenna; e, tip of endopodite shown in "d"; f, tip of ventral branch of coxale endite of mandible; g, epipodite of maxilla; h, rod-shaped organ, medial eye, and outline of right lateral eye; i, left lateral eye, anterior to left; j, upper lip, anterior to right; k, left copulatory organ, anterior to left; l, distal end of basale, exopodite, 1st endopodial joint, and part of 2nd endopodial joint of right mandible, medial view (midbristle on dorsal margin of basale, and suture separating 1st and 2nd joints of endopodite not shown). (Same magnification in microns: h-j; g, e, l; b, c, k.)

joint with 1 long spinous dorsal bristle and 2 short ventral bristles; 5th joint short with terminal margin fully extending across joint on lateral side, on medial side terminal suture not visible except near sensory bristle of 5th joint; sensory bristle of 5th joint reaching past 8th joint and with abundant filaments; medial bristle of 6th joint located near dorsal margin and with few marginal spines; ventral margin of 6th joint with indentation at distal end of muscle extending from 5th joint; dorsal margin of 6th joint slightly undulating, with proximal protuberance. Seventh joint: a-claw with faint teeth along ventral margin; b-bristle with 5 spinous marginal filaments, excluding stem; long c-bristle with tip missing, 35 filaments on remaining part. Eighth joint: d-bristle absent; e-bristle bare, about three-fourths length of b-bristle; long f-bristle with 33 filaments; g-bristle with 9–10 filaments including tip.

Second antenna (Figure 18*d,e*): Protopodite with few minute spines forming clusters on dorsal part of medial surface, and without medial bristle. Endopodite 3-jointed: 1st joint elongate bare; 2nd joint with 3 bristles distal to middle of ventral margin; proximal bristle of 3rd joint with stout proximal part; tip of 3rd joint serrate. Exopodite: 1st joint elongate bare; 2nd to 8th joint with long hairs forming clusters on inner distal margins; joints 2–7 with short faint spines forming row along terminal margins; bristles on joints 2–8 with natatory hairs; 9th joint obscure on both limbs.

Mandible (Figure 18*f,l*): Coxale endite similar to that on female limb. Basale endite with 4 slender spinous end bristles, 3 slender ventral bristles, 2 dwarf bristles and short glandular peg with numerous pores; additional slender bristle present on ventral margin of basale near endite (bristles in place of triaenid bristles are atypical, being very slender and bare or with only minute marginal teeth and not much different from end bristles); dorsal margin of basale with slender midbristle equal in length to about half width of basale at its middle (bristle not folded back as on female), and 2 terminal bristles. Exopodite hirsute with 2 terminal bristles, length less than one fourth length of dorsal margin of 1st endopodite joint. Endopodite: 1st joint with 3 long ventral bristles; ventral margin of 2nd joint with 3 terminal bristles; 2nd joint with 3 short proximal bristles, stout spinous a-, b-, c-, and d-bristles; lateral surface with

long spinous bristle between c- and d-bristles, but no bristle between b- and c-bristles; medial surface with 4 cleaning bristles between b- and c-bristles (one of these almost on dorsal margin of joint), 3 cleaning bristles forming row just proximal to c-bristle, 6 cleaning bristles forming row opposite c-bristle, and 1 long spinous bristle just distal to d-bristle; medial surface of 2nd joint with short faint spines forming clusters; 3rd joint similar to that on limb of female.

Maxilla (Figure 18*g*), 6th limb, 7th limb: Similar to those limbs on female.

Fifth limb: Not examined in detail, but, in general, morphology similar to that on female.

Furca: Right lamella with 9 claws, 10 on left; posterior claw bent backward; claws with more curvature than those on female.

Rod-shaped organ: Similar to that of female but some indication of middle suture (Figure 18*h*).

Eyes: Medial eye bare about same size as lateral eye; lateral eye with about 18 ommatidia (larger than lateral eyes on female). (Figure 18*h,i*).

Posterior and upper lip (Figure 18*j*): Similar to those on female.

Copulatory appendage: Triangular process with few bristles near elongate tip (Figure 18*k*).

COMPARISONS.—The new species *C. bacescui* is closely related to *C. grimaldi* (Skogsberg, 1920). The criteria by which the two species may be distinguished are as shown in Table 2. *Cylindroleberis*

TABLE 2.—Comparisons of characters of *Cylindroleberis bacescui*, new species, and *C. grimaldi* (Skogsberg, 1920). (B=with conspicuous bulge under bristle; F=oriented medially; L=sublinear; P=with proximal protuberance; R=projecting at right angles; S=smooth)

Characters	<i>C. grimaldi</i> *	<i>C. bacescui</i>
Length of female carapace (mm)	1.53–1.7	1.83–1.91
Length of male carapace (mm)	1.7–1.75	2.02
Number of hyaline bristles on posterior infold	18–20	ca. 32
Male 1st antenna, dorsal margin of 6th joint	S	P
Female 1st antenna, dorsal margin of 2nd joint	L	B
Female mandible, midbristle on dorsal margin of basale	R	F

* Data based on illustrations by Skogsberg (1920:514, fig. 99).

grimaldi var. *vicina* (Skogsberg, 1920:518) and *Cylindroleberis nodulifera* (Poulsen, 1965:449) differ from *C. bacescui* in not having a midbristle on the dorsal margin of the mandibular basale.

Cylindroleberis species indeterminate

MATERIAL.—USNM 141560, *Thalassa* station X054, 1 juvenile male, length 1.24 mm, height 0.59 mm, no lateral eyes; USNM 141823, 1 adult male, *Thalassa* station X068, length 1.96 mm, height 0.81 mm, resembles *C. bacescui*, new species, but with no dorsal midbristle on mandibular basale, and with 6-bristle of maxilla only about two-thirds length of terminal bristle, 1 female chonistomatid copepod present in brood chamber.

Prinotoleberis Kornicker, 1974

One species of this genus was collected in the study area, *Prinotoleberis pax*, new species.

DISTRIBUTION.—In the present collection, members of the genus were collected off Mauritania at depths of 96–338 m. Kornicker (1974b:00) reported another species of the genus from the Gulf of Naples at a depth of 55 m.

Prinotoleberis pax, new species

FIGURES 19, 20

HOLOTYPE.—[USNM 139842], ovigerous female, length 1.73 mm. Valves and some appendages in alcohol, remaining appendages on slides; in collection of the Museum of Natural History "Grigore Antipa," Bucharest.

TYPE-LOCALITY.—*Thalassa* station X048.

ETYMOLOGY.—The specific name from the Latin *pax* meaning "peace."

PARATYPE.—[USNM 141107], 1 ovigerous female from same sample as holotype; USNM 141108, 1 adult female with unextruded large eggs, from same sample as holotype; USNM 141109, 1 juvenile male, length 1.67 mm, height 0.81 mm; USNM 141260, 1 juvenile female, length 1.52 mm, height 0.71 mm; [USNM 141262], 5 specimens including 3 ovigerous females; USNM 141263, 11 specimens including 3 ovigerous females. All paratypes from same sample as holotype. [USNM 141107] and [USNM

141262] in collection of the Museum of Natural History, "Grigore Antipa," Bucharest.

ADDITIONAL SPECIMENS.—USNM 141821, 1 adult female; USNM 141824, 2 juvenile males, 12 juveniles and adults from *Thalassa* station X068; USNM 141828, 1 adult female from *Thalassa* station X008. All specimens in the collection of the National Museum of Natural History, Smithsonian Institution.

DISTRIBUTION.—Collected at three stations off Mauritania at depth of 96–338m (Figures 2, 3).

DESCRIPTION OF FEMALE (Figures 19, 20).—Carapace elongate with dorsal and ventral margins parallel (Figure 19a); deep incisor placed just below valve middle; posterior and anterior margins evenly rounded; surface smooth with minute punctae visible under high magnification.

Infold (Figure 19d–l): Behind rostrum with about 20 bristles along list, about 21 bristles between list and incisor forming 2 rows, and about 50 bristles anterior and dorsal to list; about 13 small bristles forming row along anterodorsal infold; about 75 bristles on broad anteroventral infold; about 100 bristles along ventral infold to point opposite lowermost hyaline flaplike bristle on posterior list. List beginning near inner margin of anterior part of infold, extending along ventral infold and continuing onto posterior infold where it broadens; posterior broad list with 17 to 18 broad transparent bristles and about 32 small bristles, 1 or 2 small bristles between each transparent bristle; 6 to 12 bristles between broad posterior list and posterior margin of valve (bristles opposite 5 ventrally located transparent bristles); 6 faint, minute processes present between posterior list and posterior valve margin.

Selvage: Lamellar prolongation with marginal fringe present along lower margin of incisor.

Size: [USNM 139842], holotype, length 1.73 mm, height 0.20 mm; [USNM 141107], length 1.65 mm, height 0.83 mm; USNM 141108, shell distorted, length only 1.65 mm; [USNM 141262], 3 ovigerous females, length 1.70 mm, height 0.82 mm; length 1.69 mm, height 0.78 mm; length 1.74 mm, height 0.81 mm, respectively.

First antenna (Figure 20c): 1st and 2nd joints with spines on lateral and medial surfaces; 2nd joint with short spinous lateral bristle and long spinous dorsal bristle; 3rd joint with short ventral bristle and 6 long spinous dorsal bristles; 3rd and

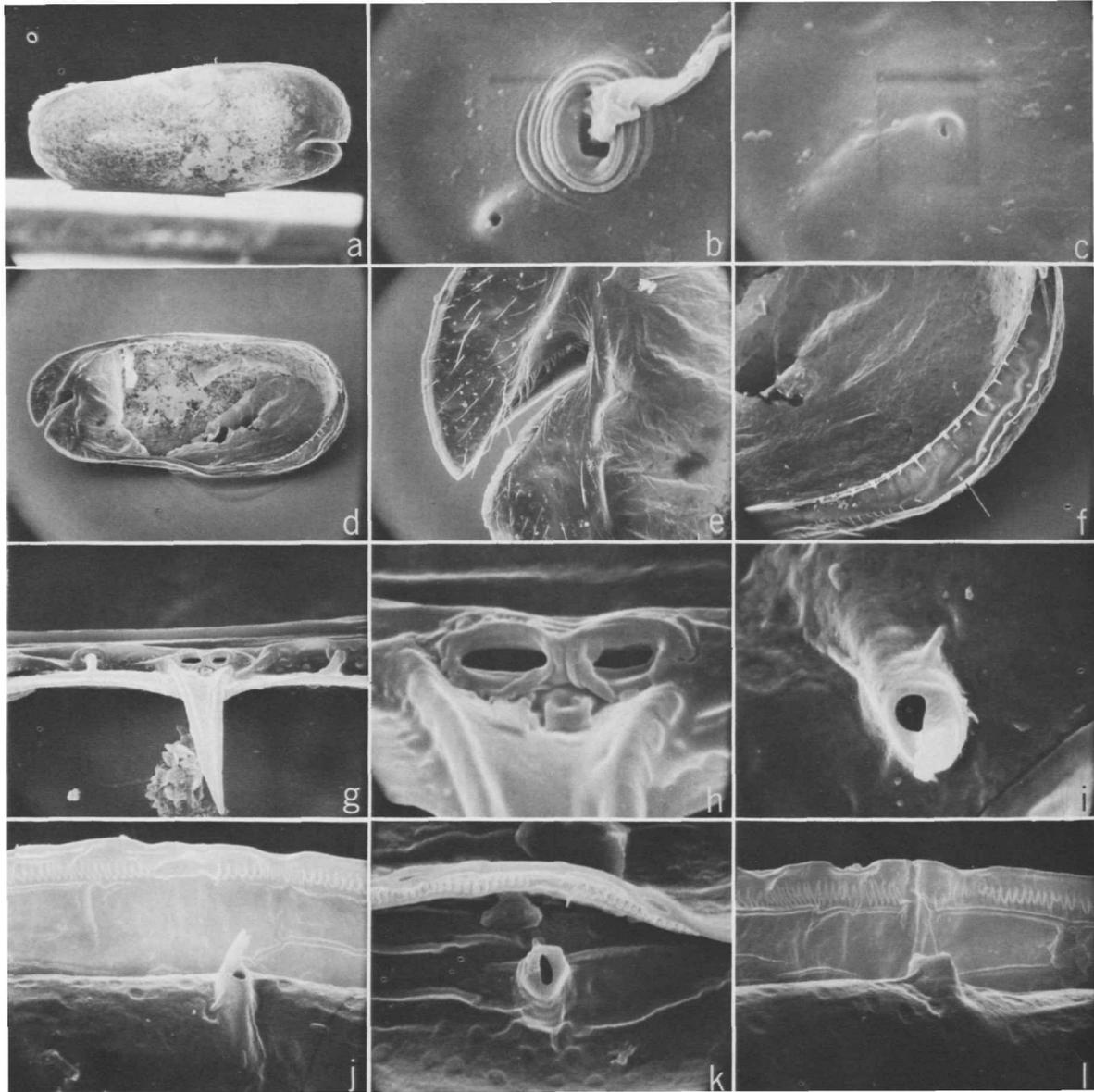


FIGURE 19.—*Prionotoleberis pax*, new species, female, USNM 141821, right valve: *a*, complete valve, lateral view, $\times 60$; *b*, detail of "*a*" showing concentrically ringed pore with hair, and minute satellite pore without hair, $\times 9000$; *c*, minute isolated simple pore without hair, $\times 9000$; *d*, complete valve, medial view, $\times 60$; *e*, detail of "*d*" showing anterior part, $\times 245$; *f*, detail of "*d*" showing posteroventral infold, $\times 190$; *g*, detail of "*f*" showing list with flaplike bristle having tube and pores at base, and single bristle on each side (posterior of valve towards bottom), $\times 2600$; *h*, detail of base of flaplike bristle shown in "*g*," $\times 11,500$; *i*, detail of "*f*" (see arrow on "*f*") showing lowermost posteroventral scooplike process on infold, $\times 6500$; *j*, oblique view of scooplike process shown in "*i*" (note that serrate selvage along posterior margin of valve, towards top, is missing opposite scooplike process), $\times 3000$; *k*, detail of "*f*" showing middle scooplike process and serrate selvage, along posterior margin of valve (towards top), $\times 3300$; *l*, oblique view of uppermost scooplike process in "*f*" (note discontinuous serrate selvage along posterior margin of valve, towards top), $\times 3300$. (Photos reduced to 52%.)

4th joints longer than wide and separated by distinct suture; 4th joint with linear distal margin, spines along ventral margin and 3 bristles, 1 long spinous dorsal bristle and 2 slender spinous ventral bristles (longer of these reaching past end of limb, shorter bristle reaching just past distal end of 5th joint); sensory bristle of 5th joint long, with short proximal bristle and 6 long terminal bristles; medial bristle of 6th joint with short marginal spines. Seventh joint: a-claw with minute teeth forming row near middle on lateral and medial sides; b-bristle with 5 filaments including tip (some filaments with marginal spines); c-bristle with 4 marginal filaments (tip broken off). Eighth joint: d-bristle represented by small spine; e-bristle bare, about three-fourths length of sensory bristle of 5th joint; f-bristle bent dorsally, with 4 marginal filaments near middle and 1 near tip (filaments with marginal spines); g-bristle with 4 marginal filaments near middle and 1 near tip.

Second antenna (Figure 20*d*): Protopodite with spines forming clusters along anterior margin and anterior (dorsal) part of medial surface, and small medial bristle. Endopodite 3-jointed, but suture between 2nd and 3rd joints indistinct; stem about two-thirds length of terminal bristle. Exopodite: 1st joint with spines forming rows along distal part of dorsal margin; 2nd to 8th joints with short spines forming row along distal margins; bristle of 2nd joint reaching past 9th joint and with spines along ventral margin and hairs along dorsal margin; bristles of 2nd to 8th joints with natatory hairs and proximal marginal spines; 9th joint with large lateral spine about same length as joint, and 4 bristles (2 long with natatory hairs, 2 short with short marginal spines); large basal spines present on joints 4 to 8.

Mandible (Figure 20*e,f*): Coxale with abundant spines on medial and lateral surfaces; coxale endite with small slender bristle present near base of ventral branch (both branches broken off on holotype). Basale: endite with usual 4 pectinate end bristles, 2 dwarf bristles (length of dwarf bristles less than one-half length of triaenid bristle), elongate glandular peg, and 3 triaenid bristles with 3 or 4 pairs of marginal spines, excluding terminal pair (right mandible of holotype with only 1 triaenid bristle); 1 triaenid bristle with 2 pairs of marginal spines, excluding terminal pair, present on ventral margin of basale near base of endite and proximal to U-

shaped sclerotized process (no bristle on right mandible of holotype); dorsal margin of basale with 1 fairly long spinous medial bristle (length of bristle slightly shorter than length of basale) and 2 long spinous terminal bristles; numerous spines present on lateral surface of basale and along proximal part of dorsal margin. Exopodite about same length as dorsal margin of 1st endopodite joint, with hirsute tip and 2 short hirsute subterminal bristles. Endopodite: 1st joint with 3 long spinous ventral bristles; ventral margin of 2nd joint with 3 spinous terminal bristles; dorsal margin with 1 short spinous proximal bristle and stout spinous a-, b-, c-, and d-bristles (c-bristle slightly broader and shorter than other bristles); no lateral bristle present between b- and c-bristles; 2 medial spinous cleaning bristles present between a- and b-bristles, 3 between b- and c-bristles, and 5 between c- and d-bristles; 1 long spinous medial bristle present at base of d-bristle; 1 long spinous lateral bristle present between c- and d-bristles; medial surface with spines forming clusters; end joint with dorsal claw and 5 spinous bristles, 4 long, 1 short. Coxale endite of paratype [USNM 141107] (ovigerous female) with 4 oblique rows of spines on ventral branch; terminal end of branch with 3 short stout spines; dorsal branch with 3 proximal pairs of angular teeth and 2 distal rows of rounded teeth along ventral margin; main spine short; a short spine present on margin just distal to main spine; tip of dorsal branch of specimen obscure.

Maxilla (Figure 20*g*): Epipodite hirsute with rounded tip not reaching middle of dorsal margin of basale; endite I with 4 bristles, 3 long, 1 short; endite II with 3 long bristles. Basale extremely hirsute with long hairs on medial and dorsal surfaces; medial surface with 6 short bare bristles near dorsal margin, 1 proximal, 5 distal; lateral surface with 1 short proximal bristle near middle; ventral margin with 1 fairly long proximal bristle and 1 long spinous terminal bristle. Endopodite: 1st joint with 1 short dorsal bristle and 1 long 6-bristle with faint marginal spines; end joint with long spinous terminal bristle extending past 6-bristle.

Fifth limb (Figure 20*h,i*): Epipodial appendage with 70 bristles; 1 or 2 slender bristles present ventral to base of stout spinous exopodial bristle; 4 additional bristles present near ventral margin of comb.

Sixth limb (Figure 20*j*): Medial surface with

minute bristle in anterodorsal corner; anterior margin with upper and lower bristles; anteroventral corner with 6 short hirsute bristles forming row; lateral flap with 1 or 2 short bristles on proxi-

mal anterior margin; posteroventral margin with 19–23 spinous bristles; medial surface and anterior, posterior, and anteroventral margins hirsute.

Seventh limb (Figure 20*k,l*): Proximal and distal

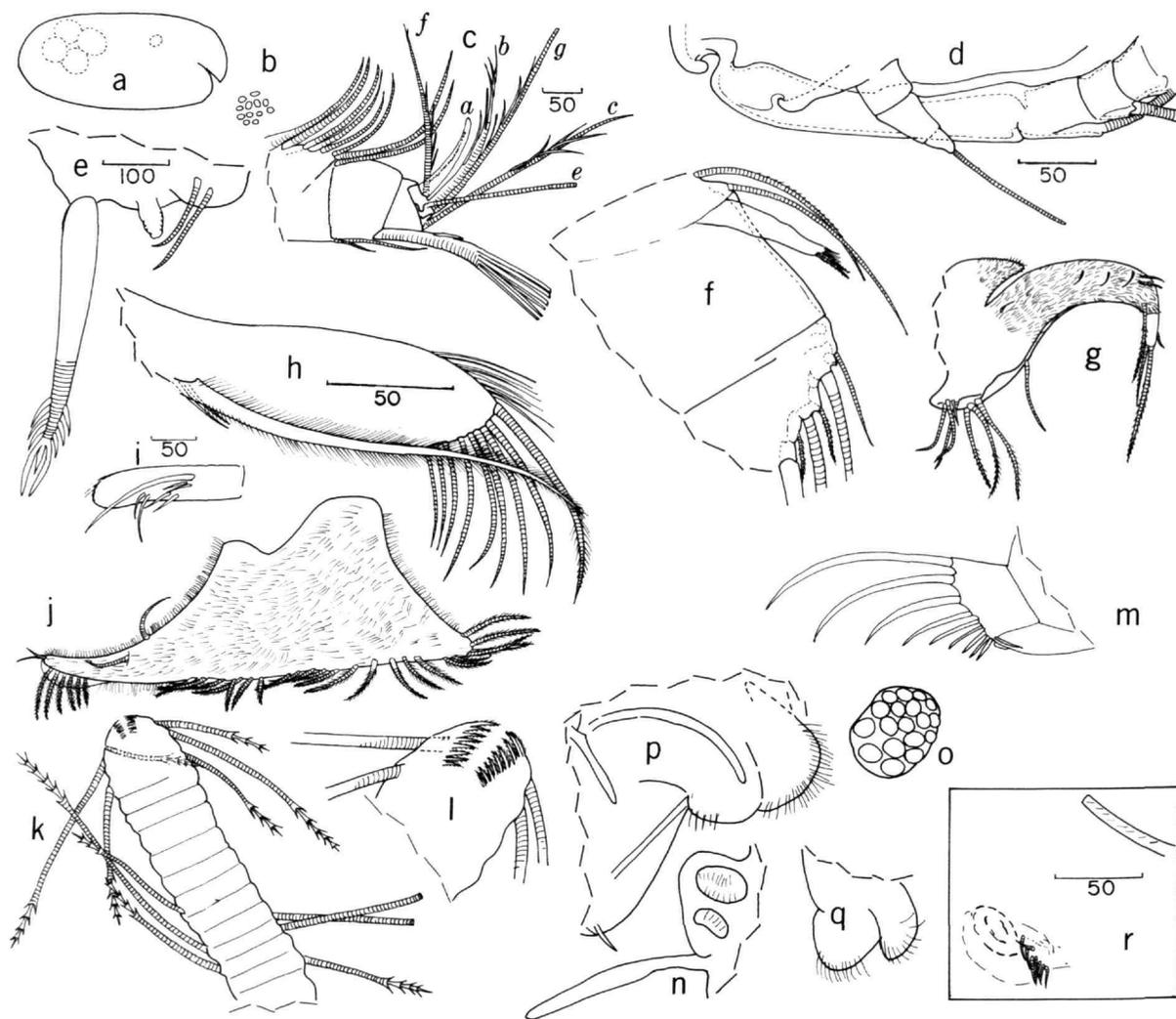


FIGURE 20.—*Prionotoleberis pax*, new species, female, [USNM 139842], holotype, length 1.73 mm: a, complete specimen showing position of eggs and lateral eye; b, sketch of central muscle scars on right valve, lateral view; c, tip of right 1st antenna, lateral view; d, endopodite and part of exopodite of right 2nd antenna, medial view; e, part of basale endite of left mandible showing one triaenid bristle, glandular peg, and two dwarf bristles, medial view; f, exopodite and parts of basale and 1st and 2nd endopodial joints of right mandible, lateral view; g, left maxilla, medial view; h, comb of right 5th limb showing upper exopodial bristles, lateral view; i, comb of left 5th limb, lateral view; j, right 6th limb, medial view; k, 7th limb; l, detail of tip of 7th limb; m, left furcal lamella; n, medial eye and rod-shaped organ; o, lateral eye; p, dorsum, anterior to left; q, upper lip, anterior to left; r, genitalia and brush organ. (Same magnification in microns: c, g, j; d, k; e, f; h, l; i, m–q.)

groups each with 6 bristles (3 + 3); each bristle with 3 to 5 bells. Terminus consisting of opposing combs, each with about 16 spinous teeth.

Furca: Each lamella with 10 claws of which posterior 3 are small bristle-like; claws 1 to 7 with teeth forming 2 rows along concave posterior margins and hairs along anterior margins; small spinous process present on lamella posterior to last bristle.

Rod-shaped organ (Figure 20n): Elongate with rounded tip.

Eyes: Medial eye bare (Figure 20n); lateral eye (Figure 20o) about the same size as medial eye, with 18 ommatidia.

Posterior: Dorsum forming right angle (it is possible that a bent thumblike process could be obscured by gills); posterior extremely hirsute (Figure 20p).

Upper lip (Figure 20q): Consists of 2 hirsute lobes and hirsute lateral flap on each side; anterior spines not observed (either absent or minute).

Genitalia and brush organ (Figure 20r): Genitalia consisting of oval sclerotized process on each side anterior to furca; brush organ consisting of about 7 minute ringed bristles.

Eggs: [USNM 139842] with 8 eggs in marsupium; [USNM 141107] with 9 eggs.

PARASITES.—USNM 141109, a juvenile male ostracode with 1 female and 1 male choniostomatid copepod and 6 clones of copepod eggs; USNM 1411260, a juvenile female ostracode with 1 female choniostomatid copepod and 2 copepod egg-clones.

COMPARISONS.—Only 1 species of this genus has been described previously, *Prionotoleberis gyion* Kornicker, 1974b. The present species differs from that in having 6 bristles along the dorsal margin of the basale of the maxilla, and in not having small bristles on the 2nd endite of the maxilla.

Polyleberis Kornicker, 1974

One species of this genus was collected in the study area, *Polyleberis mackenziei* Kornicker, 1974b.

DISTRIBUTION.—In the present collection, representatives of the genus (1 species) were collected off Mauritania at depths of 20–480 m. Kornicker (1974b) reported the same species in the Gulf of Naples.

Polyleberis mackenziei Kornicker, 1974

FIGURES 21–23

Polyleberis mackenziei Kornicker, 1974b:50, figs. 21, 22.

HOLOTYPE.—Female without eggs (may not be mature) in collection of Zoological Station of Naples.

TYPE-LOCALITY.—Gulf of Naples, Italy.

MATERIAL.—[USNM 141815], 1 adult female from *Thalassa* station X033, some appendages on slide, other appendages and valves in alcohol; [USNM 141814], 1 adult female from *Thalassa* station X043; USNM 141816, 1 adult, 2 juveniles, from *Thalassa* station X033; USNM 141820, 1 juvenile male from *Thalassa* station X41; USNM 141272, 1 ovigerous female and USNM 141273, adult female, from *Thalassa* station X042; USNM 143970, 3 juvenile males and USNM 143971, 3 unsexed juveniles, from *Cornide de Saavedra* station A1, sample 10. [USNM 141814] and [USNM 141815] in Museum of Natural History "Grigora Antipa," Bucharest.

DISTRIBUTION.—Collected at five stations off Mauritania at depths of 20–480 m (Figures 2, 3). Kornicker (1974b:50) reported the species from the Gulf of Naples.

DESCRIPTION OF FEMALE (Figures 21, 22).—Carapace elongate in lateral view with linear dorsal and ventral margins (Figure 22a); incisur placed just below valve middle; posterior margin evenly rounded; slight recess in anteroventral margin visible with transmitted light.

Infold (Figure 21d–f, 22b): Infold of rostrum with about 5 bristles along list, 8 bristles between list and incisur, and about 22 bristles anterior and dorsal to list; about 20 bristles on broad anteroventral infold, and about 15 bristles along ventral infold to point opposite lowermost flaplike bristle on posterior list, broad posterior list with about 24 broad transparent bristles, and about 13 short bristles, not more than 1 short bristle between a pair of transparent bristles; 8 fairly long bristles ventral to 5 posterior processes present on posterior infold between broad posterior list and posterior margin of valve; about 35 minute faint pores forming row just posterior to processes in dorsal half of posterior infold.

Selvage: Lamellar prolongation with marginal fringe present along lower margin of incisur.

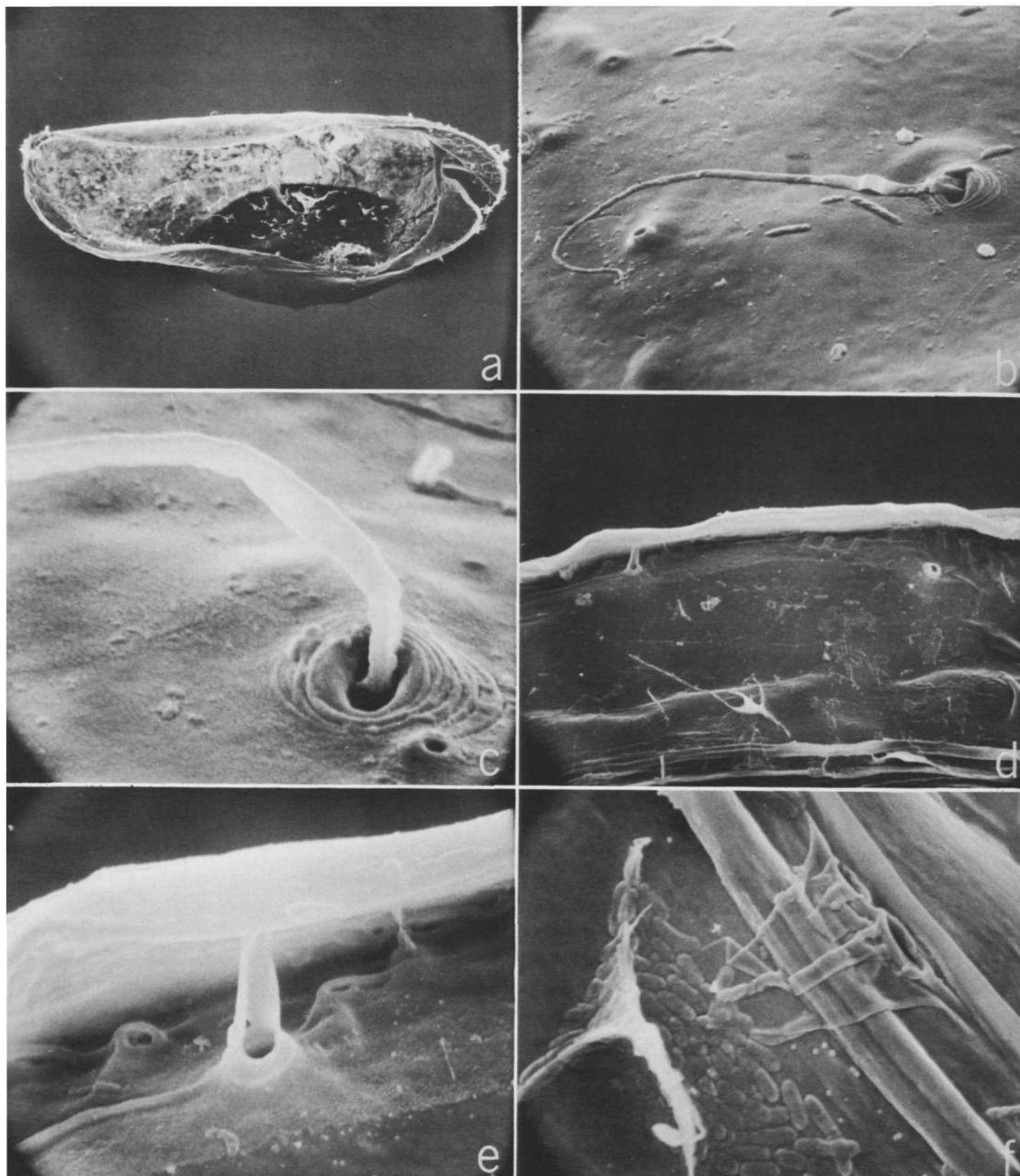


FIGURE 21.—*Polyleberis mackenziei*, female, USNM 141272, left valve: *a*, complete valve, medial view (ventral and dorsal margins folded inward), $\times 55$; *b*, lateral surface near dorsal margin showing concentrically ringed pore with hair and minute pore without hair, $\times 3600$; *c*, lateral surface near dorsal margin showing concentrically ringed pore with hair and minute satellite pore, $\times 10,000$; *d*, detail of posterior infold with posterior end of valve (towards top) and list (horizontal across bottom), open pores and two scooplike processes are just within posterior margin of valve (process on right has tip broken off and appears as open pore), $\times 1000$; *e*, detail of “*d*” showing left scooplike process and associated pores, $\times 5000$; *f*, detail of middle part of list in “*d*” showing flaplike bristle with tubes and pores at its base (posterior end of valve to left; elliptical objects are bacteria), $\times 5000$. (Photos reduced to 73½%.)

Size: [USNM 141814], length 1.81 mm, height 0.79 mm, height 44 percent of length; [USNM 141815], length 1.96 mm, height 0.77 mm, height 39 percent of length; USNM 141816 (adult), length 1.89 mm, height 0.82 mm, height 43 percent of length; USNM 141272, length 1.91 mm, height 0.78 mm, height 41 percent of length; USNM 141273, length 1.88 mm, height 0.76 mm, height 41 percent of length.

First antenna (Figure 22c,d): 1st joint with hairs forming clusters on lateral surface near distodorsal corner; 2nd joint with long spinous dorsal bristle and short spinous lateral bristle; dorsal margin of 2nd joint forming slight bulge at base of bristle; combined 3rd and 4th joints quadrate with distinct diagonal suture; 3rd joint with short ventral bristle and 6 long spinous dorsal bristles; 4th joint with linear dorsal margin, 1 long spinous dorsal bristle and 2 slender ventral bristles (longer of these with short marginal spines and reaching past 8th joint, smaller bristle bare and reaching middle of 6th joint; sensory bristle of 5th joint of left limb of [USNM 141815] with 7 long filaments, proximal of these more slender and shorter than others (both limbs of [USNM 141814] with 8 filaments); medial bristle of 6th joint spinous, reaching well past tip of a-claw of 7th joint. Seventh joint: a-claw short with few serrations on ventral margin near tip; tip blunt on left limb of [USNM 141815], b-bristle with 5 filaments including tip, some with marginal spines; c-bristle broken on [USNM 141815], with 5 filaments on remaining part. Eighth joint: d-bristle represented by minute point; e-bristle bare reaching just past tip of sensory bristle of 5th joint; f-bristle of [USNM 141815] with 4 marginal filaments; g-bristle broken on [USNM 141815], 4 filaments on remaining part.

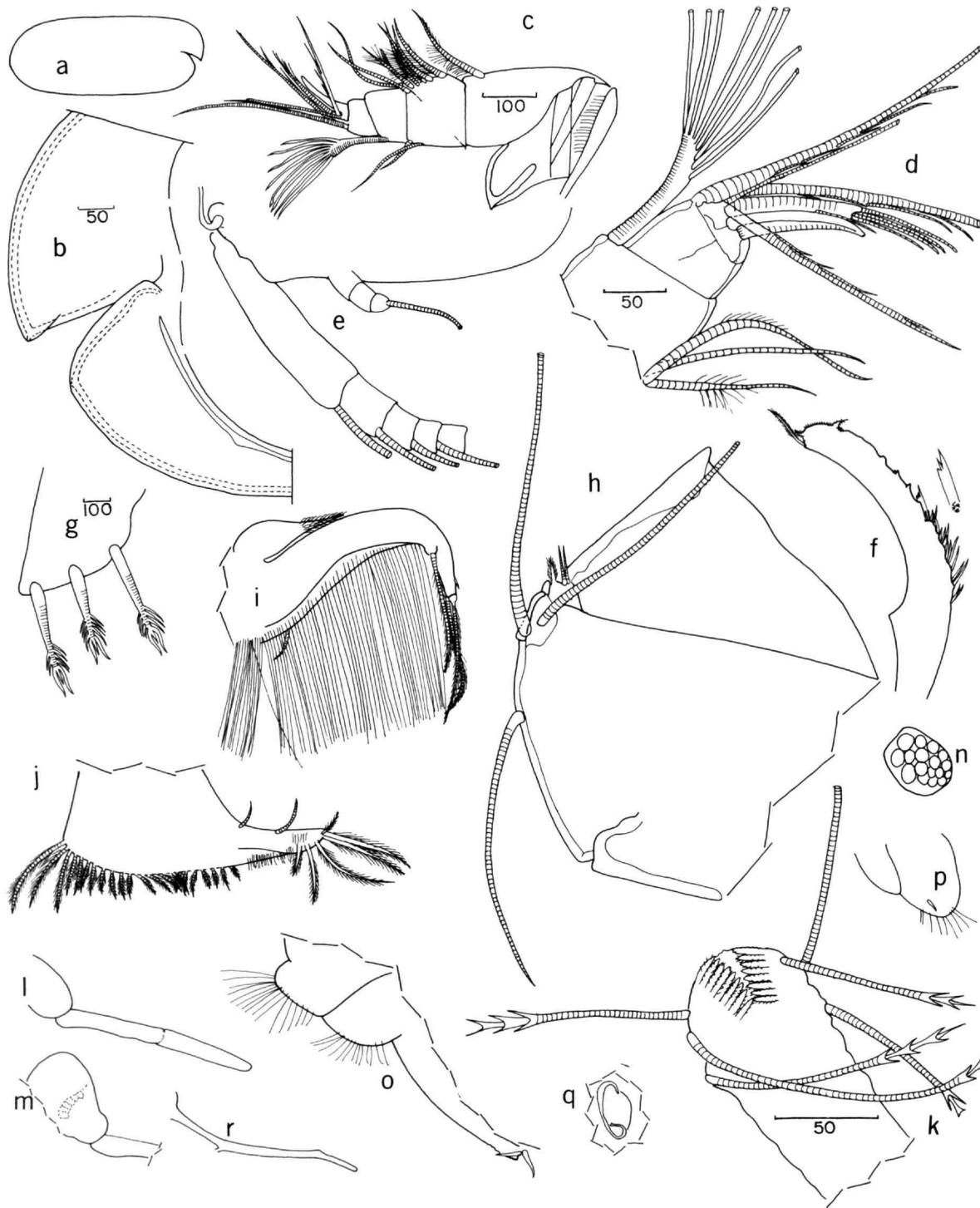
Second antenna (Figure 22e): Protopodite with short medial bristle. Endopodite weakly 3-jointed, terminal bristle slightly longer than stem of endopodite. Exopodite: bristle of 2nd joint spinous, just reaching distal margin of 9th joint; joints 4 to 8 each with basal spine, joint 9 with lateral spine about half length of joint; joints 2 to 8 with comb of short spines forming row along distal margin; bristles on joints 3 to 8 and 2 long bristles of 9th joint with spines along ventral margin and with natatory hairs; 9th joint with 3 bristles, 2 long, 1 short with short marginal spines; distal medial end

of 3rd joint with hairs about three-fourths length of 4th joint forming row.

Mandible (Figure 22f-h): Coxale endite: Ventral branch with about 6 rows of ventral spines and 2 or 3 minute terminal teeth; dorsal branch with 4 or 5 ventral knobs, short main spine and short terminal bristle; dorsal bristle with base opposite main spine, with marginal hairs; small bristle present near base. Basale: endite with 4 end bristles, 3 triaenid bristles with 3 or 4 pairs of spines not including terminal pair, glandular peg, and 2 dwarf bristles (1 of these about twice length of other); ventral margin of basale with U-shaped indentation and, proximal to it, 1 triaenid bristle with 4 pairs of spines not including terminal pair; dorsal margin with fairly long midbristle (about length of dorsal margin of basale) with faint marginal spines, and 2 slender spinous fairly long terminal bristles. Endopodite: 1st joint with 3 long spinous ventral bristles; dorsal margin of 2nd joint with short proximal bristle and stout spinous a-, b-, c-, and d-bristles; medial surface with short spines forming clusters, short cleaning bristle distal to a-bristle, 5 cleaning bristles forming oblique row proximal to b-bristles, and 1 long spinous bristle distal to base of d-bristle; lateral surface without bristle between b- and c-bristles, with 1 long spinous bristle between c- and d-bristles; ventral margin of joint with 3 spinous terminal bristles; end joint with short straight dorsal claw, and 5 spinous bristles. Exopodite minute with short terminal bristles and hirsute tip, process including bristles not reaching one-third distance along dorsal margin of 1st endopodite joint.

Maxilla (Figure 22i): Endite I with 3 long and 1 short bristle; endite II with 3 long spinous bristles; epipodite pointed, hirsute, not reaching middle of dorsal margin of basale. Basale hirsute; ventral margin with short proximal, minute distal, and long spinous terminal bristle; lateral surface with 1 short proximal bristle; medial surface with 1 short slender distal bristle near dorsal margin. Endopodite: 1st joint with short dorsal bristle and long spinous 6-bristle; terminal bristle of 2nd joint spinous and only slightly longer than 6-bristle.

Fifth limb: Lateral side of comb with 2 slender bristles ventral to base of long spinous exopodial bristle and 2 pairs of bristles near ventral margin; dorsal margin of comb without hairs except near distal end.



Sixth limb (Figure 22j): Anterior margin with short upper and long lower bristle; anteroventral tip with 5 bristles plus 1 slender bristle on lateral flap. Posteroventral margin with 21–24 bristles which decrease in length anteriorly along margin; posterior 3 bristles much longer than others; posterior 9–14 bristles with long hairs; anterior 13–14 bristles with long proximal and short distal hairs. Medial side with 2 short bristles near proximal anterior corner.

Seventh limb (Figure 22k): Each limb with 12 bristles, 6 proximal, 3 on each side, and 6 distal, 3 on each side; each bristle with 2–4 terminal bells; opposing combs with about 15 spinous teeth.

Furca: Each lamella with 9 claws; claw 9 oriented posteriad; claws with teeth along concave margins; claws 1–6 with hairs along distal anterior margin; comb of spines on lamella posterior to last claw; margin of lamella following comb also with short spines.

Rod-shaped organ: Organ broadening near middle, with rounded tip (Figure 22l).

Dorsum (Figure 22o): Forming almost right angle, spinous.

Upper lip: Hirsute with anterior spine; lateral flap hirsute (Figure 22p).

Eyes: Lateral eye (Figure 22n) about same size as medial eye, with about 18 ommatidia. Medial eye (Figure 22m) without hairs.

Genitalia: Ovoid with sclerotized ring (Figure 22q).

Eggs: USNM 141272 with 4 or 5 eggs.

PARASITES.—One cyproniscid isopod in marsupium of USNM 141273, an adult female with unextruded eggs.

FIGURE 22.—*Polyleberis mackenziei*, female: a, complete specimen, length 1.96 mm; b, anterior of right valve (bristles not shown), medial view; c, right 1st antenna, medial view; d, tip of "c"; e, endopodite and proximal part of exopodite of right 2nd antenna, medial view; f, coxale endite of mandible; g, triaenid bristles on basale endite of mandible; h, basale, exopodite, and 1st endopodite joint of left mandible, lateral view; i, left maxilla (not all bristles shown), medial view; j, right 6th limb, lateral view; k, tip of 7th limb; l, medial eye and rod-shaped organ; m, medial eye and proximal part of rod-shaped organ; n, left lateral eye; o, dorsum, anterior to right; p, upper lip, anterior to right; q, right genitalia; r, left γ -sclerite of furca, anterior to left. ([USNM 141815]: a, b, e, g, h, j–l, o–r. [USNM 141814]: c, d, f, i, m, n. Same magnification in microns: b, i, l–r; c, j; d–f; k, h.)

DESCRIPTION OF JUVENILE MALE (Figure 23).—Size: USNM 143970, 2 specimens, length 1.57 mm, height 0.69 mm; length 1.56 mm, height 0.64 mm, respectively. USNM 141820, length 1.91 mm, height 0.80 mm.

First antenna: Sensory bristle of 5th joint of USNM 143970 with 7 terminal filaments, proximal of these about one-half length of remaining 6.

Polyleberis species indeterminate

MATERIAL.—USNM 143973, 1 juvenile female, length 1.22 mm, height 0.50 mm, from *Cornide de Saavedra* station A4b, sample 12 (this specimen had only 6 terminal filaments on the sensory bristle of the 1st antenna); USNM 143974, 1 juvenile female, length 1.24 mm, height 0.52 mm, from *Cornide de Saavedra* station A3a, sample 11 (sensory bristle on 1st antenna similar to that of USNM 143973).

CYLINDROLEBERIDINAE genus indeterminate

MATERIAL.—One adult male, *Thalassa* station X046, length 1.28 mm, height 0.70 mm, no lateral eyes, fairly long midbristle on mandibular basale, exopodite of mandible almost reaching middle of 1st endopodite joint, no lateral bristle between b- and c-bristles on 1st endopodite joint of mandible; 1 A-1 male, Dakar, length 1.52 mm, height 0.86 mm, no lateral bristle between b- and c-bristles on 1st endopodial joint of mandible, long exopodite on mandible, no midbristle on dorsal margin of basale of mandible, dorsal margin of basale of maxilla with 1 short proximal bristle and 1 short distal bristle; sensory bristle of 1st antenna with 1 short proximal bristle and 6 long terminal bristles, large lateral eye; 2 adult males, Dakar, length 1.49 mm, height 0.91 mm, length 1.42 mm, height 0.84 mm, exopodite of mandible long, long lateral bristle between b- and c-bristles on 1st endopodial joint of mandible, no dorsal bristle on basale of mandible, large lateral eyes, no processes on posterior infold.

CYCLASTEROPINAE Poulsen, 1965

This subfamily is represented in the study area by two genera, *Cycloleberis* Skogsberg, 1920, and *Asteropteron* Skogsberg, 1920.

DISTRIBUTION.—Members of this subfamily are

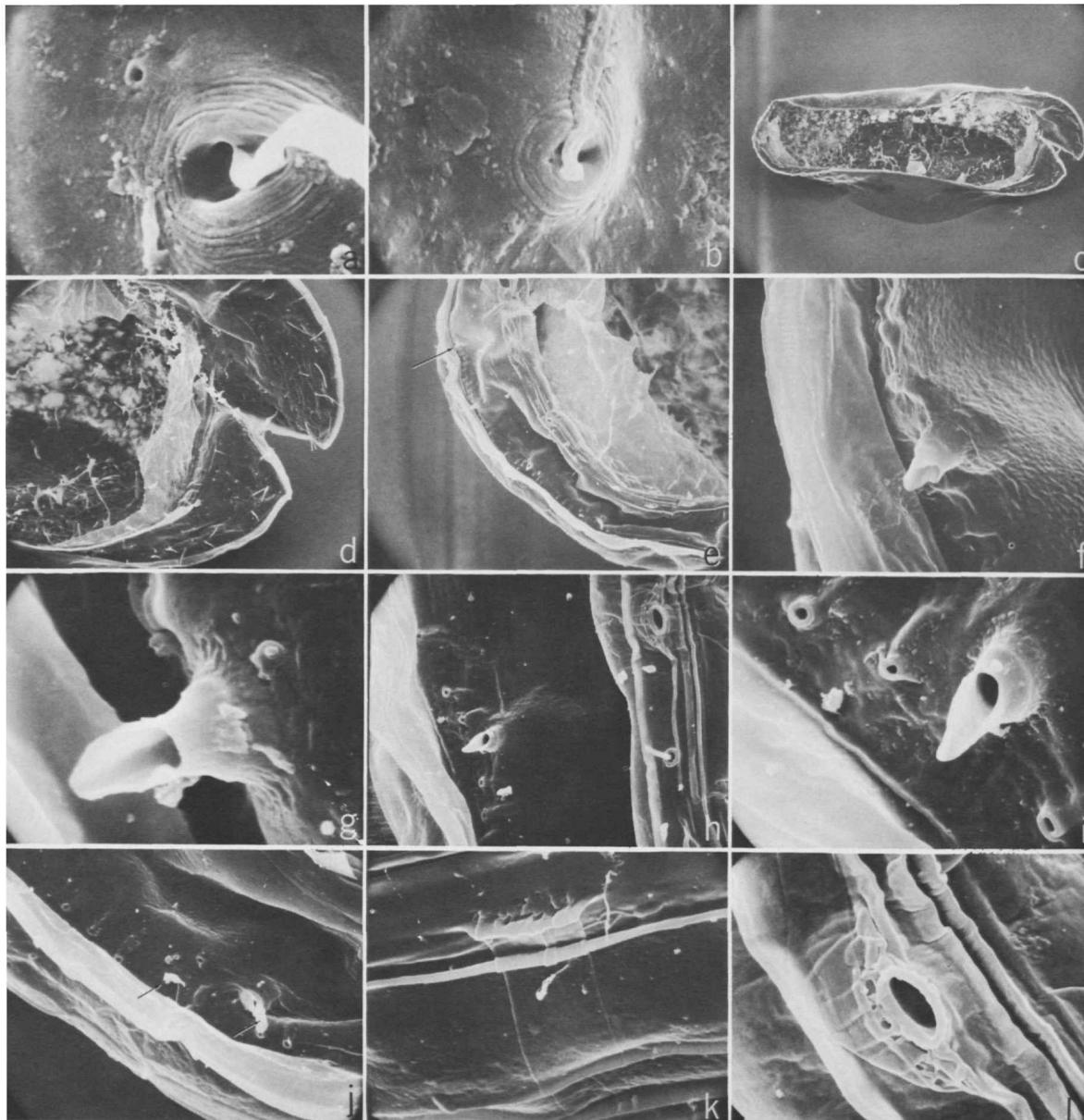


FIGURE 23.—*Polyleberis mackenziei*, A-1 male, USNM 143970A, left valve. Lateral surface: *a*, concentrically ringed pore with hair and smaller satellite pore without hair near anterior margin of valve, $\times 13,000$; *b*, concentrically ringed pore with hair near posterior of valve, $\times 10,000$. Medial surface: *c*, complete valve, dorsal margin folded inward, $\times 62$; *d*, detail of "*c*" showing anterior end, $\times 190$; *e*, detail of "*c*" showing posteroventral end, $\times 440$; *f*, detail of "*e*" (see arrow in "*e*") showing upper scooplike process and pore dorsal to process (note serrate selvage along part of margin of valve), $\times 3800$; *g*, detail of "*e*" showing scooplike process second from top, $\times 10,000$; *h*, detail of "*e*" showing scooplike process third from top, two pores on each side, list with single bristle, and flaplike bristle having tubes and a single large pore at its base, $\times 2000$; *i*, detail of "*h*" showing scooplike process and three pores, $\times 6500$; *j*, detail of "*e*" showing scooplike process fourth from top and adjacent pores (note faint serrate selvage along edge of valve; white objects indicated by arrows are debris), $\times 1000$; *k, l*, detail of "*e*" showing flaplike bristle and associated tubes and pores, $\times 6200$. (Photos reduced to 52%.)

widespread between latitudes of about 40°N to 50°S. Previously known depth range was 1–100 m (Kornicker, in press). The depth is increased to 1100 m herein.

Key to the Genera of Cyclasteropinae in This Study

Surface of carapace smooth	<i>Cycloleberis</i>
Surface of carapace with lobate processes or U-shaped midrib	<i>Asteropteron</i>

Cycloleberis Skogsberg, 1920

The collection contained one adult male and several juveniles of *Cycloleberis squamiger*, new combination.

DISTRIBUTION.—The genus *Cycloleberis* is world-wide between latitudes of about 41°N and 47°S. Previously known depth range was from intertidal depths to 65 m. The present collection increases the maximum depth to 1100 m.

Cycloleberis squamiger (Scott, 1894), new combination

FIGURES 24–31

Asterope squamiger Scott, 1894:140, pl. 14: fig. 58, pl. 15: figs. 24, 28, 29, 31.—Müller, 1912:52 [*Cypridinarum* genera dubia et species dubiae].

Cyclasterope lobiancoi.—Klie, 1943:50, figs. 1–4.

LECTOTYPE.—A juvenile instar in the British Museum (Natural History), designated herein (label in British Museum: "*Asterope squamiger*").

TYPE-LOCALITY.—São Thomé Island, Portugal.

MATERIAL.—USNM 143798, 1 adult male from *Thalassa* station X052; USNM 143992, 2 juveniles from *Thalassa* station X052; [USNM 143980], 1 juvenile from *Thalassa* station X033; [USNM 143976], 1 juvenile female, length 2.45 mm, height 2.05 mm, from *Thalassa* station X044; USNM 143993; 1 juvenile female from *Thalassa* station X044. USNM 143978, 1 juvenile male, length 3.77 mm, height 3.06 mm, from *Cornide de Saavedra* station A7b, sample 14; USNM 143990, 1 juvenile female, length 2.42 mm, height 2.05 mm, from *Cornide de Saavedra* station A3a, sample 11; USNM 143991, 1 juvenile from *Cornide de Saavedra* station A1a, sample 10. [USNM 143980] and [USNM 143976] deposited in the collection of the Museum of Natural History "Grigora Antipa," Bucharest, Romania.

DISTRIBUTION.—Specimens assigned to *Cycloleberis squamiger* were collected from 5 localities off

the coast of Mauritania and 1 off the coast of Spanish Sahara at depths of 20 to 1100 m (Figures 2, 3).

Kornicker examined specimens, identified by Klie (1943) as *Cyclasterope lobiancoi* (Müller, 1894), from the Hamburg Zoological Museum. These specimens consisted of a vial containing 4 disarticulated valves and a complete undissected juvenile, a label with the number "10" and a second label stating, "*Cyclasterope lobiancoi* (G. W. Müller) Mauritanien: Muschelgrunde vor Port Etienne, 20–30 m, August 1923, fide R. Ph. Dollfus." Three glass slides containing appendages of 2 juvenile males were also received. Because of the similarity in appendages and carapaces, and the proximity of the collecting areas, we have assumed that Klie's specimens and ours are conspecific. Klie's specimens will be discussed further by Kornicker (in prep.).

Reasons for assigning the Mauritanian specimens to *C. squamiger* and a supplementary description of the lectotype will be given by Kornicker (in prep.).

DESCRIPTION OF ADULT MALE (Figures 24–31).—Carapace elongate, smooth, with widely spaced minute punctae (Figures 24, 28a); shallow incisur at valve middle; posterior evenly rounded with slight indentation in posterodorsal corner; long hairs forming row near posterior margin (Figure 24c,f,g).

Infold (Figures 25f,l, 26, 27a–i, 28d): Behind rostrum with about 275 simple bristles, mostly on anterior half of infold; about 30 simple bristles between list and incisur; anteroventral infold ventral to incisur with about 50 long and short simple bristles on outer half and about 12 long bristles near inner margin; ventral margin with about 100 short spinous bristles forming 1 or 2 rows along inner margin of infold (list) and about 100 long spinous bristles forming 1 or 2 rows near middle; posterior with broad list with 18 long bristles (many of the long bristles with shorter bristle near base); and about 150 short bristles (some appearing as

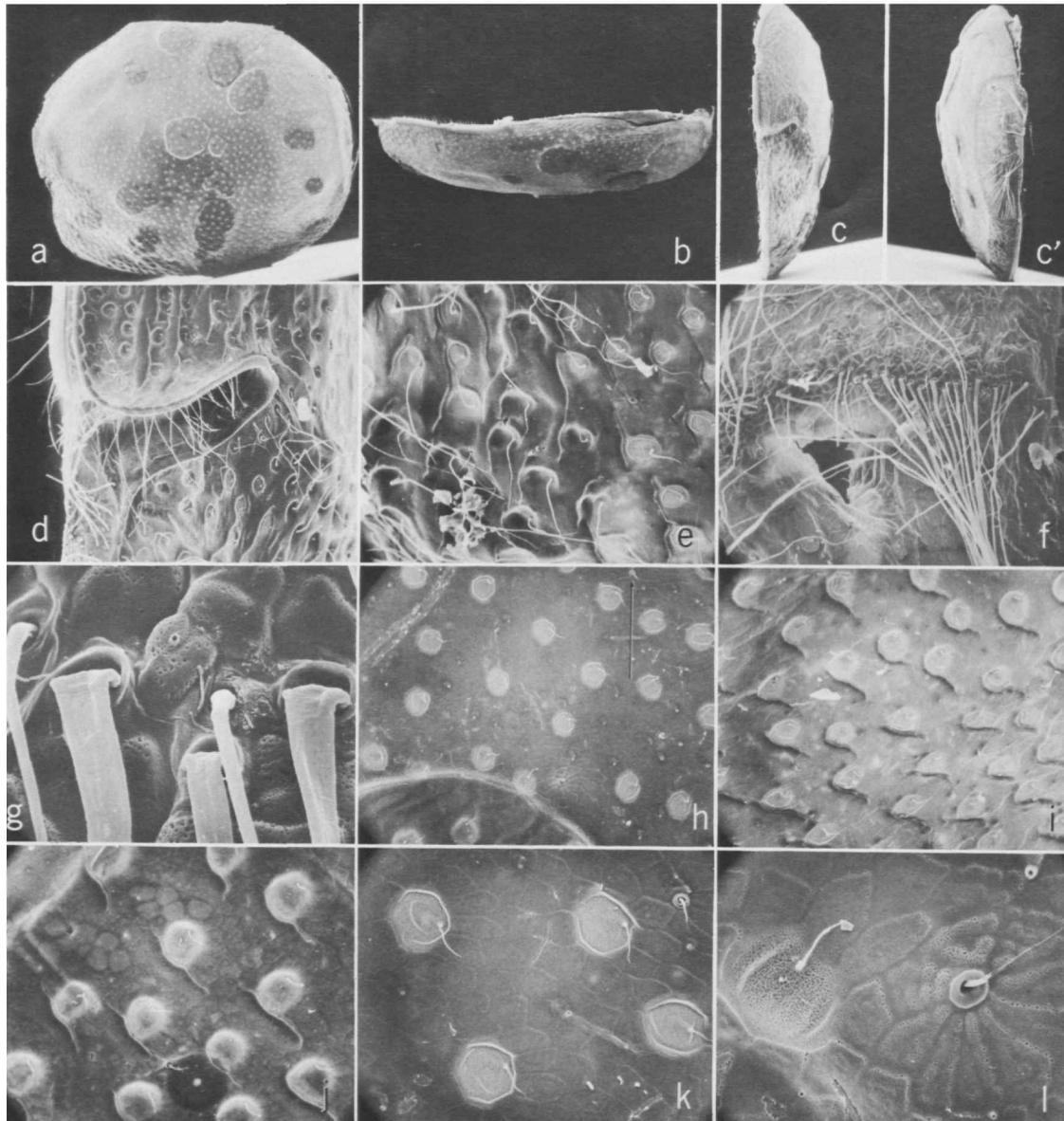


FIGURE 24.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, left valve: *a*, complete valve, lateral view, anterior to left (irregular ovoid areas are microconcretions), $\times 25$; *b*, same, dorsal view, anterior to left, $\times 27$; *c*, *c'*, same, anterior and posterior views, $\times 27$; *d*, detail of "*a*" showing incisur, $\times 130$; *e*, detail of "*a*" showing fossae and bristles on anterior part of valve ventral to incisur, $\times 200$; *f*, detail of upper end of row of bristles on posterior end of valve shown in "*c*," $\times 235$; *g*, detail of bases and proximal parts of two sizes of bristles shown in "*f*," $\times 2360$; *h*, fossae and pores near middle of valve shown in "*a*" (arc towards lower left is margin of microconcretion), $\times 210$; *i*, fossae and lineations near posterodorsal margin of valve, $\times 200$; *j*, fossae and lineations on microconcretion near middle of ventral margin of valve, $\times 280$; *k*, fossae, an open pore with hair (upper right), minute pores without hairs, and faint reticulate structure near middle of valve (see arrow in "*h*"), $\times 525$; *l*, detail of "*h*" (near edge of concretion) showing fossae with bristle, pore with bristle, three minute pores without bristles, and porous structure of exocuticle (note radial structure of carapace around pore with bristle), $\times 1050$. (Photos reduced to 51%.)

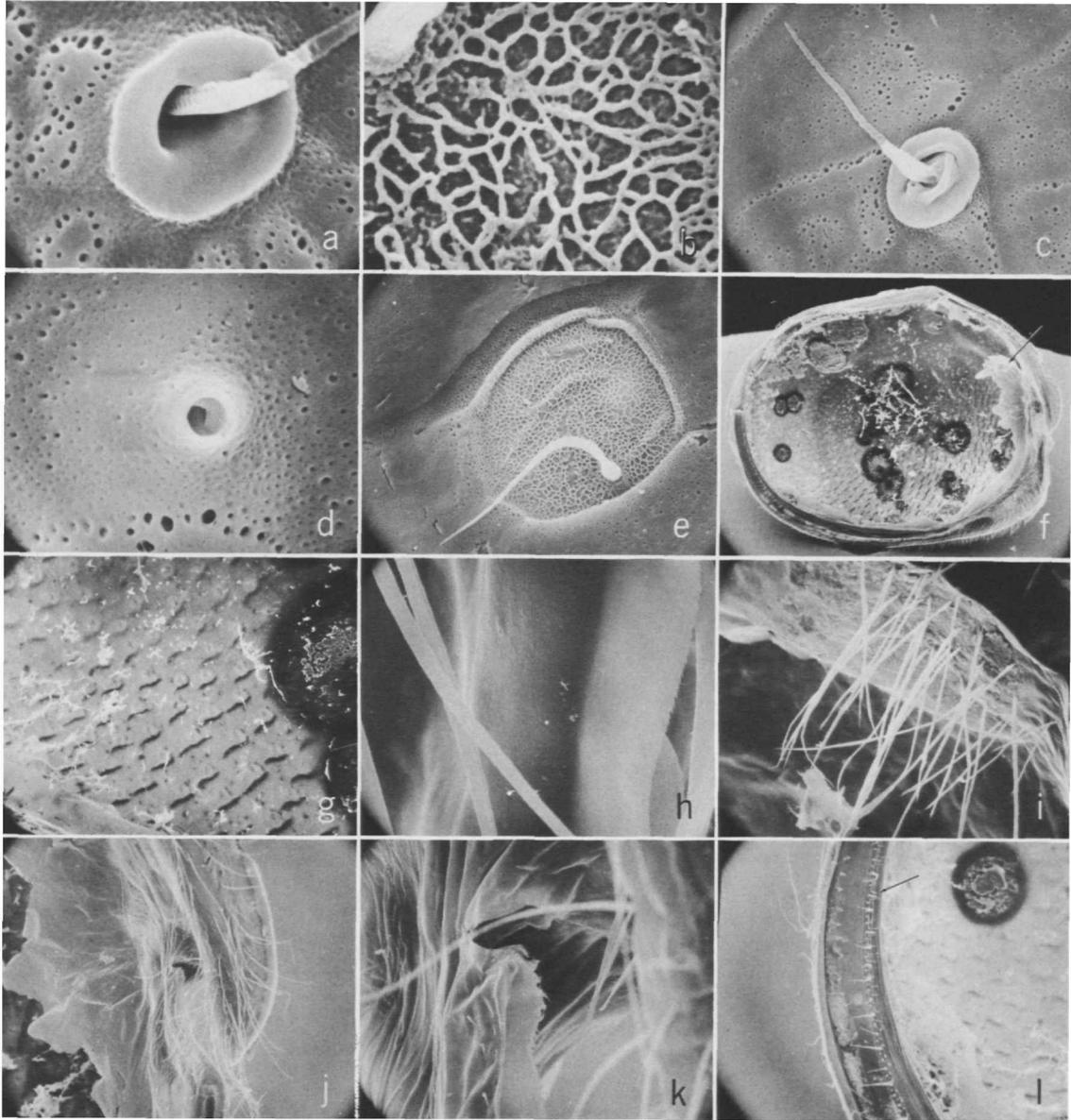


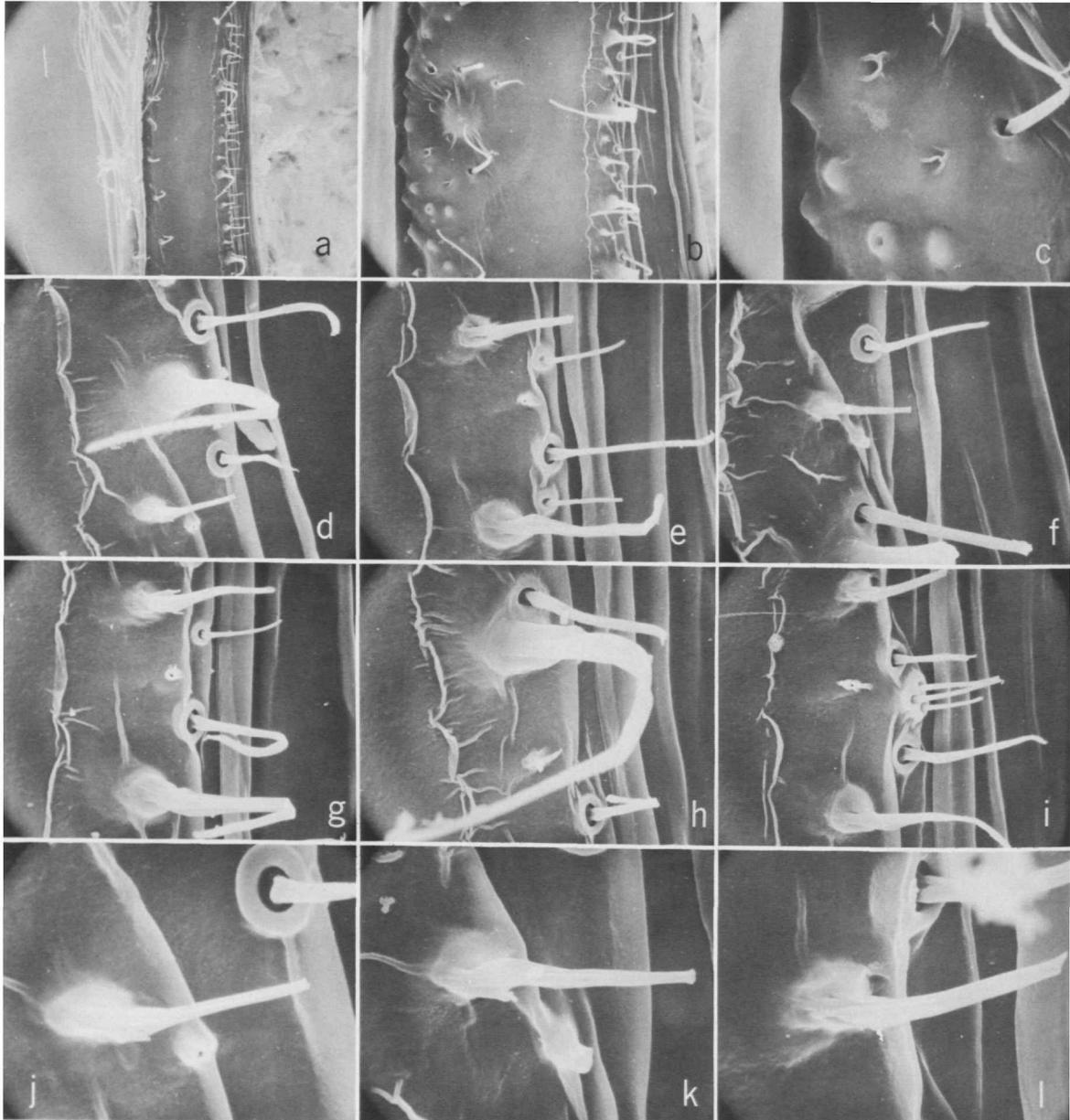
FIGURE 25.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, left valve. Lateral surface: *a*, detail of Figure 24*l* showing pore and base of bristle (note crenulations on base of bristle), $\times 5000$; *b*, detail of Figure 24*l* showing base of bristle and reticulations in fossae, $\times 10,500$; *c*, more complex pore (cf. "a") having minute pore near base, $\times 3255$; *d*, pore without bristle (note porous structure of exocuticle), $\times 10,000$; *e*, fossae and bristle, $\times 2000$. Medial surface: *f*, complete valve, anterior to right (ovoid dark areas inside valve are microconcretions; see Figure 24*a* showing concretions from outside), $\times 23$; *g*, detail of "f" showing lineations ventral to middle (dark area on right is concretion), $\times 100$; *h*, detail of anteroventral margin of "f" showing lamellar prolongation of selvage with serrate edge, $\times 2000$; *i*, detail of vestment (see arrow in "f") showing hairs on anterodorsal part of vestment, $\times 500$; *j*, detail of "f" showing incisor, $\times 1000$; *k*, detail of "j" showing lamellar prolongation with fringed edge on inner end of lower margin of incisor, $\times 5000$; *l*, detail of "f" showing posterodorsal part of valve (note bristles on infold, see Figure 26*g* for detail of arrowed area), $\times 100$. (Photos reduced to 51%.)

minute spines); about 50 bristles present between broad list and posterior valve margin (bristles shorter near dorsal margin); bristles forming row present along anterior margin ventral to incisur, and along ventral and posterior margins.

Vestment: Long hairs forming cluster present in anterodorsal corner (Figures 25*i*, 28*c*).

Size: USNM 143798, length 4.55 mm, height 3.10 mm.

Micromorphology of carapace (based on scanning-electron photomicrographs): Lateral surface: Surface with abundant shallow fossae (Figure 24*a-e*, *h-l*); fossae with reticulate flat bottom (Figures 24*k,l*; 25*b,e*) except along anterior and anterovent-



tral margin of valve where bottoms are slightly concave (Figure 24e); each fossae with short bristle emerging from closed pore; bristle usually posterior to center of fossae; each fossae along ventral part of carapace with oblique ridge at ventral margin (Figure 24i,f); some fossae along anterior part of carapace with ridges along anterior margins more-or-less parallel to anterior valve margin (Figure 24d,e); bristle in each fossae on anteroventral part of shell longer than those in fossae elsewhere (Figure 24e); surface between fossae faintly reticulate (Figure 24h,k,l); short bristles emerging from open pores widely scattered over surface (Figure 24h-l, 25a-c); reticulations on carapace tend to be radiate in vicinity of the short bristle (Figure 24l); open pores widely scattered on surface (Figure 24k,l, 25d); these pores tend to be between adjoining reticulations (Figure 24k,l); minute porous surface visible at magnifications above about $\times 1000$ (Figures 24l, 25a,c,d); these pores tend to be aligned along margins of reticulations (Figures 24l, 25c), but some form rough circles (Figures 25a); slender and stout bristles form vertical row near posterior shell margin (Figure 24a,c,f,g); microconcretions form ovoid discs in valve (Figure 24a); these discs project outward from valve surface (Figure 24b,c);

reticulations in shell are visible on concretions (Figure 24h). Medial surface: Ridges and faint indications of fossae visible on medial surface of carapace except over microconcretions (Figure 25f,g,l); the ridges appear to be more extensive than on lateral surface of carapace.

Vestment: Long hairs are present on the antero-dorsal part of the vestment posterior to the rostrum (Figure 25i).

Posterior list: List bears posterior row of bristles emerging from closed pores and anterior row of short and long bristles emerging from open pores (Figures 25l, 26); bristles from closed pores consist of long stout bristles alternating with short tubelike bristles with alar projections or pore at base (Figures 26d-l, 27b,c); a short raised pore present between each pair of bristles emerging from closed pores and usually slightly anterior to them (Figures 26d-k, 27a,c).

Infold between posterior list and posterior margin of valve: Bristles form row just anterior to posterior margin of valve (26a,b, 27d); small mounds, some with pores, present between bristles and posterior valve margin (Figures 25l, 26b,c).

Ventral list: List with fringed lamellar prolongation extends anteriorly from point just posterior to valve middle to point about one-fourth length of valve from anterior end (Figures 25f, 27e-k).

Salvage: Lamellar prolongation with fringe present along lower margin of incisur (Figure 25j,k); lamellar prolongation with serrate margin present along anteroventral margin (Figure 25h) and ventral margin (Figure 27l).

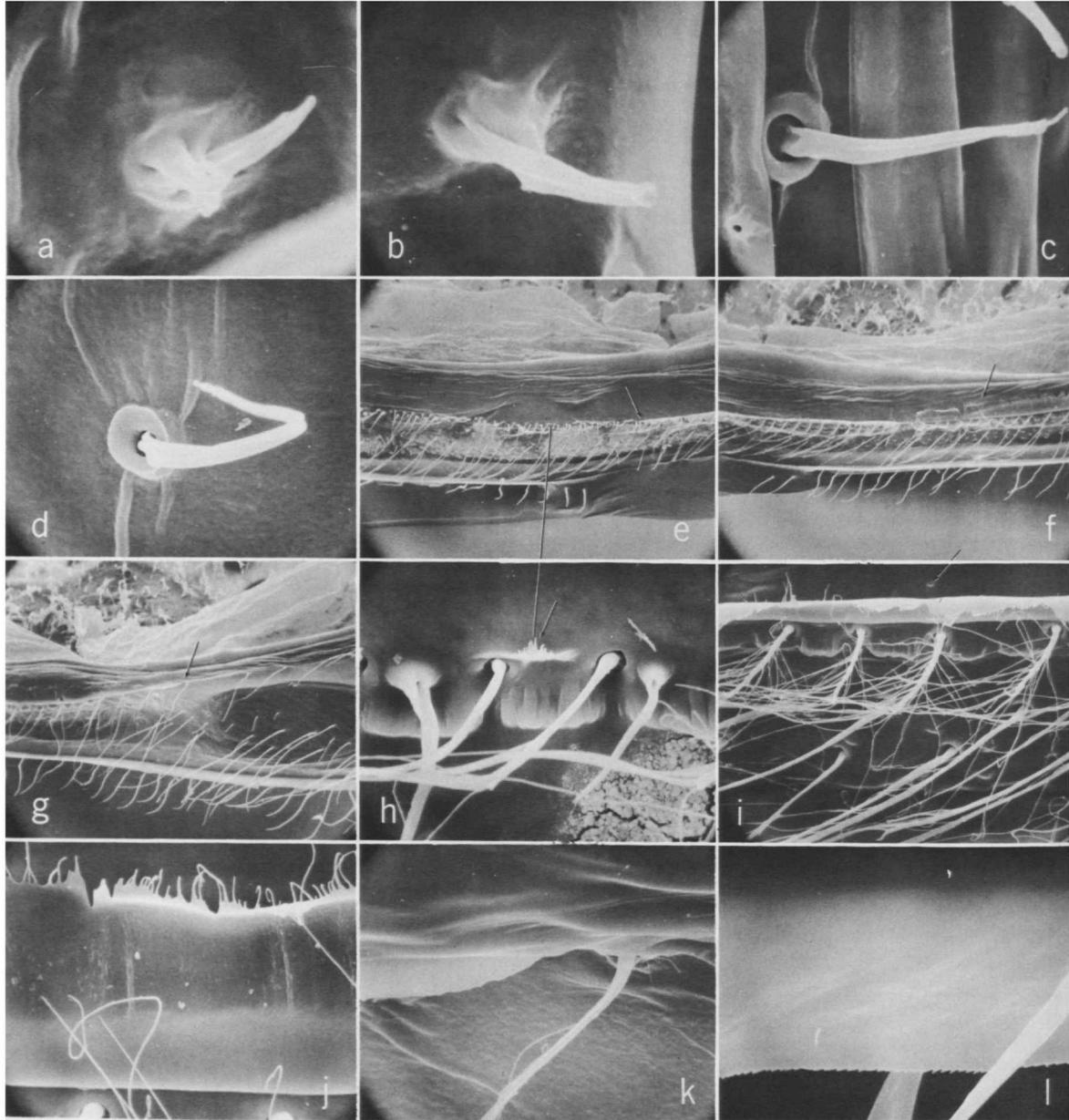
First antenna (Figures 28e, 31a): 1st joint with spines along ventral margin and on distal medial surface; 2nd joint with spines along ventral margin, proximally on dorsal margin, and abundant on distal medial surface; 5 slender straight bristles present along dorsal margin (4 proximal of these with short faint marginal spines, distal bristle longer than others and with long proximal and short distal spines), 6 short spinous bristles present on distal lateral surface; 3rd joint with 16 spinous bristles along dorsal margin and 1 short bare bristle near middle of ventral margin; 4th joint with 1 long spinous terminal dorsal bristle and 5 spinous terminal ventral bristles, 1 short, 4 long; 5th joint slightly longer than 4th, sensory bristle with abundant thin filaments and at tip 7 stouter and shorter filaments; dorsal margin of 6th

FIGURE 26.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, left valve, medial surface: a, postero-ventral margin (includes part of dorsal end of margin shown in Figure 25l), $\times 230$; b, bristles on list, bristles, pores, and nodes on infold posterior to list (detail from just above middle of infold on Figure 25l), $\times 500$; c, one bristle, one pore, and two nodes from middle of infold in "b", $\times 1500$; d, detail of list near bottom end of "b" showing two bristles of unequal length emerging from open pores along anterior margin of list, one long stout bristle between and posterior to the two open pores, one tubelike bristle with projections at base, and one raised pore anterior to base of tubelike bristle, $\times 2000$; e, detail from lower end of list in "a" (cf. "d"), $\times 2000$; f, detail from just above middle of list in "b" (cf. "d"), $\times 2000$; g, detail of list indicated by arrow in Figure 25l (cf. "d"), $\times 2000$; h, detail of list partly shown at bottom end of "a" (cf. "d"), $\times 2000$; i, detail of middle part of list in "a" showing tubelike bristle near top, long stout bristle near bottom, raised pore near middle, two single pores with bristles along inner margin, and cluster of three pores with bristles between the two single pores with hairs, $\times 2000$; j, detail of "d" showing tubelike bristles, raised pore, and anterior open pore with bristle, $\times 5000$; k, detail of "f" showing tubelike bristle and raised pore, $\times 5000$; l, detail of "i" showing tubelike bristle, $\times 5000$. (Photos reduced to 53%.)

joint much shorter than dorsal margin, with short faint marginal spines. Seventh joint: dorsal margin of joint offset from dorsal margin of 6th joint; a-claw on short pedestal, with rounded tip curving dorsally, bare; b-bristle about two and one-half times length of a-claw, with 14 marginal filaments; c-bristle extremely long, tip broken off on both

limbs of specimen, but with 41 filaments on remaining part. Eighth joint: d- and e-bristles bare, shorter than b-bristle; f-bristle similar to c-bristle; g-bristle slightly longer than b-bristle, with 19 marginal filaments.

Second antenna (Figures 28f, 31b-d): Protopodite with short slender medial bristle, but no spines



or hairs. Endopodite 3-jointed: 1st joint with 1 proximal and 3 or 4 distal bristles, all bare; 2nd joint longer than 1st, with 7 or 8 short distal bristles; 3rd joint reflexed, with 1 long proximal bristle and pointed ridged tip. Exopodite: 1st joint with short terminal medial spine; joints 2-8 with short slender basal spines, short hairs or spines along distal medial margin, and long hairs on distal dorsal corner; 9th joint with 2 short slender lateral spines about one-third length of joint, and 5 bristles, 4 long, 1 short (short bristle medial and proximal); bristles of joints 2-9 with natatory hairs, but no marginal spines.

Mandible (Figures 29a,b, 31e,f): Coxale endite with medial bristle near base; ventral branch with 6 or 7 oblique rows of spines; distal 2 or 3 rows with stouter spines than others, and with some spines blunt or bulbous (the blunt and bulbous spines are probably the result of growths of foreign

material); tip of ventral branch with 3 teeth, dorsal of these longer than other 2 and with minute terminal teeth; ventral margin of dorsal branch with 5 short stout teeth followed by 4 slender recurved teeth; posterior bristle with faint short hairs present at tip of dorsal branch; short spines present on dorsal margin of tip of dorsal branch appear to be continuation of hairs on bristle; faint line parallel to dorsal margin near tip gives false impression that base of posterior bristle is proximal to tip (Figure 29b).

Distal end of basale endite with 5 pectinate bristles of varying length; 7 shorter bristles pectinate near tip form row medial to the 5 end bristles; row continues with 10 short bristles along dorsal margin of endite (tips of bristles with 6-12 pairs of marginal spines decreasing in length distally along bristles; end of each bristle with minute triaenid tip); dorsal margin of endite with 10 short slender bare bristles with spine-shaped tips, 6 forming distal row, 4 forming proximal row; ventral margin of basale with 10 short bristles, proximal 6-8 of these with triaenid tips, remaining with very slender spines in distal part; distal ventral margin with 2 long, or 2 long and 1 short, distal bristles with long marginal spines; medial surface near ventral margin with 5 minute bare bristles with spine-formed tip; dorsal margin of basale with 5 short slender bare subterminal bristles and 2 long spinous terminal bristles; medial surfaces of coxale and basale with long hairs; hairs restricted to dorsal halves of joints.

Exopodite reaching just beyond distal end of 1st endopodite joint, hirsute with long proximal and short distal hairs; ventral margin with bare midbristle about two-thirds length of exopodite; slightly shorter bare bristles present just distal to midbristle. Endopodite: ventral margin of 1st joint with 1 minute bare bristle, 5 long slender bristles with short marginal spines, and 2 long stout bristles with long marginal spines; ventral margin of 2nd joint with 4 long slender bristles with short marginal spines (bases of bristles form oblique row on medial surface), and 2 long stout terminal bristles with short marginal spines; dorsal margin and medial surface of 2nd endopodite joint with abundant bristles; end joint with 3 long bare claws, 1 long lateral bristle with short marginal spines along ventral margin, and 2 short ventral bristles, both with short marginal spines.

FIGURE 27.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, left valve, medial surface: a, detail of Figure 26h showing tubelike bristle and possibly a raised pore at its base, $\times 10,000$; b, detail of tubelike bristles near lower end of list shown in Figure 26a, $\times 10,000$; c, detail of open pore with bristle and small raised pore near anterior margin of list in Figure 26a (note minute process at tip of bristle), $\times 5000$; d, detail of Figure 26a showing lowermost bristle on infold posterior to list, $\times 3000$; e, detail of ventral margin of valve shown in Figure 25f just posterior to middle (glue attaching specimen to mount appears at lower right), posterior end of faint fringed lamellar prolongation on selvage is indicated by arrow, $\times 145$; f, detail of middle of ventral margin in Figure 25f (glue attaching specimen to mount appears at lower left) faint fringed lamellar prolongation on selvage is indicated by arrow, $\times 145$; g, detail of ventral margin in Figure 25f near anterior (elliptical dark area on right is same as in Figure 25f), arrow indicates anterior end of lamellar prolongation on selvage, $\times 145$; h, detail of "e" showing small remnant of selvage (indicated by arrow) located posterior to continuous selvage (the remnant in the photograph is mounted directly below where it is present in "e" as indicated by connecting line; note grooves in base of two broad bristles on each side of pair of hirsute bristles emerging from open pores), $\times 2000$; i, detail from near middle of "f" (indicated by arrow) showing lamellar prolongation of list and hirsute hairs emerging from open pores, a minute pore is present on infold just proximal to selvage (arrow), $\times 1000$; j, detail from lamellar prolongation just to right of middle of "f" showing marginal fringe, $\times 2600$; k, detail from "g" showing anterior end of lamellar prolongation of selvage, $\times 2000$; l, detail from ventral margin (anterior to middle) of valve shown in Figure 25f showing lamellar prolongation of selvage, note serrate margin, $\times 3000$. (Photos reduced to 53%.)

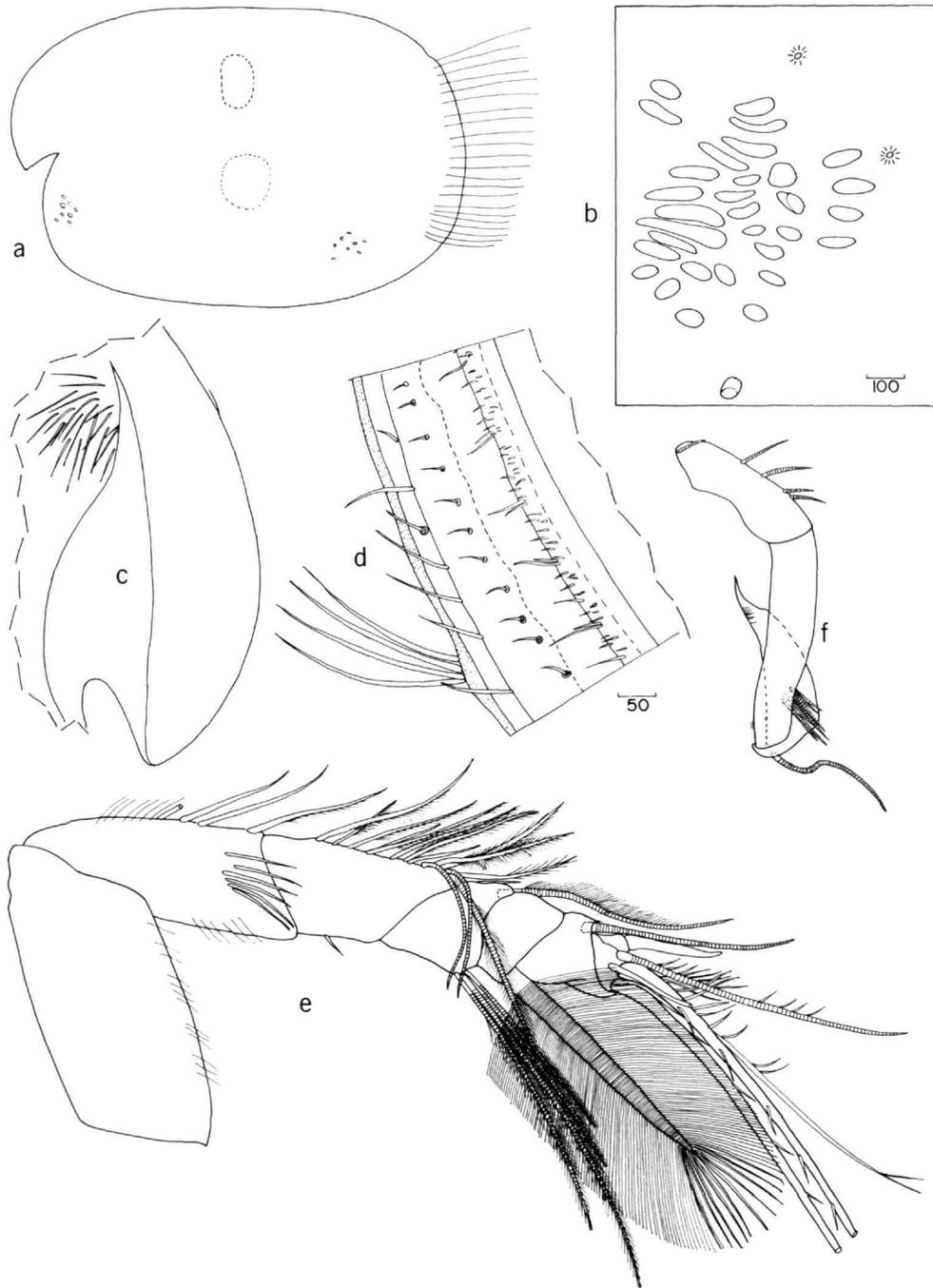


FIGURE 28.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, length 4.55 mm: a, complete specimen showing position of lateral eye and central muscle scars, spacing of fossae indicated; b, central muscle scars and two pores surrounded by radiating reticulations, left valve, lateral view; c, anterior showing position of hairs on vestment in anterodorsal corner behind rostrum, left valve, medial view; d, detail of posterodorsal corner, left valve, medial view; e, right 1st antenna, lateral view; f, endopodite of left 2nd antenna, medial view. (Same magnification in microns: b, c, e, f.)



FIGURE 29.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798, *a*, left mandible without coxale endite, medial view; *b*, coxale endite of right mandible, lateral view; *c*, left maxilla, medial view; *d*, distal part of right maxilla, medial view; *e*, protopodite of left maxilla (folded dorsally on mounted limb), anterior to left. (Same magnification in microns: *a*, *c*; *b*, *d*.)

Maxilla (Figures 29c-e, 31g): Epipodite narrow, pointed, bare, about two-thirds length of basale. Bristles on protopodite indistinct on both limbs of specimen, but appearing to have scythe-shaped bristle of baleen comb and 1 slender bristle followed by group of 3 long and 3 short bristles followed by group of 6 long bristles adjacent to 4 or 5 short bristles (Figure 29e). Basale: lateral surface with 1 short proximal bristle; medial surface with 20 short proximal spine-tipped bristles near dorsal margin, and 4 short spine-tipped distal bristles forming row along terminal margin; distal margin with 1 long, 11 or 12 short bristles, all spine-tipped (3 short bristles anterior and 8 or 9 short bristles posterior to the long bristle (Figure 29c,d); ventral margin with 17 or 18 short spine-tipped bristles (distal 3 bristles longer than others; middle of these with marginal spines) and 1 long spinous terminal bristle; dorsal margin proximal to distal bristles and medial surface spinous; medial surface with long hairs proximally and near ventral margin. Exopodite small with 3 bristles of unequal length, shortest of these bare, others with marginal spines. Endopodite 1st joint with 1 spine-tipped bristle near middle, 1 long spinous 6-bristle, and hairs on medial surface; 2nd joint with 6 unequal terminal bristles, some with a few marginal spines and spine at tip.

Fifth limb (Figures 30a, 31h): Epipodial appendage with 110 bristles, anterior and posterior bristles shorter than those in middle part. Comb: dorsal margin with 2 sclerotized processes, a curved process near middle, and a rounded process distal to middle; 7 minute bristles present along posterior margin and near tip of curved process; anterior margin hirsute; ventral and anteroventral margins with spinous bristles; lateral surface with 15 bristles: 2 slender spinous bristles near anteroventral margin, 1 stout spinous bristle ventral to middle, 12 bristles with bases ventral and posterior to stout bristles (includes 1 long spinous bristle and 4 minute bare bristles forming 2 pairs near base of stout bristle, and 7 short bristles closer to ventral margin).

Sixth limb (Figures 30b,c, 31i): Maximum width about three and one-third times narrow proximal part; anterodorsal corner with about 18 minute broad medial spines; medial side of anterior margin of protopodite with 4 minute bristles followed by 14 short spinous bristles forming row extending

to upper suture; 2 slender bristles present near anterior margin dorsal to upper suture; 8 slender bristles either bare or with spines present on medial side between upper and lower sutures; anterior margin of protopodite with 34 slender hirsute bristles forming row; anterior margin between sutures with 12 slender spinous bristles; anterior margin from lower suture to anterior tip of limb with about 25 slender hirsute bristles; lateral flap with about 4 slender spinous bristles along anterior edge; ventral margin with about 80 short and long bristles in addition to about 35 minute bristles (minute and short bristles as well as some long bristles have bases medial to ventral margin, all remaining long bristles have bases on ventral margin); extended posterior tip of limb with 3-5 spinous bristles; 3 short bare bristles present in place of epipodial appendage.

Seventh limb (Figure 31j): Broad, distal one-third with 67 or 68 bristles, 32-35 on each side, each bristle with 3-9 bells; most rings with 2 bristles, 1 on each side, rarely with 1 or 3; terminus with opposing combs, each with about 32 teeth, all with pectinate margins.

Furca (Figure 30d-f,i): Each lamella with 3 main claws followed by 9 secondary claws; primary claws with 2 rows of teeth, one along concave margin, other on medial surface slightly in from concave margin; teeth subequal in length but all fairly large (no minute teeth present); hairs present along convex margins of primary claws; concavity in lamella between bases of main claws 1 and 2 with greatest depth 47-52 percent of greatest width; concavity on lamella between bases of main claws 2 and 3 with greatest depth 72-79 percent of greatest width; projections of lamella forming bases of main claws 1 to 3 with medial hairs forming 2 rows; secondary claws with spines and teeth along anterior and posterior margins (teeth near middle, spines distal); secondary claws 1 and 9 smaller than secondary claw 2; secondary claws 2-5 slightly shorter than secondary claws 6-8; secondary claws 2-9 decrease slightly in diameter proximally along lamella; secondary claw 1 only very slightly offset proximally from secondary claw 2; short segment following lamellae with long hairs forming row; secondary claw 1 immediately adjacent to main claw 3 on left lamella, about width of base of claw 3 distant from claw 3 on right lamella.

Eyes: Lateral eye (Figure 30h) well developed

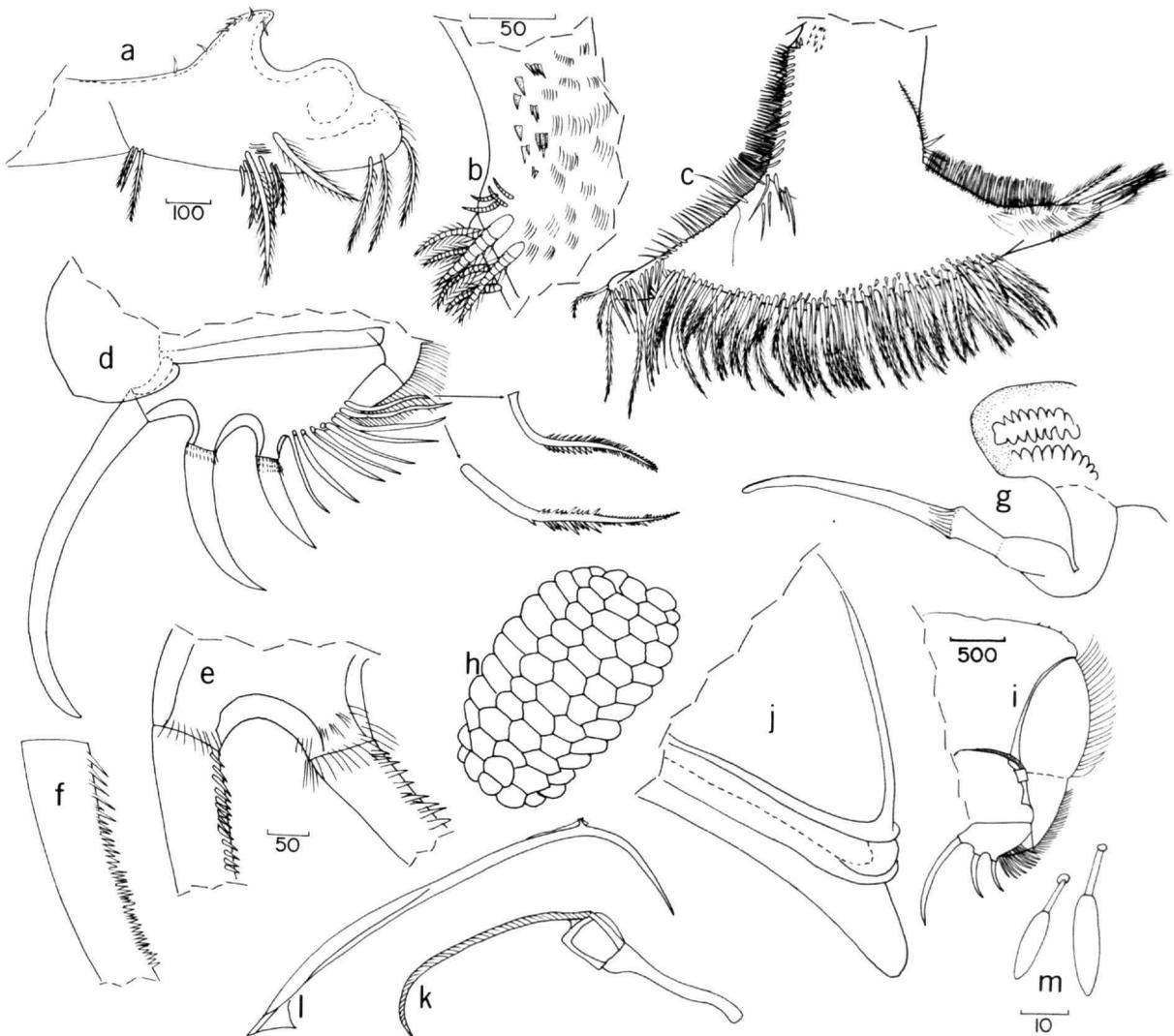


FIGURE 30.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798: *a*, comb (ventral bristles not shown), right 5th limb, lateral view; *b*, anterodorsal corner showing medial spines and proximal bristles, right 6th limb, medial view; *c*, complete limb (marginal spines on bristles along anterior margin and on medial surface not shown), right 6th limb, medial view; *d*, left lamella of furca (marginal teeth on claws not shown except on detail drawings of secondary claws 7 and 9); *e*, medial teeth on proximal parts of claws 1 and 2 of right lamella of furca, medial view; *f*, lateral teeth on proximal part of claw 1 of left lamella of furca, lateral view; *g*, medial eye and rod-shaped organ; *h*, right lateral eye; *i*, posterior and furca showing Y-sclerite (crosshatched); *j*, posterior tip of three gill-like structures on left side, lateral view; *k*, left Y-sclerite of furca (sclerite is crosshatched), lateral view; *l*, right Y-sclerite, anterior to right, lateral view; *m*, two of three elongated organisms attached to 5th exopodial joint of left 2nd antenna. (Same magnification in microns: *a*, *c*, *d*, *g*, *h*, *j*, *k*; *e*, *f*, *l*.)

with about 74 ommatidia (5 rows, each with 12–14 ommatidia); medial eye (Figure 30g) bare, about one-half size of lateral eye, pigmented distally.

Rod-shaped organ (Figure 30g): With broad base and weakly 2 or 3 jointed, tip rounded.

Posterior (Figure 30i): 1st and 2nd segments

above furcal lamellae hirsute; dorsum with very faint minute spines; dorsal process absent.

Gill-like structures (Figure 30j): Distal ends acuminate.

Y-sclerite: Consisting of simple concave sclerite (Figure 30i,k,l).

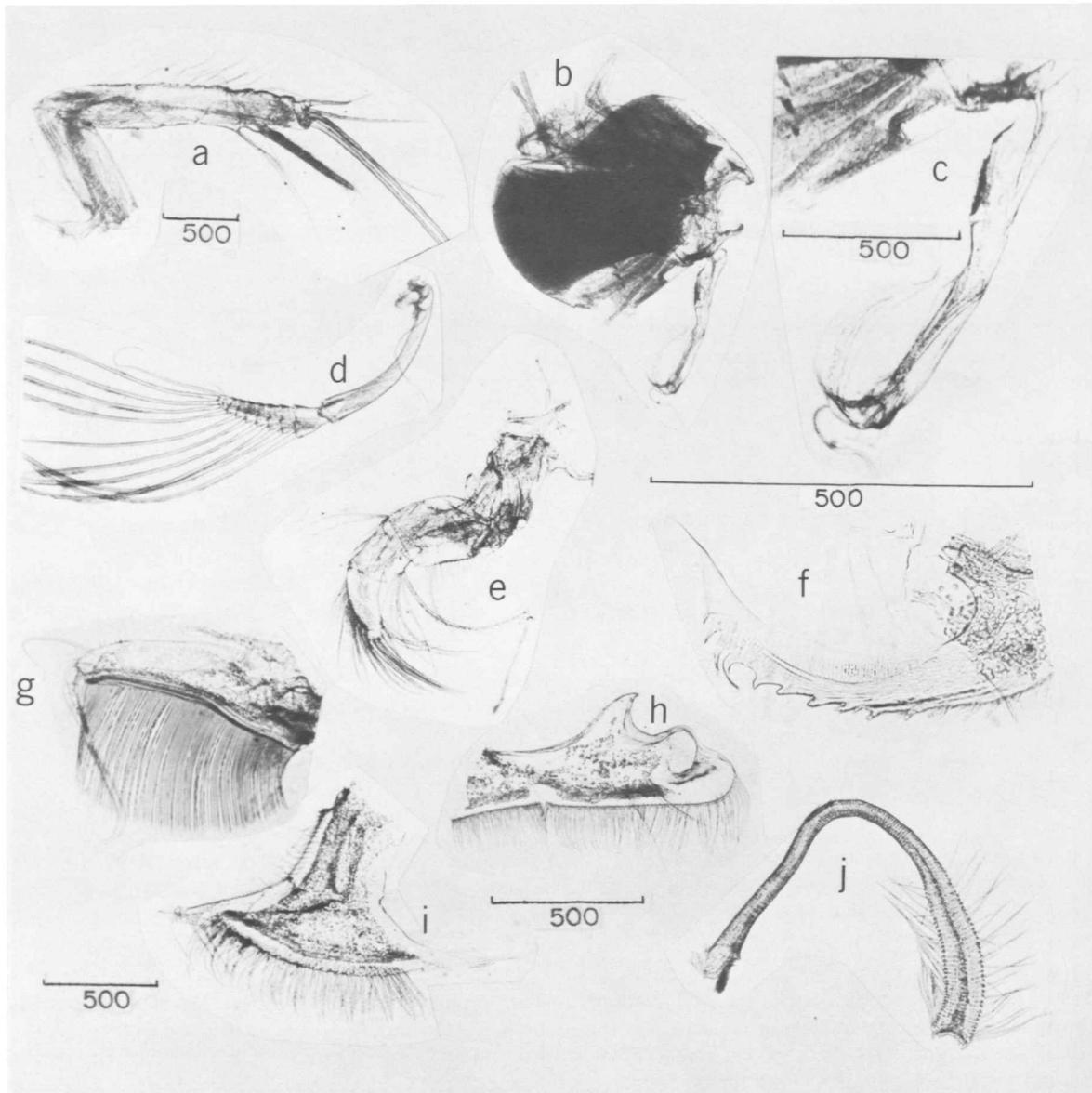


FIGURE 31.—*Cycloleberis squamiger*, new combination, adult male, USNM 143798; a, 1st antenna; b, protopodite and endopodite of 2nd antenna; c, detail of "b"; d, exopodite of 2nd antenna; e, mandible; f, coxale endite of mandible; g, maxilla; h, comb of 5th limb; i, 6th limb; j, 7th limb. (Same magnification in microns: a, b, d, e; g, i, j)

Asteropteron Skogsberg, 1920

The collection contained two new species of this genus: *A. upsilon* and *A. setiferum*. A juvenile of another species was also present and is designated *Asteropteron* species indeterminate.

DISTRIBUTION.—Species of the genus *Asteropteron* are worldwide between latitudes of about 33°N and 37°S. Previously known depth range of the genus was 4 to 100 m (Kornicker, in press). The depth range is increased with the present collection to 1100 m.

Asteropteron upsilon, new species

FIGURES 32–36

HOLOTYPE.—[USNM 141267], adult female, length 1.74 mm. Valves and some appendages in alcohol, remaining appendages on slide, in collection of Museum of Natural History "Grigore Antipa," Bucharest.

TYPE-LOCALITY.—Station X057.

ETYMOLOGY.—The specific name is in reference to the U-shaped ridge that ornaments this species.

PARATYPE.—USNM 142386, adult? female, station A3a, sample 11.

Additional specimen: [USNM 141265], juvenile, instar II?, length 1.22 mm, station X048, in collection of Museum of Natural History "Grigora Antipa," Bucharest.

DISTRIBUTION.—Collected at three localities between latitudes 18°44'N and 20°50'05"N and longitudes 16°24'W and 17°39'00"W, at depths of 35 to 270 m. The bottom at two of the localities was reported as sand (X057) and sandy mud (X048) (Figures 2, 3).

DESCRIPTION OF FEMALE (Figures 32, 33, 34a–d, 35).—Carapace oval in lateral view with small rostrum and incisur (Figure 32); each valve with marginal ridge paralleling outer edge; branch of ridge on posterodorsal margin extending from marginal ridge inwards towards edge of each valve; left valve with short ridge along middle part of dorsal margin; each valve with distinct U-shaped ridge paralleling marginal ridge (upper segment of this ridge missing on right valve of holotype, but reconstructed in Figure 32 because the anterior end of the lower part of the ridge is torn indicating that the upper part of the ridge was formerly present).

Infold (Figure 33c–e): Narrow along anteroventral, ventral, and posterior margins, broad along anterodorsal margin, and slightly wider in posteroventral corner; anterodorsal infold behind rostrum with 13 or 14 fairly long bristles forming row paralleling edge of valve; no bristles on anterior infold below incisur; ventral infold with 11 bristles near inner margin; posterior infold with about 14 short and long bristles near inner margin (some of these forming clusters of 2 or 3 bristles and may bifurcate); posteroventral corner of infold on right valve with 4 long bristles near outer margin. List with minute spines present from just below incisur and extending along ventral margin to posteroventral corner.

Selvage: Wide striate selvage with marginal fringe present along free margin; selvage continuous along incisur; double selvage observed along anteroventral and ventral margin (Figure 33b).

Central muscle scars (Figures 32, 33a): Consisting of about 9 large and 10 small oval scars in front of valve middle and between U-shaped ridge.

Pores: Broad pores extend through ribs terminating medially in narrow thread (Figure 33f); marginal pores beneath infold terminating in base of long bristles present around edge of each valve lateral to lamellar prolongation of selvage.

Size: [USNM 141267], holotype, length 1.74 mm, height (including dorsal rib) 1.35 mm; USNM 142386, length 1.60 mm, height 1.24 mm, width 1.19 mm (possibly not an adult).

First antenna (Figures 33g, 34d,q, 35a): 1st joint with few short spines along ventral margin and on lateral surface; 2nd joint with spines along ventral and dorsal margins and cluster of long hairs on distal lateral surface, and 4 dorsal bristles (proximal of these with short spines, remaining with long spines). Third joint short, triangular; ventral margin with 1 slender ventral bristle reaching just past middle of 5th joint; dorsal margin with 1 proximal and 2 terminal bristles, all with long marginal spines. Fourth joint trapezoidal with stout spinous terminal bristle on dorsal margin reaching just past end of limb, and no ventral bristles. Sensory bristle of 5th joint with bifurcate tip and 2 long single filaments reaching from near middle to bifurcate tip of bristle. Medial bristle on 6th joint absent. Seventh joint: a-claw long with slender dorsally curved tip, about same length as joints 3–8; b-bristle slightly longer than a-claw, without fila-

ments; c-bristle similar to b-bristle. Eighth joint: d-bristle almost as long as a-claw, with marginal hairs; e-bristle slender minute, f- and g-bristles similar to c-bristles, no filaments.

Second antenna (Figure 35*b,c*): Protopodite bare. Endopodite short, 3-jointed, bent laterally forming right-angle; suture separating 1st and 2nd joints distinct, proximal to middle; suture separat-

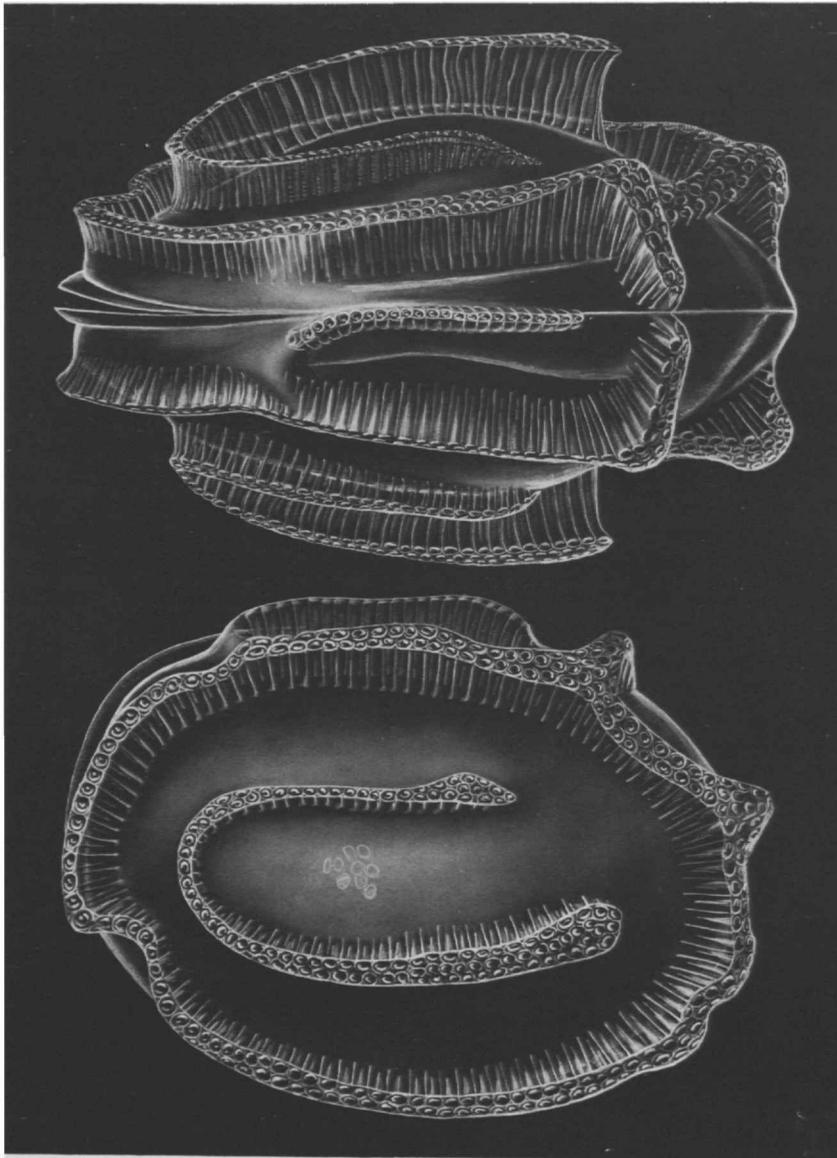


FIGURE 32.—*Asteropteron upsilon*, new species, female, [USNM 141267], holotype, length 1.74 mm, dorsal and lateral views.

ing 2nd and 3rd joints faint, distal to middle; joints 1-3 without hairs; 3rd joint with terminal bristle reaching to about distal end of 5th exopodial joint. Exopodite: 1st joint with minute terminal medial spine; joints 2-9 with natatory bristles; 9th joint with 3 bristles, one of these shorter than others; basal spines absent.

Mandible (Figure 33*h-j*): Coxale endite without proximal bristle; ventral branch with a few proximal hairs, and spines forming 4 oblique rows; tip with 3 short pointed teeth; dorsal branch with 4 teeth along ventral margin, short main spine, single spinous terminal spine, and spinous tip forming almost a right angle with ventral margin of branch. Basale: endite with 5 terminal bristles; longest of these with paired teeth about half-way along margin, remaining shorter bristles with paired teeth about one-third way along margin; teeth decreasing in length distally; one slender dwarf bristle present, about three-fourths length of shortest end bristle; one triaenid bristle present on endite near base; ventral margin of basale with 3 additional triaenid bristles with 4-7 pairs of spines followed by about 10 pairs of teeth that occupy about last one-quarter of bristle and decrease in length distally; proximal pair of teeth separated from remaining pairs by distance greater than that between remaining pairs; dorsal margin of basale with 2 subterminal bristles reaching to about middle of 2nd endopodial joint, medial of these bare, other with long spines. Exopodite reaching about two-thirds length of 1st endopodial joint, with 2 subequal bare terminal bristles; tip of exopodite with short hairs forming row distally along dorsal and ventral margins. Endopodite: 1st joint with 4 ventral bristles, 2 bare, 2 with long spines; ventral margin of 2nd joint with single distal bristle having pointed tip and marginal spines near tip; dorsal margin with 5 or 6 bristles, either bare or with short marginal spines, plus group of 5 subterminal bristles (3 spinous medial cleaning bristles, 2 slender lateral bristles); medial surface of 2nd joint with spines forming rows. End joint with 3 bare claws and 2 slender bare bristles.

Maxilla (Figure 33*k,l*): Epipodite reaching about three-fourths length of dorsal margin of basale, with pointed tip and short hairs. Endite I and endite II each with 3 bristles. Basale: ventral margin with 1 short bristle near middle and 2 terminal bristles (1 short on medial side and 1 long on

lateral side); dorsal margin and surface of basale hirsute; dorsal margin and lateral surface each with 1 short proximal bristle. Endopodite: 1st joint with long beta-bristle with faint marginal spines; end joint with 4 bristles with faint marginal spines.

Fifth limb (Figure 33*m,n*): Epipodial appendage with 62 bristles; dorsal margin of comb with only hairs, no bristles; spinous exopodial bristle just reaching past end of comb; 3 groups of short slender bristles present near ventral margin of comb on lateral side consisting of 2, 2, and 1 bristles; proximal pair with long spinous bristle near their bases.

Sixth limb (Figure 33*o*): Anterior margin of protopodite with 7 short bristles dorsal to 2 longer bristles; a third long bristle present on suture ventral to 2 long bristles; lateral flap and anteroventral margin with 24 or 25 spinous bristles; posterior tip with 1 short spinous bristle.

Seventh limb (Figure 33*p*): Each limb with 18 or 19 bristles, each with 3-5 bells; terminus consisting of 4 teeth with serrate margins.

Furca (Figure 33*q*): Each lamella with 3 long closely spaced claws followed by 3 shorter claws and then a laterally placed bristle near posterior end of lamella; tips of claws 1-4 curved and extremely slender; all claws with teeth along posterior margins; claws 5 and 6 with teeth along anterior margin; claw 1 with hairs along anterior margin; anterior margin of lamella with long hairs; claw 1 of right lamella with 4 long teeth proximally on concave margin.

Rod-shaped organ (Figure 34*a*): Elongate, 1-jointed, with bulbous rounded tip and long hairs near middle.

Eyes: Medial eye pigmented, bare (Figure 34*a*); lateral eye small with 4 ommatidia (Figure 34*a,b*).

Posterior: Dorsum consisting of long process with hairs along tip (Figure 34*c*).

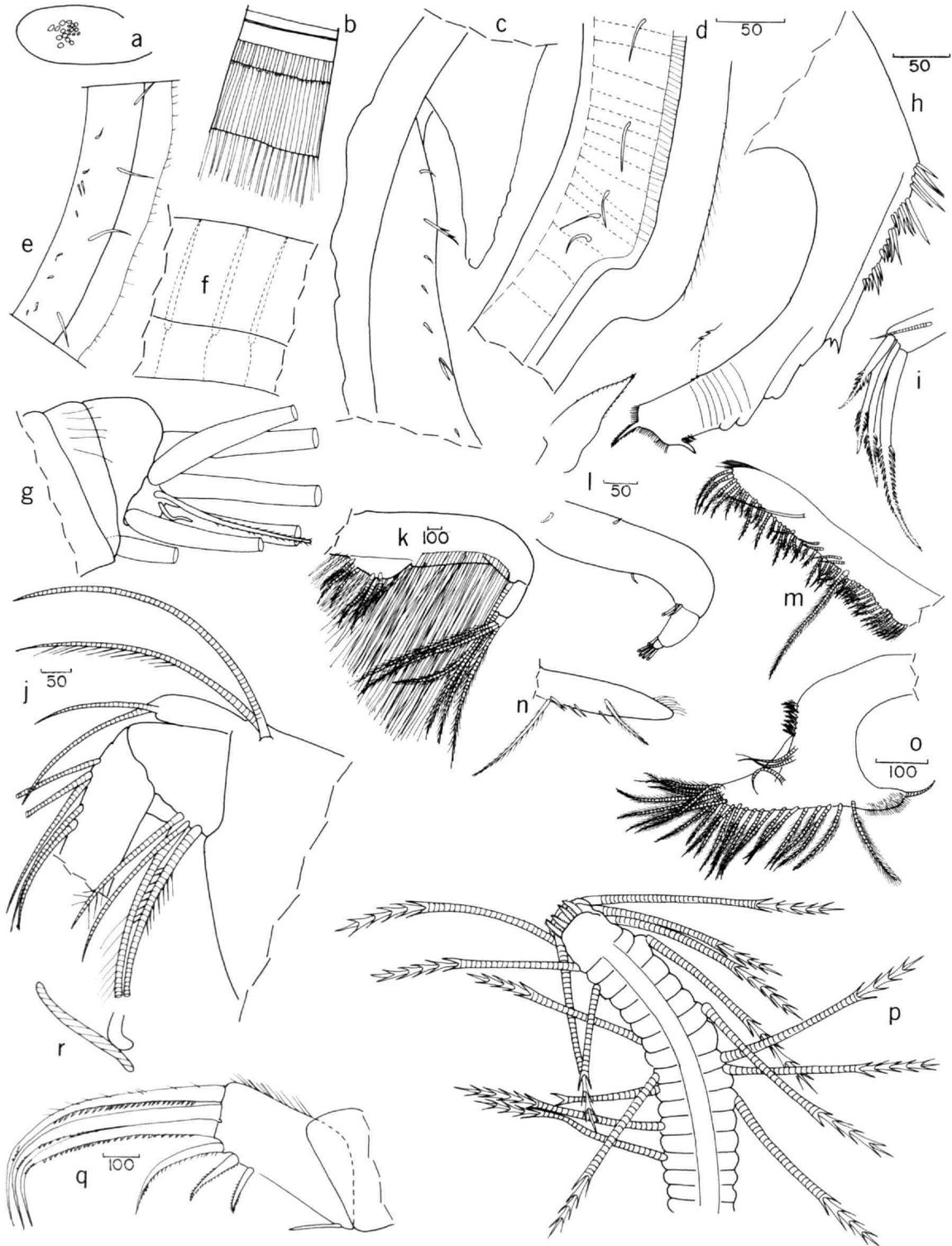
Gill-like structures: Elongate with rounded tips (Figure 34*c*).

Upper lip: Consists of 2 hirsute lobes with hirsute lateral flap on each side; anterior of each lobe with long spine (Figure 34*a*).

Y-sclerite: Short, almost straight (Figure 33*r*).

Eggs: [USNM 141267] with 9 large unextruded eggs, 4 on one side, 5 on the other. USNM 142386 with minute unextruded eggs.

DESCRIPTION OF JUVENILE INSTAR II? (Figures 34*e-q*, 36).—Carapace oval in lateral view with



small rostrum and incisur (Figures 34e, 36); each valve with concentric ridge paralleling outer edge, crescent-shaped ridge below central adductor muscle scar area, and long hairs scattered on surface.

Infold: Behind rostrum with 9 long bristles forming row paralleling edge of valve (Figure 34f); small spine present on infold at inner end of incisur; posteroventral infold with about 18 bristles, some forming clusters of 2 or 3 bristles.

Selvae: Wide striate selvae with sparse fringe present along free margins; selvae very wide along anterior margin (Figure 34f).

Central muscle scars: Consisting of about 18 ovoid scars at valve middle above crescent-shaped ridge.

Size: [USNM 141265], length 1.22 mm, height 0.96 mm.

First antenna (Figure 34g): First joint with hairs on lateral surface; 2nd joint with long hairs forming row on distal lateral surface, distal dorsal margin, and middle of ventral margin; 3rd joint short, triangular, with 1 spinous dorsal bristle reaching middle of 5th joint (base of bristle just proximal to middle of margin); 4th joint trapezoidal, with long hairs along dorsal margin and on distal ventral margin; 5th joint elongate with long hairs on dorsal and ventral margins and on lateral surface; sensory bristle of 5th joint undivided, without filaments, annulate except at extreme tip, which may be forked; 6th joint with long hairs forming distal row on lateral side, and slender

medial bristle about one-fourth length of a-claw. Seventh joint: a-claw long slender, annulate on distal one-third, about same length as joints 4–8 inclusive; b-bristle slightly longer than a-claw, without filaments; c-bristle similar to b-bristle. Eighth joint: d-bristle bare, about same length as a-claw; e-bristle bare slightly longer than d-bristle, both finely annulate, slender, tapering to pointed tip; f-bristle bent at right-angle dorsally, without filaments; g-bristle about same length as b-, c-, and f-bristles, without filaments.

Second antenna (Figure 34h,q): Protopodite with spinous medial bristle. Endopodite distinctly 3 jointed with well-defined sutures separating joints; suture separating joints 1–2 proximal to middle; suture separating joints 2–3 distal to middle; terminal end of 3rd joint reaching 3rd exopodial joint; terminal bristle reaching just beyond 9th exopodial joint; joints 1–3 without hairs. Exopodite: 1st joint with hairs along dorsal margin and small terminal medial spine; joints 2–9 with natatory bristles; 9th joint with 2 bristles, dorsal of these about one-third length of other bristle.

Mandible (Figure 34i): Coxale endite without proximal bristle; ventral branch with proximal hairs, and spines forming several oblique rows; tip of dorsal branch with spinous bristle at dorsal corner, forming right angle with ventral margin of branch. Basale: endite with 2 end bristles, 1 dwarf bristle, 1 triaenid bristle (with 15–17 pairs of spines in addition to terminal pair), and 1 long (about twice length of triaenid bristle) hirsute bristle with base between triaenid and dwarf bristles; ventral margin of basale without bristles; dorsal margin of basale with 2 subterminal bristles reaching tip of limb (bristles equal in length); both with long marginal hairs). Exopodite almost reaching distal end of 1st endopodite joint, with 2 spinous subequal terminal bristles; distal half of exopodite with long hairs along dorsal margin. Endopodite: 1st joint with 2 spinous ventral bristles (medial bristle about half length of lateral bristle); ventral margin of 2nd endopodite joint with single distal bristle with pointed tip and marginal spines along distal half; dorsal margin with long hairs near middle and 4 spinous subterminal bristles; medial surface of 2nd joint with long hairs forming clusters; end joint with 2 long bare claws (1 medial, 1 lateral), 1 short spinous ventral bristle, and 1

FIGURE 33.—*Astropteron upsilon*, new species, female, [USNM 141267], holotype, length 1.74 mm: a, sketch of central muscle scars within U-shaped ridge on left valve, lateral view; b, detail of lamellar prolongation on selvae along anteroventral margin of right valve, medial view; c, detail of left valve showing bristles on posterior infold near dorsal end, medial view; d, detail of anterior of left valve showing small rostrum and incisur, medial view; e, posterior infold, right valve; f, detail of pores in dorsal rib on right valve, medial view (wide pores are in rib, narrow pores are in the shell at base of rib); g, tip of right 1st antenna, lateral view; h, coxale endite of mandible; i, tip of basale endite of mandible showing dwarf bristle and four of five pectinate bristles; j, part of mandible showing exopodite; k, left maxilla, medial view (not all bristles shown on basale); l, epipodite and basale bristles of left maxilla; m, comb of left 5th limb, lateral view; n, comb of right 5th limb, lateral view; o, right 6th limb, medial view; p, 7th limb; q, left lamella of furca; r, left γ -sclerite, anterior to left. (Same magnification in microns: b–g; i, j, p; k, m; l, n; q, r.)



long dorsal bristle (about three-fourths length of claws) with some spines along ventral margin.

Maxilla: Epipodial appendage reaching about three-fourths length of dorsal margin of basale, with short hairs and pointed tip. Endites I and II each with 1 or 2 bristles. Basale: ventral margin with 2 terminal bristles (1 short on medial side, 1 long on lateral side); medial surface with hairs forming rows and 1 short proximal bristle. Endopodite: 1st joint with long spinous δ -bristle, and 1 short dorsal bristle reaching beyond end of joint; end joint with 3 spinous bristles.

Fifth limb (Figure 34j,k): Epipodial appendage with 52–54 bristles. Comb (twisted on both mounted limbs): dorsal margin with long hairs near tip, no bristles; ventral margin with 7 short spinous bristles; lateral surface with 4 slender exopodial bristles.

Sixth limb (Figure 34l): Limb hirsute along margins and on lateral flap; posterior tip with 1 short spinous bristle.

Seventh limb: Not observed with certainty; if present, minute, bare.

Furca (Figure 34m): Each lamella with 2 long closely spaced claws followed by 2 shorter claws; claws 1 and 2 separated from lamella by suture; claws 3 and 4 continuous with lamella; all claws with teeth along posterior margins; spines present on lamellae following posterior claw.

Rod-shaped organ: Elongate, 1 jointed, with rounded tip (Figure 34n).

Eyes: Medial eye appearing as an expansion of

rod-shaped organ (Figure 34n); lateral eye not observed.

Posterior (Figure 34o): Dorsum consisting of thumb-like process with long hairs.

Upper lip: Each lobe hirsute with large anterior spine (Figure 34n).

Y-sclerite: Posterior end with dorsal branch (Figure 34p).

DEVELOPMENT.—The presence of 1 bristle on the 6th limb of [USNM 141265] suggests that it is an instar in stage II of its ontogeny (Kornicker, 1969: 3). The ornamentation on the instar is much simpler than that on the adult in having neither posterodorsal ribs nor undulations in the posterodorsal or posteroventral margins of the peripheral ridge. The lateral ridge on each valve of the instar does not continue above the central adductor muscle area as it does on the adult. Most appendages on the instar bear fewer bristles than do those of the adult, but there are notable exceptions. The e-bristle on the 1st antenna is minute on the adult, but longer than the d-bristle on the instar; a slender bristle present on the 6th joint of the instar is absent on the adult. The protopodite of the 2nd antenna on the instar bears a fairly long medial bristle, which is absent on the adult. Despite the many differences in morphology between the adult and instar they are assumed to be conspecific because of the close spacing of the long furcal claws; it is however, possible that the adult and instar are not conspecific. Therefore, the instar is not considered a paratype.

FIGURE 34.—*Astropteron upsilon*, new species. Female, [USNM 141267], holotype: a, anterior of body showing medial eye and rod-shaped organ, left lateral eye, and upper lip; b, right lateral eye; c, posterior showing dorsum and gill flaps; d, 1st antenna. Juvenile, instar II?, [USNM 141265], length 1.22 mm: e, outline of complete specimen showing midrib; f, anterior showing minute incisur and bristles on infold, medial view; g, tip of left 1st antenna, lateral view; h, left 2nd antenna, medial view (bristles on exopodite not shown); i, distal part of both ventral and dorsal branches of coxale endite of left mandible, medial view; j, comb of left 5th limb showing exopodial bristles; k, comb of right 5th limb, medial view; l, right 6th limb, lateral view; m, right lamella of furca; n, anterior of body showing medial eye, rod-shaped organ, and upper lip, anterior to right; o, dorsum anterior to right; p, right Y-sclerite, anterior to right; q, endopodite or right 2nd antenna, medial view. (Same magnification in microns: a, b, f, m–p; g, h, l, q; j, k.)

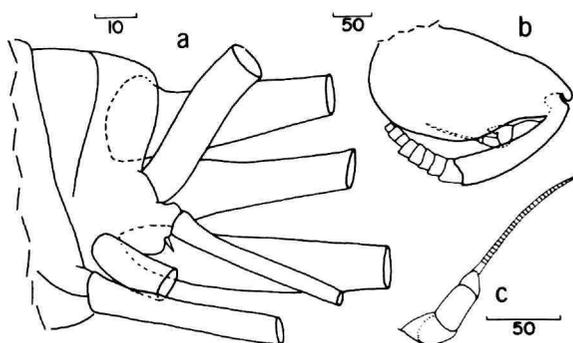


FIGURE 35.—*Astropteron upsilon*, new species, female, USNM 142386, length 1.60 mm: a, tip of left 1st antenna, lateral view; b, left 2nd antenna, medial view (exopodial bristles not shown); c, endopodite of left 2nd antenna, lateral view.

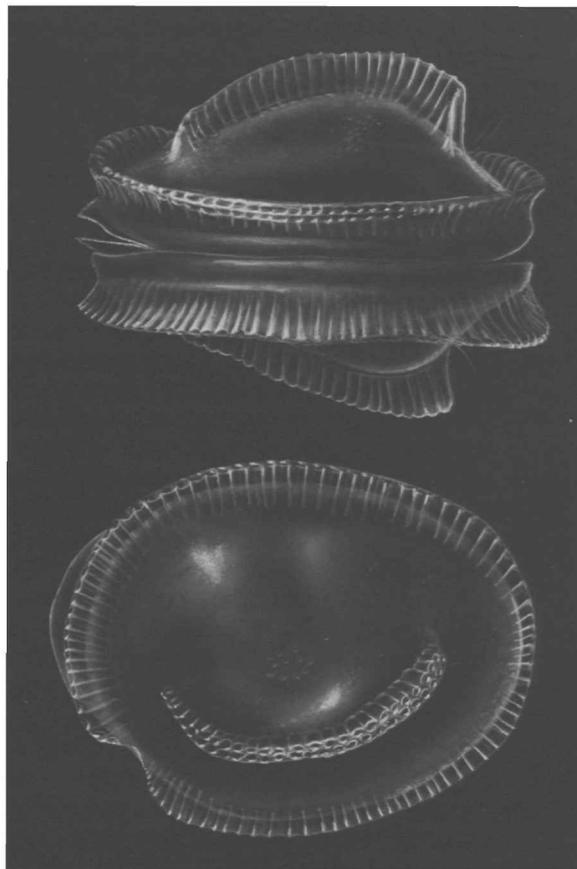


FIGURE 36.—*Asteropteron upsilon*, new species, juvenile instar II, [USNM 141265], length 1.22 mm, dorsal and lateral views.

Asteropteron setiferum, new species

FIGURES 37-43

HOLOTYPE.—[USNM 141266], 1 adult female, length 2.70 mm. Specimen deposited in the Museum of Natural History "Grigore Antipa," Bucharest (1 vial, 4 slides).

TYPE-LOCALITY.—Station X044.

ETYMOLOGY.—The specific name from the Latin *setifer* (bearing bristles), in reference to the many bristles on the mandibular basale.

DISTRIBUTION.—Known only from the type-locality off the coast of Mauritania at a depth of 1100 m on a mud bottom. No other species in the genus has been reported from water deeper than 100 m (Kornicker, in press).

DESCRIPTION.—Carapace ornate with small incisure and rostrum; single lateral protuberance projecting anteriorly beyond rostrum (Figures 37, 38, 41a-c); similar protuberance, but broader, projecting anteriorly beyond shell margin below incisure; 3 lateral posterior protuberances projecting posteriorly and reach to, or slightly beyond, posterior shell margin; ventral and posterior margins of shell slightly inset; process lateral to rostrum continuing posteriorly as lateral ridge above central muscle scar area and terminating posteriorly in short posterior process; middle part of ridge with 3 low nodes; a second lateral ridge with 3 or 4 low nodes present just within ventral margin and parallel to it; middle part of valve containing central muscle scars depressed; posterior ends of upper and lower lateral ridges connected by vertical ridge with

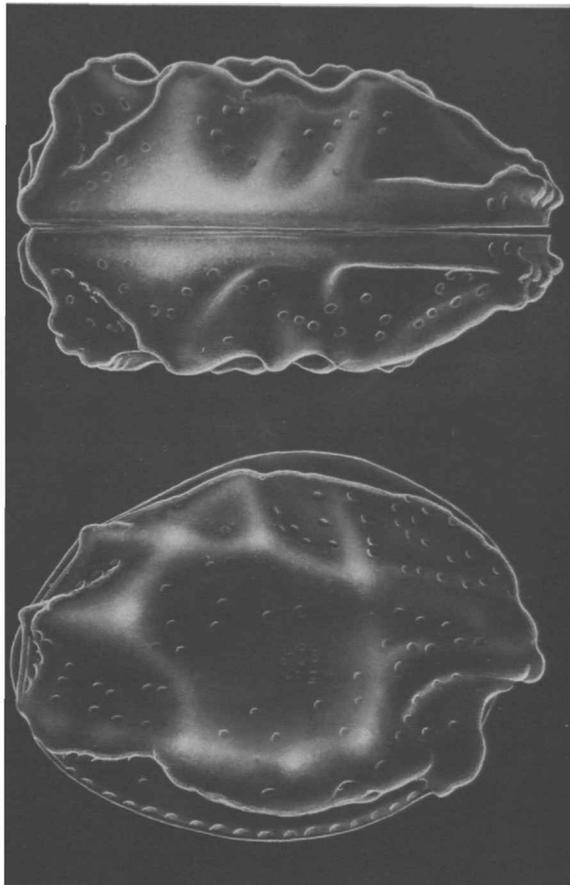


FIGURE 37.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype, length 2.70 mm, dorsal and lateral views.

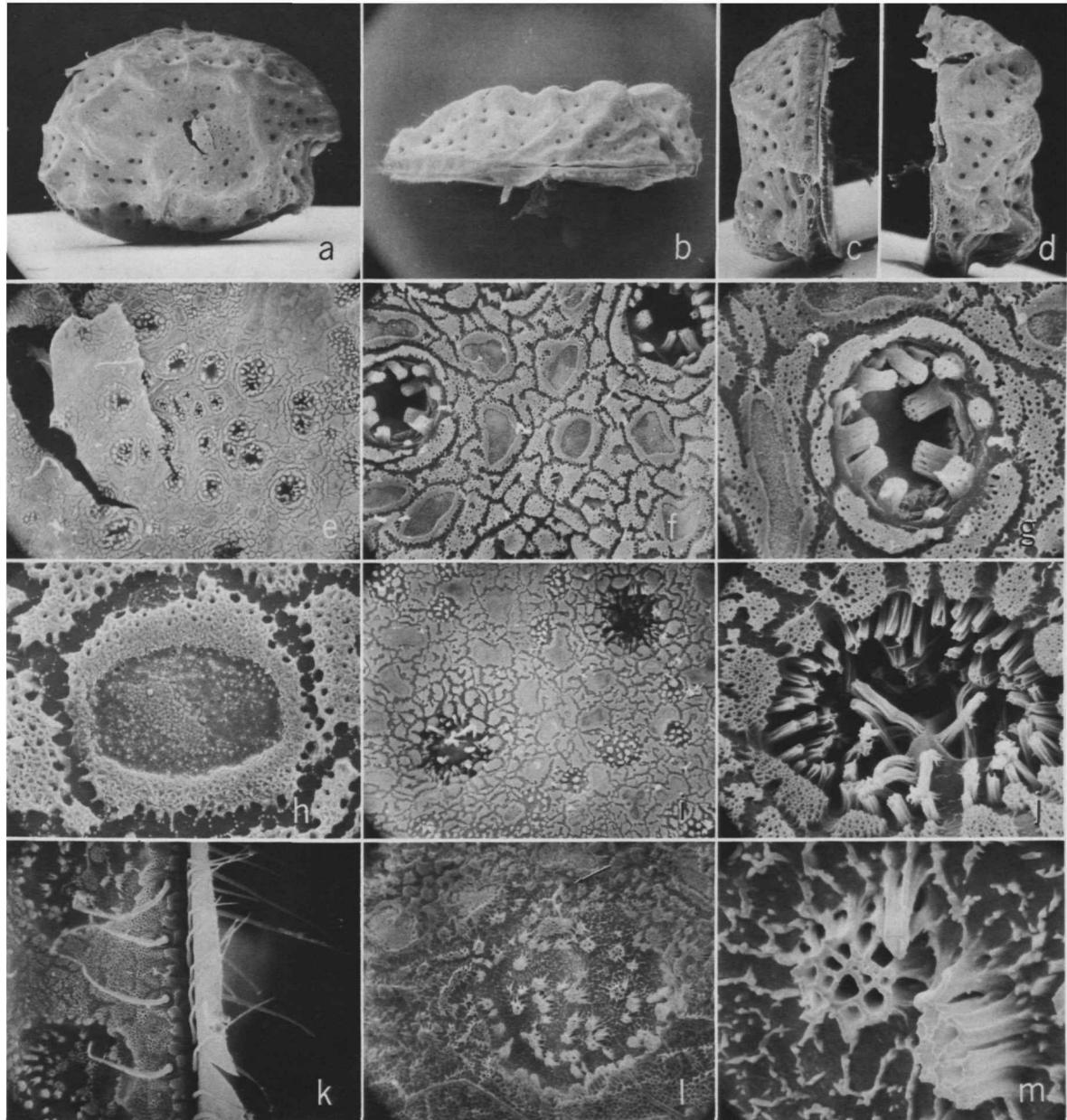


FIGURE 38.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype, right valve: *a*, complete valve, lateral view, anterior to right, $\times 37$; *b*, dorsal view, anterior to left, $\times 37$; *c*, anterior view, $\times 42$; *d*, posterior view, $\times 45$; *e*, detail of "a" showing fossae over central muscle attachments, $\times 190$; *f*, detail of lower left part of "e" showing two fossae, $\times 165$; *g*, detail of left fossae on "f," $\times 1400$; *h*, detail of flat-bottomed fossae to right of middle of "f," dorsal margin of fossae is to right, on "k," $\times 3000$; *i*, detail of "a" showing fossae just posterior to upper boundary of central muscle scar area, $\times 370$; *j*, fossae of type shown in "i," $\times 1400$; *k*, detail of "c" showing fossae along anterodorsal margin, bristles and lamellar prolongation, $\times 500$; *l*, detail of "b" showing fossae along anterodorsal margin (see Figure 39*b* for detail of arrowed area), $\times 735$; *m*, detail of cluster of tubelike processes to right of middle of fossae shown in "l," $\times 5250$. (Photos reduced to 53%.)

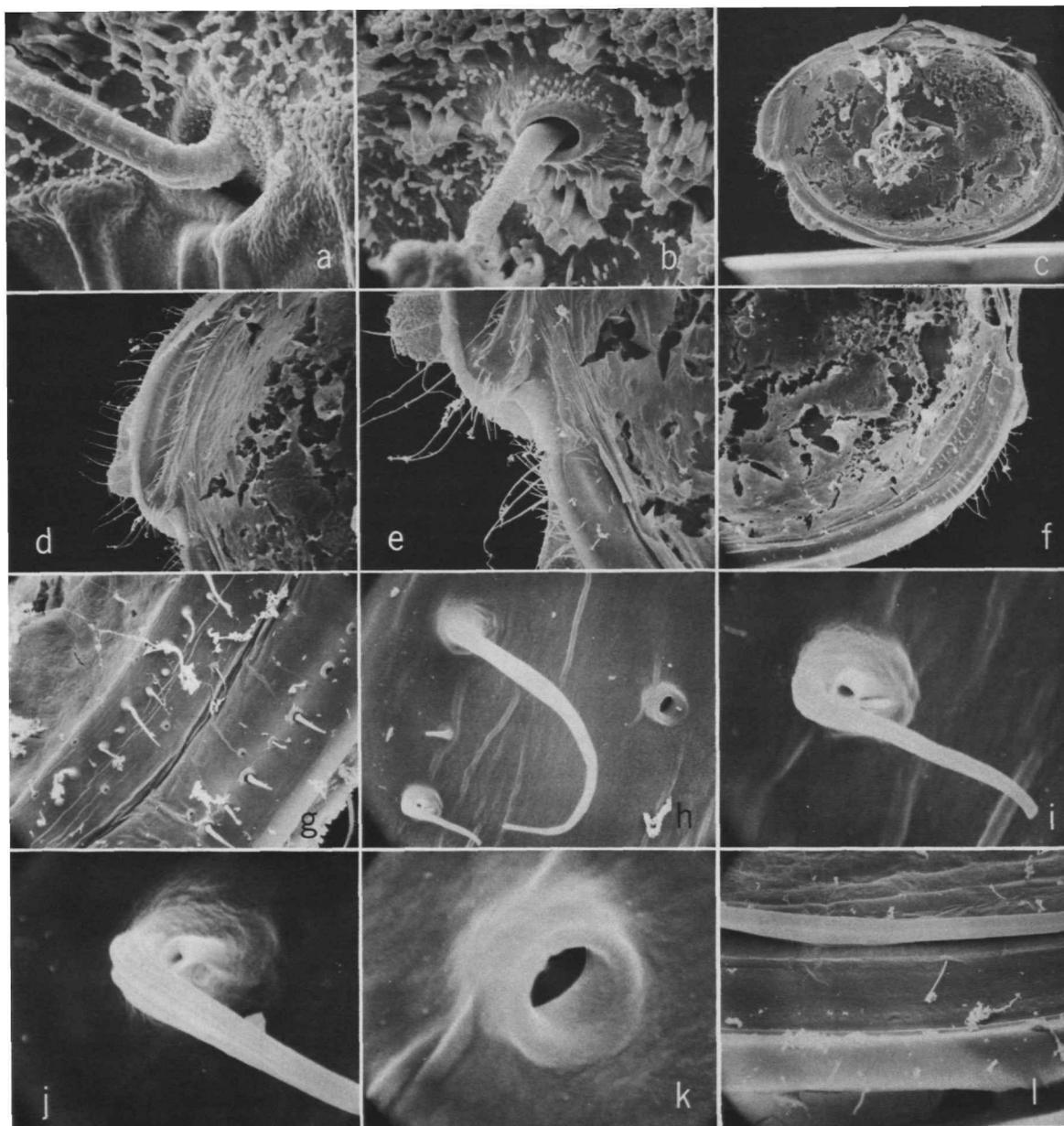


FIGURE 39.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype, right valve. Lateral surface: *a*, base and proximal part of bristle near anterodorsal margin of valve (note papillae on bristles), $\times 5250$; *b*, lipped pore with bristle near dorsal margin of valve (see arrow on Figure 38*f*), $\times 5250$. Medial surface: *c*, complete valve, $\times 37$; *d*, detail of "*c*" showing anterior part, $\times 90$; *e*, detail of "*d*" showing incisur, $\times 185$; *f*, detail of "*c*" showing postero-ventral margin, $\times 90$; *g*, detail of "*f*" showing bristles on infold (bristles may be missing from the empty pores on infold), $\times 455$; *h*, detail of list near top of infold in "*f*" showing 1 long bristle, 1 short bristle, and bent bristle with tubelike process at the outer side of its base, and empty pore dorsal to bristles, $\times 2020$; *i*, detail of "*h*" showing bent bristle, $\times 6750$; *j*, detail of "*g*" showing bent bristle on list with 2 tubelike processes at its base, $\times 6750$; *k*, detail of "*g*" showing rimmed pore near outer margin of list, $\times 9000$; *l*, detail of ventral margin anterior to middle of "*c*" showing outer lamellar prolongation of selvage, single bristle on infold, and broad list along inner margin of infold, $\times 500$. (Photos reduced to 53%.)

node near middle; surface of carapace with numerous coarse punctae.

Infold (Figures 39*c-l*, 41*b,c*): Rostral infold with 6 short bristles near rostral tip, row of about 56 long and short bristles (35 long, 21 short) forming row parallel to anterior margin, about 21 short bristles between row of bristles and anterior margin of carapace, about 5 bristles between row of bristles and inner margin of infold; about 10 bristles forming row on anterodorsal infold (this row is continuation of anterior row of long and short bristles); 3 minute bristles present posterior to inner end of incisur; anteroventral infold with about 13 bristles between selvage and list; distinct list present near inner margin of infold extending from below incisur to posterior end of ventral infold; ventral infold with 7 widely spaced short bristles; posteroventral infold with 12 less widely spaced bristles (some with long marginal hairs) followed by 9 short closely spaced bristles and then about 12 minute bristles; posterior infold with outer row of 10 short bristles, middle row of 8 short bristles, and inner row of about 33 short and minute bristles (13 short, 20 minute); outer margin of posterior infold (edge of valve) forming right angle near valve middle.

Central muscle scars: Consisting of about 24 oval to slightly elongate individual scars (Figure 38*a,e-g*).

Selvage: Ventral and anteroventral margins with broad lamellar prolongation with distinct striations in proximal part and weak striations in distal part, edge smooth; anterodorsal margin including rostrum with lamellar prolongation similar to that on ventral margin except for being narrower and having marginal fringe (Figures 38*c*, 39*d,e*); posterior margin ventral to right angle with narrow selvage with marginal fringe.

Size: [USNM 141266], holotype, length 2.70 mm, height 1.98 mm.

Micromorphology of carapace based on scanning-electron photomicrographs (the valve was held about 10 seconds in a sonic vibrator which removed a thin covering film and exposed intricate microstructures): Surface of carapace with numerous fossae (Figure 38*a-c*); about 25 fossae containing 10–25 round bundles of tubes pointing inwards present in the central muscle scar area (each fossae appears to be placed over the end of a muscle strand) (Figure 38*e-g*); fossae with flat bottoms

having a pebbly texture present between tubular fossae in area of the central muscle scars and elsewhere (Figure 38*e-i,l*); fossae on surface of valve outside central muscle scar area with about 70 long tubes having a more-or-less polygonal cross-section (Figure 38*i,j*); the long tubes point inwards from sides of fossae and are on bottom of fossae; fossae along anterodorsal margin of valve with short bundles of tubes on bottom, each tube polygonal in cross-section (Figure 38*k-m*); latter type fossae also present elsewhere on surface except in area of central muscle scars (Figure 38*i*); surface between fossae with closely spaced patches of short tubular structures (Figure 38*f-l*); bristles sparsely distributed on valve surface (see arrow on Figure 38*l*) and forming 2 rows along free margins (Figure 38*k*); some bristles emerge from closed pores (Figure 39*a*), and some from open lipped pores (Figure 39*b*); bristles have surface papillae (Figure 39*a,b*).

Posterior list: List with middle row of closed pores with bristles and inner and outer rows of open pores with bristles (Figure 39*f-k*); bristles in middle row include long bristles (Figure 39*h*), short bristles (Figure 39*h*), and medium bristles with pore at base (Figure 39*h-j*) (It is possible that the short and medium bristles are tubular with open ends, but this was not determined herein); many open pores in inner and outer rows have bristles missing (Figure 39*g,h,k*).

Anteroventral and ventral list: List along anteroventral and ventral margin broad, flat; lamellar prolongation, if present, with smooth margin (Figure 39*d-f,l*).

Selvage: Broad lamellar prolongation present along free margins (Figures 38*k*, 39*d-f,l*); outer margin of prolongation serrate (Figure 38*k*).

First antenna (Figures 40*a*, 41*d*): 1st joint with long hairs along ventral margin; 2nd joint with spines along ventral and proximal dorsal margins and 5 dorsal bristles, 4 proximal, 1 distal (distal bristle missing on left limb of USNM 141266); 3rd joint with 1 short ventral bristle and 3–4 dorsal bristles (1 near middle, 2–3 terminal); 4th joint longer than 3rd, with 1 terminal spinous dorsal bristle and 3 ventral bristles (1 long spinous, 2 short bare, or with short spines); sensory bristle of 5th joint with 3 short proximal and 4 long terminal filaments; 6th limb with minute medial bristle. Seventh joint: a-claw longer than joints 5 to 8, ringed in distal part; b-bristle with about 6 short

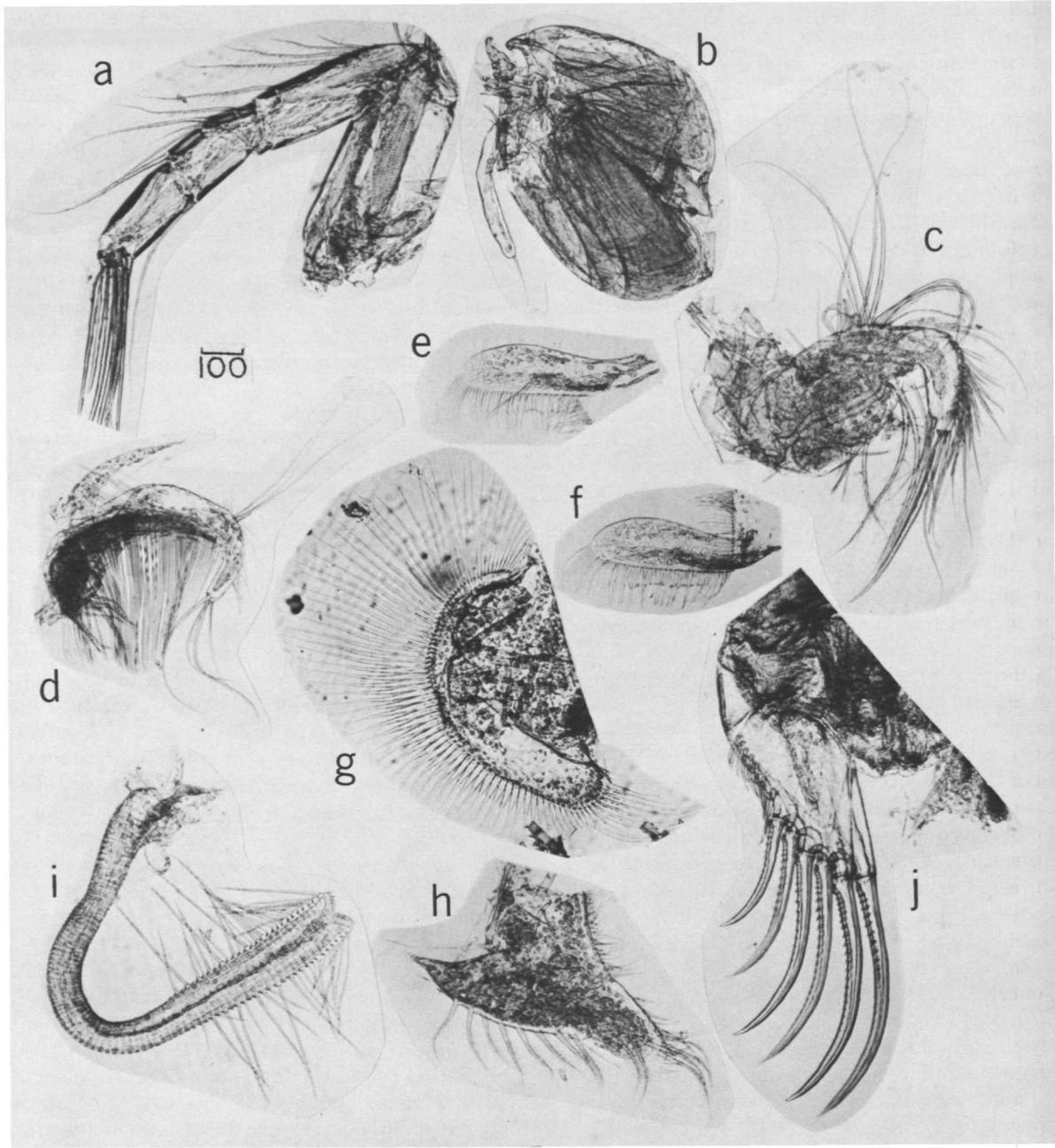


FIGURE 40.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype: *a*, 1st antenna; *b*, protopodite and endopodite of 2nd antenna; *c*, mandible; *d*, maxilla; *e*, *f*, combs of 5th limbs; *g*, epipodite of 5th limb; *h*, 6th limb; *i*, 7th limb, *j*, furca. (Same magnification in microns: *a-j*.)

filaments including tip; c-bristle shorter than b-bristle, with 9 short filaments including tip. Eighth joint: d- and e-bristles bare, slightly shorter than c-bristle; f-bristle about same length as c-bristle, with 8 filaments including tip; g-bristle slightly shorter than f-bristle, about same length as c-bristle, with 8 filaments including tip; g-bristle slightly shorter than f-bristle, with 6 short filaments including tip.

Second antenna: Protopodite with short medial bristle, few long hairs on medial surface near endopodite and short hairs proximally on ventral margin (Figure 40*b*). Endopodite (Figures 40*b*, 41*e*): 3rd joint fused with 2nd and no suture evident between them; 1st joint with 9–11 bristles; 2nd joint bare; 3rd joint with 1 long bare terminal bristle. Exopodite: 1st joint with short distomedial bristle; bristle on 2nd joint with slender proximal spines along ventral margin and distal natatory hairs; 3rd to 8th joints with natatory bristles (some bristles with slender spines); 9th joint with 5 natatory bristles, 3 long, 1 medium, 1 short.

Mandible (right limb, [USNM 141266]): Coxal endite (Figure 41*h,i*): ventral branch with spines forming 8 oblique rows on medial surface and stouter spines along ventral margin; tip with 3 small teeth (2 long, 1 short); minute bristle present on endite near base of ventral branch; ventral margin of dorsal branch with 3 small teeth proximal to 4 knobs; main spine with serrate margin; about 14 spines forming row on lateral side of branch proximal to main spine; dorsal corner of tip of dorsal branch with short spines forming cluster at base of hirsute bristle; tip of branch between base of hirsute bristle and main spine serrate. Basale (Figure 41*f,g,j*): endite with 7 terminal bristles (2 long, 4 medium, 1 short), 7 triaenid bristles (4th pair of spines from the proximal end much longer than others), and 5 dwarf bristles (distal of these about twice length of others); glandular opening with about 14 pores present near distal end of endite; ventral margin of basale with 5 triaenid bristles (one pair of spines much longer than others), 2 proximal short bristles (with bases on medial surface of basale), 1 very long bristle with long proximal and short distal spines, and 4 short spinous distal bristles; dorsal margin of basale with 7 short and 5 long distal spinous bristles; lateral surface with about 15 short spinous bristles proximally near dorsal

margin and about 8 short spinous bristles distally, also near dorsal margin; medial surface near dorsal margin hirsute. Exopodite hirsute, slightly longer than dorsal margin of 1st endopodite joint, with 2 spinous subterminal bristles (proximal bristle longer than distal bristle) (Figure 41*k*). Endopodite: ventral margin of 1st joint with 2 long stout proximal bristles with long marginal spines and 1 shorter bristle near middle with short marginal spines; medial surface of 2nd joint with spines forming rows in distal half; ventral margin of joint with 3 spinous terminal bristles; dorsal margin with about 30 spinous bristles (some of these of triaenid type); end joint with 2 short spinous bristles on ventral corner, 1 long lateral terminal bristle with few marginal spines, 2 clawlike bristles (1 ventral, 1 dorsal) with few marginal spines along ventral margins, and 1 longer bare clawlike bristle medial to other claws.

Mandible (left limb, [USNM 141266]) (Figure 40*c*): Endopodite differs from right limb described above in having 5 terminal bristles on ventral margin of 2nd joint and no short bristles on ventral corner of end joint.

Maxilla (Figures 40*d*, 42*a,b*): Epipodite long, tapering to point, tip hirsute; endite I with 5 bristles with spinous tips; endite II with 1 long bristle with spinous tip, 1 medium and 8 short slender bristles. Basale: dorsal margin with 15–19 proximal bristles of varying length and 9 short and 6 long distal bristles; medial side with 3 distal bristles, 2 near middle, 1 near ventral margin; ventral margin with about 13 bristles along margin, 1 long bristle present on lateral side at distal end of baleen-comb; medial surface of basale hirsute. Endopodite: medial side of 1st joint hirsute; dorsal margin with 7 short bristles; ventral margin with 1 long spinous 6-bristle; end joint with 5 spinous bristles. Exopodite with 3 bristles, 1 long, 2 short, not on lobe.

Fifth limb: Epipodial appendage with 80–82 bristles (Figure 40*g*). Comb: dorsal margin hirsute, with 7 slender bristles on left limb (Figures 40*e*, 42*c*) of [USNM 141266], 5 on right (Figure 40*f*); lateral surface with stout spinous epipodial bristle reaching end of comb and 4 short proximal bristles near ventral margin.

Sixth limb (left limb, [USNM 141266]) (Figures 40*h*, 42*d*): Anterior margin with 2 sutures; margin above upper suture with about 30 short spinous



FIGURE 41.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype: *a*, outline of left valve showing concretions (crosshatched), central muscle scars (small circles just below and in front of valve middle) and outlines of fossae, lateral view; *b*, anterior of right valve, medial view; *c*, posterior of right valve, medial view; *d*, left 1st antenna, lateral view (not all filaments shown on bristles of 5th to 8th joints); *e*, endopodite of 2nd antenna, medial view; *f*, distal end of basale endite showing glandular openings; *g*, triaenid bristle on basale endite; *h*, part of coxale endite showing tip of ventral branch and part of dorsal branch; *i*, tip of dorsal branch of coxale endite, *j*, basale showing dorsal bristles; *k*, exopodite and triaenid bristle on dorsal margin of 2nd endopodial joint. (Same magnification in microns: *b*, *c*; *f*–*i*.)

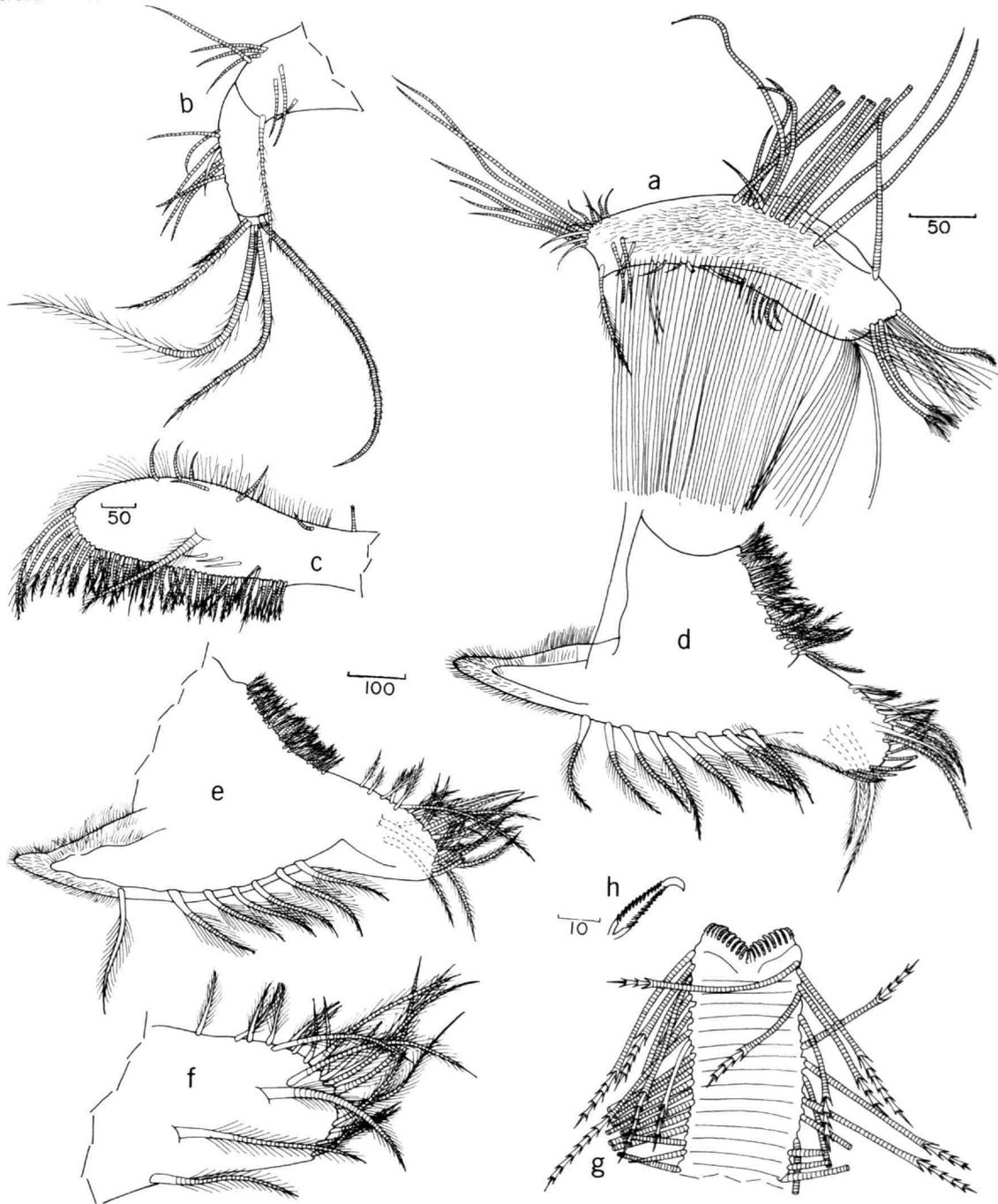


FIGURE 42.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype: *a*, right maxilla, medial view, proximal part (not all bristles shown); *b*, right maxilla, distal part (not all bristles on basale shown); *c*, comb, left 5th limb, lateral view; *d*, left 6th limb (not all bristles shown); *e*, right 6th limb (not all bristles shown); *f*, anterior tip of left 6th limb; *g*, 7th limb, distal end; *h*, detail of comb tooth of 7th limb. (Same magnification in microns: *b*, *c*, *f*, *g*; *d*, *e*.)

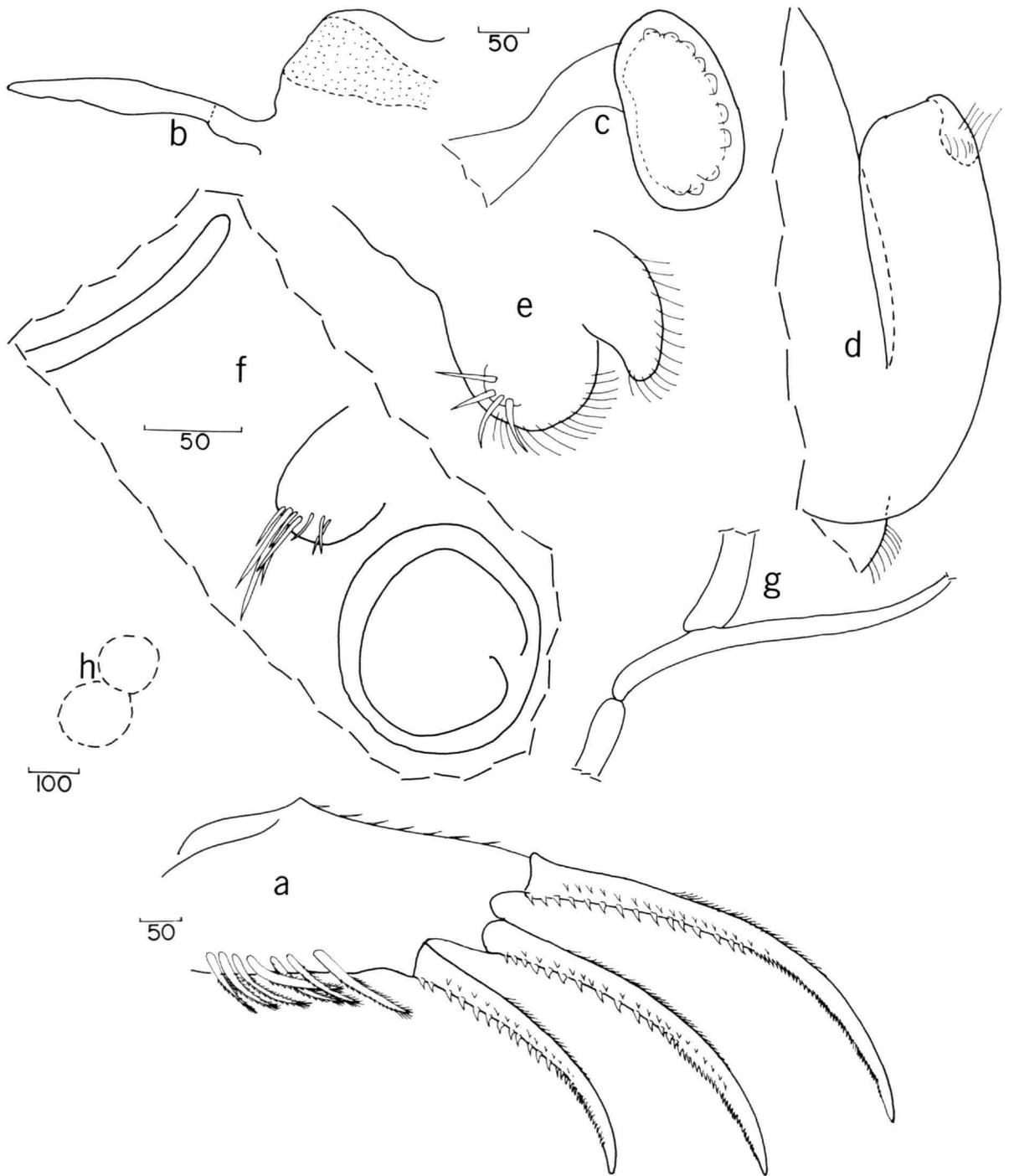


FIGURE 43.—*Asteropteron setiferum*, new species, female, [USNM 141266], holotype: *a*, right lamella of furca; *b*, rod-shaped organ and medial eye; *c*, lateral eye; *d*, posterior of body; *e*, left side of upper lip, anterior to left; *f*, right brushlike organ and genitalia, anterior end of Y-sclerite of furca (above brushlike organ); *g*, right Y-sclerite of furca shown with tips of connecting sclerites; *h*, outlines of two unextruded eggs. (Same magnification in microns: *b-e*, *g*.)

bristles; margin between sutures with 7 short spinous bristles (some of the bristles between sutures have bases on medial side of limb); anterior margin below lower suture with 4 short bristles; lateral anteroventral flap (sole) with 14 bristles; 11 spinous bristles present on limb medial to lateral flap (these bristles could be considered to be on anterior part of ventral margin); ventral margin posterior to lateral flap with 8 bristles; hirsute posterior tapering to rounded tip; 1 short spinous epipodial bristle present on posterior margin near middle; medial surface of end joint with about 26 minute bristles forming double row near ventral margin.

Sixth limb (right limb, [USNM 141266]) (Figure 42e,f): Differs from left limb described above in not having upper suture on anterior margin; ventral margin above single suture with 24 bristles; 15 bristles forming row present on medial side close to anterior margin; 7 bristles present on ventral margin posterior to lateral flap.

Seventh limb (Figures 40i, 42g): Each limb with 52–56 bristles, 23–30 bristles on each side; some distal rings near tip with 2 bristles on 1 side and 1 or 2 bristles on other; each bristle with up to 8 bells. Terminus: each opposing comb with 19 spinous teeth.

Furca (Figures 40j, 43a): Each lamella with 3 long stout claws followed by 7 or 8 short secondary claws; main claws with medial and lateral teeth along concave margins, secondary claws with slender teeth along posterior margins and minute teeth or hairs distally along anterior margins; anterior and ventral margins of lamellae hirsute; anterior margin also with some spines.

Rod-shaped organ: Broadening near middle, with indistinct proximal suture; tip rounded, bare (Figure 43b).

Eyes: Medial eye (Figure 43b) large, pigmented, bare. Lateral eye (Figure 43c) pigmented, about

same size as medial eye, with about 14 ommatidia; each eye connected to head region by stalk.

Posterior (Figure 43d): Posterior hirsute; dorsal process finger-like, with spines at tip (terminal lobe may be present, but, if so, is folded over).

Upper lip (Figure 43e): Consisting of 2 hirsute lateral lobes on each side of low saddle; saddle with 4 slender anterior spines; each lobe with 4 spines on small node; a hirsute flap present posterolateral to each lobe.

Brushlike organ: Consisting of small lobe with about 9 minute bristles posterodorsal to genitalia (Figure 43f).

Genitalia: Consisting of oval sclerotized ring (Figure 43f).

Y-sclerite: Almost linear (Figure 43g).

COMPARISONS.—The large number of proximal bristles (15) and distal bristles (8) on the lateral surface of the mandibular basale near the dorsal margin distinguishes *A. setiferum* from previously described species. The carapace of *A. setiferum* differs from that of *Asteropteron nodulosum* Poulsen, 1965, in having fewer coarse punctae and in not having a U-shaped ridge in the posterodorsal part. The carapace of the new species does not have the elongate posterior process present on *Asteropteron skogsbergi* Poulsen, 1965.

Asteropteron species indeterminate

MATERIAL.—1 juvenile, probably instar III, length 1.49 mm, height 1.13 mm, USNM 143797, from Station X052; in collection of National Museum of Natural History (the shell of this specimen is similar to that of *Asteropteron setiferum*, new species, but the ventral margin and lateral surface of the mandibular basale have few bristles).

DISTRIBUTION.—From only one locality off the coast of Spanish Sahara at a depth of 53 m on a sand bottom.

Literature Cited

- Bowman, Thomas E., and Louis S. Kornicker**
 1967. Two New Crustaceans: The Parasitic Copepod *Sphaerionellopsis monothrix* (Choniostomatidae) and its Myodocopid Ostracod Host *Parasterope pollex* (Cylindroleberidae) [sic] from the Southern New England Coast. *Proceedings of the United States National Museum*, 123 (3613):1-28, 7 figures, 1 plate.
- Brady, G. S.**
 1868. A Synopsis of the Recent British Ostracoda. *Intellectual Observer*, 12:110-130, 2 plates.
 1897. A Supplementary Report on the Crustaceans of the Group Myodocopa Obtained during the 'Challenger' Expedition, with Notes on Other New or Imperfectly Known Species. *Transactions of the Zoological Society of London*, 14 (pt. 3, no. 7):85-100, plates 15-17.
- de Folin, L.**
 1870. Crustacés. Pages 245-246 in Chapter 16: Crustacés et mollusque nouveaux de la côte d'Afrique. *Les fonds de la mer*. Volume 1. Paris: Savy, Libraire-Éditeur.
- Klie, Walter**
 1940. Beiträge zur Fauna der Eulitorals von Deutsch-Südwest-Afrika, II: Ostracoden von der Küste Deutsch-Südwest-Afrika. *Kieler Meeresforschungen*, 3 (2):404-448, 91 figures.
 1943. Ostracoden aus Marokko und Mauretanien. *Zoologischer Anzeiger*, 143 (3/4):49-62, 20 figures.
- Kornicker, Louis S.**
 1958. Ecology and Taxonomy of Recent Marine Ostracodes in the Bimini Area, Great Bahama Bank. *Publications of the Institute of Marine Science*, 5: 194-300, 89 figures.
 1969. Morphology, Ontogeny, and Intraspecific Variation of *Spinacopia*, a New Genus of Myodocopid Ostracod (Sarsiellidae). *Smithsonian Contributions to Zoology*, 8:1-50, 26 figures, 6 plates.
 1974a. Ostracoda (Myodocopina) of Cape Cod Bay, Massachusetts. *Smithsonian Contributions to Zoology*, 173:1-20, 11 figures.
 1974b. Revision of the Cypridinacea of the Gulf of Naples (Ostracoda). *Smithsonian Contributions to Zoology*, 178:1-000, 26 figures.
- In press. Antarctic Ostracoda (Myodocopina). *Smithsonian Contributions to Zoology*, 163.
 In prep. Ivory Coast Ostracoda (Suborder: Myodocopina).
Moguilevsky, A., and F. C. Ramírez
 1970. *Cycloleberis poulsenii* Especie Nueva (Ostracoda, Asteropidae) Crustacea Bentónico Del Area De Mar Del Plata, Argentina. *Physis*, 29 (79):461-471, 8 figures.
- Müller, G. W.**
 1894. Die Ostracoden des Golfes von Neapel und der Angrenzenden Meeres-Abschnitte. Volume 21 of *Fauna und Flora des Golfes von Neapel*. viii+404 pages, 40 plates. Berlin: Verlag von R. Friedlander & Sohn.
 1906. Die Ostracoden der Siboga-Expedition. Volume 30 in *Siboga-Expeditie*, 40 pages, 9 plates. Leiden: E. J. Brill.
 1912. Ostracoda. In *Das Tierreich*. Volume 31, xxxiii + 434 pages, 92 figures. Berlin: Verlag R. Friedlander und Sohn.
- Poulsen, E. M.**
 1965. Ostracoda-Myodocopa, 2: Cypridiformes-Rutidermatidae, Sarsiellidae and Asteropidae. Volume 65 in *Dana Report*. 484 pages, 156 figures. Copenhagen: Carlsberg Foundation.
- Reys, Simone**
 1965. Ostracodes de la biocoenose des fonds detritiques cotiers et de ses facies d'algues calcaires. *Recueil des Travaux de la Station Marine D'Endoume*, 38 (54):255-267.
- Scott, T.**
 1894. Report on Entomostraca from the Gulf of Guinea, Collected by John Rattray, B.Sc. *Transactions of the Linnean Society*, 2nd series (Zoology), 6:1-161, 15 plates.
- Skogsberg, T.**
 1920. Studies on Marine Ostracods, I: Cypridinids, Halocyprids and Polycopids. *Zoologiska Bidrag fran Uppsala*, supplement, 1:1-784, 153 figures.
- Vos, A. P. C. De**
 1957. Loste annotée des ostracodes marins des environs de Roscoff. *Archives de Zoologie Expérimentale et Générale*, 95 (1):1-74.

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